The Next Generation Infrastructures Foundation represents an international consortium of knowledge institutions, market players and governmental bodies which joined forces to cope with the challenges faced by today’s and tomorrow’s infrastructure systems. The consortium cuts across infrastructure sectors, across disciplinary borders and across national borders, as infrastructures systems themselves do. With the strong participation of practitioners in a concerted knowledge effort with social and engineering scientists, the foundation seeks to ensure the conditions for utilization of the research results by infrastructure policy makers, regulators and the infrastructure industries.

Ivan Steve Martina
Regulation in Splendid Isolation

A Framework to Promote Effective and Efficient Performance of the Electricity Industry in Small Isolated Monopoly Systems

Effective regulation is the most critical enabling condition for infrastructure reform. Crafting proper regulation is the greatest challenge facing policymakers in developing and transition economies.

This book showcases a framework for small isolated monopoly systems (SIMS) to promote effective and efficient performance of the electricity industry. Deployment of the framework proposes options for regulatory mechanisms comprising regulatory substance and regulatory governance based on the institutional quality and corporate governance maturity of the country. The framework is intended to serve as a synthesis of a diversity of aspects from an institutional, regulatory and governance perspective. Pursuing effective and efficient performance of the electricity industry is a process of continuous improvement which requires reform measures in the sector. To assure reasonable success the overarching principles of credibility, legitimacy and transparency should be applied in such a way that the outcome should be perceived as fair and just by the stakeholders. The framework is an instrument to support the broader stakeholder discussion and provide a nucleus around which diverse stakeholders interests can logically coalesce.

Ivan Steve Martina holds a degree in Engineering and Business Administration at the HTS Tilburg and a degree in Information Management at the Tilburg University. This book is the result of Ph.D research conducted at the Faculty of Technology, Policy and Management of the Delft University of Technology.

Regulation in Splendid Isolation

A Framework to Promote Effective and Efficient Performance of the Electricity Industry in Small Isolated Monopoly Systems

Ivan Steve Martina

ISBN 978-90-79787-08-1
Regulation in Splendid Isolation

A Framework to Promote Effective and Efficient Performance of the Electricity Industry in Small Isolated Monopoly Systems

Ivan Steve MARTINA
Regulation in Splendid Isolation

A Framework to Promote Effective and Efficient Performance of the Electricity Industry in Small Isolated Monopoly Systems
Dit proefschrift is goedgekeurd door de promoter:
Prof.dr.ir.M.P.C. Weijnen

Samenstelling promotiecommissie:
Rector Magnificus, voorzitter
Prof.dr.ir. M.P.C. Weijnen, Technische Universiteit Delft, promoter
Dr.ir. R.A. Hakvoort, Technische Universiteit Delft, copromotor
Prof.dr. J.A. de Bruijn, Technische Universiteit Delft
Prof.dr. A.A.L.G. Wentink, Universiteit van Tilburg, TiasNimbas Business School
Prof.dr. F. Kunneman, Universiteit van de Nederlandse Antillen
Prof.dr.ing. V. Marcha, Universiteit van Utrecht
Prof. V. Jankauskas, Vilnius Gedimino Technical University

ISBN-978-90-79787-08-1

Published and distributed by:
Next Generation Infrastructures Foundation
P.O. Box 5015
2600 GA Delft
The Netherlands
T: +31 15 278 2564
F: +31 15 278 2563
E: info@nginfra.nl
I: www.nginfra.nl

Keywords: Regulation, Governance, Institutions, Performance Measurement, Benchmarking

Copyright ©2009 by Ivan Steve Martina, Willemstad, Curacao
All rights reserved. No part of the material protected by this copyright notice may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording or by any information storage and retrieval system, without written permission from the author.

Printed in the Netherlands
Contents.

1 Introduction 13
  1.1 Background 14
    1.1.1 The Electricity Supply Industry in Perspective 14
    1.1.2 The Interplay between Energy Sector Reform and Governance 15
    1.1.3 Determinants of Public Policy and Sector Performance 18
  1.2 Problem Statement, Research Objective and Research Questions 20
    1.2.1 Problem Statement: 20
    1.2.2 Research Objective 22
    1.2.3 Research Questions 23
  1.3 Research Approach 25
    1.3.1 The SCP Paradigm 25
    1.3.2 The New Institutional Economics 25
    1.3.3 An Adaptation of the SCP Paradigm through the Lens of the NIE 27
    1.3.4 Multidisciplinary Nature 29
    1.3.5 Research Methods 29
  1.4 Outline of the Thesis 29

2 Key Economic Principles and Concepts of SIDS and SIMS 31
  2.1.1 Background 32
  2.1.2 Chapter Outline 32
  2.2 The Electricity Supply Industry 32
    2.2.1 Characteristics of the Electricity Supply Industry 32
    2.2.2 Functional Decomposition of the Electricity Supply Industry 33
    2.2.3 Electricity Supply Markets 35
    2.2.4 Natural Monopoly 39
  2.3 Features of Small Island Developing States 41
    2.3.1 General Features of SIDS 41
    2.3.2 Economic Features of SIDS 43
    2.3.3 Economic Vulnerability and Resilience Concepts and Measurements 46
  2.4 Small Isolated Monopoly Systems for the Electricity Supply 49
    2.4.1 A Definition for SIMS 49
    2.4.2 Policy Challenges Facing SIMS 51
2.4.3 Stocktaking of the Caribbean Power Sector Reform: A Case Study 53

2.5 Conclusions 56
2.5.1 Synthesis 56
2.5.2 The way forward 57

3 Effective and Efficient Industry Performance 59
3.1 Introduction 60
3.1.1 Background 60
3.1.2 Chapter Outline 60
3.2 Defining Effective and Efficient Industry Performance 61
3.2.1 An Operational Delineation of Performance 61
3.2.2 Effectiveness further explored 63
3.2.3 Efficiency further explored 65
3.2.4 Effective and Efficient Industry Performance: a Definition 67
3.2.5 Measuring Industry Performance: Performance Measurement Frameworks. 68
3.2.6 The Malcolm Baldrige Quality Award 68
3.2.7 The Balanced Scorecard 70
3.2.8 EFQM 72
3.2.9 The Performance Prism 73
3.2.10 Concluding remarks on Performance Measurement Frameworks 77

3.3 Measuring Industry Performance: Overview of Benchmarking Techniques 77
3.3.1 Classification of Benchmarking Techniques 77
3.3.2 Frontier Based Benchmarking Methods 78
3.3.3 Mean and Average Benchmarking Methods 79
3.3.4 Process Approaches 80
3.3.5 Concluding Remarks on Benchmarking Methods 81
3.4 Case Study: The Caribbean Benchmark Study 81
3.4.1 The Uni–dimensional Caribbean Benchmark Study 81
3.4.2 Case Study: The multi – dimensional Caribbean benchmark study 87
3.4.3 Reflection on the Use of Benchmarking within a Caribbean Context 88

3.5 Conclusion 90
3.5.1 Synthesis 90
3.5.2 The way forward 91
4 The Interplay of Institutions with Industry Performance 93

4.1 Background 94
4.1.1 Background Outline 94

4.2 Understanding Institutions 94
4.2.1 Institutions, What They Are and Which Role They Play 94
4.2.2 Institutions and Governance 96
4.2.3 Core Institutions for Good Governance Structure 98

4.3 Institutions and Regulation 100
4.3.1 The Various Meanings of Regulation 100
4.3.2 Theory of Economic Regulation 102
4.3.3 Basic Engineering of Regulation: Institutional Approaches 108

4.4 Detailed Engineering of Regulation: Price-setting Policies 114
4.4.1 Cost of Service Regulation 114
4.4.2 Price Cap Regulation 116
4.4.3 Yardstick Regulation 118
4.4.4 Franchise Regulation 119
4.4.5 Hybrid Schemes 120
4.4.6 Reflections on Price Setting Policies 120

4.5 Conclusions 121
4.5.1 Synthesis 121
4.5.2 The Way Forward 123

5 The Interplay of Governance with Industry Performance 125

5.1 Background 126
5.1.1 Background Outline 126

5.2 Understanding Governance 126
5.2.1 Conceptual and Definitional Issues 126
5.2.2 Modes of Governance 127
5.2.3 What Constitutes ‘Good Governance’? 129

5.3 Regulatory Governance 130
5.3.1 Regulatory Governance: Conceptual and Definitional Issues 130
5.3.2 The Interplay of Regulatory Governance with Industry Performance 134

5.4 Corporate Governance 135
5.4.1 Conceptual and Definitional Issues 135
5.4.2 A Review of Corporate Governance 136
5.4.3 The interplay of Corporate Governance 137
5.5 Measuring State, Regulatory and Corporate Governance

- 5.5.1 Measuring State Governance / Institutional Quality
- 5.5.2 Measuring Regulatory Governance
- 5.5.3 Measuring Corporate Governance

5.6 Conclusions

- 5.6.1 Synthesis
- 5.6.2 The Way Forward

6 A Framework to Promote Effective and Efficient Performance of the Electricity Industry in SIMS

6.1 Introduction

- 6.1.1 Background
- 6.1.2 Chapter Outline

6.2 A Framework to Promote Effective and Efficient Performance of the Electricity Industry in SIMS

6.3 The Institutional and Governance Perspective

- 6.3.1 Country Governance / Institutional Quality
- 6.3.2 Application of the Country Governance Perspective of the Framework
- 6.3.3 Corporate Governance
- 6.3.4 Application of the Corporate Governance Perspective of the Framework

6.4 The Regulatory Menu of Options “Options in the Game”

- 6.4.1 Options for the Regulatory System
- 6.4.2 A Recap of Regulatory Substance and Regulatory Governance
- 6.4.3 The Menu of Regulatory Options further Explored
- 6.4.4 Application of the Framework
- 6.4.5 Reflections on the Regulatory Menu of Options

6.5 Conclusion

7 Research Synthesis

- 7.1 Introduction
- 7.2 Research Synthesis
- 7.2.1 Problem Statement and Research Objective
- 7.2.2 Research Question 1: Key Concepts and Economic Principles of SIDS and SIMS
- 7.2.3 Research Question 2: Effective and Efficient Industry Performance

Contents
7.2.4 Research Question 3: The Interplay of Institutions with Industry Performance
7.2.5 Research Question 4: The Interplay of Governance with Industry Performance
7.2.6 Research Question 5: A Framework to Promote Effective and Efficient Performance of the Electricity Industry in SIMS

8 Reflections, Policy Implications and Recommendations
8.1 Reflections
8.1.1 Reflections on the importance of Policy Intervention
8.1.2 Reflections on the Purpose of a Framework
8.1.3 Reflections on Deployment of the Framework to Promote Effective and Efficient Industry Performance
8.2 Policy Implications and Recommendations
8.2.1 Policy Implications
8.2.2 Policy Recommendations
8.2.3 Recommendations for Future Work

References
Annex I. Case Study: Stocktaking Caribbean Power Sector Reform
Annex II. Case Study: Caribbean Benchmarking Study
Annex III. Case Study: Measuring Governance
Annex IV. Price Regulation Further Explored
Annex V: Reflections on Strategic Planning and Management of the Energy Sector
Summary
Samenvatting
Curriculum Vitae
NGInfra PhD Thesis Series on Infrastructures
Let me start by stating that I ever so much enjoyed conducting the research and writing of this thesis. It’s the apotheosis of my career in the utilities which gave me the opportunity, amongst others, to serve as President and CEO of Aqualectra, the Curaçao Water and Power Production and Distribution Company, but also as Board member of CARILEC, the Caribbean Association of Electric Utilities. In the capacity of President and CEO I was given the challenge to initiate and realize complex reform processes within the Curaçao utility sector by integrating the production and distribution companies, creating a public private partnership and laying down the foundations for a sustainable supply of electricity and water. As CARILEC board member I initiated, launched and guided important studies, amongst others the Caribbean Benchmark study and Stocktaking of the Caribbean Power Sector Reform. The objectives were to increase the understanding and knowledge on determinants of the performance of Caribbean utilities. For me it became apparent that there was a need for a framework through which various aspects and stakeholders interests could logically coalesce. This thesis proposes a framework to promote effective and efficient performance of the electricity industry focused on small isolated monopoly systems.

I would like to start by thanking my promotor Margot Weijnen, who provided me, with the opportunity to do this PhD project and for her genuine interest in the idiosyncrasies of small island development states and the challenges they face from a public policy perspective. I want to express my sincere gratitude to my co-promotor Rudi Hakvoort for his guidance, enlightening and valuable comments on this thesis but also his valuable advice to sector reform challenges that we have faced and dealt with. The ambiance of sun, sea and sandy beaches, enjoying a lobster termidore, definitely contributed to the most inspiring discussions and also helped digesting complex institutional, regulatory and governance matters.

I would also like to thank all the members of the Doctoral committee. A very special thanks to Anthon Wentink who was also a member of my graduation committee at the Tilburg University. We have always maintained an academic relationship, and I am forever grateful to his valuable contribution when I decided to enter into this PhD project.

I would also like to convey special words of thanks to all my Aqualectra colleagues, Aqualectra Supervisory Board Members, Carilec fellow Board members, Carilec members, Kema and other consultants and friends in the utilities throughout the Caribbean. It would be too many names to mention but in a way you all have contributed to the successful completion of this dissertation.
My warmest thoughts to my late mother Joyce, for the forming that made me who I am today and my dear father Don, who always inspires and encourages me to build bridges, cross bridges and make that next step.

My final and dearest thanks go to my family. Thank you, Connie, for your tender love and care. This gives me so much comfort, based upon which I can always keep on moving forward, step by step one step at a time, because you are always there. To my children D’Vaughn and R’Chaugnne, thank you for, not understanding at this time but, simply accepting why Papa was not always there when you expected or needed me. I trust in due course, when reading this thesis, you will understand and that it gives a convincing answer why Daddy needed to wear such a strange dress when defending this thesis.

_Ivan Steve Martina_
_Curaçao, May, 2009_
Introduction

1. Regulation in Splendid Isolation
1.1.1 The Electricity Industry in perspective

Electricity is essential to the production of almost all goods and services and therefore is vital to the public interest. In addition, reliable electricity systems have become more important because businesses and households rely on electronic devices to perform an enormous range of tasks, both basic and advanced. Thus adequate, reliable, competitively priced electricity is essential for modernization, domestic growth, and international competitiveness – and among the most urgent challenges facing developing and transition economies (Kessides, 2004). Nevertheless there is a major disconnect between the public’s perception of the electricity system and the goods and services the public depends on, let alone those to which they aspire, is vague – to – non existent in the minds of most. Even those who are engaged on the periphery of the business are generally indifferent to its future as long as the lights stay on (EPRI, 2003). The 2007/2008 energy crises with ever increasing crude oil and fuel oil prices are further challenging the opportunities and threats facing the electricity sector. It is clear that the community of stakeholders sees electricity as more than just another form of commodity energy. It is the lifeblood of modern society, with three basic dimensions – political, economic and technical – that must be balanced if progress is to be achieved.

The political dimension derives from the fact that electricity is not just another commodity; it can’t be stored, and it is an essential public service. Any effort to effectively change the terms and conditions of electrical service, and the physical and institutional infrastructure on which that service is based, ultimately depends on a political “sale” involving extensive outreach and consensus building.

The economic dimension derives from the fact that the electricity supply industry is highly capital intensive. Investors’ confidence is key in this respect which can be negatively impacted by regulatory uncertainty resulting in deferral of capital expenditures. Arguably, the larger economic problem lies beyond the financial health of the industry itself, in terms of the long term economic impact of reduced investment in the nation’s most critical infrastructure.

The technological dimension is typically described in terms of technically – enabled capabilities that are now missing, and are desired or needed to meet political or economic objectives, ranging from greater power reliability to cleaner energy to greater demand – side response to greater energy efficiency.

In effect, this “trilemma” of economics, politics and technology now circumscribes the electricity sector. Policies must wisely balance all three dimensions to meet rising stakeholder needs and expectations, and ensure the sustained health and value of the sector. There is a growing consensus that the successful development of utility infrastructure – electricity, natural gas, telecommunications and water – depends in no small part on the adoption of appropriate public policies and the effective implementation of these policies (Jamison, Berg,
Gasmi, Tavara, 2004). Central to these policies is the development of a regulatory apparatus that provides stability, protects consumers from the abuse of market power, guards consumers and operators against political opportunism, and provides incentives to service providers to operate efficiently and make needed investments (Berg, 2000). The key question considered in this research is the design of a framework to promote the deployment of an effective and efficient electric supply industry (ESI) taking into consideration the characteristics of small isolated monopoly systems (SIMS) of small island development states (SIDS). The background of this research, the research objective and questions, and the research approach used are presented in this chapter. First the determinants of Public Policy and Sector Performance are presented briefly as background for the analysis. Then, the research objectives and research questions are defined and the research approach used is outlined.

1.1.2 The interplay between Energy Sector Reform and Governance

The history of energy sector reform is replete with well intentioned programs undone by popular resistance expressed through democratic or non – democratic processes, some themselves of recent origin and some decades old (USAID 2005). In some cases, the reforms were necessary to build a well – functioning energy sector, and the sector has continued to languish in their absence. In others, they were either unwise or poorly timed. Necessary financial and technical measures are often much easier to discern and recommend than are the means of accomplishing them in an enduring way.

Because many of the countries undertaking energy sector reform are also democracies or evolving toward democracy, the interplay between energy sector reform and democratic governance is as important as it is complex. The need for energy sector reform to be acceptable to the public (because public opposition will undermine reform) and for the public to be involved in shaping the reforms (because the public must have an effective voice in designing economic reforms) emerges as an inescapable lesson from failures in recent years (USAID 2005).

Many countries are trying to resolve the conflict between the unwillingness of the public to tolerate economic pain – especially pain whose justification may be dubious and whose promised benefits will arrive years in the future – and the need for various energy sector changes that disrupt settled relationships regarding rates, investment returns, social welfare and employment. For that ways ought to be found to harmonize the unpopular but necessary aspects of energy sector reform with the will of electorates. At the end of the day, energy policy needs to serve the needs of the public, not the other way around, and it needs to be arrived at and implemented in ways that make clear that it is doing just that.

Seen from within the energy sector, these disconnects have similar characteristics revolving around some or all of the following assumptions.
The customers do not want to pay the full costs of building and operating an adequate system because:

> It goes against historical political arrangements so embedded they are thought of as “cultural”;
> They do not understand the realities of the utility business;
> Their leaders, dependent on public support, do not dare to enlighten or to disappoint them;
> Current economic conditions are so bad that people have no prospect of earning the money to pay higher bills;
> Service is unreliable and not worth even the prices now being charged;
> Highly visible corruption leads ordinary people to believe that increased tariffs will result not in improved service but in unjust enrichment of predatory criminals;
> Higher tariffs will only benefit foreign investors.

Low-income citizens will oppose reforms for the foregoing reasons because:

> They cannot afford tariffs that cover the cost of serving them and will therefore be disconnected, or at least have to cut back on their consumption;
> The country has made provision of subsidized electricity as part of its welfare system and something to which all of its citizens are entitled;
> Extension of energy services to unserved areas is less likely without substantial subsidies.

Energy sector workers will oppose reforms because:

> Pressure to reduce cost will inevitably result in lower wages and fewer jobs, especially when the sector is overstaffed;
> Jobs in the energy sector – even unnecessary jobs – are part of the social service system, so loss of these jobs will consign many more families to poverty;
> Reduced subsidies may reduce the ability of the sector to increase (or maintain) wage levels.

Private investors will not put money into the existing system because:

> The public will not accept tariffs adequate to provide a fair return or even to assure recovery of the original investment;
> Corruption at every level from the meter reader to the operation of the wholesale market siphons off so much money that earning a reasonable rate of return is impossible;
> The government retains so large a stake in much of the system that newcomers cannot hope to be treated fairly;
The country lacks the legal and judicial structure necessary to ensure that contracts will be honoured, that property rights will be respected, that decisions will be made in a fair and transparent manner; The country lacks a regulatory process made up of honest, competent individuals with adequate powers, resources, training and distance from the political process to do their jobs in a capable and predictable manner; The country lacks traditions of corporate governance sufficient to support either energy sector reform or broader reforms necessary to provide a stable investment climate; Market rules and the process for establishing them do not inspire confidence.

Existing government agencies oppose energy sector reform because:

- The creation of an “independent” regulatory institution and reliance on private ownership threaten the prestige (and perhaps the existence) of the existing bureaucracies;
- The public discontent occasioned by the reforms will threaten the government’s hold on power;
- Government will lose its ability to reflect national security and social policy in energy decision making;
- Opportunities for corruption (or at least for the enhancement of inadequate salaries) flowing from the existing system of licensing, inspections and approvals will diminish;
- Ability to keep contracts, fund flows and “market” workings secret will diminish;
- Control of one or more major economic sectors will wind up in foreign hands.

Environmentalists oppose (or do not support) reforms because:

- Provision for attention to cost effective energy efficiency has not been made;
- Environmental impacts of various energy sources will not be evaluated or mitigated;
- Potential contribution of renewable energy has not been taken into account;
- Provision for consideration of environmental impacts of future energy supply investments and policies – with input from the public – has not been made;
- Power plant siting proceedings will be no more transparent or accessible than before.

Many of these propositions are less intractable than they have seemed. The desire for improved service can mitigate the pressure to reduce energy sector employment. Customers are often willing to pay the cost of utility service as long as they see the improved service before they receive the higher bills. Energy efficiency programs – including those that reduce waste and losses before the energy reaches the customer –
can often help generate the savings necessary to reduce the price impacts of reform programs, thus reducing political pressure against reforms.

While success in energy sector reform is never assured, the chances of success are much greater when the reforms are perceived by the public to be legitimately arrived at and implemented with ongoing concern for fairness and justice. For such a consensus to exist in a democracy, certain preconditions must exist. These preconditions pertain to the public’s ability to influence the tariffs, the investments and the environmental impacts of day-to-day decision making in the reformed energy sector (USAID 2005).

Major governance issues in the energy sector will need to be dealt with if reform is to be seen as legitimate and if institutions implementing reform are to be credible. This leads us into a further analysis of public policy within the energy sector where three broad areas are addressed: market structure, corporate behaviour and sector performance. In the next paragraph we will take a closer look at the determinants of public policy and sector performance.

1.1.3 Determinants of Public Policy and Sector Performance

Public policy establishes the legal constraints facing decision-makers and determines the jurisdictional responsibilities of different levels of government. The basic rationale is that market imperfections (market power and information gaps) and market failure (such as pollution) require some form of government intervention. Energy policies tend to address three broad areas: market structure, corporate behaviour and sector performance. While antitrust regulation addresses mergers and anticompetitive behaviour in the economy, energy sector economic regulation tends to address those elements of the market structure (including the supply chain) that are viewed as natural monopolies (Berg, 2002).

Figure 1.1 “Determinants of Public Policy and Sector Performance” is a flow diagram that shows how public policy responds to sector performance and has been adopted and modified from the flow diagram of Berg, 2002, that shows how public policy responds to sector performance. The behaviour of firms (in terms of pricing, cost cutting, provision of services, and network expansion) follows from the market structure and rules affecting behaviour. Ultimately, public perception is influenced by sector performance, including adoption of innovations, network reliability, environmental impacts and other outcomes.

The boxes in the figure represent the factors that are part of the policy environment and that can be understood as follows:

The three boxes to the far left represent some of the factors that influence a government’s choice of infrastructure policy. **Experience** refers to local, national and international experience with infrastructure, public and regulatory policies. Industry performance under regulatory regimes in different nations provides lessons that affect agency design and incentive policies. The **Institutional Conditions** box depicts
how other factors influence public policy towards the design of regulatory agencies. These factors include the strength and independence of a country’s judicial system, the nature and stability of the country’s political system, the autonomy of regulatory officials, resources at their disposal, and enforcement of property rights and laws that pertain to infrastructure development policy. Levy and Spiller (1994; 1995) document how these factors affect the ability of regulators to maintain some independence from political pressures and to make credible long-term commitments to private investors. The Objectives and Priorities box relates to the broad economic and social objectives of citizens and includes freedom, equality, justice, high living standards and technological advancement. Social values may reflect a consensus or be deeply divisive and lead to dramatic shifts in public policy. Events such as an oil crisis or a natural disaster can also trigger changes in public priorities and a willingness to move from the status quo.

On the far right, the traditional industrial organization model depicts the chain of causation from basic conditions to industry performance. Basic conditions include those factors that affect industry demand (e.g., population, income, and education) and those that affect industry supply (e.g., production technologies, operating practices, and factor prices). Basic conditions facing an industry determine the feasible number of suppliers in an industry. Basic conditions comprise General Economic Conditions and the nature of Input Markets. The former include macroeconomic features of a nation: employment, savings, and inflation rates, as well as the strength, stability, and diversity of its economy, its balance of trade and the strength and stability of its capital markets. These, in turn, drive the input markets that determine the cost of key factors of production.

Furthermore the figure has two shaded boxes, being corporate governance and regulatory governance. The common denominator of the boxes is governance.

Corporate Governance: is the system by which business corporations are directed and controlled. The corporate governance structure specifies the distribution of rights and responsibilities among different
participants in the corporation, such as the board, managers, shareholders and other stakeholders, and spells out the rules and procedures for making decisions on corporate affairs. By doing this, it also provides the structure through which the company objectives are set, and the means of attaining those objectives and monitoring performance (OECD April 1999).

**Regulatory Governance:** Includes the legal mandate given to a government agency, resources available for policy implementation, the organizational design of the agency, and the processes adopted by the agency, all of which affect regulatory activities (Berg, 2005). The clarity of an agency’s roles, the degree of its autonomy and techniques for ensuring accountability represent the foundation elements of the regulatory system. Similarly, a regulatory process that emphasizes stakeholder participation, transparency, and predictability will be more credible than one without these features. The actual Regulatory Incentives developed and implemented by the agency will affect the behaviour and performance of regulated entities.

Finally, citizen acceptance of public policies, industrial outcomes and the political processes that lead to those policies depends on how well industry performance matches shared national objectives. It should be perceived as **Legitimate, Credible, Transparent, Fair and Just**. This is depicted in the box at the base of the figure. If there is no social consensus (or shared political vision), the legitimacy of the system is continually called into question. The lack of consensus could stem from disagreement regarding facts or lack of consensus regarding values. In either case, controversy is endemic in energy policy, where different stakeholders seek to influence policy outcomes.

The figure “Determinants of Public Policy and Sector Performance” depicts the circular dynamics of the larger decision environment in which government policymakers, regulators, energy firms and public and private investors operate and interact.

Having established some insight about the determinants of public policy, sector performance and their importance, in subsequent paragraphs we can now further elaborate on the problem statement, research objective and research questions.

### 1.2 Problem Statement:

The utilities sector has particular features that distinguish it from other industries. First, its technologies are characterized by large, specific, sunk investments; second, its technologies also exhibit important economies of scale and scope; and third, its products are massively consumed. What separates the utilities sector from the rest of the economy is then the combination of three features: specific investments, economies of scale and widespread domestic consumption. These three features are at the core of the contractual problems that have traditionally raised the need for governmental regulation of utilities (Goldberg 1976; Williamson 1988; Barzel 1989; North 1990; Baysan and Guash 1993; Levy and Spiller 1993; Guash and Marshall 1993).
In the utility sector three types of contractual problems are particularly important:

1. **Contractual Problems Between Firms and Government**
   Because a utility’s assets are largely sunk and its customers constitute a large portion of the population and are mostly captive and vocal, governments might have an incentive to expropriate the utility’s quasi-rents. This does not mean that the government takes over the operation of the company, but rather that it sets maximum prices for the utility’s products that compensate for its operating costs and the return on its non-specific assets. These prices provide sufficient ex post incentives for the firm to operate, but not to invest at efficient levels.

2. **Contractual Problems Between Firms and Customers**
   Contractual problems between the firms and their customers, or the asymmetric bargaining power between the sole firm supplying the service and its customers, provide what is usually called “market failure” rationale for regulation. Contracting between firms and customers may fail either because the sector is not contestable, which results in the exercise of market power, or because the sector is contestable but not “sustainable”, which implies inefficient investment policies.

3. **Contractual Problems Between Interest Groups and the Government**
   Contractual problems between interest groups and the government are behind the regulations that govern the creation or extraction of rents. Governments have the possibility to distort utility pricing for purpose of income distribution (cross-subsidization). This makes the pricing of utilities inherently political with the incentive and opportunity to behave opportunistically vis-à-vis the investing company.

For the purpose of this thesis the three identified contractual problems will be referred to as the utility problem. Our problem statement “the utility problem” entails that the massive consumption, economies of scale and sunk investments ultimately provide governments (either national or local) with the incentive and opportunity to behave opportunistically vis-à-vis the utility company. Opportunistic behavior, especially in inadequate tariff setting, will lead to the so-called vicious circle of performance decline. The utility will cut back on capital and maintenance costs at the expense of worsening service. As a consequence the system will become more expensive to maintain and inefficiency in the system will increase. Wrong price signals will go to the consumers with as a consequence inefficient usage. To correct this downward spiral
huge rehabilitation costs are needed. However, if a government wants to assure a healthy development of the utility infrastructure, then it will need to design institutional arrangements and governance structures that will limit its own ability to behave opportunistically vis-à-vis the utility. As stated by Berg (2000), the development of a regulatory apparatus that provides stability, protects consumers from the abuse of market power, guards consumers and operators against political opportunism, and provides incentives to service providers to operate efficiently and make needed investments is essential for a successful development of utility infrastructure. This leads us to elaboration of the research objective.

1.2.2 Research Objective

Recognizing the essentials for a successful development of utility infrastructure, many countries have implemented far-reaching reforms over the past two decades – restructuring, encouraging private participation, and establishing new approaches to regulation (Kessides, 2004). However, there is no universal reform model, nor does one universal regulatory framework exist; every restructuring and private participation program must take into account the sector’s features and the country’s economic, institutional, social, and political characteristics. While much is known about electricity sector reform for developed countries, for developing countries and in particular for the Caribbean nations, this is relatively limited. In existing studies, the Caribbean is typically conveniently referred to as ‘Latin America and the Caribbean’ or ‘Central America and the Caribbean’ where the vast majority of the cases relate to the larger Caribbean islands. This thesis is different in this respect as it explicitly focuses on the electric utility in the Caribbean. More particularly, in the context of this thesis, the Caribbean electric utility is defined as relatively small island monopoly systems (SIMS) i.e. with a peak load of up to 150 MW and the islands are located in the Caribbean Sea. Almost all of the electricity supply systems in those countries are vertically integrated monopoly systems. Another characteristic is that the regulatory framework in those countries is still in its infancy.

The circumstances of natural monopolies, and in particular in the mentioned case of SIMS, more specific economic regulation is desirable. Economic regulation of this type is an almost universal feature in market economies. It is clear that the need to protect consumers against natural monopolies plays an important role in economic regulation. However, if enterprises are to be starved of resources, and if their investors are to be confident about committing funds, the interests of the enterprise also need to be safeguarded. Therefore, it is important that through a framework that promotes effective and efficient industry performance a balance of interests between consumers, enterprises, and government should be achieved. This comprises the central theme of this investigative study and leads to the formulation of the overall objective of this thesis.

\footnote{This is also referred to as the hold up problem as a consequence of political opportunism, Spiller, 1996; and for a recent review of the ‘hold up literature’, Schmitz, 2001.}


Effective industry performance refers to the extent to which the industry pursues its underlying policy objectives.

Efficient industry performance refers to the extent to which service providers deliver a certain level of production against minimized costs, or maximize production for a given level of inputs.

1.2.3 Research Questions

In order to analyze the above research objective, a number of research questions should be answered. The research questions can be divided to three categories. The first deals with theoretical aspects and definitions of industry performance. The context of small island development states is of most importance, and the reason why the specific characteristics and the economic features of these states will be further analyzed. The second category of questions looks at the interplay of institutions with industry performance and the interplay of governance with industry performance. This is done from a theoretical perspective and the applicability of the theoretical underpinnings on how to measure the influence of institutions and governance on industry performance is investigated. Finally, the third category focuses on the design of a framework to promote effective and efficient industry performance and is deployed in the case of SIMS.


This section starts with looking at the specific characteristics of the electricity supply industry and elaborates on the functional decomposition of the industry. The different electricity supply markets are reviewed and the natural monopoly is further elaborated as SIMS are in compliance with the determinants of a natural monopoly. Specific attention should be drawn on how to measure industry performance. This section further explores the features of small island development states (SIDS) for a better understanding of the broader environment in which SIMS operate. The general features and the economic features of SIDS are addressed. Efficient and effective industry performance is essential for maximizing social welfare. Special attention will be given on measurement of effective and efficient industry performance. The following research questions have been identified:

RQ1. What are the key economic principles and concepts of SIMS?

RQ2. What comprises effective and efficient industry performance and how can it be measured?
PART 2. The Interplay of Institutions and Governance with Effective and Efficient Industry Performance.

The first two research questions will lead to a thorough understanding of the theoretical foundations of SIDS and SIMS and what comprises effective and efficient industry performance. In section two further research will be dedicated to the interplay of institutions with effective and efficient industry performance and the interplay of governance with effective and efficient industry performance. Specific attention will be drawn to how to measure the influence of institutions and governance on industry performance. This leads to the following subsequent two research questions.

RQ3. How do Institutions Influence Industry Performance and how Can this be Measured?

RQ4. How does Governance Influence Industry Performance and how Can this be Measured?

PART 3. The Design of a Framework to Promote Effective and Efficient Performance of the Electricity Industry in SIMS.

Exploring research questions 3 and 4 gives insight into the interplay of institutions and governance with industry performance. Together with the first two questions the foundations are in place for the design of a framework for SIMS to support successful sector reform. While success in sector reform is never assured, the chances of success are much greater when reforms are perceived by the public to be legitimately arrived at and implemented with an ongoing concern for fairness and justice. This requires consent in what has been stated earlier as the “trilemma” of economics, politics and technology. Decision – makers need to understand fundamental principles of scarcity and choice. It requires critical thinking with regard to alternative policies. The key issue involves recognizing that we give something up when a choice is made: we give up an alternative policy and its outcomes. The use of a framework promotes the process of building consent between the diverse disciplines that can be applied to the examination of policy issues, and which, ultimately, is needed to secure a reasonable consensus on policy choices. The final question aims to explore the design of a framework for to promote effective and efficient performance of the electricity industry in SIMS.

RQ5. What are the Characteristics of a Framework to Promote Effective and Efficient Performance of the Electricity Industry in SIMS?
1.3.1 The SCP Paradigm

Industrial economics is concerned with the activities and policies (including prices, advertising and product quality) of business firms towards suppliers, incumbent rivals, customers, potential entrants and substitute products in different market settings. The central questions addressed by industrial economics are:

1. Is there market power, and if so, how do you measure it?
2. How do firms acquire and maintain market power?
3. What are the implications of market power?
4. What is the role for public policy as regards market power?

To do a complete analysis of an industry, market or economy, there is a three part paradigm consisting of market structure, conduct and performance denominated as the structure – conduct – performance (SCP) paradigm. The SCP paradigm appears to be a relevant approach to analyze the structure, conduct and performance of the electricity supply sector. Special attention will be drawn to the case of SIMS which is a central focus within the context of this investigative study. Figure 1.2 gives a graphical representation of the SCP Paradigm.

1.3.2 The New Institutional Economics

As a research approach the concepts of the new institutional economics (NIE) are applied. New institutional economics (NIE) studies institutions and how institutions interact with organizational arrangements. Institutions are the written and unwritten rules, norms and constraints that humans devise to reduce uncertainty and control their environment. These include (i) written rules and agreements that govern contractual relations and corporate governance, (ii) constitutions, laws and rules that govern politics, government, finance, and society more broadly, and (iii) unwritten codes of conduct, norms of behavior, and beliefs. Organizational arrangements are the different modes of governance that agents implement to support production and exchange. These include (i) markets, firms, and the various combinations of forms that economic actors develop to facilitate transactions and (ii) contractual agreements that provide a framework for organizing activities, as well as (iii) the behavioral traits that underlie the arrangements chosen. In studying institutions and their interaction with specific arrangements, new institutionalists have become increasingly concerned with mental
models and other aspects of cognition that determine how humans interpret reality, which in turn shape the institutional environment they build (North 1990, p. 3–6; Williamson 2000).

New institutional economics abandons the standard neoclassical assumptions that individuals have perfect information and unbounded rationality and that transactions are costless and instantaneous. NIE assumes instead that individuals have incomplete information and limited mental capacity and because of this they face uncertainty about unforeseen events and outcomes and incur transaction costs to acquire information. To reduce risk and transaction costs humans create institutions, writing and enforcing constitutions, laws, contracts and regulations – so-called formal institutions – and structuring and inculcating norms of conduct, beliefs and habits of thought and behavior – or informal institutions. They develop modes of organization embedded in these settings that provide different incentives that vary in their capacity to motivate agents. For new institutionalists the performance of a market economy depends upon the formal and informal institutions and modes of organization that facilitate private transactions and cooperative behavior. NIE focuses on how such institutions emerge, operate, and evolve, how they shape the different arrangements that support production and exchange, as well as how these arrangements act in turn to change the rules of the game.

A Framework for social analysis is used. Four levels of social analysis are distinguished in Figure 1. The solid arrows that connect a higher with a lower level signal that the higher level imposes constraints on the level immediately below. The reverse arrows that connect lower with higher levels are dashed and signal feedback.

The top level is the social embeddedness level. This is where the norms, customs, mores, traditions, etc. are located. Religion plays a large role at this level. Level 1 is taken as given by most economists. Institutions at this level change very slowly – in the order of centuries or millennia.

The second level is referred to as the institutional environment. The structures observed here are the product of politics and provide the rules of the game within which economic activity is organized. The polity, judiciary, and bureaucracy of government are all located here. The laws regarding property rights – their definition and enforcement – are prominently featured. According to North, institutions are ‘the humanly devised constraints that structure political, economic, and social interactions. They consist of informal constraints, sanctions, taboos, customs, traditions, and codes of conduct, and formal rules – constitutions, laws, property rights’ –1991, p.97. North argues that ‘institutions consist of a set of constraints on behavior in the form of rules and regulations; and, finally, a set of moral, ethical, behavioral norms which define the contours and that constrain the way in which the rules and regulations are specified and enforcement is carried out’ –North –1984, p.8. So described, the informal constraints are located at Level 1 and the formal rules – the polity, judiciary, bureaucracy – are located at Level 2.

---

3 This framework was first set out in Williamson 1995.
First – order economizing – get the institutional environment right – is featured here.

The third level is where the institutions of governance are located. Although property remains important, a perfectly functioning legal system in order to enforce contracts is not contemplated. Instead of costless court ordering, a comparison of costly court enforcement with costly private ordering is needed. Much of the relevant governance actions moves to the latter.

Transaction cost economics operates at Level 3. Taking the rules of the game at Level 2 as shift parameters, Level 3 deals with the play of the game. Alternative modes of organization are described as syndromes of attributes that differ in discrete structural ways. Second – order economizing applies: get the governance structures – markets, hybrids, firms, bureaus – right. The period over which such decisions come up for consideration is of the order of a year to a decade.

Level 4 moves from discrete structural to marginal analysis. This is the level with which neo – classical economics and, more recently, agency theory have been concerned. The neo – classical decision variables are price and output; agency theory deals with an efficient incentive alignment in the face of differential risk.

NIE’s breadth and innovation have fostered a multi – disciplinary approach. Institutional analysts adapt useful concepts and methodology from political science, sociology, law, anthropology, cognitive science, evolutionary biology, and any other discipline that sheds light on the rules, norms and beliefs that govern human interactions in the process of production and exchange. Within this thesis the concepts of the NIE will be used as the research approach and in particular the 1st order economizing principle; rules of the game to analyze the interplay between institutions and industry performance and the 2nd order economizing principle; play of the game, to analyze the interplay of governance and industry performance. The 1st and 2nd economizing principles will be intertwined with the SCP paradigm and will be elaborated in the subsequent paragraphs.

1.3.3 An adaptation of the SCP paradigm through the lens of the NIE

This research approach is based on an adaptation of the SCP paradigm through the lens of the NIE. The SCP paradigm is used as a conceptual framework that outlines key links between public policy, basic industry conditions and sector performance. The SCP paradigm was developed to analyze industry. In this thesis we will conduct an analysis of SIMS by extending the SCP analysis with the 1st and 2nd order economizing principles of the NIE. The 1st order economizing principle relates to “get the institutional environment right”; rules of the game. We will analyze the interplay of institutions with effective and efficient industry performance. The 2nd economizing principle relates to “get the governance structure right”, play of the game. We will analyze the interplay of governance with effective and efficient industry perform-
The objective is to look at SIMS and gain an understanding of the key determinants that promote effective and efficient industry performance. It is the belief that this common understanding together with shared values will play a pivotal role in conducting a process to balance the competing interest of economics, politics and technology in crafting public policy. The resulting policy outcomes affect three broad areas: market structure (related to entry and vertical integration/disintegration), corporate behavior (price caps, reliability mandates, service standards, network modernization requirements) and industry performance (reliable, accessible, affordable, and efficient utility services). Figure 1.4 represents that adapted SCP – Paradigm through the lens of institutional economics as the research approach within this investigative study.

**Figure 1.3:**
Williamson’s Framework for Social Analysis
*Source: Williamson (1995)*

<table>
<thead>
<tr>
<th>Level</th>
<th>Frequency (years)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>$10^1$ to $10^2$</td>
<td>Often noncalculative; spontaneous (caveat: see discussion in text)</td>
</tr>
<tr>
<td>L2</td>
<td>$10$ to $10^2$</td>
<td>Get the institutional environment right. 1st order economizing</td>
</tr>
<tr>
<td>L3</td>
<td>1 to 10</td>
<td>Get the governance structures right. 2nd order economizing</td>
</tr>
<tr>
<td>L4</td>
<td>continuous</td>
<td>Get the marginal conditions right. 3rd order economizing</td>
</tr>
</tbody>
</table>

**Figure 1.4:**
Research Approach
*Source: Authors construct adapted from Berg (2006)*

1st Economizing principle
Get the Institutional Environment Right “Rules of the Game”

2nd Economizing principle
Get the Governance Structure Right “Play of the Game”

---

*Introduction*
1.3.4 Multidisciplinary Nature

The “trilemma” of economics, politics and technology that circumscribes the electricity sector requires policies that must wisely balance all three dimensions to meet rising stakeholder needs and expectations to ensure the sustained health and value of the sector. This requires a multidisciplinary approach to arrive at sound public policy choices.

This thesis combines several disciplines i.e. those of strategic management, regulatory management, economics, governance and electrical engineering. In particular, the focus of this thesis is on the design of a framework for SIMS resulting in a blend of institutional and regulatory economics and governance. This mix reflects the multi-disciplinary nature of the utility problem in satisfying the various stakeholder’s wants and needs. The combination of the three is believed to provide better opportunities to untangle the complexities surrounding the institutional, regulatory and governance problems at stake here.

1.3.5 Research Methods

This thesis makes use of primarily four research methods, namely literature reviews, field research, case studies and methodology development. The literature review concentrated in chapters 2 to 5 assesses both the academic and non-academic literature. The academic literature consists mainly of publications on the public policy, economic, governance and engineering perspectives of the problems. The non-academic publications include benchmarking publications and regulatory publications such as electricity laws, regulatory frameworks and regulatory decisions. This study has also benefited from insight obtained through interviews, talks, and discussions with different agents from the Caribbean Electric Utilities and regulatory specialists. These include members of regulatory staff, consultants, researchers, boards of the utilities and policy makers active in the area of electricity sector reform, electricity regulation and utility management. The results from the field research were particularly helpful in developing a proper framework to promote effective and efficient industry performance in the case of SIMS, ultimately to achieve optimal social welfare.

The outline of the thesis is presented in Figure 1.4: “Schematic representation of the contents of the thesis”. The outline of the thesis follows the same structure as the research approach. The thesis consists of three main parts. The thesis starts with an “Introduction”, which includes chapter one in which the introduction, background, problem statement, research objective and research questions of this investigative study are presented.

Part I “System, Theory and Literature” presents the system that will be investigated, the theory underlying the foundation of the study, and the relevant literature. It is divided into three chapters. Chapter 2 elaborates on the system including the specific characteristics and economic principles of SIDS and SIMS, markets and the electricity supply...
industry. In chapter 2 research question 1 is addressed. Effective and efficient industry performance in terms of concepts, definitions and measurement challenges, all related to research question 2, is further explored in chapter 3.

Part 2 “Analysis” is a further exploration of the interplay of industry performance with institutions and governance. Part 2 consists of two chapters. Chapter 4 relates to the 1st economizing principle, the rules of the game: Get the institutional environment right. Chapter 5 relates to the 2nd economizing principle, the play of the game: Get the governance structures right. Special attention is also drawn on how to measure the influence of institutions with industry performance and how to measure the influence of governance with industry performance.

Part 3 “Design” comprises the design of a framework for SIMS that promotes effective and efficient performance of the electricity industry and is related to research question 5. This will be elaborated in chapter 6.

The final section, comprising of synthesis and conclusions is elaborated in chapter 7. In chapter 8 some reflective thoughts on the subject matter are shared and some policy implications and recommendations are given. Finally, the limitations of this research and some suggestions for improvement and possible extensions of this research are discussed.
Key Economic Principles and Concepts of SIDS and SIMS
2.1 Background

The central theme of this investigative study is to propose a framework to promote effective and efficient industry performance for small isolated monopoly systems for the electricity supply (SIMS). The starting point is an analysis of what comprises SIMS, their specific characteristics and the economic principles and concepts that they adhere to. An analysis of SIMS requires a thorough understanding of the broader context, being the unique characteristics of the electricity supply industry and the environment in which it operates. Isolated systems in this case refer to the fact that the electrical supply systems of islands do not have interconnection possibilities like the mainland. So the specific geographical and economic characteristics of small island development states (SIDS) will also be explored. Inevitably this will have an impact on the policy facing SIMS is the reason why also policy challenges facing SIMS will be elaborated in this chapter.

2.1.2 Chapter Outline

Section 2 starts with looking at the specific characteristics of the electricity supply industry and elaborates on the functional decomposition of the industry. The different electricity supply markets are reviewed and the natural monopoly is further elaborated as SIMS are in compliance with the determinants of a natural monopoly.

Section 3 further explores the features of small island development states (SIDS) for a better understanding of the broader environment in which SIMS operate. The general features and the economic features of SIDS are addressed.

In section 4 a definition of SIMS is given and the various policy challenges facing SIMS are further elaborated upon. Finally, section 4 gives a synthesis and draws some conclusions.

2.2 Characteristics of the Electricity Supply Industry

Within the electricity supply industry there is the existence of natural monopoly conditions, externalities, and public good characteristics. These result from a number of unique economic characteristics (Steiner 2001).

> Electricity cannot be stored. The non-storability of electricity reduces the size of markets according to the time dimension.
> The size of the market is determined by instantaneous demand rather than demand over a longer time period. As a consequence, it is more likely that a single firm can supply consumers in a given market at minimum efficient scale. Furthermore:
> The demand for electricity is subject to great cyclical, seasonal, and random variation in both the short and long term. At the same time, to satisfy customers’ expectations, supply must be continuous, reliable, and supplied with sustained frequency and voltage. As a consequence, electricity producers must maintain "spinning reserve" and "black start capacity".
> The pairing of variable demand and continuous supply requires...
that suppliers maintain excess capacity to meet peaks in demand. As the number of customers supplied by a given utility increases, reserve margin requirements decrease because the grouping of heterogeneous consumers effectively pools risk faced by suppliers, and, as a consequence, operating and capital costs per customer decrease.

In short, these conditions lead to increasing returns to scale and cost efficiencies to be realized by a monopoly market structure. Additionally, externalities occur because the operation, function, and malfunction of each generator affects system conditions throughout the entire interconnected network. Moreover, investment in generating capacity involves difficult dynamic optimization in the face of uncertainty, externalities in the sense that any addition or deletion of capacity affects the entire network, and public good characteristics in the sense that additions to a transmission network benefit all producers and consumers. The externality and public good aspects of electricity suggest the need for planning and coordination of the electricity supply network, roles that may also be most efficiently performed by a natural monopolist. While on the whole, electricity supply is characterized by natural monopoly conditions, externalities, and public good, some of its functional segments do not possess these economic features. The following section will elaborate on a functional decomposition of the electricity supply industry.

2.2.2 Functional Decomposition of the Electricity Supply Industry

The electricity supply industry can be functionally divided into generation, transmission, distribution, and supply. This functional division is particularly important for understanding recent regulatory developments. The different functions are differentiated technologically and economically, and regulatory reform has tended to proceed at this level of differentiation.

*Generation is the production of electricity.* It involves the transformation of another form of energy into electrical energy. Electricity production may use oil, natural gas, coal, nuclear power, hydro power (falling water), renewable fuels, wind turbines, and photovoltaic technologies. The different generating technologies are differentiated according to cost structure. The main cost components of electricity generation are (delivered) fuel prices, capital costs, and operating and maintenance costs. Costs are also influenced by the performance of the generating technology (capacity factor, thermal efficiency, and operating life). Nuclear generation has high capital costs which result in part from long construction lead times (interest charges) and decommissioning costs (costs of retiring a plant at the end of its design life). High fixed costs also result from public opposition to nuclear technology and waste disposal. On the other hand, nuclear technology has low fuel and operating costs (variable costs), and over the lifetime of a nuclear plant these costs...
remain relatively constant. Hydro generation costs depend largely on geography and climate. The variable costs to hydro generation are low. The costs of coal, oil, and natural gas fired generation consist largely of input fuel prices, so that the variable costs of fossil – fuel generation are higher than for nuclear generation. However, fossil – fuel generation tends to have lower fixed costs than nuclear generation, particularly in the case of gas – fired plants, which have very short construction lead times.

The diversity of generating technology and cost structure results in a “least cost merit order”, in which different kinds of generators are operated according to variable costs: nuclear technology and often hydro technology and coal serve as base load, whereas other fossil fuel fired plants serve as intermediate or peak load. A diversified generation technology set improves efficiency by reducing reserve requirements and facilitating the balance of supply and demand for electricity in real time. The “least – cost merit order” and its associated efficiency gains should also lead to lower electricity prices.

Transmission and distribution comprise the “wires” functions. Transmission is the high – voltage transport of electricity. However, transmission is not merely transportation, but it also involves the management of dispersed generators in a grid to maintain suitable voltage and frequency and to prevent system breakdown. Transmission is a natural monopoly because competition in transmission would result in duplication of the existing network (duplicating high voltage AC networks and competing grid coordinators would increase transmission costs). Regulation of transmission typically involves rate – of – return regulation of prices, which has been shown in the classic study of Averch and Johnson (1962) to lead to over – investment in capital and, consequently, failure to cost – minimize. Co – ordination of generators in a merit – order lies between generation and transmission. From this perspective, integration of generation and transmission would lead to economies if it internalizes externalities that result from generators who make investment and operating decisions that affect the entire network. On the contrary, if generation (itself not a natural monopoly) is integrated with transmission, then it will be subject to the same regulatory challenges and inefficiencies as transmission under rate – of – return regulation.

Distribution is the low – voltage transport of electricity. Like transmission, it is generally considered to be a natural monopoly; competition would similarly entail duplication of the existing set of “wires”. Unlike transmission, there are no benefits to its integration with generation.

Supply of electricity is the sale of electricity to end – users. This includes metering, billing, and marketing, and may be wholesale or retail. Supply is not considered to be a natural monopoly, nor are there significant advantages to its integration with the other functions. Each of these functions contributes to the costs of providing electricity to the final consumer. The share of cost of each function according to the OECD is illustrated as follows:
2.2.3 Electricity Supply Markets

There are a large number of decisions and choices involved in the restructuring of electricity markets. This implies a large number of possible options that the policy maker may choose from. In practice however, four basic models emerge, and although they may come in different variations, each power sector reform option can be classified as belonging to one of these four models. The four models differ with respect to the degree of competition and customer choice. They are:

1. **Monopoly** – the traditional status quo, where a single entity generates all electricity and delivers it over a transmission network to distribution companies or customers.

2. **Single buyer** – where a single agency buys electricity from competing generators, has a monopoly on transmission, and sells electricity to distribution and large power users without competition from other suppliers.

3. **Wholesale competition** – where multiple distributors buy electricity from competing generators, use the transmission network to deliver it to their service areas under open access arrangements, and maintain monopolies on sales in their service areas.

4. **Retail competition** – where customers have access to competing generators, directly through a retailer of their choice, and transmission and distribution networks operate under open access arrangements.

In table 2.2 the options are summarized.

The following elaboration on electricity markets is based on a review from amongst others; Kessides (2004), Ocaña (2003), the Regulatory Assistance Project (2000) and Hunt and Shuttleworth (1996).

**The Monopoly Option further elaborated:**

Given the unique economic characteristics of the power industry – especially the need for coordination between generation and transmission, and the difficulty of replicating vertical relationships with market mechanisms – the monopoly option has some appeal. In theory an integrated company could minimize the cost of meeting demand at

---

**Table 2.1:** Breakdown of Electricity Supply Cost  
*Source: OECD (2001)*

<table>
<thead>
<tr>
<th>Feature</th>
<th>Monopoly</th>
<th>Single buyer</th>
<th>Wholesale competition</th>
<th>Retail competition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competing generators?</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Choice for retailers?</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Choice for customers?</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
each point in time through optimal dispatch of its power stations, taking into account system wide transmission constraint losses. In the long run it could exploit the investment relationships between generation and transmission and undertake investments based on system wide planning. But these benefits will probably be small relative to those that come from promoting competition in generation: lower construction and operating costs, incentive to close inefficient plants, and better pricing (Joskow 2000a).

The Single Buyer Option further Elaborated:

The single buyer model has evolved under a variety of organizational forms. It may simply comprise the state – owned vertically integrated utility. Alternatively, the national utility might be split into generation, transmission, and distribution companies, with the transmission and dispatch facilities remaining under public ownership and the newly formed transmission and dispatch entity buying electricity from generators and selling it to distribution companies at regulated tariffs (figure 2.2).

The model may further entail the dispatch company being unbundled from the single buyer entity. In the model’s extreme form the single buyer buys all energy and capacity in the market, is the sole authorized seller of electricity (ruling out competitive supply), decides what, from whom, and how much to buy, and assumes most of the credit and market risk (active single buyer). Another form of the centralized buying model entails an entity acquiring a large part of the energy and capacity (and selling it to distribution companies at regulated tariffs) but not being the only buyer in the system (principal buyer).
Finally, a relatively new model involves the buyer acting as an aggregator and procurement coordinator, responsible for the procurement of energy to distribution companies. The buyer, however, does not take the initiative on how much and from whom to buy, and assumes no credit or market risk (passive buyer; Barker, Mauer, and Storm van Leeuwen 2003).

**Wholesale Competition further Elaborated**

With wholesale competition, local distribution companies retain their exclusive service territories and buy power from competing generators (figure 2–3). Customers are generally not able to choose their suppliers, only users consuming more than a certain volume of power (typically, industrial consumers) are allowed to contract directly with generators. Although the absolute number of high-volume users is typically very small, these users do form a substantial part of the market when the volume of energy purchased is taken into account. By allowing wholesale customers to buy cheaper power from alternative suppliers and by providing more customers for independent power producers, this option makes the market more competitive and dynamic than does the single buyer model.

Several prerequisites must be met for wholesale electricity markets to succeed (Wolak 2003). First, buyers must have a spot market or power exchange (where buying and selling occurs) and a forward market (where market participants can negotiate contracts). Forward contracts mitigate the risk of volatile spot prices and encourage suppliers to bid aggressively in the spot market. Second, a competitive wholesale market requires a sufficient number of unaffiliated suppliers. Competitive entry will be inhibited if a single supplier dominates the market. Third, there is a need for active participation by as many customers as is economically feasible in both long-term and short-term markets.

Allowing wholesale electricity buyers to enter long-term purchasing agreements with suppliers facilitates financing of new generation capacity. In the short-term market, suppliers will be much less likely to exercise market power if customers can alter their consumption in response to short price-signals. Fourth, wholesale electricity markets require an economically reliable transmission network—that
is, one with adequate capacity so that each location on the network faces sufficient competition among generators, to preclude localized monopoly power. Finally, there is a need for a credible, effective, fast – acting regulatory mechanism to deal with flaws in market design and encourage efficient behavior by market participants. This is especially imperative when wholesale electricity markets are established without all the essential prerequisites just described.

Retail Competition further Elaborated.

Under the retail competition model, there is free choice for contracting power for all consumers – up to the household consumers. The retail competition model thus goes furthest with introducing competition and choice for consumers. Typically, retail competition is introduced in phases. Power sector reform usually starts with providing choice to larger industrial consumers (comparable to the wholesale model), then followed by medium – sized consumers (commercial and businesses) and finally, down to the retail consumers i.e. households.

The retail competition model needs open access to the transmission and distribution networks. Furthermore, a mechanism is required to cater for bilateral trading across the network e.g. in the form of a spot market. The retail competition model requires the development of different processes such as settlement, meter reading, billing mechanisms, and is typically associated with substantial investments in IT infrastructure. In particular, availability of metering data is important as this directly feeds into the billing and invoicing processes that take place from one market party to the other. This can for example be invoicing from generators to suppliers, from suppliers to final consumers, but also from one generator to the other or one supplier to a generator. Different permutations are possible and clearly, a good metering system is crucial to the effectiveness of the retail competition model.

Ideally, metering should be performed on a real – time basis but given the high costs and enormous amounts of data that would need to be handled, it is usually restricted to hourly or half – hourly time intervals. Trading on the spot market as well as in other markets (e.g. bilateral) also occurs on an hourly or half – hourly basis. For larger consumers, such frequent measurement is usually available. But this
may not be true for smaller consumers, in particular households where metering tends to take place on an annual basis. For such consumers, standard demand profiles need to be established.

2.2.4 Natural Monopoly

For the purpose of this thesis the natural monopoly will be further explored as it is a fundamental characteristic of the electricity supply systems for Small Island Developing States for which a framework will be elaborated to promote effective and efficient industry performance.

It is well known that competition stimulates economic efficiency and that this generally leads to increased welfare for the benefit of society. Sometimes however, competition is not feasible. Such a situation applies in the case of natural monopoly. Natural monopolies arise if duplication of an infrastructure or service is uneconomic i.e. technology and demand are such that it is cheaper for a single firm to serve the market than for multiple firms together. The underlying source of this problem is subadditivity of costs (Train 1991): Assume that one firm produces a given level of output $x$ and that there are two other firms producing $x'$ and $x''$ such that $x' + x'' = x$. Then, subadditivity implies that $C(x) < C(x') + C(x'')$ in which $C(x)$ stands for the costs to produce the given output $x$. More generally, a natural monopoly arises if the condition $C(\sum x_i) < \sum C(x_i)$ applies. Then, it is cheaper for a single firm to produce the total output $x$ than for two or more individual firms.

The main sources of the existence of subadditivity of costs are economies of scale and economies of scope. Economies of scale imply that average costs fall with increasing output. The most prevalent of economies of scale are fixed costs, costs that are incurred irrespective of the level of output. Whether or not a natural monopoly will be sustainable depends on the range of economies of scale relative to the market demand.

In the standard situation average costs decrease over all output levels and clearly there will be a natural monopoly. However, if average costs decrease, but not with all levels of output (for example a “U – shaped” average costs curve), and demand is located in the increasing section of the average costs curve, but not too far away from the bottom of the U – shape, still a natural monopoly situation arises (see figure 2.5). If average costs decrease and then increase, a natural monopoly will exist until demand splits the market equally between firms. Then, two firms will both produce an output $Q_2$ at average costs of $AC_2$. A single firm producing all output $2Q_2$ would incur higher average costs. This border case is referred to as a natural duopoly. Competition occurs when economies of scale are exhausted at a level of output that is small compared to market demand.

Next to economies of scale, economies of scope also lead to subadditivity of costs. Economies of scope arise if a given quantity of each of two or more goods can be produced by one firm at lower costs than if each good were produced separately. This can be expressed as follows. Assume that the costs to produce two goods of quantity $x_1$
and $x_2$ are given by respectively $f(x_1, 0)$ and $f(x_2, 0)$. Combined production costs are given by $f(x_1, x_2)$. Economies of scope exist if $f(x_1, x_2) < f(x_1, 0) + f(0, x_2)$ i.e. when it is cheaper for a single firm to produce both products.

Networks – including electricity distribution networks – provide a clear example of natural monopolies (Newbery 1999, p. 27). Here, large scale economies exist as a result of the large portion of fixed costs. By their very nature, electricity networks are very capital intensive. Electricity distribution networks still comply with the natural monopoly definition if the more elaborate list of characteristics of natural monopolies, provided by Farrer (1902), is taken into account:

1. Economies of scale;
2. Capital – intensity;
3. Non – storability with fluctuating demand;
4. Locational specificity generating location rents;
5. Producing necessities or essential for the community;
6. Involving direct connections to customers.

Small vertically integrated electricity supply systems of SIDS also fit Farrer’s list perfectly. To the best of our knowledge there is no rule for the size of the electric supply industry that makes unbundling prohibitive. However, the primary virtue of unbundling is that it promotes competition, ensuring that firms provide their services at efficient prices. Unbundling is likely to be particularly attractive when market size and density permit many operators to function, providing both active and potential competition.

Figure 2.5: The relation between average costs and demand ($A_c$= average cost, $D$=demand, $x$=output)

Source: Train, (1991)

5 As cited by Newbery (1999, p. 28)
We concur with Kessides (2004) and Bacon (1995) that in many developing countries markets are too small for substantial competition to emerge. It has been argued that countries with an installed generation capacity of lower than 500 MW seem small for introduction of competition and as a consequence the benefits of competition that come from unbundling will be limited. Moreover, provision of many innovative market–responsive utility services requires investments in physical infrastructure. In unbundled systems it may be difficult for providers of competitive final services to coordinate with monopoly owners of infrastructure networks – especially if their incentives for investments are not in harmony. Thus another factor required for unbundling is a mature, well-developed set of network facilities, so that there is little need for new investments where incentive problems are more likely. Yet circumstances in most developing and transition economies are exactly the opposite. These countries require substantial new infrastructure investments, either because their networks are underdeveloped or because they have not been adequately maintained or modernized (or both).

Small Island Developing States (SIDS) are the group of small islands in the Pacific, Caribbean, Atlantic, Indian Ocean, Mediterranean and the South China Sea (AIMS), that have not yet reached developed country status. SIDS are small islands and low-lying coastal countries that share similar sustainable development challenges which increase their vulnerability and has resulted in their “special case” status in the international arena. This “special case” status is based on the following challenges to SIDS which include small populations, lack of resources, remoteness, and susceptibility to natural disasters, excessive dependence on international trade and vulnerability to global developments. In addition they suffer from lack of economies of scale, high transportation and communication costs, and costly public administration and infrastructure (Small Island Developing State Network, 2003). These characteristics will be further explored and are classified as general features and economic features of SIDS.

At present, fifty-one small island developing States and territories are included in the list used by the United Nations Department of Economic and Social Affairs in monitoring the progress in the implementation of the Barbados Programme of Action. These States and territories often work together through the Alliance of Small Island States (AOSIS).

2.3.1 General Features of SIDS

The purpose of this section is to highlight those characteristics that differentiate small island states from major industrial states. The special features of insularity will be further elaborated and comprise the following:

**Geographic**

SIDS vary widely in their geographical characteristics. They range from archipelagos like Indonesia, with an area of 1.9 million
square kilometers, to Saba, with an area of 13 square kilometers. There are also numerous single islands, like Curacao with an area of 440 square kilometers. There are high islands derived from volcanoes, from aggregations of continental rocks or from elevations of reef rock. There are low islands, comprising single islets, or two or more connected by reef rock to form atolls of carbonate rocks generally less than 15 feet above sea level. Islands are found in every altitude and in all climates.

**Small size**

Small size is the most frequently mentioned geographical characteristic of SIDS. Of the 23 Caribbean SIDS listed by the United Nations Department of Economic and Social Affairs (UNDESA) 17 had populations of less than one million in 2008.

**Remoteness**

Remoteness is another characteristic of SIDS. Most SIDS are more than 500 kilometers away from the nearest continent, and located away from frequented shipping and airline routes.

**Fragile Ecosystems**

The fragility of the ecosystems of SIDS is a consequence of their geographic isolation. The fragility of ecosystems is exacerbated by the intrusion of modern economic activities in a relatively small geographic space.

**Proneness to Natural Disaster**

SIDS are located in the path of natural disasters. Hurricanes, tropical cyclones and volcanoes have caused the greatest damage to SIDS. Naturally the effects of any disaster are more pronounced for a small island than for a large country with a variety of products and back up facilities.

**Economic Possibilities**

Insularity imposes limits on the range of economic possibilities open to SIDS. Lall and Gosh put it very well: “A large economy can do practically everything that a small one can, but not vice versa”. At the same time, even very small continental countries can participate in the economic activities of large contiguous states. For example, Luxemburg shares the electrical grid of its neighbors.

**Limited Land Area**

Small land area is the most obvious constraint on SIDS, limiting their opportunities for economic exploitation. Moreover, the volcanic origins of most SIDS render them mountainous, making for reduced arable land and difficult conditions for mechanization and transportation.

**Limited Natural Resources**

Insularity also imposes limits on the extent and range of natural
resources available for exploitation. Moreover, because of their geological origin (oceanic volcanoes), small islands are unlikely to have minerals of economic importance except for those like Trinidad, which are geologically part of a continent; they are also unlikely to have commercial deposits of fossil fuels.

**Demographic Constraints**

In absolute terms, the population of SIDS is usually small—sometimes so small as to make economic viability questionable. Frequently, population size appears to exceed the carrying capacity of the island. The deterioration of the domestic economy may force unemployed workers to seek work abroad. Migration opportunities may suddenly open up, for example, for English Caribbean emigrants to the UK in the 1950s and to the US in the 1970s and the Dutch Caribbean emigrants in the late 1990s and early 2000. Most problematic of all is the “brain drain”, that is the emigration to wealthier countries of persons trained in professional and technical skills at considerable cost to SIDS. A few successful emigrants may return to start businesses, but the most highly skilled seldom do. To secure a supply of skilled workers, SIDS must train many more people than its anticipated requirements.

**Political Constraints**

Small size naturally imposes serious political constraints upon small SIDS in their dealings with large neighbors. Even countries such as Mexico and Canada experience considerable discomfort from their proximity to the United States. SIDS are even more likely to get hurt as major powers throw their weight around in their perceived spheres of influence.

2.3.2 Economic Features of SIDS

The economics of SIDS, especially the smaller SIDS, may be analyzed in terms of openness, risk and economies and diseconomies of scale, within constraints of the general features of SIDS. This section is predominantly based on Blackman (2006) "The Practice of Economic Management: a Caribbean Perspective". The economic features reviewed are therefore within a Caribbean context.

**Openness**

Their narrow and skewed natural resource bases incline small SIDS towards economic specialization in their international trading arrangements. The net result is that SIDS tends to rely on one or a few agricultural products or minerals. If they are lucky, they also possess the basis of a tourism industry. Relatively small population size, limited resources, and absolutely small national incomes also limit the availability of capital for the development of SIDS. SIDS have therefore always relied heavily on capital inflows, either as foreign investment, imperial grants or, more recently, foreign loans, both commercial and concessional. A quote of Dana
Khatkate states that: “The economic characteristics of a mini state are that goods which are produced tend to be exported, goods which are sold in the mini state tend to be imported, and commodities which are both produced and consumed within the mini state tend to be services”.

**Risks Facing SIDS**

A small land area with a considerable distance from a continental landmass faces several hazards. Eight major hazards will be summarized that contribute to the risks facing SIDS.

- Hurricanes, volcanoes, earthquakes and similar acts of God require elaborate disaster preparedness measures.
- The geographical remoteness of SIDS and their relatively extensive coastlines are a constant invitation to intrusion. Smuggling, improper fishing practices, pollution of coastal areas by passing ships, invasion by alien fishermen, drug smugglers and mercenaries must all be guarded against.
- In the absence of appropriate conservation policies, the fragile biological, plant and marine ecosystems could be irreparably damaged and rare and unique species lost forever.
- Demographic instability could lead to excessive population pressures and strain the “carrying capacity” of a SIDS.
- Extensive specialization subjects the economies of SIDS to marked fluctuations of foreign exchange earnings.
- The indigenous cultures of SIDS are notoriously vulnerable to the intrusion of alien influences. A fine balance must be preserved between the adoption of useful technologies and the insidious penetration of alien influences, such as novel criminal practices, drugs and other socially harmful imports.
- New scientific advances in biotechnology and materials sciences could alter the comparative advantages in agriculture and mining that some SIDS now enjoy.
- The political decisions of major nations, whether reflecting malevolence, insensitivity or ignorance, may impact adversely on the economies of SIDS.

**Diseconomies of Remoteness**

Obvious diseconomies facing SIDS are those associated with remoteness. Islands that are isolated from major population and industrial centers are obviously at a disadvantage in terms of freight cost of imports and exports while their service industries, especially tourism, are severely handicapped by scarce or expensive airline services. Archipelagic SIDS have the further problem of intra-island or intra-regional transport. Transport costs frequently determine the viability of industries. For this reason SIDS governments are frequently forced to undertake the operation of airlines, shipping and ferry services in circumstances where private enterprises find the rate of return unattractive.
Narrow Markets

Severe diseconomies derive from the narrow markets of SIDS which reflect small populations and relatively low and badly distributed incomes. This deprives producers of economies of scale available in large economies, and makes for high unit costs. It also renders competition in the international arena difficult. Producers of tradable goods lack the domestic markets from which fixed costs may be recovered, allowing goods priced at marginal cost to penetrate foreign markets.

Narrow markets also give rise to monopoly and oligopoly and, in turn, to high transaction costs, since prices always tend to be higher than would prevail in highly competitive markets. This situation is most troublesome for national economic decision makers who must often choose between intervening themselves in the marketplace or allowing colluding oligopolies to fix prices.

High Cost of Infrastructure

The small scale of SIDS also condemns them to frightful diseconomies in the installation and maintenance of infrastructures. Runways for 747 aircraft must be as long in a SIDS as in London or Amsterdam, and deep – water harbors as deep in St. Kitts as in Rotterdam.

There are also minimal economic scales and standards for certain facilities, such as power and cement plants, and telecommunications systems. However the cost of such installations in SIDS must be borne by so few taxpayers that the financial burden is much greater than in larger societies with lower per capita incomes.

The small population of most SIDS also creates tremendous problems in the provision of many services that are considered essential to modern societies. Also the scale does not allow for crucial research and development. In some instances, common services, like shipping, university education and meteorological services may be provided cooperatively among neighboring SIDS; however, expensive facilities, like airports and harbors, must often be replicated on each island.

Economies of Small Scale

The synergies that arise when large quantities of a product or service are traded are fairly limited within SIDS given the size of the population. However, small has certain advantage as well. It is relatively easier for SIDS to achieve national consensus, to formulate and carry out programs, and above all, to achieve changes in policy in response to developments in a volatile environment.

In this investigative study we will concentrate on SIDS in the Caribbean. In subsequent paragraphs a list of the islands comprising the focus group of SIDS in this investigative study, together with the companies responsible for operating the electricity supply systems, will be given.
2.3.3 Economic Vulnerability and Resilience Concepts and Measurements

Many small states manage to generate a relatively high GDP per capita when compared to other developing countries in spite of their high exposure to exogenous economic shocks. This would seem to suggest that there are factors which may offset the disadvantages associated with such vulnerability. This phenomenon was termed by Briguglio (2003) as the “Singapore Paradox”. The “Singapore Paradox” refers to the seeming contradiction that a country can be highly exposed to exogenous shocks, rendering it economically vulnerable, and yet still manage to attain high levels of GDP per capita. Briguglio (2003, 2004) explains this in terms of the juxtaposition of economic vulnerability and economic resilience.

Economic vulnerability is well-documented in the literature from the conceptual and empirical viewpoints (see for example Briguglio, 1995; 2003; and Atkins et al., 2000). Most studies on economic vulnerability provide empirical evidence that small states, particularly island ones, tend to be characterized by high degrees of economic openness and export concentration. These lead to exposure to exogenous shocks, that is, economic vulnerability, which could constitute a disadvantage to economic development by magnifying the element of risk in growth processes, without necessarily compromising overall viability. Empirical work on the construction of an economic vulnerability index (see Briguglio, 1995; Briguglio and Galea, 2003; Farrugia, 2004) is often based on the premise that a country’s proneness to exogenous shocks stems from a number of inherent economic features, including high degrees of economic openness, export concentration and dependence on strategic imports.6

Economic resilience refers to the policy-induced ability of an economy to recover from or adjust to the negative impacts of adverse exogenous shocks and to benefit from positive shocks. The term is used in two senses, respectively relating to the ability to (a) recover quickly from a shock and (b) withstand the effect of a shock. The resilience index proposed by Briguglio et al (2006) is intended to measure the effect of shock absorption or shock counteraction policies across countries. It is hypothesized that the variables that capture these effects are, amongst others, macroeconomic stability, microeconomic market efficiency, good governance and social development.7

Briguglio (2003, 2004) proposes a methodological approach that identifies four possible scenarios into which countries may be placed according to their vulnerability and resilience characteristics. In this approach, economic vulnerability is ascribed to inherent conditions affecting a country’s exposure to exogenous shocks, while economic resilience is associated with actions undertaken by policy-makers and private economic agents which enable a country to withstand or recover from the negative effects of shocks. Actions which enable a country to better benefit from positive shocks are also considered to be conducive to economic resilience. The identified scenarios are termed as

---

6 Farrugia (2004) elaborated further on these ideas by considering the economic strength of trading partners as a proxy for the probability of shocks to exports.

7 A more detailed consideration of these criteria is given in Briguglio (2003).
“best case”, “worst case”, “self made”, and “prodigal son.”

> Countries falling within the “prodigal son” category are those with a relatively low degree of inherent economic vulnerability but whose policies are deleterious to economic resilience, thereby exposing them to the adverse effects of shocks.
> The “best case” category applies to countries that are not inherently vulnerable and which at the same time adopt resilience-building policies.
> Conversely, the “worst case” category refers to countries that compound the adverse effects of inherently high vulnerability by adopting policies that run counter to economic resilience.
> Countries classified as “self made” are those with a high degree of inherent vulnerability and which are economically resilient through the adoption of appropriate policies that enable them to cope with or withstand the effects of their inherent vulnerability.

These four scenarios are depicted in Figure 2.6 “Economic Vulnerability / Economic Resilience, Juxtaposing Vulnerability and Resilience” where the axes measure inherent economic vulnerability and nurtured resilience, respectively.

This method of defining vulnerability in terms of inherent features and resilience in terms of policy-induced changes has a number of advantages.

Firstly, the vulnerability index would refer to permanent (or quasi permanent) features over which a country can exercise practically no control and therefore cannot be attributed to inadequate policies. In other words, countries scoring highly on the index cannot be accused of inflicting vulnerability on themselves through misguided policy approaches.

Secondly, the resilience index would refer to what a country can do to mitigate or exacerbate its inherent vulnerability. Scores on this index would therefore reflect the appropriateness of policy measures.

Thirdly, the combination of the two indices would indicate the overall risk of being harmed by external shocks due to inherent vulnerability features counterbalanced to different extents by policy measures.

Given that vulnerability refers to inherent characteristics which render countries prone to exogenous shocks, vulnerability scores for a particular country should not differ much over time, and therefore it is not expected that a country moves vertically along the quadrants of Figure 2.6. But horizontal movement is possible for those countries that adopt measures which build resilience and vice versa. It would thus be possible for countries to switch between the worst case and the self made classifications, or the prodigal son and the best case classifications, through changes in their economic policies.

In Briguglio et al (2006) a classification of countries has been done using the resilience index and the vulnerability index. We refer to Figure 2.6 “Economic Vulnerability / Economic Resilience, Results Economic Vulnerability / Economic Resilience” for a graphical representation of these scenarios.

---

8 The analogy with the prodigal son is that these countries, though “born in a good family”, squander their riches.
The overall tendencies that can be derived from their analysis are that:
>
- countries which fall in the “best – case” quadrant are mostly the large “developed countries”;
- countries which fall in the “self – made” quadrant include a number of small states with a high vulnerability score;
- countries which fall in the “prodigal – son” quadrant include mostly large third world countries; and
- countries which fall in the “worst – case” quadrant include a few vulnerable small countries with weak economic performance.

Within the context of this investigative study we conclude that, with the exception of very few Caribbean SIDS that fall into the worst case quadrant, the vast majority of the Caribbean SIDS fall in the self made and best case quadrant.

We would like to point out the relevance of measurement and use of indices:
>
- **Disseminating of Information**: An index is a very good instrument for drawing attention to the issue being investigated. It makes policymakers, decision makers and stakeholders more aware of the factors that lead to the composition of the index. The exercise of creating an index also generates academic discussion and enhances awareness amongst scholars and practitioners on the issues involved.

- **Indices Can Help to Develop a Common Language for Discussion**. One often finds that parties engaged in debate go off at tangents because of lack of common definitions. In the case of indices, the quantification of their components requires precise definitions, and this could help focus the discussion on matters directly relevant to the issue.

- **Promoting the Idea of Integrated Action**. Although a composite index yields a single – value measure of the phenomena under consideration, it summarizes complex realities and therefore conveys the message that the issue under in-
vestigation is not the outcome of a single factor. This could help to foster an awareness of the interconnections between the components of the index. In the case of economic resilience, for example, it is often not enough, and may even be counterproductive, to take action in one area in isolation from others.

Having discussed the concepts of SIDS, economic vulnerability and economic resilience we would like to make some propositions for SIDS relating these concepts to an energy dimension.

> Energy and Economic Resilience
SIDS can become economically resilient if they:
- Use more of their own natural resources more efficiently
- Leverage upon the opportunities for renewable energy and invest in a timely manner in the upgrade of their generation, transmission and distribution system
- Lower the cost of energy, allowing lower cost for domestic production and services, thereby improving their competitiveness and ability to export goods and services.

> Energy and Social Resilience
SIDS have the opportunity to build social resilience by:
- Improving the accessibility and affordability of energy, and
- Creating new employment in local industries focused on domestic energy resources.

> Energy and Social Vulnerability
Social vulnerability is increased by:
- An uncertain energy supply and
- Lack of access to affordable energy
This leads to a socially unstable situation of the have and the have nots.

> Energy and Environmental Vulnerability
Environmental vulnerability is increased by risks such as:
- Fossil fuel spills
- Particulars in the air from poorly combusted fuels.
In the long term this contributes to climate change. Albeit that from SIDS this is a very minor contribution.

2.4.1 A Definition for SIMS
Reference is made to the characteristics of the electricity supply industry, the natural monopoly, general and economic features of SIDS. In this section we will now further elaborate on the electricity supply systems within SIDS. These systems are denominated as small island monopoly systems (SIMS). A very important characteristic for the definition of SIMS is that the electricity supply systems are vertically integrated systems which are still monopolies and will probably remain monopolies for the foreseeable future. Vertical integration, for the focus group of SIDS in this study, is a solution to the following:

> Vertical Integration and the Hold-Up Problem. The dedicated
nature of electricity assets implies that generators need transmission to get their product to consumers and that transmission assets need generators. Thus either side can “hold up” the other. That is, once assets are in place and independently owned, transmitters might refuse to pay anything above a generating plant’s marginal costs and generating firms might accept such demands. Generation requires transmission to reach consumers, the power plant’s assets cannot be dedicated to other uses, and the plant itself cannot move to a more lucrative service territory. A solution to this possibility is vertical integration, which ends the tension between generation and transmission over the division of the economic surplus from their interaction.

> Coordination of Investment in a Complex System. Vertical integration facilitates the coordination of highly specific and interdependent investments in generation and transmission. The two are substitutes in the production of bulk power (since transmission allows access to a larger universe of power plants) and complementary in the delivery of electricity from generators to consumers. Any new facility affects the economic value of all other facilities in the system, and an organization that owns the most of such facilities may also be most likely to understand their interactions and invest optimally in them.

> Risk Reduction and Risk Management. A vertically integrated utility may have less risk than one that operates under long term contracts with generators. Greater certainty may lower the company’s cost of capital which is of most importance in such a capital intensive industry. Furthermore the coordination mechanisms in day to day operation are possibly better assured.

As already emphasized vertical integration and the natural monopoly environment are essential for the definition of SIMS.

For the purpose of this thesis small isolated monopoly systems will be defined as:

“The isolated vertically integrated electrical supply systems of small island development states operating in a natural monopoly environment”.

Within this thesis the focus is geared towards SIMS of Caribbean SIDS. Another particularity is that the companies operating the SIMS are a member of the Caribbean Electric Utility Services Corporation, CARILEC9, and have participated in the Caribbean Benchmark Study10 and stock-taking of Caribbean Power Sector Reform11. CARILEC is the regional body of the electric utility industry in the Caribbean, orienting the utilities, investors and other stakeholders about the characteristics, behaviour and outlook of the electrical industry in the region. Acting as aggregator of its members’ needs, CARILEC produces and disseminates adequate information on the operation of regional utilities to improve electric en-
ergy supply in the Caribbean. We would like to refer to Annex II “Case Study: Caribbean Benchmarking Study” for a list of SIMS with the respective names of the companies operating them.

2.4.2 Policy Challenges Facing SIMS

SIMS, as in many other countries or states, face a number of policy challenges related to utility services. A few are summarized below. These are based on the author’s insights and experience and the CARILEC Position Paper on Energy Policy (2008).

> **Electricity Demand and Supply** – Growing population is increasing demand for electricity. As a consequence steps should be taken for improved energy efficiency and demand – side management that might reduce demand growth. Increasing supply to satisfy demand raises issues of infrastructure development, utility financing, price increases, and environmental impact.

> **Energy Infrastructure Development** – Reliable and well – positioned infrastructure for generating and transmitting electricity to population and business centers is important to avoid supply disruptions and related price volatility. Chronic supply issues would limit the economy, quality of life, and ability to enhance environmental protections.

> **Utility Financing** – Providing utility infrastructure requires investment in long – lived assets and ongoing upkeep. Investor confidence in proper regulatory and legislative treatment of investments is critical for ensuring adequate financing. At the same time, regulatory scrutiny of and incentives for efficiency should remain.

> **Energy Price Volatility** – Consumers and businesses are all feeling the impact of rising energy prices. Mechanisms are crucial that help customers, utilities, and policy makers to adapt to this new reality while balancing the state’s infrastructure, financing, economic development, affordability, and environmental goals.

> **Environmental Protection** – Environmental concerns affect electricity and water supplies, and future investment. New transmission and generating facilities can be complex and costly, which ultimately limits supply and increases prices for consumers. A recurrent question arises: Are there less costly ways to address environmental concerns with respect to the location of facilities? Also, uncertainty regarding climate change policies raises investment risk, which ultimately increases costs for consumers.

> **Electricity Pricing** – Do the current electricity prices reflect the opportunity costs of electricity use? How can policies be created to ensure that customers and suppliers make economically appropriate decisions with respect to electricity use?

> **Assistance to Low –Income Households** – In electricity supply, assistance programs for low income households appear to be a necessity to guarantee a minimum standard of living. Are these programs relevant for the future? Are energy assistance programs
adequate for the new environment of volatile energy prices?

- **Power Sector Reform** – Power sector reforms are designed to introduce competition where feasible, which is in the upstream production and downstream supply functions of the industry. Given the natural monopoly characteristics of the vertical integrated small electricity supply systems, what would be an optimal degree of power sector reform?

- **Regulation** – Does the current regulatory environment guarantee an adequate balance to protect the consumers’ and the investor’s interest and is it perceived to be politically legitimate and credible in the eyes of all stakeholders involved?

- **Hurricane hardening** – SIMS in the Caribbean must harden their electric infrastructure to better withstand and recover from severe weather. This requires a research and development effort to better understand hurricanes and to develop more effective and economical methods for protecting the infrastructure.

The above list of issues is not intended to be comprehensive. Rather it is meant to provide a sample of challenges that SIMS face. If the state is to address these challenges, leadership in government, industry, and education must carefully consider the nature of each issue and respond appropriately. A framework should facilitate addressing these challenges. A framework that promotes effective and efficient industry performance which is the central theme of this thesis will be further explored in chapter 6. In this part the challenges facing SIMS, which should be addressed through a framework, will be further explored and, like all public policy and business issues, include technical and adaptive challenges.

**Technical challenges**, which are the bread and butter of utilities policy and regulation, occur when there is general agreement on the existence and nature of the problem, the alternative solutions are clear, and work can be completed by subject matter experts. Examples include establishing incentive mechanisms for environmental regulations, developing procedures for enrolling low-income households in the lifeline discount program, evaluating proposals for rate increases, and hardening the electric infrastructure to better withstand and recover from hurricanes. Such issues are often demanding and complex, requiring significant amounts of expertise to resolve, but they are largely technical in that solving them is the work of subject matter experts, such as lawyers, engineers, accountants, and economists.

**Adaptive Challenges**, in contrast, arise when fundamental changes in a group’s (or an individual’s) environment call for the group to rethink basic goals and strategies to thrive or even just survive. Examples might include resolving electric infrastructure siting issues, which challenge traditional views of electricity supply and deeply felt perspectives on environmental protection. Similarly, electricity distri-
bution issues call into question historical approaches to governance, pricing, economic development, environmental protection, and standards of living.

Adaptive challenges are characterized by disagreements on the nature and existence of the problem. With adaptive challenges, only people who are part of the problem can be part of the solution, so the work of adaptive change can only be done by those whose values and traditions are challenged. Subject matter experts can only provide short-term ‘patches’ that do not solve the real problem.

Tackling technical challenges is the central work of experts in regulatory agencies, legislative bodies, other government organizations, industry, think tanks, and universities. Numerous university research centers around the world are looking for solutions to the technical challenges of utilities policy.

Addressing adaptive challenges requires leadership that exposes threats and engages people in rethinking basic assumptions and traditions. Leadership also emphasizes the interplay of issues. For example, energy policy needs to consider other uses/industries that are part of the overall supply and demand picture, such as transportation, land use, and efficiency (reflecting architectural and engineering standards). The challenges presented by the infrastructure sectors must be explicitly and carefully addressed in order to leave a sound legacy for future generations.

2.4.3 Stocktaking of the Caribbean Power Sector Reform: A Case Study

To gain a better understanding of the progress made by the focus group of Caribbean SIDS and SIMS in this investigative study, a stocktaking exercise of power sector reform was conducted. We refer to Annex I “Case Study: Stocktaking of the Caribbean Power Sector Reform”, where this study is fully elaborated upon. Herewith we give a summary of the conducted study and obtained results.

The methodology used was based on a questionnaire used by the Energy Sector Management Assistance Program12 (ESMAP) and based on a power sector reform rating methodology used by the European Bank for Reconstruction and Development.13

---

Box 2.1: ESMAP Questionnaire

1. Has the utility been commercialized and corporatized?
2. Has an Energy law been completely passed by Parliament (a law which would permit the creation of a sector that could be unbundled and/or privatized in part or in whole?)
3. Has a regulatory body started work (a body that is separate from the utility and from the Minsitry)?
4. Is there a private sector investment on greenfield sites in operation, or under construction?
5. Has the core state owned utility been restructured/separated?
6. Has any existing state owned enterprise been privatized (including outright sale, voucher privatization or joint ventures?)

The questions should be answered with either a yes or a no. The maximum response is six yes answers. By treating each yes as a value of one and each no as a value of zero, the maximum value of 6 could be achieved.

---

12 The ESMAP study was published in 1999. 115 countries have participated in the study.
13 The EBRD study was published in 2000. 26 countries have participated in the study.
In total 14 Caribbean SIDS have participated. The results of the ESMAP questionnaire are shown in Table 2.3: "Results ESMAP Questionnaire". The results are also aggregated and a reform indicator is calculated. This is presented in Table 2.4: “Aggregated ESMAP Caribbean Power Sector Reform Scores”. The Caribbean power sector reform score is compared with other regions illustrated in Figure 2.7: “Power Sector Reform Indicator Comparison of Regions”. Finally we show the power sector reform transition levels derived from the EBRD methodology in Figure 2.8 “Results Caribbean EBRD Power Sector Reform Transition Levels”.

1. **Level 1**: Power sector operated as a government department; political interference in running the industry; few commercial freedoms or pressures; average prices below costs, with external and implicit subsidy and cross subsidy; very little institutional reform, with monolithic structure with no separation of different parts of the business.

2. **Level 2**: Power company distanced from the government, for example a joint-stock company, although still political interference; some attempts to harden budget constraint but management incentives for efficient performance weak; some degree of subsidy and cross subsidy; little institutional reform; monolithic structure with no separation of different parts of the business; minimal, if any, private-sector investment.

3. **Level 3**: Law passed accounting for full-scale restructuring of the industry, including vertical unbundling through accounting separation, setting up a regulator, some tariff reform and improvements in revenue collection; some private involvement.

4. **Level 4**: Law for industry restructuring passed with separation of the industry into generation, transmission, and distribution, and setting up a regulator with rules for cost-effective tariff setting formulated and implemented; arrangements for network access (negotiated access, single-buyer model) developed; substantial private-sector involvement in distribution and/or generation.

5. **Level 4+**: Business separated vertically into generation, transmission, and distribution; an independent regulator with full power to set cost-reflective effective tariffs; large-scale private-sector involvement; institutional development covering arrangements for network access and full competition in generation.

In total 14 Caribbean SIDS have participated. The results of the ESMAP questionnaire are shown in Table 2.3: "Results ESMAP Questionnaire". The results are also aggregated and a reform indicator is calculated. This is presented in Table 2.4: “Aggregated ESMAP Caribbean Power Sector Reform Scores”. The Caribbean power sector reform score is compared with other regions illustrated in figure 2.7: “Power Sector Reform Indicator Comparison of Regions”. Finally we show the power sector reform transition levels derived from the EBRD methodology in Figure 2.8 “Results Caribbean EBRD Power Sector Reform Transition Levels”.

### Table 2.3: Results ESMAP Questionnaire

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Aruba</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Barbados</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Bermuda</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Bonaire</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Cayman</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Curaçao</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Grand Bahama</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Grenada</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Jamaica</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Montserrat</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>St. Martin</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Trinidad</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

### Table 2.4: Aggregated ESMAP Caribbean Power Sector Reform Scores

<table>
<thead>
<tr>
<th>Reform</th>
<th>Corporate</th>
<th>Law</th>
<th>Regulator</th>
<th>IPP’s</th>
<th>Restructure</th>
<th>Privatization</th>
<th>Reform Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14</td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>10</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Percentage</td>
<td>100%</td>
<td>50%</td>
<td>50%</td>
<td>36%</td>
<td>71%</td>
<td>64%</td>
<td>66%</td>
</tr>
</tbody>
</table>
The Stocktaking of the Caribbean Power Sector Reform study resulted in the following findings:

- It is noteworthy to observe that according to responses of the ESMAP Power Sector Reform questionnaire all participating Caribbean utilities have been corporatized. The score obtained for this reform level indicator was 100%.

- The aggregated ESMAP Energy Law indicator and the Regulator indicator obtained a score of 50% indicating that still considerable progress with further deployment of these reform indicators can be made.

- The ESMAP Aggregated Privatization indicator obtained a relatively high score of 64% indicating considerable presence of private ownership in the sector. As a consequence the sector is exposed to pressures from private sector and lending agencies to adhere to governance principals from a country-, regulatory - and corporate governance perspective.
The overall ESMAP Reform indicator shows that in the Caribbean countries surveyed, on average, in two third of the cases, considerable reform steps have been undertaken. The aggregated overall reform indicator of 4 is relatively high compared to the other regions with only Latin America with an aggregated overall reform indicator of 4, three outperforming the surveyed Caribbean Countries. We need to make an observation that the aggregated overall reform indicator obtained from the other regions reflects the power sector reform status of the year 2000.

- The EBRD defined the levels of transition of Power Sector Reform (levels 1 – 4+) according to more complex criteria. It is noteworthy to observe that 50% of the participating countries have transition levels of maximum 2 and another 50% have transition levels between 2 and 4. None of the countries have a maximum transition level of 4+. One country scored a transition level of 1, 6 countries scored a transition level of 2, two countries scored a transition level of 3 and five countries scored a transition level of 4.

- During the discussions session of the presentation of the Caribbean power sector reform status the reform step of regulation was identified as currently the most challenging and pressing aspect of reform. Transparency, consistency, coherence and predictability were pronounced as fundamental principles that require a high level of adherence as the major prerequisite to guarantee an effective performance of the electric utility. This finding has been reaffirmed during sessions held to craft the CARILEC position paper on Energy policy and has been documented in the CARILEC Position Paper on Energy policy launched in 2008.

2.5.1 Synthesis

In this chapter the specific characteristics of the electricity supply industry, the functional decomposition of the industry and different electricity supply markets are elaborated. Special attention is given to the determinants of a natural monopoly. Furthermore the general and economic features of small island development states (SIDS), comprising amongst others small populations, lack of resources, remoteness, susceptibility to natural disasters, excessive dependence on international trade and vulnerability to global developments are explored. We have looked into concepts and measurement of economic vulnerability and economic resilience. Economic vulnerability is defined as the exposure of an economy to exogenous shocks, arising out of its inherent characteristics, typically associated with smallness, while economic resilience is the policy – induced ability of an economy to withstand or recover from the effects of adverse shocks. Furthermore the important policy challenges, amongst others energy price volatility, utility financing, environmental protection and regulation, categorized as technical challenges and adaptive challenges facing electricity supply systems of
SIDS, have been elaborated upon.

A definition for SIMS has been explored. The following definition for SIMS is proposed within this investigative study: **SIMS are vertically integrated electrical supply systems of SIDS operating in a natural monopoly environment.**

Furthermore we have elaborated on the conducted study “Stocktaking of the Caribbean Power Sector Reform”. The major findings reveal that the overall reform indicator, out of a maximum score of 6, obtained a score of 4 which is relatively high indicating that considerable reform steps have been taken throughout the 14 Caribbean SIDS that have participated. The Energy law indicator and the Regulator indicator obtained a score of 50% indicating that considerable progress with further deployment of these reform indicators can still be made.

Throughout this chapter research question **RQ1. “Key economic principles and concepts of SIDS and SIMS”** is fully elaborated. This comprises an important building block of the framework to promote effective and efficient industry performance for SIMS. In the subsequent chapters we will further elaborate on the several other important building blocks to finally put them together in a framework for SIMS to promote effective and efficient industry performance.

### 2.5.2 The way forward

Having established a definition for SIMS in the subsequent chapters we will further explore what constitutes effective and efficient industry performance from both a literature review perspective and a case study perspective. This will be done throughout chapter 3. In chapters 4 and 5 we will than further elaborate on the interplay of institutions with industry performance and the interplay of governance with industry performance. Having elaborated on these building blocks separately we will then integrate them into a framework for SIMS to promote effective and efficient industry performance in chapter 6.
Regulation in Splendid Isolation

Key Economic Principles and Concepts of SIDS and SIMS
Effective and Efficient Industry Performance
3.1 Introduction

3.1.1 Background

In most business enterprises a good information system is required to enable those who own the enterprise, the principals, to control the actions of those they employ to run the enterprise, their agents. This permits those who supply capital to the enterprise to judge its performance and take action to correct poor performance. In the private sector this line of accountability is relatively clear – cut, as is the overall objective of the enterprise to maximise the net present value of profits. Investors have an incentive to continuously assess whether to buy, sell or retain equity in the enterprise and have an effective and immediate sanction to use against poor management in the form of a withdrawal of funds. Competitive pressures ensure that poor performers do not survive in the long run (Simmons, 2000).

Relatively simple financial ratios and, more recently, discounted cash flow analyses have formed the principal monitoring devices in the private sector. The emphasis is now for enterprises to disclose comprehensive information in their financial statements and for investors and their advisers to form their own measures of profitability.

In the public sector the situation is considerably more complex. There are several dimensions to the principal/agent relationship for public utilities, lines of accountability are much less clear cut and there is often an absence of competition. Furthermore, the relationship between the organisation and its customers is more complex in the case of public utilities. Whereas in the private sector the customer is normally assumed to be kept informed of output quality and options by advertising and competition, in the public sector the customer typically does not have access to alternative suppliers and comparative data may form the only basis for judging output quality (Lawrence, 1993).

Performance for any enterprise will be multi – faceted. However, the complexity of this for public enterprises providing infrastructure services is likely to be much greater, leading to the need for more complex performance measurement information systems than those typically found in the private sector. As a result, rather than simply focusing on measures of profitability and potential financial distress, performance measurement of public utilities has tended to focus on measures associated with inputs, processes, outputs and outcomes.

Throughout this chapter the concept of industry performance and the crucial role of performance measurement will be further explored both from a corporate and a regulatory perspective. Specific emphasis will be given to concepts of industry performance for an electric utility.

3.1.2 Chapter Outline

Section 2 starts with an operational delineation of performance and performance measurement. Effective and efficient industry performance is further explored and a definition is given within the context of this thesis. In section 3 a review will be given of internationally recognized performance measurement frameworks that can be deployed by utility management. Section 5 will elaborate on performance measu-
3.2 Defining Effective and Efficient Industry Performance

3.2.1 An Operational Delineation of Performance

In this paragraph the questions of what performance is and how to create it are addressed.

The word performance is widely used in all fields of management. In the management control area, terms such as performance management (Euske, Lebas and McNair, 1993), measurement, evaluation, or appraisals (e.g. Bruns, 1992) are widely used. Often, performance is identified or equated with effectiveness and efficiency (e.g., Neeley, Gregory and Platts, 1995). In short, performance is one of those “suitcase words” in which everyone places the concepts that suit them, letting the context take care of the definition.

According to Euske and Lebas (2002) a review of dictionaries (of both the French and the English language) shows a diversity of meanings for the term performance. Performance is:

- measurable by either a number or an expression that allows communication (e.g., performance in management is a multi-person concept);
- to accomplish something with a specific intention (e.g., create value);
- the result of an action (value created, however measurable);
- the ability to accomplish or the potential for creating a result (e.g., customer satisfaction seen as a measure of the potential of the organization for future sales);
- the comparison of a result with some benchmark or reference selected – or imposed – either internally or externally;
- surprising result compared to expectations;
- acting out, in psychology;
- a show, in the “performing arts,” that includes both the acting or actions and the result of the actions as well as the observation of the performers by outsiders;
- a judgement by comparison (the difficulty here is to define who the “judge” is, and to know on which criteria the judgment will be formed).

Performance refers simultaneously to the action, result of the action and to the success of the result compared to some benchmark. Viewing performance as a comparative judgment captures some of this complexity. If there is a judgment, a judge must be selected and criteria for the judgment need to exist.

The criteria for the judgement are likely to focus on results, since the purpose of management is to create a continuous flow of value. Euske and Lebas (2002) argue that it therefore becomes important to create a definition that will focus managers on anticipation of performance. They take the position that performance is the sum of processes that will lead managers to take appropriate actions in the present that
will create a performing organization in the future. In other words, performance is defined as “doing today what will lead to measured value tomorrow”.

To create something in the future a causal model is necessary, so that the process through which performance (future results) will be created can be identified and managed. Past performance (past results) alone is not necessarily a good predictor of future performance. A causal model that links action now to results in the future can take a variety of forms. From a generic perspective the following three stages can be observed:

- outcome (often reduced to output results)
- processes, and
- foundations.

Each firm or organization will need to define the concepts that apply to its own, unique situation. The very process of definition of the three components of the model is an essential step in creating performance. Once the model is defined, each organization must select the appropriate indicators to describe it and monitor its status.

Performance is a complex concept. The complexity increases both the difficulty of defining the concept, and the likelihood that indicators of performance will at times be contradictory. Such contradictions can be managed if one has a good understanding of the process that generates the various types of results; hence the importance of the causal model as a means to understanding the organization and its interaction with its environment. However, once a model is adopted, performance, because it is defined as a process as well as the future outcome, cannot be separated from the model. The model both defines and legitimates the performance (Fligstein, 1990). Performance is a social construct. The model creates the reality about what performance is.

We would like to bring forward three of the nine propositions of Euske and Lebas (2002), that form the basis on which performance can be defined, identified, measured, and managed.

**Proposition 1**
Performance can only be expressed as a set of parameters or indicators that are complementary, and sometimes contradictory, that describe the process through which the various types of outcome and results are achieved.

**Proposition 2**
Understanding performance relies on the identification of a causal model that describes how actions today can influence results in the future. Performance is not a one-off event. Performance is dynamic. A performance measure is an instance in the continuous performance creation process. A performance measure is a leading indicator of performance only if the organization has acquired the knowledge and the mastery of its causal relationships and can reproduce this outcome or result in the future.
Proposition 3

Performance is a relative concept requiring judgement and interpretation. Performance is affecting a superior process or result relative to the referent. Choice of the referent is a significant decision with long term consequences. The relatively superior position could be short or long term and over few or many indicators. Contradictions among the temporal measures and other indicators are inevitable. Performance will again be in an interpretative context in which managers or users of information will decide on the key parameters of performance.

Recapitulating, Lebas and Euske (2002) have explained that performance is the result of a deliberate construction – that is, it is not something an individual observes and measures. "Performance is a relative concept, defined in terms of...a complex set of time – based and causality – based indicators...[it] is about generating future results...[which] can be described through a causal model. Each part of the model can in turn be subjected to analysis" (p. 65).

Performance is meaningful only when used by a decision maker, however. Lebas and Euske (2002), among others, believe that specific meaning should be the result of discussions between organization managers and executives. The goal of these discussions is to identify a set of causal relationships, then to choose a common set of indicators. These indicators should relate to all stakeholders of the organization and define performance from their varied and respective points of view.

3.2.2 Effectiveness Further Explored

Effectiveness is defined as the degree to which objectives are met. Within the context of a public utility effectiveness is related to the degree to which the public utility policy objectives are met. The objective of the public utility policy is to promote the provision of public utility services that contribute to the long – term economic development of a country or region and to the wellbeing of its people by adopting a policy seeking to:

- ensure the long – term sustainability of services;
- achieve economic efficiency in the provision of services;
- safeguard the quality dimensions of services;
- promote the accessibility and assure the affordability of services to all citizens;
- meet wider national objectives, in particular the protection of the environment.

To Ensure Long – Term Sustainability of Services

Ensuring long – term sustainability of services is contingent on the availability of resources to fund the operation, maintenance and investments that are required to improve and expand the services to existing and future consumers. Therefore, service suppliers must be assured a stream of financial flows that covers the operating, maintenance and capital expenditures associated with the services; macroeconomic and sector conditions must foster a favourable investment environment in the industry, facilitate access to financial resources and reduce the cost of capital; and consumers must be satisfied or the political sustainability of the services may be in jeopardy.

To Achieve Economic Efficiency

When economic efficiency is achieved, prices can be kept at the minimum level compatible with the long – term sustainability of the service, and at the same time, they can provide consumers with incentives resulting in an optimal use of the service. If circumstances permit, competition will be the most effective means of promoting economic efficiency. However, when circumstances do not permit, efficiency incentives can still be enhanced through a variety of institutional and regulatory mechanisms.

To Safeguard Quality

The adequacy of any public service will be contingent on safeguarding the quality provided to the consumer. It is therefore important to ensure that cost changes are properly balanced with any change in the quality of service. This balance can be obtained only with the development of a sound framework for quality of service regulation. This framework will encompass a set of procedures whereby feasible quality standards are clearly defined with reference to the balance of costs and benefits, and subsequently monitored and enforced via a system of penalties and incentives.

To Promote Accessibility and Assure Affordability

Promoting accessibility and assuring affordability of the service to all citizens occupies an important position in the political philosophy of public service provision. Social policies should reflect the importance of promoting access and affordability but all users.

To Meet Wider National Objectives

The operation of public services may sometimes be in conflict with wider national objectives such as the protection of the environment. The power sector clearly has a substantial impact on environmental quality. As a consequence this sector must be integrated within a framework of environmental regulation which is compatible with the economic circumstances of the country.
Trade-offs Among Objectives

A number of important trade-offs exist among the objectives. For example, long-term sustainability may come into direct conflict with promoting accessibility and attaining efficiency. Where such situations arise, difficult judgments will need to be made. While the appropriate balance will be highly context-dependent, the resolution of such trade-offs should be guided by the long-term achievement of the objectives; it should be based on a thorough analysis of the problem; and should be resolved via the use of transparent policy mechanisms that minimize any economic distortion. However, to avoid getting into the vicious circle of performance decline no compromise should be made in meeting the objective of long-term service sustainability by ensuring that financial flows rise to a level compatible with full cost recovery, while guaranteeing economic efficiency as a general goal of service provision.

3.2.3 Efficiency further explored

Efficiency is a relative term. It is never absolute. It is relative to some criterion. Efficiency is a judgement, a statement of preference. In the context of economics the judgement or preferences are about allocation of resources.

In the theoretical literature, the efficiency of a firm is defined in terms of two separate concepts: technical efficiency and allocative efficiency (Farrell 1957). Technical efficiency reflects the ability of a firm to produce the maximum level of output from a given set of inputs, whilst allocative efficiency reflects the extent to which firms use inputs (for example capital and labour) in optimal proportions for a given set of input prices and a given technology. These two measures of efficiency can then be combined into a measure of economic efficiency – which is also referred to as cost efficiency.

In each case, the relevant efficiency measure is defined relative to some notion of best practice at a particular point in time. This notion of best practice is referred to as the efficiency frontier. If a firm is operating on the frontier it is defined as efficient; if it is operating away from the frontier it is defined as inefficient, and the level of inefficiency is measured relative to the frontier (in the case of a cost frontier, inefficient firms are those operating above the cost frontier). From a practical perspective, efficiency measurement therefore requires the computation or estimation of an efficiency frontier, and there are a number of alternative benchmarks that might be used to define the frontier and a number of different measurement techniques (see paragraph 3.4 Benchmarking Techniques).

By way of illustration, Figure 3-1 shows a simple example of a cost frontier, where (minimum) total costs are shown as a function of a single output variable. Firm B is operating on the efficiency frontier and is therefore considered to be 100% efficient and is given an efficiency score of unity. By contrast, firm C is above the cost frontier, and is measured relative to the cost frontier by the ratio AB/AC, which is less than
The efficiency scores derived in this way lie between zero and one. In this case, since the comparison is measured relative to a cost frontier, the derived efficiency measure reflects total economic or cost efficiency.

Efficiency measures computed relative to the production frontier – which shows output as a function of input quantities – reflect technical efficiency only.

The terms efficiency and productivity are closely related, and are often used interchangeably for convenience. However, they are slightly different. Measurement of productivity and efficiency both involve an assessment of the outputs delivered per unit of input. The difference is that efficiency is measured relative to a frontier, which takes account of differences in scale and in other environmental factors.

**Figure 3.1: Cost Frontier**

*Source: CEPA (2003)*

---

**Productivity:** Physical productivity is defined as output over inputs, and may be expressed in terms of partial measures (e.g. labour productivity) or total factor productivity (TFP). When combined with information about input prices, physical productivity measures may be converted into measures of unit cost which can be thought of as productivity measures. Productivity differences between firms at a point in time will be affected by differences in efficiency, but also by the scale of production and other environmental factors that affect the production process. When looking at productivity comparisons over time, an additional source of productivity change – technical change or technological progress – becomes possible.

**Efficiency:** The same measures of inputs and outputs used to measure productivity are used to identify efficiency scores. The difference is that efficiency is a relative measure (relative to an efficiency frontier). In constructing the efficiency frontier, differences in scale and other operating environmental factors are taken into account before calculating efficiency scores. This means that where there are economies of scale, a large firm would be defined as more productive than other firms, but would not, other things equal, be defined as more efficient. (Just to confuse matters further, however, sometimes the litera-
Regulation in Splendid Isolation

Effective and Efficient Industry Performance

Ture refers to productivity differences resulting from scale effects as ‘scale inefficiency’.

These definitions are important in a regulatory context. Economic regulators are concerned with assessing the potential for regulated firms to deliver improvements in TFP over time.

\[
\text{TFP} = \text{Efficiency} + \text{Technology} + \text{Scale Effects} + \text{Environment}
\]

Equation 1

This equation shows that such an assessment requires consideration of four separate elements:

- The scope for inefficient firms to improve their efficiency performance by moving towards the efficiency frontier (catch-up savings);
- The productivity gains which might result from technological progress (shift in the frontier);
- Potential productivity growth resulting from scale effects; and
- Potential productivity growth resulting from any expected changes in other environmental variables.

Within this thesis the following definition will be used for economic efficiency:

**Economic Efficiency**: A term that refers to the optimal production and consumption of goods and services. This generally occurs when prices of products and services reflect their marginal costs. Economic efficiency gains can be achieved through cost reduction, but it is better to think of the concept as actions that promote an increase in overall net value (which includes, but is not limited to, cost reductions).

Economic efficiency can be broken down into the following categories:

- **Productive Efficiency**: the relationship between inputs and outputs and the adoption of best practice technologies and approaches;
- **Allocative Efficiency**: the extent to which resources are put to their best use by providing the right signals for consumption and investment; and
- **Dynamic Efficiency**: the extent to which innovation and productivity gains are encouraged over time.

3.2.4 Effective and Efficient Industry Performance: a Definition

Having explored an operational delineation of performance, effectiveness and efficiency we propose the following definition for “Effective and Efficient Industry Performance”.
The delivery of reliable, affordable and widely accessible service at the lowest possible prices in such a way as to maintain acceptable service quality, financial viability and environmental sustainability levels.

3.2.5 Measuring Industry Performance: Performance Measurement Frameworks.

Research indicates that organizations using balanced performance measurement systems as the basis for their management perform better than those that do not (Lingle and Schliemann, 1996). For the benefit to be realized, it is necessary for organizations to implement an effective performance measurement system that “enables informed decisions to be made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through acquisition, collation, analysis, interpretation, and dissemination of appropriate data” (Neeley, 1998, pp.5 – 6). This definition is important as it indicates that a performance measurement system has a number of constituent parts:

- Individual measures that quantify efficiency and effectiveness of actions;
- A set of measures that combine to assess the performance of an organization as a whole;
- A supporting infrastructure that enables data to be acquired, collated, sorted, analyzed, interpreted, and disseminated.

For the full benefit of measurement to be exploited it is important for an organization to maximize the appropriateness and effectiveness of measurement activity at each of these levels. In the following paragraphs we will review the well established existing performance measurement frameworks that could be deployed by utility management to measure performance.

3.2.6 The Malcolm Baldrige Quality Award

The Malcolm Baldrige National Quality Award is a very prestigious award that provides a systems perspective for companies to understand performance management (Kesler, 1995). The criteria for performance excellence provide organizations with an integrated, results – oriented framework for implementing and assessing processes for managing all operations. Performance excellence criteria also reflect validated, current management practices against which an organization can measure itself. With their acceptance nationally and internationally as the model for performance excellence, the criteria represent a viable way to communicate best practices among organizations. The criteria are also the basis for the Malcolm Baldrige National Quality Award process – that is, they represent the basis for making awards and providing feedback to applicants. The annual self – evaluation covers the following seven categories of criteria:

- Leadership
- Strategic Planning
- Customer and Market Focus
Regulation in Splendid Isolation

Effective and Efficient Industry Performance

Information and Analysis
Human Resource Focus
Process Management
Business Results

Assessments like the Malcolm Baldrige Award rely on criteria that emphasize customer importance. Leadership criteria, for example, pertain to the company’s leadership system, values, expectations, and public responsibilities. Strategic Planning criteria refer to the effectiveness of strategic and business planning and deployment of plans, with a strong focus on customer and operational performance requirements. Business Results, on the other hand, focus on performance results, trends, and comparison to competitors in key business areas – customer satisfaction, financial and marketplace, human resources, suppliers and partners, and operations.

The Malcolm Baldrige Award was named after a former Secretary of Commerce. It was established in 1987 to recognize United States companies for their achievements in quality and business performance (Wentink, 2005). Its purpose was also to raise the importance of quality and performance excellence as a competitive edge. Specifically, the Award was established to promote quality awareness, recognize quality achievements of U.S. companies, and publicize successful strategies (Capezio & Morehoue, 1995). This prestigious award is determined annually by a Board of Examiners which evaluates applications based on the seven fundamental categories listed above. The Award especially places great emphasis on customer satisfaction. Judgement is determined by approach, deployment, and results. But it is not the Award per se that holds the greatest value. Rather, the value pertains to its use as an excellent framework – one of the few measures that come close to producing an international standard for TQM. The value of a structured discipline using a points scoring system has been well established in quality and safety assurance systems. It is of interest to note that the extension of this approach to a total quality process has long been established in the Japanese – based Deming prize.

Figure 3.2: Baldrige Criteria for Performance Excellence Framework
Source: www.baldridge.nist.gov.com

Effective and Efficient Industry Performance
The Malcolm Baldrige National Quality Award is presented annually to companies that exhibit excellence in all aspects of quality (Wentink, 2005). A maximum of two awards may be presented in each of three classifications: large manufacturing, services and small business. As previously noted, the Award spans seven categories, but places most emphasis on top executive leadership among the evaluation criteria (Capezio & Morehoue, 1998). It could also be viewed as a framework for business process reengineering, among other applications.

3.2.7 The Balanced Scorecard

The balanced scorecard approach to strategic management was developed in the early 1990s and represents "one of the major developments in management accounting in the past decade," according to Olve et al (1999). These researchers examined the balanced scorecard in relation to the effects of assurance and process accountability on managerial judgment. Results of their study suggested "that either the requirement to justify an evaluation to a superior or the provision of an assurance report on the balanced scorecard increases the use of unique measures in managerial performance evaluation judgments".

Essentially, this performance framework is a measurement tool that is used to convert the strategic goals of the company into performance measures and objectives – both financial and non-financial (Kaplan & Norton, 2001). It can be used for the whole of the business enterprise, or for individual departments or units within the organization. In companies that are more diversified, for example, individual business units may function in different product markets and thus require different strategies. The balanced scorecard represents a very flexible measurement tool in that it allows managers of different units to customize their unit scorecard to match their unique set of performance measures, targets, and goals. Most units have certain goals and targets in common, but also have their own unique set of goals and objectives.

This approach to measurement – different from many predecessors – provides clear directions as to what companies should measure in order to balance the financial perspective and thus represents not just a measurement system, but a management system as well. For example, it provides feedback around both the internal business processes and external outcomes in order to continuously improve strategic performance and results. When used to its fullest potential, the balanced scorecard transforms strategic planning from a static exercise into a dynamic part of the organization that supplies meaningful vision and strategy (Kaplan & Norton, 2001).

Thus, the balanced scorecard has emerged as a management tool for translating organizational vision into a set of measurable strategic or tactical objectives. According to Kaplan and Norton (1996), while the initial focus and the application of the balanced scorecard has been geared towards the private sector, the opportunity for the scorecard to improve outcomes in the public sector is even greater than that of the private sector. This tool provides substantial focus, motiva-
tion and accountability, Kaplan notes. In addition it communicates to external constituents and internal employees the outcomes and performance drivers by which the organization will achieve strategic objectives.

As explained in the literature, this approach suggests that the company – regardless of type of industry or profit status – should be viewed from four different points of view (Kaplan & Norton, 2001). These perspectives include:

> learning and growth,
> business process,
> customer, and
> financial

For each of these perspectives, metrics should be developed and data collected and analyzed. Figure 3.3 on the following page provides a flowchart as to how these areas relate to each other, what should be measured, and how they relate to the company vision and strategy as a whole. As indicated for each area, the balanced scorecard requires a listing of objectives, measures, targets, and initiatives. The question to be asked from the financial perspective, for example, is “To succeed financially, how should we appear to our shareholders?” With respect to internal business processes, the question to ask is “To satisfy our shareholders and customers, what business processes must we excel at?” As can be seen, all four areas with their respective questions relate to and are indeed dictated by the organization’s overall vision and strategy.
3.2.8 EFQM

Another performance framework under discussion at the present time is the European Foundation for Quality Management (EFQM) model. This model is more commonly known as the Business Excellence Model (EFQM Home Page, 2004) and was developed in 1992 as a framework for assessing applications for the European Quality Award. Again, this measurement tool serves both as a performance and a management measure because it provides opportunities for management to assess how close (or far) they are from achieving excellence and which weaknesses they need to further address.

The EFQM model is based on nine criteria, five of which are called “Enablers.” These simply refer to what the organization does. The remaining criteria are called “Results.” These pertain to what the company achieves. Excellence, according to the model, is gained in terms of the leadership that drives the company policy and strategy. It is also reached when leadership is able to motivate people to best use partnerships and resources to operate and improve the organization’s more important processes.

As further explained by Wentink (2005), under each enabler criteria questions are asked about what is undertaken. Responses to these questions are assessed against a checklist of best practices. “There are then a further 4 themes [criteria] for the results the organisation is achieving which are:

- Customer Results;
- People Results;
- Society Results; and
- Key Performance Results.

Performance in these areas is assessed over time and trends evaluated”. Each of the nine model criteria are further separated into 32 sub-criteria for the more important purposes of clarification and scoring. Through self-assessments, the company needs to formally list how each of the enabler and Results criteria are Approached, Deployed, Assessed, and Reviewed. This is called the RADAR methodology.

As explained on the EFQM home page, while distinguishing between a large variety of ways to achieve performance excellence, this particular model is based on the following principle: “Excellent results with respect to Performance, Customers, People and Society are achieved through Leadership driving Policy and Strategy, that is delivered through People Partnerships and Resources, and Processes” (EFQM, 2004, p. 1).

Some fundamental concepts are inherent in this model. For example, with regard to results, excellence is achieved when meeting the needs of all groups of stakeholders. For customers, excellence is achieved by creating sustainable customer value. Excellence in leadership, on the other hand, is attained when guidance is visionary, inspirational, and purposeful. Through employee development and involvement, people excellence is attained. Excellence is also attained through developing and maintaining value-added partnerships.
Components of the model are presented in the diagram on the following page (see Figure 3 – 4). As indicated, the major enabler, leadership, motivates other enablers (people, policy and strategy, etc.) to best use partnerships to address processes. Results the organisation is achieving are produced in terms of People, Customer, Society and Key Performance.

There are a number of advantages to employing this model. Specifically, the EFQM provides a framework which is easy to understand throughout the organisation and it serves to identify gaps and weaknesses which the company needs to address.

It also identifies strengths the company can use to develop and further consolidate. An additional advantage is that the framework can be used for benchmarking against other organizations. Of the greatest importance, however, is the advantage that the framework “enables private, public and voluntary sector organisations to compare their performance and provides a method for measuring improvements in performance over time” (Wentink, 2005).

3.2.9 The Performance Prism

The final performance framework under discussion at the present time is the Performance Prism and represents another performance measurement technique (Neely, 2002b). It is an innovative performance measurement and management framework and differs from the others described in previous sections above in that it addresses all of an organization’s stakeholders. These include customers, investors, intermediaries, suppliers, employees, regulators, others associated with the organization, and communities as well. This is achieved by assessing needs and wants in a reciprocal relationship – that is, by considering the needs and wants of each of the organization’s stakeholders in addition to what the organization wants and needs from each of its stakeholders (Neely, 2002b).

The Performance Prism is comprised of five facets; these include

- Stakeholder Satisfaction,
- Strategies,
- Processes,
- Capabilities, and
- Stakeholder Contribution.

Figure 3.4: EFQM Model
Source: www.efqm.com
Neely and Adams (2002) provide a graphic picture of this prism (see Figure 3.5). They explain that the top and bottom facets represent Stakeholder Satisfaction and Stakeholder Contribution, respectively. The three side facets consist of Strategies, Processes and Capabilities. The researchers clarify why they selected this prism shape:

“A prism refracts light. It illustrates the hidden complexity of something ... simple as white light. So it is with the Performance Prism. It illustrates the complexity of performance measurement and management. Single dimensional, traditional frameworks pick up elements of this complexity.

“While each offers a unique perspective, it is essential to recognize that this is all that they offer – a single uni-dimensional perspective on performance. Performance, however, is not uni-dimensional. To understand it in its entirety, it is essential to view from the multiple and interlinked perspectives offered by the Performance Prism” (p. 8).

All performance measures should begin with a clear picture of who the key stakeholders are and what they want, they explain. Organizations aspiring to be successful also have defined what strategies they will pursue to ensure that value is delivered to these stakeholders – thus the top and bottom facets. Strategies, processes and capabilities are the means to reach their goals and objectives. In the view of Neely and Adams (2002), those organisations aspiring to be successful in the long term: “…understand what processes the enterprise requires if these strategies are to be delivered and they have defined what capabilities they need to execute these processes…” (p. 3). In addition, organizations wishing to be successful have also thought carefully about what it is that the organisation wants from its stakeholders – employee loyalty, customer profitability, long term investments, etc.
Regulation in Splendid Isolation

Effective and Efficient Industry Performance

termined, the second perspective should focus on performance strategies. The key question regarding strategies is which should be adopted to ensure that the needs and desires of the stakeholders are met. Measurement assumes four roles in this respect.

First, measures are required so that managers can track whether or not the strategies they have chosen are actually being implemented. Second, measures can be used to communicate these strategies within the organisation. Third, measures can be applied to encourage and incentivise implementation of strategy. Fourth, once available, the measurement data can be analysed and used to challenge whether the strategies are working as planned (and, if not, why not) (Neely & Adams, 2002, p. 5).

In applying the five interlinked perspectives on performance that the researchers have identified, key questions must be asked by the organization for measurement design purposes. These are listed as follows:

- **Stakeholder Satisfaction** who are the key stakeholders and what do they want and need?
- **Strategies** what strategies do we have to put in place to satisfy the wants and needs of these key stakeholders?
- **Processes** what critical processes do we require if we are to execute these strategies?
- **Capabilities** what capabilities do we need to operate and enhance these processes?
- **Stakeholder Contribution** what contributions do we require from our stakeholders if we are to maintain and develop these capabilities? (Neely & Adams, 2002, pp. 7 - 8).

The researchers also provide a chart to illustrate the dynamic relationships of stakeholder needs and stakeholders’ contributions (organization wants and needs) to the company in question (see Figure 3.6 “Stakeholder and Organization Wants and Needs” on the following page). The organization’s stakeholders include customers and intermediaries, employees, suppliers, regulators and communities, and investors.

As indicated, satisfaction criteria of each group differ, as do contributions. Customer satisfaction measures include fast, right cheap, and easy, for example, while suppliers want trust, unity, profit and growth. Of interest is the fact that supplier satisfactions actually represent customer contributions to the organization, while customer satisfactions represent supplier contributions.

A final graphic illustration is presented by the researchers to further emphasize the dynamic and interlocking relationships between Performance Prism facets (see Figure 3.7 on the following page). It also provides a view of the multiple perspectives offered by the performance measurement tool in terms of delivering stakeholder value. Clearly,
stakeholder satisfaction is at the core of all successful and meaningful measurement.

According to Neely and Adams (2002) in a different report, the performance prism can also help managers remain clear about their goals and objectives without compromising quality in critical areas during a downturn. They explain, “Reducing the quality of the services you provide to important customers is a recipe for meltdown. Slimming down services to customers who are unlikely to make you profitable, on the other hand, may be an option. Conversely, by gaining a better understanding of key customers’ needs, it may be possible to win complementary business and crush weaker competitors” (p. 29).

From their analysis, the researchers conclude that financial measures themselves are not enough to assist organizations through downturns.
They need to be used together with the Performance Prism because it is this measurement tool that deals with all company stakeholders. When stakeholders are defined from the two points of view – what they want and what the organization wants from them – “managers can set priorities, leading to better – informed decisions on capital investment, cost – cutting measures, outsourcing, business processes and strategic plans” (Adams & Neely, 2002, p. 32).

3.2.10 Concluding remarks on Performance Measurement Frameworks

Performance measurement frameworks have been developed to help organizations design a set of performance measures that appropriately assess their success. Performance measurement systems assist managers in tracking the implementation of business strategy by comparing actual results against strategic goals and objectives. A performance measurement system typically comprises systematic methods of setting business goals together with periodic feedback reports that indicate progress against those goals. Performance goals may be either short term or long term. Short term performance usually focuses on time frames of one year or less. Longer term performance goals include the ability to innovate and adapt to changing competitive, societal and environmental dynamics over periods of several years.

Regulators and Utility Managers should be able to recognize and/or create opportunities to enhance utility performance and turn them into advantages over both the short term and long term. Performance measurement systems can play a critical role in helping regulators and managers to communicate on utility performance, and to adapt and learn.

3.3.1 Classification of Benchmarking Techniques

The object of benchmarking is to compare the efficiency of carrying out a particular business activity or group of activities either at a point in time or over time. The main tasks of benchmarking, therefore, are to measure the efficiency frontier, and the scope that firms have to improve their efficiency. Ideally, benchmarking can also be used to break down efficiency scores into different components, i.e. productive, allocative and dynamic efficiency. Many techniques can, in theory, be used to perform such disaggregation of efficiency scores.

There are a variety of approaches to the measurement of the relative efficiency of firms in relation to an efficiency frontier. Broadly speaking, these approaches can be classified into three main types:

> Programming techniques;
> Econometric (parametric) techniques; and
> Process approaches.

Programming techniques relate outputs to inputs without recourse to econometric estimation. The efficiency frontier is calculated from the data. Data envelope analysis (DEA) is a widely used approach in this category. Index approaches to determining efficiency (partial
and total factor productivity) also calculate efficiency scores, and so are included in this category, although they do not result in the calculation of an efficiency frontier.

Econometric methods, in contrast, require an assumption about the relationship between inputs and outputs, and estimate the parameters of a function representing this. Econometric methods can be further categorized as deterministic or stochastic. The deterministic approaches assume that all the deviation from an estimated frontier is due to inefficiency. Under a stochastic approach, however, inefficiency is deconstructed into inefficiency and measurement error.

Process techniques attempt to assess efficiency using “bottom-up” techniques. One such approach used by regulators relies on reviews of company practices and plans. It is also possible to use engineering data to calculate what costs should be for a particular company, based on its own individual characteristics. Another approach is to use surveys to canvas views on potential cost savings in specific areas. These approaches are summarized in Table 3.1.

In this chapter the main techniques available to compute productivity and efficiency measures will be further elaborated.

### 3.3.2 Frontier Based Benchmarking Methods

Frontier-based benchmarking methods identify or estimate the efficient performance frontier from the best practice in an industry or a sample of firms. This frontier is the benchmark against which the relative performance of firms is measured. The main frontier benchmarking methods are Data Envelopment Analysis (DEA), Corrected Ordinary Least Square (COLS), and Stochastic Frontier Analysis (SFA). DEA is based on the linear programming technique while COLS and SFA are statistical techniques.

---

**Table 3.1: A Hierarchy of Benchmarking Techniques**

<table>
<thead>
<tr>
<th>Programming techniques</th>
<th>Single-year data</th>
<th>Multi-year data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear programming approaches</td>
<td>Data envelopment analysis (DEA)</td>
<td>Panel data =&gt; Malmquist index</td>
</tr>
<tr>
<td>Index approaches</td>
<td>Partial factor productivity (PFP)</td>
<td>Panel data PFP</td>
</tr>
<tr>
<td>Total factor productivity (TFP)</td>
<td>Panel data TFP</td>
<td></td>
</tr>
<tr>
<td>Malmquist index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Econometric (parametric) Techniques</td>
<td>Deterministic Corrected ordinary least squares (COLS) Pooling data allows increased sample size</td>
<td></td>
</tr>
<tr>
<td>Stochastic Stochastic frontier analysis (SFA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process approaches</td>
<td>Engineering economic analysis Engineering economic analysis (EEA)</td>
<td></td>
</tr>
<tr>
<td>Process benchmarking</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

14 The review of these methods is based on Pollitt (1995). See also DTech (1999).
In DEA the efficiency of the firms is computed rather than estimated. DEA identifies an efficient frontier made up of the most efficient firms in the sample and measures the relative efficiency scores of the less efficient firms in relation to these. An advantage of DEA is that it does not require specification of a production or cost function. DEA allows calculation of allocative and technical efficiencies. The latter can be broken down into scale, congestion, and pure technical efficiencies (Färe et al., 1985). DEA can also examine the effect of environmental variables (Yaisawarng and Klein, 1994). DEA results can be sensitive to the inputs and outputs in the model. The results are also sensitive to measurement errors in the frontier firms as the efficiency scores are measured relative to the frontier. Further, the number of efficient firms on the frontier is sensitive to the number of inputs and outputs.

In SFA and COLS the relative efficiency scores are estimated rather than computed. Both techniques require specification of a production or cost function. The UK water and electricity regulators apply COLS to operating costs of water and electricity distribution utilities. Similar to DEA, the COLS technique assumes all deviations from the efficient frontier are due to inefficiency. The efficiency scores with COLS are therefore rather sensitive to the position of the frontier firms. On the other hand, SFA recognises the possibility of stochastic errors in the measurement of the inefficiencies. At the same time, if there are no inefficiency measurement errors in the sample, the error assumption would result in some inefficiency being regarded as noise. Consequently, due to the error factor, the estimated efficiency scores with SFA are likely to be higher than those measured by COLS.

3.3.3 Mean and Average Benchmarking Methods

In contrast to frontier methods, benchmarking in incentive regulation can be in relation to some measure of mean or average performance. One such regression-based statistical method is the Ordinary Least Square (OLS) method that is closely related to COLS. However, OLS estimates an average production or a cost function of a sample of firms. The actual performance of firms can then be compared against the estimated performance by plugging their input, output, and environmental data into the estimated function15.

As discussed under yardstick regulation, the mean of the costs of a peer group of firms can serve as the benchmark for individual firms. In this approach, all the firms in the group are subject to the same price cap. A version of this approach is used by the National Energy Commission (CNE) in Chile to calculate the value added for the distribution services. The value added for a group of comparable firms is derived from a designed efficient model or reference firm (Chisari 2007). In Spain, the regulator uses model firms for specific geographical areas to allocate a portion of the total system revenues among distribution utilities.

Also, the sliding scale method can be viewed as a form of average benchmarking in which the target rate of return (ROR) in the deadband is intended to represent a fair ROR that is based on the return

---

15 See DTe (1999, pp. 30 – 31) for a comparison of the OLS, COLS, and SFA techniques.
earned by comparable industries or firms in similar operating environments. The regulated utility is therefore competing with the average performance in the industry or economy.

Partial Factor Productivity (PFP) or Total Factor Productivity (TFP) are index methods and also considered benchmark techniques based on average performance. These methods are designed to compare the efficiency with which companies deploy their inputs. The rationale for the use of these methods is that the trend in industry unit costs can be separated into two factors:

> The trend in input prices; and
> The trend in the efficiency with which inputs are used.

In RPI\(^{16}\)– X regulation, the ‘X’ can be thought of as the trend in efficiency, and so this could be benchmarked against the trend in efficiency. Productivity comparisons may be made based on partial productivity or total factor productivity measures. Both methods essentially construct ratios of measures of output to measures of input. Different indices use different methods to weight inputs and outputs, and it is this that gives the methods their different qualities. The method is relatively easy to implement. However, less efficient firms may find it easier than efficient firms to outperform the TFP and earn large profits. Finally, targeted incentive schemes can use average or frontier performance benchmarks to address specific aspects of the operation of the firms. These benchmarks may be based on the past or expected performance of the firm or industry.

3.3.4 Process Approaches

Engineering economic analysis (EEA) is classified under the process approaches. EEA can be used to calculate the optimal cost level for a particular firm by defining a ‘model’ firm and by building up the inputs and costs in a ‘bottom – up’ manner. Essentially, the engineering analysis leads to the creation of a production function. Data for individual companies is then used in the production function to determine the overall appropriate cost level for the company.

Through this approach company business plans are reviewed and challenged in order to identify specific efficiency initiatives for each relevant area of cost or activity.

The application of EEA typically involves the following steps:

> Examining the key features of each distribution region, including the terrain, and the dispersion of customers
> Designing a least cost network to serve these customers, given the physical features; and
> Estimating the cost of building and maintaining this least cost network.

Process benchmarking is also classified under the process approaches. Process benchmarking involves assessing business processes and plans for individual companies by expert consultants, who determine
the scope for performance improvement. This is done by examining individual functions, and using experience and relevant external benchmarks of different business functions to estimate the extent to which a company can reduce its costs.

Analysis undertaken in this type of work includes:

- Identification of cost savings in specific business functions common to all businesses, including human resources and finance;
- The impact that new technology (e.g. new applications of information and communication technology) could have on business functions;
- Analysis of any specific unfavourable contracts that could be renegotiated at lower cost;
- Identification of specific operating cost savings that could be achieved in the business operations.

3.3.5 Concluding Remarks on Benchmarking Methods
The review of benchmarking techniques has shown that there are advantages and disadvantages to each. Essential to all the benchmarking techniques is the availability of datasets of acceptable quality. A summary of the key characteristics and main advantages and disadvantages are summarized and set out in table 3.2 on the next page.

3.4.1 The Uni–dimensional Caribbean Benchmark Study
In 2004 CARILEC started with what is now a yearly repetitive benchmarking study of Caribbean utilities in order to assess and compare regional performance. The study identified, measured and benchmarked suitable indicators for the island utilities with regard to their technical, commercial, financial and organizational performance and assessed their standing against best international practices.

The Caribbean Electric Utility Services Corporation (CARILEC0 is the regional body of the electric utility industry in the Caribbean, orienting the utilities, investors and other stakeholders about the characteristics, behaviour and outlook of the electrical industry in the region. Acting as aggregator of its members’ needs, CARILEC produces and disseminates adequate information on the operations of regional utilities to improve electric energy supply in the Caribbean.

Seventeen utilities providing an electricity service in countries and territories of the Caribbean participated in the study and the results and conclusions allowed characterization of the current operating profile of the electric utility industry in the region. The Caribbean Benchmark study is now a yearly revolving study.

The benchmarking study involved identifying key performance metrics, convincing the member companies to participate, defining and collecting data on performance, analysing the data and identifying opportunities for improvement. The overall goal was to identify, adapt and implement superior practices to improve performance. The methods and results of benchmarking should be integrated as part of a comprehensive

---

*As a CARILEC Board member the author of this thesis had the opportunity to take leadership, initiate and coordinate, on behalf of CARILEC this Caribbean Benchmarking initiative.*
Performance Management System (PMS) oriented to achieving corporate objectives. The intent was that managers and regulators could keep control of key company indicators, establish targets, and track the evolution in time and evaluate the results of operating changes and efficiency improvement plans. Accordingly, the regional benchmarking study was conceived and developed as the initial stage of a Performance Management System that could be implemented by CARILEC to establish regional improvement strategies, and by each utility at the company level to fulfil their own corporate objectives.

The study utilized key indicators to measure and compare utilities’ performance, for which purpose quantitative metrics reflecting key aspects of the organization were selected as performance indicators. The metrics aimed to assist management in measuring the achievement of utility objectives, and therefore appropriate indicators measuring

<table>
<thead>
<tr>
<th>Table 3.2: Key characteristics of the main benchmarking methodologies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Key characteristics</strong></td>
</tr>
<tr>
<td>DEA</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>TFP</td>
</tr>
<tr>
<td>COLS</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>SFA</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>EEA</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
physical inputs and outputs were selected, in addition to more usual financial ratios used to evaluate corporate results. There is not a standard set of indicators applicable to all utilities; however, the similarity of the activities related to the provision of electricity services and the specific characteristics of the island systems allowed for the identification of a group of indicators suitable to measure and benchmark the operating performance of Caribbean utilities. The following criteria were used to select the set of performance indicators for the study:

> Indicators used internationally by the electric utility industry.
> Performance metrics tailored to the specific characteristics of island systems.
> Aggregate indicators suitable to be used at executive level for management purposes.
> Indicators considering organizational, economical and technical aspects.
> Indicators covering the different areas of the utility business: generation, transmission – distribution and commercial operations.
> Indicators suitable to be used as part of a Performance Monitoring System.
> Availability and quality of utility data.

Based on the set of performance indicators selected for the study, a data gathering list was prepared for the utilities considering data necessary to calculate the indicators and information about the companies and their electric systems useful to characterise the regional profile and to interpret the results. As the main means to gather the information required, a standard questionnaire was distributed by CARILEC among the utilities.

The data received through the questionnaires was ‘debugged’ and validated to the extent possible for consistency and with other sources. Likewise, information from CARILEC and other publicly available information from the utilities such as annual reports, operations reports, financial statements, investor information, and tariff sheets were consulted. The information collected from the utilities and the other sources was used to build a regional database with the characteristics of the electric systems and the operating results of the utilities.

The regional database was used to measure the performance indicators and contained other information useful for the subsequent analyses. The indicators calculated were then compared and benchmarked regionally. Additionally, comparisons with international figures were carried out for the most relevant indicators in order to gain insight on regional performance in relation to other parts of the world. Finally, the results of the study identified particular characteristics of the region, specific differences among utilities and strengths, weaknesses and improvement areas for the range of issues covered by the indicators.

In the following tables we show some country data and some service area data.
## Table 3.3: Participating Countries and Utilities Caribbean Benchmark Study

<table>
<thead>
<tr>
<th>Country/Territory</th>
<th>Utility</th>
<th>Area (km²)</th>
<th>Population</th>
<th>Density (pop./sq.km)</th>
<th>GDP (million USD$)</th>
<th>GDP per capita ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td>ANGLEC</td>
<td>91</td>
<td>12,522</td>
<td>137.6</td>
<td>139.4</td>
<td>11,132</td>
</tr>
<tr>
<td>Curacao</td>
<td>AQUALEC</td>
<td>444</td>
<td>135,822</td>
<td>305.9</td>
<td>2,276.5</td>
<td>16,761</td>
</tr>
<tr>
<td>Bahamas</td>
<td>BEC, GBPC</td>
<td>13,878</td>
<td>300,000</td>
<td>22.1</td>
<td>4,500.0</td>
<td>14,677</td>
</tr>
<tr>
<td>Belize</td>
<td>BEL</td>
<td>22,960</td>
<td>301,300</td>
<td>13.1</td>
<td>1,149.0</td>
<td>3,813</td>
</tr>
<tr>
<td>Bermuda</td>
<td>BELCO</td>
<td>46</td>
<td>62,000</td>
<td>1,347.8</td>
<td>5,355.0</td>
<td>86,371</td>
</tr>
<tr>
<td>Barbados</td>
<td>BLPC</td>
<td>416</td>
<td>306,611</td>
<td>737.0</td>
<td>3,061.0</td>
<td>9,983</td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td>BVIE</td>
<td>153</td>
<td>23,098</td>
<td>151.0</td>
<td>1,000.0</td>
<td>43,294</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>CUC</td>
<td>197</td>
<td>45,400</td>
<td>230.7</td>
<td>2,400.0</td>
<td>52,863</td>
</tr>
<tr>
<td>Dominica</td>
<td>DOMLEC</td>
<td>754</td>
<td>70,755</td>
<td>93.8</td>
<td>157.8</td>
<td>2,230</td>
</tr>
<tr>
<td>Guadeloupe</td>
<td>EDF</td>
<td>1,700</td>
<td>447,000</td>
<td>262.9</td>
<td>10,250.0</td>
<td>22,931</td>
</tr>
<tr>
<td>St. Maarten, Saba, St. Eustatius</td>
<td>GEBE</td>
<td>68</td>
<td>47,577</td>
<td>699.7</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Grenada</td>
<td>GRENLEC</td>
<td>386</td>
<td>95,000</td>
<td>246.1</td>
<td>440.0</td>
<td>4,632</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>LUCELEC</td>
<td>617</td>
<td>164,791</td>
<td>267.1</td>
<td>867.1</td>
<td>5,262</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>T&amp;TEC</td>
<td>5,128</td>
<td>1,300,000</td>
<td>253.5</td>
<td>19,224.4</td>
<td>14,788</td>
</tr>
<tr>
<td>St. Vincent and the Grenadines</td>
<td>VINLEC</td>
<td>389</td>
<td>117,534</td>
<td>302.1</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Aruba</td>
<td>WEB Aruba</td>
<td>193</td>
<td>103,484</td>
<td>536.2</td>
<td>2,396.0</td>
<td>23,153</td>
</tr>
</tbody>
</table>

## Table 3.4: Key Characteristics Participating Utilities Caribbean Benchmark Study

<table>
<thead>
<tr>
<th>Utility</th>
<th>Islands</th>
<th>Service Area (sq. km)</th>
<th>Population served</th>
<th>Customers (num.)</th>
<th>Demand (MW)</th>
<th>kW/customer</th>
<th>customer/sq.km</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGLEC</td>
<td>Anguilla</td>
<td>91</td>
<td>11,900</td>
<td>7,104</td>
<td>13.0</td>
<td>1.84</td>
<td>78.1</td>
</tr>
<tr>
<td>AQUALEC</td>
<td>Curacao</td>
<td>444</td>
<td>134,396</td>
<td>65,318</td>
<td>112.7</td>
<td>1.73</td>
<td>147.1</td>
</tr>
<tr>
<td>BEC</td>
<td>All major islands within the Commonwealth except Inagua &amp; Grand Bahama</td>
<td>1,642</td>
<td>256,617</td>
<td>96,389</td>
<td>227.1</td>
<td>2.36</td>
<td>58.7</td>
</tr>
<tr>
<td>BEL</td>
<td>Belize</td>
<td>22,960</td>
<td>218,000</td>
<td>70,957</td>
<td>66.6</td>
<td>0.94</td>
<td>3.1</td>
</tr>
<tr>
<td>BELCO</td>
<td>Bermuda</td>
<td>46</td>
<td>62,000</td>
<td>34,043</td>
<td>117.2</td>
<td>3.44</td>
<td>740.1</td>
</tr>
<tr>
<td>BLPC</td>
<td>Barbados</td>
<td>416</td>
<td>274,000</td>
<td>114,261</td>
<td>157.0</td>
<td>1.37</td>
<td>274.7</td>
</tr>
<tr>
<td>BVIE</td>
<td>British Virgin Islands</td>
<td>153</td>
<td>23,000</td>
<td>13,068</td>
<td>27.2</td>
<td>2.08</td>
<td>85.4</td>
</tr>
<tr>
<td>CUC</td>
<td>Grand Cayman</td>
<td>197</td>
<td>44,000</td>
<td>21,117</td>
<td>79.0</td>
<td>3.74</td>
<td>107.3</td>
</tr>
<tr>
<td>DOMLEC</td>
<td>Dominica</td>
<td>754</td>
<td>69,340</td>
<td>32,008</td>
<td>14.5</td>
<td>0.45</td>
<td>42.5</td>
</tr>
<tr>
<td>EDF</td>
<td>Guadeloupe, Les Saintes, Marie Galante, Saint Martin, Saint Barthelemy</td>
<td>1,700</td>
<td>447,000</td>
<td>208,118</td>
<td>235.0</td>
<td>1.13</td>
<td>122.4</td>
</tr>
<tr>
<td>GBP</td>
<td>Grand Bahama</td>
<td>1,472</td>
<td>50,000</td>
<td>18,887</td>
<td>73.2</td>
<td>3.88</td>
<td>12.8</td>
</tr>
<tr>
<td>GEBE</td>
<td>St. Maarten, Saba, St. Eustatius</td>
<td>68</td>
<td>44,247</td>
<td>19,615</td>
<td>49.1</td>
<td>2.50</td>
<td>288.5</td>
</tr>
<tr>
<td>GRENLEC</td>
<td>Granada, Carriacou, Petit Martinique</td>
<td>344</td>
<td>93,000</td>
<td>36,792</td>
<td>25.7</td>
<td>0.70</td>
<td>107.0</td>
</tr>
<tr>
<td>LUCELEC</td>
<td>St. Lucia</td>
<td>616</td>
<td>164,791</td>
<td>54,509</td>
<td>49.8</td>
<td>0.91</td>
<td>88.5</td>
</tr>
<tr>
<td>T&amp;TEC</td>
<td>Trinidad and Tobago</td>
<td>3,000</td>
<td>1,220,000</td>
<td>375,348</td>
<td>1,070.0</td>
<td>2.85</td>
<td>125.1</td>
</tr>
<tr>
<td>VINLEC</td>
<td>St. Vincent &amp; Grenadines</td>
<td>384</td>
<td>110,000</td>
<td>36,840</td>
<td>19.2</td>
<td>0.52</td>
<td>95.9</td>
</tr>
<tr>
<td>WEB Aruba</td>
<td>Aruba</td>
<td>N/A</td>
<td>N/A</td>
<td>1</td>
<td>123.1</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Outlook
The majority of countries and territories forming the Caribbean region are located in the islands of the Caribbean sea basin and the total population of approximately 40 million is mostly concentrated in the largest islands. Agriculture, extraction of natural resources, tourism and other services constitute the basis of the islands’ economies, with manufacturing also being important in the largest islands. The islands are facing significant economic challenges stemming from increased exposure to global competition and the end of trade privileges for many of its traditional products. At the same time, because the region is relatively stronger than other developing states and transitional economies, development assistance is diminishing.

Regulation
In general, Caribbean utilities are vertically integrated monopolies subject to the traditional costs of service regulation. Governments set service rates and monitor compliance with concessions and licence requirements. The governments of the region have pursued regulatory reforms to some extent, mostly where privatization of companies has taken place. Competition is limited to the presence of independent power producers (IPPs) in a few islands. Only the larger countries have regulatory bodies and have introduced modern incentive price regulation while quality regulation is in initial stages.

Characteristics
Most utilities show similar organizations, having a rather flat scheme with two managerial levels; one at the top executive level and the other formed by division managers. Outsourcing is gaining importance within regional operations. In general, fuel costs represent the highest expenditure item for the utilities, accounting in average for 30 to 40% of total annual costs.

The market composition shows a high percentage of commercial consumption, with a share of 40% to 60% of total consumption, which is explained by the electric loads of hotels and tourist facilities. Residential demand comes second in energy consumption and industrial load is significant in some islands.
Electric Systems

The areas of service of the utilities are subject to the particular Caribbean weather conditions, including a salty and corrosive environment, and the occurrence of natural phenomena that impose special conditions on the electric systems for their design, operation and maintenance. The insular condition of the service areas also determines a high dependence on diesel generation and the lack of benefits from the network interconnections of larger systems. On the other hand, the relative small sizes of the electric systems make circuit lengths shorter and unit sizes a larger fraction of system load compared to other systems.

Thermal generation is the predominant energy production technology found in the region. The most common generating units are low and medium speed diesels, but steam and combustion turbine generation is also used. All diesel, steam and combustion turbines use fuel oil as their primary energy source. A few hydro generation units and two wind plants are also in operation.

Low voltages are used for energy transportation due to the relatively short distances between production and consumption centres in the islands. A combination of ring and radial configurations can be found in the regional networks, which favors service reliability. Another relevant feature is the significant proportion of underground circuits present in some islands.

Results

Based on the information supplied by the utilities and the benchmarking of performance indicators carried out, the main findings of the study showed the following:

- With a few exceptions, mainly due to differences in the scope of services provided, the results indicate a rather uniform performance explained by the similarities of technologies used in the region and of the physical environment where the utilities carry out their business.
- Differences in performance were found that could be explained in part by differences in the characteristics of the systems beyond the control of utilities, such as topography, customer base, demand composition and load density.
- Other differences in the indicators pointed out a more efficient performance of some companies compared to others regarding particular aspects, indicating potential opportunities for improvement.

Reference is made to Annex II, “Case Study: Caribbean Benchmarking Study” for a further elaboration on the Benchmarking Study.

Conclusions

The benchmarking study of Caribbean utilities has been conceived as the initial stage of a performance monitoring system at both
regional and company level and includes annual updates for a three-year period. The approach, methodology, performance indicators selection and results of this study are valuable for government agencies, electric industry associations and companies considering similar performance evaluations especially across regions including several jurisdictions and utilities.

3.4.2 Case Study: The multi-dimensional Caribbean benchmark study

The data gathered for the Caribbean Benchmark study was also used to conduct a multi-dimensional benchmark study. The multi-dimensional benchmark study was done primarily from a regulatory perspective. In utility ratemaking, benchmarking involves comparing one or more utility performance measures to “external” performance standards. An external performance standard is one that exists outside the company itself (Parker, 2001). Examples include the performance of other utilities that are designated to be “peers,” industry average measures, or industry best performance measures. Benchmarking, therefore, leads to direct and explicit comparisons between a company’s performance and one or more performance standards that are established outside of the company itself. The general idea is that the company under scrutiny is expected to operate just as efficiently as the so-called peer companies. Targets for performance improvement are set on the basis of the gap between current and peer performance. This improvement target is sometimes referred to as the efficiency factor or the x-factor.18

In section 3.4 we have given a complete overview of the different benchmarking techniques. For the purpose of the multi-dimensional benchmarks study the Data Envelope Analysis (DEA) was used as it is considered by many regulators throughout the world to lead to appropriate benchmarking inferences and is one of the most popular benchmarking approaches in utility regulation.19 DEA is a non-parametric mathematical programming approach to productivity frontier estimation (Zhu, 2003). The general idea of DEA is to measure a firm’s productivity performance by observing its distance to the productivity frontier which is constructed on the basis of the best performing firms (peers) in the given data sample. This is done on the basis of a linear programming formulation. An intuitive interpretation of the DEA formulation is that of measuring the distance to a multi-dimensional productivity frontier. This frontier is constructed by enveloping all efficient input and output combinations. The efficiency measure is then obtained by measuring the distance between the firm’s actual performance and that of its projection (shadow) on the frontier.

Efficiency evaluation, as quantified in terms of the efficiency score for each company, is dependent on input and output selection. The following input and output variables were selected.

18 We should note that the x-factor does not only represent efficiency improvement but also other factors such as demand growth, investments, etc. However, efficiency improvement is one of the most important ingredients in determining the x-factor.
19 See for example Jamasb and Pollit (2000).
RESULTS

For a detailed elaboration on the methodology used and the different DEA models using constant return to scales (CRS) and variable returns to scale (VRS) we refer to Martina et al (2007, 2008) and Annex II “Case Study: Caribbean Benchmarking Study”.

The DEA study revealed the following results:

- The best performing utility obtained, for all the different models used, a weighted average score of 1;
- The worst performing utility obtained, for all the different models used, a weighted average score of 0.669;
- The overall weighted average score of the participating utilities was 0.913;
- The results also indicate that the efficiency levels of at least half a dozen CARILEC members are substantially below the frontier efficiency levels in the Caribbean.
- The weighted average score of United States Bundled Power benchmarking\(^{20}\) for comparable Caribbean size of utilities was 0.97 for the year 1999 and 2000.

In table 3.6 the DEA results are summarized. We refer to Annex II: “Case Study: Caribbean Benchmarking Study” for a further elaboration on the DEA scores.

### Table 3.5: Input and Output Variables Caribbean DEA Benchmarking Study

<table>
<thead>
<tr>
<th>Input Variables</th>
<th>Output Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed generation capacity (MW)</td>
<td>Total consumption (GWh)</td>
</tr>
<tr>
<td>Total transformer capacity (MVA)</td>
<td>Population with an electricity connection</td>
</tr>
<tr>
<td>Total length of T&amp;D lines (km)</td>
<td>Total Customers</td>
</tr>
<tr>
<td>Number of employees</td>
<td>Total length of T&amp;D lines (km)</td>
</tr>
</tbody>
</table>

**Observation:** The input output selection of the available Caribbean sample did not include monetary measures as it was difficult to obtain a normalized set of monetary measures and also the variety of currencies that exist among the different Caribbean countries. Converting all these currencies to a common and comparable unit is likely to be problematic.

### Table 3.6: Aggregated DEA Scores Caribbean Benchmarking Study

<table>
<thead>
<tr>
<th>Territory</th>
<th>CRS Average</th>
<th>VRS Average</th>
<th>Overall Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribbean (Data of the year 2004)</td>
<td>0.886</td>
<td>0.931</td>
<td>0.913</td>
</tr>
<tr>
<td>USA Bundled Power Benchmarking (Data of the year 2000)</td>
<td></td>
<td></td>
<td>0.970</td>
</tr>
</tbody>
</table>

**Source:** Martina et al (2005)


3.4.3 Reflection on the Use of Benchmarking within a Caribbean Context

There are at least six audiences for benchmarking studies: benchmarking specialists, the press, the general public, the regulator, policymakers (elected representatives and appointed officials), and utility managers. Although each group has different needs, all may use the relative and absolute rankings as catalysts for better stewardship of resources.

Relative rankings allow the different audiences to compare the performance of utilities in comparable situations. Here the key problem
is how to select firms that are truly similar to one another. Alternatively stated, it should be safeguarded that the rankings indeed reflect the different conditions each utility faces. Ideally, relative ranking should reflect the utility’s decisions rather than the unique characteristics of service territories beyond the utility’s control, including topography, population density, etc. In addition, the history of the system matters: current utilities more or less ‘inherited’ systems that reflect a set of political, economic, regulatory and social decisions (with positive and negative impacts) made by others in the past. Thus, already realized performance improvements over time also need to be taken into consideration. In addition, absolute comparisons are necessary, since the relatively weakest performer in one group might have a much better absolute performance than the best firms in another group of comparable firms (for instance, those in another country at a similar stage of development). Comparisons are only valid as long as the results indeed tell us whether particular firms are performing below potential. At issue is here how to define “potential performance”.

When used properly, performance measurement and benchmarking encourage enterprises to become “learning organizations”. This is a term coined by Senge (1990) to describe organizations which have been successful in getting their employees to think and work as teams, adapt readily to change and take a system – wide view in problem – solving. By recognizing that every enterprise can learn something about another’s operations and highlighting the need to continually be improving performance to remain in front, benchmarking encourages a culture which emphasizes the need to learn and have an open mind. Identifying major gaps in performance levels may therefore force an organization to fundamentally rethink its way of doing things.

Moreover, we need to recognize that no single performance measure or technique is ‘complete’ in the sense that it can provide the entire answer. All quantitative analysis involves significant assumptions and limitations. Consequently, one should not rely on one single tool but use several instruments, both quantitative and qualitative, to make an overall judgment of how a particular enterprise is performing and what needs to be done. Techniques should be complemented by a “sanity check” in order to be sure that empirical results make sense (Ahmad and Rafi g, 1998).

Finally, it has been observed within the context of the Caribbean bundled power benchmarking that electric utilities are often faced with a dearth of key data. This often leads to resistance in applying new approaches as the data is of inadequate quality. Nevertheless, a useful start can usually be made on performance measurement with data that is currently available – waiting for the perfect data is a recipe for indefinite inaction and the use of available data itself a catalyst for the development of better quality data (Berg, 2003). The appropriate management response in this situation is best characterized by saying “never underestimate the symbolic importance of actually doing something”.

Effective and Efficient Industry Performance
3.5.1 Synthesis

In this chapter a thorough analysis is given of the theoretical concepts of performance, effectiveness and efficiency and specifically of the application of these concepts within the context of public utilities. Furthermore the challenge of how to measure industry performance has been explored by reviewing performance measurement frameworks and benchmarking techniques. In exploring these concepts research question 2: RQ2 “Effective and Efficient Industry Performance and Measurement” has been dealt with. The chapter starts with an operational delineation on performance. Performance has a diversity of meanings. Performance refers simultaneously to an action, the result of that action and to the success of the result compared to some benchmark. As stated by Lebas and Euske (2002), “Performance is a relative concept, defined in terms of...a complex set of time-based and causality-based indicators...[it] is about generating future results...[which] can be described through a causal model. Performance is meaningful only when used by a decision maker, and should be the result of discussions in which a set of causal relationships and a common set of indicators has been identified. These indicators should relate to all stakeholders of the organization and define performance from their varied and respective points of view”.

The concept of effectiveness and efficiency is further explored. Effectiveness is related to achieving the intended outcome. Within the context of a public utility effectiveness is related to the degree to which the public utility’s policy objectives are met, such as ensuring the long–term sustainability of services, achieving economic efficiency in the provision of services, safeguarding the quality dimensions of services, promoting the accessibility and assuring the affordability of services to all citizens, and meeting wider national objectives, in particular protection of the environment.

Efficiency concerns the cost of achieving the intended outcome. In this thesis the concept of economic efficiency is used and is defined as the optimal production and consumption of goods and services and can be broken down into the categories of productive, allocative and dynamic efficiency. This has led to the following definition of Effective and Efficient Industry Performance:

The delivery of reliable, affordable and widely accessible service at the lowest possible prices in such a way as to maintain acceptable service quality, financial viability and environmental sustainability levels.

Furthermore performance measurement frameworks and benchmarking techniques have been reviewed as a means of measuring industry performance. The Caribbean uni- and multi-dimensional benchmark study has been conducted as a practical application of measuring utility performance and has been elaborated upon as a case study. We conclude that performance measurement and benchmarking are valuable tools...
to encourage enterprises to become “learning organizations” and seek continuous improvement.

3.5.2 The way forward

The concept of “Effective and Efficient Industry Performance” has been dealt with in this chapter. In chapter 2 the features and economic principles of SIDS and SIMS have been thoroughly investigated. At this point part 1 of the thesis comprising “the system” of this investigative study has been dealt with. In the following chapters we will enter into the analysis stage of the thesis comprising: the 1st economizing principle: get the institutional environment right; rules of the game and the 2nd economizing principle, get the governance structure right, rules of the game. This analysis will provide the essential building blocks for the framework to promote effective and efficient industry performance for small isolated monopoly systems.
The Interplay of Institutions with Industry Performance
4.1 Background

The central theme of this investigative study is to propose a framework to promote effective and efficient industry performance for small isolated monopoly systems (SIMS) for the electricity supply in SIDS. In the previous chapters important building blocks have been explored such as (a) the specific characteristics of SIDS and the economic principles of SIMS and (b) concepts, definitions and the measurement challenge regarding effective and efficient industry performance.

In this chapter the interplay of institutions with industry performance will be further explored as an important building block within the framework to promote effective and efficient industry performance for small isolated monopoly systems. As is stated in Joskow, 2004, legal, political, social and economic institutions (“institutions”) have important effects on economic performance. The effects of alternative public policies aimed at improving economic performance in various dimensions will vary along with the institutions that are available to respond to them. In this chapter research question “RQ3. The Interplay of Institutions with Industry Performance” will be further investigated. Institutional analysis seeks to understand the role of government and political institutions in policy formation, implementation and economic performance.

4.1.2 Chapter Outline

This chapter is structured as follows. Section 4.2 unravels the conceptual and definitional issues pertaining to institutions, what they are, which role they play and how they are intertwined with governance. The all-important question of what institutions are essential for good governance, and the form that they should take will be explored. In section 4.3 institutional approaches to electric supply regulation will be investigated. Therefore the various meanings of regulation and the theory of economic regulation will be analysed. This section will conclude with options for the institutional design for regulatory agencies. In section 4.4 the challenge of how to measure the impact of institutions on industry performance will be investigated. The chapter finishes with a synthesis of the interplay of institutions with industry performance.

4.2 Understanding Institutions

4.2.1 Institutions, What They Are and Which Role They Play

In Institutions, Institutional Change and Economic Performance, Douglass C. North defines institutions as formal and informal “rules of the game” that provide a framework within which individuals seek to coordinate their separate activities and insure against risk. This has now become a universally accepted definition. Institutions structure incentives and constraints, define procedures for changing the rules, and delimit membership.

The institutional framework of society includes both the formal and informal rules as well as the resulting organizations that people create and within which they interact to reach their individual and collective goals. Formal rules, such as laws and contracts, define the rules and give people the rights and mechanisms to enforce the rules. Informal
rules depict the expectations that individuals hold about the uncertain consequences of actions and events. Informal rules take into account the real-world costs of negotiating agreements, monitoring compliance, and enforcing sanctions.

Peter G. Klein (1998) explains that when the formal rules of the game provide incentives that are consistent with individual self-interest, then actual behaviour will generally conform to formal rules. But when the formal rules conflict with individual self-interest, then individuals will have incentives to evade the rules and, if there are penalties for evasion, to conceal their actions. In a market system, there are few constraints on the form of organizations that people set up. Individuals try to choose arrangements that reduce the costs of governance in order to minimize the sum of production costs and transaction costs. They will trade off agency costs - the transaction costs of negotiating, monitoring, and enforcing agreements - against the resource costs of preventing agency problems. Market-supporting institutions provide a framework that lowers the costs and reduces the risks of cooperating in economic activity.

According to Hare (2001), economic institutions are social arrangements possessing a number of special features: (a) they regulate economic behaviour in ways which, in the short run, often conflict with individual preferences; (b) they are based on shared expectations, derived from custom, trust, legal provisions etc.; (c) they make most sense if the economy is thought of as a "repeated game" in which most types of transaction occur many times; and (d) anonymity, in the sense that the functioning of a given institution should not be dependent upon the identity of the economic agents seeking to conduct the types of transaction to which the institution relates.

Given such characteristics, many institutions are likely to have the character of public goods. Among other things, this implies that the "supply of institutions" generated by the market mechanism left to itself is unlikely to correspond to the socially efficient level. Under these conditions, there is evidently a role for the state both in creating institutions which the market does not provide and regulating in the public interest those which it does. Well functioning market-type economies are generally found to contain institutions or institutional arrangements to provide for the following key economic functions (Hare, 2001):

- Private property rights and contracts;
- Banks and other financial markets; existence, functioning and regulation;
- Labour market institutions: social policy and the social safety net;
- Clear fiscal environment for firms, perceived as fair, predictable and enforced;
- Institutions dealing with competition policy, industrial policy and trade policy.

In sum, institutions play the following role in an economy. Institutions provide organization and structure. They provide mecha-
isms and rules for coordinating economic activity and supply information needed for coordination. They provide mechanisms for making choices and providing incentives for individuals. They structure a framework of human rights and property rights, defining the rights to control assets and to benefit from their use. They establish a framework of markets for coordinating private exchange and production and define the role of government and the procedures for making public choices.

4.2.2 Institutions and Governance

In this section we will further explore the meaning and role of institutions with a focus to discuss the dynamics by which institutions shape the governance process. The interesting question would be: how do institutions shape good governance, which is critical to economic growth? Having explored the definition of institutions in the previous paragraph we conclude that institutions embody the basic rules that govern all public and private actions. It is necessary to underline the important distinction between governance and institutions - a distinction which is often blurred in the literature. Of the many existing definitions of governance in this thesis we adopt the definition of governance as “rules, processes and behaviour that affect the way in which powers are exercised, particularly as regards openness, participation, accountability, effectiveness and coherence” (European Commission, European Governance - A White Paper, 2001).

As explained by Menard and Shirley (2005) while institution is essentially about rules, governance is essentially about the setting, application, and enforcement and adjudication of those rules. Based on this dichotomy, governance can be viewed as a flow variable and institutions as a stock variable. Note, however, that irrespective of the precise set of institutions (rules) that governments adopt, good governance is required to ensure that those institutions have their desired effect. Juxtaposing the definitions of governance and that of institutions above, it is obvious that institutions matter for governance because governance occurs in and through institutions. However, the dynamics and channels by which institutions affect or shape governance is not readily clear.

Analytically, institutions ultimately shape governance by:

- shaping actors’ preferences and actions;
- providing actors with power, authority, and resources;
- shaping transactions costs;
- shaping the capacity of the state.

These will now be briefly discussed, drawing on Menard and Shirley (2005), Hare (2001), Klein (1998) and Williamson (1998).

Institutions as Shapers of Actors’ Preferences and Actions

What agents do and how they act are influenced to a large degree by the constraints, or lack thereof, imposed by the institutional environment in which they operate. Thus, institutions decide the rules of the game that dictate what agents should and should not do, as well as...
determine the ‘penalties’ for deviant behaviour or lack of compliance with those rules. These rules, therefore, provide the incentive structure that ultimately shapes the preferences and actions of agents. In terms of economic governance, institutions and the constraints that they engender have significant bearing on the manner in which the nation’s resources are managed by policymakers. For example, if institutions relating to the control of public finances are weak or dysfunctional, governments, as agents of governance, may not be compelled to keep within the legislatively determined budgetary limits, resulting in over-expenditure and misallocation of resources. On the other hand, if the institutions (‘the rules of the game’) stipulate that the executive will be held accountable for unauthorised expenditures, the tendency (preference) of decision-makers to over-spend or indulge in unruly, irresponsible strategies will be curtailed. A parallel example in the corporate world is the incentive structure provided by institutions (corporate laws and regulations), compelling corporate managers to have as their goal the maximisation of the company’s profit and, therefore, shareholders’ value.

Institutions Providing Actors with Power, Authority and Resources

Apart from determining the rules of the game, institutions also provide agents with power, authority, and resources. As Levi (1990:407)\textsuperscript{24} argues, institutions both contain and create power. For example, the Treasury in most countries is at the apex of the decision-making structure only because the national institutions – the laws, regulations, decrees, and other administrative arrangements – recognise the important role that it plays in the management of the nation’s economic resources, and therefore grant it the power, resources, and legitimacy to perform that function. A similar example is the power of the Auditor-General and other oversight agencies. The office of the Auditor-General can only perform its watchdog functions effectively if the institutions provide it with both the authority and resources to carry out those functions, as well as the means (institutions) to ensure that its work and findings are enforced.

Institutions as Shapers of Transaction Costs

One other important role of institutions is that they shape transaction costs. Transaction costs may be defined as the search, information, and enforcement costs of conducting business or market exchange. A good example of this important role of institutions is property rights – one of the institutions that command a place of importance in modern development economics. By clarifying titles and ownership to property, effective property rights regimes reduce information asymmetry, thereby facilitating the formulation of effective decisions. The reduction in transaction costs and the greater degree of certainty that it generates induces public actors to make productive decisions. It follows, therefore, that institutional innovation aimed at reducing transaction costs is essential for successful economic development.

\textsuperscript{24} As cited by Bell (2002).
Institutions as Shapers of State Capacity

Institutions enhance state capacity – defined as the capacity of the state to choose and implement policies – by equipping it with the necessary authority and resources. Authority implies that the state has a degree of popular acceptance and legitimacy, as framed by the legal, economic, and social institutions. Resources refer to both the financial resources and the availability of skilled and competent manpower, including the necessary underlying infrastructure that enables the state to effectively formulate and implement its policy strategies. In the context of governance through state authority, for example, the capacity of the government is assisted by having a bureaucracy staffed with qualified and experienced experts and dedicated policy advisers and implementers. Examples of the channels through which institutions provide authority and resources, thereby enhancing state capacity, include legislative provisions for a fair and democratic electoral process, effective rules for staff appointment, promotion, and dismissal in the bureaucracy, and the regulations and/or decrees covering performance standards and ethical behaviour in the workplace. They also include a range of institutions that facilitate the efficient flow and effective mobilisation of the nation’s resources, such as a Constitution, the Public Finance Act and a host of financial regulations and decrees.

All in all, we can conclude that institutions fundamentally affect the efficiency and quality of governance by providing the incentives, rules and constraints, and resources and power that ultimately drive the performance of public actors. Indeed, if the primary concern of governance is the optimal management and allocation of the country’s social and economic resources in a way that fosters sound development, then institutions define the right governance structure. It is important to note that by shaping governance in the ways described above, institutions affect economic outcomes. For example, by distributing rights to the most efficient agents, institutions can enhance productivity and growth. By affecting the incentives to invest, for example, through strengthening property rights, institutions can affect investment levels and adoption of new technology. By delineating market rights, such as through competition law, institutions limit producer rents and protect consumers from monopolistic prices. Finally, by clarifying rights for the disadvantaged in markets, institutions can directly affect the lives of people, especially the poor. But how does one choose among the vast array of institutions available to select those that should have priority within a particular context? In other words, which institutions are essential for good governance, and hence for high-quality growth and development? These questions are addressed in the following section.

4.2.3 Core Institutions for Good Governance Structure

Identifying those institutions that are crucial for good governance, and hence that would provide the right institutional framework for economic growth and development, is not an easy task. This is...
Regulation in Splendid Isolation

The Interplay of Institutions with Industry Performance

because there is no universally applicable mapping of institutions that would suit all contexts and situations. While one can take an example from the types of institutions in the successful developed countries, there is no reason to suppose that those economies have already exhausted all the useful institutional variations that could underpin healthy and vibrant economies (Stern and Holder, 1999). Nevertheless, there are a number of crosscutting principles that could be considered in determining an institutional configuration that is universally applicable.

The institutions covered in this section that are considered to be the key constituents of an institutional structure that underpins good governance are property rights, regulatory institutions, public sector institutions, and legal institutions, drawing on Menard and Shirley, (2005), Stern and Holder (1999) and Toatu (2006). These institutions are depicted in Figure 4.1.

In making this selection, three main characteristics of institutions were considered:

(i) the extent to which these institutions have been applied in successful economies;
(ii) the extent to which these institutions play a central role in enhancing the effectiveness of the other institutions; and
(iii) the extent to which these institutions affect the entire incentive regime.

While it is true that society operates within a complex set of institutions that are intertwined and interdependent, there are institutions that market systems or economic transactions just cannot do without. The four institutions listed above are such institutions.

Therefore, an optimal governance structure is one that is founded on the core institutions above – a strong property rights regime, well-regulated financial institutions, an effective and reliable legal system,
and effective public sector institutions. An effective property rights regime is one that is capable of protecting and enforcing property rights, including the protection and enforcement of the exclusivity, saleability, and transferability of those rights. Regulatory institutions are considered to be effective if they are able to protect investors and consumers; ensure the integrity of markets; and promote stability within the financial system. Public services are considered effective if they are underpinned by rules that ensure the implementation of effective public policies, including rules governing the operation of the public service. Finally, legal institutions are considered effective if they are independent from the government and their independence is guaranteed by law; they have the power and resources to enforce the laws of the nation; and they are transparent and efficient. A country that operates within the framework of these core institutions is more capable of ensuring good governance, and able to benefit from the positive economic outcomes that would result from it.

Having explored the conceptual and definitional aspects of institutions, how institutions shape the governance process and the core institutions for a good governance structure, we will now further explore the institutions within the context of regulation.

4.3.1 The Various Meanings of Regulation

Regulation is a popular subject of study in several disciplines across and beyond the social sciences. The various definitions of regulation reflect specific disciplinary concerns, are oriented towards different research methods, and reflect to a significant extent the unique personal, national and historical experience of the formulator of the definition (Jordana and Levi-Faur, 2004). For a further discussion of the various meanings and a clarification of how they reflect different research agendas and disciplinary concerns, Baldwin et al. (1998) will be further elaborated. Three meanings for the notion of regulation have been identified:

a. Targeted rules;
b. All modes of state intervention in the economy;
c. All mechanisms of social control, by whosoever exercised.
   (cf. Ogus, 2001, 1-3; Doern and Wilks, 1998, 6)

The three meanings of regulation are described in Figure 4.2: in three circles that expand from the narrowest meaning of regulation (I) to its broadest (III).

In its narrowest and simplest sense, regulation refers to “the promulgation of an authoritative set of rules, accompanied by some mechanism, typically a public agency, for monitoring and promoting compliance with these rules” (Baldwin et al., 1998, 3). A second meaning of regulation refers to “all the efforts of state agencies to steer the economy” (ibid). This meaning is broader than the first since it includes, in addition to rule-making, measures such as taxation, subsidies, redistri-
The third meaning of regulation is broader still, and encompasses “all mechanisms of social control, including unintentional and non-state processes”. According to Baldwin et al. (1998, 4), it extends:

To mechanisms which are not the products of state activity, nor part of any institutional arrangement, such as the development of social norms and the effects of markets in modifying behavior. Thus a notion of intentionality about the development of norms is dropped, and anything producing effects on behavior is capable of being considered as regulatory. Furthermore a wide range of activities which may involve legal or quasi-legal norms, but without mechanisms for monitoring and enforcing compliance, might come with the definition.

The three meanings to some extent reflect the changes that have been identified in the economic and social context of regulation. According to the OECD (1997), regulation refers to the diverse set of instruments by which governments set requirements on enterprises and citizens. Regulation includes laws, formal and informal orders and rules issued by all levels of government, and rules issued by non-governmental or self-regulatory bodies, which enjoy delegated regulatory power: constitutions, parliamentary laws, subordinate legislation, decrees, orders, norms, licenses, plans, codes, and even some forms of administrative guidance can all be considered as “regulation” (OECD Council document, quoted in Black, 2002, p.9). In this approach regulation is straightforwardly based on rules which may give strict directives, or be broadly enabling in ways which permit further negotiation; rules may also be framed in ways which concede discretion over detailed application. Any enquiry into rulemaking must establish what are the institutions of rule-making, who are the rule-makers, how rules are implemented, and by whom, and the forms that compliance and accountability take (Ogus, 2002, 639-45).

Another simple yet broad definition (Hood et al., 2000) takes
regulation to be “the use of public authority to set and apply rules and standards” (p3). The authors, however, make a distinction between the regulation for private entities (non-state activities), and regulation inside government (within and between government agencies, and between different levels of national government). These authors, representing a mix of legal and policy science disciplines, essentially regard the principles of regulation to be the same in either the public or the private sectors, or indeed in any combination of these sectors as represented, for example, by public-private partnerships, or contracting arrangements, or situations where there may be some form of regulation common to both sectors (e.g. medical professional self-regulation). This view is reinforced and extended in Hood and Scott (2000).

Moving forward we will explore the theory of economic regulation which is a key determinant that influences effective and efficient industry performance. Within this thesis we therefore use the term regulation in its narrowest and simplest sense. Regulation refers to “the promulgation of an authoritative set of rules, accompanied by some mechanism, typically a public agency, for monitoring and promoting compliance with these rules” (Baldwin et al., 1998, 3).

4.3.2 Theory of Economic Regulation

The theory of economic regulation developed from the nineteenth century and the literature is now vast (for recent reviews see e.g. Laffont and Tirole, 1993, 2000; Levy and Spiller, 1994; Newbery, 1999). The case for economic regulation of public utility markets is premised on the existence of significant market failure resulting from economies of scale and scope in production, that lead to higher unit costs if more than one firm competes in the market. Another possible source of market failure is information asymmetries in market transacting. Markets are able to maximize social welfare where consumers and producers are perfectly (or at least well) informed when making choices in the market place. Where one party to a transaction has more information than the other about the quantity or quality of the outputs to be transacted, a condition known as ‘asymmetric information’, then this party could act ‘opportunistically’, exploiting its superior knowledge to gain utility at the expense of the other party.

Since the 1960s, however, the economics of regulation literature has also focused on circumstances where we might expect to find ‘regulatory failure’, that is to say circumstances where the regulation of markets might reduce rather than increase economic welfare. The seminal study in this literature is that by Averch and Johnson, who in 1962 presented a model of how regulation of a firm’s rate of return would lead to incentives to over-invest. Following publication of this paper, studies highlighted other potential inefficiencies that could be introduced by rate of return regulation, notably distorted service quality and higher operating costs (e.g. Bailey, 1973).

Today the economics of regulation literature includes the following propositions (for further discussion on these see e.g. Kahn, 1988;
The institutional context is critical to the process and outcomes of a regulatory regime.

As Granovetter (1985) recognized in his study of ‘embeddedness’, behavior and institutions are constrained by social relations. This is true of any regulatory regime, which will be embodied in the specific institutional context of a country as reflected in its formal and informal rules of economic transacting and social behavior. As Picciotto (1999, p.3) comments: ‘In all societies formal rules enacted by the state influence social behavior only indirectly, filtered through layers of formal and informal social institutions, and normative patterns and practices’. In turn these institutional effects are credited with having important effects on the trajectory of economic development (Lal, 1999, ch.3). In consequence, the World Bank has been criticized for adopting an ‘under-socialized approach’ to policy reform (Torp and Rekve, 1998, p.80).

Regulation in economies involves the setting of particular rules regarding market structure and business conduct and these rules both arise out of and influence the future shape of economic institutions. Levy and Spiller (1994) focus on regulatory arrangements to sustain private investment and how these vary with the institutional endowment in different countries. Also, ‘new institutional economics’ has had an impact on the economics of regulation especially through transaction cost theory.

Transaction cost economics is concerned with the costs that enter into market transacting and that are associated with policing opportunistic behavior in markets (Williamson, 1985; Allen, 1991). Economic development is seen not as simply a matter of amassing economic resources in the form of physical and human capital but as a matter of ‘institution building’ so as to reduce information imperfections, maximize economic incentives and reduce transaction costs. Included in this institution building are the laws and political and social rules and conventions that are the basis for successful market production and exchange. Another important consideration is ‘culture’ or the way of doing things in society, which forms in North’s analysis one of the ‘informal’ constraints on human interaction (North, 1990, 1991). Particularly relevant modes of conduct in the context of the regulatory state would seem to include probity in public administration, independence of the courts, low corruption and cronyism, and traditions of civic responsibility.

Regulation is associated with information asymmetries.

The regulator and the regulated can be expected to have different levels of information about such matters as costs, revenues and demand. The regulated company holds the information that the regulator needs to regulate optimally and the regulator must establish rules and incentive mechanisms to force and coax this information from the company. Given that it is highly unlikely that the regulator will receive all
of the information required to regulate optimally to maximize social welfare, the results of regulation, in terms of outputs and prices, remain ‘second best’ to those of a competitive market. Shapiro and Willig (1990) argue that state ownership provides more information to regulators than private ownership so contracting should be less problematic when the state both owns and regulates. However, state ownership is associated with inadequate incentives to gather and use this information to maximize welfare (Hayek, 1945). In other words, there tends to be a trade off between state ownership reducing the information asymmetries and hence the transaction costs of regulation and the relative incentives under state control and market transacting for agents to maximize social welfare (Grossman and Hart, 1986; Sappington and Stiglitz, 1987; Shapiro and Willig, 1990: Yarrow, 1999). This leads to ‘credibility’ and ‘commitment’ considerations: specifically, credibility on the part of investors that the regulatory rules will bring about the intended outcome; and commitment of government to the current regulatory rules, so that post-privatization or post-concession award the regulator does not act opportunistically to reduce the prices and profits of the private regulated businesses. Regulatory credibility will be enhanced if the regulator faces high costs of deviating from a commitment.

Investment in a regulated environment is subject to a threat of hold up leading to under-investment.

Because the regulatory contract, whether formal or informal, is incomplete, it is vulnerable to post-contract opportunism. Public utilities are capital intensive and therefore post-contract one or other party may have an incentive to adopt opportunistic behavior to improve its own wellbeing. Utility networks involve sunk investments that are specific to the venture, so that once a network is created, the balance of bargaining advantage at the time of a contract renegotiation may shift from the private-sector investor to the regulator (on behalf of the government) with implications for pricing and investment (Spiller, 1996; and for a recent review of the ‘hold up literature’, Schmitz, 2001). In principle prices could be reduced to short-term marginal costs. Where the investor fears this outcome, referred to as ‘hold up’, front-end loading of returns, take or pay contracts with governments and sovereign guarantees from the state or international agencies may be required by the private sector. In turn such guarantees reduce the net economic benefits of attracting private capital by reducing managerial incentives to control costs. The precise result of opportunistic behavior depends crucially, however, on the relative bargaining power of the regulated and the regulator. Alternatively, the regulator and hence the government could be subject to ‘hold up’, where post-contract private investors demand a tariff or other contract adjustment in their favor and the regulator has no alternative supplier to turn to.

Regulatory regimes are prone to capture.

‘Regulatory capture’ involves the regulatory process becoming
biased in favor of particular interest groups and notably the regulated companies. Regulators can be assumed to care about the levels of both consumer and producer surplus because both impact on social welfare – benefits to consumers are reflected in consumer surplus but producer surplus is necessary to stimulate innovation (Kirzner, 1997). A regulator that is neutral between consumer utility and profit would place an equal weighting on consumer and producer surplus.

One that favors consumers would weight consumer surplus more highly. Regulatory capture is associated with a weighting favoring producer over consumer surplus. In the extreme case, the regulatory capture literature concludes that regulation always leads to socially sub-optimal outcomes because of ‘inefficient bargaining between interest groups over potential utility rents’ (Laffont and Tirole, 1993; Newbery, 1999, p.134). In the Chicago tradition of regulatory capture (Stigler, 1971; Peltzman, 1976) regulators are presumed to favor producer interests because of the concentration of regulatory benefits and diffusion of regulatory costs, which enhances the power of lobbying groups as rent-seekers. What is clear is that the capability of firms to influence public policy is an important source of comparative advantage (Shaffer, 1995).

Regulation is also subject to ‘political capture’; indeed political capture may well be a much greater risk than capture by producer groups outside of the political system. Where political capture occurs, the regulatory goals are distorted to pursue political ends. This is most likely to arise where the regulation is directly under the control of government ministers; hence the case for some kind of arm’s length or ‘independent’ regulatory agency. Under political capture, regulation becomes a tool of self-interest within government or the ruling elite (Stiglitz, 1998).

Balanced against the risks of regulatory and political capture, however, there is the possibility that regulators might develop a culture of arrogant independence, bordering on vexatious regulation. This creates some uncertainty about the desirable degree of regulatory independence. In principle three broad forms of regulation can be identified:

(a) the regulatory authority is integrated into the normal government machinery, notably where it is a section of the ministry and controlled by the minister;

(b) the semi-independent agency, which has some independence from the ministry but where decisions can still be over-ruled by a superior government authority; and

(c) the independent agency, where there is no right of appeal to a superior government (political) authority, though there usually will be a right of appeal to the courts to ensure fairness and rationality in the decision-making process (in a number of jurisdictions known as an appeal on “due process”, (Smith, 1997; Von Der Fehr, 2000, p.49)).

The independent agency is normally favored by western advisors, who draw from the experience of regulation in the UK and US.
However, regulatory independence and an impartial judicial review of due process may not be credible and require a minimum level of institutional quality, an issue developed further in chapter 5.

A regulatory system should be both effective and efficient. Effective regulation achieves the social welfare goals set down by the government for the regulator at the time the regulatory office was established, and as subsequently amended after appropriate consultation. This can be achieved by regulation affecting:

(a) the structure of markets and
(b) conduct in markets through appropriate incentives and penalties.

Efficient regulation achieves the social welfare goals at minimum economic cost. The economic costs of regulation take two broad forms:

(1) the costs of directly administering the regulatory system, which are internalized within government and reflected in the budget appropriations of the regulatory body or bodies; and
(2) the compliance costs of regulation, which are external to the regulatory agency and fall on consumers and producers in terms of the economic costs of conforming with the regulations and of avoiding and evading them.

Both the administrative and compliance costs of regulation may rise over time especially if economic regulation becomes an industry in its own right. As stated by Blundell and Robinson (2000, p11) it has been suggested that regulators could empire build. The self-interest of regulators will, in general, make them tend to exaggerate benefits, underestimate costs and over-estimate the demand for action on their part.

Competition is superior to state regulation and should be preferred. Economic regulation attempts to ‘mimic’ the social welfare results of competition, but it can do so only in a ‘second best’ way because competitive markets generate superior knowledge of consumer demands and producer supply costs (Sidak and Spulber, 1997, pp.522-26). Indeed, government regulation can introduce important economic distortions into market economies. Regulation is far from being a full substitute for competition: it can create systematic distortions, it generally faces a trade-off between promoting one type of efficiency at the expense of another, and it is likely to generate significant costs, in terms of both direct implementation and exacerbation of inefficiency (Hay and Morris, 1991, p.636-7). For such reasons, in the economics of regulation literature there is a strong preference for competition over state regulation and, where there is not a natural monopoly, for adopting regulation only until competition arrives.
Regulatory substance and governance

Regulatory substance and governance are two most important dimensions of any regulatory system.

Regulatory governance refers to the institutional and legal design of the regulatory system and is the framework within which decisions are made. Regulatory governance is defined by the laws, processes, and procedures that determine the enterprises, actions, and parameters that are regulated, the government entities that make the regulatory decisions, and the resources and information that are available to them. Regulatory governance is the “how” of regulation. It involves decisions about the following:

- Independence and accountability of the regulator.
- Relationship between the regulator and policymaker(s).
- Autonomy of the regulator.
- Processes – formal and informal – by which decisions are made.
- Transparency of decision making by the regulator or other entities making regulatory decisions.
- Predictability of regulatory decision making.
- Accessibility of regulatory decision making.
- Organizational structure and resources available to the regulator.

Observation: Regulatory governance will be further explored in chapter 5: “The interplay of Governance with Industry Performance”.

Regulatory substance refers to the content of regulation. It is the actual decisions, whether explicit or implicit, made by the specified regulatory entity or other entities within the government, along with the rationale for the decisions. Regulatory substance is the “what” of regulation. It typically involves decisions about the following:

- Tariff levels.
- Tariff structures.
- Automatic and non-automatic cost pass-through mechanisms.
- Quality-of-service standards.
- Handling of consumer complaints.
- Investment or connection obligations and reviews.
- Network access conditions for new and existing customers.
- Accounting systems.
- Periodic reporting requirements.
- Social obligations.

This review of propositions from the economics of regulation literature incorporates observations on the importance of the institutional setting, regulatory rules and the regulatory process. While the search for practical solutions may lead countries to adopt regulatory policies that do not necessarily accord with the theory (Crew and Kleindorfer, 1996, p.215), the theory is a useful starting point for analyzing practice in developing and transition economies, specifically in the case of Small Island Development States with their respective small iso-
4.3.3 Basic Engineering of Regulation: Institutional Approaches

Basic engineering of regulation comprises the mechanism through which societies place substantive or procedural constraints on regulatory discretion and resolve conflicts that arise in relation to these constraints. (Such constraints on regulatory decision making have been called “contractual governance institutions”; see Williamson 1985, p 35; Levy and Spiller 1993).

According to Guasch and Spiller (1999) three complementary mechanisms must be in place for the basic engineering to provide regulatory stability and credibility. First, substantive restraints on regulatory discretion must be embedded in the regulatory framework; second, formal or informal constraints must limit the ability of the executive branch to change the regulatory framework itself and third, institutions must enforce those substantive and procedural constrains.

In the following paragraph we will review the institutional approaches of ESI Regulation and the formal regulatory instruments that are available.

Institutional Approaches to ESI Regulation

There are broadly three broad institutional approaches to ESI regulation:

1. The independent regulatory agencies separate from the ministry,
2. Ministries handle most regulatory responsibilities directly,
3. Ministerial regulatory agencies are established.

Variations in the institutional framework from regulatory agencies arise partly from different legal and political traditions. They also reflect the need for institutional frameworks to be consistent with regulatory practice and industry structure. The adoption of a particular institutional framework is generally linked to the regulatory model that is being implemented. Diversity also reflects different compromises among the many goals that the institutions aim to meet. These include specific regulatory goals such as transparency, protection against the capture of regulators by industry interests and short-term political pressure, the predictability and stability of regulation, accountability, and keeping down red tape.

Within the three broad approaches to ESI regulation the following options are identified to deploy the regulatory function:

- **Ministry:**
  Regulatory tasks are performed by a (line) minister. A ministry is part of the executive branch of government that is specifically responsible for some industry.

- **Ministerial Agency:**
  A ministerial agency is an autonomous body linked to the line ministry which operates on a separate budget and under an autonomous management and may be subject to a differentiated
legal framework. However, ultimately a ministerial agency is subordinated to the ministry although it may operate with a substantial degree of independence.

- **Independent Advisory Agency:**
  Independent regulatory agencies are defined as independent public bodies empowered to regulate specific aspects of an industry. Sometimes they share regulatory duties with other public entities, notably the ministry, but they are isolated, to some extent, from short-term political influence. Different types of independent agency are possible depending both on the degree of political independence and on the range of powers assigned to them.

- **Competition Authority**
  The competition authority is the institution in charge of enforcing competition law. Competition authorities have two functions. They act ex post to enforce prohibitions on collusion, abuse of a dominant position and other anti-competitive behaviour. They may act ex ante to prevent mergers and acquisitions which are deemed to be detrimental to competition. By contrast, regulatory authorities primarily act ex ante, setting rules that frame the conduct of market participants (although sometimes regulators are involved in dispute resolution and complaint management, which are ex post activities).

- **Supranational Institution**
  Finally, a supranational regulatory institution may be installed. Such an institution may operate highly independent from national bodies. Its powers are being derived from supranational legislation (in a European context, this is European law) or from national legislation mandating powers to this body. Effectively, such a supranational institution may function as an independent regulatory agency.

The following is a schematic representation of the institutional approaches to ESI regulation.
Regulatory agencies can be designed in many different ways. Options include the role (or mission) they are assigned, their governance, the specific regulatory functions and processes, the resources and internal management of the agency, the start-up strategy and other factors. The main options are summarized in the table below.
Table 4.1: Options for the Design of Regulatory Agents
Source: Ocaña (2002)

<table>
<thead>
<tr>
<th>Area</th>
<th>Design issue</th>
<th>Key options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission</td>
<td>Objectives</td>
<td>One or several among:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Consumer protection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Investor protection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Economic efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Competition advocacy</td>
</tr>
<tr>
<td>Jurisdiction (powers)</td>
<td></td>
<td>Regulatory powers only or, additionally:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Mergers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Other competition law</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Policy on entry, investment, privatisation</td>
</tr>
<tr>
<td>Industry coverage</td>
<td></td>
<td>One industry or multi-industry</td>
</tr>
<tr>
<td>Governance</td>
<td>Decision-making structure</td>
<td>- Single regulator or commission</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Odd or even number of commissioners</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Staggered terms or not</td>
</tr>
<tr>
<td>Appointment of regulators</td>
<td></td>
<td>- Made by parliament or by government</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Stakeholders allowed or not</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Based on professional competence criteria or not</td>
</tr>
<tr>
<td>Independence safeguards</td>
<td></td>
<td>- Irrevocable mandates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Prohibition of conflicts of interest during and after mandate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Stable funding</td>
</tr>
<tr>
<td>Regulatory activities</td>
<td>Functions</td>
<td>One or several among:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Regulation of monopolies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- End-user tariffs and quality standards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Monitoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Dispute resolution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Advisory role to government</td>
</tr>
<tr>
<td>Process and appeals</td>
<td></td>
<td>- Process based on:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rule-making</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Negotiation among stakeholders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Monitoring and remedial action</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Rules to promote transparency of decision making</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• such as hearings and publication of decisions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Designation (or not) of an independent appeals body</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Grounds for appeal restricted to complaints on undue process or not</td>
</tr>
<tr>
<td>Co-ordination with</td>
<td></td>
<td>Formal or informal mechanisms for consultation and referral</td>
</tr>
<tr>
<td>other authorities</td>
<td>Fundidng</td>
<td>- Earmarked or not</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- From state budget or from industry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Size</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Stability of time horizon</td>
</tr>
<tr>
<td>Human resources</td>
<td></td>
<td>- Salaries at market levels or subject to civil service rules</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Competence and specialisation of staff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Use of external resources</td>
</tr>
<tr>
<td>Reporting and auditing</td>
<td></td>
<td>- Reporting to parliament, to line ministry, to other ministry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- External audits</td>
</tr>
<tr>
<td>Transition issues</td>
<td>Start-up strategy</td>
<td>- Timing: set up before or after reform</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Initially, staff on secondment from industry or ministry allowed or not</td>
</tr>
</tbody>
</table>
Formal Regulatory Instruments

As observed before, according to Guasch and Spiller (1999) three complementary mechanisms must be in place for the basic engineering to provide regulatory stability and credibility. First, substantive restraints on regulatory discretion must be embedded in the regulatory framework; second, formal or informal constraints must limit the ability of the executive branch to change the regulatory framework itself and third, institutions must enforce those substantive and procedural constraints. For basic regulatory instruments four options are identified, being:

- Specific legislation;
- Presidential decrees;
- Contracts;
- Administrative procedures.

Specific Legislation

Specific legislation as a basic engineering choice satisfies the first requirement for regulatory stability (that substantive restraint on regulatory discretion be embedded in the regulatory framework). Whether it also satisfies the second and the third requirements depends, however, on the nature of the country’s institutional endowments. If the legislative institutions make it easy to pass new laws, then the second requirement for regulatory stability, (that formal or informal constraints limit the executive’s ability to alter an established regulatory framework), may fail, because the executive could always upset the regulatory understanding by passing new legislation. Thus unless widely accepted norms prohibit opportunistic changes in law, specific legislation does not satisfy the second requirement for regulatory stability. A second instance where specific legislation may not be a sound basic engineering choice is where the judiciary is not truly independent, and therefore is not capable of restraining the executive. In this case the executive could deviate from the direct instructions of the law, without triggering a legal challenge. Specific legislation in this case will not satisfy the third requirement for regulatory stability (that institutions are capable of enforcing substantive constraints). The use of specific legislation is a way to restrain regulatory discretion.

Presidential Decrees

There are two basic types of presidential decrees.

- Administrative determination; this is the most commonly used presidential decree especially in Latin American countries which in general have yet to develop a tradition of a “fourth” administrative branch, as in the United States. Administrative determinations are usually ministerial decisions that take the form of a presidential decree. Such decrees are commonly modified or replaced by other decrees as time passes by.

- Regulatory Presidential decree; within this context the regulatory agency is left to interpret a particular law. Courts seldom
contest these decrees except when the decree clearly violates a direct stipulation of the law. Regulatory decrees, however, cannot easily be replaced by another presidential decree.

Regulatory frameworks introduced by presidential decrees may be reinterpreted or further regulated. The potential of further regulation opens the door for future administrations to distort or amend the initial understanding. Therefore the second requirement for regulatory stability (that formal or informal constraints limit the ability of the executive branch to change the regulatory framework) may fail.

Contracts

Because the basic contractual problem in utilities is related to the inability of governments to commit themselves to a regulatory framework once it has been put in place, several countries have embedded the regulatory framework in formal contracts. These contracts take the form of operating licenses that specify the regulatory framework in which the firms operate. The licence stipulates the regulatory process to be applied, and if government deviates from that process, the courts step in. In parliamentary systems the use of contracts to regulate is innovative because courts uphold contracts but do not restrain regulators in administrative decisions.

For contracts to satisfy the first criterion for regulatory stability, then, they must be very specific and clearly limit what the regulator can do. A license that does not specify the regulatory mechanism in detail, but rather leaves the administration free to make all regulatory decisions, will fail the first criterion for regulatory stability. Whether specific licenses will satisfy the second requirement for regulatory stability depends on whether the courts see licenses as binding contracts. If courts do not treat licenses as contracts, or if they grant the administration substantial leeway in interpreting those contracts, license-based regulatory contracts will fail the second and the third criteria for regulatory stability.

Administrative Procedures

Administrative procedures may serve as the choice of basic engineering. The regulation of utilities should be on a well specified body of administrative procedures, at both federal and state levels. These procedures determine how agencies make decisions and specify the independent appeals process.

The use of administrative procedures as a generic way to enforce regulatory bargains requires not only a previously developed body of law but also a judiciary that is accustomed to challenging administrations on procedural grounds.

Conclusion

In summary, three institutional characteristics are key to understanding the constraints that limit a country’s basic engineering option: the existence of an independent judiciary that enforces regulatory con-

---

27 Administrative law controls the administrative operations of government. It sets forth the powers that may be exercised by administrative agencies, lays down the principles governing the exercise of those powers, and provides legal remedies to the parties aggrieved by administrative action.
First, a judiciary with a strongly held tradition of administrative law facilitates the use of administrative procedures. Such a judiciary can provide assurances that the government will not deviate from specific legislative or constitutional commitments that underpin the regulatory system. A judiciary that respects contracts and property rights also makes contracts (license) a feasible choice of basic engineering.

Second, legislative and executive institutions that grant the executive substantial control over legislative agendas and outcomes do not favor the basic engineering option of specific legislation because turnover in the executive may have important implications for regulation. If legislative powers alternate between political parties with substantially different interests, specific legislation does not provide a safeguard against administrative discretion because a new administration could modify the laws.

Third, informal norms may substitute for legislative flexibility. In particular nations that have a strong set of norms that determine acceptable legislative behavior may consider specific legislation as a feasible basic engineering option.

In this section we will further examine the current economic thinking on price regulation of utilities. We restrict ourselves to price-policies aspects of detailed engineering of regulation because price setting could be considered the most challenging and politically sensitive aspect of economic regulation. In particular, we will review the major options available for price regulation of utilities in order to gain a better understanding of regulatory best practices in this area. A useful framework in which to examine these options are the five general forms of utility regulation identified by Berg:

- Cost of service regulation (including direct price setting and rate of return).
- Price cap regulation.
- Performance based regulation.
- Franchise regulation.
- Yardstick regulation.


4.4.1 Cost of Service Regulation

Essentially, cost of service regulation can be divided into two broad categories, direct price setting and rate of return regulation. While cost of service regulation has tended to become less favoured in recent years, it continues to play an important role in various regulatory environments, amongst others the Caribbean.

---

Direct price setting
Perhaps the most intrusive form of regulation occurs when the government takes an active role in setting the prices that can be charged. This can take place in a number of contexts. For example, the utility can be operated as a government department or through an agency or commission as has been the case with many United States utilities.

In recent times, the price setting model of regulation has come under strong criticism in the literature. A major focus of this criticism has been the lack of clear objectives (or the presence of competing objectives) established for the rate setting body. While it is the case that the role of the government department or utility commission is to act as a market surrogate and set price, that task is performed in a political and social context. Consequently, while the economic criterion of efficiency is an input to the rate making process, it is balanced against a range of other objectives. Therefore, there may be significant pressure for the regulator to suppress economically efficient pricing structures.

A second major criticism of price setting (and a major theme in the literature) is the principal-agent problem. This problem has two dimensions. First, the regulated enterprise (the agent) is likely to be subject to different incentives and motivations than the government (the principal). Consequently, the agent may pursue the objectives set for it in a manner that is contrary to the anticipation of the principal. Second, the agent will usually possess substantially more information about its customers, costs and market conditions than the principal. This information asymmetry can be used to the advantage of the agent in order to manipulate outcomes to its advantage. The conclusion from the principal-agent debate is that the outcomes of regulation can be very different from what was intended by the government. In such an environment, prices set by the regulator may result in a range of unintended consequences and inefficiencies.

Rate of Return Regulation
The process of rate of return regulation can be divided into three basic steps:
1. The firm’s costs are reviewed, and costs deemed to be unnecessary are eliminated.
2. A rate of return judged to be fair for the firm is specified.
3. Prices and their structure are set to generate enough revenue to cover costs and provide a fair rate of return.

The key property of rate of return regulation is that it permits the regulator to limit the profit level that can be achieved. Restraining profits by fixing the maximum return on investment (in real terms) provides the enterprise with a degree of autonomy in conducting its affairs while limiting monopoly behaviour.

As with direct price setting, the literature identifies significant problems with rate of return regulation. These include:
> Allowable costs. Problems in determining allowable costs arise
Regulation in Splendid Isolation

because the regulated firm typically is charging a price below the profit maximising level and has the ability to raise prices and cover the costs without lowering profit. Consequently, the firm may have an incentive to exaggerate its costs or incur costs that are not necessarily in the best interests of consumers. Two costs that have been the subject of litigation in the United States are advertisements that are intended to promote company image and charitable contributions also meant to provide goodwill. Similar issues arise with R&D expenses.

> **Depreciation expense.** Depreciation can be a real cost in the sense that it represents wear and tear on capital and therefore should be included as an allowable expense. However, depreciation can also reflect economic obsolescence due to poor investment decisions. Further, the selection of an appropriate depreciation schedule can be highly subjective.

> **Incentives.** There is very little incentive for a firm to hold down its operating costs if they can be passed on to the consumer. For example, the regulated firm may not have a strong incentive to seek out the least cost method of production or to bargain with a union over wages. Effective monitoring of the firm’s effort in reducing costs is virtually impossible short of duplicating the firm’s managerial functions. Firms subject to rate of return have been hypothesised to operate with too much capital for the output being produced since the cost of the artificially high capital base can be passed on to consumers (the Averch-Johnson effect).

> **The rate base and allowed return.** The firm’s capital stock, or rate base, is instrumental in determining the firm’s profit. However, there is no clear guideline on how the rate base should be measured. For example, should the capital stock be measured based on the original cost of the capital, its market value, its replacement (present) cost or some other measure? Each measure can yield significantly different results.

> **Regulatory capture.** It may be the case that the regulatory agency has preferences that unduly reflect the benefits obtained either by consumers or firms in the regulated market. This may affect the balance between public interest and firm interest.

4.4.2 Price Cap Regulation.

Price cap regulation, as an alternative to traditional rate of return regulation, developed as a practical regulatory tool in the early 1980s in Britain. In 1983, the newly privatised British Telecom was regulated by price caps after the recommendations of a report by Stephen Littlechild. In his report, Littlechild argued that price cap regulation would provide desirable incentives to achieve and improve productive efficiency, while reducing the information burden of regulation. He argued that unlike rate of return regulation, price caps do not require imprecise and often arbitrary measures of a rate base or return on capital.
and eliminate the need to allocate costs when only some parts of a firm are regulated. He also argued that the simplicity of price caps would reduce the likelihood of regulatory capture.

In its simplest form a price cap simply sets a maximum allowed inter-temporal path for the price of a specific product. The rules for the path are set in advance. For example, the price of a specific product in any given year may be capped at a level that alters over time in response to a price index that is exogenous to the regulated firm and a factor \( X \) set in advance by the relevant regulator. The maximum price then rises in line with the main index of retail prices but falls at a rate \( X \) set in advance. The value of \( X \) is meant to reflect potential cost savings by the firm due to either increased efficiency or technological progress. The \( X \) factor enables these cost savings to be shared with consumers without adversely affecting the incentives of the firm to achieve these savings. The \( X \) factor is set to reflect expected firm productivity improvements in excess of those expected for the general economy and expected changes in input prices for the regulated firm that differ from the general economy wide rate of price change.

Overall, the view in the literature is that the experience with price cap regulation has generally been a success. Price caps offer a better alternative than the more traditional forms of regulation, and owing to the incentives that they foster, price caps have the potential to yield better outcomes in terms of economic efficiency while requiring relatively minimal regulatory effort. However, the literature observes that the desirable properties of price caps can be eroded due to poor implementation. By heeding the lessons about the implementation of price caps outlined in the literature, the positive attributes of this scheme can be protected. Important lessons include:

> Choosing the correct value of \( X \). In practice, it can be difficult to choose the correct value of \( X \). If \( X \) is set too high, the firm will not be able to cover its costs, but if \( X \) is set too low then the firm will earn supernormal profits and prices will remain excessive. Ideally, the value of \( X \) will be based on expected future productivity improvements; however, this determination involves a degree of subjectivity.

> Setting \( X \) based on past performance. If the regulator uses the past performance of the firm, such as profitability, as a guide to setting the \( X \) factor then management incentives will be undermined and the price cap will take on the characteristics of rate of return regulation. This effect will be more pronounced if reviews of the \( X \) factor are undertaken at short intervals.

> Level of the initial price base. The effectiveness of price cap regimes can be undermined if the initial price base significantly diverges from efficient prices. Even after years of operating under a price cap, a firm may still be well below world’s best practice if initial adjustments were not made.

> Breadth of the price cap bundle. The bundle of products included in the price cap basket must be carefully designed. If the bundle
is too broad then the firm may use its freedom under the cap for anti-competitive purposes, but if the basket is too narrow then opportunities to rebalance prices for both consumer and firm gains will be limited.

> **Quality standards.** Price caps should not be used in an environment that is independent of service quality and infrastructure development. For example, the firm may maintain its profits under the price cap by reducing the quality of the product it sells to consumers.

**Performance Based Regulation**

Within performance based regulation (PBR) three schemes can be identified.

> “A Performance incentive scheme”. Under PBR, performance measures are used to motivate the firm. Generally, this involves linking the profits of the firm (or employee remuneration) to performance measures in such a way that the firm’s profits are permitted to increase if it achieves certain performance standards. In this manner, the firm has an incentive to seek out cost efficiencies and to improve customer services so that it will be permitted to achieve higher returns.

> “Basic Scheme”, is another PBR scheme in which surplus profits are split between shareholders and employees. By permitting the firm’s owners and employees to retain returns from introduced efficiencies, these players have an incentive to increase firm efficiency. A modification of the scheme can also return some of the surplus profits to consumers.

> “Output floor scheme”, is a third PBR scheme. Under an output floor scheme, the regulated enterprise has substantial freedom as long as it meets the minimum level of production set by the regulator. The firm may set any prices, any mix of inputs and earn any level of profit it chooses, provided that it meets the output floor. However, provided that the output floor has been set correctly, it is highly likely that the firm will be required to reduce its overall price level in order to stimulate sufficient demand to meet the output floor.

Difficulties can arise in implementing such schemes. For example, it may be difficult to find easily defined objective performance measures that can be controlled by the firm. Also, the firm may have an incentive to achieve a target at very high costs, which can then be passed on to consumers.

4.4.3 **Yardstick Regulation**

The development of international performance measures offers a way of indirectly introducing competitive pressures to infrastructure industries by comparing actual performance with international benchmarks. By providing a means of comparing performance between
similar infrastructure enterprises in different regions, states, or in
different countries, efficiency measurement can promote attainment of
best practice.

A number of basic approaches are available for yardstick regu-
lation including setting target levels, comparing a time-series of the
organisation’s performance, comparing the performance of business
units within the organisation and comparisons with external agencies.
As an example, comparisons between similar business units within
the enterprise can act as a useful incentive mechanism and introduce
a competitive element where external competition is absent. If linked
to a performance appraisal or performance pay system, such compari-
sions can act as a valuable tool in improving overall firm performance.

Within these basic frameworks, the next step involves selecting
appropriate performance measures. For infrastructure industries per-
formance measures are generally divided into three broad categories:
accounting, non-financial and economic indicators. The principal crite-
rion for choosing a set of performance measures is that they be compre-
hensible, comprehensive, useable and timely. For the performance
measures to be comprehensible they must be few in number, but they
must nevertheless provide an overall indication of the performance of
the firm. A large number of technical measures may in total provide a
comprehensive overview of the firm but may be difficult to interpret,
especially if some indicators move in opposite directions.

As with price cap regulation, care must be taken in the imple-
mentation of yardstick regulation. Attempts at yardstick regulation are
almost always criticised by the regulated firm on the basis of ‘special
circumstances’ that render its comparison with other firms as inappro-
priate. While these criticisms are generally driven by self-interest, it is
clearly the case that care should be taken when comparing two enter-
prises. Even elaborate and complex comparisons will be unlikely to
fairly compare two enterprises across all circumstances. Consequently,
a degree of subjectivity must be employed when implementing yard-
stick regulation.

Defining objective performance measures can provide a chal-
lenge for the regulator, especially when the provision of services is the
subject of the study. On occasion, perverse incentives can arise if all
activities of the enterprise are not included in the comparison. Despite
these qualifications, yardstick regulation can provide some important
insights into the performance of the firm. In particular, international
comparisons can provide a useful measure of how the firm is perform-
ing compared with similar organisations overseas. Yardstick regula-
tion may be most effective when used in combination with other types
of regulation or used as a guide in setting the X factor for price cap
regulation.

4.4.4 Franchise Regulation

The principle behind franchising is that the government (as the
representative of consumers) can award to one firm an exclusive right
to produce and sell a particular good in a particular market. The firm that receives the right or franchise is one of many bidders that compete for the franchise by offering to sell the good to consumers at a specified price. The bidder offering the best price-quality package is awarded the franchise. If collusion does not occur between the bidders then competition between them should drive price down towards average cost. By allocating one firm exclusive rights, it is expected that the firm should be able to exploit any natural monopoly economies present.

As with the other regulatory schemes, franchise regulation gives rise to some difficulties in practice. These include complexities in determining the winning bidder, setting an appropriate term for the length of the contract and attracting new bidders at the contract renewal stage. Nevertheless, these difficulties are encountered frequently in the economy. For example, similar issues must be addressed whenever contracts are awarded. Consequently, with careful management these issues should be able to be addressed.

4.4.5 Hybrid Schemes

In addition to the general schemes discussed above, another regulatory option is to make modifications to the general schemes or to combine elements from different schemes. The objective of hybrid schemes is to offset the weaknesses of one scheme with some of the strengths of others. This approach can increase the complexity of the regulatory scheme and so an assessment must be made of whether the gains in the effectiveness of the scheme outweigh the increased regulatory costs. Overall, hybrid regulatory schemes offer the potential for significant improvements in regulatory effectiveness and should therefore be examined when designing systems.

4.4.6 Reflections on Price Setting Policies

Significant elements of many utility industries exhibit natural monopoly characteristics such that unregulated producers may have substantial potential to exploit market power and raise prices. Consequently, a case may be made for government involvement to protect the interests of consumers and to ensure that higher levels of output growth are achieved.

There is also substantial political and social pressure for government regulation. This pressure arises because of concerns that unregulated utilities may not adequately guarantee security, stability and safety of supply and also may impose ‘unfair’ pricing on customers that have little bargaining power. However, there is a counterpart to this demand for regulation. Utility industries are capital intensive and their assets are durable, long-lived and immovable. Demands for access and ‘fair’ or ‘non-exploitative’ prices mean that investors might expect that after they have sunk their capital they would be limited in the prices they can charge and be subjected to possibly onerous obligations to supply. Therefore, the incentive to invest depends critically on expectations of the future pricing policy and must be considered by the regulator.
Consequently, there is a need to balance the costs of regulation against the expected benefits. A useful test for undertaking this task is that outlined earlier in this chapter which requires first that market failure be demonstrated, second the government through regulation must be able to do better given the similar constraints faced by the private sector and third the benefits from regulation must be greater than its costs.

Having justified the need for regulation, attention then turns to the appropriate type of regulation. Five broad categories of regulation have been discussed in this SECTION. While the effectiveness of each type of regulation will vary depending on the circumstances, there is a clear preference in the literature for incentive type regulation. In particular, the literature speaks positively of price cap regulation which offers a better alternative than the more traditional forms of regulation, and owing to the incentives that are fostered price caps have the potential to yield better outcomes in terms of economic efficiency while requiring relatively minimal regulatory effort. However, the literature observes that the desirable properties of price caps may be eroded due to poor implementation. By heeding the lessons about the implementation of price caps outlined in the literature, the positive attributes of this scheme can be protected.

Finally, hybrid schemes offer an interesting alternative to the five basic schemes. By combining schemes, the negative aspects of the various schemes can be offset by the positive aspects of others.

The identified price regulation schemes will form the basis of a menu of options for the regulatory design within the framework for SIMS to promote effective and efficient industry performance. For a further more detailed elaboration on price regulation we refer to Annex IV “Price regulation further explored”.

4.5.1 Synthesis

Throughout this chapter we have investigated the 1st order economizing principle of the NIE “Get the institutional environment right, the rules of the game”. Throughout this chapter various important concepts such as institutions, what they are, which role they play, the interaction with governance and the concept of regulation, its various meanings, institutional approaches to utility regulation, basic and detail engineering aspects of regulation have been analyzed and reviewed. Throughout this chapter we have dealt with research question: “RQ3. The Interplay of Institutions with Industry Performance”.

Summarizing the interplay of institutions with industry performance we could state that the institutional framework of society includes both the formal and informal rules as well as the resulting organizations that people create and within which they interact to reach their individual and collective goals. Formal rules, such as laws and contracts, define the rules and give people the rights and mechanisms to enforce the rules. Informal rules depict the expectations that individuals hold about the uncertain consequences of actions and events. Informal rules
take into account the real-world costs of negotiating agreements, monitoring compliance, and enforcing sanctions.

Analytically, institutions ultimately shape governance, by shaping actors’ preferences and actions, providing actors with power, authority and resources, shaping transactions costs and shaping the capacity of the state. Therefore, an optimal governance structure is one that is founded on the core institutions, namely a strong property rights regime, well-regulated financial institutions, an effective and reliable legal system, and effective public sector institutions.

The analysis has been further directed toward regulation as a specific form of institutional analysis. In its narrowest and simplest sense, regulation refers to “the promulgation of an authoritative set of rules, accompanied by some mechanism, typically a public agency, for monitoring and promoting compliance with these rules” (Baldwin et al., 1998, 3).

In terms of institutional approaches to ESI regulation three broad categories are identified: (1) The independent regulatory agencies separate from the ministry, (2) Ministries handle most regulatory responsibilities directly, (3) Ministerial regulatory agencies are established. Variations in the institutional framework from regulatory agencies arise partly from different legal and political traditions. From a basic engineering perspective four options for basic regulatory instruments have been identified, being, specific legislation, presidential decrees, contracts and administrative procedures. The analysis revealed that to provide regulatory stability ultimately three complementary mechanisms must be in place for the basic engineering to provide regulatory stability and credibility. First, substantive restraints on regulatory discretion must be embedded in the regulatory framework; second, formal or informal constraints must limit the ability of the executive branch to change the regulatory framework itself and third, institutions must enforce those substantive and procedural constraints.

From a detailed engineering perspective we have focused on price setting policies as these can be considered the most challenging and politically sensitive aspect of economic regulation. We have reviewed the five general forms of utility regulation comprising, cost of service regulation (including direct price setting and rate of return), price cap regulation, performance based regulation, franchise regulation and yardstick regulation (Berg 1997).

Having analyzed the interplay of institutions with industry performance we can conclude that:

- The extent and characteristics of a country’s institutional and administrative endowments limit the choice of regulatory instruments and institutions. The main challenge is to design regulatory processes that, while limiting discretion, are compatible with the country’s institutional structure of government and with legal and administrative traditions of the country.
- From a basic engineering perspective three institutional characteristics are key to understanding the constraints that limit a
country’s options: the existence of an independent judiciary that enforces regulatory constraints, the role of legislative and executive institutions and the existence of widely accepted informal norms that limit opportunistic behavior.

> From a detailed engineering perspective there is a tradeoff between commitment and flexibility related to the detail of specification of the regulatory framework. A regulatory framework with limited detail is possible in the case where the country possesses an acceptable level of informal norms or has institutionalized decision-making requiring a consensus to restrain arbitrary administrative decisions. Countries that don’t have these features may have to settle for more rigid detailed engineering.

4.5.2 The Way Forward

In this chapter we have dealt with the interplay of institutions with industry performance. We have also reviewed the basic engineering and detailed engineering options for regulation and observed that they are influenced by the institutional endowments of a country. Basic and detailed engineering options provide fundamental building blocks for the framework to promote effective and efficient industry performance for SIMS. In the next chapter we will investigate the interplay of governance with industry performance. From a governance perspective we will provide for a structure to measure the institutional endowments of a country based upon which the basic and detailed engineering options could be proposed.
The Interplay of Governance with Industry Performance
5.1 Introduction

5.1.1 Background

The central theme of this investigative study is to propose a framework to promote effective and efficient performance of the electrical power industry in SIMS. In the previous chapters important building blocks have been explored such as (a) the specific characteristics of SIDS and the economic principles of SIMS and (b) concepts, definitions and the measurement challenge regarding effective and efficient industry performance. In chapter 4, the 1st economizing principle; “get the institutional environment right, rules of the game”, has been fully explored and a framework of institutional approaches to regulation of the electric supply industry has been provided.

In this chapter the 2nd economizing principle; “get the governance structures right”, play of the game, will be further explored. Effective and efficient industry performance is intertwined with a governance dimension. The term governance can be used in several contexts such as international governance, national governance or local governance, regulatory governance and corporate governance. Governance is a broad and multi-dimensional process, involving deep questions concerning the specification of the arenas of governance and the different modes by which governance may be conducted. In this chapter we will unravel the different governance dimensions, what constitutes good governance and further explore the interplay of governance, from a country, corporate and regulatory perspective, with effective and efficient industry performance.

5.1.2 Chapter Outline

This chapter is structured as follows. Section II unravels the conceptual and definitional issues pertaining to governance in an attempt to place in perspective the core elements of good governance and its determinants. Subsequently, in Sections III and IV, regulatory governance and corporate governance are further explored with their interplay with industry performance. Section V takes up the measurement challenge on how to measure country governance, regulatory governance and corporate governance. The chapter is finalized with a synthesis of the interplay of governance with effective and efficient industry performance.

5.2 Understanding Governance

5.2.1 Conceptual and Definitional Issues

Various authors have attempted to define the term ‘governance’. According to Bell (2002), for example, governance is defined as “the use of institutions and structure of authority to allocate resources and coordinate or control activity in society”. The European commission has defined governance as “rules, processes and behaviour that affect the way in which powers are exercised... particularly as regards openness, participation, accountability, effectiveness and coherence” (European Commission, European Governance - A White Paper, 2001). Kaufmann et al (1999) define governance as “the traditions and institutions by which authority in a country is exercised”. According to USAID (2005)
in its simplest form, governance refers to the process of decision-making and the process by which decisions are implemented. In broad terms, governance involves the institutional environment in which citizens interact among themselves and with government agencies and officials. The term governance can be used in several contexts such as international governance, national governance or local governance and corporate governance. In ADB (1999) it is stated that “governance is the manner in which power is exercised in the management of the country’s economic and social resources for development”. It is important not to confuse ‘governance’ with ‘government’. Governance is a much broader process than government, which is a subset of governance, and may involve state and non-state actors. Closer analysis of these definitions highlights three important issues implicit in the governance process.

The first is the notion that there must be an agent of governance (i.e., someone responsible for governance). This agent could be either the state or non-state actors. It is important to note that the notion of governance does not make any assumption about which agents do the governing, i.e., governance is not the exclusive right of the state or government. Also, the governance agent must have the capacity and authority to ‘govern’.

The second implication is that there are defined ‘rules’ and accepted norms by which governance ought to be conducted and gauged. It implies mechanisms for accountability, transparency, predictability, and participation – the so-called ‘pillars of good governance’.

Accountability means that agents (the ‘governors’) can be called to task for their actions.

Transparency means that relevant information is accessible at low cost.

Predictability means policies, laws and regulations are clear, known in advance, and are uniformly and effectively enforced.

Participation means that people are consulted and/or involved in the activities that affect them.

The third implication is that governance is concerned directly with sound development management. That is, if the governance process is concerned primarily with the optimal management and allocation of the nation’s resources, then governance has a crucial development role to play.

We will now further explore the concept of governance in terms of modes of governance and what constitutes good governance.

5.2.2 Modes of Governance

As mentioned earlier, governance is not the exclusive responsibility of the state or government. Non-state actors also play an important role in the governance process. To underscore this point, a brief outline of the different modes of governance is in order. According to Soasastroo (2000) the three modes of governance considered are governance through state authority; governance through the market; and governance through networks, associations and communities.
These modes are self-explanatory and are briefly explained below.

**Governance through State Authority:** This concept of governance is the most widely known form of governance and it is particularly relevant in the developing world, where the government is the major constitutive element of the governance process. It underlines the important role of the state/government in providing the regulatory environment and institutional underpinning to facilitate efficient market exchange. For example, without courts to interpret and enforce agreements, commercial life would become chaotic; without laws to define, and police and courts to enforce them, property rights would be non-existent. Thus, governance through this mode takes place through the interplay of a host of institutional arrangements and policy strategies that the state puts in place. Inevitably, the state will be a player in any mode of governance. Unlike any other institutions, the state acts in a ‘meta-governance’ role because it, and it alone, can allocate the rights, regulations, sanctions, the legitimacy, and even the incentives and resources on which other forms of governance depend. In this meta-governance role, the state acts to ensure that the wider systems of governance are operating efficiently, effectively and accountably. Thus, state governance cuts across all modes of governance and is central to the effectiveness of the entire system of governance.

**Governance through the Market:** The most basic form of governance here is through the forces of competitive markets, i.e., through market exchange and the price mechanism. Under this mode, therefore, the balance of governance and coordinating functions shifts towards greater reliance on markets, private allocation, and contracting. Economic activity is largely determined by the forces of supply and demand, acting to a large degree in a self-regulating fashion. However, markets are never freestanding. Effective competition in markets requires considerable attention to the codification and enforcement of the rules of the political leadership permeating all levels of society if anti-competitive and arbitrary behaviours are to be avoided. As already explained, only the state can provide these institutions. It is in this context that the state will always be an important constitutive element of any form of market governance.

**Governance through Networks, Associations, and Communities:** Governance also includes the activities of formal organisations such as business associations or labour unions engaging in corporatist bargaining with each other and/or with governments. It may also include the activities of informal organisations such as village councils, which administer the social and economic activities as well as the allocation and use of resources in the village. Other examples of this form of governance include modes that emphasise various forms of public-private collaboration and power sharing, together with the empowerment and engagement of civil society and various forms of community institutions.

It should be emphasised that the three modes of governance outlined above are not mutually exclusive, as they may overlap with and
complement each other. Collectively, therefore, they define the nature, form, and operational efficiency of the country’s governance landscape.

5.2.3 What Constitutes ‘Good Governance’?

Having defined governance and the modes by which it may be executed, the next challenging task is to address the issue of what constitutes ‘good governance’. In line with the definitions of governance above, ‘good governance’ can be said to materialise if the state is able, through the power and authority vested in it, to allocate the nation’s resources, and coordinate economic activities in an optimal manner. The notion of optimality connotes efficiency and effectiveness. It means that governance is conducted within the framework of effective rules and policies that underpin social harmony and sound development. In the context of state governance, good governance implies the capacity to formulate and implement sound economic policies, to institute effective legal institutions, to ensure public oversight and participation of civil society, and to have in place a credible civil service that provides citizens with an acceptable level of public services in an effective and efficient manner. This is summarised in Figure 5.1.

Figure 5.1: The Core Constituents of Good Governance
Source: Authors construct adopted from Toatu (2006)

Effective Civil Rights
- Correct Restructuring
- Right Pay/Incentive Structure
- Meritocratic Appointment
- Well Resourced Bureaucracy

Effective Legal Institutions
- Democratic Constitution
- Independent and Reliable Judiciary
- Meritocratic judicial Appointment
- Adequately resourced judiciary

Sound Economic Policies
- Effective fiscal and Monetary Institutions
- Effective Regulatory Mechanisms
- Deregulation/Tax Simplification
- Transparent Privilization
- Budget Custom Reforms
- Procurement Reform
- Secure Property Rights

Public Oversight and Civil Society
- Parliamentary Oversight
- Civil Society/Media Participation
- International Community Organization

These constituents of good governance must, however, be gauged against certain predetermined criteria or principles of good governance. According to the Institute on Governance, these principles are not only about the results of power but about how well power is exercised. According to this approach, good governance exists where those in positions of power are perceived to have acquired their power legitimately, and there is appropriate voice accorded to those whose interests are affected by decisions. Further, the exercise of power results in a sense of overall direction that serves as a guide to action. Performance is a fourth criterion: governance should result in performance that is responsive to the interests of citizens or stakeholders. In addition, good governance demands accountability between those in positions of pow-

---

er and those whose interests they are to serve. Accountability cannot be effective unless there is transparency and openness in the conduct of work being done. And, finally, governance should be fair, which implies conformity to the rule of law and the principle of equity.

According to Soesastro (2000), good governance is widely identified with the following attributes: transparency, accountability, efficiency and fairness. These are the ground rules of governance, which must be used to assess governance outcomes. Therefore, good governance does not only mean that the state operates effective policies and laws, but it also means, and more importantly, that it executes those policies and laws of the state in a transparent, accountable, predictable, efficient and fair manner. In Box 5.1 we summarize good governance principles from a political perspective and from an economic perspective.

<table>
<thead>
<tr>
<th>Box 5.1: Good Governance Principles from a Political and Economic Perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Political Principles</strong></td>
</tr>
<tr>
<td>• Good governance is based on the establishment of a representative and accountable form of government.</td>
</tr>
<tr>
<td>• Good governance requires a strong and pluralistic civil society, where there is freedom of expression and association.</td>
</tr>
<tr>
<td>• Good governance requires good institutions – sets of rules governing the actions of individuals and organisations and the negotiation of differences between them.</td>
</tr>
<tr>
<td>• Good governance requires the primacy of the rule of law, maintained through an impartial and effective legal system.</td>
</tr>
<tr>
<td>• Good governance requires a high degree of transparency and accountability in public and corporate processes. A participatory approach to service delivery is important for public services to be effective.</td>
</tr>
</tbody>
</table>

5.3 Regulatory Governance: Conceptual and Definitional Issues

There is an extensive literature on regulatory governance both in general and as it should be applied to utility regulation. The modern literature on the latter effectively starts with the seminal 1994 paper by Levy and Spiller in which they emphasize the distinction between (a) regulatory governance arrangements and (b) regulatory content (i.e. what was regulated and how). On regulatory governance, Levy and Spiller drew attention both to the need for governance arrangements that were sufficiently robust to provide adequate protection for private investors as well as consumers and were securely located in the economic, political, constitutional and legal arrangements of individual coun-
tries. This view became (and remains) the dominant paradigm within which thinking about regulatory arrangements for electricity and other infrastructure industry has developed. However, since then the literature on governance has developed considerably both conceptually and empirically. In this section, we consider what governance features have been considered most important for effective utility regulation and associated governance and are derived from various publications, amongst others Levy and Spillerr (1994), Smith, 1997, Stern & Holder, 1999, and Noll, 2000. Also in 1997, the UK Better Regulation Task Force33 (BRTF) published its Principles for Good Regulation34. These evolving views have been summarized by Brown et al (2006) as the ten key principles of the independent regulator model of regulatory governance and are considered as best practice. These principles are:

1. **Independence**

   Infrastructure regulators should, by law, be free to make decisions within their scope of authority without having to obtain prior approval from other officials or agencies of the government. They need to be adequately insulated from short-term political pressure.

2. **Accountability**

   Regulators need to be held accountable for their actions. The mechanisms for ensuring accountability include the following:

   - Appeal rights for parties believing their interests harmed by regulatory agency decisions that have been made against the requirements in the law, either on process or on substance.
   - Substantive reporting and audit obligations on the regulatory agency.
   - Oversight or performance reviews through evaluations and hearings.
   - Ethical and procedural obligations.
   - Extensive transparency obligations (for example, on regulatory decisions and their justification).

3. **Transparency and Public Participation**

   The entire regulatory process must be fair and impartial and open to extensive and meaningful opportunity for public participation. The following are recommended with very limited exceptions:

   - All documents and information used for decision making should be available for public inspection.
   - All procedures by which and criteria upon which decisions are made should be known in advance and made publicly available.
   - No major decision should be made by a regulatory agency without being set down in a publicly available written document. The document should include the following:
     - A clear statement of the decision.
     - A description and analysis of all evidence taken into consideration.

---

33 The BRTF is responsible for advising the UK government on all aspects of regulation, not just economic regulation of utilities.

34 These principles are also prominently displayed on the home page of the BRTF website (http://www.brt.gov.uk)
- A summary of the views offered by participants to the proceedings.
- A full discussion of the underlying rationale for the decision.

4. Predictability
The regulatory system should provide reasonable, although not absolute, certainty as to the principles and rules that will be followed within the overall regulatory framework. The following are recommendations for changes in that framework:

> Changes should occur only after extensive public notice and consultation so that stakeholders have a meaningful opportunity to provide feedback to decision makers before the change is implemented.
> To the extent possible, changes should be instituted gradually.
> Regulatory decisions and policy determinations, including laws and governing regulatory decisions, should apply prospectively and never retroactively.

5. Clarity of Roles
The role of the regulatory agency should be carefully defined in law. Similarly, the roles of other sector agencies (either government or non-government) should be carefully defined to avoid the following:

> Duplication of functions.
> Interagency conflicts.
> Mixed signals to stakeholders.
> Policy confusion.

6. Completeness and Clarity in Rules
The regulatory system, through laws and agency rules, should provide all stakeholders with clear and complete timely advance notice of the principles, guidelines, expectations, and responsibilities, consequences of misbehavior, and objectives that will be pursued in carrying out regulatory activities.

7. Proportionality
Regulatory intervention in the sector should be proportionate to the challenges the regulators are addressing:

> Intervention should be the minimum necessary to remedy the problem being addressed and should be undertaken only if the likely benefits outweigh the expected economic and social costs.
> Regulators should have an array of powers and remedies at their disposal in order to ensure that they possess the ability to calibrate their actions to the circumstances faced.

8. Requisite Powers
Regulatory agencies should, under the law, possess all powers required to perform their mission. Those powers should, at a minimum,
include the authority for the following:

> To set tariffs for regulated entities.
> To establish, modify, and monitor market and service quality rules.
> To address market power and market design problems adequately.
> To carry out normal administrative functions.
> To investigate, as well as adjudicate or mediate, consumer complaints.
> To provide dispute resolution facilities for the regulated entities.
> To compel the provision of needed information.
> To monitor and enforce its decisions, and to remedy problems.

9. Appropriate Institutional Characteristics
Regulatory agencies must be able to consistently perform professionally, competently, and thoroughly, which requires the following:

> Compensation and education or training opportunities for commissioners and staff that are competitive with what is available at regulated entities.
> A reliable, adequate, and independent source of revenue and adequate budgets.
> The ability to retain outside consultants when needed.
> Commissioners who are appropriately insulated from short-term political repercussions.
> Regulatory decisions that are, if possible, made by a board of three or five commissioners who come from diverse professional backgrounds.

All regulatory decisions should be subject to final appeal to a single, impartial or independent, legally designated court or tribunal with the following requirements. The specified appeal forum should possess regulatory expertise. The regulatory decision should, with very limited exception, remain in force while the appeal is pending. And the appeal body should affirm regulatory decisions unless the following is true:

> The regulators acted beyond their legal authority.
> The regulators failed to follow appropriate procedural requirements.
> The regulators acted arbitrarily or unreasonably.
> The regulators acted against the plain weight of the evidence before the court.

10. Integrity
Strict rules governing the behavior of decision makers should be in place so as to preclude improprieties or any conduct appearing to be improper. The rules governing behavior should be fully, fairly, and vigorously enforced so as to tolerate no breaches. Included among the subjects to be covered by ethical rules should be the following:
1. Prohibition against bribes and gratuities of any kind.
2. Prohibition of all forms of conflicts of interest.
4. Reasonable disclosure of financial interests.
5. Prohibition of use of inside information for personal gain.

The following reasons are given by Brown et al (2006) why these principles can be considered as best practice:

- The independent regulator model has become the de facto governance model, at least on paper, in most of the 200 countries that have created new national or regional regulatory systems in the past 10 years;
- Some preliminary empirical evidence shows that the independent regulator governance model, when adopted in both law and practice, leads to better sector outcomes;
- The independent regulator model can accommodate a wide variety of sector structures and transactions;
- The suggested best-practice governance principles and standards can be used to evaluate the performance of almost any hybrid regulatory system, as long as there is an independent (or at least an institutionally separate) regulatory entity;
- It would be confusing to present multiple competing benchmarks. A single uniform standard of regulatory governance is favored to minimize the confusion that would arise with multiple governance benchmarks. It seems sensible to have a single benchmark that reflects the governance approach taken by most governments that have created new regulatory systems in the past 15 years or more.

5.3.2 The Interplay of Regulatory Governance with Industry Performance

According to Kessides (2004), effective regulation, protecting the interests of both investors and consumers, is the greatest challenge facing policymakers in developing and transition economies. Effective regulation is therefore a major determinant to achieving effective and efficient industry performance.

The role of good governance as a key to economic growth and development effectiveness has been succinctly underlined in a number of theoretical and empirical works. For example, Kaufmann, Kraay and Zoido-Lobatan (1999) have proved empirically the close link between the quality of governance and the level of per capita income across countries. Likewise, both the World Bank and IMF have strongly supported the view that good governance is a key determinant of economic development in the developing countries.

Several empirical studies examine whether regulatory governance is a factor affecting sector performance. Cubbin and Stern (2006)
find that both regulatory law and higher quality regulatory governance lead to higher per capita generation capacity. They conclude (p.135) that agencies with better governance are:

- Less likely to make mistakes;
- More likely to correct mistakes speedily;
- Less likely to repeat mistakes;
- More likely to develop procedures and methodologies that involve participants and to develop good practice.

Their results are in line with earlier findings of Heinsz (2002) that utilized an indicator of governmental checks and balances as a determinant of infrastructure investment. Estache, Perelman, Trujillo (2005) surveyed a large number of productivity studies and found that reforms promoted both technological change and movements towards the efficient frontier.

Based on the results of our literature review evidence is provided that it is likely to be the case that soundly designed and well established electricity and other utility service regulatory agencies should and do have a beneficial effect on industry outcomes. Governance plays a pivotal role because agencies with better governance should (a) make fewer mistakes and (b) have their mistakes identified and rectified better and more quickly so that (c) good regulatory practice is more readily established and maintained.

5.4.1 Conceptual and Definitional Issues

Governance identifies rights and responsibilities, legitimises actions and determines accountability. It is concerned with the source, use and limitation of power. Corporate governance is concerned with the process by which corporate entities are governed, that is, with the exercise of power over the direction of the enterprise, the supervision of executive actions, the acceptance of a duty to be accountable and the regulation of the corporation within the jurisdiction of the states in which it operates (Tricker, 1994).

According to Tricker, corporate governance is an umbrella term that includes specific issues from interactions among senior management, shareholders, board of directors, and other corporate stakeholders. In its narrowest sense, the term may describe the formal system of accountability of senior management to the shareholders. At its most expansive the term is stretched to include the entire network of formal and informal relations involving the corporate sector and their consequences for society in general.

Corporate governance serves as an essential foundation for superior performance. If organisation structure or managerial accountabilities and rewards are inconsistent with value creation, effectiveness will decrease (McTaggart, Kontes and Mankins, 1994).

According to Keasey and Wright (1993), corporate governance is defined to include the structure, process, cultures and systems that en-
gender the successful operation of an organisation. They argue that there is a need to view corporate governance as having two broad dimensions. First, the monitoring of management performance and ensuring accountability of management to shareholders; it emphasises the stewardship and accountability dimension of corporate governance. Second, governance structure and process need to encompass mechanisms for motivating managerial behaviour towards increasing the wealth of the business; that is, to enhance enterprise value.

The OECD (1999) takes a broad view of corporate governance and defines it as the full set of relationships among a company’s management, its board, its shareholders and other stakeholders. It provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance.

5.4.2 A Review of Corporate Governance

In this section corporate governance will be described including the parties involved in corporate governance, and the principles and mechanisms of control; it is based on a literature review of amongst others OECD (1999, 2004, 2005), Worldbank (1999), McTaggart et al (1994), Tricker (1994) and Peij (2002).

Corporate governance is the set of processes, customs, policies, laws and institutions affecting the way a corporation is directed, administered or controlled. Corporate governance also includes the relationships among the many players involved (the stakeholders) and the goals for which the corporation is governed. The principal players are the shareholders, management and the board of directors. Other stakeholders include employees, suppliers, customers, banks and other lenders, regulators, the environment and the community at large.

Corporate governance is a multi-faceted subject. An important theme of corporate governance deals with issues of accountability and fiduciary duty, essentially advocating the implementation of guidelines and mechanisms to ensure good behaviour and protect shareholders. Another key focus is the economic efficiency view, through which the corporate governance system should aim to optimize economic results, with a strong emphasis on shareholders’ welfare. There are yet other sides to the corporate governance subject, such as the stakeholder view, which calls for more attention and accountability to players other than the shareholders (e.g.: the employees or the environment).

The term corporate governance has come to mean two things:
> the processes by which companies are directed and controlled.
> a field in economics, which studies the many issues arising from the separation of ownership and control.

Relevant rules include applicable laws of the land as well as internal rules of a corporation. Relationships include those between all related parties, the most important of which are the owners, managers, directors of the board, regulatory authorities and to a lesser extent employees and the community at large. Systems and processes deal with matters such as delegation of authority.
The corporate governance structure spells out the rules and procedures for making decisions on corporate affairs. It also provides the structure through which the company objectives are set, as well as the means of attaining and monitoring the performance of those objectives. Corporate governance is used to monitor whether outcomes are in accordance with plans and to motivate the organization to be more fully informed in order to maintain or alter organizational activity. Corporate governance is the mechanism by which individuals are motivated to align their actual behaviors with the overall participants.

Parties involved in corporate governance: Parties involved in corporate governance include the regulatory body e.g. the Chief Executive Officer, the board of directors, management and shareholders. Other stakeholders who take part include suppliers, employees, creditors, customers and the community at large. In corporations, the shareholder delegates decision rights to the manager to act in the principal’s best interests. This separation of ownership from control implies a loss of effective control by shareholders over managerial decisions. Partly as a result of this separation between the two parties, a system of corporate governance controls is implemented to assist in aligning the incentives of managers with those of shareholders. With the significant increase in equity holdings of investors, there has been an opportunity for a reversal of the separation of ownership and control problems because ownership is not so diffuse.

A board of directors often plays a key role in corporate governance. It is their responsibility to endorse the organisation’s strategy, develop directional policy, appoint, supervise and remunerate senior executives and to ensure accountability of the organisation to its owners and authorities. All parties to corporate governance have an interest, whether direct or indirect, in the effective performance of the organisation. Directors, workers and management receive salaries, benefits and reputation, while shareholders receive capital return. Customers receive goods and services; suppliers receive compensation for their goods or services. In return these individuals provide value in the form of natural, human, social and other forms of capital.

A key factor in an individual’s decision to participate in an organisation e.g. through providing financial capital is trust that they will receive a fair share of the organisational returns. If some parties are receiving more than their fair return then participants may choose not to continue participating, leading to organisational collapse.

Principles: Key elements of good corporate governance principles include honesty, trust and integrity, openness, performance orientation, responsibility and accountability, mutual respect, and commitment to the organisation.

Of importance is how directors and management develop a model of governance that aligns the values of the corporate participants and then evaluate this model periodically for its effectiveness. In particu-
ular, senior executives should conduct themselves honestly and ethically, especially concerning actual or apparent conflicts of interest, and disclosure in financial reports.

**A Corporate Governance Framework: Internal and External Architecture**

In figure 5.1, a corporate governance framework is presented from the perspective of an internal and external architecture (World Bank, 1999). The framework reflects an interplay between internal incentives (which define the relationship among the key players in the corporation) and external forces (notably policy, legal, regulatory, and market) that together govern the behaviour and performance of the firm.

The internal architecture defines the relationships among key players in the corporation. In its narrowest sense, corporate governance can be viewed as a set of arrangements internal to the corporation that define the relationships between managers and shareholders. The shareholders may be public or private, concentrated or dispersed. These arrangements may be embedded in company law, securities law, listing requirements, and the like or negotiated among the key players in governing documents of the corporation, such as the corporate charter, by-laws, and shareholder agreements.

The governance problems that need to be addressed vary according to the ownership structure in the corporate sector. At one end of the spectrum is the publicly traded company with widely dispersed shareholdings. There, the challenge is for outside shareholders to control the performance of managers. Since managers dominate, the key governance mechanism is the rules for selecting directors, who need to have enough independence to ensure that they will properly monitor managers’ performance. At the other end of the spectrum is the closely held company with a controlling shareholder and a minority of outside shareholders, where the manager acts at the dictate of the controlling shareholder. There the primary governance issue is how outside shareholders can prevent the controlling shareholder from extracting excess benefits through self-dealing or disregard of minority shareholders’ economic rights. Common protections include limits on self-dealing by insiders, anti-dilution provisions, and appraisal or withdrawal rights for minority shareholders. Where a publicly traded corporation is dominated by a controlling shareholder, additional governance mechanisms may include voting rights, allowing outsiders’ representation on the board, and takeover rules limiting the “control premium” that insiders can appropriate.

The external architecture provides a level playing field and keeps players in line. These internal mechanisms for corporate governance are strengthened by external laws, rules, and institutions that provide a level, competitive playing field and discipline the behaviour of insiders, whether managers or shareholders. In developed market economies, these policies and institutions minimize the divergence between
Regulation in Splendid Isolation

The Interplay of Governance with Industry Performance

Social and private returns and reduce costly agency problems, primarily through greater transparency, monitoring by regulatory and self-regulatory bodies, and compliance mechanisms. Notable among the institutions that discipline corporations are the legal framework for competition policy, the legal machinery for enforcing shareholders’ rights, systems for accounting and auditing, a well-regulated financial system, the bankruptcy system, and the market for corporate control.

Developed markets increasingly feature a dense network of reputational agents\(^\text{35}\) who significantly reduce monitoring costs. They include accounting and auditing professionals, lawyers, investment bankers and analysts, credit rating agencies, consumer activists, environmentalists, and media. Keeping an eye on corporate performance and insider behaviour, these reputational agents can exert pressure on companies to disclose relevant information, improve human capital, recognize the interests of outsiders, and otherwise behave as good corporate citizens. They can also put pressure on government through their influence over public opinion.

These internal and external features have come together in different ways to create a range of corporate governance systems that reflect specific market structures, legal systems, traditions, regulations, and cultural and societal values. The systems may vary by country and sector and even for the same corporation over time. But they affect the agility, efficiency, and profitability of all corporations – private, publicly held, and state-owned.

5.4.3 The interplay of Corporate Governance with Industry Performance

As concluded by Edwards and Clough (2005), the connection between corporate governance and organizational performance lies in the multi-dimensional nature of (good) governance. Narrowly conceived, corporate governance involves ensuring compliance with legal obligations.

\(^{35}\) Reputational agents refer to the private sector agents, self-regulating bodies, the media, investment and corporate governance analysts, and civic society that reduce information asymmetry, improve monitoring of the firms, and shed light on opportunistic behaviour. Their actions influence both companies and government.

<table>
<thead>
<tr>
<th>Internal</th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shareholder</td>
<td>Shareholders</td>
</tr>
<tr>
<td>Board of Directors</td>
<td>Reputational Agents</td>
</tr>
<tr>
<td>Management</td>
<td>• Press</td>
</tr>
<tr>
<td>Core Functions</td>
<td>• Accountants</td>
</tr>
<tr>
<td></td>
<td>• Lawyers</td>
</tr>
<tr>
<td></td>
<td>• Credit rating</td>
</tr>
<tr>
<td></td>
<td>• Investment Bankers</td>
</tr>
<tr>
<td></td>
<td>• Financial Media</td>
</tr>
<tr>
<td></td>
<td>• Research</td>
</tr>
<tr>
<td></td>
<td>• Governance Analysts</td>
</tr>
</tbody>
</table>

Figure 5.2: Corporate Governance Internal and External Architecture

tions, and protection for shareholders against fraud or organisational failure. Without governance mechanisms in place – in particular, a board to direct and control – managers might ‘run away with the profits’.36

Understood in this way, good governance minimises the possibility of poor organisational performance.

As noted earlier, however, more recent definitions of good governance emphasise the contribution good governance37 can make to improved organizational performance by highlighting the strategic role of the board. Legal compliance, ongoing financial scrutiny and control, and fulfilling accountability requirements are fundamental features of good corporate governance. However, a high-performing board will also play a strategic role. It will plan for the future, keep pace with changes in the external environment, nurture and build key external relationships (for example, business contacts) and be alert to opportunities to further the business. The focus is on performance as well as conformance. The board is not there to simply monitor and protect but also to enable and enhance.

State-owned enterprises like their private sector counterparts generally face the same problems in ensuring that companies operate in the most efficient manner. Conflicting interests of the company’s board and management vis-à-vis the shareholders, create a motive for opportunistic behaviour by these agents with respect to the shareholders. Monitoring difficulties for shareholders – stemming from the separation of ownership and control under the company model – may create scope for boards and management to act opportunistically to advance their own interests, rather than the best interests of the company and its shareholders.

The detrimental effect on efficiency can be more severe in the case of government-owned business, as the government faces some additional problems in ensuring that its commercial businesses operate efficiently. Those problems include (World Bank, 2004) “weak external pressures from capital markets (for example, no threat of take-over), and often from product markets; and the political reasoning that produced public ownership often conflicts with economic efficiency”.

Good corporate governance within the context of a public utility according to OECD 2004-A, 2005) takes a broad view and ensures the functioning of an effective legal and regulatory framework, that the state acts as an informed and active owner and establishes a clear and consistent ownership policy, that the rights of the shareholders are recognized, that the relationship with stakeholders is constructive, that enterprise maintains high levels of transparency and accountability and that the boards of state-owned enterprises have the necessary authority, competencies and objectivity to carry out their function of strategic guidance and monitoring of management. Good corporate governance promotes effective and efficient organizational performance which in turn promotes effective and efficient industry performance.

---

36 This understanding of corporate governance as, primarily, a protective mechanism stems from agency theory. Agency theory emphasises individual action and specifically the self-interested individual who will seek to maximise her/his personal gain. This creates an inherent tension or conflict between managers and owners. The board is there to safeguard the interests of the owners from managerial opportunism (Smallman, 2004: 80-82 and Donaldson & David, 1991: 50-51).

37 See for example: The ASX Principles of Good Corporate Governance (2003), The OECD Principles of Corporate Governance (2004) and the ANAO Principles of Public Sector Governance (2003). See also the characteristics of good governance identified by the United Nations, within the context of a broad understanding of governance (1997).
5.5.1 Measuring State Governance / Institutional Quality

In our analysis of institutions we have concluded that institutions provide organization and structure. They provide mechanisms and rules for coordinating economic activity and supply information needed for coordination. They provide mechanisms for making choices and provide incentives for individuals. They structure a framework of human rights and property rights, defining the rights to control assets and to benefit from their use. They establish a framework of markets for coordinating private exchange and production and define the role of the government and the procedures for making public choices. Furthermore in relation to governance we have concluded that institutions fundamentally affect the efficiency and quality of governance by providing the incentives, rules and constraints, and resources and power, that ultimately drive the performance of public actors.

The objective of measuring state governance, within the context of the framework to promote effective and efficient performance of the electrical power industry in small isolated monopoly systems, gives us insight in a country’s institutional quality as a prerequisite to adopt certain regulatory mechanisms. To this end the Worldwide Governance Indicators (WGI) research project of Kaufmann, Kraay and Mastruzzi, covering 212 countries and territories and measuring six dimensions of governance between 1996 and 2006: Voice and Accountability, Political Stability and Absence of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption, provides us with the necessary insight. The WGI indicators reflect a state governance dimension which can also be denominated as institutional quality.

In Kaufmann, 2008 reference is made to Kaufmann et al, 1991, in which governance is defined as “the traditions and institutions by which authority in a country is exercised”. This includes the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them. Furthermore they state that no strong consensus has formed around a single definition of governance or institutional quality. For this reason, throughout their article, the terms governance, institutions, and institutional quality are used interchangeably, if somewhat imprecisely. Although the number of definitions of governance is large, there is some consensus. Most definitions agree on the importance of a capable state operating under the rule of law.

Both rule based and outcome based indicators of governance are used. e.g. a rules-based indicator of corruption might measure whether countries have legislation prohibiting corruption or have an anticorruption agency. An outcome-based measure could assess whether the laws are enforced or the anticorruption agency is undermined by political interference. To measure public sector accountability, one could observe the rules regarding the presence of formal elections, financial disclosure requirements for public servants, and the like. One could also assess the
extent to which these rules operate in practice by surveying respondents regarding the functioning of the institutions of democratic accountability. Because a clear line does not always distinguish the two types of indicators, it is more useful to think of ordering different indicators along a continuum, with one end corresponding to rules and the other to ultimate governance outcomes of interest.

Given the above reasoning and also the fact that the definition of institutions used by North as the formal and informal “rules of the game” that provide a framework within which individuals seek to coordinate their separate activities and insure against risk, is so broad, the WGI captures our objective of an assessment of the quality of key institutions in a country.

The WGI could be seen as measuring governance using a framework that distinguishes between indicators that measure formal rules and indicators that measure the practical application or outcomes of these rules. The analysis calls attention to the strengths and weaknesses of both types of indicators as well as the complementarities between them. It distinguishes between the views of experts and the results of surveys and assesses the merits of aggregate as opposed to individual governance indicators. For a detailed discussion on the methodology and data sources of the WGI we refer to Kaufmann, Kraay, and Mastruzzi (2004) and (2006). The six dimensions of governance that are measured are summarized in subsequent box.

The methodology consists of identifying many individual sources of data on perceptions of governance that can be assigned to these six broad categories. A statistical methodology known as an unobserved components model to construct aggregate indicators from these measures is then used. These aggregate indicators are weighted averages of the underlying data, with weights reflecting the precision of the individual data sources. The methodology also generates margins of error for the estimates of governance for each country, which need to be taken into account when making comparisons of governance across countries.

**Box 5.1: Six Dimensions of the World Governance Indicators**

1. **Voice and Accountability (VA)** – measuring the extent to which a country’s citizens are able to participate in selecting their governments, as well as freedom of expression, freedom of association, and a free media.
2. **Political Stability and Absence of Violence (PV)** – measuring perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism.
3. **Government Effectiveness (GE)** – measuring the quality of public services, the quality of civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies.
4. **Regulatory Quality (RQ)** – measuring the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
5. **Rule of Law (RL)** – measuring the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence.
6. **Control of Corruption (CC)** – measuring the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as “capture” of the state by elites and private interest.
Regulation in Splendid Isolation

The Interplay of Governance with Industry Performance

and over time. A maximum score per governance dimension of 2.5 can be obtained and a minimum score of -2.5 can be obtained.

For the purpose of the framework to promote effective and efficient performance for the electric power industry in SIMS we propose in line with Levy and Spiller to focus on the country’s legislative and executive institutions and the country’s judicial institutions as the key determinants for the institutional endowments of a country. These coincide with the Government effectiveness (GE), Regulatory Quality (RA) and Rule of Law (RL) governance dimensions of the WGI. In box 5.3 we relate the country governance scores with the framework classification of institutional quality.

In Figure 5.3 the institutional quality perspective of the framework to promote effective and efficient performance for the electric power industry in SIMS is presented.

5.5.2 Measuring Regulatory Governance

Measuring the effectiveness of regulatory systems began to be examined and debated almost as soon as new regulatory systems came into existence. Such evaluations have taken different forms depending on what is being sought from the evaluation. According to Brown et al. (2006) in general, the evaluations are performed in one of three ways:

- Type 1 – cross-country statistical analyses.
- Type 2 – cross-country descriptive analyses (with and without benchmarking).
- Type 3 – single-country structured case studies.

1 Cross country statistical analyses.

Type 1 studies use various statistical techniques (primarily econometric techniques based on variants of regression analysis) to examine whether various formal and informal characteristics of governance have produced positive or negative effects on the economic performance of the sector. The data for these studies usually come from published information and questionnaires sent to the regulators in different countries. Typically, the studies try to determine whether certain regulatory characteristics or combinations of characteristics (such as institutional
The interplay of governance with industry performance

independence, existence of a regulatory statute, or type of tariff-setting system) have had positive or negative effects on different dimensions of sector performance (such as levels of investment and capacity utilization).

The studies attempt to use real-world data to test general propositions on the potential economic effects of regulation. They are not designed to provide detailed recommendations on specific reforms. This does not, however, imply that the studies are irrelevant to the real world of regulation. Presumably, policy-makers will benefit from knowing whether different dimensions of regulatory governance (for example, an independent regulator) and substance (for example, cost of service versus price cap regulation) are associated with increases in infrastructure investment, productivity, and performance. Quantitative answers to these fundamental questions can be found only from econometric studies of this type, whatever qualifications may be attached to specific studies. With the growing availability of “panel data” (comparable data for a good number of countries for a number of years), the quality of these studies has greatly improved. In general, the more recent studies increasingly confirm the view that good regulation improves investment and productivity performance in developing countries both in telecoms and in electricity generation40.

2 Cross-Country Descriptive Analyses

These are cross-country studies that are designed to compare the formal characteristics of regulatory systems in different countries41. Typically, they focus on legally specified elements of governance, such as appointment and removal procedures, funding sources, appeals of regulatory decisions, and the division of responsibilities between the regulator and other parts of the government. The end product is usually a published report with various tables designed to facilitate comparisons across countries. The general goal of such studies is to allow for benchmarking of regulatory systems rather than trying to prove or disprove the general propositions that are the focus of the Type 1 studies. These studies are usually conducted in the hope that a country’s political authorities will be convinced that they need to improve their regulatory system if they see that it compares unfavorably with the regulatory systems in other comparable countries.

3 Single-Country Structured Case Studies

A third approach is single-country analyses of an existing regulatory system42. Typically, they take the form of structured case studies that focus on regulatory governance. Depending on the resources that are available, the evaluation may be limited to an examination of the formal legal and institutional aspects of the regulatory system, or it may go more deeply and review how the formal elements have actually been employed. The case studies are “structured” in the sense that the questionnaires and interview guidelines provide a checklist to ensure that case studies for different countries examine a similar core set of issues. Depending on the available resources, the case studies may involve

40 For a high-quality panel data study of regulatory outcomes in fixed-line telecoms, see Gutierrez (2003). Cubbin and Stern (2005) provide the first major panel data study of the effect of the quality of regulatory governance on developing countries’ generation capacity.

41 See CEER (2004); Commission of the European Communities (2005); ITU (2001); Ocaña (2002); and Stern and Holder (1999).

42 For electricity, see Brown and De Paula (2002 and 2004) on Brazil, Prayas Energy Group (2002) on India, the World Bank (2004) on Russia, and Moscote (2004) on Ukraine. The principal findings and recommendations of these reports are summarized in appendix G.

43 It is not uncommon for trade associations or nongovernmental organizations (NGOs) to sponsor analyses of infrastructure regulatory systems. Such studies can be very helpful in identifying weaknesses or problems in both the design and the implementation of the system, but they also may be biased because they inevitably reflect the commercial or consuming interests of the organization that commissioned the assessment.

44 The applicability and usefulness of the best practice independent regulator model relies on a number of assumptions about the country in which it is being considered, e.g. the nature of the overall legal system, transparency, intellectual discipline and rigor, respect for property rights etc. There should be sufficient institutional quality as opposed to institutional fragility, to accommodate the independent regulatory model. Given the institutional quality attention should be directed to good-fit rather than best practice regulatory systems.

The Interplay of Governance with Industry Performance
quick, mid-level, or in-depth evaluations. See Box 5.4 for a further elaboration on Quick, Mid-Level and In-Depth Evaluations.

For the purpose of the framework to promote effective and efficient performance of the electric power industry in SIMS we propose to use a Regulatory Governance Appraisal Framework in which the regulatory governance principles of Brown et al. (2006) will be used. The governance criteria can obtain a score of 1 to 4 where 1 indicates no merit with regard to the criteria for effective and independent utility regulation and 4 represents the independent regulator model as international best practice. In figure 5.4 the Regulatory Governance Perspective of the framework is presented.

5.5.3 Measuring Corporate Governance

There is a large body of empirical research that has assessed the impact of corporate governance on firm performance for the developed markets. Studies have shown that good governance practices have led a significant increase in the economic value added of firms, higher pro-
The Interplay of Governance with Industry Performance

1. Ensuring an Effective Legal and Regulatory Framework for State-Owned Enterprises

The legal and regulatory framework for state-owned enterprises should ensure a level-playing field in markets where state-owned enterprises and private sector companies compete in order to avoid market distortions. The framework should build on, and be fully compatible with, the OECD Principles of Corporate Governance and their measurement technique. The OECD Principles were originally issued in 1999 and have since become the international benchmark for corporate governance, forming the basis for a number of reform initiatives, both by government and the private sector (OECD, 2004-A). The principles were revised in 2003 to take into account developments since 1999, through a process of extensive and open consultations, and drawing on the work of the Regional Corporate Governance Roundtables for non-OECD countries. The new principles were agreed by OECD governments in April 2004 (OECD Policy Brief, 2004).

The principles (see Box 5.6) cover six key areas of corporate governance – ensuring the basis for an effective corporate governance framework; the rights of shareholders; the equitable treatment of shareholders; the role of stakeholders in corporate governance; disclosure and transparency; and the responsibilities of the board. There are explanatory annotations for each area that also indicate the range of policy measures which have proved useful in achieving them. Key to the success of the principles is that they are principle based and non-prescriptive so that they retain their relevance in varying legal, economic and social contexts.

The OECD has also issued Guidelines for State Owned Companies (see Box 5.5). The demand for these guidelines is as a consequence of the reform undertakings of corporate governance of state-owned enterprises which is an important but also complex undertaking. A major challenge is to find a balance between the state’s responsibility for actively exercising its ownership functions, such as the nomination and election of the board, while at the same time refraining from imposing undue political interference on the management of the company. Another important challenge is to ensure that there is a level playing field in the markets where private sector companies can compete with state-owned enterprises and that governments do not distort competition in the way they use their regulatory or supervisory powers.
### Box 5.5: OECD Guidelines for State Owned Companies

#### 2. The State Acting as Owner
The state should act as an informed and active owner and establish a clear and consistent ownership policy, ensuring that the governance of state-owned enterprises is carried out in a transparent and accountable manner, with the necessary degree of professionalism and effectiveness.

#### 3. Equitable treatment of Shareholders
The state and state-owned enterprises should recognize the rights of all shareholders and in accordance with the OECD Principles of Corporate Governance ensure their equitable treatment and equal access to corporate information.

#### 4. Relations with Stakeholders
The state ownership policy should fully recognize the state-owned enterprises responsibilities towards stakeholders and request that they report on their relations with stakeholders.

#### 5. Transparency and Disclosure
State-owned enterprises should observe high standards of transparency in accordance with the OECD Principles of Corporate Governance.

#### 6. The Responsibilities of the Boards of State-Owned Enterprises
The boards of state-owned enterprises should have the necessary authority, competencies and objectivity to carry out their function of strategic guidance and monitoring of management. They should act with integrity and be held accountable for their actions.

### Box 5.6: OECD Corporate Governance Principles

#### 1. Ensuring the Basis for an Effective Corporate Governance Framework
The corporate governance framework should promote transparent and efficient markets, be consistent with the rule of law and clearly articulate the division of responsibilities among different supervisory, regulatory and enforcement authorities.

#### 2. The Rights of Shareholders and Key Ownership Functions
The corporate governance framework should protect and facilitate the exercise of shareholder’s right. Basic shareholders rights should include the right to: 1) secure methods of ownership registration; 2) convey or transfer shares; 3) obtain relevant and material information on the corporation on a timely and regular basis; 4) participate and vote in general shareholder meetings; 5) elect and remove members of the board; and 6) share in the profits of the corporation.

#### 3. The Equitable Treatment of Shareholders
The corporate governance framework should ensure the equitable treatment of all shareholders, including minority and foreign shareholders. All shareholders should have the opportunity to obtain effective redress for violation of their rights.

#### 4. The Role of Stakeholders in Corporate Governance
The corporate governance framework should recognize the rights of stakeholders established by law or through mutual agreements and encourage active cooperation between corporations and stakeholders in creating wealth, jobs, and the sustainability of financially sound enterprises.

#### 5. Disclosure and Transparency
The corporate governance framework should ensure that timely and accurate disclosure is made on all material matters regarding the corporation, including the financial situation, performance, ownership, and governance of the company.

#### 6. The Responsibilities of the Board
The corporate governance framework should ensure the strategic guidance of the company, the effective monitoring of management by the board, and the board’s accountability to the company and the shareholders.
For a complete review of the principles we refer to the OECD Principles of Corporate Governance (OECD, 2004-A) and for a complete review of the guidelines for state owned companies we refer to the OECD guidelines for State Owned Companies (OECD, 2005).

Each of the principles is followed by a number of supporting sub-principles. The principles are also supplemented by annotations that contain commentary on the principles and are intended to help readers understand their rationale. The annotations also contain descriptions of dominant trends and offer alternative implementation methods and examples that may be useful in making the principles operational.

Measuring corporate governance is based on the “Methodology for Assessing the Implementation of the OECD Principles on Corporate Governance” (OECD, 2006). The approach of the Methodology to making an assessment is principally qualitative although the Methodology may take into account certain quantitative measures. The Methodology follows an assessment scale similar to that used by other Financial Stability Forum (FSF) standard setters and by the World Bank according to:

- observed/implemented,
- broadly observed/implemented,
- partly observed/implemented and
- not observed/implemented.

The classification also reflects a judgment about the effectiveness of enforcement and the operation of markets. For each principle, “essential criteria” are specified that seek to make the principle’s outcome more specific and easier to verify by a reviewer for effective evaluation of implementation, while preserving functional equivalence.

Within the context of the framework box 5.7 shows the relationship between the framework classification of corporate governance and the classification of the OECD principles for corporate governance.

<table>
<thead>
<tr>
<th>Framework Classification of Corporate Governance</th>
<th>OECD Assessment measures of Corporate Governance principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak</td>
<td>Not implemented</td>
</tr>
<tr>
<td></td>
<td>A not implemented assessment likely is appropriate where there are major shortcomings, amongst others:</td>
</tr>
<tr>
<td></td>
<td>• The core elements of the standards described in a majority of the applicable Essential Criteria are not present; and/or</td>
</tr>
<tr>
<td></td>
<td>• Incentives and/or disciplinary forces are not operating effectively to encourage at least a significant minority of market participants to adopt the recommended practices.</td>
</tr>
</tbody>
</table>
For the purpose of the Framework to promote effective and efficient performance of the electrical power industry in SIMS we propose to use the OECD Principles of Corporate Governance and Guidelines for State Owned Companies depicted in the Figure 5.5: “The Corporate Governance Perspective of the Framework”.

<table>
<thead>
<tr>
<th>Framework Classification of Corporate Governance</th>
<th>OECD Assessment measures of Corporate Governance principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate</td>
<td>Partially implemented</td>
</tr>
<tr>
<td></td>
<td>A partly assessment is likely appropriate in the following situations:</td>
</tr>
<tr>
<td></td>
<td>• One or more core elements of the standards described in a minority of the applicable Essential Criteria are missing, but other applicable Essential Criteria are fully or broadly implemented in all material respects.</td>
</tr>
<tr>
<td></td>
<td>• The core elements of the standards described in all of the applicable Essential Criteria are present, but incentives and/or disciplinary forces are not operating effectively to encourage at least a significant minority of market participants to adopt the recommendation practices;</td>
</tr>
<tr>
<td></td>
<td>• The core elements of the standards described in all of the applicable Essential Criteria are present, but implementation levels are low because some or all of the standards are new.</td>
</tr>
<tr>
<td>Strong</td>
<td>Broadly / fully implemented</td>
</tr>
<tr>
<td></td>
<td>One or more applicable essential criteria are fully implemented or less than fully implemented, but, at minimum:</td>
</tr>
<tr>
<td></td>
<td>• All of the applicable Essential criteria are implemented to some extent;</td>
</tr>
<tr>
<td></td>
<td>• The core elements of the standard are present.</td>
</tr>
<tr>
<td></td>
<td>• Incentives and/or disciplinary forces are operating with some effect to encourage at least the majority of market participants to adopt the recommended practices.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Corporate Governance categories</th>
<th>Framework classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weak</td>
</tr>
<tr>
<td>Ensuring an Effective Legal and Regulatory Framework</td>
<td></td>
</tr>
<tr>
<td>The State Acting as an Owner</td>
<td></td>
</tr>
<tr>
<td>Equitable Treatment of Shareholders</td>
<td></td>
</tr>
<tr>
<td>Relations with Stakeholders</td>
<td></td>
</tr>
<tr>
<td>Transparency and Disclosure</td>
<td></td>
</tr>
<tr>
<td>Responsibilities of the Boards of State-Owned Enterprises</td>
<td></td>
</tr>
</tbody>
</table>

OECD / World Bank Classification

<table>
<thead>
<tr>
<th></th>
<th>1 not implemented</th>
<th>2 partially / broadly implemented</th>
<th>3 fully implemented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framework classification</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.6 Synthesis

Throughout this chapter we have investigated the 2nd order economizing principle of the NIE “Get the governance structure right, the play of the game”. The concept of governance has been thoroughly analyzed and reviewed. Specific attention is given to the interplay of governance with industry performance and how to measure this. In this chapter we have dealt with research question: “RQ4. The interplay of governance with industry performance and how to measure this”.

Summarizing we could state that governance identifies rights and responsibilities, legitimises actions and determines accountability. It is concerned with the source, use and limitation of power. The several modes of governance, being governance through (a) state authority, (b) the market and, (c) network associations and communities have been explored. Specific attention is drawn to the principles of good governance. The different governance perspectives, being state governance, regulatory governance and corporate governance, have been fully reviewed.

Within the context of state governance, good governance implies the capacity to formulate and implement sound economic policies, to institute effective legal institutions, to ensure public oversight and participation of civil society, and to have in place a credible civil service that provides citizens with an acceptable level of public services in an effective and efficient manner. For the purpose of the framework, to promote effective and efficient performance of the electricity supply industry in SIMS, it is proposed, in line with Levy and Spiller, to focus on the country’s legislative and executive institutions and the country’s judicial institutions as the key determinants for the institutional endowments of a country. These coincide with the Government Effectiveness (GE), Regulatory Quality (RA) and Rule of Law (RL) performance indicators of the World Governance Indicators which provide a framework for measurement of state governance or institutional quality. We have constructed a country governance measurement perspective for the framework for SIMS to promote effective and efficient industry performance.

Regulatory governance refers to the institutional and legal design of the regulatory system and is the framework within which decisions are made. Regulatory governance is defined by the laws, processes, and procedures that determine the enterprises, actions, and parameters that are regulated, the government entities that make the regulatory decisions, and the resources and information that are available to them. Regulatory governance is the “how” of regulation. The ten key regulatory governance principles of Brown, et al (2006) are considered a best practice and are used as the principles to measure the quality of regulatory governance. The regulatory governance principles are, independence, accountability, and predictability, clarity of roles, completeness and clarity of rules, proportionality, requisite powers, appro-
appropriate institutional characteristics and integrity. We have constructed a regulatory governance measurement perspective for the framework to promote effective and efficient performance for the electricity supply industry in SIMS.

Corporate governance is a multi-faceted subject. Corporate governance is the set of processes, customs, policies, laws and institutions affecting the way a corporation is directed, administered or controlled. Corporate governance also includes the relationships among the many players involved (the stakeholders) and the goals for which the corporation is governed. The principal players are the shareholders, management and the board of directors. Other stakeholders include employees, suppliers, customers, banks and other lenders, regulators, the environment and the community at large. The OECD Principles for Corporate Governance and the OECD Guidelines for State Owned Companies are used as the principles against which the quality of corporate governance is measured. These principles are: ensuring an effective and legal framework, the state acting as an owner, equitable treatment of shareholders, relations with stakeholders, transparency and disclosure and responsibilities of the boards of state owned enterprises. We have constructed a corporate governance measurement perspective for the framework to promote effective and efficient performance of electricity supply industry in SIMS.

There is quite some empirical evidence of the interplay of state governance, regulatory governance and corporate governance with industry performance. Kaufmann, Kraay and Zoido-Lobatan (1999) have proved empirically the close link between the quality of governance and the level of per capita income across countries. Likewise, both the World Bank and IMF have strongly supported the view that good governance is a key determinant of economic development in the developing countries. Cubbin and Stern (2006) find that both regulatory law and higher quality regulatory governance lead to higher per capita generation capacity. Their results are in line with earlier findings of studies conducted by Heinsz (2002) and Estache, Perelman, Trujilio (2005).

Following our analysis on the interplay of governance with industry performance which lies in the multi-dimensional nature of good governance, we conclude that:

> Within the context of state governance, good governance implies the capacity to formulate and implement sound economic policies, to institute effective legal institutions, to ensure public oversight and participation of civil society, and to have in place a credible civil service that provides citizens with an acceptable level of public services in an effective and efficient manner. These are the key country endowments and determine the institutional quality to ensure the establishment or reform of regulatory agencies ultimately to promote effective and efficient industry performance.

> Within the context of regulatory governance, good governance implies that the regulatory function is deployed independently,
with the necessary accountability, transparency and public participation, with the necessary clarity of roles and clarity and completeness of rules, that regulation is proportionate and the regulator possesses the necessary authority and requisite powers within appropriate institutional characteristics and with the necessary integrity. Good governance plays a pivotal role because agencies with better governance should (a) make fewer mistakes and (b) have their mistakes identified and rectified better and more quickly so that (c) good regulatory practice is more readily established and maintained and in doing so promoting effective and efficient industry performance.

> Within the context of corporate governance, from a public utility perspective, good governance ensures the functioning of an effective legal and regulatory framework, that the state acts as an informed and active owner and establishes a clear and consistent ownership policy, that the rights of the shareholders are recognized, that the relationship with stakeholders is constructive, that enterprise maintains high levels of transparency and accountability and that the boards of state-owned enterprises have the necessary authority, competencies and objectivity to carry out their function of strategic guidance and monitoring of management. Good corporate governance promotes effective and efficient organizational performance which in turn promotes effective and efficient industry performance.

5.6.2 The Way Forward

In this chapter the 2nd economizing principle, “get the governance structures right”, has been fully explored. Furthermore a framework to measure state governance or institutional quality, regulatory governance and corporate governance has been suggested. The several building blocks for the framework to promote effective and efficient performance for the electricity supply industry in SIMS are now in place. They comprise: the economic principles of small island development states and small island monopoly systems which have been dealt with in chapter 2; in chapter 3 a conceptual delineation of industry performance and how this can be measured has been reviewed; in chapter 4 the 1st economizing principle “get the institutional environment right” has been dealt with and in chapter 5 the 2nd economizing principle “get the governance structure right” has been dealt with. In chapter 6 these building blocks will be integrated in a coherent framework to promote effective and efficient performance of the electricity supply industry in small isolated monopoly systems. This framework will be deployed in the case of eight small isolated monopoly systems.
A Framework to Promote Effective and Efficient Performance of the Electricity Industry in SIMS
6.1 Introduction

6.1.1 Background

The central theme of this investigative study is to propose a framework to promote effective and efficient performance of the electricity industry in SIMS. The framework is intended to serve as a synthesis of a diversity of aspects, within a coherent context, to assist in the trilemma of politics, economics and technology. Pursuing effective and efficient industry performance is a process of continuous improvement which requires reform measures in the sector. To assure reasonable success the overarching principles of credibility, legitimacy and transparency should be applied in such a way that any outcome should be perceived as fair and just by the stakeholders involved. The framework is an instrument to deal with the utility problem and to stimulate the broader stakeholder discussion and provide a nucleus around which diverse stakeholders’ interests can logically coalesce.

In the previous chapters important building blocks have been explored starting with the research objective (chapter 1), the specific characteristics and economic principles of SIDS and SIMS (chapter 2), the concepts of effective and efficient industry performance (chapter 3), the interplay of institutions with industry performance (chapter 4) and the interplay of governance with industry performance (chapter 5). In this chapter these building blocks will be integrated in a framework for SIMS to promote effective and efficient performance of the ESI. The proposed framework will be elaborated through the lens of the NIE using the perspectives of the 1st and 2nd order economizing principles.

6.1.2 Chapter Outline

As previously discussed a framework for SIMS to promote effective and efficient performance of the electricity industry will be elaborated from an institutional and a governance perspective. Per perspective the fundamental aspects that require adherence and compliance to promote effective and efficient industry performance will be elaborated upon. Paragraph 6.1 starts with an overview and high level description of the framework. Paragraph 6.2 elaborates on the institutional perspective and application in the case of Caribbean SIDS. Paragraph 6.3 elaborates on the corporate governance perspective and application in the case of Caribbean SIMS. Paragraph 6.4 provides a menu of regulatory options and a proposed regulatory mechanism for the selected Caribbean SIDS and SIMS. This chapter will be finalized with a synthesis and conclusion in paragraph 6.5.

<table>
<thead>
<tr>
<th>Box 6.1: Economizing Principles of the New Institutional Economics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st order economizing principle</td>
</tr>
<tr>
<td>2nd order economizing principle</td>
</tr>
</tbody>
</table>
The main objective of the framework is to assist policy makers and management of utilities and other entities to adequately deal with the so called utility problem and achieve the overall desired goal of “Effective and Efficient Industry Performance”. But Effective and Efficient Industry Performance means different things to different people, with a wide variety of labels and meanings preventing a common understanding. We refer to the trilemma of politics, economics and technology. The conducted research revealed that industry performance refers to the effectiveness and efficiency of the process through which industry outcome has been realized in terms of:

- Output and Consumption
- Efficiency (Technical and Economic)
- Quality of Supply
- Financial Performance
- Capacity, Investment and Maintenance
- Prices
- Competition if Applicable
- Social Indicators

Through the framework fundamental concepts as a prerequisite to achieve effective and efficient industry performance are put in context. They are derived from key principles and critical standards that represent best practices. Through the framework various institutional, governance, regulatory management and utility management concepts are integrated in which a common definition is established, components are identified and key concepts are described. This framework accommodates most viewpoints and provides a starting point for assessment and enhancement in the pursuit of effective and efficient industry performance for future initiatives of rule- and policy-making bodies and education (for the several stakeholders involved).

The proposed framework to promote effective and efficient performance of the electricity industry in SIMS looks at regulation as a “design” problem which is constrained by two dimensions: a country governance dimension and a corporate governance dimension. Juxtaposing these two dimensions in a matrix gives as a result a menu of options for the regulatory system comprising of regulatory substance with associated regulatory governance. Regulatory substance and regulatory governance are seen as choice variables for policymakers. Country governance or institutional quality gives insight into the specific institutional endowment of a nation, which determines the form and severity of the country’s regulatory problems and the range of options for resolving them. Furthermore the dimension of Corporate Governance which has a direct interplay with efficient and effective industry performance provides another constraint that determines the options available for the regulatory system. Finally choices about regulatory incentives are also implicitly constrained by the regulatory governance principles built into the regulatory system.

The framework illustrated in figure 6.1 maps the options for the
regulatory system by juxtaposing the country's governance dimension and the corporate governance dimension and sets the stage for further analysis and regulatory design.

The following options for the regulatory system have been identified:

- No Effective Regulation;
- Basic Regulation;
- Self-imposed Regulation;
- Intermediate Regulation;
- Advanced Regulation.

The menu of options of the regulatory system is proposed as a result of how the quality of country governance (institutional quality) and the quality of corporate governance can be classified. In the following paragraphs we will summarize the country, corporate and regulatory governance perspectives that will drive the menu of options for the regulatory system. Furthermore we will elaborate on the conducted deployment of the framework and share our thoughts and findings.

6.3.1 Country Governance / Institutional Quality

Governess is the manner in which power is exercised in the management of the country’s economic and social resources for development (ADB, 1999). Good governance means that the state operates effective policies and laws and that it executes those policies and laws of the state in a transparent, accountable, predictable, efficient and fair manner.
To measure a country’s governance or institutional quality we use the WGI of Kaufmann et al. For the purpose of the framework to promote effective and efficient performance of the ESI in SIMS we propose in line with Levy and Spiller to focus on the country’s legislative and executive institutions and the country’s judicial institutions as the key determinants for the institutional endowments of a country. These coincide with the Government Effectiveness (GE), Regulatory Quality (RA) and Rule of Law (RL) performance indicators of the WGI of Kaufmann et al. We refer to chapter 5 paragraphs 5.1. “Measuring Country Governance / Institutional quality” where we have constructed the “Country Governance Measurement Perspective” of the framework to measure the institutional quality of the country. In the box below we summarize the dimensions that are measured:

**Box 6.2: SIMS Framework Country Governance Dimensions**

1. **Government Effectiveness (GE)** – measuring the quality of public services, the quality of civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies.

2. **Regulatory Quality (RQ)** – measuring the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

3. **Rule of Law (RL)** – measuring the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence.

6.3.2 Application of the Country Governance Perspective of the Framework

We have deployed the country governance perspective of the framework for Caribbean SIDS by using the publicly available Worldwide Governance Indicators (WGI) derived from Kaufman, D., Kraay A., Mastruzzi M., (2007) “Worldbank Bank Policy Research Working Paper 4280”. This paper represents the latest update of the WGI research project. We refer to table 6.1. “Country Governance scores of Caribbean SIDS” which shows the selected 2006 country governance measures of the Caribbean SIDS that are the focus of this investigative study.

The units in which governance is measured follow a normal distribution with a mean of zero and a standard deviation of one in each period. This implies that virtually all scores lie between -2.5 and +2.5, with higher scores corresponding to better outcomes.

A useful role of the aggregate indicators is that they allow summarizing in a compact way the diversity of information available on governance for each country and so make comparisons possible across countries and over time.

Deploying the country governance measurement perspective of the framework gives as a result a qualification of the country’s institutional quality. Conducting the analysis to determine the institutional quality of the country will give fundamental insight into the opportunities for improvement required to develop to the next stage of institutional quality. For reference purposes we have also included the govern-

---

51 This paper reports on the latest update of the World Wide Governance Indicators research project covering 212 countries and territories and measuring six dimensions of governance between 1996 and 2006. In less than a decade, a substantial number of countries exhibit statistically significant improvements in at least one dimension of governance, while other countries exhibit deterioration in some dimensions. The decade long aggregate indicators, together with disaggregated individual indicators, are available on a newly-redesigned website at www.govindicators.org
### Table 6.1: Country Governance scores for Caribbean SIDS

<table>
<thead>
<tr>
<th>Country</th>
<th>Criteria</th>
<th>Score</th>
<th>Average</th>
<th>Frame classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td>Government Effectiveness</td>
<td>1.57</td>
<td>1.53</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>1.33</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>1.68</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Aruba</td>
<td>Government Effectiveness</td>
<td>1.29</td>
<td>1.00</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>0.84</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>0.88</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Bahamas</td>
<td>Government Effectiveness</td>
<td>1.15</td>
<td>1.15</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>1.08</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>1.22</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Belize</td>
<td>Government Effectiveness</td>
<td>-0.18</td>
<td>-0.14</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>-0.19</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>-0.05</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Bermuda</td>
<td>Government Effectiveness</td>
<td>1.02</td>
<td>1.08</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>1.33</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>0.88</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Barbados</td>
<td>Government Effectiveness</td>
<td>1.21</td>
<td>1.03</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>0.89</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>1.00</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>Government Effectiveness</td>
<td>1.29</td>
<td>1.26</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>1.33</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>1.15</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Dominica</td>
<td>Government Effectiveness</td>
<td>0.77</td>
<td>0.78</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>0.9</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>0.66</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Grenada</td>
<td>Government Effectiveness</td>
<td>0.17</td>
<td>0.24</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>0.44</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>0.12</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Jamaica</td>
<td>Government Effectiveness</td>
<td>0.13</td>
<td>0.33</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>0.25</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>0.60</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Netherlands Antilles (Curaçao, Bonaire, St. Maarten)</td>
<td>Government Effectiveness</td>
<td>0.75</td>
<td>0.82</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>0.84</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>0.88</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>St. Kitts and Nevis</td>
<td>Government Effectiveness</td>
<td>0.84</td>
<td>0.89</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>1.00</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>0.82</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>Government Effectiveness</td>
<td>1.00</td>
<td>0.97</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>1.08</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>0.82</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>St. Vincent and the Grenadines</td>
<td>Government Effectiveness</td>
<td>0.92</td>
<td>0.88</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>0.90</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>0.82</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>Government Effectiveness</td>
<td>0.23</td>
<td>0.22</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>0.70</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>-0.26</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>Government Effectiveness</td>
<td>1.86</td>
<td>1.75</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>1.65</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>1.75</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Government Effectiveness</td>
<td>1.83</td>
<td>1.75</td>
<td>-2.5</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>1.76</td>
<td></td>
<td>-1.25</td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>1.73</td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

### Reference countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Score</th>
<th>Average</th>
<th>Frame classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands</td>
<td>1.86</td>
<td>1.75</td>
<td>-2.5</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1.83</td>
<td>1.75</td>
<td>-2.5</td>
</tr>
</tbody>
</table>
ance scores of the United Kingdom and the Netherlands as in the colonial period these countries were the mother countries of the English and Dutch speaking Caribbean SIDS and as a consequence of that are often referred to as benchmarks.

6.3.3 Corporate Governance

Corporate governance affects the development and functioning of capital markets and exerts a strong influence on resource allocation. It impacts upon the behavior and performance of firms, innovative activity, entrepreneurship, and the development of an active industry sector. However, there is no single model of corporate governance. In the economics debate concerning the impact of corporate governance on performance, there are basically two different models of the corporation, the shareholder model and the stakeholder model. According to OECD (1999) in its narrowest sense (shareholder model), corporate governance often describes the formal system of accountability of senior management to shareholders. In its widest sense (stakeholder model), corporate governance can be used to describe the network of formal and informal relations involving the corporation. According to the stakeholder model, the corporation is responsible to a wider constituency of stakeholders than shareholders. Other stakeholders may include contractual partners such as employees, suppliers, customers, creditors and social constituents such as members of the community in which the firm is located, environmental interest, local and national governments, and society at large. This view holds that corporations should be “socially responsible” institutions, managed in the public interest. According to this model performance is judged by a wider constituency interested in employment, market share, and growth in trading relations with suppliers and purchasers, as well as financial performance.

Within the context of the framework for SIMS to promote effective and efficient performance of the Electricity Industry we share the view of the stakeholder model for corporate governance and adopt the OECD Principles for Corporate Governance and the OECD Guidelines for State Owned Enterprises. We refer to chapter 5 paragraph 5.5.2. “Measuring Corporate Governance” in which we have constructed the “Corporate Governance Measurement Perspective” of the framework for SIMS to promote effective and efficient industry performance.

6.3.4 Application of the Corporate Governance Perspective of the Framework

We have selected 8 Caribbean SIDS to deploy the Corporate Governance Measurement Perspective of the framework. Per utility we have obtained the corporate governance scores from at least three respondents so that a government view, a service provider view and a consumer/stakeholder view is represented in the scores. We refer to annex III “Case Study: Measuring Governance” for a further elaboration on the conducted research. It was agreed upon with the respondents that the scores per utility would be presented anonymously. We refer to Mayer (1996) p. 11.
**Table 6.2: Corporate Governance Scores for the Utilities of the selected Caribbean SIDS**

<table>
<thead>
<tr>
<th>Country</th>
<th>Criteria</th>
<th>Overall score</th>
<th>Average score</th>
<th>Framework classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility 1</td>
<td>Ensuring an effective legal and regulatory framework</td>
<td>2</td>
<td>2.5</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>The State acting as owner</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equitable treatment of shareholders</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relations with stakeholders</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transparency and disclosure</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsibilities of the Boards of the SOE</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility 2</td>
<td>Ensuring an effective legal and regulatory framework</td>
<td>2</td>
<td>2.3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>The State acting as owner</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equitable treatment of shareholders</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relations with stakeholders</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transparency and disclosure</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsibilities of the Boards of the SOE</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility 3</td>
<td>Ensuring an effective legal and regulatory framework</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>The State acting as owner</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equitable treatment of shareholders</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relations with stakeholders</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transparency and disclosure</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsibilities of the Boards of the SOE</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility 4</td>
<td>Ensuring an effective legal and regulatory framework</td>
<td>3</td>
<td>3.2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>The State acting as owner</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equitable treatment of shareholders</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relations with stakeholders</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transparency and disclosure</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsibilities of the Boards of the SOE</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility 5</td>
<td>Ensuring an effective legal and regulatory framework</td>
<td>2</td>
<td>2.1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>The State acting as owner</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equitable treatment of shareholders</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relations with stakeholders</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transparency and disclosure</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsibilities of the Boards of the SOE</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility 6</td>
<td>Ensuring an effective legal and regulatory framework</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>The State acting as owner</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equitable treatment of shareholders</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relations with stakeholders</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transparency and disclosure</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsibilities of the Boards of the SOE</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility 7</td>
<td>Ensuring an effective legal and regulatory framework</td>
<td>4</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>The State acting as owner</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equitable treatment of shareholders</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relations with stakeholders</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transparency and disclosure</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsibilities of the Boards of the SOE</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility 8</td>
<td>Ensuring an effective legal and regulatory framework</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>The State acting as owner</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equitable treatment of shareholders</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relations with stakeholders</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transparency and disclosure</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsibilities of the Boards of the SOE</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Deploying the corporate governance measurement perspective of the framework gives as a result a qualification of the maturity level of corporate governance. Conducting the analysis to determine the maturity level of corporate governance gives fundamental insight into the opportunities for improvement required to develop to the next stage of maturity in deploying corporate governance.

6.4.1 Options for the Regulatory System

The framework maps the options for the regulatory system which are constrained by the quality of country governance (institutional quality) and the quality of corporate governance and sets the stage for analysis and regulatory design. Reference is made to figure 6.1 for a schematic representation of the framework.

The following options for the regulatory system have been identified:

- No effective regulation;
- Basic regulation;
- Self-imposed regulation;
- Intermediate regulation;
- Advanced regulation.

The regulatory options will now be further elaborated in terms of regulatory substance and regulatory governance.

6.4.2 A Recap of Regulatory Substance and Regulatory Governance

Each of the options of the regulatory system will now be further elaborated in terms of regulatory substance and regulatory governance.

We would like to reiterate the basic goals (Kessides, 2004) that will guide the design of a regulatory system:

- Rent extraction – setting rates that strike a socially acceptable compromise between the interests of consumers and investors.
- Supply-side efficiency – providing signals and incentives for suppliers and investors to increase efficiency.
- Demand-side efficiency – providing signals and incentives for efficient consumption of regulated services.
- Revenue adequacy – allowing regulated firms to earn sufficient revenue to attract needed capital.
- Fairness – ensuring that prices are just and reasonable, and contribute to universal service goals without significant distortions.

The regulatory system has two important dimensions: regulatory governance and regulatory substance. We will briefly summarize the content of each in line with Brown et al (2006).

Regulatory governance refers to the institutional and legal design of the regulatory system and is the framework within which decisions are made. Regulatory governance is defined by the laws, processes, and procedures that determine the enterprises, actions, and parameters that are regulated, the government entities that make the
regulatory decisions, and the resources and information that are available to them. Regulatory governance is the “how” of regulation. It involves decisions and is based on principles that are summarized in the table below.

### Box 6.3: Regulatory Governance Decisions and Principles

<table>
<thead>
<tr>
<th>Decisions about</th>
<th>Principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Independence and accountability of the regulator.</td>
<td>• Independence</td>
</tr>
<tr>
<td>• Relationship between the regulator and policymaker(s).</td>
<td>• Accountability</td>
</tr>
<tr>
<td>• Autonomy of the regulator.</td>
<td>• Transparency and public participation</td>
</tr>
<tr>
<td>• Processes —formal and informal— by which decisions are made.</td>
<td>• Predictability</td>
</tr>
<tr>
<td>• Transparency of decision-making by the regulator or other entities</td>
<td>• Clarity of roles</td>
</tr>
<tr>
<td>making regulatory decisions.</td>
<td>• Completeness and clarity in rules</td>
</tr>
<tr>
<td>• Predictability of regulatory decision-making.</td>
<td>• Proportionality</td>
</tr>
<tr>
<td>• Accessibility of regulatory decision-making.</td>
<td>• Requisite powers</td>
</tr>
<tr>
<td>• Organizational structure and resources available to the regulator.</td>
<td>• Appropriate institutional characteristics</td>
</tr>
<tr>
<td></td>
<td>• Integrity</td>
</tr>
</tbody>
</table>

Regulatory substance refers to the content of regulation. It is the actual decisions, whether explicit or implicit, made by the specified regulatory entity or other entities within the government, along with the rationale for the decisions. Regulatory substance is the “what” of regulation. It typically involves decisions about the following:

### Box 6.4: Regulatory Substance Decisions

- Tariff levels
- Tariff structures
- Automatic and non automatic cost pass-through mechanisms
- Quality-of-service standards
- Handling of consumer complaints
- Investment or connection obligations and reviews
- Network access conditions for new and existing customers
- Accounting systems
- Periodic reporting requirements
- Social obligations

Note: The options of the regulatory system of the framework to promote effective and efficient industry performance focuses on economic regulation and in particular on the process of utility pricing as this could be considered the most complex and politically sensitive part of regulatory substance.

6.4.3 The Menu of Regulatory Options further Explored

Per Regulatory option we will elaborate on the rationale, regulatory substance, available tools, and regulatory governance principles and close with some reflection on the option.
Table 6.3: Self Imposed Regulation

<table>
<thead>
<tr>
<th>Regulatory system</th>
<th>Intermediate regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale</td>
<td>All economic regulation, through which the five articulated regulatory system goals are balanced, flows from directives derived from adherence to an intermediate to strong corporate governance and relative weak institutional endowment. Self-regulation on the enterprise level occurs when the service provider conform to the spirit, standards, and substance of good governance because they deem it important for the sustained success of the company.</td>
</tr>
<tr>
<td>Regulatory substance</td>
<td>Price setting is done where the firm simply submits a bill for its operating expenses and capital costs (depreciation plus an after-tax return on its investment that equals or exceeds its cost of capital), and the regulator passes on these costs in prices charged to consumers. Prices are continuously tied to these accounting costs. No major involvement of the regulator in assessing the cost of service of the service provider. No formally prescribed method of determining the operating expenses and capital costs.</td>
</tr>
</tbody>
</table>
| Available tools | The service provider should have an advanced level of the deployment of a performance measurement framework based upon which performance monitoring by stakeholders is made possible. Internationally recognized frameworks are:  
• MBQA; The framework of the Malcom Baldridge Quality Award;  
• EFQM; The framework of the European Foundation for Quality Management;  
• BSC; The Balanced Score Card of Kaplan & Norton;  
• The Performance Prism of Andy Neely. |
| Regulatory Governance principles | Because of the relatively passive role of the regulator an acceptable adherence of the regulatory principles predictability and integrity should be in place. Once the service provider submits the tariff the process followed by the regulator should be predictable and there should be reasonable assurance that the regulator acts with integrity. Enforcement by the service provider will be severely challenged as a consequence of weak institutional endowments, particularly the aspect of sound law courts and the ability to enforce commercial contracts. |
| Reflection | Intermediate to strong Corporate Governance is a prerequisite for the long term sustainability of the infrastructure as the provision of capital will be severely challenged because of weak institutional endowments. However, with the necessary guarantees in place and the intermediate to strong corporate governance in place the utility service provider might overcome the challenges induced by a weak institutional environment. |
Table 6.4: Basic Regulation

<table>
<thead>
<tr>
<th>Regulatory system</th>
<th>Basic regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rationale</strong></td>
<td>All economic regulation, through which the five articulated regulatory system goals are balanced, flows from directives derived from a regulatory authority that is embedded within an intermediate to strong institutional environment, however corporate governance is qualified as weak.</td>
</tr>
<tr>
<td><strong>Regulatory substance</strong></td>
<td>Price setting is done directly by the government. The government takes an active role in determining the price, however price setting is not based on a pre established model nor necessarily based on a relation of the cost incurred by the service provider. The role of the government or utility commission is to act as a market surrogate and set price, that task is performed in a political and social context. Consequently, while the economic criterion of efficiency is an input to the rate making process, it is balanced against a range of other objectives.</td>
</tr>
</tbody>
</table>
| **Available tools**      | • Cost of Service analysis.  
                          • Determining the Weighted Average Cost of Capital |
| **Regulatory Governance principles** | The regulator has a relatively active role because of the review of the cost of service. Not only should the principles of predictability and integrity have an acceptable level of adherence, also the principles of proportionality and requisite powers.  
The proportionality principle relates to possible regulatory interventions. These should be balanced and only undertaken if the likely benefits outweigh the expected economic and social cost.  
The principles of requisite powers relate to amongst others the authority to set the regulated tariffs and to monitor and enforce its decisions and to remedy problems. |
| **Reflection**           | The direct price setting model of regulation has come under strong criticism in the literature. A major focus of this criticism has been the lack of clear objectives (or the presence of competing objectives) established for the rate setting body. Because of balancing a range of other objectives besides the economic criterion of efficiency, there may be a significant pressure for the regulator to suppress economically efficient pricing structures.  
A second major criticism is the principal-agent problem. This problem has two dimensions. First, the regulated enterprise (the agent) is likely to be subject to different incentives and motivations than the government (the principal). Consequently, the agent may pursue the objectives set for it in a manner that is contrary to the anticipation of the principal. Second, the agent will usually possess substantially more information about its customers, costs and market conditions that the principal. This information asymmetry can be used to the advantage of the agent in order to manipulate outcomes to its advantage.  
The conclusion from the principal-agent debate is that the outcomes of regulation can be very different to what was intended by the government. In such an environment, prices set by the regulator may result in a range of unintended consequences and inefficiencies. |

---

### Table 6.5: Intermediate Regulation

<table>
<thead>
<tr>
<th>Regulatory system</th>
<th>Intermediate regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rationale</strong></td>
<td>All economic regulation, through which the five articulated regulatory system goals are balanced, flows from directives derived from an intermediate to strong institutional endowments and intermediate to strong corporate governance.</td>
</tr>
<tr>
<td><strong>Regulatory substance</strong></td>
<td>Regulation is done by using the Rate of Return (ROR) regulatory methodology. Within this methodology the revenue to be earned by a utility should be equal to the cost to supply electricity plus a fair return on the rate base. Cost of supply means all expenses that are directly or indirectly incurred in the production and supply of electrical energy. Return means the amount of money to be earned by suppliers of capital for their investment in the business. Rate base means all productive assets employed by the utility in the supply of electricity.</td>
</tr>
<tr>
<td><strong>Available tools</strong></td>
<td>The ROR methodology is applied by using the following formula: ( R = E + (V - d + w) r ) Where: ( R ) = the required revenue of the regulated entity ( E ) = the operating expenses or, as mentioned above, the cost to supply ( V ) = the value of the qualifying property, plant and equipment ( d ) = the accumulated depreciation on qualifying property, plant and equipment held by the regulated entity ( w ) = the allowance for working capital held by the regulated entity ( r ) = the calculated rate of return using the weighted average cost of capital (WACC)</td>
</tr>
<tr>
<td><strong>Regulatory Governance principles</strong></td>
<td>This regulatory system assumes a fairly active role of the regulator. All regulatory ten governance principles should possess an acceptable level of adherence</td>
</tr>
<tr>
<td><strong>Reflection</strong></td>
<td>The ROR will be reflected upon summarizing some of the advantages and disadvantages.</td>
</tr>
</tbody>
</table>

#### Advantages
- The methodology is simple and can be understood by both the regulated entity and the Regulator.
- It sets a basis for the determination of tariffs under a cost reflective regime.
- It ensures the financial viability of the regulated utility.
- It reduces investment risk which results in lower required return on capital.

#### Disadvantages
- The methodology gives no incentive to reduce costs because of the guaranteed return on investment.
- Incentive to overstate costs and asset base to obtain a higher price increase.
- Determination of the fair rate of return is always subject to considerable debate.
- Encouragement of over-investment in assets which could be non productive assets resulting in underinvestment of productive assets.
- Encouragement of micro management by the regulator.
### Table 6.6: Advanced Regulation

<table>
<thead>
<tr>
<th>Regulatory system</th>
<th>Advanced Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rationale</strong></td>
<td>All economic regulation, through which the five articulated regulatory system goals are balanced, flows from directives derived from strong institutional endowments and strong corporate governance.</td>
</tr>
<tr>
<td><strong>Regulatory Substance</strong></td>
<td>Regulation is done using the Incentive Based Regulatory (IBR) methodology. Utility management is encouraged to be efficient in the running of their business. The IBR methodology puts a cap on the utility’s revenue, profits or price in order to persuade management to produce and supply electricity at the least cost possible. The IBR methodology attempts to mimic competition in that in a competitive environment, a firm is a price taker and can only increase its profits by producing at the least cost possible or by increasing the volume of output it produces and sells. The IBR methodology is based on the economic principle of “Profit maximisation by cost minimisation”. Common methodologies are Price/Revenue cap, Yardstick or Benchmarking: <strong>Price/Revenue cap methodology</strong> calculates the required revenue of the regulated entity at the beginning of the regulatory period, which is normally three to five years. This revenue is then adjusted annually by a formula, usually consisting of a price index minus a productivity factor. <strong>Yardstick</strong> happens where the regulated tariffs are determined from a model theoretical firm that provides a service with certain quality characteristics and is efficient both in the expansion of its facilities and in their operation and maintenance. This is the scheme that defines the competitiveness rules against which real firms are measured. <strong>Benchmarking</strong> happens by comparing the efficiency of a regulated monopoly with its local or international counterparts, to identify the scope for further efficiency improvements.</td>
</tr>
</tbody>
</table>

| **Available Tools**  | Programming techniques (DEA, TFP), Econometric techniques (COLS, SFA), Process approaches (EEA) |

**Regulatory Governance principles**

The advanced regulatory system assumes a regulator with a high level of maturity and coincides with the best practice model of the independent regulator. As a consequence all 10 principles of regulatory governance should possess an acceptable level of adherence.

**Reflection**

**Advantages**
- Encourages the efficient use of the regulated entity’s resources.
- Utility management is afforded the opportunity to apply innovations for the better performance of the entity they manage.
- Because the IBR period runs for three to five years, the Regulator does not have to approve price increases on an annual basis.
- Less micro management by the regulator.

**Disadvantages**
- The total factor productivity factor, the X factor in the IBR formula, has its challenges to be determined.
- IBR is forward looking, and full of uncertainties and potential errors. Adjustment during the period is extremely difficult.
- Reduction of cost might go at the expense of downgrading maintenance, lowering the quality of supply and service and delaying necessary investments.

---

*We refer to chapter 5 paragraph 5.2 Overview Benchmarking Techniques for a further elaboration on available tools and techniques.*
6.4.4 Application of the Framework

The framework has been applied for the eight utilities from which we have conducted research to obtain a corporate governance measure and from which we have a country governance measure as well. In the case of the investigated Caribbean SIDS and SIMS deploying the framework gives the following result:

It can be observed that the eight SIDS and SIMS, according to the framework, all qualify for a regulatory mechanism denominated as intermediate regulation. Furthermore, it could be observed that in three cases the corporate governance score is close to or above three which suggests that there is quite some opportunity to blend self imposed regulatory aspects into the regulatory mechanism. In one case the institutional quality is above the threshold of 1.25 which suggests, according to the framework, a strong institutional environment, a prerequisite for advanced regulation. Moving forward, the challenge would be to strengthen corporate governance. For the remaining four cases we can observe that, according to the framework, intermediate regulation should be a viable option and they face the challenges to strengthen both the institutional quality and their corporate governance to continue to improve and comply fully with the respective requirements to successfully deploy intermediate regulation.

Having deployed the framework for the mentioned cases a logical next step would be to analyze the regulatory starting conditions of the SIDS and SIMS, that is to say, to conduct a thorough analysis of the actual regulatory mechanism and how regulatory governance is being deployed. Based on this analysis and also guided by the growth path as suggested by the framework to promote effective and efficient performance of the electricity industry in SIMS, a gap will become apparent. Public utility policy should than be geared to reform measures to bridge that gap. The added value of the framework is that it focuses the major stakeholders involved, being the representatives responsible for public policy, representatives responsible for providing the service and representatives of the consumers, on those aspects that require improvement from a country governance, a corporate governance and a regulatory governance perspective, provided that the ambition as to where the respective SIDS and SIMS wants to be is determined. With this observa-
tion we have reached a point that we consider most interesting for future research and that will be elaborated upon in the next chapter in the paragraph “Recommendations for future research”.

For the case of Curaçao, however, we have conducted additional research. We have conducted a thorough analysis of the actual regulatory environment and regulatory mechanism and proposed options as to what we consider the next logical steps in improvement of the regulatory environment and regulatory mechanism for the country. Our thoughts are a result of thorough analysis, discussions with stakeholders and two conducted seminars named: “Balancing the private and public interests, Willemstad Curaçao, February 13, 2007” and “Creating a regulatory environment of the water and electricity supply on Curaçao, Willemstad Curaçao, May 14, 2008”. We refer to the forthcoming book, Hakvoort, R., and S. Martina., (2009) “Reflections on a Utility Regulator for Curaçao” where we have documented the case and where we share our thoughts and findings.

6.4.5 Reflections on the Regulatory Menu of Options

We have stated that the main objective of the framework is to assist policy makers and management of utilities and other entities to adequately deal with the so called utility problem and achieve the overall desired goal of “Effective and Efficient Performance of the Electricity Industry”.

We have proposed a framework to promote effective and efficient industry performance in the case of SIMS looking at regulation as a “design” problem constrained by two components: an institutional component and a corporate governance component. Juxtaposing these two components in a matrix gives as a result options for the regulatory system comprising regulatory substance with associated regulatory governance.

We have identified the following options:

> No effective regulation;
> Basic regulation;
> Self-imposed regulation;
> Intermediate regulation;
> Advanced regulation.

We have elaborated on each option in terms of the rationale, the regulatory substance in particular pricing policies and available tools, and regulatory governance principles, and we concluded the elaboration of each option with some reflections. Applying the framework will lead to the selection of identified regulatory options. Whatever the regulatory option chosen we would like to make the following statement:

The conduit and oversight of regulation are delegated to a regulatory institution. Regulation is an ongoing task of fine-tuning and adapting decisions as foreseen and unforeseen events unfold. This argues, on efficiency grounds, that the regulatory agency be accorded a fair amount of flexibility and that the principles that will be followed in adjusting decisions be clear and publicly known so that other parties (particularly the operator)
can assess the economic impact on their operations and plan and act accordingly. Two fundamental challenges should be addressed. One is the commitment to stick to these principles and the other is that the high level of discretion is not captured by interest groups. The following conditions are essential for regulation to be effective: (a) Managerial freedom (freedom to set employment conditions to assure technically proficient and highly motivated professionals), (b) political autonomy (freedom from political and interest group influence), (c) accountability (the duty of an agent or employee to respond to and fulfill its responsibilities), (d) checks and balances (to limit the power of single individuals within the institution) and (e) incentives (to reward good performance and to punish arbitrary or inadequate performance).

In closing we would like to re-iterate the two golden rules of regulation55. These reflect meta-principles for the design of any regulatory system:

Rule 1: Regulation is a means to an end. What ultimately matters are outcomes, not regulatory rules.

Rule 2: The benefits of regulation must exceed the costs of regulation.

Rule 1 deals with the objective of regulation. Any regulation should improve the provision of services. Therefore, the search should not be after a specific model or after a specific organizational structure, but the focus must be on the effects: Which regulatory model will maximize the benefits for the stakeholders involved?

Rule 2 indicates that although a regulator may contribute to an improvement of the utility services it must not be forgotten that rules and regulation bring along direct and indirect costs. The direct costs of regulation are the budget of the regulatory entity and the costs incurred by the regulated entities to comply with the rules. Indirect costs relate to the often not very visible effect of distracting investors or decisions not taken by the utility due to the adopted system of regulation.

We suggest adding a third ‘golden rule’56 specifically for the case of SIMS.

Rule 3: Regulation should be proportionate to the challenges the regulators are addressing.

First world countries have conventionally relied on independent regulatory bodies to guard the interests of investors and consumers in infrastructure and promote enduring economic and legal commitments by government and the investor. For SIDS these conventional regulatory bodies might have a high cost, or the skills required are not readily available.

and independence in a small state is very difficult to achieve. The regulatory aspects of a small vertically integrated system are not so complex and could be structured with limited staff performing limited functions. It is our belief that the adherence to fundamental country, regulatory and corporate governance principles should ultimately constrain opportunistic behavior and ensure a right balance of competing interests from the parties involved. What is needed is a combination of statutory regulation and self-regulation. The mix will vary per country, but nowhere can statutory regulation alone promote effective governance. The stronger the partnership between the politicians and, regulators, consumers and service providers, the more soundly based will be their governance structures.

As Francois Bourguigon, Chief Economist of the World Bank puts it in Kessides57 (2004): “Effective regulation is the most critical enabling condition for infrastructure reform. Crafting proper regulation is the greatest challenge facing policymakers in developing and transition economies”. Although a broad consensus has emerged on what forms the basis of “good regulation”, practical constraints to the development of such regulatory mechanisms appear acute, particularly in developing and transition economies. However, as we state, with a collective mindset, Caribbean SIDS will overcome the trilemma of politics, economics and technology and should be able to deploy the art of regulation that involves establishing rules that allocate value to consumers and suppliers in such a way as to maintain incentives for the firm to create value by deploying technology adequately, while promoting political legitimacy in the eyes of consumers and other stakeholders.

Small island Monopoly Systems exhibit natural monopoly characteristics such that unregulated service providers may have substantial potential to exploit market power and raise prices. Consequently, a case may be made for government involvement to protect the interest of consumers and to ensure that higher levels of output growth are achieved.

There is also substantial political and social pressure for government regulation. This pressure arises because of concerns that unregulated utilities may not adequately guarantee security, stability and safety supply and also may impose “unfair” pricing on customers that have little bargaining power.

However, there is a counterpart to this demand for regulation. Utility industries are capital intensive and their assets are durable, long-lived and immovable. Demands for access and “fair” or “non-exploitative” prices mean that investors might expect that after they have sunk their capital they would be limited in the prices they can charge and be subjected to possibly onerous obligations to supply. We refer to the so-called utility problem as stated in this investigative study. Therefore, the incentive to invest depends critically on expectations of the future pricing policy and must be considered by the regulator.

We would like to highlight the importance of regulation as described by Berg (1999). The art of regulation involves establishing rules

---

that allocate value to consumers and suppliers in such a way as to maintain incentives for the firm to create value, while promoting political legitimacy in the eyes of consumers and other stakeholders. So, proper regulation drives effective and efficient industry performance in terms of Output and Consumption, Efficiency (technical and economic), Quality of Supply, Financial Performance, Capacity, Investment and Maintenance, Prices, Competition if possible and Social Indicators.

Having justified the need and importance for regulation, attention then turns to the appropriate type of regulation, specifically in the case of Caribbean SIDS and SIMS. A framework to promote effective and efficient performance of the electricity industry in SIMS is proposed. The framework is built through the lens of the first and second economizing principles of the new institutional economics:

- Get the institutional environment right; the rules of the game.
- Get the governance structure right; the play of the game.

Appropriate regulation is seen as a design problem. The regulatory mechanism to be adopted, as a result of juxtaposing country governance dimensions and corporate governance dimensions, provides a focus on options and principles which we refer to as:

- Options in the game, and
- Principles in the game.

The regulatory options are classified as:
1. Self imposed regulation;
2. Basic regulation;
3. Intermediate regulation;
4. Advanced regulation.

The options for the recommended appropriate regulatory system are derived by the classification of the level of institutional quality of a country, being weak, intermediate or strong and the quality of corporate governance being weak, intermediate or strong.

The regulatory system comprises two fundamental aspects being, regulatory substance and regulatory governance. Regulatory substance refers to the content of regulation. Regulatory governance refers to the institutional and legal design of the regulatory system and is the framework within which decisions are made.

The regulatory system is interwoven with energy policy and the policy of the utility service provider. The regulatory framework together with the elaborated energy policy framework and the utility policy framework (Annex V) gives a comprehensive guide to the respective policy deployment in which Caribbean SIDS are engaged to promote effective and efficient electricity industry performance. In deploying the policy, making the appropriate choices and implementing reform, the outcome should satisfy the three overarching principles of Credibility, Legitimacy and Transparency. With reasonably assurance any outcome will than be perceived as fair and just by the stakeholders involved.
In this chapter we will give a syntheses of this thesis were we will address the problem statement, research objective and research questions with their subsequent findings and conclusions.

7.2.1 Problem Statement and Research Objective

Utilities generally have three distinctive features. First, they require technologies that are considered to be specific sunk investments; second they display aspects of natural monopoly (economies of scale and scope in the physical provision of basic services, economies of scale in planning and managing the network and network externalities) and third, their products are massively consumed, usually by captive consumers with fairly inelastic demand. These three features are at the core of the contractual problem that has traditionally raised the need for governmental regulation of utilities (Goldberg 1976; Williamson 1988; Barzel 1989; North 1990; Baysan and Guash 1993; Levy and Spiller 1993; Guash and Marshall 1993).

In the utility sector three types of contractual problems are particularly important:

1. Contractual problems between firms and government;
2. Contractual problems between firms and customers;
3. Contractual problems between interest groups and the government:

For the purpose of this thesis the three identified contractual problems will be referred to as the utility problem. The problem statement of this investigative study “the utility problem” entails that the massive consumption, economies of scale and sunk investments ultimately provide governments (either national or local) with the incentive and opportunity to behave opportunistically vis-à-vis the utility company. Opportunistic behavior in especially inadequate tariff setting will lead to the so called vicious circle of performance decline. The utility will cut back on capital and maintenance costs at the expense of worsening service. As a consequence the system will become more expensive to maintain and inefficiency in the system will increase. Wrong price signals will go to the consumers with as a consequence inefficient usage. To correct this downward spiral huge rehabilitation costs are needed\(^5\). However, if a government wants to assure a healthy development of the utility infrastructure, then it will need to design institutional arrangements and governance structures that will limit its own ability to behave opportunistically vis-à-vis the utility. As stated by Berg, (2000), the development of a regulatory apparatus that provides stability, protects consumers from the abuse of market power, guards consumers and operators against political opportunism, and provides incentives to service providers to operate efficiently and make needed investments is essential for a successful development of utility infrastructure.
The research objective is related to the circumstances of natural monopolies were specific economic regulation is desirable. Economic regulation is an almost universal feature in market economies. However, with the focus of this investigative study on Caribbean small isolated development states (SIDS) with their small isolated monopoly systems (SIMS) economic regulation is still in its infancy. It is clear that the need to protect consumers against natural monopolies plays an important role in economic regulation. However, if enterprises are to be starved of resources, and if their investors are to be confident about committing funds, the interests of the enterprise also need to be safeguarded. Therefore, it is important that through a framework that promotes effective and efficient performance of the electricity industry a balance of interests between consumers, enterprises, and government could be achieved. This comprises the central theme of this investigative study and leads to the formulation of the overall research objective of this thesis.

**The Development of a Framework for Small Isolated Monopoly Systems to Promote Effective and Efficient Performance of the Electricity Industry.**

*Effective industry performance* refers to the extent to which the industry pursues its underlying policy objectives.  
*Efficient industry performance* refers to the extent to which service providers deliver a certain level of production against minimized costs or maximize production for a given level of inputs.

The problem statement and research objective will be dealt with through five key research questions. In the subsequent paragraphs a synthesis and some reflections will be given per research question.

7.2.2 Research Question 1:  
**Key Concepts and Economic Principles of SIDS and SIMS**

We have conducted research to gain an understanding of the specific characteristics and key economic principles associated with small island development states and their small isolated monopoly systems for the electricity supply. They comprise the basic conditions through which the chain of causation to industry performance according to the traditional industrial organization model begins. In this investigative study we have focused our analysis on Caribbean SIDS of which their utilities are a member of CARILEC.

The general features of SIDS can be summarized as, their level of remoteness, their fragile eco systems, they are prone to natural disasters, they have limited economic possibilities, limited land area, limited natural resources, demographic constraints and political constraints.

The economic features of SIDS are analyzed in terms of openness, risk and economies and diseconomies of scale.

> **Openness** relates to their narrow and skewed natural resource bases. In most of the cases SIDS tends to rely on one or a few
agricultural products or minerals. If they are lucky, they also possess the basis of a tourism industry. Relatively small population size, limited resources, and absolutely small national incomes also limit the availability of capital for the development of SIDS.

> **Risk** facing SIDS relates to eight major hazards comprising, natural disasters (hurricanes, earthquakes), their geographical remoteness, their fragile biological, plant and marine ecosystems, demographic instability that could lead to excessive population pressures, extensive specialization subjects the economies of SIDS to marked fluctuations of foreign exchange earnings, indigenous cultures of SIDS are notoriously vulnerable to the intrusion of alien influences. New scientific advances in biotechnology and materials sciences could alter the comparative advantages in agriculture and mining that some SIDS now enjoy and the political decisions of major nations, whether reflecting malevolence, insensitivity or ignorance, may impact adversely on the economics of SIDS.

> **Economies and Diseconomies of scale**, relates to severe diseconomies derived from the narrow markets that in turn give rise to monopoly and oligopoly and, in turn, to high transaction costs. Furthermore it relates to high cost of infrastructure, and the absences of synergies that arise when large quantities of a product or service are traded given the relatively small size of the population.

Despite the vulnerability as a consequence of the general and economic features of SIDS according to Brigugilio et al (2006) many small states manage to generate a relatively high GDP per capita when compared to other developing countries. Furthermore SIDS also show economic resilience, which refers to the policy, induced ability of an economy to recover from or adjust to the negative impacts of adverse exogenous shocks and to benefit from positive shocks.

In the modern society electricity is essential to the production of almost all goods and services and therefore is vital to the public interest. In addition, reliable electricity systems have become more important because businesses and households rely on electronic devices to perform an enormous range of tasks, both basic and advanced. According to Kessides (2004) adequate, reliable, competitively priced electricity is essential for modernization, domestic growth, and international competitiveness – and among the most urgent challenges facing developing and transition economies of which we confirm that is the case for Caribbean SIDS.

SIMS are the electricity supply systems that provide the electricity utility services for SIDS. Within this investigative study SIMS are defined as:
“The isolated vertically integrated electrical supply systems of small island development states operating in a natural monopoly environment”.

Following Robert Bacon (1995) for systems with an installed capacity of less than 500 MW the vertically integrated model is being considered the preferred structure as it gives a solution to the potential “hold up problem” between generation, transmission and distribution, it facilitates coordination of investment in a complex system and it reduces risk and promotes better risk management for the benefit of long term sustainable supply of electric utility services.

Furthermore SIMS are faced with a number of policy challenges related to utility services comprising amongst others, energy price volatility, electricity pricing, energy infrastructure development, utility financing, environmental protection, affordability and accessibility issues, increasing electricity demand and supply as a consequence of the growing population, power sector reform and regulation.

The summarized policy challenges can be categorized as technical challenges and adaptive challenges. These challenges should be addressed by politicians, policymakers, advisors, regulators and utility managers. Technical challenges occur when there is general agreement on the existence and nature of the problem, the alternative solutions are clear, and work can be completed by subject matter experts. Adaptive challenges, in contrast, arise when fundamental changes in a group’s (or an individual’s) environment call for the group to rethink basic goals and strategies to thrive or even just survive. Clarity of roles and responsibilities is of most importance to address these policy challenges. We argue that politicians and policymakers have as their prime responsibility the crafting of energy policy. Utility management has the responsibility to provide the services as efficiently as possible within the required reliability and service quality levels. We refer to Annex V "Reflections on Strategic Planning of the Energy Sector" where we share our views on an energy policy and an electricity sector policy framework. Regulators need to find the right balance between protecting the consumer from monopolistic abuse and protecting the service provider from political opportunism to earn a fair return on investment to assure continuity of supply in the long run. Failing to strike this balance by inadequate utility pricing will lead to the vicious circle of utility performance decline. A framework will be proposed to promote effective and efficient performance of the electricity industry and serves to logically coalesce competing interests. This framework is being constructed through the lens of the 1st and 2nd economizing principles of the new institutional economics and will be further elaborated by addressing research question 5. The building blocks of the framework will be constructed by addressing research questions 2, 3 and 4.

Concluding remarks related to the research topic “Key Concepts and Economic Principles of SIDS and SIMS”, are summarized as follows:
Caribbean SIDS, due to their small size, with the absences (in most cases) of natural energy resources and the fact that there is no interconnection of electricity supply systems, inherently makes the electricity supply systems relatively expensive.

Following Robert Bacon (1995) we concur that the vertically integrated model is the preferred model to guarantee an accessible, affordable and reliable electricity supply in the case of SIMS with an installed capacity of less than 500 MW.

Regulation is still in its infancy in the Caribbean region especially for the island systems with an installed capacity of less than 500 MW. Regulation is seen as one of the major challenges that should be addressed to promote effective and efficient industry performance and prevent the utility entering the vicious circle of performance decline.

7.2.3 Research Question 2:
Effective and Efficient Industry Performance

Effective and efficient industry performance comprises three fundamental concepts being: Performance, Effectiveness and Efficiency. These three concepts will be individually explored and then brought together for the purpose of the definition of effective and efficient industry performance.

Performance

Performance for any enterprise will be multi-faceted. However, the complexity of this for public enterprises providing infrastructure services is likely to be much greater leading to the need for more complex performance measurement information systems than those typically found in the private sector. As a result, rather than simply focusing on measures of profitability and potential financial distress, performance measurement of public utilities has tended to focus on measures associated with inputs, processes, outputs and outcomes.

For a definition of performance we follow Euske and Lebas, (2002) “Performance is the result of a deliberate construction, it is a relative concept, defined in terms of ... a complex set of time-based and causality-based indicators ... [it] is about generating future results ... [which] can be described through a causal model”. From the nine propositions of Euske and Lebas, (2002), that form the basis on which performance can be defined, identified, measured, and managed we would like to highlight three which we find most applicable for the concept of industry performance; these include:

1. Performance can only be expressed as a set of parameters or indicators that are complementary, and sometimes contradictory, that describe the process through which the various types of outcome and results are achieved.
2. Understanding performance relies on the identification of a casual model that describes how actions today can influence results in the future. Performance is not a one-time event. Performance is dynamic.
3. Performance is a relative concept requiring judgement and interpretation.

**Effectiveness**

Effectiveness is defined as the degree to which objectives are met. Within the context of the public utility, effectiveness is related to the degree into which the public utility policy objectives are met. The objective of the public utility policy is to promote the provision of public utility services that contribute to the long-term economic development of the country and/or region and to the wellbeing of its people by adopting a policy seeking to:

- ensure the long-term sustainability of the services;
- achieve economic efficiency in the provision of the services;
- safeguard the quality dimensions of the services;
- promote the accessibility and assure the affordability of the services to all citizens;
- meet wider national objectives, in particular the protection of the environment.

**Efficiency**

Efficiency is a relative term. It is never absolute. It is relative to some criterion. Efficiency is a judgement, a statement of preference. In the context of economics the judgement or preferences are about allocations of resources. Economic Efficiency is a term that refers to the optimal production and consumption of goods and services. This generally occurs when prices of products and services reflect their marginal costs. Economic efficiency gains can be achieved by increasing overall net value which can be achieved amongst others things through cost reductions, better utilization, and revenue enhancement. Economic efficiency can be broken down into the following categories:

- **Productive efficiency:** the relationship between inputs and outputs and the adoption of best practice technologies and approaches;
- **Allocative efficiency:** the extent to which resources are put to their best use by providing the right signals for consumption and investment; and
- **Dynamic efficiency:** the extent to which innovation and productivity gains are encouraged over time.

Based on the above delineation of performance, effectiveness and efficiency we propose the following definition for effective and efficient industry performance:

*The delivery of reliable, affordable and widely accessible service at the lowest possible prices in such a way as to maintain acceptable service quality, financial viability and environmental sustainability levels.*

The other dimension of research question 2 comprises the challenge of measuring industry performance. Industry performance
could be measured by using performance measurement frameworks and benchmarking:

**Performance Measurement Frameworks**

Research indicates that organizations using balanced performance measurement systems as the basis for their management perform better than those that do not (Lingle and Schliemann, 1996). For the benefit to be realized, it is necessary for organizations to implement an effective performance measurement system that “enables informed decisions to be made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through acquisition, collation, sorting, analysis, interpretation, and dissemination of appropriate data”. (Neeley, 1998, pp.5-6.) This definition is important as it indicates that a performance measurement system has a number of constituent parts:

- Individual measures that quantify efficiency and effectiveness of actions;
- A set of measures that combine to assess the performance of an organization as a whole;
- A supporting infrastructure that enables data to be acquired, collated, sorted, analyzed, interpreted, and disseminated.

As part of this investigative study we have analyzed four of the leading performance measurement frameworks that can be used for the purpose of performance measurement and management, being:

1. The Malcolm Baldrige Quality Award (MBQA)
2. The Balanced Score Card (BSC) from Kaplan and Norton.
3. The European Foundation for Quality Management (EFQM)
4. The Performance Prism

All of these measurement frameworks have a proven track record and could be applied by utility management in their pursuit of effectiveness and efficiency in the deployment of utility services.

**Benchmarking**

The object of benchmarking is to compare the efficiency of carrying out a particular business activity or group of activities either at a point in time or over time. The main tasks of benchmarking, therefore, are to measure the efficiency frontier, and the scope that firms have to improve their efficiency. Ideally, benchmarking can also be used to disaggregate efficiency scores into different components, i.e. productive, allocative and dynamic efficiency. Many techniques can, in theory, be used to perform such decomposition of efficiency scores. There are a variety of approaches to the measurement of the relative efficiency of firms in relation to an efficient frontier of a sample. Broadly speaking, these approaches can be classified into three main types:

- Programming techniques;
- Econometric (parametric) techniques; and
- Process approaches.
Programming techniques relate outputs to inputs without recourse to econometric estimation. The efficiency frontier is calculated from the data. Data envelope analysis (DEA) is a widely used approach in this area of work, and is used to determine efficiency index approaches (partial and total factor productivity). It is also used to calculate efficiency scores, which are included in this category, although they do not result in the calculation of an efficiency frontier.

Econometric methods, in contrast, require an assumption about the relationship between inputs and outputs, and estimate the parameters of a function representing this. Econometric methods can be further categorized as deterministic or stochastic. The deterministic approaches assume that all the deviation from an estimated frontier is due to inefficiency. Under a stochastic approach, however, inefficiency is decomposed into inefficiency and measurement error.

Process techniques attempt to assess efficiency using “bottom-up” techniques. One such approach used by regulators relies on reviews of company practices and plans. It is also possible to use engineering data to calculate what the cost of service should be for a particular company, based on its own individual characteristics. Another approach is to use surveys to canvass views on potential cost savings in specific areas.

The benchmarking approaches are summarized in the table below.

<table>
<thead>
<tr>
<th>Table 7.1: A Hierarchy of Benchmarking Techniques</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Programming techniques</th>
<th>Single-year data</th>
<th>Multi-year data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear programming approaches</td>
<td>Data envelopment analysis (DEA)</td>
<td>Panel data =&gt; Malmquist index</td>
</tr>
<tr>
<td>Parametric Programming Analysis (PPA)</td>
<td>Index approaches</td>
<td>Partial factor productivity [PFP]</td>
</tr>
<tr>
<td>Total factor productivity [TFP]</td>
<td>Panel data TFP</td>
<td></td>
</tr>
<tr>
<td>Malmquist index</td>
<td>Econometric [parametric] Techniques</td>
<td>Deterministic</td>
</tr>
<tr>
<td>Stochastic</td>
<td>Stochastic frontier analysis (SFA)</td>
<td></td>
</tr>
<tr>
<td>Process approaches</td>
<td>Engineering economic analysis</td>
<td>Engineering economic analysis (EEA)</td>
</tr>
<tr>
<td>Process benchmarking</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Case Study: Caribbean Benchmark Study

For the Caribbean SIDS a Caribbean Benchmark study has been performed comprising a uni-dimensional benchmark study and a multi-dimensional benchmark study.

The uni-dimensional benchmark study involved identifying key performance metrics, convincing the member companies to participate, defining and collecting data on performance, analysing the data and identifying opportunities for improvement. The overall goal was to identify, adapt and implement superior practices to improve perform-
The methods and results of benchmarking should be integrated as part of a comprehensive Performance Management System (PMS) oriented to achieve corporate objectives. As a result, a set of 32 indicators were selected which are classified as follows: general, generation, transmission-distribution, and commercialization indicators. The uni-dimensional benchmark study is now an annual revolving study within the CARILEC utilities.

The multi-dimensional benchmark study was conducted primarily from a regulatory perspective. In utility ratemaking, benchmarking involves comparing one or more utility performance measures to “external” performance standards. An external performance standard is one that exists outside the company itself (Parker, 2001). Examples include the performance of other utilities that are designated to be “peers,” industry average measures, or industry best performance measures. Benchmarking, therefore, leads to direct and explicit comparisons between a company’s performance and one or more performance standards that are established outside of the company itself. The general idea is that the company under scrutiny is expected to operate just as efficiently as the so-called peer companies. Targets for performance improvement are set on the basis of the gap between current and peer performance. This improvement target is sometimes referred to as the efficiency factor or the x-factor.

We have used the DEA methodology to perform the multi-dimensional benchmark study. For a detailed elaboration on the methodology used and the different DEA models using constant return to scales (CRS) and variable returns to scale (VRS) we refer to Martina et al (2007) and Annex II “Case Study: Caribbean Benchmark Study”.

The DEA study revealed the following results:

- The best performing utility obtained, for all the different models used, a weighted average score of 1;
- The worst performing utility obtained, for all the different models used, a weighted average score of 0.669;
- The overall weighted average score of the participating utilities was 0.913;
- The results also indicate that the efficiency levels of at least half a dozen CARILEC members are substantially below the frontier efficiency levels in the Caribbean.
- The weighted average score of United States Bundled Power benchmarking for comparable Caribbean size of utilities for the year 1999 and 2000 was 0.97.

Concluding remarks related to the research topic “Effective and Efficient Industry Performance” are summarized as follows:

- Effective and efficient industry performance relates to the extent to which the utility is able to provide for reliable, affordable and widely accessible service at the lowest possible prices in such a way as to maintain acceptable service quality, financial...
viability and environmental sustainability levels.

> Performance is not what an individual observes, but should be the result of a deliberate construction, defined in terms of a complex set of time-based and causality based indicators which can be described through a causal model.

> Utility management should deploy a performance measurement framework that will enable informed decisions to be made and actions to be taken because it quantifies the efficiency and effectiveness of past actions through acquisition, collation, sorting, analysis, interpretation, and dissemination of appropriate data.

> In measuring industry performance benchmarking plays an important role as it provides the techniques to compare utility operations over time and across utilities and provides lessons to be learned from best practices.

7.2.4 Research Question 3: The Interplay of Institutions with Industry Performance

Research question 3 relates to the 1st order economizing principle of the NIE, “Get the institutional environment right, the rules of the game”. We have conducted research to gain an understanding of the interplay of institutions with effective and efficient industry performance. In Institutions, Institutional Change and Economic Performance, Douglass C. North defines institutions as formal and informal “rules of the game” that provide a framework within which individuals seek to coordinate their separate activities and insure against risk.62 This has now become a universally accepted definition. Institutions structure incentives and constraints, define procedures for changing the rules, and delimit membership.

Institutions are intertwined with governance. While institution is essentially about rules, governance is essentially about the setting, application, and the enforcement and adjudication of those rules. Based on this dichotomy, governance can be viewed as a flow variable and institutions as a stock variable. Our research has revealed that good governance is required to ensure that those institutions have their desired effect.

Summarizing, we could state that the institutional framework of society includes both the formal and informal rules as well as the resulting organizations that people create and within which they interact to reach their individual and collective goals. Formal rules, such as laws and contracts, define the rules and give people the rights and mechanisms to enforce the rules. Informal rules depict the expectations that individuals hold about the uncertain consequences of actions and events. Informal rules take into account the real-world costs of negotiating agreements, monitoring compliance, and enforcing sanctions.

Analytically, institutions ultimately shape governance by shaping actors’ preferences and actions, providing actors with power, authority, and resources, shaping transaction costs and shaping the capacity of the state. Therefore, an optimal governance structure is one that is founded

on the core institutions, being, a strong property rights regime, well-regulated financial institutions, an effective and reliable legal system, and effective public sector institutions.

The analysis has been further directed toward regulation as a specific form of institutional analysis. In its narrowest and simplest sense, regulation refers to “the promulgation of an authoritative set of rules, accompanied by some mechanism, typically a public agency, for monitoring and promoting compliance with these rules” (Baldwin et al., 1998, 3).

Our analysis of the economics of regulation has revealed the following propositions63 depicted in the box below:

<table>
<thead>
<tr>
<th>Table 7.2: Propositions of Economic Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The institutional context is critical to the process and outcomes of a regulatory regime.</td>
</tr>
<tr>
<td>• Regulation is associated with information asymmetries.</td>
</tr>
<tr>
<td>• Investment in a regulated environment is subject to a threat of hold up leading to under-investment.</td>
</tr>
<tr>
<td>• Regulatory regimes are prone to capture.</td>
</tr>
<tr>
<td>• A regulatory system should be both effective and efficient.</td>
</tr>
<tr>
<td>• Competition is superior to state regulation and should be preferred.</td>
</tr>
<tr>
<td>• Regulation comprises regulatory substance and regulatory governance</td>
</tr>
</tbody>
</table>

In terms of institutional approaches to ESI regulation64 three broad categories are identified: (1) The independent regulatory agencies separate from the ministry, (2) Ministries handle most regulatory responsibilities directly, (3) Ministerial regulatory agencies are established. Variations in the institutional framework from regulatory agencies arise partly from different legal and political traditions.

From a basic engineering perspective four options for basic regulatory instruments have been identified, being, specific legislation, presidential decrees, contracts and administrative procedures. The analysis revealed that ultimately three complementary mechanisms must be in place for the basic engineering to provide regulatory stability and credibility. First, substantive restraints on regulatory discretion must be embedded in the regulatory framework; second, formal or informal constraints must limit the ability of the executive branch to change the regulatory framework itself and third, institutions must enforce those substantive and procedural constraints.

From a detailed engineering perspective we have focused on price setting policies as these can be considered the most challenging and politically sensitive aspect of economic regulation. We have reviewed the five general forms of utility price regulation according to Berg65 (1997) comprising, cost of service regulation (including direct price setting and rate of return), price cap regulation, performance based regulation, franchise regulation and yardstick regulation.

Concluding remarks related to the research topic “The Interplay of Institutions with Industry Performance”, are summarized as follows:

---

The extent and characteristics of a country’s institutional and administrative endowments limit the choice of regulatory instruments and institutions. The main challenge is to design regulatory processes that, while limiting discretion, are compatible with the country’s institutional structure of government and with legal and administrative traditions of the country.

From a basic engineering perspective three institutional characteristics are key to understanding the constraints that limit a country’s options: the existence of an independent judiciary that enforces regulatory constraints, the role of legislative and executive institutions and the existence of widely accepted informal norms that limit opportunistic behavior.

From a detailed engineering perspective there is a tradeoff between commitment and flexibility related to the detail of specification of the regulatory framework. A regulatory framework with limited detail is possible in the case where the country possesses an acceptable level of informal norms or with institutionalized decision making requiring a consensus to restrain arbitrary administrative decisions. Countries that don’t have these features may have to settle for more rigid detailed engineering.

7.2.5 Research Question 4: The Interplay of Governance with Industry Performance

Research question 4 relates to the 2nd economizing principle of the NIE “Get the governance structures right; the play of the game”. Effective and efficient industry performance is intertwined with a governance dimension. Governance is a broad and multi-dimensional process, involving deep questions concerning the specification of the arenas of governance and the different modes by which governance may be conducted.

Closer analysis of governance highlights three important issues implicit in the governance process. The first is the notion that there must be an agent of governance (i.e., someone responsible for governance). This agent could be either the state or non-state actors. Also, the governance agent must have the capacity and authority to ‘govern’. The second implication is that there are defined ‘rules’ and accepted norms by which governance ought to be conducted and gauged. It implies mechanisms for accountability, transparency, predictability, and participation – the so-called ‘pillars of good governance’. The third implication is that governance is concerned directly with sound development management. That is, if the governance process is concerned primarily with the optimal management and allocation of resources, then governance has a crucial development role to play.

The term governance can be used in several contexts such as international governance, national governance or local governance, regulatory governance and corporate governance. Within the context of this investigative study we focus on the interplay of state governance, regulatory governance and corporate governance with industry per-
formance. We also propose a governance measurement framework.

**Country Governance / Institutional Quality**

State Governance has many definitions. In this investigative study we adopt the ADP (1999) definition of state governance: “Governance is the manner in which power is exercised in the management of the country’s economic and social resources for development”. Good governance means that the state operates effective policies and laws and that it executes those policies and laws of the state in a transparent, accountable, predictable, efficient and fair manner.

To measure country governance or institutional quality we propose to use the WGI of Kaufmann et al (2007). For the purpose of the framework to promote effective and efficient performance of the electricity industry in SIMS we propose in line with Levy and Spiller to focus on the country’s legislative, executive and judicial institutions as the key determinants for the institutional endowments of a country. These coincide with the Government Uffectiveness (GE), Regulatory Quality (RA) and Rule of Law (RL) performance indicators of the WGI of Kaufmann et al (2007). Based on these indicators we have constructed the “Country Governance Measurement Perspective” of the framework to measure the institutional quality of a country.

**Regulatory Governance**

Regulatory governance refers to the institutional and legal design of the regulatory system and is the framework within which decisions are made. Regulatory governance is defined by the laws, processes, and procedures that determine the enterprises, actions, and parameters that are regulated, the government entities that make the regulatory decisions, and the resources and information that are available to them. Regulatory governance is the “how” of regulation. Regulatory governance principles comprise; independence, accountability, transparency and public participation, predictability, clarity of roles, completeness and clarity of rules, proportionality, requisite powers, appropriate institutional characteristics and integrity.

To measure regulatory governance we propose to use the regulatory governance criteria of Brown et al (2006). We have constructed the “Regulatory Governance Measurement Perspective” of the framework to promote effective and efficient performance of the electricity industry for SIMS to measure the quality of regulatory governance. Scores of 1 to 4 can be obtained and will be classified as “1 – Not implemented”, “2 – Partially implemented”, “3 – Broadly implemented” and “4 – Fully implemented”.

**Corporate Governance**

Corporate governance is concerned with the process by which corporate entities are governed, that is, with the exercise of power over the direction of the enterprise, the supervision of executive actions, the acceptance of a duty to be accountable and the regulation of the corporation within the jurisdiction of the states in which it operates. Within
the context of this investigative study we share the views of the stakeholder model of corporate governance. According to the stakeholder model, the corporation is responsible to a wider constituency of stakeholders other than shareholders. This view holds that corporations should be “socially responsible” institutions, managed in the public interest. According to this model performance is judged by a wider constituency interested in employment, market share, and growth in trading relations with suppliers and purchasers, as well as financial performance.

To measure corporate governance we propose to use the OECD Principles for Corporate Governance and the OECD guidelines for State Owned Enterprises. We have constructed the “Corporate Governance Measurement Perspective” of the framework to promote effective and efficient performance of the electricity industry in SIMS, to measure corporate governance. Scores of 1 to 4 can be obtained and will be classified as “1 – Not implemented”, “2 – Partially implemented”, “3 – Broadly implemented” and “4 – Fully implemented”.

The Interplay of Governance with Industry Performance

There is some empirical evidence of the interplay of state governance, regulatory governance and corporate governance with industry performance. Kaufmann, Kraay and Zoido-Lobatan (1999) have proved empirically the close link between the quality of governance and the level of per capita income across countries. Likewise, both the World Bank and IMF have strongly supported the view that good governance is a key determinant of economic development in the developing countries. Cubbin and Stern (2006) find that both regulatory law and higher quality regulatory governance lead to higher per capita generation capacity. Their results are in line with earlier findings of studies conducted by Heinsz (2002) and Estache, Perelman, Trujilio (2005).

Concluding remarks related to the research topic “The Interplay of Governance with Industry Performance”, are summarized as follows:

> In the context of state governance, good governance implies the capacity to formulate and implement sound economic policies, to institute effective legal institutions, to ensure public oversight and participation of civil society, and to have in place a credible civil service that provides citizens with an acceptable level of public services in an effective and efficient manner. These are the key country endowments that should be in place for the establishment or reform of regulatory agencies.

> Well established electricity and other utility service regulatory agencies should and do have a beneficial effect on industry outcomes. Regulatory governance plays a pivotal role because agencies with better governance should (a) make fewer mistakes and (b) have their mistakes identified and rectified better and more quickly so that (c) good regulatory practice is more readily established and maintained. The industry and the regulatory arrange-

---

66 Definition by Tricker (1994)
Regulation in Splendid Isolation

ments must be based within an effective governance framework.

> The connection between corporate governance and industry performance lies in the multi-dimensional nature of (good) governance. Narrowly conceived, corporate governance involves ensuring compliance with legal obligations, and protection for shareholders against fraud or organizational failure. Good corporate governance minimizes the possibility of poor organizational performance.

7.2.6 Research Question 5: A Framework to Promote Effective and Efficient Performance of the Electricity Industry in SIMS

The central theme of this investigative study is to propose a framework for SIMS to promote effective and efficient performance of the electricity industry. The framework is intended to serve as a synthesis of a diversity of aspects, within a coherent context, to assist in the tri-lemma of politics, economics and technology, to promote effective and efficient performance of the electricity industry in SIMS. For that purpose the determinants of public policy and sector performance have been analysed through the lens of the NIE using the 1st order economizing principle “get the institutional environment right; rules of the game” and the 2nd order economizing principle “get the governance structures right; play of the game”.

Through the framework various institutional, governance, regulatory management and utility management concepts are integrated in which a common definition is established, components are identified and key concepts are described. This framework accommodates most viewpoints and provides a starting point for rule- and policy-making bodies, for their assessment and enhancement of initiatives in the pursuit of effective and efficient industry performance.

The framework to promote effective and efficient industry performance of the electricity industry in SIMS looks at regulation as a “design” problem which is constrained by two dimensions, a country governance dimension and a corporate governance dimension. Juxtaposing these two dimensions in a matrix gives as a result a menu of options for the regulatory system comprising of regulatory substance with associated regulatory governance. Regulatory substance and regulatory governance are seen as choice variables for policymakers. Country governance or institutional quality gives insight into the specific institutional endowments of a nation, which determines the form and severity of the country’s regulatory problems and the range of options for resolving them. Furthermore the dimension of Corporate Governance which is intertwined with effective and efficient industry performance provides another constrain that determines the options available for the regulatory system. Finally, choices about regulatory incentives are also implicitly constrained by the regulatory governance principles built into the regulatory system.

Regulatory substance in the framework focuses on price regula-
Regulation as this is seen as the most complex and politically sensitive aspect of regulation. Through the framework a menu of regulatory options is presented as a result of constraints imposed by the assessed institutional quality and corporate governance quality. Figure 7.1 shows a schematic representation of the framework.

We herewith summarize the menu of regulatory options.

<table>
<thead>
<tr>
<th>Regulatory option</th>
<th>Price regulation</th>
<th>Regulatory Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-imposed regulation</strong></td>
<td>Price setting is done based on operating expenses and capital costs submitted by the firm. Prices are tied to accounting costs. No major involvement of the regulator in assessing the cost of service. No formally prescribed method of determining the operating expenses and capital costs.</td>
<td>Self-regulation on the enterprise level occurs when the service provider conform to the spirit, standards, and substance of good governance because they deem it important for the sustained success of the company. Adherence to the regulatory principles of predictability and integrity should be in place as guarantee reasonable assurance that tariff request will be dealt with accordingly.</td>
</tr>
<tr>
<td><strong>Basic regulation</strong></td>
<td>Price setting is done directly by the government, however price setting is not based on a pre established model nor necessarily based on a relation of the cost incurred by the service provider. The role of the government or utility commission is to act as a market surrogate and set price, that task is performed in a political and social context.</td>
<td>Together with the principles of predictability and integrity also the principles of proportionality and requisite powers should have an acceptable level of adherence. This because of the relative active role of the regulator or regulatory commission.</td>
</tr>
</tbody>
</table>
**Deployment of the Framework to Promote Effective and Efficient Performance of the Electricity Industry in SIMS**

We have deployed the framework through a case study involving eight Caribbean SIDS and SIMS. The country governance scores were obtained using the World Governance Indicators of Kaufmann et al (2007). The corporate governance scores were obtained by means of circulating a corporate governance measurement questionnaire to at least three respondents per participating country to obtain the views from a utility, regulatory and consumer/wider stakeholder perspective.

It can be observed that the eight SIDS and SIMS, based on the country governance and corporate governance scores, according to the framework all qualify for a regulatory mechanism denominated as intermediate regulation. For seven of the analyzed cases this implies a concrete opportunity to evolve from the current state of basic regulation to the next phase of intermediate regulation. The framework sheds light on the regulatory substance and governance to be adopted to successfully evolve to intermediate regulation.

In chapter 8 we will reflect on the use of the framework to promote effective and efficient performance of the electricity industry in SIMS and we will also elaborate on some policy implications and policy recommendations.

<table>
<thead>
<tr>
<th>Regulatory option</th>
<th>Price regulation</th>
<th>Regulatory Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate regulation</td>
<td>Price setting is done by using the Rate of Return (ROR) regulatory methodology.</td>
<td>This regulatory system assumes a fairly active role of the regulator. All regulatory</td>
</tr>
<tr>
<td></td>
<td>Within this methodology the revenue to be earned by a utility should be equal</td>
<td>ten governance principles should possess an acceptable level of adherence.</td>
</tr>
<tr>
<td></td>
<td>to the cost to supply electricity plus a fair return on the rate base”.</td>
<td></td>
</tr>
<tr>
<td>Advanced regulation</td>
<td>Regulation is done using the Incentive Based Regulatory (IBR) methodology.</td>
<td>This regulatory system assumes a fairly active role of the regulator. All regulatory</td>
</tr>
<tr>
<td></td>
<td>The methodology intends to persuade management to produce and supply electricity</td>
<td>ten governance principles should possess an acceptable level of adherence.</td>
</tr>
<tr>
<td></td>
<td>at the least cost possible by using one or a combination of the techniques of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Price/revenue Caps, establishing yardsticks through a model theoretical firm and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or using Benchmarking to determine performance improvement opportunities.</td>
<td></td>
</tr>
</tbody>
</table>
Reflections, Policy Implications and Recommendations
8.1.1 Reflections on the importance of Policy Intervention

Small island development states are faced with challenges as a consequence of their economic vulnerability and opportunities as a consequence of economic resilience. Economic vulnerability is defined as the exposure of the economy to exogenous shocks, arising out of its inherent characteristics typically associated with smallness. Economic resilience comprises the actions undertaken by policy-makers and private economic agents which enable a country to withstand or recover from the negative effects of shocks. The effectiveness of government policy intervention is a key success factor in achieving economic resilience. Good domestic policies will be more than ever essential – essential but of course not in themselves sufficient – to successful development. As with all countries, policies that bring macroeconomic stability need to be supplemented by good and appropriate structural and social policies that provide the basis for growth and successful transformation of their economies. Arguably such policies are even more important in small states than in larger ones, first because in countries that are vulnerable to external shocks it is even more important to avoid internally generated instability; and second because in small states policy mistakes can have longer lasting and more pervasive effects than they would in larger states. In effect one aspect of vulnerability is susceptibility to domestic policy mistakes.

Policy intervention should be based on a national policy derived from a vision of the nation for its economy. This vision generally includes the improvement of the quality of life for all of its citizens. Many nations have recognized that in order to attain this objective of a better life, it is necessary to develop a broad strategy based on human development and international competitiveness. To fulfil such broad-based strategies, nations will, among other avenues, look to their electricity sectors to help fuel the desired economic growth and enhancement of the general well being of the population. After all, electricity is more than a form of commodity energy; it is the underpinning of the modern quality of life, the nation’s indispensable engine of prosperity and growth, and the reason why the performance of the sector must be effective and efficient. Effective performance of the electricity sector implies that policy objectives are met, such as reliability, affordability, accessibility of the supply within environmentally sustainable levels. Efficient performance of the electricity sector implies that the services are rendered against rationalised cost and the right price signals are sent to the consumers.

Many countries have embarked on electricity sector reform to improve the performance of the sector. Sector reform is therefore a global phenomenon, though the direction and rate of change is country – and sub-sector – specific and motivated by different factors. Our research revealed that the process of electricity sector reform involves three discrete, but interrelated elements: modifying the structure of the industry to enhance the prospects for competition, changing ownership patterns and/or creating forms of public-private partnerships to provide stronger
incentives for efficiency growth, and establishing a transparent regulatory framework to balance private and public interest. Specifically this last element is further explored throughout this thesis by proposing a framework to promote effective and efficient performance of the electricity industry in SIMS.

The framework to promote effective and efficient performance of the electricity industry in SIMS shows that policy intervention related to regulation requires certain maturity levels in country, corporate and regulatory governance. Given the several characteristics of smallness related to SIDS, form a regulatory perspective, SIDS will be severely challenged with two main characteristics being the regulatory commitment and the availability of competent human resources.

Regulatory commitment relates to the fact that regulatory institutions for the electricity sector of Caribbean SIDS are still quite young and in several instances non existent. Independent from the chosen structure of the regulatory office, the regulatory governance principles of clarity of roles and clarity of rules should be very well articulated and lived by especially in circumstances that the regulator takes decisions that are not in the political interest of government. The regulator can expect severe blame shifting, political expediency and attempts to be sidelined and should be able to withstand these pressures on a frequent basis over a period of time.

Availability of competent human resources is a recognized characteristic of smallness. Regulation requires specific knowledge that requires capacity building and training. Core regulatory competencies should be developed for both regulatory substance and regulatory governance. Labour conditions and the working environment should be in such a way that competent staff remains with the office of the regulator and can withstand special offers of mainly the private sector up to certain levels.

We would like to finalize by observing that policy intervention is important and that ultimately the intent is to affect positively regulatory substance, i.e. competent and robust regulatory decisions that achieve a balance between investment and development outcomes.

8.1.2 Reflections on the Purpose of a Framework

This research culminates in a framework for SIMS to promote effective and efficient performance of the electricity industry. Some reflection on the purpose of a framework reveals that in the broadest sense, a framework is a set of ideas, principles, agreements or rules that provide a basis or outline for something intended to be more fully developed at a later stage. Frameworks are somewhat arbitrary by their nature. The act of abstracting eliminates certain details to focus on essential factors. The key to the usefulness of a framework is the degree to which it conforms to the underlying determinants.

The advantages of using frameworks are that they should allow us to ask questions. According to Mortenson (1972), a good model and/or framework is useful, in providing both general perspectives and
particular vantage points from which to ask questions and to interpret the raw stuff of observation. The more complex the subject matter – the more amorphous and elusive the natural boundaries – the greater the potential rewards of model building and deploying a framework.

Models and frameworks should clarify complexity. They do this, as Chapenis (1961) noted, by reducing complexity to simpler, more familiar terms. Thus, the aim of a framework is not to ignore complexity or to explain it away, but rather to create order and coherence.

Furthermore Chapenis (1961) argues that deploying a framework should lead to new discoveries. Frameworks and models have heuristic value, that is, they provide new ways to conceive hypotheses. This may well be their most important function. With the aid of a good framework we are jarred from conventional modes of thought. Ideally, any framework and model, even when studied casually, should offer new insights and culminate in what can be only described as an “Aha” experience.

Obviously frameworks and models have limitations as well. They can lead to oversimplifications. Frameworks and models can miss important points of comparison. As stated by Chapenis (1961): “A model can tolerate a considerable amount of slop” [p.118]. This can lead to the necessary confusion. There is also the danger of premature closure. The model designer may escape the risks of oversimplification and map reading and still fall prey to dangers inherent in abstraction.

With these reflective thoughts on frameworks and models in mind, we would like to observe that the framework for SIMS to promote effective and efficient performance in the electricity industry for SIMS does provide a synthesis in which diverse aspects logically coalesce. Through the framework fundamental concepts as a prerequisite to achieve effective and efficient industry performance are put in context. They are derived from key principles and critical standards that represent best practices. Through the framework various institutional, governance, regulatory management and utility management concepts are integrated in which a common definition is established, components are identified and key concepts are described.

The framework provides a menu of regulatory options, classified as basic regulation, self imposed regulation, intermediate regulation and advanced regulation. These options are proposed by juxtaposing the quality of country governance and corporate governance and also provide the prerequisites for the quality of regulatory governance. Achieving the highest scores of country governance and corporate governance in the framework will result in proposing advanced regulation which coincides with the independent model of regulation which could be considered a best practice. This stage can be reached by gradual transition adopting options that precede the option of advanced regulation given the maturity stage of country governance, corporate governance and regulatory governance at a certain period in time. The framework therefore recognizes the importance of leaning principles of the learning organization and society as defined by Peter Senge (2006), consisting of
elements such as, the ability to adapt to the external environment, continually enhance capabilities, development of collective and individual learning and use results of learning to achieve better results. Gradual transition implies learning and growing towards next levels of maturity in terms of country governance, corporate governance and regulatory governance that serve as prerequisites to adopt available regulatory options.

8.1.3 Reflections on Deployment of the Framework to Promote Effective and Efficient Industry Performance

Deployment of the proposed framework for SIMS should lead to consensus building on the overarching desire to pursue effective and efficient performance of the electricity industry. After all, electricity could be considered a nation’s most critical energy supply system, and the nation’s indispensable engine of progress and prosperity. Deployment of the framework provides the stakeholders involved, specifically the ones responsible for crafting and executing public policy, with a focus on the 1st and 2nd economizing principles of the NIE:

> Get the institutional environment right; “rules of the game” and
> Get the governance structures right; “play of the game”.

Deployment of the framework sheds light on where the country stands in terms of adherence to the basic principles of country governance and where the service provider stands in terms of corporate governance. Juxtaposing the country governance and the corporate governance perspectives in a matrix gives as a result a menu of options for regulation of electric utilities. These options comprise regulatory substance and regulatory governance. We would like to state that, in addition to the 1st and 2nd economizing principles of the NIE, deployment of the framework to promote effective and efficient performance of the electricity industry also leads to a focus on, what we denominate as:

> Options in the game and
> Principles in the game.

Deploying policy means, after careful analysis and evaluation, making choices and implementing the related reform. We recognize the complexity of any reform especially power sector reform and therefore through the framework we focus on those principles on which we believe it should be based. The country, corporate and regulatory governance principles used in the framework for SIMS to promote effective and efficient performance of the electricity industry are universal in their application. The way they are put into practice has to be determined by those with responsibility for implementing them. What is needed is a combination of statutory regulation and self-regulation. The mix will vary per country, but nowhere can statutory regulation alone promote good governance. The stronger the partnership between the policymakers, regulators, consumers and service providers, the more
soundly based will be their governance structures. Ultimately governance is concerned with providing the balance between economic and social goals and between individual and communal goals. The aim is to align the interests of individuals, corporations and society. The common features that stand out in respect of high-performing economies are stability in broad policy directions, flexibility in responding to market signals, and discipline in sticking with measures necessary for meeting long-term objectives despite short-term difficulties, all hallmarks of good governance. The principles to be adopted should shed light. We would like to put forward the following quote which adequately captures subject matter:

Correct principles are like light houses.
They do not move.
The most we can do is to bounce our heads against them, so we might as well learn them, adopt them and practice them.
(Source unknown)

In closing our reflections we would like to state that deploying policy requires making choices. Whatever the choice, ultimately it’s the determination, persuasion and commitment of the ones involved with the implementation of reform measures to produce outcomes for the benefit of the customers and the society at large. After all, we observe that effective and efficient industry performance is delivered by utilities operating in different market structures, with different ownership structures and different regulatory arrangements. There is no one best structure or model. The parties involved should make it work. Our final thought from a somewhat philosophical perspective, acknowledging the importance of structures, systems and processes, is therefore that:

“Structures, systems and principles are as good as the people using them”.
(Source: Steven Martina)

We will review the policy implications related to the deployment of the framework for SIMS to promote effective and efficient performance of the electricity industry by sharing some thoughts on public utility policy and the basic conditions for accomplishment of public policy objectives. Deploying the framework for effective and efficient performance of the electricity industry will have as its outcome a proposed regulatory mechanism to be adopted. We will also give some specific policy recommendations for successful implementation of the regulatory mechanism.

8.2.1 Policy Implications

The objective of Public Utility Policy is to promote the provision of public utility services that contribute to the long-term economic development of the country and to the wellbeing of its people by adopting a sector structure and regulatory policy seeking to:
> ensure the long-term sustainability of the services;
> achieve economic efficiency in the provision of the services;
> safeguard the quality dimensions of the services;
> promote the accessibility of the services to all citizens; and
> meet wider national objectives, in particular the protection of the environment.

A number of important trade-offs exist among the objectives. For example, long-term sustainability may come into direct conflict with promoting accessibility and attaining efficiency. Where such situations arise, difficult judgments will need to be made. We have referred to these competing interests as the trilemma of politics, economics and technology that circumscribes the electricity sector. While the appropriate balance will be highly context-dependent, the resolution of such trade-offs should be guided by the long-term achievement of the objectives, should be based on a thorough analysis of the problem, and should be resolved via the use of transparent policy mechanisms that minimize any economic distortion. However, there is one area in which no compromise should be made and that is, in meeting the objective of long-term service sustainability by ensuring that revenues allow for full cost recovery, while guaranteeing economic efficiency as a general goal of service provision. This requires that policy should be based on certain basic conditions. These basic conditions that must be met to assure the accomplishment of the objectives are:

> the separation of the roles of policy formulator, regulator and service provider;
> the existence of a sector structure that fosters economic efficiency and maximizes the scope for competition if possible (in the case of SIMS with an installed capacity of less than 500 MW the vertically integrated monopoly is our preferred model);
> the adoption of a sound and adequate regulatory regime;
> the appropriateness of the institutional vehicles for regulation;
> the adequacy of the legal framework;
> the adoption of governance modes that provide efficiency incentives for management; and
> the existence of a firm government commitment to the objectives of the policy.

Successful deployment of public utility policy requires that both a long-term and a comprehensive view of involvement be taken in a public utility sector. This is because of the depth and lead time of the reforms that SIDS in particular will require to comply with the basic conditions, the important interactions among these conditions, the variety and complementarities of the available instruments to support SIDS, and the continuous innovation in the field of regulation. The basic conditions help to define a core program of actions required for a self-sustaining sector reform process, in circumstances where such reforms are clearly required, and provide criteria on which to judge the adequacy
of a given regulatory framework. Well-designed sector reforms are complex tasks that ordinarily take a long time to complete. Furthermore, the success of a reform process is not assured once all the constituent elements of the framework have been put in place. Success depends not only on an adequate design of a regulatory framework and regime, but also on supervision, enforcement, continuous implementation, and adaptations to changing circumstances. In particular, the process of regulation requires a sustained effort to ensure that the fruits of the reform are ultimately forthcoming. This will involve not only continued training and support, but also the strengthening of the institution as a whole by helping to create the appropriate “culture of regulation” in the SIDS concerned.

8.2.2 Policy Recommendations

Deploying the framework for SIMS to promote effective and efficient performance of the electricity industry gives as an outcome a proposed regulatory mechanism to be adopted. The regulatory mechanism comprises regulatory substance and regulatory governance and the options have been classified as basic regulation, self imposed regulation, intermediate regulation and advanced regulation. Advanced regulation is in line with the model of the independent regulator that according to Brown et al (2006) could be considered the best practice.

The creation and building of independent, competent, credible and legitimate regulatory institutions remains a goal and requires reform. It’s an evolutionary process of growth stages from infancy to youth, to maturity and ultimately to old age. Our policy recommendations are based on strategic principles that have validity throughout the various life cycles.

1. A strong and sustained policy commitment by government is essential to successful reform. Government should develop reform via a systematic, open and defensible process.
2. Policies should be transparent, they should be publicly available, clear and well articulated in order to generate widespread understanding of, and support for, reform objectives amongst key stakeholders including government agencies, industry participants, consumers and the community generally.
3. Reform policy objectives should take into account the linkages with other key policy areas including sustainable development. Reform objectives should be flexible enough to take account of wider community objectives, without compromising basic reforms. Reform objectives, goals, and timetables should be challenging but achievable.
4. Government should attempt to generate widespread understanding and acceptance of the reform objectives and process from industry, consumers and the society at large.
5. Successful reforms require sustained government support throughout the whole process and especially in the case of change of government.
In the case of the Caribbean SIDS, which are in an evolutionary process of developing their regulatory institutions, complementary, transitional and/or hybrid regulatory options and models could be considered. These include regulatory contracts, contracting-out regulatory functions, advisory regulators, regional regulators, mandated pre-scheduled independent regulatory assessments, building the demand-side for regulatory transparency and fairness, and partial-risk guarantees for regulatory failure. These transition regulatory models are derived from Erberhard, A. (2007), “Matching regulatory design to country circumstances, the potential of hybrid and transitional models”, Gridlines, Public-Private Infrastructure Advisory Facility. These transitional models are further elaborated in table 8.1 and their applicability for Caribbean SIDS and SIMS will be commented upon.

<table>
<thead>
<tr>
<th>Regulatory options</th>
<th>Brief description</th>
<th>Applicability in the case of Caribbean SIDS and SIMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulating by contract</td>
<td>Regulating by contract involves pre-specifying regulatory regimes, including multi-year tariff setting systems in detail in such legal instruments as basic law, secondary legislation, licenses, concession contracts or power purchase agreements.</td>
<td>This model can work for Caribbean SIDS. The regulatory agency can successfully coexist with a regulatory contract where it is incomplete and additional regulatory mechanisms are needed. A prerequisite is a mature level of adherence to the country governance principle of “Rule of Law” and the regulatory governance principle of “Clarity of roles and Completeness and Clarity of Rules”.</td>
</tr>
<tr>
<td>Contracting-out regulatory functions</td>
<td>Contracting out of regulatory functions is the use of external contractors, either by regulatory agencies or as stipulated in a regulatory contract, to perform certain functions such as tariff reviews, benchmarking, monitoring of compliance or dispute resolution.</td>
<td>In the case of Caribbean SIDS contracting out may be considered when there are challenges or problems regarding a regulator’s independence, competence/capacity or legitimacy – or where regulatory contracts require additional support for their effective administration. Contracting-out may also be used for cost-benefit reasons.</td>
</tr>
<tr>
<td>Advisory regulators</td>
<td>Advisory regulators can take one of two institutional forms. In the first case, regulatory agencies may not have full independence in decision-making and may only make recommendations to the minister or president; i.e. the regulators themselves are the advisors. In the second case, advisory regulators may take the form of separate expert panels – i.e. a form of contracted out regulatory function that has been provided for in regulatory contracts.</td>
<td>In the vast majority of the cases of Caribbean SIDS the advisory model is in effect. In this model the Minister has the authority to overrule the advice and as a consequence, if this happens frequently, this model may lose credibility with investors, and perhaps also consumers. The effectiveness of this model is very much dependent on the level of adherence to the country governance principle “Rule of Law”. Furthermore the regulatory governance principle “Transparency” can support this model to turn the advice in a strong advice witch involves that the regulator’s advice must be given in a publicly available document that provides a clear statement and explanation of the decision. The minister may request reconsideration of the</td>
</tr>
</tbody>
</table>
8.2.3 Recommendations for Future Work

In paragraph 1.2 in which we elaborate on the research objective we have stated that recognizing the essentials for a successful development of utility infrastructure, many countries have implemented far-reaching reforms over the past two decades - restructuring, encouraging private participation, and establishing new approaches to regulation (Kessides, 2004). While much is known about electricity sector reform for the developed countries, for the developing countries and in particular for the Caribbean nations, this is relatively limited. In this thesis we have focused on utilities of Caribbean SIDS and in particular those utilities denominated as small island monopoly systems with an installed capacity of below 500MW. They have the following two common features which are, that their electricity supply systems are vertically integrated monopoly systems and the regulatory framework is still in its infancy.
Throughout this thesis we have dealt with a framework to promote effective and efficient performance of the electricity industry in SIMS. Deploying the framework will lead to a fundamental understanding of institutional quality and the quality of corporate governance. Measuring and juxtaposing these governance dimensions in a matrix will lead to a proposed regulatory mechanism comprising of regulatory substance and regulatory governance. In this thesis we have focused on price mechanisms as part of regulatory substance (limitation 1) and we have deployed the framework focused on SIMS (limitation 2). However, service quality is an important dimension within regulatory substance. Furthermore country governance and corporate governance perspectives of the framework are universal and serve to address the 1st and 2nd economizing principles of the NIE (get the institutional environment right, rules of the game and get the governance structures right, play of the game) The identified limitations 1 and 2 drive our first recommendation.

**First Recommendation:**

To further enhance the framework to promote effective and efficient performance in the electricity industry by incorporating the quality dimension of regulation besides the pricing dimension of regulation which at hand is the primary focus. Furthermore the framework, being based on universal institutional and governance principles, could be deployed for systems beyond SIMS to test its applicability.

We acknowledge that regulation is a means to an end and what matters most is the sector outcome in terms of accessible, affordable and quality utility services provided within financially viable and environmentally sustainable levels. Regulation is not the answer to all problems; however, good regulation promotes effective and efficient industry performance. Systematic evaluations of infrastructure regulatory entities are recommended. Rare is the new institution that performs exactly as it was intended. If a new regulatory system is encountering problems, corrections are more easily made sooner rather than later. Such corrections are more likely to be initiated if they result from prescheduled, periodic reviews. The value of regularly scheduled reviews has been recognized in developed countries. For example, in the European Union (EU), the EU Commission produces annual “benchmarking” reports on EU member-states’ energy regulators, and individual countries conduct their own periodic reviews commissioned by government ministries, legislatures, or audit agencies. Similarly, U.S. regulatory agencies are subject to regular legislative oversight hearings to review their policies and practices, as well as the larger regulatory framework within which they operate. We are not aware of any regional evaluation of regulatory effectiveness throughout the Caribbean region as yet which leads to our following recommendation.
Second Recommendation:

Evaluate the effectiveness of regulatory bodies throughout the Caribbean region. This research can be done as cross-country studies that are designed to compare the formal characteristics of regulatory systems in different countries. Typically, they focus on legally specified elements of governance, such as appointment and removal procedures, funding sources, appeals of regulatory decisions, and the division of responsibilities between the regulator and other parts of the government. The end product is usually a published report with various tables designed to facilitate comparisons across countries. The general goal of such studies is to allow for benchmarking of regulatory systems. These studies are usually conducted to promote awareness that a country’s political authorities will be convinced that they need to improve their regulatory system if they see that it compares unfavorably with the regulatory systems in other comparable countries.\(^7\)

For the specific interest of any given participant single-country analyses of an existing regulatory system\(^7\) could be done. Typically, this will take the form of structured case studies that focus on regulatory governance. Depending on the resources that are available, the evaluation may be limited to an examination of the formal legal and institutional aspects of the regulatory system, or it may go more deeply and review how the formal elements have actually been employed. The case studies are “structured” in the sense that the questionnaires and interview guidelines provide a checklist to ensure that case studies for different countries examine a similar core set of issues. Depending on the available resources, the case studies may involve quick, mid-level, or in-depth evaluations. We would like to refer to Brown, A., Stern, J., Tenenbaum B., and Gencer D. (2006), “Handbook for Evaluating Infrastructure Regulatory Systems”, The World Bank, Washington D.C., in which they provide an excellent toolkit to conduct the suggested research.

\(^{70}\) See CEER (2004); Commission of the European Communities (2005); ITU (2001); Ocaña (2002); and Stern and Holder (1999).

\(^{71}\) For electricity, see Brown and De Paula (2002 and 2004) on Brazil, Prayas Energy Group (2003) on India, the World Bank (2004) on Russia, and Moscote (2004) on Ukraine. The principal findings and recommendations of these reports are summarized in appendix G.
References

Ajobhia, V. (2006)
“Regulating Beyond Price, Integrated Price Quality Regulation for Electricity Distribution Networks”. KEMA

Ahmad, P. and M. Rafiq (1998)

Alexander, I. and C. Harris, (2001)


Averch, H. and L. Johnson (1962)

Bailey, E.E. (1973)

Baldwin, R. and M. Cave (1999)


Black, J. (2002)


References


Bruns, W.J. (1992)

Capezio, P., and D Morehouse (1995)


Chapenis, A. (1962)

Chisari, O. (2007)


Cubbin, J and J, Stern (2006)

“Changing Regulatory Institutions in Britain and North America”. Toronto: University of Toronto Press.


DTe. (1999)
“Price Cap Regulation in the Electricity Sector”. The Haque. Dutch Electricity Regulatory Service.

References
EBRD (2004)
p. 58; (October); available at http://rru.worldbank.org/
PublicPolicyJournal/ Summary.aspx?id=127

Edwards, E. and R. Clough (2005)
"Corporate Governance and Performance, An Exploration of the Connection in a Public Sector Context". Issues Series paper No.1, Corporate Governance ARC Project, University of Canberra, Australia.


"Accounting for Poverty in Infrastructure Reform: learning from Latin America’s Experience". Worldbank Institute, Washington DC:Worldbank.


Euske, K.J., and M. Lebas

Fliigstein, N. (1990)

Färe, R., Grabowski, R., and S Grosskopf (1985)

Farrel, M.J. (1957)

Granovetter, M. (1985)


Guasch, J., and P. Spiller (1999)

Hare, P. (2001)

“Reflections on a Utility Regulator for Curacao”. University of the Netherlands Antilles.


Hayek, F (1945)

“A Primer on Incentive Regulation for Electric Utilities”. Oak Ridge National Laboratory.

Heinsz, W.J. (2002)

**References**

“Regulating Government in a ‘Managerial Age: Towards a Cross-National Perspective, Discussion Paper No. 1”.
Centre for Analysis of Risk and Regulation, London, London School of Economics and Political Science.

**Hunt, S., and G. Shuttleworth (1996)**
“Competition and Choice in Electricity”. John Wiley & Sons Inc.

**Institute on Governance (2006)**
“Partnerships: Putting Good Governance Principles in Practice”.
www.iog.ca.com

“Benchmarking and Regulation of Electricity Transmission and Distribution Utilities: Lessons from International Experience”.
University of Cambridge.

**Jamison, M., Berg, S., Farid, G, and J. Tavára (2004)**

“Corporate Governance and Board Effectiveness”.
Journal of Banking and Finance 22 (May), 371-403.

**Jordana, J and D. Levi-Faur (2004)**

**Joskow, P. (2000a)**


**Joskow, P. and R. Schamlensee (1986)**
”Incentive Regulation for Electric Utilities”.
Yale Journal on Regulation., vol 4 (1), 1-49.

“The Balanced Scorecard – Translating Strategy into Action”,

“Linking the Balanced Scorecard to Strategy”,
California Management Review.


“Strategy Maps: Converting Intangible Assets into Tangible Outcomes”,


“Governance Matters”, Policy Research Working Paper 2196,
The World Bank.


“Governance Matters V, Governance Indicators for 1996-2005”,

**Kaufman, D., A. Kraay, and P. Zoido-Lobaton, 2007**
“Governance Matters VI: Governance Indicators for 1996-2006”
The World bank.

**Kaufmann, D., and A. Kraay (2008)**
“Governance Indicators: Where Are We, Where Should We Be Going?”.
MPRA Paper No 8212.

“A Survey of Performance Based Regulation Plans and Benchmarking”,
Pacific Economics Group.

“Issues in Corporate Accountability and Governance”,
Accounting and Business Research, pp 291-303.
Regulation in Splendid Isolation

References


Kirzner, I. (1997)


“New Institutional Economics”, 0530, Department of Economics, University of Georgia Athens.


Lawrence, D. (1993)

Lawrence, D., Swan, P. and J. Zeitsch (1991)


“Regulation of British Telecommunications Profitability”,
London Department of Industry.

Martina, S. (2005)
“Stocktaking of Caribbean Sector Reform”, Presentation held on the
KEMA seminar “Staying Ahead of the Regulator” 31 October 2005,
Hotel San Juan Puerto Rico, Puerto Rico.


Menard, C., and M. Shirley (2005)

Mc Tagger, J., Kontes, P. and M. Mankins (1994)
“Managing for Superior Returns: The Value Imperative”,
The Free Press, New York, N.Y.

MDTE. (1995)
“Investigation by the Department on its own motion into the theory and implementation of incentive regulation for electric and gas companies under its juridiction”. Massachusetts Department of Telecommunications and Energy.

“Governance-based Analysis of Regulation”,

Mortensen, C. (1972)
“Communication: The Study of Human Communication”,

Naess, P. (2001)
“Urban Planning and Sustainable Development”.
European planning studies 9(4): 503.


References


“Regulatory and Institutional Models for the Electricity Industry”, Comillas University and European University Institute.

OECD. (1997)

OECD. (2001)

OECD. (2004)
“OECD Principles of Corporate Governance”, Organization for Economic Co-operation and Development.

OECD. (2004-A)

OECD. (2005)

OECD. (2005)

OECD. (2006)

References
Ogus, A. (2001)  
"Regulation, Economics and the Law",  
Cheltenham, UK and Northampton, USA: Edward Elgar.


Parker, D. (2001)  


Picciotto, S. (1999)  
“Introduction: What Ruled for the World Economy?”,  

“Ownership and Performance in Electric Utilities”,  

Regulatory Assistance Project. (2000)  
“Best Practices Guide: Implementing Power Sector Reform”,  
USAID Office of Energy, Environment and Technology.

Reiche, K., Tenenbaum B., Kieffer, G. and C. Torres (2005)  

“Privatization, Information and Incentives”,  
Regulation in Splendid Isolation

**References**

*Sawkins, J. (1995)*

*Schmalensee, R. (1989)*

*Schleifer, A. (1985)*

*Schleifer, A., and R. Vishny (1997)*
“A Survey of Corporate Governance”, Journal of Finance 52 (June), 737-783.

*Schmitz, P. (2001)*

*SEE. (1997)*

*Senge, P. (1990)*

*Shaffer, B. (1995)*

*Shamalensee, R. (1979)*

*Shapiro, C. and R. Willig (1990)*

*Shleifer, A. (1985)*
Regulation in Splendid Isolation

References

Schimtz, P. (2001)


Sidak, J. and D. Spulber (1997)


“Governance and the Crisis in Indonesia”, in P. Drysdale (edit) “Reform & Recovery in East Asia – The Role of the State and Economic Enterprise”, Routledge, London.


Stigler, G. (1971)


Steiner, F. (2001)
Stern, J. and S. Holder (1999)


Tenenbaum, B. (1996)

“Privitization in Developing Countries: Lessons to be Learnt from the Mozambican Case”, Transformation, no. 36, p.73-92.

“From Institutions to Governance – Getting the Governance Structure Right for Optimal Economic Performance”. The Australian National University, Canberra.

Tricker, R. (1994)

USAID. (2005)
“The Nexus Between Energy Sector Reform and Democracy & Governance”. Produced for review by the USAID, prepared by AEAI and PA Government Services Inc.


**Waldman, D. and J. Elisabeth (2001)**  

**Wentink, T. (2005)**  

“Yardstick and Incentive Issues in UK Electricity Distribution Price Controls”, Fiscal Studies, 22, 2, 233-47

**Williamson, J. (1985)**  

**Williamson, O. (1998)**  

**Wolak, F. (2003)**  


**World Bank. (1999)**  

**World Bank. (2003a)**  
References


Yarrow, G. (1999)

Annex I.

Case Study: Stocktaking Caribbean Power Sector Reform
Introduction

The objective of this case study was to conduct an analysis to gain insight in the progress Caribbean Utilities have made in terms of power sector reform. Furthermore we wanted to create a platform through which experience and lessons learned regarding power sector reform among the Caribbean utilities could be exchanged. In this case study we will present the driving forces and general objectives and benefits of power sector reform and provide a further analysis on what power sector reform comprises based on insights from a number of authors. Furthermore we will present the questionnaires that have been used for stocktaking of power sector reform of the participating Caribbean utilities, show the obtained results and discuss the findings. We will finalize the case study with some reflections and also recommendations for further research related to power sector reform of Caribbean Utilities.

Driving forces for power sector reform

The principal driving forces behind power reform, general described in publications include the following:

> the poor performance of the state-run electricity sector in terms of high costs, inadequate expansion of access to electricity service for the population, and/or unreliable supply;
> the inability of the state sector to finance needed expenditures on new investment and/or maintenance;
> the need to remove subsidies to the sector in order to release resources for other pressing public expenditure needs; and
> the desire to raise immediate revenue for the government through the sale of assets from the sector.

Although some traditional state-owned and -run enterprises have performed well, and indeed were often formed by nationalizing private-sector companies that were either too small to exploit economies of scale or too large to prevent monopolistic abuse, there was an increasing awareness during the 1980s that a lengthy period of state ownership, without the forces of competition or the incentives of the profit motive to improve performance, eventually resulted in excessive costs, low service quality, poor investment decisions, and lack of innovation in supplying customers.

Objectives and Benefits of Power Sector Reform.

The ultimate purpose of reform in the electricity sector is to enable the sector to provide improved service to customers at reasonable and fair cost in an environmentally compatible way in order to support economic and social development without burdening the state budget. These objectives should be accomplished by:

> Requiring sector enterprises to operate according to commercial standards
> Making maximum use of market mechanisms for improving

---


the efficiency of the electricity industry, and
> Regulating transparently the monopoly elements of the industry.

In general terms, the benefits of reform are that:
> Decisions are made on sound economic, financial, and environmental grounds.
> Incentives and pressures are applied to reduce operating costs and improve the efficiency of the system.
> The setting of transparent and fair prices reflects more accurately costs and tends to reduce direct and/or cross-subsidies; in addition, fair prices give the right signals to the consumers regarding consumption levels and patterns. The needs of the customers are the focus of service improvement efforts.

Power sector reform further explored

Power sector reform consists of a process of changes along four different but interdependent axes: management, ownership, structure, and regulation. The structural change begins with the realization that the existing structure is too inflexible to respond efficiently to market forces and to provide appropriate incentives for such responses. The government functions need to be broken into:
> Those that are inherent to the role of government and that government cannot relinquish, such as the roles of setting general policy and strategy, and sector regulation and supervision;
> Those that are subsidiary to the role of government and that can be transferred, wholly or partially, to the private sector, such as ownership, operation and management of energy facilities; and
> Those that are not core functions of the sector and that can be transferred to other sectors such as research and development and construction and manufacturing services.

The process of reform moves along two intertwined paths, one relating to government actions and one relating to sector and enterprise restructuring. The first path involves changes in the legal and institutional framework; the second involves the commercialization and corporatization of enterprises. The regulatory framework and sector structure are closely interconnected. The precise dimensions of governmental and sectoral reform may vary, but in each case the reform effort needs to be governed by a set of clear objectives:
> Increase efficiency in generation through competition, whenever possible, or through regulation based on efficient enterprises and energy use, conservation and other measures;
> Maintain service reliability by setting rules to limit unreasonable interruptions of supply and variations from the technical standards (e.g. in voltage frequency levels)
> Increase the security of supply in terms of numbers of suppliers and types of energy resources;
> Improve environmental protection by establishing clear rules in
the construction and operation of energy facilities, coupled with enforcement mechanisms and the requisite penalties or incentives;

> Attract capital, domestic or foreign, by establishing clear and stable “rules of the game” that relieve the governments burden of funding the sector;

> Develop competition in the supply of electricity services to customers, where viable, as a means of increasing the economic efficiency of the sector.

The steps in enterprise reform are depicted in the figure below

We will now further elaborate on the four interdependent axis; management, ownership, structure, and regulation that comprises the process of change of Power Sector Reform.

**The Management axis**

The process moves from a government department to private enterprise, and the governance and control systems becomes more market driven and less subject to government intervention. The following steps are identified:

1. **Performance contracting**: refers to contracts that are a mechanism for enterprise managers and the government to decide on specific duties, responsibilities, and performance obligations. In general these contracts are used where governments continue to impose certain nonmarket constraints on enterprises.

2. **Commercialization**: refers to the process of internal transformation to enhance the efficiency of enterprises by exposing them to commercial pricing signals and incentives. Commercialization requires, among other things, the adoption and implementation of internationally recognized accounting practices and standards that bring about transparency in cost calculation and address the issue of ownership claims. Commercialization involves amongst others, financial restructuring and subsequent recapitalizing of enterprise balance.
sheets, reforming internal organization and leadership to optimize management and control, redefining enterprise objectives and corporate policy to reflect commercial objectives and targets.

3. **Corporatization;** refers to a process in which the corporate form of an enterprise is established; the legal status of the enterprise is established with its rights as a separate legal entity, and the rights and obligations of its owners and managers are laid down. In general this represents a transformation to a limited liability entity with a stock-holding capital structure.

**The Ownership Axis**

1. **Privatization:** This term refers to the divestiture of ownership in a corporation through the sale of its shares to private sector owners. Privatization can range from partial (selling a minority share, less than 50 percent, to the public) to full (selling a majority stake to the public). The distinction between the two is primarily an issue of voting rights or claims to enterprise governance. Successful privatization is a function of investor’s perception of the intent of the government vis-à-vis the commercialization objectives of the enterprise.

2. **Independent Power Producers:** Refers to the process in which capacity additions to the system have been brought by independent power producers (IPPs). IPP projects can take different forms. Two structures are dominant, however: the Build Own and Operate (BOO) and Build, Operate, and Transfer (BOT) models. Variants to these models involve differences in the timing of asset transfer, sale, and lease-back provisions, and the rehabilitation and operation of existing assets.

**The structural Axis**

**Power Sector Structure:** Central to the design and selection of an appropriate sector structure is the concept of a natural monopoly, which is said to exist when (one) power company can provide certain services in the power market at a lower cost than two or more companies. In the literature four generic models are adequate to represent that available structural options:

1. Model 1: This is an integrated monopoly with no competing generating or distribution companies in an area. Customers buy from the monopoly company.
2. Model 2: Distribution is separated, but generation and transmission remain integrated. Distributors have no choice of supplier from whom to buy power.
3. Model 3: The purchasing agency model, competition to generate power exists, but all sales must be made to the designated purchasing agency. This agency then sells to retailers or its own customers, who have no choice of supplier.
4. **Model 4:** This involves central transmission with open access for retail sales. Competition exists in generation, with customers or retailers having a choice of supplier, possibly buying and selling through a power pool.

The above models differ in a number of aspects. The degree of vertical integration depends on the extent to which generation, transmission, and distribution are managed together or separately. The relevant criterion for restructuring decisions is the relative cost of making contracts between separate entities versus the benefits of greater production efficiency through competition, taking into account that small systems are not amenable to it.

**The Regulatory Axis**

Power Sector Regulation; Appropriate regulation is a corollary to the decisions for sector restructuring. As the power sector moves away from a government department towards greater operating autonomy, and as new commercial structures are introduced, including private sector participation, an explicit regulatory function becomes increasingly necessary. Through the regulatory framework a balance of interests between consumers, enterprises and government should be achieved. The responsibilities placed on the regulatory body need to reflect the need to ensure such a balance of interests.

Regulation should be based on core principals amongst others:

- Stability and Predictability;
- Simplicity;
- Transparency;
- Continuity;
- Promotion of Efficiency;
- Allowing managerial independence;
- Based on incentives rather than instructions;

**Elements of a power sector reform program**

In general it could be stated that power reforms are designed to introduce competition where feasible, which is in the upstream production and downstream supply functions of the industry structure, and to use economic regulation of the wholesale and retail power markets to promote competition and protect consumer interests.

A full-scale power reform program generally consists of the following main elements.

---

**Box Annex I-1: Main Elements of a Power Reform Program**

*Source: R. Bacon and J. Besant-Jones (2001).*

1. Obliging electricity enterprises to operate according to commercial principles. This obligation extends to state-owned entities that undertake one or more of the basic functions in the supply chain, namely generation, transmission, system control, distribution, and supply services to users of electricity. The supply services function encompasses the sale of electricity procured on the wholesale electricity market to electricity users and the associated customer services of billing, collection, and maintenance. These principles require that enterprises pay taxes...
and market-based interest rates, earn commercially competitive returns on equity capital, and have the autonomy to manage their own budgets, borrowing, procurement, and labor employment.

2. Introduction of competition in order to improve sector performance in terms of efficiency, customer responsiveness, innovation, and viability. Competition can be developed in the generation-and supply-service segments but in most cases is not feasible in the network segments (transmission, distribution, and system control) because these functions are natural monopolies. Supply services to large electricity users is an intrinsically competitive segment because the cost of competing for their business is small compared with the potential profits. Supply services to all but large electricity users, however, has usually been a monopoly in practice because the profits per customer are too small to stimulate competition. Hence, this element of supply service has generally been carried out by the entity that distributes electricity to these users because both these functions serve the same market. The threshold level of customer demand at which the supply to meet it becomes competitive has been coming down, however, and full competition in the retail market has been introduced in England and Wales, Norway, and some parts of the United States. A further consideration is that consumers must be able to switch between suppliers at low cost—any arrangement in which consumers have to remain with their original supplier gives market power back to the sellers even when the sellers have only modest market shares.

3. Restructuring of the electric power supply chain to enable the introduction of competition. This involves breaking up ("unbundling") the incumbent power utility into multiple generators and distributors of power that trade with each other in a competitive wholesale power market. To prevent the acquisition of anticompetitive amounts of vertical market power by any generators or distributors, transmission, and system control are placed with independent companies (or they may be combined) with restrictions on ownership or on control (through governance arrangements) of such companies by generators and distributors. Independent electricity suppliers should be allowed to compete with distributors for the custom of large users (this could be delayed in those countries where distribution and supply systems are so dilapidated at the time of privatization that new owners need a period of assured revenues to remedy the worst deficiencies before having to compete for the business of their largest customers), and supply licenses can be granted to generators as well as to firms that specialize in energy trading.

4. Privatization of the unbundled electricity generators and distributors under dispersed ownership, because competition is unlikely to develop properly between entities that are under common ownership—whether state or private. In developing countries, furthermore, private investors and operators are expected to bring in financial resources and technical and managerial expertise that will rectify the prevailing low standard of electricity supply by state-owned power utilities.

5. Development of economic regulation of the power market that is applied transparently by an agency that operates independently from influence by government, electricity.

---

Power sector reform questionnaires
The methodology that was used for stocktaking of the Caribbean Power Sector Reform was based on a questionnaire used by the Energy Sector Management Assistance Program (ESMAP) and based on a power sector reform rating methodology used by the European Bank for Reconstruction and Development. In the boxes below the questionnaires are presented.

---

*The ESMAP study was published in 1999. 115 countries have participated in the study.

*In the EBRD study was published in 2000. 26 countries have participated in the study.*
Results to date of the Caribbean power sector reform

The questionnaires were submitted to the utility members of the Carilec during week 41 of the year 2005. In total we got 14 respondents. The results were presented and discussed the 31st of October 2005 during a one day seminar held in Puerto Rico.
Table Annex I – 1: Caribbean Power Sector Reform Scores
Source: Martina [2005]

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Anguilla</th>
<th>Barbados</th>
<th>Bermuda</th>
<th>Bonaire</th>
<th>Cayman</th>
<th>Curacao</th>
<th>Grand Bahama</th>
<th>Grenada</th>
<th>Jamaica</th>
<th>Montserrat</th>
<th>St. Lucia</th>
<th>St. Martin</th>
<th>Trinidad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility corporatized?</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Energy Law passed?</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Regulatory Body?</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Private Investment?</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Restructuring?</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Privatization?</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Score</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Corporate Law Regulator IPP’s Restructure Privatization Reform Indicator
14 7 7 5 10 9 4
100% 50% 50% 36% 71% 64% 66%

Figure Annex I – 1: Power Sector Reform Indicator Comparison of Regions
Source: Caribbean obtained by Martina [2005]
Source: Other Countries obtained by Bacon and Besant Jones (2001)

Figure Annex I-2: Results Caribbean EBRD Power Sector Reform Transition levels
Source: Martina (2005)
The Caribbean Power Sector Reform resulted in the following findings:

- It is noteworthy to observe that according to the ESMAP Power Sector Reform methodology all participating Caribbean utilities have been corporatized. The score obtained for this reform level indicator was 100%.
- The aggregated ESMAP Energy law indicator and the Regulator indicator obtained a score of 50% indicating that still considerable progress with further deployment of these reform indicators can be made.
- The ESMAP privatization indicator obtained a relatively high score of 64% indicating that the sector has considerable exposure to pressure from private sector and lending agencies to adhere to governance principals from a country, regulatory and corporate governance perspective.
- The overall ESMAP Reform indicator shows that the Caribbean countries surveyed, on average, in two third of the cases, considerable reform steps have been undertaken. The overall indicator of 4 is relatively high compared to the other regions with only Latin America with an overall reform indicator of 4.3 outperforming the surveyed Caribbean Countries. We need to make an observation that the reform indicator obtained from the other regions reflects the stocktaking of power sector reform of the year 2000.
- The EBDR defined the levels of transition of Power Sector Reform (levels 1 – 4+) according to more complex criteria. It is noteworthy to observe that 50% of the participating countries have transition levels of maximum 2 and another 50% have transition levels between 2 and 4. None of the countries have a maximum transition level of 4+. 1 country scored a transition level 1, 6 countries scored a transition level 2, 2 countries scored a transition level 3 and 5 countries scored a transition level 4.
- During the discussions session of the presentation of the Caribbean power sector status the reform step of regulation was identified as the most challenging and pressing aspect of reform where transparency, consistency, coherence and predictability were pronounced as the fundamental principals that requires a high level of adherence as the major prerequisite to guarantee an effective performance of the electric utility. This finding has been reaffirmed during sessions held to craft the Carilec position paper on Energy policy and has been documented in the Carilec Position Paper on Energy policy launched in 2008.

Recommendations for future research
In this section we will outline a number of power sector reform hypothesis that we have discussed and experienced are often subject to vigorous public debates and a set of core indicators for electricity sector reform. Having a shared set of core indicators will contribute to re-
search and policy making by facilitating verification and extension of results from other studies. The indicators can be used in general purpose monitoring of reform progress, as well as in empirical studies using econometric, efficiency and case study analysis of individual countries and cross-country comparisons.

Observation: The policy questions outlined here are by no means meant to be exhaustive; however as empirical research on Caribbean utilities is currently limited and existing evidence is rather fragmented, we want to present a framework through which type of research these policy questions could be addressed. Furthermore the vast majority of the identified core indicators have been incorporated in the Caribbean Benchmark Study.

**Box Annex I-1: Power Sector Reform Hypothesis**

1. **Higher economic and governance indicators, as well as independent regulation and cost-reflective pricing, lead to higher private investment.**

Private sector investment constitutes the cornerstone of market-oriented electricity reforms. However, international investors indicate reform vulnerability in developing countries to macroeconomic volatility and weaknesses in political and economic governance and institutions (Harris, 2003). The significance of these factors has direct policy relevance for many reforming countries and for international development organizations. This type of question can best be addressed by cross-country analysis using econometric methods. The main core indicators for the analysis with reference to the components of the reform model are investments (Table VI), country-level factors (Table VII), sector regulation (Table IV), economic factors (Table VIII), and social aspects (Table IX).

2. **There is a system size below which vertical separation and competition is not effective or not worthwhile, and a level of institutional and governance endowment below which private participation is not feasible.**

It is generally recognized that reform design should take the specific characteristics of the sector into account. However, this notion is often expressed in general, rather than specific terms. Two factors that characterize many reforming developing countries are small system size and very weak institutions. Countries with small systems may have inherent limitations with regards to the introduction of effective competition. Also, the poorest countries tend to exhibit the weakest levels of institutional development so are regarded by private investors as too risky or commanding high-risk premiums. This type of question may be addressed by cross-country analysis using econometric or comparative case studies. The main core indicators for this analysis with reference to the components of our reform model are market structure indicators (Table III), key reform steps (Table II) and various country-level indicators.

3. **Diverse generation resource mix, energy independence and country institutional development are positively correlated with extent of reform.**

An understanding of the importance of exogenous factors as determinants of the type or extent of reform can help in design and lead to an understanding of what measures may be feasible. This, and similar questions, can be addressed through econometric methods. The main core indicators with reference to the components of the reform model are the key reform steps implemented (Table II), resource mix and endowments indicators (Table I), and country-level indicators (Table VII).

4. **Incentive regulation and privatization improve cost and technical efficiency in electricity distribution networks.**

In general, this type of analysis is best addressed through efficiency and productivity analysis at company level. These techniques are used to determine the relative efficiency of the distribution utilities. Alternatively, efficiency analysis can be used as part of the regulatory reform of distribution networks and the implementation of yardstick regulation or post-reform monitoring and performance evaluation. A variety of combinations of input and output can be used. Monetary core indicators, such as controllable operating costs, capital expenditures and stock of capital, are
required for cost efficiency analysis of firms. In addition, the main physical characteristics of the system need to be accounted for, namely, the length of network, transformers, units of electric energy delivered, system losses, maximum system simultaneous demand, and number and composition of the utilities’ customers (Table VI).

5. Welfare economic effects of reform vary across income groups, and ineffective regulation prevents the gains from reform from being passed onto customers. Reform and privatization are expected to lead to tangible benefits for consumers. However, in many developing countries there are indications that public acceptance of privatization programmes has declined in recent years (Lora and Panizza, 2002). This may be partly the result of ineffective regulatory frameworks for ensuring that customers benefit from efficiency improvements and that vulnerable income groups are protected. This type of question can be addressed through case studies involving cost-benefit analysis and distributional impacts. The main core indicators with reference to the components of our reform model are price and consumption data for income groups (Table IX), changes in access and quality of service (Table V), regulatory framework (Table IV), and where possible environmental impacts of reforms (Table X).

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource mix</td>
<td>Electricity generation mix:</td>
</tr>
<tr>
<td></td>
<td>• net generation capacity (MW)</td>
</tr>
<tr>
<td></td>
<td>• energy supplied (MWh)</td>
</tr>
<tr>
<td>Energy security and resource independence</td>
<td>• Electricity consumption, domestic production, import, export (MWh)</td>
</tr>
<tr>
<td></td>
<td>• Energy consumption, domestic production, import, exports (MTOE).</td>
</tr>
<tr>
<td></td>
<td>• Self-sufficiency in electricity – domestic production GWh / domestic production – net imports (%)</td>
</tr>
<tr>
<td></td>
<td>• Energy self-sufficiency – domestic/total (%)</td>
</tr>
<tr>
<td>Reserve generation capacity</td>
<td>• Reserve capacity – at maximum demand (MW, and as % of total installed capacity)</td>
</tr>
<tr>
<td>Electricity and energy consumption per capita</td>
<td>• Electricity consumption per capita</td>
</tr>
<tr>
<td></td>
<td>• Energy consumption per head</td>
</tr>
<tr>
<td>Unserved demand</td>
<td>• Households without electricity (number and % of total)</td>
</tr>
<tr>
<td></td>
<td>• Non-commercial energy (amount)</td>
</tr>
<tr>
<td>Energy and electricity intensity of GDP</td>
<td>• Electricity use per GDP unit (kWh/$)</td>
</tr>
<tr>
<td></td>
<td>• Energy use per GDP unit (TOE/$)</td>
</tr>
<tr>
<td>Overall system price-cost relationship</td>
<td>• Price/cost (values per kWh, ratio)</td>
</tr>
<tr>
<td>Number of customers</td>
<td>• No. of residential, industrial, and commercial customers</td>
</tr>
</tbody>
</table>
### II. Key Reform Steps

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity law or act</td>
<td>• Date of effectiveness [year]</td>
</tr>
<tr>
<td>Corporatisation</td>
<td>• Are state-owned enterprises corporatised? (no/yes—fully, partially)</td>
</tr>
<tr>
<td>Privatisation</td>
<td>• Start date [year]</td>
</tr>
<tr>
<td></td>
<td>• Privatisation proceeds from G, T, D [national currency and US$ per kW, MWh]*</td>
</tr>
<tr>
<td></td>
<td>• Privatised electricity assets – G (MW), T (MW), D (MWh) as % of total</td>
</tr>
<tr>
<td>Unbundling</td>
<td>• Vertical separation of G from T/D [no/yes—legal, accounting, ownership]</td>
</tr>
<tr>
<td>Private sector participation (new entry)</td>
<td>• Are new private concessions and greenfield investments allowed? (no/yes)</td>
</tr>
<tr>
<td>Retail competition</td>
<td>• Is retail competition allowed? (no/yes) Down to what level</td>
</tr>
<tr>
<td>Wholesale electricity market</td>
<td>• Is a wholesale market established? (no/yes) – Pool, single-buyer, cost-based/price-based, voluntary/compulsory participation, demand participation, contract market bilateral, forward, balancing, IPPs</td>
</tr>
<tr>
<td>Regulator</td>
<td>Is a regulator established? (no/yes – independent, ministerial, other)</td>
</tr>
<tr>
<td>Network regulatory reform</td>
<td>• Is there incentive regulation for T networks? (no/yes – price-cap, partial incentive schemes, other)</td>
</tr>
<tr>
<td></td>
<td>• Is there incentive regulation for D networks? (no/yes – price-cap, partial incentive schemes, other)</td>
</tr>
<tr>
<td>Composite reform index</td>
<td>• Number of key reform steps taken [alternatively weighted]</td>
</tr>
</tbody>
</table>

*G: Generation, T: Transmission, D: Distribution

### III. Market Structure

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of vertical integration</td>
<td>• Energy delivered by vertically integrated firms (own generation as % of total demand)</td>
</tr>
<tr>
<td>Number of firms</td>
<td>• Number of G, T, D firms</td>
</tr>
<tr>
<td>Ownership structure</td>
<td>• Private, local, government owned G, T, D firms [size -MW/MWh, number of firms]</td>
</tr>
<tr>
<td>Wholesale market</td>
<td>• Is there a wholesale generation market? (no/yes – type: e.g. single-buyer, cost-based pool, voluntary or compulsory pool participation, demand-side participation, bilateral/forward contract market, balancing market, IPPs)</td>
</tr>
<tr>
<td>Wholesale market concentration</td>
<td>• Market share of 1st-5th largest generators (as % of total capacity).</td>
</tr>
<tr>
<td></td>
<td>• HHI of generation firms [index]</td>
</tr>
<tr>
<td>Access to networks</td>
<td>• Are there provisions for generators to have access to transmission network? (no, – rTPA, nTPA)</td>
</tr>
</tbody>
</table>

Case Study: Stocktaking Caribbean Power Sector Reform
### III. Market Structure

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail market opening</td>
<td>• Degree of market opening (% of total consumption liberalised)</td>
</tr>
<tr>
<td></td>
<td>• Threshold level for retail customer choice [MW, MWh]</td>
</tr>
<tr>
<td></td>
<td>• Retail competition</td>
</tr>
<tr>
<td></td>
<td>[no., % share of independent suppliers in different market segments]</td>
</tr>
<tr>
<td></td>
<td>• Degree of switching from incumbent suppliers [no. and % of eligible customers]</td>
</tr>
<tr>
<td>Interconnections</td>
<td>• Interconnections with other systems [capacity, % share of total market]</td>
</tr>
<tr>
<td>Independent Power Producers (IPPs)</td>
<td>• Significance of IPPs [no., share, and type long-term contract, merchant]</td>
</tr>
</tbody>
</table>

### IV. Regulation, Governance and institutions

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment of a regulator</td>
<td>• Start date of regulator [year]</td>
</tr>
<tr>
<td>Network regulation and price control</td>
<td>• T regulation (ROR, PCAP, other)</td>
</tr>
<tr>
<td></td>
<td>• D regulation (ROR, PCAP, other)</td>
</tr>
<tr>
<td></td>
<td>• Length of price control period [years]</td>
</tr>
<tr>
<td></td>
<td>• Are there quality of service targets? [no/yes – type]</td>
</tr>
<tr>
<td>Transmission network access and system operation</td>
<td>• Is third-party access to T networks? [no/yes – TPA, nTPA]</td>
</tr>
<tr>
<td></td>
<td>• Is TSO independent of network operator? [no/yes]</td>
</tr>
<tr>
<td>Market structure regulation</td>
<td>• Are there restrictions on vertical integration? [no/yes]</td>
</tr>
<tr>
<td></td>
<td>• Are there restrictions on horizontal integration? [no/yes]</td>
</tr>
<tr>
<td>Subsidies</td>
<td>• Are there cross-subsidies between residential, industrial and service users? [no/yes – type]</td>
</tr>
<tr>
<td></td>
<td>• Are there government-funded subsidies? [no/yes – type]</td>
</tr>
<tr>
<td>Regulatory budget and resources</td>
<td>• Annual budget size of regulator [amount]</td>
</tr>
<tr>
<td></td>
<td>• Source of regulatory funds [government, levies on companies, customer levies, other]</td>
</tr>
<tr>
<td></td>
<td>• Total and professional staff [no.]</td>
</tr>
<tr>
<td>Regulator appointment and dismissal</td>
<td>• Who appoints the regulator? [president, prime minister, parliament]</td>
</tr>
<tr>
<td></td>
<td>• How long is the regulator’s term? [fixed term – years, unlimited_]</td>
</tr>
<tr>
<td></td>
<td>• Can the regulator be re-appointed? [no/yes]</td>
</tr>
<tr>
<td></td>
<td>• Which authority can dismiss the regulator [president, prime minister, minister, parliament]</td>
</tr>
<tr>
<td>Regulatory decisions</td>
<td>• Who makes the final regulatory decisions? [a single head, board, other]</td>
</tr>
<tr>
<td>Regional regulators</td>
<td>• Are there regional regulators? [no/yes]</td>
</tr>
<tr>
<td>Consultation and transparency and mandate</td>
<td>• Is there an open consultation process prior to decisions? [no/yes]</td>
</tr>
<tr>
<td></td>
<td>• Are regulatory decisions open to the public? [no/yes]</td>
</tr>
<tr>
<td></td>
<td>• Does the regulator publish hearings, decisions, and explanations? [no/yes]</td>
</tr>
</tbody>
</table>
### IV. Regulation, Governance and institutions

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultation and transparency and mandate</td>
<td>• Does the regulator have a website? [no/yes]</td>
</tr>
<tr>
<td></td>
<td>• Are consultation papers on the website? [no/yes]</td>
</tr>
<tr>
<td>Appeal</td>
<td>• Can the regulator’s decisions be appealed? [no, yes – to whom]</td>
</tr>
<tr>
<td>Regulatory discretion</td>
<td>• Can the regulator decide on prices? [no/yes]</td>
</tr>
<tr>
<td></td>
<td>• Can the regulator decide award of G, T, and D permits/licences? [no/yes]</td>
</tr>
<tr>
<td></td>
<td>• Is the regulator mandated to protect customers? [no/yes]</td>
</tr>
<tr>
<td></td>
<td>• Does the regulator have mandate and rules concerning disconnection</td>
</tr>
<tr>
<td></td>
<td>for non-payment? [no/yes]</td>
</tr>
<tr>
<td></td>
<td>• Are there other formal [government, consumer groups, etc.]</td>
</tr>
<tr>
<td></td>
<td>bodies in charge of customer protection? [no/yes – who]</td>
</tr>
</tbody>
</table>

### V. Sector Performance

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical and physical performance</td>
<td>• Asset utilisation: system load factor [electricity generation MWh /</td>
</tr>
<tr>
<td></td>
<td>average capacity MWx8760 as a percentage]</td>
</tr>
<tr>
<td></td>
<td>• Labour productivity [net electricity generation per employee MWh]</td>
</tr>
<tr>
<td></td>
<td>• Plant availability factor [Load factor by plant, i.e. electricity</td>
</tr>
<tr>
<td></td>
<td>generation MWh / average capacity MWx8760 ratio]</td>
</tr>
<tr>
<td></td>
<td>• T system losses -technical and non-technical losses [MWh, %]</td>
</tr>
<tr>
<td></td>
<td>• D system losses – technical and nontechnical losses [MWh, %]</td>
</tr>
<tr>
<td></td>
<td>• Electricity consumption per capita (KWh)</td>
</tr>
<tr>
<td></td>
<td>• Generation capacity per capita (MW)</td>
</tr>
<tr>
<td></td>
<td>• Reserve margin</td>
</tr>
<tr>
<td>Sector investments</td>
<td>• Domestic investments in G, T, D – greenfield projects, privatised</td>
</tr>
<tr>
<td></td>
<td>assets (amounts)</td>
</tr>
<tr>
<td></td>
<td>• Foreign investments in G, T, D – greenfield and privatised assets</td>
</tr>
<tr>
<td></td>
<td>(amounts)</td>
</tr>
<tr>
<td></td>
<td>• Government investments in G, T, D (amounts)</td>
</tr>
<tr>
<td></td>
<td>• Foreign investments as % of total foreign direct investments [FDI]</td>
</tr>
<tr>
<td>Quality of service</td>
<td>• Reliability of service [number of interruptions]</td>
</tr>
<tr>
<td></td>
<td>• Security of service [number of minutes lost per customer]</td>
</tr>
<tr>
<td>Non-payments</td>
<td>• Non-payment and foregone revenues</td>
</tr>
<tr>
<td></td>
<td>(amount, as % of total electricity delivered, as % of total revenues)</td>
</tr>
<tr>
<td>System expansion</td>
<td>• Generation capacity growth (MW, as % of total)</td>
</tr>
<tr>
<td>Prices</td>
<td>• End-user prices -residential, industrial, commercial sectors with and</td>
</tr>
<tr>
<td></td>
<td>without taxes (price per KWh)</td>
</tr>
<tr>
<td></td>
<td>• Ratio of industrial to residential prices</td>
</tr>
</tbody>
</table>
### V. Sector Performance

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric energy</td>
<td>• Total units of energy sold (MWh)</td>
</tr>
<tr>
<td></td>
<td>• Domestic/industrial/commercial sale (MWh)</td>
</tr>
<tr>
<td></td>
<td>• Maximum demand (MW)</td>
</tr>
<tr>
<td></td>
<td>• Service area (Sq. km)</td>
</tr>
<tr>
<td>Customers</td>
<td>• Total no. of customers</td>
</tr>
<tr>
<td></td>
<td>• No. residential/non-residential customers</td>
</tr>
<tr>
<td>Networks</td>
<td>• Total network length (km)</td>
</tr>
<tr>
<td></td>
<td>• Low/medium/high-voltage (km)</td>
</tr>
<tr>
<td></td>
<td>• Total transformer capacity (MVa)</td>
</tr>
<tr>
<td></td>
<td>• Low/high-voltage transf. cap. (MVa)</td>
</tr>
<tr>
<td></td>
<td>• Total no. of transformers</td>
</tr>
<tr>
<td></td>
<td>• No. of low/high-voltage transformers</td>
</tr>
<tr>
<td></td>
<td>• Total energy loss at T/D networks (MWh)</td>
</tr>
<tr>
<td></td>
<td>• Technical and non-technical energy losses at networks (MWh, % of total energy)</td>
</tr>
<tr>
<td>Quality of service</td>
<td>• Security of service (no. of minutes lost)</td>
</tr>
<tr>
<td></td>
<td>• Reliability of service (no. of interruptions)</td>
</tr>
<tr>
<td>Costs and revenues</td>
<td>• Total costs (value)</td>
</tr>
<tr>
<td></td>
<td>• Controllable O&amp;M costs (value)</td>
</tr>
<tr>
<td></td>
<td>• Labour costs (value)</td>
</tr>
<tr>
<td></td>
<td>• Annual capital expenditures (value)</td>
</tr>
<tr>
<td></td>
<td>• Electricity capital stocks (value)</td>
</tr>
<tr>
<td></td>
<td>• Revenues from electricity sales (value)</td>
</tr>
<tr>
<td></td>
<td>• Net margin (net earnings/revenue %)</td>
</tr>
<tr>
<td></td>
<td>• Corporate capital employed (value)</td>
</tr>
<tr>
<td>Power generation</td>
<td>• Generation capacity – by fuel type (MW)</td>
</tr>
<tr>
<td></td>
<td>• Energy production – by fuel type (MWh)</td>
</tr>
<tr>
<td></td>
<td>• Load factor (avg. load MW/ capacity MW)</td>
</tr>
<tr>
<td></td>
<td>• Electricity sold to other utilities (MWh)</td>
</tr>
<tr>
<td></td>
<td>• Purchased power from other utilities (MWh)</td>
</tr>
</tbody>
</table>

### VI. Macro Level Indicators

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>• GDP per capita OECD Bacon and Besant-Jones (2002)</td>
</tr>
<tr>
<td>Energy intensity</td>
<td>• Electricity use per unit of GDP</td>
</tr>
<tr>
<td></td>
<td>• Energy use per unit of GDP</td>
</tr>
<tr>
<td>Economic liberalization</td>
<td>• Has liberalisation been implemented in other infrastructure industries? (no/yes – e.g. natural gas, telecom, transport, railway)</td>
</tr>
<tr>
<td>Country risk</td>
<td>• Country risk index</td>
</tr>
<tr>
<td>Institutional endowment</td>
<td>• Institutional and political strength – e.g. Judiciary independence, economic management, corruption indices</td>
</tr>
</tbody>
</table>
### VI. Macro Level Indicators

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign aid and economic dependence</td>
<td>• Foreign aid share of GDP (ratio)</td>
</tr>
<tr>
<td></td>
<td>• Degree of economic freedom (index)</td>
</tr>
<tr>
<td>Human capital</td>
<td>• Literacy rate (%)</td>
</tr>
<tr>
<td></td>
<td>• Post-secondary education (%)</td>
</tr>
</tbody>
</table>

### VII. Economic impacts

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative prices</td>
<td>• Ratio of industrial to residential prices</td>
</tr>
<tr>
<td>Subsidies</td>
<td>• Are there cross-subsidies between residential, industrial and service users? (no/yes)</td>
</tr>
<tr>
<td></td>
<td>• Are there public subsidies? (no, yes–amount)</td>
</tr>
<tr>
<td>Investments in the sector</td>
<td>• Private and Government investments in G, T, D (amounts)</td>
</tr>
<tr>
<td></td>
<td>• Government investments in G, T, D (as % of total public budget &amp; investments)</td>
</tr>
<tr>
<td>Efficiency gains</td>
<td>• Estimated efficiency gains (as % of GDP)</td>
</tr>
</tbody>
</table>

### VIII. Social impacts

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer prices</td>
<td>• End-user prices – Avg. residential, industrial, commercial prices with and without taxes (per KWh)</td>
</tr>
<tr>
<td></td>
<td>• Price levels for different income groups (%)</td>
</tr>
<tr>
<td></td>
<td>• Consumption levels for different income groups (MWh)</td>
</tr>
<tr>
<td></td>
<td>• Expenditures on electricity for different income groups</td>
</tr>
<tr>
<td></td>
<td>• Ratio of daily disposable income for 20% poorest income groups to price of electricity</td>
</tr>
<tr>
<td>Economic welfare</td>
<td>• Welfare effect among income groups</td>
</tr>
<tr>
<td></td>
<td>• Welfare distribution effect among government, consumers, producers</td>
</tr>
<tr>
<td>Access to service</td>
<td>• Level of electrification (no., % of total households connected)</td>
</tr>
<tr>
<td></td>
<td>• Rate of change in electrification (no. of new connections)</td>
</tr>
<tr>
<td></td>
<td>• Level of urban electrification (no., % of total urban households connected)</td>
</tr>
<tr>
<td></td>
<td>• Level of rural electrification (no., % of total rural households connected)</td>
</tr>
<tr>
<td>Energy use</td>
<td>• Electricity consumption per capita (KWh)</td>
</tr>
<tr>
<td></td>
<td>• Commercial energy use per capita (KWh, annual growth rate %)</td>
</tr>
<tr>
<td></td>
<td>• Share non-commercial energy as total energy consumption (%)</td>
</tr>
<tr>
<td>Continuity of service</td>
<td>• Dis-connections from service (no.)</td>
</tr>
</tbody>
</table>
### IX. Environmental impacts

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
</table>
| **Climate change** | • CO₂ emissions by the sector (0,000 tones)  
• Rate of change in CO₂ emissions by the sector (%)  
• CO₂ intensity of the sector (000 tones/MWh) |
| **Polluting emissions** | • SO₂, NOx, particulates, CO, VOC emissions by the sector (quantity)  
• Rate of change in SO₂, NOx, particulates, CO, VOC emissions by the sector (%)  
• Concentration levels of SO₂, NOx, particulates, CO, VOC in urban areas (values) |
Annex II.

Case Study: Caribbean Benchmarking Study
Introduction

The Caribbean Electric Utility Services Corporation CARILEC is the regional body of the electric utility industry in the Caribbean, orienting the utilities, investors and other stakeholders about characteristics, behaviour and outlook of the electrical industry in the region. Acting as aggregator of its members needs, CARILEC produces and disseminates adequate information on the operation of regional utilities to improve electric energy supply in the Caribbean.

In 2004, CARILEC commenced a benchmarking study of its member utilities, what has become a yearly revolving exercise, in order to assess regional performance, provide comparative data and facilitate establishing operating standards and best practices for electricity supply across the region. As a CARILEC Board Member I had the opportunity to take leadership in initiating and managing the Caribbean Benchmark Study. The objective of the study was to identify measure and benchmark suitable performance indicators for island utilities with regard to their technical, commercial, financial and organizational performance and to determine the standing of utilities operating performance against international best practices.

The underlying rationale for this project was twofold. First, there was and still is a general acknowledgment by Caribbean utilities of the fact that in order to achieve continuous improvement, benchmarking can be a powerful tool. By comparing and identifying best practices, the scope for improvement can be measured and translated into concrete management targets to be set. Second, there is the anticipation that, as has happened already in other places in the world, a change in regulatory policy towards incentive or price-cap regulation will take place.

Conducting ones own benchmarking analysis is important for Caribbean utilities in two respects. First, it demonstrates the view of the utilities that the change in regulatory thinking is not a threat but rather an opportunity for further improvement. Second, the benchmarking analysis intends to highlight the possibilities but also the restrictions in benchmarking electrical systems of sometimes very different economies. By conducting the benchmarking analysis, different models could be tested and the restrictions when used in the regulatory setting underlined. By being proactive, regulatory benchmarking failures could be prevented – eventually at the benefit for all parties involved including the utilities, regulator, and customers.

Sixteen utilities on fifteen islands providing electricity services in countries and territories of the Caribbean participated in the study and the results and conclusions allowed characterizing the current operating profile of the electric utility industry in the region. Details on these utilities are provided in the next section.

Objective and outline

The objective of this case study is to discuss the applicability of benchmarking from a management as well as from a regulatory perspective. In particular, we consider the issue from the perspective of
small island economies such as present in the Caribbean. We perform our analysis on the basis of a discussion of the CARIBBEAN benchmarking study. We aim to identify the potential limitations of benchmarking small island economies and make some preliminary suggestions for a suitable regulatory system for the Caribbean.

**Outlook**

The majority of countries and territories forming the Caribbean region are located in the Caribbean Sea basin. The total population that the CARILEC Utilities serve that have participated in the Caribbean Benchmarks Study is approximately 3.6 Million from which 1.3 Million is concentrated in the largest islands being Trinidad & Tobago. Agriculture, extraction of natural resources, tourism and other services constitute the basis of the island economies, with manufacturing being also important in the largest islands. The islands are facing significant economic challenges stemming from increased exposure to global competition and the end of trade privileges for many of its traditional products. At the same time, because the region is economically relatively stronger than other world development areas, development assistance is diminishing.

The perspectives of the electricity supply in the region are inseparable to its economic development and the availability of energy resources. The economic activity is the main driver of electricity demand and will determine future requirements in terms of new investments, reliability and quality of service. With a few exceptions, the islands are predominantly net energy importers and oil dependent, so energy costs and environmental awareness are important in the region.

**Regulation in the Caribbean region**

In general, Caribbean utilities are vertically integrated monopolies. Utilities are mostly subject to a form of cost of service regulation as can be observed in the US albeit much less formally applied. Specific power sector regulators are usually lacking. Rather, central governments (in the form of e.g. the Energy Minister) adopt the role of regulator and are in charge of setting rates and monitor compliance with concessions and license requirements. The governments of the region have pursued regulatory reforms to some extent, mostly through the corporatization of companies and on price regulations. Competition is limited to the presence of independent power producers (IPPs) on a few islands. Some countries have recently set up dedicated energy regulators and are now considering or already moving towards the direction of modern incentive price regulation systems such as price-caps.

**Characteristics of Caribbean utilities**

Utilities are rather uniform in terms of organization, having a rather flat structure with two managerial levels; one at the top executive level and other conformed by division managers. Outsourcing is gaining importance within regional operations. In general, fuel costs represent
the highest cost item for the utilities, accounting on average for 30 to 40% of total annual cost. The market composition shows a high percentage of commercial consumption, with a share of 40% to 60% of total consumption, which is explained by electric loads of hotels and tourist facilities. Residential demand comes second in energy consumption and industrial load is significant in some islands.

**Electric systems in the Caribbean region**

The areas of service of the utilities are subject to the particular Caribbean weather conditions, including salty and corrosive environment, and the occurrence of natural phenomena that impose special conditions on the electric systems for their design, operation and maintenance. The insular condition of the service areas also determines a high dependence on diesel generation and the lack of benefits from the network interconnections of larger systems making circuit lengths shorter and unit sizes a larger fraction of system load compared to other systems.

Thermal generation is the predominant energy production technology found in the region. The most common generating units are low and medium speed diesels but steam and combustion units are also applied in certain countries.

Low voltages are used for energy transportation due to the relative short distances between production and consumption centres in the islands. A combination of ring and radial configurations can be found in the regional networks favouring service reliability. Another relevant feature is the significant proportion of underground circuits present in some islands.

A sample of the information gathered from the regional utilities who participated in the Caribbean Benchmark study is presented in Table 1 and 2 showing the participants and some characteristics of utility service.

**Table Annex II-1: Participating Countries and Utilities Caribbean Benchmark Study**

<table>
<thead>
<tr>
<th>Country/Territory</th>
<th>Utility</th>
<th>Area (km²)</th>
<th>Population</th>
<th>Density (pop./sq.km)</th>
<th>GDP (million USD$)</th>
<th>GDP per capita ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td>ANGLEC</td>
<td>91</td>
<td>12,522</td>
<td>137.6</td>
<td>139.4</td>
<td>11,132</td>
</tr>
<tr>
<td>Curacao</td>
<td>AQUALECTRA</td>
<td>444</td>
<td>135,822</td>
<td>305.9</td>
<td>2,276.5</td>
<td>16,761</td>
</tr>
<tr>
<td>Bahamas</td>
<td>BEC, GBPC</td>
<td>13,878</td>
<td>300,000</td>
<td>22.1</td>
<td>4,500.0</td>
<td>14,677</td>
</tr>
<tr>
<td>Belize</td>
<td>BEL</td>
<td>22,960</td>
<td>301,300</td>
<td>13.1</td>
<td>1,149.0</td>
<td>3,813</td>
</tr>
<tr>
<td>Bermuda</td>
<td>BELCO</td>
<td>46</td>
<td>62,000</td>
<td>1,347.8</td>
<td>5,355.0</td>
<td>86,371</td>
</tr>
<tr>
<td>Barbados</td>
<td>BLPC</td>
<td>416</td>
<td>306,611</td>
<td>737.0</td>
<td>3,061.0</td>
<td>9,983</td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td>BVIE</td>
<td>153</td>
<td>23,098</td>
<td>151.0</td>
<td>1,000.0</td>
<td>43,294</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>CUC</td>
<td>197</td>
<td>45,400</td>
<td>230.7</td>
<td>2,400.0</td>
<td>52,863</td>
</tr>
<tr>
<td>Dominica</td>
<td>DOMLEC</td>
<td>754</td>
<td>70,755</td>
<td>93.8</td>
<td>157.8</td>
<td>2,230</td>
</tr>
<tr>
<td>Guadeloupe</td>
<td>EDF</td>
<td>1,700</td>
<td>447,000</td>
<td>262.9</td>
<td>10,250.0</td>
<td>22,931</td>
</tr>
<tr>
<td>St. Maarten, Saba, St. Eustatius</td>
<td>GEBE</td>
<td>68</td>
<td>45,777</td>
<td>699.7</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Grenada</td>
<td>GRENELEC</td>
<td>386</td>
<td>95,000</td>
<td>246.1</td>
<td>440.0</td>
<td>4,632</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>LUCELEC</td>
<td>617</td>
<td>164,791</td>
<td>267.1</td>
<td>867.1</td>
<td>5,262</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>T&amp;TEC</td>
<td>5,128</td>
<td>1,300,000</td>
<td>253.5</td>
<td>19,224.4</td>
<td>14,788</td>
</tr>
<tr>
<td>St. Vincent and the Grenadines</td>
<td>VINLEC</td>
<td>389</td>
<td>117,534</td>
<td>302.1</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Aruba</td>
<td>WEB Aruba</td>
<td>193</td>
<td>103,484</td>
<td>536.2</td>
<td>2,396.0</td>
<td>23,153</td>
</tr>
</tbody>
</table>
Regulation in Splendid Isolation

Case Study: Caribbean Benchmarking Study

The role of external benchmarks

A general management perspective

Benchmarking is an analytical method used to compare the activities of one company (or business unit) with those of comparable companies providing similar products and services. Through a systematic comparison, companies learn from each other, identify potential productivity improvements and thus explore better ways of running their business. Benchmarking techniques also allow estimating the degree of relative efficiency of a company and quantifying productivity improvement targets. For previous comparable studies, see e.g. IPART (1999), in which 219 Australian, New Zealand, England & Wales and US distribution companies participated; Whiteman (1999) in which 7 Australian and international sample of 32 utilities participated, and Filipini (1998) in which 39 Swiss municipal electricity distribution utilities participated.

For electric utilities, the application of key performance indicators and benchmarking techniques, in a structured manner, represents an indispensable tool for any objective-oriented management approach and it is essential for the development of performance enhancing and cost reduction programs. The utilization of key quantitative indicators and benchmarking analysis provides valuable comparative information that if used properly can help utilities gain perspective on their operating performance and design strategies to increase overall performance (Neeley, 1998). In the following figure we illustrate the role of benchmarking in a process we denominated as: Managing with benchmarks.
A regulatory perspective

In utility ratemaking, benchmarking involves comparing one or more utility performance measures to “external” performance standards. An external performance standard is one that exists outside the company itself (Parker, 2001). Examples include the performance of other utilities that are designated to be “peers,” industry average measures, or industry best performance measures. Benchmarking, therefore, leads to direct and explicit comparisons between a company’s performance and one or more performance standard that are established outside of the company itself. The general idea is that the company under scrutiny is expected to operate just as efficiently as the so-called peer companies. Targets for performance improvement are set on the basis of the gap between current and peer performance. This improvement target is sometimes referred to as the efficiency factor or the x-factor.78

Operating conditions

In any benchmarking study of utility performance, it is important to control for operating conditions that are beyond managers’ control. It is widely acknowledged that electric utilities confront operating conditions that are largely beyond their control. For example, unlike firms in competitive industries, utilities have much stronger obligations to provide service to designated customers within a given service territory.

Cost can also be sensitive to the mix of customers served. The assets needed to provide delivery service will differ somewhat for residential, commercial, and industrial customers. Even more importantly, different types of customers have different levels and temporal patterns of demand and energy consumption. These differences can affect the incremental and average costs associated with a given set of utility assets (see Ajodhia, 2005).

---

78 We should note that the x-factor does not only represent efficiency improvement but also other factors such as demand growth, investments, etc. However, efficiency improvement is one of the most important ingredients in determining the x-factor.
In addition to customer characteristics, cost can be sensitive to the physical environment of the service territory. The cost of constructing, operating and maintaining a given network will depend on the terrain over which that network extends. These costs will also be influenced by climate and other naturally related factors. For example, costs will likely be higher in areas with high winds, a propensity for hurricanes or other severe weather that can damage power distribution equipment and disrupt service. The operating costs will also be influenced by the type and density of vegetation in the territory, which will be at least partly correlated with precipitation and other weather variables. To a great extent, these conditions accompany the particular territory that the power distributor is required to serve and are therefore beyond management control.

Another important operating condition is the price(s) paid to acquire the input(s) used in production. Labor prices are usually determined in local markets, while prices for capital goods and materials are often determined in national or even international markets. The level of input prices facing a company are often largely beyond management control and will have a significant impact on cost.

Finally, on a higher level, the exchange rate between the local currency and the US dollar will contribute to the operating cost, as well as the structure of the debt of the utility. Finally, the specific generation technology (especially its dependence on fossil fuels) determines its particular exposure to volatile fuel prices.

In the following sections we will elaborate on the conducted unidimensional benchmark study and the multidimensional benchmark study.

The unidimensional Caribbean benchmark study

**Methodology**

A benchmarking study involves identifying key performance metrics, choosing companies to benchmark, defining and collecting data on performance, analysing the data and identifying opportunities for improvement. The overall goal is to identify, adapt and implement superior practices to improve performance. The methods and results of benchmarking can be integrated as part of a comprehensive Performance Management System (PMS) oriented to achieve corporate objectives. Such a system allows managers to keep control on key company indicators, establish targets, track the evolution in time and evaluate the results of operating changes and efficiency improvement plans. The selection of suitable performance indicators, the implementation and updating of a database to measure operating results and periodic monitoring are all components of a PMS.

Accordingly, the regional benchmarking study was conceived and developed as the initial stage of a Performance Management System that can be implemented by CARILEC to establish regional improvement strategies and by each utility at the company level to fulfill their...
own corporate objectives. The benchmarking study is characterized as a uni-dimensional benchmarking study as it compares performance indicators with each other but does not account for the relationships between different input and output factors.

**Criteria and Activities**

The Caribbean benchmarking study included the selection of key indicators to measure utilities' performance, defining and collecting data on system characteristics and utility operating results, building a regional database, measuring and comparing performance indicators, identifying best practices and analysing the results. Careful attention was given to identify characteristics of utility operations that allowed meaningful comparisons, so utilities could benefit from sharing data with regional peers, identifying desired performance levels and establishing future performance targets.

The study utilized key indicators to measure and compare utility's performance, for that purpose quantitative metrics reflecting key aspects of the organization were selected as performance indicators. The metrics were aimed to assist management in measuring the achievement of utility objectives, and therefore appropriate indicators measuring physical inputs and outputs were utilized in addition to more usual financial ratios used to evaluate corporate results.

There is not a standard set of indicators applicable to all utilities; however, the similarity of the activities related to the provision of electricity services and the specific characteristics of the island systems allowed for the identification of a group of indicators suitable to measure and benchmark the operating performance of Caribbean utilities. The following criteria were used to select the set of performance indicators for the study:

- Indicators used internationally by the electric utility industry.
- Performance metrics tailored to the specific characteristics of island systems.
- Aggregate indicators suitable to be used at executive level for management purposes.
- Indicators considering organizational, economical and technical aspects.
- Indicators covering the different areas of the utility business: generation, transmission-distribution and commercial operations.
- Indicators suitable to be used as part of a Performance Monitoring System.
- Availability and quality of utility data.

We refer to the Box Annex II -1 “Caribbean Benchmark Performance Indicators” for a summary of the performance indicators that were used. In total 32 performance indicators were selected which are categorized as general indicators, generation indicators, transmission and distribution indicators and commercialization indicators.
Phases

Based on the set of performance indicators selected for the study, a list of the information required from the utilities was prepared considering data necessary to calculate the indicators and information about the companies and their electric systems useful to characterise the regional profile and to interpret the results. As main means to gather the information required a standard questionnaire was distributed by CARILEC among the utilities for that purpose. The data received through the questionnaires was ‘debugged’ and validated for consistency and with other sources to the extent possible. Likewise, information from CARILEC and other publicly available from the utilities like annual reports, operations reports, financial statements, investor information, and tariff sheets were consulted. The information collected from the utilities and the other sources was used to build a regional database with the characteristics of the electric systems and the operating results of the utilities.

The regional database was used to measure the performance indicators and contained other information useful for the subsequent analyses. The indicators calculated were then compared and benchmarked regionally. Additionally, comparisons with international figures were carried out for the most relevant indicators in order to gain insight on regional performance in relation with other world regions. Finally, the results of the study identified particular characteristics of the region, specific differences among utilities and strengths, weaknesses and improvement areas for the range of issues covered by the indicators.

At present the CARILEC Benchmarking database contains information collected over the years 2002 till 2006. In the year 2009 the study will be updated for the available data of the years 2007 and 2008.

Findings and recommendations

The uni-dimensional benchmark study has revealed the following main findings:

> The region has a very high coverage of electricity service; The regional average coverage over the years 2002 - 2006 was 96.5%;

> The regional average for energy losses is comparable to other world regions; The regional average energy losses over the years 2002 – 2006 was 11.8%;

> System load factors are similar across the region and comparable to other world regions; The total average system load factor over the years 2002 - 2006 was 69.9% which is relatively high which suggests a high utilization of the generation facilities throughout the region;

> The regional average energy cost is high compared with other world regions; The regional average cost over the years 2002 - 2006 was 185.3 USD$/MWh;

> The regional average energy cost has been increasing during the period 2002-2006 and especially for the last two years (2005-2006) due to the impact of oil crisis on the generation
costs. The regional Average energy cost was 232.5 USD$/MWh for the year 2006;

- Customer service rates are high compared to international figures due to the impact of fuel costs reflected on the generation costs.

During the period of 2002 – 2006:

- The cost for domestic usage of 100 Kwh/Month was on average USD 24.8
- The cost for domestic usage of 400 Kwh/Month was on average USD 99.0
- The cost for commercial usage of 2000 Kwh/Month was on average USD 527
- The cost for commercial usage of 5000 Kwh/Month was on average USD 1,297
- The cost for industrial usage of 10,000 Kwh/Month was on average USD 2,499
- The cost for industrial usage of 100,000 Kwh/Month was on average USD 24,242
- The regional operating profit margin over the years 2002 – 2006 was on average 9%;
- The regional Return on Assets over the years 2002 – 2006 was on average 6.0%;
- The regional generation reserve margin over the years 2002 – 2006 was on average 62.6% indicating that sufficient generation reserves are found in most of the utilities in the region;
- The regional generation availability over the years 2002 – 2006 was on average 81.4% indicating which could be considered relatively high indicating good maintenance practices;
- The regional electricity grid losses over the years 2002 – 2006 was on average 7.6%.

The uni-dimensional benchmark study has revealed the following recommendations:

- Further improvement on the collection of interruption and reliability data;
- Further improvement on the collection of data necessary to calculate energy losses;
- Strive for a uniform application of reliability standards;
- Strive for a uniform definition of power quality standards;
- Further improvement of incorporation of Customer service practices;
- Inclusion of performance measures to measure the environmental impact;
### List of performance indicators

#### GENERAL INDICATORS

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical</strong></td>
<td></td>
</tr>
<tr>
<td>Service Coverage (%)</td>
<td>Population with electricity service</td>
</tr>
<tr>
<td></td>
<td>Total population x 100</td>
</tr>
<tr>
<td></td>
<td>Shows the percentage of users within the area served by the Utility with electricity service.</td>
</tr>
<tr>
<td>System Energy Losses (%)</td>
<td>Net energy entering the system - Total energy sold</td>
</tr>
<tr>
<td></td>
<td>Net energy entering the system x 100</td>
</tr>
<tr>
<td></td>
<td>Shows total system energy losses as a percentage of the net energy entering the system.</td>
</tr>
<tr>
<td></td>
<td>It is a measure of the overall technical efficiency of utility service.</td>
</tr>
<tr>
<td>System Load Factor (%)</td>
<td>Net energy entering the system [MWh]</td>
</tr>
<tr>
<td></td>
<td>Maximum system demand [MW] x 8760 hours</td>
</tr>
<tr>
<td></td>
<td>x 100</td>
</tr>
<tr>
<td></td>
<td>Shows the load factor of the system. It is a measure of utilization of system capacity.</td>
</tr>
<tr>
<td></td>
<td>The maximum system demand is the annual system peak load.</td>
</tr>
<tr>
<td><strong>Economical</strong></td>
<td></td>
</tr>
<tr>
<td>Average Energy Cost ($/MWh)</td>
<td>Total annual costs [$]</td>
</tr>
<tr>
<td></td>
<td>Gross energy entering the system [MWh]</td>
</tr>
<tr>
<td></td>
<td>Shows the average system cost of energy (including losses). It measures cost effectiveness</td>
</tr>
<tr>
<td></td>
<td>of utility service.</td>
</tr>
<tr>
<td>Customer Service Rates ($)</td>
<td>Post service rates charged to end users for specific amounts of consumption.</td>
</tr>
<tr>
<td></td>
<td>It shows how much the service costs to consumers.</td>
</tr>
<tr>
<td><strong>Financial</strong></td>
<td>Net income [$]</td>
</tr>
<tr>
<td>Operational Profit Margin (%)</td>
<td>Operational revenue [$]</td>
</tr>
<tr>
<td></td>
<td>Shows profit margin from operations. It is an indicator of the profitability of utility</td>
</tr>
<tr>
<td></td>
<td>operations.</td>
</tr>
</tbody>
</table>
### GENERAL INDICATORS

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial</strong></td>
<td></td>
</tr>
<tr>
<td>ROA Return on Assets (%)</td>
<td>$\frac{\text{Net income ($)}}{\text{Assets value ($)}} \times 100$</td>
</tr>
<tr>
<td>Debt Level (%)</td>
<td>$\frac{\text{Long term debt ($)}}{\text{Assets value ($)}} \times 100$</td>
</tr>
<tr>
<td>Labor Productivity (man-years/1,000 customers)</td>
<td>$\frac{\text{FTE of staff (man-years)}}{\text{total number of customers served / 1,000}}$</td>
</tr>
<tr>
<td>Incident Rate (# incidents/100 employees)</td>
<td>$\frac{\text{number of work incidents}}{\text{total number of employees / 100}}$</td>
</tr>
</tbody>
</table>

### GENERATION INDICATORS

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical</strong></td>
<td></td>
</tr>
<tr>
<td>Generation Reserves Margin (%)</td>
<td>$\frac{\text{System installed capacity} - \text{System peak load}}{\text{System peak load}}$</td>
</tr>
<tr>
<td>System Equivalent Availability (%) x 100</td>
<td>$\frac{\sum \text{Unit rating (MW) x available hours}}{\text{System installed capacity (MW) x 8760 hours}} \times 100$</td>
</tr>
<tr>
<td>Plant Energy Consumption (%)</td>
<td>$\frac{\text{Gross energy generated} - \text{Net energy generated}}{\text{Gross energy generated}} \times 100$</td>
</tr>
</tbody>
</table>

---

**Case Study: Caribbean Benchmarking Study**
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Utilization Factor (%)</strong></td>
<td>Shows the capacity utilization factor for the system. It measures how much of the generating capacity of the system is actually used.</td>
</tr>
<tr>
<td><strong>Generation Non-Served Energy (%)</strong></td>
<td>Measures energy not supplied due to generation outages. It is an indicator of generation service reliability.</td>
</tr>
<tr>
<td><strong>Fuel Cost ($/MWh)</strong></td>
<td>Average cost of the fuel component per thermal MWh generated. It shows the impact of fuel costs on generation costs.</td>
</tr>
<tr>
<td><strong>Generation Cost ($/MWh)</strong></td>
<td>Average cost per MWh generated including capital costs. It measures cost effectiveness of generation activities.</td>
</tr>
<tr>
<td><strong>Generation Productivity (man-years/10 MW)</strong></td>
<td>Shows staff utilization per 10 MW installed. It is a measure of productivity.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy Grid Losses (%) x 100</strong></td>
<td>Entering energy = energy entering to each voltage level. Delivered energy = net energy delivered at each voltage level. Shows energy losses in the T-D network by voltage level. It is an indicator of the efficiency of the T-D network.</td>
</tr>
<tr>
<td>Indicator</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>T-D Non-Served Energy (%) x 1000</strong></td>
<td>Measures energy not delivered due to T-D interruptions. It is an indicator of T-D service reliability.</td>
</tr>
<tr>
<td><strong>SAIFI</strong> System Average Interruption Frequency Index</td>
<td>Reliability index representing how often the customers experience sustained interruptions in average. Sustained interruptions are those longer than five minutes.</td>
</tr>
<tr>
<td><strong>SAIDI</strong> System Average Interruption Duration Index (hours)</td>
<td>Reliability index representing the average duration of service sustained interruptions for customers. Sustained interruptions are those longer than five minutes.</td>
</tr>
<tr>
<td><strong>Average Restoration Time (minutes)</strong></td>
<td>Reliability index representing the average time required to restore service after an interruption.</td>
</tr>
<tr>
<td><strong>Voltage and Frequency Deviations (#)</strong></td>
<td>Number of annual voltage and frequency deviations from the standard operating range of variation. They are measures of power quality.</td>
</tr>
<tr>
<td><strong>Transmission-Distribution Cost ($/MWh)</strong></td>
<td>Average T-D cost per MWh delivered. It is a measure of cost effectiveness of T-D operations.</td>
</tr>
<tr>
<td><strong>Transmission-Distribution Productivity (man-years/10,000 MWh)</strong></td>
<td>Shows T-D staff utilization per 10,000 MWh delivered. It is a measure of productivity.</td>
</tr>
</tbody>
</table>
### COMMERCIALIZATION INDICATORS

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Non-Technical Losses (%) | \[
\text{Available energy} - \frac{\text{Energy sold}}{\text{Available energy}} \times 100
\] Shows energy losses due to non-registered consumptions (non-technical losses). It measures electricity delivered for which the utility is not paid. |
| Customers w/o Meter (%) | \[
\frac{\text{Number of customers without meter}}{\text{Total number of customers served}} \times 100
\] Shows the percentage of customers served whose consumption is not metered. It is an indicator of service efficacy. |
| Number of Complaints (#/1,000 customers) | \[
\frac{\text{Number of complaints}}{\text{Total number of customers served}} \times 1,000
\] Shows the number of complaints received per 1,000 customers served. It is an indicator of customer service quality. |
| **Economical** | | |
| Commercialization Cost ($/customer) | \[
\frac{\text{Total commercialization costs ($)}}{\text{Total number of customers served}}
\] Average commercialization cost per customer served. It is a measure of cost effectiveness of commercial activities. |
| Bad Debt (%) | \[
\frac{\text{Bad debt ($)}}{\text{Operational revenues ($)}} \times 100
\] Measures receivables deemed uncollectible. It considers bills unpaid after 180 days. |
| **Organizational** | | |
| Commercialization Productivity (man-years/1,000 customers) | \[
\frac{\text{FTE of commercial staff (man - years)}}{\text{Total number of customers served}} \times 1,000
\] Shows commercial staff utilization per 1,000 customers served. It is a measure of productivity. |
The multi-dimensional Caribbean benchmark study

Multi-dimensional benchmarking studies control for the impact of operating conditions if comparisons across utilities are to be meaningful. Different benchmarking techniques use different approaches for controlling for operating conditions. We refer to Chapter 3 paragraphs 3.4 where we give an overview of the several benchmarking techniques.

Data Envelope Analysis (DEA) is considered by many regulators throughout the world to lead to appropriate benchmarking inferences and is one of the most popular benchmarking approaches in utility regulation.79 DEA is a non-parametric mathematical programming approach to productivity frontier estimation (Zhu, 2003). The general idea of DEA is to measure a firm’s productivity performance by observing its distance to the productivity frontier which is constructed on the basis of the best performing firms (peers) in the given data sample. This is done on the basis of a linear programming formulation.

The basic idea of DEA, as proposed by Charnes et al. (1978) is to solve the efficiency score for each firm based on a linear program. This is done as follows. Consider a data sample consisting of N firms with each K input and M output factors. The vector $x_j$ represents the inputs used by firm $j$ to produce a set of outputs $y_j$. Suppose now that $u$ is an $M \times 1$ vector of output weights and $v$ a $K \times 1$ vector of input weights. In that case, the general measure of efficiency is provided by:

$$\frac{u^Ty_j}{v^Tx_j}$$

That is, efficiency is defined as the weighted ratio of outputs over inputs. By definition, efficiency is a scalar between zero and one, which denotes no and full efficiency respectively. The efficiency for firm $j$ can now be calculated by finding appropriate values for $u$ and $v$. This requires maximization of all efficiency ratios under the constraint that these are equal or less than one. This can be formulated as the following optimization problem:

$$\max_{u,v} \frac{u^Ty_j}{v^Tx_j}$$

subject to

$$\frac{u^Ty_j}{v^Tx_j} \leq 0, \ k = 1...N$$

$$u,v \geq 0$$

Solving this problem, however, yields an infinite number of solutions. This can be overcome by adding an additional constraint:

79 See for example Jamasb and Pollit (2000).
Using duality in linear programming, this can then be written down in the common form for the DEA problem:

\[
\begin{align*}
\text{max}_{u, v} & \quad u^T y_j \\
\text{subject to} & \quad v^T x_j = 1 \\
& \quad u^T y_j - v^T x_j \leq 0, \ k = 1\ldots N \\
& \quad u, v \geq 0
\end{align*}
\]  

(3)

\[
\begin{align*}
\text{min}_{\theta, \lambda} & \quad \theta \\
\text{subject to} & \quad -y_j + Y \cdot \lambda \geq 0 \\
& \quad \theta \cdot x_j - X \cdot \lambda \geq 0 \\
& \quad \lambda \geq 0
\end{align*}
\]  

(4)

The matrices X and Y represent respectively the input and output data space that consist of the individual input and output vectors \(x_j\) and \(y_j\) for all \(N\) firms. The optimization problem needs to be run for each firm and results in its efficiency score \(\theta\).

An intuitive interpretation of the DEA formulation is that of measuring the distance to a multi-dimensional productivity frontier. This frontier is constructed by enveloping all efficient input and output combinations. The efficiency measure is then obtained by measuring the distance between the firm’s actual performance against that of its projection (shadow) on the frontier.

### Caribbean Bundled Power Benchmarking

**Input-Output Selection**

Efficiency evaluation, as quantified in terms of the efficiency score for each company, is dependent on input and output selection. The variables for analysis could be assets, such as distribution lines and distribution line transformers; expenses such as operation and maintenance and capital addition expenses; performance indicators, such as losses, and frequency and duration of interruptions (being a measure for quality); or sales and capacity indicators, such as number of customers, total energy sales, and system peak. Generally, ratios should be avoided since they might result in incorrect interpretation of efficiency (Cooper et al., 2000). Inclusion of too many variables creates the problem that the discriminative power of the DEA is reduced. Therefore, only the most significant variables must be included. Furthermore, as a general guideline the variables for which it is desirable to have a lower value should be considered as inputs and those variables for which it is desirable to have a higher value should be considered as outputs.
The input output selection of the available Caribbean sample did not include monetary measures as it was difficult to obtain a normalized set of monetary measures and also the variety of currencies that exist among the different Caribbean countries. Converting all these currencies to a common and comparable unit is likely to be problematic.

**Output variables**

Economic theory suggests that quantities of work performed by utilities should be included in the DEA model as output variables (Zhu, 2003). Some of the output variables that are often used in DEA models for power services are the number of retail customers, the total electricity delivered (in MWh), and peak demand (in MW) which should be supplied.

In a DEA analysis, it is further necessary to classify the extensiveness of the delivery system (e.g. the total km transmission and distribution (T&D) lines in power, as either an input or an output. Arguments can be made for either treatment. For example, the length of T&D lines will clearly be correlated with the number of wires and poles which is used, in the model, as an input for delivering power to customers. On the other hand, electricity supply differs from nearly all other goods and services in that the firm supplying the product must deliver the product directly into the premises (home or business) of the end users. There is accordingly a transportation element in the ‘output’ (i.e. a power delivery output) provided by the electric utilities. This transportation output clearly depends on the spatial distribution of the utilities’ customers, which varies considerably among companies. A practical way of measuring the transportation output provided by utilities is through the total length of T&D lines, since these lines measure the transportation “path” between supply sources and end-use consumption.

The authors believe it is more sensible to consider the length of T&D lines as an output rather than an input in DEA models. For completeness, however, we have considered some models where T&D miles are classified as inputs as well as models where they are classified as outputs.

The specific choices for the model output variables also depend on the availability of data sources. In our DEA, these differed depending on the specific DEA application. For the present study, the outputs in the specific DEA studies are:

- Total generation (GWh);
- Total consumption (GWh);
- Population with an electricity connection;
- Total Customers;
- Total length of T&D lines (km);

**Input variables**

As the present benchmark considers utilities responsible for both generation, transmission and distribution, each aspect should be covered in the DEA. As with the output variables our choices for input
variables differed depending on the data availability. The following input variables were selected:

- Installed generation capacity (MW);
- Total transformer capacity (MVA);
- Total length of T&D lines (km), and
- Number of employees.

The total installed generation capacity (in MW) seems to be an appropriate variable since it is a comprehensive measure of the capital input used in the power generation services. Furthermore, two other measures of the capital intensity were used, which are the length of lines (representing the total extent of the power delivery system) and the total transformer capacity. This latter capacity also includes step-up transformers that increase voltage from generation voltage levels to the levels used for power transmission over long distances through high-voltage lines, as well as step-down transformers that decrease voltage to the levels at which power is distributed to end-users. Finally, the total number of utility employees measures the non-capital inputs that are used to provide bundled power services.

**Results**

The results of the Caribbean bundled power benchmarking are reported in table 2. In this table, “CRS” refers to DEA models that assumed constant return to scale. “VRS” refers to models that allowed variable returns to scale. For each of the 12 models, the choices for input and output are identified. Furthermore, DEA results per utility are presented, with reference to a specific DEA model. Also, average DEA scores per utility of the VRS models and the CRS models are presented and a weighted average DEA score of both the CRS and VRS models is presented. Finally per CRS and VRS model a DEA average score of all the participating utilities is presented and a weighted average DEA score of both the CRS and VRS models for all participating utilities is presented. We refer to Table Annex II-1 “DEA-Scores Caribbean Bundled Power benchmarking”. For confidentiality reasons the names of the utilities are not mentioned in the tables.

Results will be further discussed by focusing on the efficiency of Utility 1. In the present study, 12 different DEA models were investigated. The DEA score of Utility 1 range from 0.92 to 1.0. The Company registers frontier performance levels on three of the six CRS models and on four of the six VRS models. When scores on all DEA models are averaged, the Company’s average score is 0.971. This indicates that Utility 1 efficiency in the provision of bundled power services is approximately 2.9% below the best levels exhibited by frontier Caribbean electric utilities. However the Company’s average score is approximately 5.4 percentage points better than the overall average Caribbean DEA score (91.3%).
Utility 1 exhibits frontier performance levels if output is measured by GWh generated and customers served instead of with the alternative proxies, GWh consumed and total population with electricity respectively. The biggest difference between these two series is that GWh generated does not consider lines losses that occur during the transmission and distribution of power, while GWh consumed does. In that sense GWh consumed is a better measure of the output that is actually provided to customers. On the other hand customers served is a more direct measure of output than the total population with electricity and is therefore a superior output measure.

Our results also show that it does not seem to matter whether total length of lines is classified as an input or an output. For example, in comparing models A2 and A6, in the former case km of line is an input whereas in the latter it serves as an output. Utility 1’s DEA score is 1.0 in both cases (which may be compared to the scores of A3 and A4). Both of these models include the same list of inputs, but in A3 the km of line is considered as an output while in A4 it is not. Utility 1’s DEA scores are 0.92 in both A3 and A4. These results imply that, relative to other Caribbean utilities, Utility 1’s measured efficiency does not depend greatly on the extensiveness of its power delivery system. Rather, the DEA scores seem to be more sensitive to how the GWh generated and the customer numbers are specified.

### Table Annex II-1: DEA Scores Caribbean bundled Power Benchmarking

<table>
<thead>
<tr>
<th>DEA scores of the benchmark study</th>
<th>Constant return to scales (CRS)</th>
<th>Variable return to scales (VRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A1</td>
<td>A2</td>
</tr>
<tr>
<td>Gwh consumed</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Population with electricity</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Gwh generated</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Customers</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Total Km line</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Installed generation capacity</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>MVA transformer capacity</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Total Km line</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Number of employees</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

**Inputs**

<table>
<thead>
<tr>
<th>CRS average</th>
<th>VRS average</th>
<th>Overall average</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.909</td>
<td>0.926</td>
<td>0.913</td>
</tr>
</tbody>
</table>

**Caribbean average**

It can also be seen that, in any given model, the scores are nearly identical for the VRS and CRS model specifications. For example, models A3 and B3 use the identical list of outputs and inputs and differ only in that model A3 assumes constant returns to scale and model B3 allows variable returns to scale. The DEA score for A3 is 0.92 and the DEA score for B3 is 0.922. These comparisons show that the assumption of constant returns to scale does not significantly ‘penalize’ Utility 1 relative to its Caribbean peers. At the same time, it should be noted that in every model specification, Utility 1’s DEA scores rises somewhat when variable returns to scale are allowed. Together, these results indicate that the scale of Utility 1 bundled power operations are close to, but somewhat below, the minimum efficient scale, so that the Company still has some potential to realize economies of scale as output expands.

Overall, our results show that in the provision of bundled power services, Utility 1 exhibits efficiency levels that are very close, if not equal to, the frontier levels displayed by the Caribbean industry. The results also indicate that the efficiency levels of at least half a dozen CARILEC members are substantially below the frontier efficiency levels in the Caribbean.

Sensitivity-based classification and gap report

In some situations a very low value of an input or a very large value of an output of a utility may mask its true efficiency and make it look efficient. Sensitivity analysis allows the analyst to perform “what-if” scenarios on the DEA model.

One approach to sensitivity analysis is based on removal of one or more decision making units from analysis and then comparing the DEA efficiencies. The second approach is based on removal of one or more variables from the model to determine changes in DEA efficiencies. Note that sensitivity is defined as the effect on DEA efficiency upon inclusion or exclusion of one or more variables from the model and not with respect to parametric variation of input or output variables. This type of sensitivity to model structure should not be confused with sensitivity to data that are used in the model. In the Caribbean bundled benchmark study one or more inputs and outputs are removed from the base model to construct a new DEA model. Comparisons of DEA efficiencies from the base model with the structurally perturbed models show the impact on efficiency.

Based on the ideas of Norman and Stoker (2000) five distinctive patterns could be obtained from the sensitivity analysis:

1. Robustly efficient: The DEA efficiency stays at one or decreases very slightly when variables are removed one at a time;
2. Marginally efficient: The DEA efficiency is 1 but drops significantly in some cases upon removal of variables.
3. Marginally inefficient: The DEA is below 1 but stays above 0.9 and stays in the range during the sensitivity analysis.
4. Significantly inefficient: The DEA efficiency is below 1 but above
0.9 and drops to much lower values during sensitivity analysis.

5. **Distinctly inefficient**: The DEA efficiency is significantly low in all conditions.

Finally a gap report summarizing the result of analysis can be prepared per utility. An example is shown in Table 4. These reports are useful since they provide targets to the utilities for performance improvements.

### Performance Gap Report for Utility A

<table>
<thead>
<tr>
<th>Utility Name</th>
<th>Utility A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year of Analysis</td>
<td>2003</td>
</tr>
<tr>
<td>Classification</td>
<td>Marginally inefficient</td>
</tr>
<tr>
<td>DEA Efficiency</td>
<td>0.85 – 0.90</td>
</tr>
<tr>
<td>Major Gaps</td>
<td>Capital additions expenses, O&amp;M expenses, and distribution Line transformers</td>
</tr>
<tr>
<td>Minor Gaps</td>
<td>None</td>
</tr>
<tr>
<td>Strengths</td>
<td>System peak Load</td>
</tr>
</tbody>
</table>

**Reflection on the Caribbean benchmark study**

There are at least six audiences for benchmarking studies: benchmarking specialists, the press, the general public, the regulator, policymakers (elected representatives and appointed officials), and utility managers. Although each group has different needs, all may use the relative and absolute rankings as catalysts for better stewardship of the resources.

Relative rankings allow the different audiences to compare the performance of utilities in comparable situations. Here the key problem is how to select firms that are truly similar to one another. Alternatively stated, it should be safeguarded that the rankings indeed reflect the different conditions each utility faces. Ideally, relative ranking should reflect the utility’s decisions rather than the unique characteristics of service territories beyond the utility’s control, including topography, population density, etc. In addition, the history of the system matters: current utilities more or less ‘inherited’ systems that reflect a set of political, economic, regulatory and social decisions (with positive and negative impacts) made by others in the past. Thus, already realized performance improvements over time also need to be taken into consideration. In addition, absolute comparisons are necessary, since the relatively weakest performer in one group might have a much better absolute performance than the best firms in another group of comparable firms (for instance, those in another country at a similar stage of development). Comparisons are only valid as long as the results indeed tell us whether particular firms are performing below potential. At issue is here how to define “potential performance”.

When used properly, performance measurement and benchmarking encourage enterprises to become “learning organizations”. This
Regulation in Splendid Isolation is a term coined by Senge (1990) to describe organizations which have been successful in getting their employees to think and work as teams, adapt readily to change and take a system-wide view in problem-solving. By recognizing that every enterprise can learn something about another’s operations and highlighting the need to continually be improving performance to remain in front, benchmarking encourages a culture which emphasizes the need to learn and have an open mind. Identifying major gaps in performance levels may therefore force an organization to fundamentally rethink its way of how it does things.

Moreover, we need to recognize that no single performance measure or technique is ‘complete’ in the sense that it can provide the entire answer. All quantitative analysis involves significant assumptions and limitations. Consequently, one should not rely on one single tool solely but use several instruments, both quantitative and qualitative, to make an overall judgment of how a particular enterprise is performing and what needs to be done. Techniques should be complemented by “sanity check” in order to be sure that empirical results make sense. (Ahmad and Rafiq, 1998)

Finally, it has been observed within the context of the Caribbean bundled power benchmarking that electric utilities are often faced with a dearth of key data. This often leads to resistances in applying new approaches as the data is of insufficient quality. Nevertheless, a useful start can usually be made on performance measurement with data that is currently available – waiting for the perfect data is a recipe for indefinite inaction and the use of available data itself a catalyst for the development of better quality data (Berg, 2003). The appropriate management response in this situation is best characterized by saying “never underestimate the symbolic importance of actually doing something”.

Conclusions of the Caribbean Benchmark Study

Recent regulatory reforms have tended to move away from traditional rate-of-return regulation towards incentive based regulation models (Jasmab and Pollit, 2002). A number of regulators have adopted price and revenue cap regulation based on the rpi–x formula. A central issue is how the efficiency requirements or X-factors are to be set. A widely favored approach is through benchmarking of utilities based on their relative efficiency. Countries such as The Netherlands, United Kingdom, and Norway have adopted benchmarking as part of the process of setting the X-factors. Benchmarking identifies the most efficient firms in the sector and measures the relative performance of the less efficient firms against these. Individual X-factors are then assigned to utilities based on their relative inefficiency. Generally, the more inefficient a utility is, the higher is the X-factor assigned to that firm. The aim is to provide the firms with an incentive to close their efficiency gap with the frontier.

In the context of the Caribbean SIDS we observe that setting the X-factor is likely to be very problematic and the negotiating process is open to regulatory capture. To begin with the regulatory offices are likely to lack reliable historic data on a company’s cost to forecast future cost...
movements. They may lack skilled economists and auditing staff to challenge the firms operating and capital cost to identify efficiency trends. Moreover, operating environments often differ substantially, thereby undermining the credibility of international cross-sectional studies at the sector level. This leads us to conclude that incentive based approaches adopted in many countries do not necessarily work in the context of Caribbean SIDS, so that different regulatory models needs to be developed.

In this case study the applicability of benchmarking from a general management perspective and from a regulatory perspective has been discussed. The results of a comparative performance analysis of 15 Caribbean utilities based on DEA have been presented. The input/output variables used for the specific DEA model used in this study were discussed and the possibilities for sensitivity analysis resulting in efficiency categories were illustrated.

The analysis however, was performed based on data of one year. Analysis based on multi-year data can provide trends in efficiency and will identify the development of the utilities’ performance. Cost data was not used in this analysis due to lack of availability. Also, inclusion of reliability data representing frequency of interruptions and duration of interruption in the analysis would provide a more holistic indication of efficiency.

We believe that benchmarking for Caribbean utilities is a valuable instrument from both a management perspective and a regulatory perspective. It provides a comprehensive measurement framework with consistency in definitions across companies based upon which best practices could be exchanged. It may also yield a complete picture of service level and cost may avoid ad hoc approaches and/or procrastination.

However, we would recommend to be very cautious on using benchmarking as the only tool in the rate setting procedure particularly in the case of Caribbean utilities. As the benchmarking study has shown, the outcome of the analysis are heavily dependent on the choice of model as well as the presence of structural differences across the sample of Caribbean utilities. When setting up a regulatory system, the limitations of benchmarking in terms of model definition as well as data quality need to be taken into account. Benchmarking can be a powerful tool in both the hands of the utility manager as the regulator provided that it is used wisely, its limitations are being acknowledged and its results are interpreted correctly.
Annex III.

Case Study: Measuring Governance
Introduction

The objective of this case study is to measure country governance and corporate governance of the selected Caribbean SIDS and utilities. We herewith deploy the country governance and the corporate governance dimensions of the framework to promote effective and efficient industry performance. In chapter 5 we have extensively elaborated on the several definitions of governance, governance dimensions and modes of governance. Closer analysis of these definitions highlights three important issues implicit in the governance process:

> The notion that there must be an agent of governance;
> The implication that there are defined ‘rules’ and accepted norms by which governance ought to be conducted and gauged. It implies mechanisms for accountability, transparency, predictability, and participation – the so-called ‘pillars of good governance’;
> The implication, that governance is concerned directly with sound development management;

Furthermore we have elaborated on the several dimensions of governance such as country governance, regulatory governance and corporate governance. Within the framework to promote effective and efficient industry performance for SIMS we have concluded that juxtaposing the maturity level of country governance and corporate governance gives as a result a suggested to be adopted regulatory mechanism with associated regulatory governance. Determining the maturity level of country governance and corporate governance is therefore of most importance in the deployment of the framework. This leads to the necessity of measuring governance. This case study elaborates on how country governance measurement has been obtained for the Caribbean SIDS and how corporate governance measurement has been conducted for the selected Caribbean Utilities. The case study comprises together with this introductory section two subsequent sections:

> Measuring Country Governance / Institutional quality
> Measuring Corporate Governance.

Measuring country governance/institutional quality

The objective of measuring country governance within the context of the framework to promote effective and efficient industry performance for SIMS is to get insight in a country’s institutional quality as a prerequisite to adopt certain regulatory mechanisms. To this end the Worldwide Governance Indicators (WGI) research project of Kaufmann, Kraay and Mastruzzi, covering 212 countries and territories and measuring six dimensions of governance between 1996 and 2006 provide the required governance scores and insight.

The WGI could be seen as measuring governance using a framework that distinguishes between indicators that measure formal rules and indicators that measure the practical application or outcomes of these rules. The analysis calls attention to the strengths and weaknesses of both types of indicators as well as the complementarities between
them. It distinguishes between the views of experts and the results of surveys and assesses the merits of aggregate against individual governance indicators. For a detailed discussion on the methodology and data sources of the WGI we refer to Kaufmann, Kraay, and Mastruzzi (2004), (2006) and (2008).

The six dimensions of governance that are measured are summarized in box Annex III-1.

For the purpose of the framework to promote effective and efficient industry performance for SIMS we propose in line with Levy and Spiller to focus on the country’s legislative and executive institutions and the country’s judicial institutions as the key determinants for the institutional endowments of a country. These coincide with the Government effectiveness (GE), Regulatory Quality (RA) and Rule of Law (RL) performance indicators of the WGI. The following matrix shows the relationship between the institutional endowments of the framework and the associated classification of scores.

In the following box we illustrate the country governance measures related to the framework classification of institutional quality.

In Figure Annex III-1 the institutional quality perspective of the framework for SIMS to promote effective and efficient industry performance is presented.

---

**Box Annex III-1:** Six Dimensions of the World Governance Indicators

*Source: Kaufmann et al (2004/2006)*

1. **Voice and Accountability (VA)** – measuring the extent to which a country’s citizens are able to participate in selecting their governments, as well as freedom of expression, freedom of association, and a free media.
2. **Political Stability and Absence of Violence (PV)** – measuring perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism.
3. **Government Effectiveness (GE)** – measuring the quality of public services, the quality of civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies.
4. **Regulatory Quality (RQ)** – measuring the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
5. **Rule of Law (RL)** – measuring the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence.
6. **Control of Corruption (CC)** – measuring the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as “capture” of the state by elites and private interest.

---

**Box Annex III-2:** Framework Classification of Institutional Quality related to Country Governance Measures

<table>
<thead>
<tr>
<th>Framework Classification of Institutional Quality</th>
<th>Kauffmann Country Governance Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Weak</td>
<td>• Below the 25th percentile</td>
</tr>
<tr>
<td>• Intermediate</td>
<td>• Between 25th – 75th percentile</td>
</tr>
<tr>
<td>• Strong</td>
<td>• Above 75th percentile</td>
</tr>
</tbody>
</table>

---

*Case Study: Measuring Governance*
We have used the latest update of the Worldwide Country Governance indicators research project (Kaufman et al, 2007). We have used the most recent scores being the 2006 scores for deployment purposes of the framework in the case of the selected Caribbean SIDS. This led to the following result in the table below:

<table>
<thead>
<tr>
<th>Country</th>
<th>Criteria</th>
<th>Score</th>
<th>Average</th>
<th>Framework classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td>Government Effectiveness</td>
<td>1.57</td>
<td>1.33</td>
<td>1.68</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aruba</td>
<td>Government Effectiveness</td>
<td>1.29</td>
<td>0.84</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bahamas</td>
<td>Government Effectiveness</td>
<td>1.15</td>
<td>1.08</td>
<td>1.22</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belize</td>
<td>Government Effectiveness</td>
<td>-0.18</td>
<td>-0.19</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bermuda</td>
<td>Government Effectiveness</td>
<td>1.02</td>
<td>1.13</td>
<td>1.28</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barbados</td>
<td>Government Effectiveness</td>
<td>1.21</td>
<td>0.89</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>Government Effectiveness</td>
<td>1.29</td>
<td>1.33</td>
<td>1.15</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dominica</td>
<td>Government Effectiveness</td>
<td>0.77</td>
<td>0.90</td>
<td>0.66</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grenada</td>
<td>Government Effectiveness</td>
<td>0.17</td>
<td>0.04</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jamaica</td>
<td>Government Effectiveness</td>
<td>0.13</td>
<td>0.25</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands Antilles (Curaçao, Bonaire, St. Maarten)</td>
<td>Government Effectiveness</td>
<td>0.75</td>
<td>0.84</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Kitts and Nevis</td>
<td>Government Effectiveness</td>
<td>0.84</td>
<td>1.00</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Lucia</td>
<td>Government Effectiveness</td>
<td>1.00</td>
<td>0.88</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For reference purposes we present the scores of all six governance dimensions in the period of 2000-2006, for the selected Caribbean SIDS of which their utilities are members of Carilec. For a further review of the governance scores including sources and weights used and standard error, we refer to Kaufmann, D. A. Kraay and M. Mastruzzi (2007) “Governance Matters VI”: Aggregate and Individual Governance Indicators 1996-2006, WPS4280, the World Bank.

<table>
<thead>
<tr>
<th>Country</th>
<th>Criteria</th>
<th>Score</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Vincent and the Grenadines</td>
<td>Government Effectiveness</td>
<td>0.92</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>Government Effectiveness</td>
<td>0.23</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>-0.26</td>
<td></td>
</tr>
<tr>
<td>Reference countries</td>
<td>Framework classification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Netherlands</td>
<td>Government Effectiveness</td>
<td>1.86</td>
<td>1.75</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>1.45</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>1.75</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Government Effectiveness</td>
<td>1.83</td>
<td>1.75</td>
</tr>
<tr>
<td></td>
<td>Regulatory Quality</td>
<td>1.76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rule of law</td>
<td>1.73</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Criteria</th>
<th>Score</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGUILLA</td>
<td>AIA</td>
<td>1.08</td>
<td>0.89</td>
</tr>
<tr>
<td>ARUBA</td>
<td>ABW</td>
<td>1.08</td>
<td>1.13</td>
</tr>
<tr>
<td>BAHAMAS</td>
<td>BHS</td>
<td>1.02</td>
<td>0.97</td>
</tr>
<tr>
<td>BARBADOS</td>
<td>BRB</td>
<td>1.12</td>
<td>1.04</td>
</tr>
<tr>
<td>BELIZE</td>
<td>BLZ</td>
<td>0.57</td>
<td>0.71</td>
</tr>
<tr>
<td>BERMUDA</td>
<td>BMU</td>
<td>1.08</td>
<td>1.13</td>
</tr>
<tr>
<td>CAYMAN ISLANDS</td>
<td>CYM</td>
<td>0.84</td>
<td>0.89</td>
</tr>
<tr>
<td>DOMINICA</td>
<td>DMA</td>
<td>0.97</td>
<td>0.95</td>
</tr>
<tr>
<td>GRENEADA</td>
<td>GRD</td>
<td>0.67</td>
<td>0.57</td>
</tr>
<tr>
<td>JAMAICA</td>
<td>JAM</td>
<td>0.51</td>
<td>0.44</td>
</tr>
<tr>
<td>NETHERLANDS ANTILLES</td>
<td>ANT</td>
<td>0.61</td>
<td>0.65</td>
</tr>
<tr>
<td>ST. KITTS AND NEVIS</td>
<td>KNA</td>
<td>1.13</td>
<td>1.11</td>
</tr>
<tr>
<td>ST. LUCIA</td>
<td>LCA</td>
<td>1.22</td>
<td>1.18</td>
</tr>
<tr>
<td>ST. VINCENT AND THE GRENADES</td>
<td>VCT</td>
<td>1.04</td>
<td>1.06</td>
</tr>
<tr>
<td>TRINIDAD AND TOBAGO</td>
<td>TTO</td>
<td>0.47</td>
<td>0.59</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>NLD</td>
<td>1.67</td>
<td>1.70</td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>GBR</td>
<td>1.42</td>
<td>1.49</td>
</tr>
</tbody>
</table>
### Governance Indicator: Political Stability

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td>AIA</td>
<td>1.17</td>
<td>1.27</td>
<td>0.79</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Aruba</td>
<td>ABW</td>
<td>1.36</td>
<td>1.44</td>
<td>0.99</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Bahamas</td>
<td>BHS</td>
<td>0.94</td>
<td>0.94</td>
<td>0.94</td>
<td>0.80</td>
<td>0.86</td>
<td>1.10</td>
</tr>
<tr>
<td>Barbados</td>
<td>BRB</td>
<td>1.10</td>
<td>1.22</td>
<td>1.24</td>
<td>1.04</td>
<td>1.02</td>
<td>0.99</td>
</tr>
<tr>
<td>Belize</td>
<td>BLZ</td>
<td>0.09</td>
<td>0.27</td>
<td>0.78</td>
<td>0.69</td>
<td>0.32</td>
<td>0.29</td>
</tr>
<tr>
<td>Bermuda</td>
<td>BMU</td>
<td>0.81</td>
<td>0.83</td>
<td>0.89</td>
<td>0.80</td>
<td>0.71</td>
<td>0.67</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>CYM</td>
<td>1.17</td>
<td>1.27</td>
<td>1.36</td>
<td>0.80</td>
<td>0.71</td>
<td>0.67</td>
</tr>
<tr>
<td>Dominica</td>
<td>DMA</td>
<td>0.78</td>
<td>0.87</td>
<td>1.08</td>
<td>0.66</td>
<td>0.46</td>
<td>0.43</td>
</tr>
<tr>
<td>Grenada</td>
<td>GRD</td>
<td>0.48</td>
<td>0.46</td>
<td>0.93</td>
<td>0.94</td>
<td>0.85</td>
<td>0.83</td>
</tr>
<tr>
<td>Jamaica</td>
<td>JAM</td>
<td>-0.28</td>
<td>-0.31</td>
<td>-0.25</td>
<td>-0.49</td>
<td>-0.44</td>
<td>-0.09</td>
</tr>
<tr>
<td>Netherlands Antilles</td>
<td>ANT</td>
<td>1.17</td>
<td>0.95</td>
<td>0.69</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>St. Kitts and Nevis</td>
<td>KNA</td>
<td>1.28</td>
<td>1.36</td>
<td>1.47</td>
<td>1.23</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>LCA</td>
<td>0.98</td>
<td>1.04</td>
<td>1.27</td>
<td>1.23</td>
<td>0.29</td>
<td>1.08</td>
</tr>
<tr>
<td>St. Vincent and The Grenadines</td>
<td>VCT</td>
<td>1.11</td>
<td>1.25</td>
<td>1.22</td>
<td>0.94</td>
<td>0.29</td>
<td>1.06</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>TTO</td>
<td>-0.15</td>
<td>-0.10</td>
<td>-0.03</td>
<td>-0.16</td>
<td>-0.16</td>
<td>0.06</td>
</tr>
<tr>
<td>Netherlands</td>
<td>NLD</td>
<td>0.77</td>
<td>0.85</td>
<td>0.95</td>
<td>1.13</td>
<td>1.23</td>
<td>1.39</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>GBR</td>
<td>0.46</td>
<td>0.33</td>
<td>0.40</td>
<td>0.57</td>
<td>0.74</td>
<td>1.02</td>
</tr>
</tbody>
</table>

### Governance Indicator: Government Effectiveness

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td>AIA</td>
<td>1.57</td>
<td>1.57</td>
<td>0.97</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Aruba</td>
<td>ABW</td>
<td>1.29</td>
<td>1.30</td>
<td>1.19</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Bahamas</td>
<td>BHS</td>
<td>1.15</td>
<td>1.28</td>
<td>1.13</td>
<td>1.24</td>
<td>1.29</td>
<td>1.34</td>
</tr>
<tr>
<td>Barbados</td>
<td>BRB</td>
<td>1.21</td>
<td>1.18</td>
<td>1.05</td>
<td>1.24</td>
<td>1.35</td>
<td>1.45</td>
</tr>
<tr>
<td>Belize</td>
<td>BLZ</td>
<td>-0.18</td>
<td>0.09</td>
<td>0.07</td>
<td>0.09</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>Bermuda</td>
<td>BMU</td>
<td>1.02</td>
<td>1.02</td>
<td>1.07</td>
<td>1.07</td>
<td>1.13</td>
<td>1.18</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>CYM</td>
<td>1.29</td>
<td>1.30</td>
<td>1.17</td>
<td>1.33</td>
<td>1.97</td>
<td>1.99</td>
</tr>
<tr>
<td>Dominica</td>
<td>DMA</td>
<td>0.77</td>
<td>0.54</td>
<td>0.36</td>
<td>0.24</td>
<td>0.29</td>
<td>0.39</td>
</tr>
<tr>
<td>Grenada</td>
<td>GRD</td>
<td>0.17</td>
<td>0.24</td>
<td>0.11</td>
<td>0.21</td>
<td>0.41</td>
<td>0.44</td>
</tr>
<tr>
<td>Jamaica</td>
<td>JAM</td>
<td>0.13</td>
<td>-0.12</td>
<td>0.12</td>
<td>0.01</td>
<td>-0.06</td>
<td>0.03</td>
</tr>
<tr>
<td>Netherlands Antilles</td>
<td>ANT</td>
<td>0.75</td>
<td>1.02</td>
<td>1.10</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>St. Kitts and Nevis</td>
<td>KNA</td>
<td>0.84</td>
<td>0.96</td>
<td>-0.08</td>
<td>-0.45</td>
<td>-0.27</td>
<td>0.04</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>LCA</td>
<td>1.00</td>
<td>1.07</td>
<td>0.21</td>
<td>0.12</td>
<td>0.01</td>
<td>0.13</td>
</tr>
<tr>
<td>St. Vincent and The Grenadines</td>
<td>VCT</td>
<td>0.92</td>
<td>1.02</td>
<td>0.26</td>
<td>-0.17</td>
<td>-0.20</td>
<td>-0.04</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>TTO</td>
<td>0.23</td>
<td>0.28</td>
<td>0.47</td>
<td>0.50</td>
<td>0.35</td>
<td>0.47</td>
</tr>
<tr>
<td>Netherlands</td>
<td>NLD</td>
<td>1.86</td>
<td>1.96</td>
<td>2.09</td>
<td>2.06</td>
<td>2.11</td>
<td>2.09</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>GBR</td>
<td>1.83</td>
<td>1.71</td>
<td>1.92</td>
<td>1.94</td>
<td>1.97</td>
<td>1.90</td>
</tr>
</tbody>
</table>
### GOVERNANCE INDICATOR: REGULATORY QUALITY

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGUILLA</td>
<td>AIA</td>
<td>1.33</td>
<td>1.09</td>
<td>0.87</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>ARUBA</td>
<td>ABW</td>
<td>10.84</td>
<td>0.85</td>
<td>0.73</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>BAHAMAS</td>
<td>BHS</td>
<td>1.06</td>
<td>1.08</td>
<td>1.11</td>
<td>1.14</td>
<td>1.30</td>
<td>1.15</td>
</tr>
<tr>
<td>BARBADOS</td>
<td>BRB</td>
<td>0.89</td>
<td>1.16</td>
<td>1.04</td>
<td>1.08</td>
<td>1.04</td>
<td>1.26</td>
</tr>
<tr>
<td>BELIZE</td>
<td>BLZ</td>
<td>-0.19</td>
<td>-0.03</td>
<td>-0.06</td>
<td>0.14</td>
<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td>BERMUDA</td>
<td>BMU</td>
<td>1.33</td>
<td>1.34</td>
<td>1.39</td>
<td>1.40</td>
<td>1.42</td>
<td>1.49</td>
</tr>
<tr>
<td>CAYMAN ISLANDS</td>
<td>CYM</td>
<td>1.33</td>
<td>1.34</td>
<td>1.42</td>
<td>1.40</td>
<td>1.42</td>
<td>1.25</td>
</tr>
<tr>
<td>DOMINICA</td>
<td>DMA</td>
<td>0.90</td>
<td>0.64</td>
<td>0.59</td>
<td>0.77</td>
<td>0.70</td>
<td>0.56</td>
</tr>
<tr>
<td>GRENADA</td>
<td>GRD</td>
<td>0.44</td>
<td>0.30</td>
<td>0.18</td>
<td>0.37</td>
<td>0.38</td>
<td>0.42</td>
</tr>
<tr>
<td>JAMAICA</td>
<td>JAM</td>
<td>0.25</td>
<td>0.26</td>
<td>0.16</td>
<td>0.19</td>
<td>0.25</td>
<td>0.22</td>
</tr>
<tr>
<td>NETHERLANDS ANTILLES</td>
<td>ANT</td>
<td>0.84</td>
<td>0.85</td>
<td>0.61</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>ST. KITTS AND NEVIS</td>
<td>KNA</td>
<td>1.00</td>
<td>1.02</td>
<td>0.06</td>
<td>0.16</td>
<td>0.13</td>
<td>0.20</td>
</tr>
<tr>
<td>ST. LUCIA</td>
<td>LCA</td>
<td>1.08</td>
<td>1.02</td>
<td>0.16</td>
<td>0.13</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>ST. VINCENT AND THE GRENADES</td>
<td>VCT</td>
<td>0.90</td>
<td>0.98</td>
<td>0.14</td>
<td>0.16</td>
<td>0.13</td>
<td>0.20</td>
</tr>
<tr>
<td>TRINIDAD AND TOBAGO</td>
<td>TTO</td>
<td>0.70</td>
<td>0.68</td>
<td>0.71</td>
<td>0.73</td>
<td>0.74</td>
<td>0.72</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>NLD</td>
<td>1.65</td>
<td>1.71</td>
<td>1.81</td>
<td>1.78</td>
<td>1.89</td>
<td>1.99</td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>GBR</td>
<td>1.76</td>
<td>1.56</td>
<td>1.76</td>
<td>1.66</td>
<td>1.71</td>
<td>1.70</td>
</tr>
</tbody>
</table>

### GOVERNANCE INDICATOR: RULE OF LAW

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGUILLA</td>
<td>AIA</td>
<td>1.68</td>
<td>1.67</td>
<td>1.17</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>ARUBA</td>
<td>ABW</td>
<td>0.88</td>
<td>0.88</td>
<td>0.94</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>BAHAMAS</td>
<td>BHS</td>
<td>1.22</td>
<td>1.32</td>
<td>1.32</td>
<td>1.32</td>
<td>1.31</td>
<td>1.25</td>
</tr>
<tr>
<td>BARBADOS</td>
<td>BRB</td>
<td>1.00</td>
<td>1.12</td>
<td>1.21</td>
<td>1.31</td>
<td>1.39</td>
<td>1.35</td>
</tr>
<tr>
<td>BELIZE</td>
<td>BLZ</td>
<td>-0.05</td>
<td>-0.02</td>
<td>0.06</td>
<td>0.20</td>
<td>-0.16</td>
<td>0.07</td>
</tr>
<tr>
<td>BERMUDA</td>
<td>BMU</td>
<td>0.88</td>
<td>0.88</td>
<td>1.12</td>
<td>1.20</td>
<td>1.22</td>
<td>1.26</td>
</tr>
<tr>
<td>CAYMAN ISLANDS</td>
<td>CYM</td>
<td>1.15</td>
<td>0.88</td>
<td>1.17</td>
<td>1.20</td>
<td>1.49</td>
<td>1.53</td>
</tr>
<tr>
<td>DOMINICA</td>
<td>DMA</td>
<td>0.66</td>
<td>0.62</td>
<td>0.62</td>
<td>0.69</td>
<td>0.63</td>
<td>0.48</td>
</tr>
<tr>
<td>GRENEDA</td>
<td>GRD</td>
<td>0.12</td>
<td>0.29</td>
<td>0.26</td>
<td>0.28</td>
<td>0.21</td>
<td>0.26</td>
</tr>
<tr>
<td>JAMAICA</td>
<td>JAM</td>
<td>-0.60</td>
<td>-0.57</td>
<td>-0.47</td>
<td>-0.59</td>
<td>-0.50</td>
<td>-0.48</td>
</tr>
<tr>
<td>NETHERLANDS ANTILLES</td>
<td>ANT</td>
<td>0.88</td>
<td>0.88</td>
<td>0.94</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>ST. KITTS AND NEVIS</td>
<td>KNA</td>
<td>0.82</td>
<td>0.79</td>
<td>0.74</td>
<td>0.61</td>
<td>0.27</td>
<td>0.44</td>
</tr>
<tr>
<td>ST. LUCIA</td>
<td>LCA</td>
<td>0.82</td>
<td>0.79</td>
<td>0.69</td>
<td>0.61</td>
<td>0.27</td>
<td>0.44</td>
</tr>
<tr>
<td>ST. VINCENT AND THE GRENADES</td>
<td>VCT</td>
<td>0.82</td>
<td>0.79</td>
<td>0.74</td>
<td>0.61</td>
<td>0.59</td>
<td>0.44</td>
</tr>
<tr>
<td>TRINIDAD AND TOBAGO</td>
<td>TTO</td>
<td>-0.26</td>
<td>-0.10</td>
<td>-0.08</td>
<td>0.12</td>
<td>0.27</td>
<td>0.36</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>NLD</td>
<td>1.75</td>
<td>1.72</td>
<td>1.77</td>
<td>1.73</td>
<td>1.75</td>
<td>1.75</td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>GBR</td>
<td>1.73</td>
<td>1.63</td>
<td>1.73</td>
<td>1.75</td>
<td>1.75</td>
<td>1.72</td>
</tr>
</tbody>
</table>
Regulation in Splendid Isolation

Case Study: Measuring Governance

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ANGUILLA</td>
<td>AIA</td>
<td>1.27</td>
<td>1.25</td>
<td>0.81</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>ARUBA</td>
<td>ABW</td>
<td>1.27</td>
<td>1.25</td>
<td>1.13</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>BAHAMAS</td>
<td>BHS</td>
<td>1.37</td>
<td>1.32</td>
<td>1.36</td>
<td>1.37</td>
<td>1.44</td>
<td>1.39</td>
</tr>
<tr>
<td>BARBADOS</td>
<td>BRB</td>
<td>1.20</td>
<td>1.21</td>
<td>1.16</td>
<td>1.22</td>
<td>1.32</td>
<td>1.39</td>
</tr>
<tr>
<td>BELIZE</td>
<td>BLZ</td>
<td>-0.30</td>
<td>-0.24</td>
<td>-0.30</td>
<td>-0.07</td>
<td>-0.22</td>
<td>-0.14</td>
</tr>
<tr>
<td>BERMUDA</td>
<td>BMU</td>
<td>1.27</td>
<td>1.25</td>
<td>1.26</td>
<td>1.30</td>
<td>1.32</td>
<td>1.39</td>
</tr>
<tr>
<td>CAYMAN ISLANDS</td>
<td>CYM</td>
<td>1.27</td>
<td>1.25</td>
<td>1.22</td>
<td>1.30</td>
<td>1.32</td>
<td>1.39</td>
</tr>
<tr>
<td>DOMINICA</td>
<td>DMA</td>
<td>0.66</td>
<td>0.66</td>
<td>0.61</td>
<td>0.46</td>
<td>0.54</td>
<td>0.44</td>
</tr>
<tr>
<td>GRENEDA</td>
<td>GRD</td>
<td>0.59</td>
<td>0.66</td>
<td>0.61</td>
<td>0.62</td>
<td>0.70</td>
<td>0.61</td>
</tr>
<tr>
<td>JAMAICA</td>
<td>JAM</td>
<td>-0.36</td>
<td>-0.47</td>
<td>-0.52</td>
<td>-0.54</td>
<td>-0.50</td>
<td>-0.25</td>
</tr>
<tr>
<td>NETHERLANDS ANTILLES</td>
<td>ANT</td>
<td>1.27</td>
<td>1.25</td>
<td>0.59</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>ST. KITTS AND NEVIS</td>
<td>KNA</td>
<td>0.96</td>
<td>0.98</td>
<td>0.23</td>
<td>0.26</td>
<td>0.30</td>
<td>0.09</td>
</tr>
<tr>
<td>ST. LUCIA</td>
<td>LCA</td>
<td>1.13</td>
<td>1.11</td>
<td>0.28</td>
<td>0.26</td>
<td>0.30</td>
<td>0.47</td>
</tr>
<tr>
<td>ST. VINCENT AND THE GRENADES</td>
<td>VCT</td>
<td>0.96</td>
<td>0.98</td>
<td>0.28</td>
<td>0.26</td>
<td>0.30</td>
<td>0.09</td>
</tr>
<tr>
<td>TRINIDAD AND TOBAGO</td>
<td>TTO</td>
<td>-0.15</td>
<td>0.02</td>
<td>0.03</td>
<td>0.06</td>
<td>-0.06</td>
<td>0.14</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>NLD</td>
<td>2.05</td>
<td>1.99</td>
<td>2.04</td>
<td>2.08</td>
<td>2.17</td>
<td>2.18</td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>GBR</td>
<td>1.86</td>
<td>1.94</td>
<td>1.99</td>
<td>2.08</td>
<td>2.10</td>
<td>2.13</td>
</tr>
</tbody>
</table>

Measuring corporate governance

For the purpose of the framework to promote effective and efficient industry performance, we have adopted the OECD principles for Corporate Governance and their measurement technique.

The principles cover six key areas of corporate governance – ensuring the basis for an effective corporate governance framework; the rights of shareholders; the equitable treatment of shareholders; the role of stakeholders in corporate governance; disclosure and transparency; and the responsibilities of the Board. There are explanatory annotations for each area that also indicate the range of policy measures which have proved useful in achieving them. Key to the success of the principles is that they are principle based and non-prescriptive so that they retain their relevance in varying legal, economic and social contexts.

The OECD has also issued Guidelines for State Owned Companies (see Box Annex III - 3). The demand for these guidelines is as a consequence of the reform undertakings of corporate governance of state-owned enterprises which is an important but also complex undertaking. A major challenge is to find a balance between the state’s responsibility for actively exercising its ownership functions, such as the nomination and election of the board, while at the same time refraining from imposing undue political interference in the management of the company. Another important challenge is to ensure that there is a level-playing field in the markets where private sector companies can compete with state-owned enterprises and that governments do not distort competition in the way they use their regulatory or supervisory powers.
1. Ensuring an Effective Legal and Regulatory Framework for State-Owned Enterprises
The legal and regulatory framework for state-owned enterprises should ensure a level-playing field in markets where state-owned enterprises and private sector companies compete in order to avoid market distortions. The framework should build on, and be fully compatible with, the OECD Principles of Corporate Governance.

2. The State Acting as Owner
The state should act as an informed and active owner and establish a clear and consistent ownership policy, ensuring that the governance of state-owned enterprises is carried out in a transparent and accountable manner, with the necessary degree of professionalism and effectiveness.

3. Equitable treatment of Shareholders
The state and state-owned enterprises should recognize the rights of all shareholders and in accordance with the OECD Principles of Corporate Governance ensure their equitable treatment and equal access to corporate information.

4. Relations with Stakeholders
The state ownership policy should fully recognize the state-owned enterprises responsibilities towards stakeholders and request that they report on their relations with stakeholders.

5. Transparency and Disclosure
State-owned enterprises should observe high standards of transparency in accordance with the OECD Principles of Corporate Governance.

6. The Responsibilities of the Boards of State-Owned Enterprises
The boards of state-owned enterprises should have the necessary authority, competencies and objectivity to carry out their function of strategic guidance and monitoring of management. They should act with integrity and be held accountable for their actions.

Based on the Corporate Governance Guidelines we have constructed a framework for measurement which allows giving a score per individual guideline. Figure Annex III-2 illustrates the corporate governance perspective of the framework.
Measuring Corporate Governance for the selected utilities

In the period of October 2008 we have submitted a corporate governance questionnaire to selected Caribbean SIDS and utilities. It was agreed upon with the participating utilities that the results would be presented in an anonymous way. Per utility the questionnaires were distributed in such a way that we would obtain the views of at least three respondents representing the views of the utility, the views of the agency responsible for deploying the regulatory function and an agency that could reflect the consumers view and the wider stakeholders view.

The obtained aggregated Corporate Governance scores per utility are presented in Table III - 3.

The scores were obtained based on the submission of the Corporate Governance Questionnaire below:

**MEASURING CORPORATE GOVERNANCE WITH THE CORPORATE GOVERNANCE GUIDELINES FOR STATE OWNED COMPANIES**

Part of the case study of the research project “A Framework to Promote Effective and Efficient Industry Performance for Small Isolated Monopoly Systems”

Delft University
Faculty of Technology, Management and Policy

Steven Martina
October 2008
Introduction

The Use and Scope of this Methodology

This Methodology is intended to underpin an assessment of the implementation of the Corporate Governance Principles and in particular the Corporate Governance Guidelines for State Owned Enterprises in a jurisdiction and to provide a framework for policy discussions. The ultimate purpose of an assessment is to identify the nature and extent of specific strengths and weaknesses in corporate governance, and thereby underpin policy dialogue that will identify reform priorities leading to the improvement of corporate governance and economic performance. Reflecting the Principles, the Methodology places emphasis on "outcomes" and, therefore, on "functional equivalence". By the latter is meant that there are many different ways, institutions, laws etc, for achieving the "outcomes" advocated by the Principles. The criteria to judge whether a principle has been implemented, therefore, have to be selected in a way that does not imply a value judgment about the "means" as such, but rather about the effectiveness and efficiency of current arrangements in terms of achieving the outcome. The Methodology does, however, recognize that the relative costs and benefits of alternative "means" of implementation might vary over time. The need for a dynamic perspective for policy dialogue is thereby recognized. To underpin policy dialogue, the Methodology like the Principles treats countries consistently, despite their widely different institutional structures and traditions. This feature is intended to facilitate a discussion about different remedies for similar problems and the transferability of experience between jurisdictions. The Methodology is intended to assess qualitatively countries against what they could and should achieve in relation to the Principles and to provide a framework for identifying policy options to improve corporate governance.

How to Assess Outcomes

The outcome oriented nature of the Principles together with their scope means that a number of individual principles are by themselves unobservable to a reviewer and that what is being assessed is a combination of legal framework and other implementation measures, enforcement, corporate practices, and the functioning of markets. For example, forming an assessment about whether boards are diligent is likely to depend on judgments about the implementation of other principles, such as those covering shareholder rights, transparency and the efficacy of the enforcement mechanism. An assessment about whether the Principles are implemented in a jurisdiction is therefore necessarily a matter of informed judgment based on a variety of sources of information. The approach of the Methodology to making an assessment is principally qualitative:

The Methodology follows an assessment scale similar to that used by the other Financial Stability Forum (SFS) standard setters and by the World Bank, which classify according to observed/implemented,
broadly observed/implemented, partly observed/implemented and not observed/implemented.

The classification also reflects a judgment about the effectiveness of enforcement and the operation of markets. For each principle, “essential criteria” are specified that seek to make the principle’s outcome more specific and easier to verify by a reviewer for effective evaluation of implementation, while preserving functional equivalence. The “essential criteria” also provide important guidance for detailed fact finding questions and how responses can be used to form a judgment.

For the purpose of policy dialogue, the assessment will often be less important than the reasons advanced by the reviewer. This is particularly so for the classification “partly implemented”. In particular, it is important for the reviewer to note whether partial implementation predominantly reflects an inadequate legal framework, poor enforcement by the authorities, lack of private redress mechanisms, weak market mechanisms or limited private sector observance, or a combination of all these. In some cases, the legal and regulatory framework might be so new that the influence on corporate practices cannot yet be properly assessed. In other cases, the essential criteria associated with a principle involve the assessment of complex and specialized topics (e.g. the operation of central securities depositories, creditor rights) that might stretch the resources of a reviewer. Nevertheless, a reviewer is still expected to form a reasoned judgment after consulting with relevant specialists, although the uncertainty and preliminary nature of the assessment will need to be noted. We refer to the Table “Assessment Scheme” in which we further elaborate the assessment scheme. We refer to the Table “Governance Principals” through which the reviewer can report the findings on the conducted review.

**References**

We have attached the OECD Guidelines on Corporate Governance of State-owned Enterprises and the OECD Methodology for assessing the implementation of the OECD Principles on Corporate Governance as some additional background information and guidance for the reviewer.

**Closing Observations**

We would sincerely like to express our gratitude to the reviewer for their kind cooperation to conduct the review and by doing so making a valuable contribution to putting in practice the corporate governance part of a framework for small isolated monopoly electrical systems to promote effective and efficient industry performance. We are talking about governance principals. Correct principals are like lighthouses. They do not move, the most we can do is to bounce our heads against them, so we might as well learn them, adapt them and practice them.

Steven Martina
October 2008
### Assessment Scheme

<table>
<thead>
<tr>
<th>Focus area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully implemented</td>
<td>The OECD Principle is fully implemented in all material respects with respect to all of the applicable Essential Criteria. Where the Essential Criteria refer to standards (i.e. practices that should be required, encouraged or, conversely, prohibited or discouraged), all material aspects of the standards are present. Where the Essential Criteria refer to corporate governance practices, the relevant practices are widespread. Where the Essential Criteria refer to enforcement mechanisms, there are adequate, effective enforcement mechanisms. Where the Essential Criteria refer to remedies, there are adequate, effective and accessible remedies. This coincides with score “4”</td>
</tr>
</tbody>
</table>
| Broadly Implemented| A Broadly Implemented assessment is likely appropriate where one or more of the applicable essential criteria are less than fully implemented in all material respects, but, at a minimum:  
• all of the applicable Essential Criteria are implemented to some extent;  
• the core elements of the standards are present (e.g. general standards may be in place although some of the specific details may be missing); and  
• incentives and/or disciplinary forces are operating with some effect to encourage at least a majority of market participants, including significant enterprises, to adopt the recommended practices. This coincides with score “3” |
| Partly Implemented | A Partly Implemented assessment is likely appropriate in the following situations:  
• One or more core elements of the standards described in a minority of the applicable Essential Criteria are missing, but the other applicable Essential Criteria are fully or broadly implemented in all material respects (including those aspects of the Essential Criteria relating to corporate governance practices, enforcement mechanisms and remedies);  
• The core elements of the standards described in all of the applicable Essential Criteria are present, but incentives and/or disciplinary forces are not operating effectively to encourage at least a significant minority of market participants to adopt the recommended practices;  
• The core elements of the standards described in all of the applicable Essential Criteria are present, but implementation levels are low because some or all of the standards are new, it is too early to expect high levels of implementation and it appears that the reason for low implementation levels is the newness of the standards (rather than other factors, such as low incentives to adopt the standards). This coincides with score “2” |
| Not Implemented    | A Not Implemented assessment likely is appropriate where there are major shortcomings, e.g. where:  
• The core elements of the standards described in a majority of the applicable Essential Criteria are not present; and/or  
• Incentives and/or disciplinary forces are not operating effectively to encourage at least a significant minority of market participants to adopt the recommended practices. This coincides with score “1” |
| Not Applicable     | This assessment is appropriate where an OECD Principle (or one of the Essential Criteria) does not apply due to structural, legal or institutional features (e.g. institutional investors acting in a fiduciary capacity may not exist). |
The legal and regulatory framework for state-owned enterprises should ensure a level-playing field in markets where state-owned enterprises and private sector companies compete in order to avoid market distortions. The framework should build on, and be fully compatible with, the OECD Principles of Corporate Governance.

**PRINCIPLE 1**

**Ensuring an effective legal and regulatory framework for state-owned enterprises**

A  There should be a clear separation between the state’s ownership function and other state functions that may influence the conditions for state-owned enterprises, particularly with regard to market regulation.

Comments

B  Governments should strive to simplify and streamline the operational practices and the legal form under which SOEs operate. Their legal form should allow creditors to press their claims and to initiate insolvency procedures.

Comments

C  Any obligations and responsibilities that an SOE is required to undertake in terms of public services beyond the generally accepted norm should be clearly mandated by laws or regulations. Such obligations and responsibilities should also be disclosed to the general public and related costs should be covered in a transparent manner.

Comments

D  SOEs should not be exempt from the application of general laws and regulations. Stakeholders, including competitors, should have access to efficient redress and an even-handed ruling when they consider that their rights have been violated.

Comments

E  The legal and regulatory framework should allow sufficient flexibility for adjustments in the capital structure of SOEs when this is necessary for achieving company objectives.

Comments
### Regulation in Splendid Isolation

#### Case Study: Measuring Governance

**F** SOEs should face competitive conditions regarding access to finance. Their relations with state-owned banks, state-owned financial institutions and other state-owned companies should be based on purely commercial grounds.

**Comments**

**OVERALL SCORE** Ensuring an effective legal and regulatory framework for state-owned enterprises

### PRINCIPLE 1 Ensuring an effective legal and regulatory framework for state-owned enterprises

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>SOEs should face competitive conditions regarding access to finance. Their relations with state-owned banks, state-owned financial institutions and other state-owned companies should be based on purely commercial grounds.</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Comments**

### PRINCIPLE 2 The state acting as an owner

The state should act as an informed and active owner and establish a clear and consistent ownership policy, ensuring that the governance of state-owned enterprises is carried out in a transparent and accountable manner, with the necessary degree of professionalism and effectiveness.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>The government should develop and issue an ownership policy that defines the overall objectives of state ownership, the state’s role in the corporate governance of SOEs, and how it will implement its ownership policy.</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Comments**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>The government should not be involved in the day-to-day management of SOEs and allow them full operational autonomy to achieve their defined objectives.</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Comments**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>The state should let SOE boards exercise their responsibilities and respect their independence.</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Comments**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>The exercise of ownership rights should be clearly identified within the state administration. This may be facilitated by setting up a co-ordinating entity or, more appropriately, by the centralization of the ownership function.</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Comments**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>The co-ordinating or ownership entity should be held accountable to representative bodies such as the Parliament and have clearly defined relationships with relevant public bodies, including the state supreme audit institutions.</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Comments**
The state as an active owner should exercise its ownership rights according to the legal structure of each company. Its prime responsibilities include:

1. Being represented at the general shareholders meetings and voting the state shares.
2. Establishing well structured and transparent board nomination processes in fully or majority owned SOEs, and actively participating in the nomination of all SOEs’ boards.
4. When permitted by the legal system and the state’s level of ownership, maintaining continuous dialogue with external auditors and specific state control organs.
5. Ensuring that remuneration schemes for SOE board members foster the long term interest of the company and can attract and motivate qualified professionals.

**OVERALL SCORE**
The state acting as an owner

**PRINCIPLE 4**

Relations with stakeholders

The state ownership policy should fully recognise the state-owned enterprises’ responsibilities towards stakeholders and request that they report on their relations with stakeholders.

**A**
Governments, the co-ordinating or ownership entity and SOEs themselves should recognize and respect stakeholders’ rights established by law or through mutual agreements, and refer to the OECD Principles of Corporate Governance in this regard.

Comments

**B**
Listed or large SOEs, as well as SOEs pursuing important public policy objectives, should report on stakeholder relations.

Comments

**C**
The board of SOEs should be required to develop, implement and communicate compliance programmes for internal codes of ethics. These codes of ethics should be based on country norms, in conformity with international commitments and apply to the company and its subsidiaries.

Comments

**OVERALL SCORE**
Relations with stakeholders
**PRINCIPLE 5**

**Transparency and disclosure**

State-owned enterprises should observe high standards of transparency in accordance with the OECD Principles of Corporate Governance.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>The co-ordinating or ownership entity should develop consistent and aggregate reporting on state-owned enterprises and publish annually an aggregate report on SOEs.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B</strong></td>
<td>SOEs should develop efficient internal audit procedures and establish an internal audit function that is monitored by and reports directly to the board and to the audit committee or the equivalent company organ.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C</strong></td>
<td>SOEs, especially large ones, should be subject to an annual independent external audit based on international standards. The existence of specific state control procedures does not substitute for an independent external audit.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>D</strong></td>
<td>SOEs should be subject to the same high quality accounting and auditing standards as listed companies. Large or listed SOEs should disclose financial and non-financial information according to high quality internationally recognised standards.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E</strong></td>
<td>SOEs should disclose material information on all matters described in the OECD Principles of Corporate Governance and in addition focus on areas of significant concern for the state as an owner and the general public. Examples of such information include: 1. A clear statement to the public of the company objectives and their fulfilment. 2. The ownership and voting structure of the company. 3. Any material risk factors and measures taken to manage such risks. 4. Any financial assistance, including guarantees, received from the state and commitments made on behalf of the SOE. 5. Any material transactions with related entities.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comments**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OVERALL SCORE</strong></td>
<td>Transparency and disclosure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Principle 6: The responsibilities of the boards of state-owned enterprises

The boards of state-owned enterprises should have the necessary authority, competencies and objectivity to carry out their function of strategic guidance and monitoring of management. They should act with integrity and be held accountable for their actions.

1. **A** The boards of SOEs should be assigned a clear mandate and ultimate responsibility for the company's performance. The board should be fully accountable to the owners, act in the best interest of the company and treat all shareholders equitably.

   **Comments**

2. **B** SOE boards should carry out their functions of monitoring of management and strategic guidance, subject to the objectives set by the government and the ownership entity. They should have the power to appoint and remove the CEO.

   **Comments**

3. **C** The boards of SOEs should be composed so that they can exercise objective and independent judgment. Good practice calls for the Chair to be separate from the CEO.

   **Comments**

4. **D** If employee representation on the board is mandated, mechanisms should be developed to guarantee that this representation is exercised effectively and contributes to the enhancement of the board skills, information and independence.

   **Comments**

5. **E** When necessary, SOE boards should set up specialized committees to support the full board in performing its functions, particularly in respect to audit, risk management and remuneration.

   **Comments**

6. **F** SOE boards should carry out an annual evaluation to appraise their performance.

   **Comments**

## Overall Score

**The responsibilities of the boards of state-owned enterprises**
Annex IV.

Price Regulation further explored
Regulating overall prices in Utilities

There are broadly four main methods of regulating prices and profits in utilities, namely the use of a price cap, rate of return regulation or cost of service regulation, a sliding scale regime, which is a hybrid of the first two, and direct state setting of prices. The last may be based on costs of production, equating to rate of return regulation, but is likely to be associated with more arbitrary rules for price setting reflecting each government’s political, social as well as economic priorities (Jamasb and Pollit, 2000). Whatever precise method is used, the economics of regulation literature suggests that regulators, whether in dedicated regulatory offices or government departments, are likely to face on-going difficulties arising from the inherent information asymmetries that exist in a regulated environment (Newbery, 1999; Parker, 2002). If prices and profits are to be regulated effectively, the regulator needs access to accurate information on the forecast revenues and efficient costs of the regulated firm, the cost of raising capital and the economic value of the firm’s asset base (Laffont and Tirole, 1993; Parker, 2002, p.502). But firms can be expected to raise costs and inflate capital investment needs and the costs of raising capital (the ‘cost of capital’) during regulatory reviews, leading to a form of ‘regulatory gaming’ (Armstrong et al., 1994, Alexander and Harris, 2001). Moreover, effective regulatory incentives and regulatory governance regimes need to be in place (Levy and Spiller, 1994) and both may be underdeveloped or even absent in developing economies. There may also be a continuous threat from regulatory capture. Regulatory capture occurs when regulatory policies become over-influenced by the goals of the regulated firm or where the regulator is subservient to political interests and lobbying groups (Stigler, 1971).

In practice, it is the firms not the regulators that have direct access to the values of costs, revenues and assets and know their true cost of capital. In effect, the job of the regulator is to provide the incentives for managers in regulated companies to maximise effort and reduce costs, while protecting consumers, and to minimise the information rent that the company achieves by failing to reveal its efficient costs of production to the regulator. However, many developing countries seem to lack strong regulatory capability in terms of trained personnel and sound laws to sustain regulatory commitment and credibility. Regulatory offices in developing countries tend to be small, under-manned for the job they face, and possibly more expensive to run in relation to GDP than in developed economies (Domah, et al., 2003). The other main difficulties found in many developing countries relate to governance problems (Stern and Holder, 1999; Minogue, 2002) or the legal powers and responsibilities of regulators, including their effective independence from regulatory (including political) capture.

The economics of regulation literature has favoured the use of price cap regulation over rate of return or cost of service regulation because of its greater incentive effects. A third alternative, sliding-scale regulation has been put forward as a compromise between the price cap...
and a controlled rate of return, which is said to combine the merits of both methods. We will further elaborate on the main methods for regulating prices and profits in utilities and discuss their applicability within the context of SIDS.

Rate of Return Regulation
The Rate of Return (ROR) Regulation is the traditional approach to regulation of privately owned monopolies and an alternative to public owned utilities. The method is a heavy-handed approach to regulation and it is generally identified with the regulation of investor-owned utilities in the US. The ROR regulation allows the utility to cover its operating and capital costs as well as a return on capital. Equation (1) shows calculation of the required revenue for firm’s targeted rate of return in year t from projected costs. (Berg et al, 2004; Hill, 1995). Alternatively, the required revenue can be calculated from the firm’s historical costs.

\[ RR_{i,t} = OE_{i,t} + Di_t + Ti_t + (RB_{i,t} \times ROR) ] \]

where:
- \( RR_{i} \) = required revenue
- \( OE_{i} \) = operating expenses
- \( Di \) = depreciation expense
- \( Ti \) = tax expense
- \( RB_{i} \) = rate base
- \( ROR_i \) = rate of return

The shortcomings of ROR regulation are extensively discussed in the literature and were first presented in Averch and Johnson (1962). The main reservation against this approach is that it does not provide incentives for cost savings and efficiency improvements but rewards over-investments. Within the framework of the Principal-Agent theory, ROR regulation is believed to cause a managerial slack or X-inefficiency that is attributed to the absence of competition. In response to these deficiencies, incentive-based regulation methods such as price cap, revenue cap, sliding scale, partial cost adjustment, yardstick competition, targeted incentive, and hybrid schemes have been proposed. These methods are reviewed in what follows.

Price Cap Regulation
The price cap approach to utility regulation, is perhaps the most widely discussed and significant innovation in utility regulation and alternative to ROR regulation. The method was first proposed in Littlechild (1983) and various versions of it have since been adopted in the regulation of infrastructure and utility industries in the UK and other countries. Price cap regulation essentially decouples the profits of the regulated utility from its costs by setting a price ceiling. The method is also referred to as the ‘RPI-X’ model. For each rate period, normally between 3 to 5 years, the price cap for each year is set based on the Retail Price Index (RPI) and an efficiency factor X. Prices remain fixed for the rate period and the utility keeps or shares the achieved cost savings. In this case...

---

81 The review of the incentive regulation methods in this section is largely based on Berg et al (2004); Hall (2000); Comnes et al. (1995); Hill (1995); Joskow and Schmalensee (1986).
82 Armstrong et al. (1994) and Rees and Vickers (1995) for detailed reviews of the price cap method and its application to privatised infrastructure industries in the UK.
83 In the US the corresponding price index is termed Consumer Price Index (CPI).
regard price cap regulation resembles an ROR regulation with rate freeze or long regulatory lag. Equations (2)-(3) shows how the price ceiling for i is set.

\[ P_{i,t} = P_{i,t-1} \times (1 + \text{RPI} - X_i) + / - Z_i \]  
\[ P = \sum p_i q_i \]  

For each year the price ceiling \( P_t \) is calculated based on the previous year’s price ceiling \( P_{t-1} \) adjusted by RPI minus the efficiency factor \( X \) decided by the regulator. The price ceiling may be adjusted using a correction factor \( Z \) to account for the effect of exogenous extraordinary events affecting the utility’s costs. The price cap \( P_t \) represents an index of the ‘n’ different tariffs \( p_1...p_n \) of the regulated utility. The use of the price index often offers the utility some degree of freedom in setting the individual tariffs. A reservation against the use of price cap regulation, particularly in the US, has been that their sales maximisation incentive conflicts with the objectives of socially desirable programmes such as those of Demand-Side Management (DSM) measures that utilities may be obliged to implement (MDTE 1995, p. 22; SEE 1997, p. 52).

Revenue Cap Regulation

The revenue cap method regulates the maximum allowable revenue that a utility can earn. Similar to the price cap regulation, the aim of the regulator is to provide the utility with incentive to maximise its profits by minimising the costs and allowing the utility to keep the cost savings achieved during the regulatory lag. Equation (4) shows the main elements of revenue cap regulation for a given year.\(^{84}\)

\[ R_{i,t} = (R_{i,t-1} + CGA_i \times \Delta\text{Cust}_i) \times (1 + \text{RPI} - X_i) + / - Z_i \]  
where:

\( R_i \) = authorised revenue  
\( CGA_i \) = customer growth adjustment factor ($/customer)  
\( \Delta\text{Cust}_i \) = change in the number of customer  
\( X_i \) = efficiency factor  
\( Z_i \) = adjustment factor for events beyond management control

The revenue cap method can also take the form of revenue-per-customer regulation in which case \( CGA \) is equal to average revenue per customer. In the UK, revenue cap regulation has been applied to the main transmission utility National Grid Company (NGC). An advantage of the method is that it can be aligned with DSM measures (MDTE 1995, p. 23). However, revenue cap regulation has been criticised for limiting the powerful incentive to increase the sales and competition and has therefore been characterised as inefficient (Crew and Kleindorfer, 1996).

\(^{84}\) See Comnes et al. (1995).
Sliding Scale (ROR bandwidth)

In sliding scale or ROR bandwidth regulation, the utility’s allowed rate of return is benchmarked against a target or reference ROR that lies within a pre-specified dead-band. Schmalensee (1979) points out that the first sliding scale regulations were used in England in the middle of the 19th century85. During the regulatory lag, the actual ROR can vary within the dead-band without causing rate adjustments. If the actual ROR falls outside the dead-band it can trigger profit sharing mechanisms or rate reviews. Equation (5) shows a simple sliding scale regulation86,10

$$r_t = r_{t-1} - \lambda (r_{t-1} - r^*)$$

(4.4)

where:

- $r_t = \text{allowed rate of return for the period under consideration}$
- $r_{t-1} = \text{actual return in the previous period}$
- $r^* = \text{benchmark rate of return}$
- $\lambda = \text{sharing parameter}$

When the $r_{t-1}$ is within the predefined dead-band the sharing parameter is equal to zero. For $r_{t-1}$ below or above the dead-band, the sharing parameter can, depending on the extent of deviation, take values ranging between zero and one. The sliding scale rate of return regulation may be combined with price or revenue cap regulation.

Yardstick Regulation

In yardstick regulation the performance of a regulated utility is compared against that of a group of comparable utilities. For example, the mean of the costs of a peer group of firms can serve as performance benchmark. The method was first proposed in Shleifer (1985) and can be used to promote indirect competition among regulated utilities operating in geographically separate markets. Equation (6) shows the main elements of a cost-based yardstick regulation87.

$$P_{i,t} = \alpha_i C_{i,t} + (1 - \alpha_i) \sum_j^n (f_j C_{j,t})$$

(4.5)

where:

- $P_{i,t} = \text{overall price cap for firm } i$
- $\alpha_i = \text{share of firm’s own cost information}$
  - $p=0$ representing pure yardstick regulation
- $C_{i,t} = \text{unit cost of firm}$
- $f_i = \text{revenue or quantity weights for peer group firms } j$
- $C_{j,t} = \text{unit costs (or prices) for peer group firms } j$
- $n = \text{number of firms in peer group}$

---

85 Cited in Joskow and Schmalensee (1986).
87 See Connies et al. (1995).
Weyman-Jones (1995) discusses some of the complexities associated with the application of yardstick regulation to electricity distribution utilities while Sawkins (1995) reports a relatively functioning and well-received implementation of the method in the privatised UK water industry. A main concern in applying yardstick regulation to electricity utilities is the degree to which the operating environment of the firms in question and their circumstances (i.e. major recent investments) are comparable. Another concern is the extent to which the data may adequately be adjusted in order to account for these differences.

Partial Cost Adjustment

Another approach to incentive regulation is to link the price adjustments to changes in the utility’s own costs observed in a reference year. The cost minimisation incentive is provided by price periodic adjustments that are less than proportional to the actual changes in the costs. Equation (7) shows a simple partial cost adjustment scheme:

\[ P_{t,t} = C_{i,t}^* + \lambda (C_{i,t} - C_{i,t}^*) \]  

\[ (4.6) \]

where:

- \( P_{t,t} \) = adjusted price  
- \( C_{i,t} \) = the actual cost per unit  
- \( C_{i,t}^* \) = reference cost per unit  
- \( \lambda \) = sharing parameter

Menu of Contracts

The menu of contracts method is an innovative approach to reduce the information asymmetry between the regulator and regulated firm. Under this scheme the regulator offers the utility a menu of incentive plans with constant consumer welfare. The utility can choose among the incentives and the flexibility in choosing among the alternatives reveals its welfare-enhancing preferences. The revealed preferences therefore represent a Pareto improvement (Crew and Kleindorfer, 1996). For example, a menu of incentives can be designed where the utility’s share of profits \( \sigma \) or some specified reward is a function of deviation of the X-factor (or price cap) chosen by the utility from a base value (Equation 8): 

\[ \sigma = f(X) \]  

\[ (4.7) \]

If the utility chooses a higher X-factor than the base value it will receive a higher reward as per equation. The major obstacles in the application of the method are the design of appropriate scheme as they require considerable information about distribution of efficiencies and the corresponding rewards.

Targeted Incentive Regulation

Targeted incentive schemes pursue narrower objectives than the broad incentive regulation approaches discussed in the above. The aim
of these schemes is to target specific aspects of the operation of the utility and achieve an outcome that would not necessarily result from broad incentive schemes. Targeted incentive regulation may be used to promote Demand Side Management (DSM) measures, environmental standards, technical efficiency, and improvement in quality of service. However, these schemes have been criticised on the ground that they distort efficient allocation of resources (Joskow and Schmalensee, 1986). Also, it has been suggested that such schemes cause distortionary effects and have been insignificant in the overall operation of the utility (Berg and Jeong, 1991).

Hybrid Schemes

The various incentive regulation methods discussed in the above are usually not observed in pure form. Rather, practical considerations and multiplicity of the regulatory objectives often result in using a combination of different incentive regulation methods. For example, targeted incentive schemes can supplement the broad incentive regulation methods. Also, incentive regulation may be combined with various profit or loss sharing schemes. As with targeted incentive, hybrid schemes may result in inefficient resource allocation.

Social Regulation

While much of the discussion of regulation instruments has focused on improvements in economic and financial performance, distributional issues have strongly influenced public policy towards infrastructure in both developed and developing countries. Most developed countries specify universal access to certain infrastructure services, including telecommunications, water and sanitation and electricity, with the goal of ensuring access for all people at affordable prices. Universal service obligations are typically incorporated in licences and concession contracts and require operators to provide services within a specified time period to any consumer that requests them within a specified geographical area. In developing countries, concerns about the accessibility and affordability of infrastructure services are more pronounced. However, as Estache, Foster and Wodon, (2002, p.6) point out, although universal service obligations are politically appealing, they have limited meaning in practice in the developing country context. This is because they fail to take into account the fact that low-income households often cannot afford the service, and hence will not request it. Also, for communities that are not currently served by the formal utility network, service expansion will need to take place on a coordinated basis, and not simply in response to individual requests.

In theory, these access and affordability concerns can be financed by cross subsidies whereby above-cost prices are charged to low-cost and high-income consumers to subsidise high-cost and low-income consumers, who pay prices below cost. In practice, subsidies on prices of infrastructure services have often been poorly targeted and regressive in their incidence. Nevertheless, there are concerns that economic
regulation may hurt the poor, where, for example, ‘tariff rebalancing’—increasing prices in order to meet costs—could make service unaffordable for the poor. Subsidies often introduce perverse economic incentives, for example wasteful consumption by subsidised consumers, or reduced incentives for utilities, to extend their services to poorer areas where subsidies are targeted. Also, there may be significant administrative costs, for example, in identifying households eligible for the subsidy.

Table 4.1 summarises the relative merits of rate of return, price cap and sliding-scale regulation within the context of developing economies with their expected institutional weaknesses. The use of a sliding-scale seems to add credibility to the regulatory regime in countries where there is a real likelihood that regulators will be captured and pressured to intervene whenever prices and profits rise or fall by more than expected. Therefore, the sliding-scale method appears to be very appropriate to economies where estimating costs and revenues in advance to set the correct price or profit at the outset is difficult or where the economic environment can change quickly and sharply. This seems to apply to many developing economies.

Table 4.1: Summary of the Relative Advantages of Rate of Return, Price Cap and Sliding-Scale Regulation in Developing Economies

<table>
<thead>
<tr>
<th>Efficiency incentives</th>
<th>Rate of return</th>
<th>Price Cap</th>
<th>Sliding-Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low: incentives to inflate opex and capex</td>
<td>High: efficiency benefits retained by the firm</td>
<td>Medium: share of efficiency benefits firm until the next price passed quickly to review consumers</td>
<td></td>
</tr>
<tr>
<td>Difficulty of administration</td>
<td>Low: requires monitoring of revenue</td>
<td>High: requires considerable financial</td>
<td>Medium: particularly need regular and and cost data to prevent and economic data that reliable profit data inefficient expenditures, but the may be well beyond the ability of a regulatory process is similar to office in a low-income that which occurs under economy to collect and state ownership analysis.</td>
</tr>
<tr>
<td>Threat of regulatory capture</td>
<td>Low: rate of return can</td>
<td>High: inflating of cost</td>
<td>Medium: risk of gaming be reset to cover the of capital and opex and hiding profits cost of capital annually, or even more frequently capex needs when the cap is set. Difficult to if necessary correct quickly later.</td>
</tr>
<tr>
<td>Threat of regulatory capture</td>
<td>Medium: frequent rate reviews may encourage capture</td>
<td>High: great benefits obtainable over a lengthy period if the price cap is too</td>
<td>Low: higher profits are shared with consumers generous</td>
</tr>
<tr>
<td>Risk of political and social rejection</td>
<td>Low: prices set</td>
<td>High: excess profits or</td>
<td>Medium: share higher social rejection according to costs and losses leading to profits, but also losses therefore more likely to closure are both likely seem fair to be unacceptable.</td>
</tr>
</tbody>
</table>

Note: the terms low, medium and high are to be interpreted as ‘relative to the other two methods’.
In summary, it seems likely that a number of difficulties are likely to be faced in operating effective control of prices and/or profits when regulatory regimes are introduced in developing economies, difficulties that so far have received insufficient attention. On balance, we conclude that sliding-scale regulation offers the best solution for low- and middle-income countries. By contrast, the price cap appears to have problems that are likely to be particularly acute in these economies. These arise from information asymmetries and weaknesses in regulatory skills and governance. In the context of developing countries the advantages of the price cap seem much less clear cut. Indeed, rate of return regulation could have powerful benefits in terms of maintaining stable profits and therefore investment incentives, especially in high inflation economies, where inflation can fluctuate sharply from year to year, and where costs and revenues cannot be reasonably estimated more than a few months in advance—i.e. where there is high regulatory uncertainty. Moreover, because rate of return regulation ties prices to costs, it should be easier for the public to understand the reason for price increases compared to those under a price cap and should protect investors against ‘hold up’ and losses that are not the result of mismanagement. By combining a price cap, with its productive efficiency incentives, with ceilings and floors to profits and losses, sliding-scale regulation appears to offer a useful compromise. It should both encourage necessary investment in utility sectors in low-income economies while protecting consumers from monopoly exploitation. Sliding-scale regulation by satisfying investors and consumers may be less open to regulatory capture. Regulatory capture occurs where firms feel the need to influence the regulator to achieve a fair rate of return and politicians feel the need to capture the regulator to avoid a consumer backlash against high prices. By helping to avoid both outcomes, sliding-scale regulation may contribute to better regulatory governance and the institution building needed if low-income economies are to develop.

Ultimately, the successful operation of price and profit regulation methods in developing countries will depend on building effective regulatory institutional infrastructures and strengthening governance environment. In the same way as privatisation alone has yielded only limited benefits, so the choice of regulatory instrument in itself is unlikely to generate substantial gains. The potential benefits of price and profit regulation will be realised only when the choice and application of regulatory instruments is part of a wider programme of regulatory reform in developing countries.
Regulation in Splendid Isolation

Price Regulation further explored
Annex V.

Reflections on Strategic Planning and Management of the Energy Sector
Introduction

In the following section a framework is presented for strategic planning and management of energy resources. It is a synthesis of the general concepts of strategic planning and integrated resource planning. I felt the need to incorporate this section of Strategic Planning and Management of the Energy Sector in this thesis to serve as a reference to conduct the process to formulate and deploy energy policy. Several Caribbean countries are not in the position of an energy policy as yet. At present either they are contemplating, initiating or are in the midst of the process of energy policy formulation. As President and CEO of Aqualectra, the Curaçao Electricity and Water Service provider, I had the opportunity to initiate, formulate and deploy an utility policy for the electricity and water supply of the island of Curaçao, named “Utility Plan 2020” which was launched in the year 2000 and which gained considerable recognition throughout the Caribbean. In the Utility Plan 2020 the concepts of strategic planning and management, integrated resource planning and performance management were embedded. The Utility plan 2020 was the basis for a so called Mega financing effort consisting of private equity and a loan totalling an amount of USD 155 Million to restructure, rehabilitate and upgrade the electricity and water supply services for the island of Curaçao. I have been invited to several Caribbean countries to present Utility Plan 2020 and to share experiences in the process of formulating the plan, formalizing the plan by obtaining the necessary institutional approvals, deploying the plan and showing results to date. In the vast majority of the cases the audience of these presentations, besides utility representatives, were government officials and representatives. Based on these experiences I felt the need to give a contribution to strategic planning and management for the energy sector not from a utility point of view but from a government point of view which I felt was often the missing link in the process to optimize electric utility services throughout the region. The presented framework in this section is a result of literature study on strategic planning and management blended with the concepts of integrated resource planning and performance management which were used in the creation of Utility Plan 2020 and the experiences I gained combined with information sharing throughout the years of deployment of Utility Plan 2020.

This section comprises the following subsections:
> The Concept of Strategic Planning and Management
> Strategic Planning and Management for Energy Resources
> The Guidelines
> The Electricity Sector Policy Cube
> Conclusion

The concept of strategic planning and management

Strategic Planning and Management (SPM) is an approach by which Governments and stakeholders take a long-term view of trends in natural resource use and environmental and social quality (described as
the ‘vision’), identify the changes necessary to bring these trends within sustainable limits and to establish a management framework to encourage key groups in society to achieve these goals.

A key feature of SPM is the development of a comprehensive ‘strategy’ that deals with all challenges, current and future, in an integrated manner. For energy resources such a strategy should look beyond energy-specific issues to economic, social and environmental costs and benefits. The strategy should be based on the integration of these elements of sustainable development. Preferably, decisions are made on a thorough and balanced analysis of costs and benefits. The strategy is subsequently translated into a manageable ‘plan’ to implement the strategy. These plans are specific in tasks, targets, timing, allocation of responsibility, funds and other resources, in a manner that allows for monitoring and evaluation of progress.

The following figure presents an overview of the relation between vision, strategy and action plan.

In this figure the baseline represents the situation in the initial year of the process. Progress will be measured against this baseline, and if justified, attributed to the implementation actions since this initial year. Results of monitoring will feed both ongoing operational (i.e., short-term) plans and the overall (i.e., long-term) strategy. Strategic feedback may result in a revision of the strategy, reformulation of goals and actions, or other adjustments.

Another key feature of SPM is the establishment of clear targets, quantitative goals, for the achievement of a sustainable energy future. Quantification of targets, followed by monitoring results against the original baseline, will enhance the transparency of progress. As energy production increases, and consumption is largely in the hands of organizations and individuals outside of the Government, the concept of strategic planning puts great emphasis on the commitment of civil society (including commercial entities and the non-governmental organizations), as partners. Each partner has its own distinct and accountable

Figure Annex V-1: Relation between Vision, Strategy and Action plan
role to play in the realization of the target, through the implementation of a set of pre-agreed actions. This is backed by a mix of regulatory requirements and cost-effective economic instruments, but also with a periodic and ongoing dialogue between relevant stakeholders.

Roughly strategic planning and management is a five step process:

> Step 1: Set objectives and targets (on the basis of a vision)
> Step 2: Develop programmes of action with relevant groups.
> Step 3: Implement the programme.
> Step 4: Monitor, evaluate and report progress.
> Step 5: Review and reset objectives and targets (where necessary).

The following figure illustrates this process.

Stakeholder involvement is important throughout the process. A stakeholder is any organization or individual which may affect or may be affected by the issue under consideration. A stakeholder is involved in the origin and/or the solution of a problem. This involvement will be or can be caused by a decision or the absence of a decision. When applied to energy resource management, it is easily understood that almost everybody has an interest in energy. It is important to identify who are the key stakeholders, i.e., who among all stakeholders should be addressed as partners in a strategic process. With these key stakeholders the initiating agency will look for long-term mutual benefits. Involving relevant stakeholders throughout the strategic planning process is very important to broaden the support for policy and activities, to avoid conflicts and to generate as much support as possible for the implementation of the plan over time.

To push this process as well as to manage it, there is need for a clear and effective management structure behind this five-step approach. This management should reside with the initiating authority. This
Regulation in Splendid Isolation

Reflections on Strategic Planning and Management of the Energy Sector

would typically be the department of energy of the Government, but other possibilities exist. Often management is actually executed through the establishment of a temporary task force or working party, with a clear mandate from the responsible authority to organize and manage the process and deliver a programme of action.

Strategic management and planning for energy resources

SPM for energy resources is based on the concepts of sustainable management for energy. The concept of sustainable management of energy is best described as the process of planning, providing and financing energy services to society in a manner that balances the economic, ecological and social impacts, without jeopardizing the opportunities of future generations to do the same. It is important to note that this process is dependent on national circumstances, level of economic development, availability of energy resources, financial resources and other factors. There are no simple solutions to the sustainable management of energy resources. As the world turns more complex, the dawning of a new energy future will depend largely on the interaction of a growing number of players within one society. It will also depend on cross-border interaction between countries. Involvement of all relevant players in all phases of decision-making processes on energy and related issues will be necessary. Governments continue to be important, as director of the process, bringing together stakeholders, setting the stage and facilitating the play.

Strategic planning and management of energy resources provides Governments with an approach to build an energy future in close cooperation with all relevant players, focusing on long-term benefits in social, economic and ecological terms.

Areas of focus typically include:

- Energy sector planning, coordination and management
- The Oil and Gas Sector
- The Transport Sector
- The Electricity and Water Sector
- New and Renewable sources of Energy
- Environmental aspects
- Energy conservation and efficiency.

Benefits include:

- A clear sense of direction for 15 to 25 years into the future.
- Commitment of relevant stakeholders.
- Investment security due to long-term arrangements.
- Integral assessment of alternative energy scenarios.
- Cost-effective measures where possible.
- Demand-side and supply-side management.
- Rural electrification as an integral element of the national plan.
- Provision of energy services to the poor.
- Reduction of negative health impact due to cleaner air.
The guidelines

The guidelines introduced in this section are focused on the strategic planning and management of energy resources for socioeconomic development and environmental protection. The guidelines offer a framework to Caribbean countries to design an energy future in an open and transparent manner, working closely with relevant stakeholders. This approach pushes energy policy beyond what is usually possible through the exclusive application of regulatory instruments.

The guidelines are presented under the following headings:
1. Vision
2. Driving forces
3. Identifying the baseline
4. Developing scenarios
5. Formulating a strategy
6. Formulating an action plan
7. Monitoring progress and evaluation
8. Adjusting to new information

Although there is a natural order in this sequence, experience shows that during the planning process there is a constant forward and backward, cyclic interaction, making the actual process much more complex than presented in this orderly fashion. The guidelines should not be seen as a linear process. The whole concept of strategic planning is very much benefiting from circular motions in an iterative process.

The guidelines will only come to full fruition in an open and transparent atmosphere. Stakeholders from diverse backgrounds need to feel secure in committing themselves to a result. The Government needs to be a trustworthy partner, in setting the stage, in sharing information and communicating to all parties in a consistent and equal manner. The guidelines do not include specific directions on external relations with stakeholder organizations, but these are of paramount importance in bringing the guidelines to effectiveness.

Vision

Strategic planning should be based on a vision. A vision should look well into the future, preferably 20 to 30 years.

Economic growth and social well-being require a vast amount of energy resources. Energy is an important driver for economic growth. The energy vision needs to contribute to the national social and economic development goals. It can be very instrumental in creating confidence with possible investors, who would like to know what the Government’s long-term ambitions mean in terms of private sector involvement.

The vision typically contains at least the following elements:
> Energy demand to match economic and social development goals
> Availability of domestic financial resources (user pays principle or other)
> Prospects for renewable energy resources
Prospects for technological improvements in conversion, transmission and distribution
Geographic relation between energy production and energy consumption
Priority areas for energy supply (residential as well as industrial/commercial; including energy for the poor and rural electrification)
Dependency on and security of foreign sources

There are several ways to formulate a vision. Traditionally, it has been in the form of a political statement. It might also be based on analytical preparatory work of experts, prepared as a part of the integrated plan or as a self-standing document. Other approaches could be to develop a vision through a system of consultations with different stakeholders, creating a wider platform for approval than the current Government. Shared responsibility with other stakeholders is certainly an important aspect of strategic planning. In particular, the electricity production companies and large users of energy in the country should be involved in order to warrant success for the vision. Widespread public consultation will not always be successful: in many cases the public wants the Government and/or the political leaders to have an opinion, a vision. The public would like to react to that vision, not constitute it.

The vision should be further concretized in quantitative goals, targets in terms of energy resource development and use, in terms of dependency on foreign resources and in terms of fuel mix. This obviously requires a certain amount of data collection and interpretation of future energy demands.

An important aspect of a vision is realism. The vision should be optimistic and sketch a positive picture, but nevertheless it should be realistic. It may be ambitious as long as the timeframe allowed for the achievement of the vision is realistic.

Driving forces

For any strategic planning process it is important to understand the underlying driving forces. The vision on the long-term energy resource planning and management should preferably be based on the understanding of the complexity of economic, social, demographic and political drivers.

There is a strong relation between driving forces and the vision. In the application of these guidelines the two steps will go hand-in-hand. Identifying driving forces and understanding their effect will be fruitful in the visionary stage of the process. On the other hand the vision (to a large extent the political idea about a sustainable energy future) will indicate which developments are driving forces and which are not. Going through a cyclical movement between these two steps will enrich the quality of both outputs: the vision and the driving forces.

Understanding driving forces requires some level of scientific preparatory work, in cooperation with leading institutes in a multidisciplinary way.
plinary approach. Many of the driving forces influence each other, which makes the analysis rather complex. Scientific consensus on the conclusions would be very helpful, but may not always prove to be a possibility. In the end, the Government and its political leadership need to decide on the way forward, applying its best judgement on the analysis.

Each of the driving forces may have a time dimension (a trend) as well as sub national deviations. Proper understanding of these trends and deviations (e.g., between rural and urban regions) requires some statistical data on economic, social and demographic developments. These data will also be useful for the identification of the baseline and for the scenario development, in the planning process.

It is important to distinguish between manageable and autonomous developments in driving forces. What is manageable and what is not, to some extent depends on the country, its power, its economic opportunities, and its culture. Autonomous developments (e.g., technological developments, societal perception), basically happen outside the control of the Government. Here are some examples of driving forces:

- Economic growth
- Population growth
- Urbanization
- Industrialization
- International economic developments
- Ratification of international agreements
- Emergency preparedness
- Price development on the resource market
- Need for hard currency
- Loan conditions for donor money/loans
- Pressure from private investment interest
- Technology breakthrough

It is important to decide whether -in the context of the country- these examples are: applicable and autonomous or manageable.

Identifying the baseline

The baseline is defined as the national energy situation at the start of the process. At a minimum, the baseline should include all aspects of the goals and targets expressed in the vision. In order to be able to monitor progress, the quantification of goals on the basis of a baseline is an important precondition. For strategic planning of a sustainable energy future, the baseline would preferably include the following items:

- Energy use per capita in the base year and expected trend towards the target year.
- Energy demand in absolute terms per type of resource in the base year and expected trend per type
- Net import/export in the base year
- Sectoral energy demand in the base year and target years
- Energy intensity of the economy
- Expected reserve of domestic energy resources (including lifetime of generating facilities) at the end of the planning period
Extend to which energy subsidies obscures potential for energy saving.

Additionally, it could include important side items like:

- Health effects
- \(\text{CO}_2\) and other emissions
- Number of people not having access to energy services
- Number of motorized vehicles
- Average fuel use in motorized vehicles

It goes without saying that this calls for a systematic collection of data relating to energy production and consumption, demographics, socio-economic developments, etc. These data need to be processed in databases, to be developed and maintained in close cooperation between Governments, research institutes and relevant stakeholders. Where national data are missing, one should start collecting these, provided the data are relevant to the strategy.

**Developing scenarios**

From the vision and the knowledge about the driving forces and the situation in the base year, the next step in the strategic planning process will be the development of alternative scenarios for a sustainable energy future. A scenario calculates the effects of a certain policy on a given goal. Different scenarios take alternative policies, very often differentiated in levels of ambition. Alternative scenarios can be elaborated in different directions. Quite common is the development of the following:

- A business-as-usual scenario; in which the existing trends and regulatory framework are not changed.
- A technical possibility scenario; in which the current state of energy technology would be applied across the country, to its maximum potential, using regulatory or other instruments.
- A sustainability scenario; in which the expected long-term results taking into account social and environmental dimensions, are calculated back to what needs to be achieved by certain intermediate dates, through a programme that includes further research, funding and actions.

Other sets of scenarios could be imagined, such as a set based on different assumptions on economic growth (and thus energy demand). Scenario calculations could be performed on the basis of a national model.

**Formulating a strategy**

The main challenge of strategic planning of a sustainable energy future lies in the strategy formulation itself. Having the vision and the scenarios and understanding the drivers are important building blocks for strategy formulation. A strategy sets out the way forward, both in terms of substance and process. It is the core of the whole SPM approach.
**Substance:**

A strategy translates the vision in realistic targets for energy generation, transmission and distribution, energy use, import/export, and the evolution towards a sustainable energy future. Preferably the strategy addresses all aspects of the energy policy, i.e., the aspects that need to be changed or phased out as well as the aspects that need to be maintained. The strategy is the overarching document on which the action plan will be based.

The strategy takes a long-term view, at least 15 years in the future, to be divided in intervals of four or five years. Where applicable this interval will be identical to existing planning procedures in the country. The strategy defines the changes to be made in those years, both for the long-term and the short-term intermediate steps. As stated before, these changes are preferably defined as quantitative targets, e.g., required change in megawatt per fuel type as compared to the base year.

The strategy sets out the specific responsibilities of every stakeholder, including the Government at all levels, in a transparent and open manner. This will provide for clarity about every stakeholders contribution to the overall solution of the problems.

The strategy outlines the results to be achieved by stakeholders, not necessarily the methods to get to the results. Effective strategic management of a sustainable energy future may benefit from a result management approach. There will be freedom (within the existing regulatory framework) to choose the method as well as the time plan, as long as the targets are met in the long-term. Obviously, sufficient progress must be shown along the way (at the intermediate steps). This will provide the stakeholders with an opportunity to react in a cost-effective manner, choosing options and timetables that match their own investment cycles and budgets. It does call for a level playing field for the stakeholders in order to prevent distorting market situations.

Examples of these targets include:

- Increasing the energy-efficiency of housing through local government targets.
- Reducing the SO\textsubscript{2} emissions of power plants through power company targets.
- Distributing investment costs in rural areas between government and energy production and distribution companies.
- Changing to (for example) a certain percentage of renewable energy sources by the end of the strategy period through a general target for every target group.

The strategy will indicate the back-up plan: what will happen if the results are insufficient to meet the targets of the strategy. This could lead to setting additional measures to be taken. It could also include evidencing targets for additional stakeholders, not present in the original plan. It could be punitive in nature, if a stakeholder has not succeeded in achieving a reasonable portion of its overall goal.

The strategy also needs to outline the necessary legal and institutional
arrangements for the future of the energy market. With continued liberalization of the energy market and volatile energy prices owing to an unpredictable oil market, it will not be easy to organize the marketplace in an effective manner. In this regard we refer to the core subject of this thesis: a proposed framework to promote effective and efficient industry performance for small isolated monopoly systems.

**Process:**

The strategy is as much a process as it is a plan. Working together with producers, distributors, corporate and individual users, Governments at different levels and stakeholder organizations, the strategy comes alive. It is this interaction between the players in a reiterative process which is as relevant to the success of the strategy as the plan itself.

Reflecting on the vision and objectives for sustainable energy development it is very clear that ultimately the concerted actions by individual stakeholders will have to bring about the desired results. Governments need to focus their attention. This accounts for two important items in these SPM process being the involvement of stakeholders and an effective management of the process.

**Formulating an action plan**

The action plan is the translation of the strategy to the level of individual activities or tasks. Every action to be taken by the initiating agency in order to implement the strategy, to promote the achievement of results by stakeholders, to manage the process, to monitor progress, and so on, needs to be included in the action plan. It is the main management tool for the initiating agency during the implementation of the strategy. The action plan may also include the actions of other agencies, private companies, and other stakeholders.

The action plan specifies the following information for every action:

> Clear description of the action including results to be obtained with performance measures.
> Time frame for the execution of the action
> Organization responsible for the execution of the action
> Individual who is in charge of execution of the action
> Means of implementation of the action (budget, tools)

The action plan could be divided in several sections dealing with a cluster of activities. A cluster manager would oversee the cluster and report on progress to the overall action plan manager within the initiating agency. Such a cluster would have a common denominator, like a specific resource (oil, gas, electricity ...) or a specific target (rural electrification, import power, ...). Preferably a cluster combines tasks within the responsibility of one agency, as this allows for easier management of the cluster. However, there is definitely some merit in keeping related issues in one cluster of activities in the action plan, in order to assess better any reciprocal effects of different activities.
Monitoring progress and evaluation

The main purpose of monitoring as an integral element of strategic planning is to ensure that the activities of all stakeholders relevant to the success of the sustainable energy future plan are being executed and result in the desired outcome. This feedback mechanism makes progress (or lack of it) visible. It is important to pass on the information to all stakeholders, as it will tell them too how they are doing (e.g., compared to other stakeholders). It will enable them as well as the managing agency to adjust their policies or take new actions that contribute to the overall goal.

There are many ways to monitor progress. A few of the most commonly used are:

- Statistical information collection and dissemination on energy generation, use, import and export, intensity, etc., by the statistical bureau
- Qualitative study based on a questionnaire by a scientific organization or consultant
- Inspection or supervision by a separate government agency
- Use of indicators

Depending on the goals of the vision and the strategy, the initiating agency may define a set of indicators at the start of the project and report on them on an annual basis from the second year of the implementation of the project. Here are some suggestions for indicators for a sustainable energy future:

- Share of non-fossil fuel in total energy generation.
- Share of non-renewables in energy resources.
- CO₂ emissions as a function of economic growth.
- Accessibility of energy resources (e.g., to the poor).
- Affordability of energy services.
- Net energy trade balance.

Additional ideas on indicators can be found in the indicator sets of IAEA and the Commission on Sustainable Development respectively. The work of that Commission is under development and can be followed on the Internet: http://www.un.org/esa/sustdev.

It is clear that a strategy with quantitative targets will provide a clear reference for periodic comparison with indicator results. This will make progress quite transparent, which is a deliberate choice within strategic planning and management. At the same time, lack of progress will also be visible. For this reason many managing agencies are careful with the distribution of these figures. Experience shows that negative results often become a driving force for further and increased activities to meet the targets. It takes courage to show these data but they are an important factor in the engagement of stakeholders and in the communication to the general public.

The results of the monitoring exercise will provide the initiating
agency with the important data and information to evaluate the progress in the course of the planning cycle. In the evaluation of this material it may become obvious that certain policies, instruments and process arrangements need to be changed. This insight moves the process forward in a new cycle, towards an adjustment of the strategy or the plan.

Adjusting to new information
It has been stated before: strategic planning is not a one-time event, it is a continuous process. New information, new insights, monitoring progress, new stakeholders and new alliances between stakeholders, all indicate a system of continued renewal and evaluation. Even if the plan is on track, new energy demands may require revision of existing scenarios and additional measures.

The initiating agency, in its capacity as the overall manager of the process, should regularly take a few steps back to look at the implementation of the strategy from a further distance. This will be helpful in understanding the bigger picture, as energy is an integral function of society and is driven by factors other than energy policy alone. It may be helpful to call upon external parties to assess the state-of-the-strategy on a regular basis and to report on its viability for the future.

An important aspect of this could be the energy dependency on one or more countries. There could also be other dependencies. Any problem outside the control of the managing agency poses a clear and direct threat to the success of the strategy. Some examples are:

> Energy import not keeping up with domestic growth in energy demand.
> New inputs require adjustments, making the strategy dynamic, or turning the plan into a process of continuous improvement.

It is very important to think about the sustainable energy future as a work-in-progress. New written versions of the strategy will be required on a periodic basis, perhaps every five years, but the strategic process needs to be a continuum.

The electricity sector policy cube
We have constructed a so called electricity sector policy cube as a framework in which we put all the building blocks of strategic planning and management of the energy sector in context focused on the electricity sector. It consists of several components with interrelationship. The relationship is depicted in a three-dimensional matrix, in the form of a cube. The top shade consists of the fundamental dimensions related to electrification, being: Universal Access, Efficiency, Service Quality, Sustainability and alignment with Energy policy and wider National Objectives. For energy resources to comply with dimensions of Universal service, Efficiency, Service Quality and Sustainability proper management is a prerequisite for which we put forward the guidelines of strategic planning and management of energy resources presented in the front shade of the cube. In the side shade of the cube we present the guiding principles that require a high level of adherence as a prerequi-
site to successfully embark on the process of policy formulation and deployment.

The following figure illustrates the Electricity Sector Policy Cube

Within this section we will limit ourselves to give a definition and brief explanation of the components of the energy policy cube.

<table>
<thead>
<tr>
<th>Electricity sector policy dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Universal service</strong>&lt;br&gt;(Accessibility &amp; Affordability)</td>
</tr>
<tr>
<td><strong>Efficiency</strong></td>
</tr>
</tbody>
</table>
### Service quality

Service Quality within the Electricity Sector Policy Cube refers to the quality of the delivery of electricity services by utilities according to predefined standards to the end user. Areas that warrant service standards include:

- **Reliability**: This includes a list of specific standards. Example for electricity services this includes the extent and duration of outages, service restoration time, frequency of planned outages, performance of worst circuits and voltage variations.

- **Call Center Performance**: This addresses how quickly and how fully calls to the utility are answered and how well consumer questions and complaints are resolved.

- **Field Service**: This covers a wired range of situations in which utility employees make visits to customer location. Standards may include how well appointments are kept and time to connect new service.

- **Billing and Complaints**: This includes billing accuracy, metering accuracy, complaint rates to the utility and regulator, overall customer satisfaction, and power quality complaints.

### Sustainability

Sustainability means meeting the needs of the present without compromising the needs and opportunities of future generations. Within the context of the Electricity Sector Policy Cube sustainability means the harnessing of resources that:

- Are not substantially depleted by continued use;
- Do not emit substantial pollutants or other hazards to the environment;
- Do not involve the perpetuation of substantial health hazards or social injustice;

Ensuring sustainability of electricity supply services is contingent on the availability of resources to fund the operation, maintenance and investments that are required to improve and expand the services to existing and future consumers. Therefore, service suppliers must be assured a revenue flow that covers the operating, maintenance and capital expenditures associated with the services; macroeconomic and sector conditions must foster a favorable investment environment in the industry, facilitate access to financial resources and reduce the cost of capital; and consumers must be satisfied to assure political sustainability of the services.

### Energy and wider national objectives

Electricity Sector Policy is an important pillar within Energy Policy and the wider public policy of a Nation. Therefore the objectives of the Electricity Sector Policy should be aligned with the energy policy objectives and wider national objectives; it must be observed that electricity sector policy objectives sometimes may be in conflict with energy and wider national objectives, e.g. the protection of the environment.

### Electricity sector policy principals

**Focused**

Electricity sector policy should be focused on the vision, the purpose and on outcomes for citizens and service users.

The principle of focus is to ensure that the process fulfills its overall purpose, achieves its intended outcomes for citizens and service users, and that operates of energy resources operate in an effective, efficient and ethical manner. This principle should guide all energy policy activity.

The supporting principles are:

- Being clear about the purpose and its intended outcomes for citizens and service users;
- Making sure that users receive a high quality service;
- Making sure that the users receive value for money.
<table>
<thead>
<tr>
<th>Clarity of functions and roles</th>
<th>Performing effectively in clearly defined functions and roles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effective Electricity Sector Policy deployment requires the stakeholders involved to be clear about the functions to be deployed and their own roles and responsibilities and those of others, and to behave in ways that are consistent with those roles.</td>
</tr>
<tr>
<td></td>
<td>The supporting principles are:</td>
</tr>
<tr>
<td></td>
<td>• Being clear about the functions</td>
</tr>
<tr>
<td></td>
<td>• Being clear about the responsibilities</td>
</tr>
<tr>
<td></td>
<td>• Being clear about the relationship between the several stakeholders, amongst others, the service provider, shareholder, regulatory entity, environmental protection agency etc etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethical conduct</th>
<th>Demonstrating that the sector exhibits a culture that encourages ethical conduct and demonstrates a commitment to compliance with the law:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The values and principles that should guide stakeholders conduct both on an individual and organizational level – the values and principles for which the individual and organization stands – should be defined and communicated. Concepts of respect, responsibility, trust, honesty, fairness and integrity should be core principals and values and should be communicated to all levels of the internal and external stakeholders.</td>
</tr>
<tr>
<td></td>
<td>The following supporting principles are identified:</td>
</tr>
<tr>
<td></td>
<td>• Define principles and values</td>
</tr>
<tr>
<td></td>
<td>• Enhance ethical climate and mindsets</td>
</tr>
<tr>
<td></td>
<td>• Foster ethical leadership</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disclosure and transparency</th>
<th>Disclosure and transparency:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within the Electricity Sector Policy process entity’s should be rigorous and transparent about how decisions are taken. Decision making in the Electricity Sector Policy process could be complex and challenging. It must further the entities purpose and strategic direction and be robust in the medium and longer terms. The regulatory entity and the service provider have different statutory requirements for the publication on their decisions. Over and above these requirements transparent decisions that are clearly explained are more likely to be understood by staff, the public and other stakeholders and to be implemented effectively. The following supporting principles are indentified:</td>
</tr>
<tr>
<td></td>
<td>• Being rigorous and transparent about how decisions are taken</td>
</tr>
<tr>
<td></td>
<td>• Having and using good quality information, advice and support</td>
</tr>
<tr>
<td></td>
<td>• Having an effective risk management system in operation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stakeholder engagement and accountability</th>
<th>Engaging stakeholders and making accountability real</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Accountabilities are multiple:</td>
</tr>
<tr>
<td></td>
<td>From a general perspective: There are accountabilities to the public [citizens] and to those who have the authority, and responsibility, to hold them to account on the public’s behalf. These include commissioners of service, parliament, ministers.</td>
</tr>
<tr>
<td></td>
<td>From the perspective of the service provider of energy resources: the primary accountability is to the shareholder however, recognition needs to be made to the legal and other obligations to all legitimate stakeholders. Stakeholders organisations should respect the rights of shareholders and promote to exercise those rights by effectively communicating information that is understandable and accessible to shareholders.</td>
</tr>
<tr>
<td></td>
<td>The following supporting principles are identified:</td>
</tr>
<tr>
<td></td>
<td>• Understanding formal and informal accountability relationships</td>
</tr>
<tr>
<td></td>
<td>• Taking an active an planned approach to dialogue with and accountability to the public</td>
</tr>
<tr>
<td></td>
<td>• Taking an active and planned approach to responsibility to staff</td>
</tr>
<tr>
<td></td>
<td>• Engaging effectively with institutional stakeholders</td>
</tr>
</tbody>
</table>
Conclusion

Strategic planning and management of energy resources and the development of a sustainable energy future are within reach for many of the Caribbean countries. It builds on existing planning and management approaches already applied in several parts of the world. Further elaboration, in many cases by taking a wider perspective (a sustainability perspective), will provide better decision-making, better involvement (and commitment) of (key) stakeholders and in the end a more sustainable future for the countries in this region.

The framework presented in this section is a mere toolbox to assist the countries of the Caribbean region in making the transition to a sustainable energy future. Every country will face its particular problems and challenges. The framework is intended to provide ideas and inspiration on how to counter these challenges and how to apply a meaningful approach towards dealing with long-term aspirations of social and economic development, by taking small steps at a time. The results are not around the corner. They will take time and effort from Governments at different levels and from many partners in society, but walking this path together can create social cohesion, economic growth and a clean environment by deploying a sustainable energy policy.
Summary
Electricity is essential to the production of almost all goods and services and therefore is vital to the public interest. In addition, reliable electricity systems have become more important because businesses and households rely on electronic devices to perform an enormous range of tasks, both basic and advanced. Thus adequate, reliable, competitively priced electricity is essential for modernization, domestic growth, and international competitiveness. Recognizing its importance countries will embark on electricity sector reform to improve the performance of the sector. Sector reform is therefore a global phenomenon, though the direction and rate of change is country specific and motivated by different factors.

Electric utilities possess three specific features; “specific investments, economies of scale and widespread domestic consumption”. These three features are at the core of the contractual problem that has traditionally raised the need for governmental regulation of utilities. We refer to contractual problems between firms and government, contractual problems between firms and consumers and contractual problems between interest groups and the government. For the purpose of this thesis the three identified contractual problems will be referred to as the utility problem. The utility problem entails that the massive consumption, economies of scale and sunk investments ultimately provide governments with the incentive and opportunity to behave opportunistically vis-à-vis the utility company. Opportunistic behavior in especially inadequate tariff setting, which is a highly political issue, will lead to the so called vicious circle of performance decline. The utility will cut back on capital and maintenance costs at the expense of worsening service. As a consequence the system will become more expensive to maintain and inefficiency in the system will increase. Wrong price signals will go to the consumers with as a consequence inefficient usage. To correct this downward spiral huge rehabilitation costs are needed.

However, if a government wants to assure a healthy development of the utility infrastructure, then it will need to design institutional arrangements and governance structures that will limit its own ability to behave opportunistically vis-à-vis the utility. This calls for the need of a framework through which institutional and governance perspectives logically coalesce to ultimately improve and provide effective and efficient industry performance.

The research objective comprises the development of a framework for small isolated monopoly systems (SIMS) to promote effective and efficient industry performance. The research approach embarks from the structure conduct performance (SCP) paradigm to analyze those determinants that are fundamental to promote effective and efficient industry performance. This is being done through the lens of the New Institutional Economics (NIE) by using the 1st order economizing principle; “get the institutional environment right, rules of the game” and the 2nd order economizing principle, “get the governance structures right, play of the game”.

Since the primary focus of this thesis is on Caribbean small
island development states (SIDS) with their respective electricity utility systems denominated as small island monopoly systems (SIMS) attention is drawn on the challenges related to regulatory reform. Regulation is still in its infancy, and this finding is confirmed by the case study of stock taking of Caribbean Power sector reform (Martina, 2005) in which the regulatory reform indicator was 50% indicating that half of the participating Caribbean SIDS have not embarked on regulatory reform as yet. The Caribbean Benchmark study also reaffirms this finding in the sense that this analysis revealed that in the vast majority of cases the regulation applied was very basic and limited to tariff settings based on rate of return regulation although less extended as is the case in the United states of America were this regulatory mechanism is widely utilized.

In this thesis regulation is considered a design problem constrained by two components: an institutional component and a corporate governance component. Regulation has several definitions depending on the perspective in which it is observed. In this thesis our perspective is narrowly conceived and regulation refers to “the promulgation of an authoritative set of rules, accompanied by some mechanism, typically a public agency, for monitoring and promoting compliance with these rules”. Regulations is also referred to as an art that involves: establishing rules that allocate value to consumers and suppliers in such a way as to maintain incentives for the firm to create value by deploying technology adequately, while promoting political legitimacy in the eyes of consumers and other stakeholders.

Regulation has two important dimensions consisting of regulatory substance and regulatory governance. Regulatory substance refers to the content of regulation. It is the actual decisions, whether explicit or implicit, made by the specified regulatory entity or other entities within the government, along with the rationale for the decisions. Regulatory substance is the “what” of regulation. Regulatory governance is defined by the laws, processes, and procedures that determine the enterprises, actions, and parameters that are regulated, the government entities that make the regulatory decisions, and the resources and information that are available to them. Regulatory governance is the “how” of regulation.

The framework to promote effective and efficient industry performance consist of three interrelated building blocks. An institutional building block related to the interplay of institutions with industry performance. A corporate governance building block related to the interplay of corporate governance with industry performance and a menu of regulatory options comprising regulatory substance and regulatory governance. The regulatory options are derived from measuring and juxtaposing the country governance and corporate governance dimension in a matrix. The regulatory options are classified as; basic regulation, self imposed regulation, intermediate regulation and advanced regulation.

Our research has revealed that the interplay of institutions with
industry performance is a result of the fact that analytically, institutions ultimately shape governance by, shaping actors preferences and actions, providing actors with power, authority, and resources, shaping transactions costs and shaping the capacity of the state. The main challenge is to design regulatory processes that, while limiting discretion, are compatible with the country’s institutional structure of government and with legal and administrative traditions of the country.

Our research has revealed that the interplay of governance, (decomposed in country governance, regulatory governance and corporate governance) with industry performance, which lies in the multi-dimensional nature of good governance, is a result of the fact that:

> Within the context of state governance, good governance implies the capacity to formulate and implement sound economic policies, to institute effective legal institutions, to ensure public oversight and participation of civil society, and to have in place a credible civil service that provides citizens with an acceptable level of public services in an effective and efficient manner. These are the key country endowments and determine the institutional quality to ensure the establishment or reform of regulatory agencies ultimately to promote effective and efficient industry performance.

> Within the context of regulatory governance, good governance implies that the regulatory function is deployed independent, with the necessary accountability, integrity, transparency and public participation, with the necessary clarity of roles and clarity and completeness of rules, that regulation is proportionate and the regulator possesses the necessary authority and requisite powers within appropriate institutional characteristics. Good governance plays a pivotal role because, agencies with better governance should (a) make fewer mistakes and (b) have their mistakes identified and rectified better and more quickly so that (c) good regulatory practice is more readily established and maintained and in doing so promoting effective and efficient industry performance.

> Within the context of corporate governance, from a public utility perspective, good governance ensures the functioning of an effective legal and regulatory framework, that the state acts as an informed and active owner and establishes a clear and consistent ownership policy, that the rights of the shareholders are recognized, that the relationship with stakeholders is constructive, that the enterprise maintains high levels of transparency and accountability and that the boards of state-owned enterprises have the necessary authority, competencies and objectivity to carry out their function of strategic guidance and monitoring of management. Good corporate governance promotes effective and efficient organizational performance which in turn promotes effective and efficient industry performance.
The framework to promote effective and efficient industry performance has been deployed for eight Caribbean SIDS, with their respective utilities. The Country Governance scores were obtained by using scores of the Worldwide Country Governance indicators research project of D. Kaufman, A. Kraay and M. Mastruzzi (Worldbank, 2007). The corporate governance scores were obtained by submitting the corporate governance measurement questionnaire to the participating countries where the response was obtained representing at least three views, being the utility view, the regulatory view and the customer/stakeholder view.

The result of deploying the framework reveals that the selected utilities qualify for intermediate regulation. In comparison with the current regulatory practices which can be denominated as basic regulation, the gap to be bridged becomes apparent and forms the basis for an improvement strategy to evolve to the next level of regulatory maturity. Deploying the framework provides clear insight in the necessary improvement opportunities from the perspectives of country governance, corporate governance and regulatory governance.

The use of the framework is intended to serve as a synthesis of a diversity of aspects, within a coherent context, to assist in balancing competing interest from the government, the regulatory agency and the service provider. Pursuing effective and efficient industry performance is a process of continuous improvement which requires reform measures in the sector. To assure reasonable success of the reform, the choices made and the measures taken should adhere to the overarching principles of credibility, legitimacy and transparency in such a way that any outcome should be perceived as fair and just by the stakeholders involved. The framework is an instrument to deal with the utility problem and to stimulate the broader stakeholder discussion and provide a nucleus around which diverse stakeholders interests can logically coalesce. It focuses on fundamental governance principles from a country, corporate and regulatory governance perspective which represent best practices.

An effective and efficient performing electricity sector is vital for the economic development of a country and enhancement of the general well being of its population. Power sector reform has embarked in the pursuit of improving the performance of the sector and entails elements like: modifying the structure of the industry to enhance the prospects for competition, changing ownership patterns and/or creating forms of public-private partnerships to provide stronger incentives for efficiency growth, and establishing a transparent regulatory framework to balance private and public interest. In the case of Caribbean SIDS there are examples of sectors that may or may not have modified their market structure, ownership structure and regulatory structure, however, we have observed effective and efficient industry performance notwithstanding different structures. This leads us to our belief that:
“structures, systems and principles are as good as the people using them”.

Once the choice has been made for a particular structure it is the successful implementation of this structure by the stakeholders involved in the reform process that ultimately provides improvement in industry performance. Our finding is that policy choices and the successful implementation thereof is based on the collective competency of the stakeholders involved to adhere to the fundamental principles that serve as a foundation for successful sector reform. The framework for small isolated monopoly systems to promote effective and efficient industry performance provides those principles from a country, regulatory and corporate governance perspective. Ultimately reform will drive effective and efficient industry performance as a consequence of the choices made and measures taken provided that they are credible, legitimate and transparent so that the outcome could be perceived as fair and just by the stakeholders involved.
Samenvatting
Elektriciteit is essentieel voor de productie van vrijwel alle goederen en diensten en dient daarom een vitaal publiek belang. Daarbij kan gesteld worden dat het belang van een betrouwbare elektriciteitsvoorziening toeneemt daar het gehele bedrijfsleven alsook de gezinshuishouding afhankelijk is van elektrische apparatuur om een groot scala aan activiteiten te verrichten, zowel elementaire activiteiten alsook geavanceerde activiteiten. Dus een adequate, betrouwbare en competitief geprijsde elektriciteitsvoorziening is essentieel voor moderniseren, groei van de economie en de internationale concurrentie positie. Bewust van deze importantie, zullen landen hervormingen in de elektriciteitssector doorvoeren teneinde de prestaties van de sector te bevorderen. Elektriciteitssectorhervormingen zijn daarom een globaal fenomeen. Het soort hervorming, de snelheid waarmee de hervormingen plaatsvinden alsook de factoren die leiden tot hervorming kunnen per land verschillen.

Energiebedrijven beschikken over drie specifieke kenmerken; (1) de infrastructuur is zeer kapitaal intensief, (2) er is sprake van schaalvoordelen, en (3) het gebruik van het product is wijdverspreid. Deze drie kenmerken vormen de basis voor het probleem dat de noodzaak voor reguleren van nutsbedrijven door de overheid noodzakelijk maakt. We refereren naar de contractuele problemen tussen nutsbedrijven en de overheid, contractuele problemen tussen de nutsbedrijven en de consument en de contractuele problemen tussen belangengroepen en de overheid. In dit proefschrift worden de drie geïdentificeerde contractuele problemen samengevoegd en benoemd tot het nutsvoorzieningprobleem. Het nutsvoorzieningprobleem als gevolg van kapitaal intensiteit, schaalvoordelen en wijdverspreide consumptie, vormen een motief voor opportunistisch gedrag van de overheid vis-a-vis het nutsbedrijf. Dit opportunistische gedrag, dat zich met name uit in inadequaten vaststelling van de hoogte van de tarieven, wat een politiek zeer gevoelige kwestie is, zal leiden tot de vicieuze cirkel van afnemende prestaties. Inadequate tariefing heeft als gevolg dat het nutsbedrijf minder zal investeren in onderhoud en vervanging, waardoor de kwaliteit van het product zal afnemen. Het gevolg is dat de gehele infrastructuur inefficiënt wordt en duurder wordt om te onderhouden. De consumenten krijgen de verkeerde prijssignalen met als gevolg inefficiënt verbruik. Teneinde deze negatieve spiraal halt toe te roepen zullen zeer hoge rehabilitatiekosten benodigd zijn.

Echter, indien de overheid een gezonde ontwikkeling van de nutsinfrastructuur wil waarborgen, dan zal het institutionele en “governance”-structuren moeten ontwikkelen teneinde haar mogelijk opportunistisch gedrag ten opzichte van het nutsbedrijf in te perken. Dit onderschrijft de noodzaak voor een kader op basis waarvan op een logische wijze institutionele en “governance”-arrangementen kunnen worden ontwikkeld voor het bevorderen van een effectieve en efficiente nutsvoorziening.

Het centrale thema van dit proefschrift behelst de ontwikkeling van een raamwerk voor kleine geïsoleerde monopolysystemen voor het bevorderen van een effectieve en efficiente elektriciteitsvoorziening. De opzet van het onderzoek is gebaseerd op de “Structure, Conduct, Performance
Regelingsvraagstuk van eilanden in het Caribische gebied, de zogeheten Caribische “Small Island Development States” (SIDS) en hun elektriciteitsystemen de zogeheten “Small Isolated Monopoly Systems (SIMS)”. Regulering van de elektriciteitssector staat nog in de kinderschoenen en deze bevinding wordt bevestigd door de analyse die is verricht naar de status van elektriciteitssectorhervormingen in het Caribische gebied, (Martina, 2005). Uit deze analyse blijkt dat de indicator voor hervormingen van elektriciteitssectorregulering 50% heeft gescoord wat impliceert dat de helft van de eilanden die hebben geparticipeerd in het onderzoek nog geen reguleringshervormingen hebben ingevoerd. Deze bevinding wordt ook bevestigd door de “Caribbean Benchmarking Study (Carilec, 2008)”. In deze studie wordt bevestigd dat regulering van de elektriciteitssector in het Caribische gebied zeer beperkt is en daar waar er sprake is van regulering dit veelal beperkt blijft tot zeer elementaire prijsregulering gebaseerd op de zogeheten “rate or return regulation” dat veel wordt toegepast in Noord Amerika, echter beperkerd in opzet.

In dit proefschrift wordt regulering gezien als een ontwerpprobleem ingekaderd door twee fundamentele dimensies, te weten, een institutionele dimensie en een “corporate governance” dimensie. Regulering kent vele definities afhankelijk van welk perspectief het wordt benaderd. In dit proefschrift wordt regulering gedefinieerd als “het afgekondigde geheel aan regels en het stimuleren van en toezien op een correcte naleving van deze regels. Het toezicht vindt normaliter plaats door een overheidsinstantie. Er wordt ook wel eens gesproken over de kunst van regulering. Het betreft de kunst om zodanige regels te creëren dat deze regels waardevol zijn voor de consument en het nutsbedrijf zodanig dat het nutsbedrijf gestimuleerd wordt om beschikbare technologie optimaal te benutten, en het geheel als bestuurlijk legitiem wordt ervaren vanuit de perspectieven van de consument en andere “stakeholders”.

Regulering kent twee fundamentele aspecten, bestaande uit enerzijds de inhoudelijke aspecten en anderzijds de “governance” aspecten van regulering. De inhoudelijke aspecten van regulering betreffen de reguleringsregels en besluiten die bestaan en/of worden genomen tezamen met de toelichting op deze regels en besluiten. De inhoudelijke aspecten van regulering worden ook wel aangeduid als het “wat” van regulering. De “governance” aspecten van regulering zijn gericht op wet- en regelgeving, de processen en procedures die van invloed zijn op de activies van nutsbedrijven, en de entiteiten die de regulatorisbeslissingen nemen. De “governance” aspecten van regulering wordt ook wel aangeduid als het “hoe” van regulering.
Het raamwerk voor het bevorderen van een effectieve en efficiënte nutsvoorziening is opgebouwd uit drie dimensies. Een institutionele dimensie, dat de wisselwerking tussen instituties en een effectieve en efficiënte nutsvoorziening belicht. Een “corporate governance” dimensie, dat de wisselwerking tussen “corporate governance” en een effectieve en efficiënte nutsvoorziening belicht. En als derde dimensie een menu van reguleringsopties bestaande uit de inhoudelijke aspecten van regulering en de “governance” aspecten van regulering. De reguleringsopties worden bepaald door de kwaliteit van instituties en de kwaliteit van “corporate governance” in een matrix aan elkaar te relateren. De reguleringsopties worden gekwalificeerd als: elementaire regulering, zelfregulering, intermediair regulering en geavanceerde regulering.

Het onderzoek heeft uitgewezen dat de wisselwerking tussen instituties en een effectieve en efficiënte nutsvoorziening is gelegen in het feit dat instituties de kaders scheppen voor “governance”. Op basis hiervan kunnen actoren handelen, prioriteiten stellen, en kunnen actoren voorzien worden van macht, middelen en autoriteit. De grote uitdaging is het ontwikkelen van een zodanig reguleringsproces dat voorziet in discretionaire bevoegdheden die aansluiten op de instituties van een land alsook op de juridische en administratieve tradities van een land.

Het onderzoek heeft uitgewezen dat de wisselwerking tussen “governance” (vanuit staats, regulering, en ondernemingsoptiek) en een effectieve en efficiënte nutsvoorziening, gelegen is in de multidimensionele aard van “good governance” en een resultante is van het feit dat:

> Binnen de context van staats “governance”, impliceert “good governance”: het vermogen tot het formuleren en implementeren van een gezond economisch beleid, het zorgdragen voor effectieve juridische instituties, het waarborgen van overheidszicht en participatie in het maatschappelijke verkeer en het zorgdragen voor geloofwaardige overheidsinstanties die de gemeenschap kunnen voorzien van diensten van een acceptabel kwaliteitsniveau. Dit zijn de fundamentele karakteristieken die de institutionele kwaliteit van een land bepalen. Dit is tevens een noodzakelijke randvoorwaarde voor het instellen van reguleringsinstanties dan wel voor het doorvoeren van reguleringshervormingen teneinde een effectieve en efficiënte nutsvoorziening te bevorderen.

> Binnen de context van regulerings- “governance”, impliceert “good governance” dat de reguleringsfunctie onafhankelijk kan worden uitgeoefend, met de nodige waarborgen voor het geven van rekenschap, gebaseerd op integriteit, transparantie en participatie. Tevens vergt het duidelijkheid over de verschillende functies en bevoegdheden en duidelijkheid en volledigheid van regels. Regulering dient afgestemd te zijn op het doel waarbij de regelgever over de nodige autoriteit en macht kan beschikken op basis van adequate institutionele kenmerken. “Good governance” is van vitaal belang. Reguleringsinstanties waarvan de “governance” op een goed niveau is ontwikkeld zullen (a) min-
Regulation in Splendid Isolation

Samenvatting
der fouten maken, (b) fouten sneller ontdekken en corrigeren en (c) reguleringspraktijken die hun diensten hebben bewezen (good practices) sneller adopteren en waarborgen. Hierdoor wordt dus een effectieve en efficiënnte nutsvoorziening bevordert.

Binnen de context van “corporate governance”, impliceert “good governance” vanuit het perspectief van de nutsvoorziening, dat er sprake is van een effectieve juridisch en reguleringskader. De staat gedraagt zich als een wel geïnformeerde en actieve aandeelhouder binnen een consistent aandeelhoudersbeleid en de rechten van de aandeelhouder(s) worden erkend. Constructieve relaties met de “stakeholders” worden nagestreefd en het nutsbedrijf hoge standaarden van transparantie en rekenschap naleeft. De raad van commissarissen dienen te beschikken over de nodige autoriteit, competenties, en objectiviteit om hun functie van toezichthouden op en ondersteunen van het management naar behoren uit te kunnen oefenen. “Good corporate governance” bevordert het effectief en efficiënt functioneren van het nutsbedrijf wat bevorderlijk is voor een effectieve en efficiënnte nutsvoorziening.

Het raamwerk ter bevordering van een effectieve en efficiënte nutsvoorziening voor kleine geïsoleerde monopoliesystemen is toegepast op acht Caribische eilanden. De institutionele kwaliteit is bepaald door gebruik te maken van de “Worldwide Country Governance indicators research project of D. Kaufman, A. Kraay and M. Mastruzzi (Worldbank, 2007).” De kwaliteit van “corporate governance” is verkregen door het compileren van de verkregen scores van de “corporate governance measurement questionnaire”. Deze questionnaire is verstuurd naar de acht participerende eilanden zodanig dat per eiland ten minste drie invalshoeken op de kwaliteit van “corporate governance” zijn verkregen van respectievelijk het nutsbedrijf, de regulerende instantie en de consumenten/”stakeholder” vertegenwoordiging.

Het resultaat van het toepassen van het raamwerk laat zien dat de institutionele condities alsook de kwaliteit van “corporate governance” zodanig is dat de nutsvoorziening kwalificeert voor intermediair reguleren. In vergelijking met de huidige reguleringspraktijken, die gekwalificeerd worden als elementaire reguleren, wordt het groeipad die doorlopen kan worden zichtbaar teneinde te evolueren naar de volgende reguleringsfase van een hogere orde. Het toepassen van het raamwerk geeft concreet inzicht in die aspecten waaraan gewerkt moet worden vanuit een staats- “governance”, een regulerings- “governance” en een “corporate governance” perspectief.

Toepassen van het raamwerk heeft als doel een groot aantal complexe aspecten op een logische en geordende wijze bijeen te brengen op basis waarvan een juiste balans kan worden gevonden voor de verschillende conflicterende belangen van de overheid, de regulerende instantie en het nutsbedrijf. Teneinde succesvolle hervormingen door te voeren in de elektriciteitssector zullen de keuzes die gemaakt moeten
worden en de maatregelen die getroffen moeten worden voldoen aan de fundamentele basisprincipes van betrouwbaarheid, rechtmatigheid en transparantie zodat de betrokken “stakeholders” de hervormingen kunnen percipieren als redelijk en billijk. Het raamwerk kan gebruikt worden als instrument voor het aanpakken van het nutsvoorzieningsprobleem alsook voor het stimuleren van het publieke debat betreffende de nutsvoorzieningen. Immers, het biedt een kader vanuit institutionele, regulerings alsook “corporate governance” invalshoeken. Het biedt een focus op fundamentele universele “good governance” principes vanuit een institutionele, regulerings- en ondernemings- invalshoek.

Een effectieve en efficiënte presterende elektriciteitssector is van vitaal belang voor de socio-economische ontwikkeling van een land en voor het welzijn van de bevolking. Hervormingen in de elektriciteitssector zijn uiteindelijk bedoeld voor het bevorderen van een effectieve en efficiënte nutsvoorziening en behelst aspecten zoals: het introduceren van competitie in de markt, veranderend aandeelhouderschap, of het creëren van publiek en private structuren, alsook het inrichten van transparante reguleringskaders teneinde een juiste balans te bewerkstelligen tussen het publiekbelang en het ondernemingsbelang. Voor wat betreft de Caribische eilanden kan gesteld worden dat er voorbeelden zijn waar dan weer wel en dan weer geen competitie in de markt is ingevoerd, waarbij wel en dan weer geen privaat aandeelhouderschap is ingevoerd, en waar wel en dan weer geen regulering is ingevoerd. We hebben ook geobserveerd dat van de verschillende structuren er voorbeelden zijn van effectief en efficiënte nutsvoorziening op basis waarvan wij concluderen dat:

“Structures, systems and principles are as good as the people using them”.

Als eenmaal keuzes gemaakt worden voor een bepaalde structuur is het van belang dat de “stakeholders” betrokken bij het hervormingsproces uiteindelijk zorgdragen voor een succesvolle doorvoering van de hervormingen teneinde een effectieve en efficiënte nutsvoorziening te bewerkstelligen. Wij concluderen dat de kwaliteit van beleidskeuzes en de mate van succesvolle implementatie in sterke mate wordt bepaald door het collectieve competentievermogen dat de “stakeholders” kunnen betrachten in het naleven van fundamentele universele basis principes. Het raamwerk voor het bevorderen van een effectieve en efficiënte nutsvoorziening voor kleine geïsoleerde monopoliesystemen reikt deze fundamentele universele principes aan vanuit het perspectief van staats ‘governance’, regulerings- “governance en “corporate governance”. Uiteindelijk zullen hervormingen leiden tot effectieve en efficiënte nutsvoorziening als gevolg van de keuzes die worden gemaakt en de maatregelen die worden genomen, onder de aannname dat zij betrouwbaar, rechtmatig en transparant zijn zodat ze door de “stakeholders” gepercipieerd kunnen worden als redelijk en billijk.
Curriculum Vitae
Ivan Steve Martina, better known as Steven Martina, was born on the 13th of November 1961 in Curaçao N.A. He is married and has two children. After completing his secondary school in Curaçao (1980) he studied Engineering and Business administration at the Tilburg institute of technology (1985) and Information Management at the Tilburg University (1989). He started his career in 1989 in the Netherlands as information analyst at the “Centrum Informatie Voorziening Oost Brabant” (CIOB) a Dutch based Information Systems Service Company. In 1990 he returned to Curaçao and joined the Effective Management Group (EMG) N.V. Within this group he was responsible for the information management strategy and policy deployment for the companies that were managed by the EMG, amongst others, Kodela the Curaçao Water and Electricity Distribution Company and the Curaçao Drydock Company (CDM). In 1995 he joined SQL Systems a company acting in the field of physical asset management and asset management information systems. He was the general manager of SQL Systems Latin America & Caribbean and SQL Systems do Brasil. In this capacity he was also active as management consultant providing consulting services in physical asset management and reliability centred maintenance to various companies in various Latin America & Caribbean countries (e.g. Mercedes do Brasil and Gessylever in Brazil, Molinos in Argentina, Cementos del Valle and Unilever in Colombia, Resilin and Unilever in Venezuela, Billiton and the Surinam State Oil Company in Surinam, Jamaica Public Services in Jamaica) In 1999 he continued his career as President and CEO of Aqualecra the Curaçao vertically integrated water and electricity supply company. He is recognized as the architect of Aqualecra’s strategic Utility Plan2020, launched in the year 2000, which gained considerable recognition and obtained major funding for rehabilitation and further optimization of the utility infrastructure. As of June 2006 he is the President & CEO of Fatum Caribbean a composite insurance company member of the Guardian Holdings Group, active in the property & casualty and life, health & pensions lines of business.

Furthermore Steven Martina is also very active in civic activities. Amongst others he is president of the board of the “Caribbean Foundation for Information Governance”, (CARIFIG), president of the board of the foundation “Un Granitu”, member of the board of the foundation “Clini Clowns Curaçao”, member of the board of the sport society “Stakamahachi” and president of the management board of the “Asphalt Lake Recovery Project”. He is a part-time teacher at the University of the Netherlands Antilles and “Business School Caribbean”. His hobbies are volleyball, swimming, cycling and running and he is also a music practitioner.
Publications
Hakvoort, R., and S. Martina. (2009),
“Reflections on a Utility Regulator for Curaçao”,
University of the Netherlands Antilles, ISBN: 978-99904-0-953-6

Martina, S., Hakvoort. R. and V. Ajodhia (2008),
“Benchmarking as a Management and Regulatory Instrument for Caribbean Electric Utilities”,

Martina, S. (2008),
“De Centripetale Kracht van een Autonoom Curaçao”,
Universiteit van de Nederlandse Antillen.

“A Benchmark of the Caribbean Electric Utilities: From Management Tool to Regulatory Instrument?”,
30th International Conference of IAEE in Wellington, New Zealand.

Martina, S. (2005),
“Stocktaking of Caribbean Sector Reform”, Paper presented at the KEMA seminar “Staying Ahead of the Regulator”

Presentations
Martina, S.
“A Framework to Promote Effective and Efficient Performance of the Electricity Industry for Small Isolated Monopoly Systems”,
Carilec 20th CEO Conference, Grand Cayman Marriott Beach Resort, Grand Cayman, June, 7 2009.

Martina, S.
The Westin Dawn Beach Resort St. Maarten, September, 9 2008

Martina, S. Chairman at the seminar

Martina, S.
“How to Deal with Energy Dependence when Oil Prices are High”, Key note address, Forum Adiiction to Oil, Renessaince Convention Center, Oranjestad, Aruba, June 25, 2008.
Martina, S.
“De Centripetale Kracht van een Autonoom Curaçao”.
Dies Rede, Dies Natalis voor de Universiteit van de Nederlandse Antillen, Willemstad Curaçao, 11 januari 2008.

Martina, S.
“Corporate Governance and Public Governance, Differences and Similarities, What have we learned?”

Martina, S., and R. Hakvoort.,
“Dreaming of the Future in a World of Utility Efficiency, Regulation and Public Interests”.

Martina, S.
“Change the Only Constant”

Martina, S.
“The Water and Electricity Supply of Curaçao in Perspective, Lessons Learned”.
Anton de Kom University, Paramaribo Surinam, 16 November 2006.

Martina, S.
“The Curaçao Water and Electricity Supply in Pursuit of Operational Excellence, the period 2000 - 2005”,

Martina, S.
“Energy Trends and its Consequences and Alternatives for Affordability”.

Martina, S.
“A New Perspective of Curaçao”,
Key note address, Dinner of the 14th Statutory Congres of the political party MAN. Brakkeput mei mei, Willemstad Curaçao, October 29, 2005.

Martina, S.
“The Curaçao Electricity Sector, within the context of Sustainability”,
Sustainable Applications for Tropical Island States (SATIS) Conference, Avila Beach Hotel, Willemstad Curaçao, August 15, 2005.
Martina, S.

Martina, S.

Martina, S.

Martina, S.
Regulation in Splendid Isolation

NGInfra
PhD Thesis Series
on Infrastructures
1. Strategic behavior and regulatory styles in the Netherlands energy industry  
Martijn Kuit, 2002,  
Delft University of Technology, The Netherlands.

2. Securing the public interest in electricity generation markets, The myths of the invisible hand and the copper plate  
Laurens de Vries, 2004,  
Delft University of Technology, The Netherlands.

3. Quality of Service Routing in the Internet: Theory, Complexity and Algorithms  
Fernando Kuipers, 2004,  
Delft University of Technology, The Netherlands.

4. The role of power exchanges for the creation of a single European electricity market: market design and market regulation  
François Boisseleau, 2004,  
Delft University of Technology, The Netherlands, and University of Paris IX Dauphine, France.

5. The ecology of metals  
Ewoud Verhoef, 2004,  
Delft University of Technology, The Netherlands.

6. MEDUSA, Survivable information security in critical infrastructures  
Semir Daskapan, 2005,  
Delft University of Technology, The Netherlands.

7. Transport infrastructure slot allocation  
Kaspar Koolstra, 2005,  
Delft University of Technology, The Netherlands.

8. Understanding open source communities: an organizational perspective  
Ruben van Wendel de Joode, 2005,  
Delft University of Technology, The Netherlands.

9. Regulating beyond price, integrated price-quality regulation for electricity distribution networks  
Viren Ajodhia, 2006,  
Delft University of Technology, The Netherlands.

10. Networked Reliability, Institutional fragmentation and the reliability of service provision in critical infrastructures  
Mark de Bruijne, 2006,  
Delft University of Technology, The Netherlands.

11. Regional regulation as a new form of telecom sector governance: the interactions with technological socio-economic systems and market performance  
Andrew Barendse, 2006,  
Delft University of Technology, The Netherlands.

12. The Internet bubble - the impact on the development path of the telecommunications sector  
Wolter Lemstra, 2006,
13. *Multi-Agent Model Predictive Control with Applications to Power Networks*

14. *Dynamic bi-level optimal toll design approach for dynamic traffic networks*

15. *Intertwining uncertainty analysis and decision-making about drinking water infrastructure*

16. *The New EU Approach to Sector Regulation in the Network Infrastructure Industries*

17. *A functional legal design for reliable electricity supply, How technology affects law*

18. *Improving Real-Time Train Dispatching: Models, Algorithms and Applications*

19. *Exploratory modeling and analysis: A promising method to deal with deep uncertainty*

20. *Characterization of Complex Networks: Application to Robustness Analysis*

21. *Shedding light on the black hole, The roll-out of broadband access networks by private operators*

22. *On Stackelberg and Inverse Stackelberg Games & Their Applications in the Optimal Toll Design Problem, the Energy Markets Liberalization Problem, and in the Theory of Incentives*
    Kate ina Stáková, 2009, Delft University of Technology, Delft, The Netherlands.

    Performance Metrics
Austine Ajah, 2009,
Delft University of Technology, Delft, The Netherlands.

24. Comprehensive models for security analysis
of critical infrastructure as complex systems
Fei Xue, 2009,
Politecnico di Torino, Torino, Italy.

25. Towards a single European electricity market,
A structured approach for regulatory mode decision-making
Hanneke de Jong, 2009,
Delft University of Technology, The Netherlands.

26. Co-evolutionary process for modeling
Large Scale Socio-Technical Systems evolution
Igor Nikolić, 2009,
Delft University of Technology, The Netherlands.

27. Regulation in Splendid Isolation: A Framework to Promote
Effective and Efficient Performance of the Electricity Industry
in Small Isolated Monopoly Systems
Steven Martina, 2009,
Delft University of Technology, The Netherlands.

Order information: info@nginfra.nl
Regulation in Splendid Isolation
Propositions

Belonging to the thesis

Regulation in Splendid Isolation
A Framework to promote Effective and Efficient Performance of the Electricity Industry in Small Isolated Monopoly Systems

Ivan Steve Martina
26 June 2009

1 The effective policies needed by the Caribbean Small Island Developing States (SIDS) to gain economic resilience and cope with the effects of their inherent vulnerability are different for each of them. [Chapter two]

2 Often the quality and availability of data are a pretext not to engage in performance measurement and benchmarking, however, performance measurement and benchmarking are valuable tools to encourage enterprises to become "learning organizations". [Chapter three]

3 Good Governance is not a luxury but a basic requirement for socio-economic development. [Chapter four and five]

4 The independent regulator model should not be advocated as “best practice” without specifying the contextual conditions of institutional quality and governance maturity. [Chapter six]

5 In the process of the constitutional restructuring of the Kingdom of the Netherlands, the islands that will obtain an autonomous status should always be cautious that freedom in the union is not reduced to freedom in unity.

6 A firm and sustainable constitution for islands is better guaranteed in an unitary state as compared to a federation.

7 A dissertation demands much of ones intellect, self discipline and perseverance.... for sure in the ambiance of an ideal Caribbean vacation destination.

8 We must risk going too far to discover just how far we can go. [Jim Rohn].

9 The global financial and economic crisis, by many accounts the worst since the Great Depression, illustrates the urgent need for universal accounting and oversight.

10 Life is the sum of all choices [Albert Camus]. We are the choices we make [Jean Paul Sartre]. The challenge is to make the right choices.

These propositions considered opposable and defendable and as such have been approved by the supervisor Prof.dr.ir.M.P.C. Weijnen
Het effectieve beleid dat de Caribische ‘Small Island Developing States [SiDS]’ behoeven om economisch veerkrachtig te worden en om de gevolgen van hun inherente kwetsbaarheid het hoofd te bieden, is voor elk van hen verschillend. (Hoofdstuk 2)

De kwaliteit en beschikbaarheid van data zijn vaak een voorwendsel om prestatiemeting en ‘benchmarking’ achterwege te laten, maar beide zijn waardevolle instrumenten om ondernemingen te stimuleren een lerende organisatie te worden. (Hoofdstuk 3)

Goed bestuur is geen luxe, maar een basisvereiste voor sociaal-economische ontwikkeling (Hoofdstuk 4/5)

Het model van de onafhankelijke toezichthouder mag niet aangeprezen worden als “best practice” zonder daarbij de contextuele condities van institutionele kwaliteit en bestuurlijke volwassenheid te specificeren. (Hoofdstuk 6)

In het proces van de staatkundige hervormingen van het Koninkrijk der Nederlanden dienen de eilanden die een autonome status zullen verkrijgen, er altijd voor te waken, dat vrijheid in verbondenheid niet degradeert tot ongewenste eenvormigheid.

Een hechte en duurzame staatsvorm voor eilanden is beter gewaarborgd in een eenheidsstaat dan in federatief verband.

Promoveren stelt hoge eisen aan intellect, zelf discipline en doorzettingsvermogen... zeker op een ideale Caribische vakantiebestemming.

Om te ontdekken tot hóever we kunnen gaan, moeten we riskeren te ver te gaan (Jim Rohn).

De wereldwijde financiële en economische crisis, in vele opzichten de zwaarste crisis sinds De Grote Depressie, illustreert hoe dringend noodzakelijk universeel rekenschap afleggen en universele supervisie zijn.

Leven is een optelsom van keuzes (Albert Camus). Wij zijn de keuzes die we maken (Jean Paul Sartre). De uitdaging is het maken van de juiste keuzes.

Deze stellingen worden opponeerbaar en verdedigbaar geacht en zijn als zodanig goedgekeurd door de promotor Prof.dr.ir.M.P.C. Weijnen
Regulation in Splendid Isolation
A Framework to Promote Effective and Efficient Performance of the Electricity Industry in Small Isolated Monopoly Systems

Effective regulation is the most critical enabling condition for infrastructure reform. Crafting proper regulation is the greatest challenge facing policymakers in developing and transition economies.

This book showcases a framework for small isolated monopoly systems (SIMS) to promote effective and efficient performance of the electricity industry. Deployment of the framework proposes options for regulatory mechanisms comprising regulatory substance and regulatory governance based on the institutional quality and corporate governance maturity of the country. The framework is intended to serve as a synthesis of a diversity of aspects from an institutional, regulatory and governance perspective. Pursuing effective and efficient performance of the electricity industry is a process of continuous improvement which requires reform measures in the sector. To assure reasonable success the overarching principles of credibility, legitimacy and transparency should be applied in such a way that the outcome should be perceived as fair and just by the stakeholders. The framework is an instrument to support the broader stakeholder discussion and provide a nucleus around which diverse stakeholders interests can logically coalesce.

Ivan Steve Martina holds a degree in Engineering and Business Administration at the HTS Tilburg and a degree in Information Management at the Tilburg University. This book is the result of Ph.D research conducted at the Faculty of Technology, Policy and Management of the Delft University of Technology.

ISBN 978-90-79787-08-1