Connecting Reason to Power

Assessments, Learning, and Environmental Policy Integration in Swedish Energy Policy

Proefschrift

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door

Måns Andreas NILSSON

Master of Science in Business Administration and Economics,
Lund University, Zweden
geboren te Lund, Zweden

Dit proefschrift is goedgekeurd door de promotoren:

Prof.dr.ir. W.A.H. Thissen
Prof. dr. R.E. Kasperson

Samenstelling promotiecommissie:

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Dedication

I dedicate this thesis to Mother and Father
for your love and
for your intellectual and moral guidance

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Samenvatting

Summary

The overall purpose of this thesis is to contribute to understanding what makes a policy-making system better at integrating sustainability concerns into its processes. Three objectives are in focus. First, to examine the problem: how can policy integration be understood analytically and what is its actual status in sector policy? Second, to explain the observed patterns: what conditions have facilitated or constrained policy integration? Third, to give prescriptions: how should institutions and assessment systems be set up to enhance the potential for policy integration as a learning process?

Policy integration has been put forward as something of a "holy grail" of public policy in Europe and is even stated in the European Treaty. However, so far progress appears to have been slow and partial. Furthermore, neither analysts nor policy practitioners are in agreement on what policy integration really means. A starting point is to clarify policy integration from a theoretical interpretation of the political principle. The thesis presents a framework for analysing environmental policy integration as a policy-learning process, defined to occur when sectoral actors reframe their understanding of key problems, objectives, and strategies towards sustainable development. This framework combines theoretical perspectives such as policy networks, learning, institutionalism, and knowledge-policy studies.

The empirical analysis is concerned with analysing patterns of policy learning and policy integration in Swedish energy policy and policymaking processes, and with tracing these processes and their outcomes in different rounds and stages of policy formation over the last two decades. The analysis is based on a triangulation of: a) qualitative analysis of arguments and reasoning in publicly-available documents; b) characterisation of policy decisions; and c) complementary information from 30 semi-structured interviews with policy actors, carried out between 2002 and 2004.

Energy policy in general since the late 1980s has undergone major reframing, from a distinct central planning frame towards an international and market-based understanding of the sector, and towards partial EPI. This has induced important policy shifts primarily in relation to climate policy, but also how the sector is governed in general, moving away from national taxes and subsidies and into market-based systems and voluntary agreements. However, of all environmental concerns, only the climate issue has become really integrated in sector policy and it appears to have crowded out other issues on the way. New actor configurations and increasing interdependencies were necessary conditions for triggering the learning processes, allowing new frames and perspectives to enter the sector policy debate. This was driven through the dissolution of the powerful industry-political iron triangle controlling policymaking in the sector in the 1970s and 1980s. The reconfiguration of actors in turn developed from exogenous factors such as Nordic- European-, and global market and policy developments.

In a higher-resolution empirical analysis of the development of nuclear and climate policy in Sweden, policy learning is related to institutional rules (such as where, how, and by whom decisions are being prepared and taken) and assessments (such as what kinds of sustainability-related knowledge is being provided, for what purpose, and in what form). According to this

analysis policy learning occurs for issues that are not highly visible or politicised, with moderate levels of interest conflict, and with an international stream pushing the agenda. It relied on processes with leadership from the sector "mainstream" that lent credibility and trust to the process and that focussed on building up joint-problem understandings and render goal conflicts and policy dilemmas explicit.

The thesis also develops a theoretical argument about the mismatch between assessments and decision making as key constraints to their effective use. Drawing on lessons from decision-making science, policy analysis, and risk management, it is argued that assessments should assume a role as an adaptive decision-centred support system, rather than as a prescribed input according to a regulated procedure. Doing this involves, among other things, including decision-making characterisation in scoping the assessment, including non-quantifiable data as well as alternatives and criteria, and making explicit the treatment of values: choices of assessment data and methods should depend on the priorities of the intended users. Finally, a practical policy-analytic application is performed to understand how factors believed to contribute to policy learning are represented in real applications of existing assessment methods. It is suggested that methods complement each other rather than compete, that precision increases when we move from life cycle data to risk assessment, and that qualitative methods have a very important role to play. Furthermore, it is stated that conventional analytical tools do not necessarily fair worse in terms of policy learning across actors than deliberative tools. They do not mix well with stakeholder participation in themselves but their results can be a stronger basis for deliberations. The exercise confirms that an understanding of the decision-making context is necessary as an integral part of the assessment.

Enhancing the potential for policy learning requires ceding environmental competencies and putting issue ownership firmly in the sectors, strategically selecting leadership, enhancing governmental capacities and incentives for learning, supporting the development of joint-problem perceptions and dilemma sharing, and institutionalising the use of both ex ante and ex post assessments at high governmental levels. Learning processes benefit from the use of combinations of assessments that highlight different perspectives and trade offs. Integrated sustainability assessments, as opposed to more focused environmental assessments, are therefore required.

Preface and acknowledgements

The research was carried out at the Stockholm Environment Institute in collaboration with the Faculty of Technology, Policy and Management at Delft University of Technology; and with project partners at the Royal Institute of Technology, Sweden; Umeå University, Sweden; and various European research groups. Several connected research projects and funding sources have contributed. The most central is "PIntS: Policy Integration for Sustainability" (2002–2006, funded by FORMAS). In addition, several complementary projects have been drawn upon: "Values and Environmental Policy-making" (2001–2002, a fellowship with the Carnegie Council for Ethics and International Affairs); "Methods for Environmental Systems Analysis in Strategic Tools" (2002–2004, funded by MISTRA; and "Methods for SEA in the Energy Sector" (2001–2003, funded by the Swedish Energy Agency and the Swedish Environmental Protection Agency), and "ANSEA" (2000–2002, funded by the European Commission).

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Introduction

All scientific inquiry starts with a problem. As a student of policy I should identify this problem, formulate it in researchable terms, investigate it and, hopefully, make some advances towards resolving it. What, then, is my problem? At a family gathering three years ago I tried to explain to my uncle what I was doing all day at work, and for what possible reason I had to move away from the beautiful Skåne region in the South of Sweden to live in the self-conscious town of Stockholm up North. We talked about energy policy and the political carousel on nuclear, and I said; "...so they are closing down these plants, and paying a lot of our taxpayers' money as compensation to these wealthy utilities, and instead they start importing electricity from coal-fired plants in Denmark and nuclear plants around the Baltic". "So people are happy with this?", he said. "No", I said, "I think pretty much everyone is upset with what happened". "I don't get it", he said, "Why can't they just reason about this?"

That pretty much summed it up for me: do "they" reason about it? Presumably, they do in some ways; at least they appear to be busy. If they do, how? And if they don't, then why? And what is the outcome of all this reasoning or whatever it is they are doing? It seems like many problems, sustainability-related and others, emerge in the wake of the political decisions taken. Have these problems been taken into account? Thus, expressed in very general terms, the overriding issue that I want to address in this thesis is: *how are important public policy decisions being made?* Understanding this is the necessary basis for developing prescriptions on: *how, if at all, might public policy decision making be improved?* In the following, this very broad theme will be narrowed down.

A few premises to start with

Words like "improved" obviously have normative connotations that might raise questions. The Swedish economist Gunnar Myrdal argued that in all social science inquiries, the researcher has normative biases and it is necessary to clearly stipulate these at the outset so they can be scrutinised and reflected upon (Myrdal, 1975). This is also the basis of the philosophy and "socio analysis" of Bourdieu; as a scientist you must reflect on your own perspective and the scientific world you live in (Bourdieu, 1994). My normative perspective on public policymaking is that decisions should be based on a set of objectives that are consistent with societal goals established through democratic procedures; it should involve a reasonably systematic attempt towards establishing a comprehensive knowledge base to inform the decision; and a correlation between the knowledge base and the decision. Policy should be shaped with an understanding of the various dimensions of its consequences and trade offs between different goals. Some would call this a "rationalistic" bias. This does not mean that I see rationalism as a good explanatory model in politics. For instance, it is rarely so that the system can first establish the goals and then look for the solutions. More often the available solutions shape what goals we assume. Nevertheless, administrative behaviour can often be characterised as boundedly rational in that it involves a purposive exploration for satisficing policy solutions within con-

straints such as cognition and culture, resources, and routines (Simon, 1997).

This bounded-rationalistic departure point and its associated biases have led me to an important premise for the research: focusing on the role of learning and the use of knowledge in policymaking. Majone (1989) states that "according to social psychologists, learning is the dominant form in which rationality exhibits itself in situations of great cognitive complexity. This suggests that the rationality of public policymaking depends more on improving the learning capacity of the various organs of public deliberation than on maximising the achievement of particular goals" (p. 183). With a learning perspective, I assume that relevant knowledge about policy issues and response options are necessary to support policymaking. I also assume that scientific and expert knowledge has a special role in the process, although there are many kinds of legitimate knowledge for policymaking, including lay knowledge and values. However, instead of prescribing any "science-speaking-truth-to-power" model, I recognise that these scientists and experts have distinct values and preferences, expressed through choices of methods, topics, and involvement in epistemic communities. Like for policymakers, their rationalities are bounded and framed.

Furthermore, knowledge enters the process not just through formal assessments but also through lobbying and networking activities of these communities. Behind the argumentation are often strategic and sometimes manipulative considerations and the knowledge base can be contradictory and ambiguous. Modern politics is then to a large extent a question of whose knowledge, within what framing, is allowed to dominate. Power can be the ability to create knowledge that supports your political position, deciding what type of knowledge should be created, what type of knowledge should be avoided, what problems should be studied, and who should participate in the knowledge creation and use (Wildavsky, 1987). For instance, an important mechanism for the Swedish government to exert power is through instructing the official committees of inquiry what themes to investigate. Students of the policy process must therefore seek to understand what knowledge and arguments are developed, and for what reasons.

The problem of policy integration

I put on a particular lens, policy integration, when approaching the study of public policy decision making. The common societal goals that the rationality is related to should, in this case, concern the integration of sustainability issues[1] into public policymaking processes, or environmental policy integration (EPI) as it is often referred to. (In the following, I will refer to this either as EPI or as policy integration, although policy integration in a more generic sense does not necessarily have to do with sustainability issues.) This is a major policy topic on the agenda in Europe today, with a constitutional backing in the

[1] This thesis is not concerned with offering a definition of sustainability. However, it is noted that the political mandate for environmental protection nowadays is given "in the framework of sustainable development" (as can be read in e.g. Swedish EPA's instructions from the government). This means that temporal and spatial scale enlargements and recognition of different stakeholder concerns, as well as environmental protection concerns in its many dimensions, are seen as components of what is to be integrated through EPI.

European Treaty, Article 6 reading "environmental protection requirements must be integrated into the definition and implementation of the Community policies […] in particular with a view to promoting sustainable development". The central problem, and the extra-scientific motivation for pursuing this field of research, is the fact that although policy integration has had a broad-based political support over the last decades, most evidence point to incomplete and unsatisfactory policy integration into processes at national as well as European levels (European Commission, 2004). In *environmental* policy, new knowledge from science and from other sources has fuelled remarkable advancements in the last three decades. As major resources go into monitoring, researching, and analysing environmental aspects of societal development, society knows more and more about the environmental sustainability implications of our activities, and what we need to do to remedy them. However, what is coming into effect in decision making in *economic* policy sectors, such as agriculture, energy or transport, is another matter. Sectors, where most of the important decisions are made, remain largely "business-as-usual", leaving sustainability concerns marginalised. Reacting to public opinion and interest group pressures appears to get the upper hand in the creation of policy. Although sustainable development perspectives are gradually encroaching on us, most environmental experts argue it is too little, and far too slow, worrying that human society will realise catastrophic scenarios of climatic change and resource depletion because inert and feeble politicians are unable or unwilling to take the necessary decisions.

So, much like the idea of sustainable development, the principle of policy integration appears to have remained on the rhetorical level, despite political backing and various supporting measures. At a very general level, the thesis seeks to understand if and why this is the case and what the problems and barriers are for further integration. Taking on a particular subset of these problems in further detail, it also aims to provide recommendations and prescriptions on how to enhance policy integration, specifically in the energy sector as well as more generally, hence contribute to our understanding of how one might pursue EPI at the national policy level. This does not mean giving environmental concerns an overriding role in the policy formulation. Instead, the process can lead to a wide range of "acceptable" outcomes.[2] Still, decision makers must understand the degree to which the policy decisions taken have implications on the environment or, in the case of important goal conflicts, the extent to which conscious and scrutinised trade offs have been made.

The thesis aims to draw out implications and prescriptions for assessments[3] and institutions to improve the conditions for policy integration. To do this, it is necessary to depart from an empirical analysis. Otherwise, prescriptions risk being based on naïve

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[2] This study does not carry any systematic overriding preference for the environment over other societal goals, a point often debated in EPI research, but one that I would consider a non-bias.

[3] Assessments, by which expert knowledge enters policymaking, have many different labels, such as strategic assessment, impact assessment (European Commission, 2002), policy evaluation (Vedung, 2000), appraisal (Owens *et al.*, 2004), and policy analysis (Hogwood and Gunn, 1984). Although they have different connotations, they are significantly overlapping. The study is concerned with both *ex ante* and *ex post* assessments.

ideas about good and bad rather than reality. Basing the prescriptions on empirical material should add value to the frequently theoretical and somewhat utopian notions about the "good process" that one sometimes finds in literature. A distinction in this regard should be clarified: the prescriptions will be concerned with improving the conditions under which decisions are being made, for instance by strengthening the use of knowledge in a given decision-making context, but not suggest ways to change the context itself. I certainly do not set out to make policymaking more rational in the traditional sense; as a neutral search for "optimal" solutions through setting goals, establishing alternatives, assessing alternatives, making decisions and evaluating. The "garbage can" style of policymaking is strongly engraved and policies will continue to develop in an incremental fashion and as a product of bargaining between actors (Lindblom, 1959; Cohen *et al.*, 1972; Kingdon, 1995). Policy integration will take place – or not – in a context of power relations, values, and competing interests. Therefore, strengthening policy integration is partly a matter of enhancing the capacity for instrumental rationality, but also a question of infusing new norms and values to guide policy (Hajer, 1995).

Intra-scientific considerations

Theory-driven research identifies a knowledge gap in existing theories or scientific basis and addresses "intra-scientific" issues. Problem-driven research is driven from the motivation of addressing "extra-scientific" policy problems and find ways to improve the issue at stake. With its departure point in the lack of policy integration, this study is primarily problem-driven rather than theory-driven. However, a reasonable requirement of policy research is that it is able to make a contribution to both motives. Indeed, there is also a set of intra-scientific motives, related to gaps in our current understanding of policy integration, what it is and what influences it, both theoretically and empirically. Although an increasing body of policy research is attempting to tackle this issue, it is far from a mature research field. First, there is very little written about what policy integration actually means and how it can be conceptualised and operationalised in research. Second, there is a tendency in current literature to confound ends with means, or in more technical terms, muddling up dependent and independent variables. Third, there is a lack of national policy studies on the subject. No similar type of study has been developed in the Swedish context, which should add empirical richness to the field. Therefore, the thesis can contribute to scientific understanding in this emerging but immature field of policy research. Fourth, the issue gives ample opportunities to combine theoretical perspectives from different fields such as policy analysis and assessment studies, environmental systems analysis, institutionalism, and policy learning, combinations that have been largely unexplored to date and can be considered interesting on purely conceptual grounds.

Summarising objectives and research questions

The overall purpose of this thesis is to contribute to our understanding of what makes for a national policymaking system that is better at integrating knowledge about environmentally sustainable development into its processes. Under this overall purpose, the thesis aims to fulfil the following objectives.

a) Contribute to theoretical and conceptual understanding of policy integration; what it is and what causes it.
b) Contribute to research methodology for analysing policy integration in national and EU policy, based on established scientific concepts.
c) Enhance the empirical understanding of policy integration in a national policy context.
d) Give design principles for assessments and institutions that will enhance the potential for improving policy integration.
e) Apply some existing environmental assessment tools in a policy-analytic exercise to examine how assessment principles play out in practice.

The study thus contains conceptual, descriptive, explanatory and prescriptive elements.[4] The conceptual research aims to clarify the ambiguous concept of policy integration and is concerned with bringing order to an existing conceptual discourse among practitioners and in academic literature. The descriptive research is concerned with questions of empirical importance such as where EPI was most prevalent in past processes, what types of arrangements were in place and who was involved. The explanatory and prescriptive research addresses the causalities, for instance why EPI is more prevalent in certain processes than in others and what we can learn from that. In addition, it was important for me to include a policy-assessment exercise in the thesis, although it comes from a different tradition of analysis than the political-science related research that constitutes the core of the thesis.

The research is framed in three sets of research questions, each of which are addressed in one or several of the articles, as indicated below. The thesis refers to the articles by the first word in the title of the article within brackets (see below).

Describe the status of policy integration

The study examines the status of policy integration in the energy sector in Sweden, including patterns across time and across issues. This will give a diagnosis of to what extent there is really insufficient policy integration. A starting point for this work is the clarification of the integration concept from a theory-based interpretation of the political principle, after which a set of empirical questions are in focus:

- What is EPI and what drives it? What should an analytical framework look like? ("*Framework*" and "*Learning*")
- What policy frames exist in the energy sector and how did they evolve over time? ("*Learning*")
- What are the major patterns of policy learning and EPI? ("*Learning*" and "*Role*")
- In what ways have they contributed to a shift in policy? ("*Learning*" and "*Role*")

[4] While good science should typically have an explanatory value, it can be argued that the really substantial and remaining breakthroughs in social sciences have been of conceptual nature; calling attention to certain phenomena in the real world without necessarily explaining their causal mechanisms; such as social capital (Putnam, 1992) and bounded rationality (Simon, 1997).

Explain what has facilitated or constrained policy learning and integration

The study seeks to explain the observed patterns of policy integration within energy policy. It studies key factors believed to influence policy integration, with a focus on institutional aspects, and seeks to understand to what extent they have an influence. However, a broader set of factors will also be accounted for, including the role of power and bargaining between interests:

- What major factors and conditions have affected the observed learning processes? ("*Learning*")
- In what ways did policymaking rules affect policy learning? Can differential learning patterns be associated with differences in rules such as on how decisions are made and who participates? ("*Learning* and "*Role*")
- Does the administrative allocation of issues systematically influence policy learning? ("*Learning* and "*Role*")
- What assessments have been provided and to what extent have they been conducive to policy learning? ("*Role*")

Prescribe institutions and assessments to facilitate policy learning and integration

The study makes prescriptions on how to enhance the potential for policy integration. This component focuses on assessments and institutions. Under this are questions about the role of the assessment, the types of knowledge covered in it, and the methods and institutions needed to acquire, draw lessons from, and institutionalise knowledge: In essence: what works – and why?

- What institutional recommendations can be given to strengthen policy integration and learning? ("*Role*")
- How can assessments be made more effective and contribute more to policymaking in general and policy learning in particular? ("*Role*" and "*Decision making*")
- What are the current mismatches between the assessment process and the decision makers' context and needs, and how can the match be improved? ("*Decision making*")
- How do existing analytical tools perform within an SEA in relation to different criteria, including potentials for relevance, legitimacy, and trust ("*Testing*")

Arrangement of thesis

The first block of the thesis contains the introduction, synthesis, and discussion part, which attempts to cover the essence of the full range of research undertaken. Within this, the methodology section gives an overly simplified and brief account of the complex fields of theory that were drawn from, and presents the empirical research design. Several of the articles present more discussion on theory and methodology. The results section briefly draws out and discusses some key findings from the articles. The discussion reflects on what has been learned, relating to theory, distilling some policy recommendations, and discussing how the research design worked out empirically. In the conclusions I draw out the key lessons and messages. In the final reflection, I again lift the discussions somewhat more "out of the box".

The second block contains five articles, of which four have been published in peer-reviewed international journals, and one has been submitted. There is some duplication in the material, which has been necessary for the articles to be stand-alone publications. Nonetheless, in the context of this thesis, they can be viewed as chapters. The articles contain both theoretical and empirical contributions.

Paper I: Nilsson, Måns and Persson, Åsa (2003), Framework for analysing environmental policy integration, is reprinted from *Journal of Environmental Policy and Planning*, 2003, Vol 5, No 4, pp 333–359, with permission from Taylor and Francis. It is referred to as "*Framework*" in the thesis.

Paper II: Nilsson, Måns (2005), Learning, frames, and environmental policy integration: the case of energy policy in Sweden, is reprinted from *Environment and Planning C*, 2005, Vol 23, No 2, pp 207–226, with permission from Pion. It is referred to as "*Learning*" in the thesis.

Paper III: Nilsson, Måns (2005), The role of institutions and assessments for policy learning: a study on Swedish nuclear and climate policy formation, was resubmitted to *Policy Sciences* on the 26th October, 2005. It is referred to as "*Role*" in the thesis.

Paper IV: Nilsson, Måns and Dalkmann, Holger (2001), Decision making and strategic environmental assessment, is reprinted from *Journal of Environmental Assessment Policy and Management*, 2001, Vol 3, No 3, pp 305–327, with permission from World Scientific Publishing. It is referred to as "*Decision making*" in the thesis.

Paper V: Nilsson, Måns; Björklund, Anna; Finnveden, Göran; and Johansson, Jessica (2005), Testing an SEA methodology for the energy sector –a waste incineration tax proposal, is reprinted from *Environmental Impact Assessment Review*, 2005, Vol 25, No 1, pp 1–32, with permission from Elsevier. It is referred to as "*Testing*" in the thesis.

"Framework" establishes a conceptual basis for the thesis, drawing on emerging literature on policy integration as well as insights from political science theory in fields such as institutionalism, networks, framing, and learning. It provides the conceptual and theoretical foundations on what policy integration is and develops an analytical framework to guide the empirical analysis. It argues that policymaking today takes place in a network context, as opposed to within hierarchical structures, and that policy integration can be understood as a type of learning across frames. Also the independent variables are developed. In *"Learning"* some further developments in the framework are made, in particular concretising the learning/EPI variable as a particular type of conceptual learning.

Two distinct empirical analyses on Swedish energy policy are carried out, reported in *"Learning"* and "*Role*". *"Learning"* takes a broad perspective on larger trends of frames and learning in general energy policy from the late 1980s up to today. In particular, it discusses the role of actor networks for learning, and investigates background variables in national politics and international policy streams. With the broader stroke, it pays less attention to precise assessment processes and institutional rules. *"Role"*, on the other hand, presents a higher-resolution empirical analysis on if and how patterns of policy

integration and learning are linked to policymaking rules and assessments in nuclear and climate policymaking. It presents an analysis of institutional systems in place, how assessments are used, in what way they contribute (or not) to policy learning and integration; and in what ways they could be improved. Contrasting nuclear and climate policy, *"Role"* also studies issue characteristics as a factor for learning.

After the three first articles, I address the topic from assessment research side in "*Decision making*" and "*Testing*". "*Decision making*", a mainly conceptual article, analyses the limited effect of strategic environmental assessment (SEA) on decision making. It draws on established decision-making theories to investigate possible relationships between decision making and assessments and scope out implications for SEA systems. It should be noted that "*Decision making*", published in 2001, represents preliminary work and early stages of the thesis process. It lacks a discussion of networks and learning, that later become central to the thesis.

Finally, in "*Testing*", design features that are commonly understood to be important for assessment effectiveness are examined in a concrete SEA exercise that applies some environmental systems-analytical tools for SEA on an energy/waste policy proposal in a "laboratory" setting. "*Testing*" moves from a social science study of assessments to a more technical policy analysis, and asks: with the toolbox currently available for SEA in energy, what are the characteristics of the applied tools, and how do they, when they are applied to a real policy case, match the criteria that are considered to make them useful? Recognising the multitude and complexity of assessment methodologies available in the context of policy assessment, this seeks to assist SEA practitioners towards an appropriate methodology for the energy sector.

Methodology

Theoretical cornerstones

The central perspective on policy integration in this thesis is based on the policy-learning concept. Around this, three theoretical perspectives connect. The first is the policy networks perspective, which represents my theoretical basis for understanding national-level policy making. The second is the institutional perspective, from which I have developed some of the causalities behind policy integration. The third is the knowledge-policy perspective, dealing with the ways in which knowledge can contribute to policy learning.

Theory is often used both as a specific term for the particular level of concretisation and as a generic term for the conceptual basis for empirical work. To clarify the relationship to theory, it is useful to distinguish different levels: *approaches, frameworks*, *theories*, and *models.* This is a simplification; in reality, there are no clear-cut distinctions between these levels. It is rather a scale where the exactness and sophistication of the causal relations differ in a hypothetic-deductive approach to research. Nevertheless, they show the choice of theoretical concretisations available for the student (Ostrom, 1999). *Approaches* can be described as sets of basic factors for research that are key to understanding a phenomenon. An approach can give rise to and harbour many different frameworks and theories. Neo-classical economics, policy networks, rational choice, political economy, and institutionalism are examples of approaches for explaining economic and political life. In institutionalism, factors such as formal and informal rules, incentives, and organisational interactions shape policy outcomes. In classical economics, prices on wages and interests, and labour, land and capital, shape the market. *Frameworks* identify the universal factors of analysis as well as generic relationships between them. They are often used to organise empirical research variables. They do not necessarily specify the precise interactions or dynamics in the relationships and as such, they can harbour a range of theories. Examples include the Pressure-State-Impact-Response framework, commonly used in environmental impact analysis, but can also include more elaborate ones. *Theories* should help to specify hypotheses about how different factors interact in more detail. These hypotheses should be possible to use to explain processes and, importantly, *predict* outcomes. Several theories can be compatible with one framework. Theories can be quite simple like a matrix with combinations of variables to predict outcomes. More advanced theories include, for instance, the Advocacy Coalition Framework or the theory of comparative advantage in international economics. *Models* are further formalised and have precise and usually quantifiable functions between a limited set of variables. Several models can be compatible with one theory. Models in economics include the Heckscher-Olin model, and general equilibrium models. Models in this sense are rare in the political sciences, with the exception of game theory (which, confusingly, is really a model).

One could argue that a "reductionist" theory or model will not be able to capture the complex nature of public policy adequately. The isolation of a limited set of variables means the exclusion of others that are likely to be significant. In economics, the assumptions regarding individual utility maximisation based on preferences have been useful

for explaining market behaviour, but its expression in political sciences, such as public choice or bureau-shaping theories, seems too narrow. Within institutionalism, two theory bodies have been put forward for explaining the mechanisms through which institutions affect behaviour and decision making; the collective action theory based on an utilitarian perspective and assumptions about individual rationality, and the social practice theory that see compliance to norms and traditions, rather than utility maximisation, as the key source of behaviour (Young, 2002). Each model seems to cover some, but far from all, of the motivations of human agents in collective choice situations. On their own, they reduce the problem in a way that might be theoretically and empirically attractive but also reduce the explanation that might impede a fuller understanding of the problem complexity.

Working with several theoretical cornerstones as discussed below is in itself a mark of how I choose to relate to theory. Adopting a problem-oriented perspective, the research does not aim to test a particular theory in the empirical research. Theory is rather used to understand the problem of policy integration and to help define factors for how policy integration can be analysed. The application of theory occurs in a context of discovery, using a range of perspectives in the search for explanations. There are therefore hermeneutic elements to the research, although the deductive approach is at the root. The ambition has been to enhance empirical understanding by reference to a variety of analytical perspectives. However, although this thesis is not designed to test or to develop theory, it still has a theoretical contribution to make. Empirical observations are confronted with theoretical perspectives. Commentaries to existing theories and frameworks are made and amendments suggested. The thesis thus contributes to the general understanding of policymaking rather than just making a statement about the studied cases.

Some effort was put into developing an analytical framework with a "variables approach". Much writing on policy integration has lacked structure and causal reasoning, sometimes suffering from confusion of what are independent and dependent variables. This suggests it is a relatively immature field but perhaps also reflects the dominance of a more discursive research tradition. Partly, the nature of the phenomenon is such that it does not lend itself to direct measurement. However, the risk is that we do not clearly understand the causalities, although this is necessary for giving useful prescriptions.

Policy networks and learning

One cannot study policymaking processes without a perspective on the context. In later years, there has been a move away from a traditional view of policymaking unfolding through a hierarchical system towards viewing policymaking as an essentially horizontal system of interdependent actors, interests, and interactions in a network context. Theories of policy networks have gained broad acceptance as a useful perspective on policymaking, municipal planning, business management, and social relations within organisations. The ideas behind network theories have sprung from many disciplines. Bourdieu developed the idea of "autonomous fields"; institutions and interest groups that dominate scientific, cultural or planning contexts (Bourdieu, 1994). Fields are roughly equivalent to networks: systems of relations between positions that are inhabited by people and institutions that compete over something shared. Today, networks are well-re-

searched phenomena with many nuances; institutions of interests, policy communities, advocacy coalitions, epistemic communities and issue networks relate to the same basic phenomenon (Marsh, 1998).

Network theory focuses on interdependence, cooperation, coordination, and exchanges as key drivers in policymaking (de Bruijn and ten Heuvelhof, 2000). In particular, policy integration has been discussed in terms of different levels of coordination (Scharpf, 1993). *Negative coordination* aspires to ensure that policy initiatives in one domain do not adversely affect the objectives pursued in others. Such coordination typically takes the form of bilateral clearance negotiations between the affected departments, something often reduced to a formality. *Positive coordination* signifies the more ambitious aspiration to maximise of government policy effectiveness and efficiency by exploring joint strategies and synergies across policy areas. This often relies on negotiations in inter-ministerial groups that are both initiated and steered by high-level coordinating units. To these levels of coordination, Peters (1998) adds a third; *integration*, whereby not only means are joined, but where also objectives and problem understandings are shared across sector departments.

Where, then, do these problem understanding and objectives come from? The beliefs, values, and perspectives from which actors derive policy positions as well as, at a deeper level, meaning to the normative direction of their thinking, can be thought of as *policy frames* (Rein and Schön, 1993). Frames are conceptually close, although not identical, to other concepts in political sciences such as *belief systems* (Sabatier, 1988), *value premises* (Dunn, 2003), and *discourses* (Hajer, 1995). In the network, actors can be aggregated into alliances or coalitions based on commonalities in these frames or belief systems (Sabatier, 1988). Frames differ on aspects such as the relative importance of issues, understanding of causalities involved, the role of knowledge, views of nature, as well as preferences on management and policy solutions. Frames work as filters for interpretation that constrain the range of solutions that are considered; leading to bounded rationality in decision making (Simon, 1991).

Adjusting and joining policy objectives requires a normative reorientation by actors in the policy system, i.e. a reframing process. Reframing is a type of policy learning that brings about changes to underlying norms, priorities and objectives. This lies close to *conceptual learning* (May, 1992) and, in organisational theory, *double-loop learning* (Argyris and Schön, 1978). Learning can also take place *within* frames, where it feeds into existing practices, norms and patterns of understanding that permits the system to better achieve its present objectives, called *technical* or *single-loop* learning. Whatever the level, policy learning is about social interactions, experience and new knowledge on behalf of actors in the policy system to bring about cognitive changes concerned with policy (Hall, 1993; Fiorino, 2001). By seeing policy integration to be about learning, knowledge assimilation and social interaction in the network come out as key mechanisms for policy integration. At the same time, policy actors can learn *politically* as well, enhancing their strategic position in the policy game. This learning occurs within frames where priorities and positions are fixed.

For further development of the analytical framework and the independent variables, I have built on research fields within institutionalism and knowledge-policy studies.

Institutionalism

The study of institutions has gained considerable interest in environmental policy studies in later years (Weale *et al.*, 2000; Young, 2002). Institutionalism is not in itself a well-defined theory but rather an approach according to which institutional rules and procedures shape and constrain, if not determine, policy outcomes (Scharpf, 1989). It is, at least in its neo-institutionalism incarnation, compatible with the network approach, with its view of the political system as characterised by actor interactions, belief systems, degrees of trust, and closeness (March and Olsen, 1989). New institutionalism emerged in the late 1980s as a reaction to the then-dominating actor-centred analyses in the political sciences. It brought back into attention structures such as organisational arrangements and procedures but this time also their normative underpinnings. Institutionalism has developed in many disciplines, which has lead to considerable confusion on what the term "institution" really means. It is therefore worth pointing out that in this study, institutions do not refer to organisations but formal and informal rules, practices, and norms applied to decision making.

Do institutions in themselves have significant effects on outcomes or do they merely establish a framework within which variables such as interests and individual actions determine the policy choices? This is partly an empirical question but it also depends on how narrow the concept is defined. Scharpf (1989) sees preferences and perceptions as separated from institutions whereas March and Olsen (1989) see them as embedded. *How* do institutions affect outcomes? Here, a major dividing line runs between rational and normative institutionalism. Ostrom (1999) emphasise incentives and how rational individuals with material self-interests act within the constraints of rules. March and Olsen (1989) argue that actors do not act for utility maximisation but to conform to common values and goals, governed by the "logic of appropriateness". In their theory, values and norms is the central factor in explaining behaviour and choice.

The overarching concepts in new institutionalism were important departure points in so far as institutional rules can help explain systematic biases in political decision making. According to the normative school of institutionalism, institutional rules that guide behaviour include both procedures, routines, organisational forms, as well as beliefs, paradigms, codes, and cultures. The consequence is that policy integration becomes a question of institutionalising new beliefs and a new meaning in the policy system, which connects us back to policy learning. But working with new institutionalism in designing a framework proved difficult. Institutions are often very broadly defined, e.g. March and Olsen (1989): "collections of standard operating procedures and structures that define and defend values, norms, interests, identities and beliefs" (p. 17). These broad strokes encourage the belief that institutions are the most important variables. However, such broad definitions are not helpful for organising empirical research since it tends to lump everything together; beliefs, and behaviour patterns, organisations, programmes. It was necessary to separate the rules and procedures by which decisions are taken as the cause and a possible change in belief systems as the effect. In this study, institution is limited to the formal and informal rules of policymaking, including intra-governmental procedures of governance and interaction. They are thus distinguished from both the belief systems and the actor networks that carry them.

Knowledge-policy studies

The institutions that shape and constrain policymaking are important framework conditions for learning, but the learning process must also be fed by knowledge. How this best occurs is in itself a domain of considerable literature, such as studies of science-policy interactions (Jasanoff, 1990; Lee, 1993) knowledge use (Lindblom and Cohen, 1979; In't Veld, 2000), and policy analysis (Dunn, 2003). Knowledge, in the form of assessments, is often expected to have an instrumental role towards a concrete change in policy output. However, it has been argued that it more often leads to more intangible changes in agendas, view-points, perspectives, and arguments (Heuvelhof and Nauta, 1997; Owens *et al.*, 2004). This is an important basis for conceptual learning since it concerns the introduction of new concepts and ideas on the agenda that can shape understanding, insights and perceptions. Similarly, knowledge from experience, evaluations, and monitoring are key to technical learning.

However, knowledge is often used as strategic ammunition. In processes of conflicting interests and high complexity (such as sustainability) actors often manipulate knowledge and pursue only those facts that support the claims that further their interests (Lindblom and Cohen, 1979). Knowledge can be used to attack opponents, enhance organisational status, delay decisions, or legitimising them (Shulock, 1999). In a learning typology this links with political learning, a process by which strategic behaviour is enhanced (May, 1992). Furthermore, strategic behaviour happens not only in the use of knowledge but also in knowledge generation. Science, and the ways in which scientists interact with the outside world, is far from neutral, as has been convincingly demonstrated in sociology of science (Bourdieu, 2004). Indeed, much of policy-oriented environmental sciences seem to blend political perspectives with science. Some see this as an imperative; "to capture the public imagination, we have to offer up some scary scenarios, make simplified dramatic statements and little mention of any doubts one might have. Each of us has to decide the right balance between being effective and being honest" (Schneider, 2002)

Institutions shape the role and place of assessments in the policy process. Therefore, the thesis does not treat assessments and institutional arrangements as isolated variables. Rather, the interaction between them is of interest. A mismatch between assessments and the decision-making context can lead to serious gaps in knowledge assimilation. This has been explored in theoretical discussions (including "*Decision making*") but there is relatively little empirical work (Kørnøv and Thissen, 2000). Jasanoff (1990) argues for negotiated bundling arenas where policymakers and scientists work together, and claims that such arenas are critical to the successful use of knowledge in policymaking.

Summary description of framework

From the theoretical concepts outlined above I constructed a framework to guide the empirical analysis ("*Framework*" and "*Learning*"). The framework is summarily represented in Figure 1, with the core elements in bold. EPI, as the dependent variable, is treated as a process of conceptual learning whereby sector actors reframe their problem perceptions, objectives, and strategies; and align them towards a conception of sustainable development. This is assumed to be a key condition for improved policy outcomes

in the sectors, ultimately the *raison d'être* for EPI. Policy learning can assume different values involving a spectrum of conceptual, technical, and political learning modes ("*Learning*"). Learning should be observable within different levels of government (agencies, committees, ministries, and politicians) and among key actor groups that participate in the policy formation, through lobbying and other contacts with the government.

Figure 1 is not a process diagram, but a simplified account of what causal relations are in the empirical focus. This thesis assumes that the essence of learning is in the link between cognition and action, and learning is therefore linked both to preparation processes and policy decisions. This creates an ambiguity. On the one hand policy learning on behalf of governments is a mechanism for policy change, and as such conceptually different from the policy change itself. On the other hand part of its measurement is in the policy change. However, learning on behalf of other actors (industrial interests, green groups and so on) is only detected in their own positions and argumentations, and is not detected in policy. Furthermore, learning is not the only mechanism for policy change; policies also develop from shifts in political power and improvised decisions ("*Learning*"). It should be noted that these are not, in my view, competing theories for policy change to be proven or disproven empirically. Rather, they are phenomena that can be examined independently and then related to a more complex and varied context. In other words, in this thesis learning-based approaches do not compete with interest-based theories in understanding policymaking: they are both part of explaining reality. Learning takes place, or not, in a context of competing actors with pluriform ideas, interests, and powers that bargain for outcomes.

The study is not about *how* policymakers learn. Such inquiries belong in disciplines such as social psychology, a field that goes beyond the reach of this thesis. It is about what is learned, and what circumstances appear to provide fertile ground for learning to appear. Within this realm, the thesis has a particular interest in the link between different patterns of policy learning and the institutional context of decision making. My interest in institutions is partly due to the prescriptive aim. Institutions can, albeit to varying degrees, be changed, whereas other factors such as political will, media attention, and public opinion, while clearly also important, are not easy to do anything about from a policy analyst's horizon. While institutions provide only part of the picture, it allows getting into an analysis of a few causal relationships around policy integration. In this thesis, institutions are treated as the independent variables, and means towards the end of policy integration and learning. In narrowing down the search for key variables, one path led to examining whether and how rules of policymaking affect learning. Such rules have to do with, for instance, on what basis decisions can be taken, where responsibility is allocated, and who gets to participate and in what ways, in different parts of the policy formation process. The other path led to examining whether and how knowledge in the form of assessments, and how they are brought into the policymaking process, affect learning.

However, I do not presuppose that the institutional arrangements, or the assessments provided, are the key determinants of learning. Other factors, such as internal crises or external events, issue characteristics, or international policy trends, might be equally or more important. This is an empirical question in the research. Furthermore, although

the institutional context is partly an independent variable, as a structural condition of policymaking, it is also to some extent shaped by the government who is free to develop different decision-making models, allocate resources for carrying out assessments, and allocate responsibilities for different issues. The government can choose to process and prepare sensitive or politically prestigious issues closer to the political levels, whereas more routine issues might be prepared further down in the bureaucracy. Hence, the study addresses a broader set of factors including the domestic political situation including public opinion, parliamentary electorate situation, government collaborators; and international policy streams such as the commitments made to the European Community or the United Nations global conventions. Here, the character of the issue itself is also considered: it might directly influence conditions for learning, because its inherent conflicts and uncertainty affect whether and how social interactions can take place between actors, as well as influencing the political will. The discussion about background variables has been informed by a review of comparative policy studies in Europe (Skou Andersen and Liefferink, 1997; Weale *et al.*, 2000; Jordan, 2002).

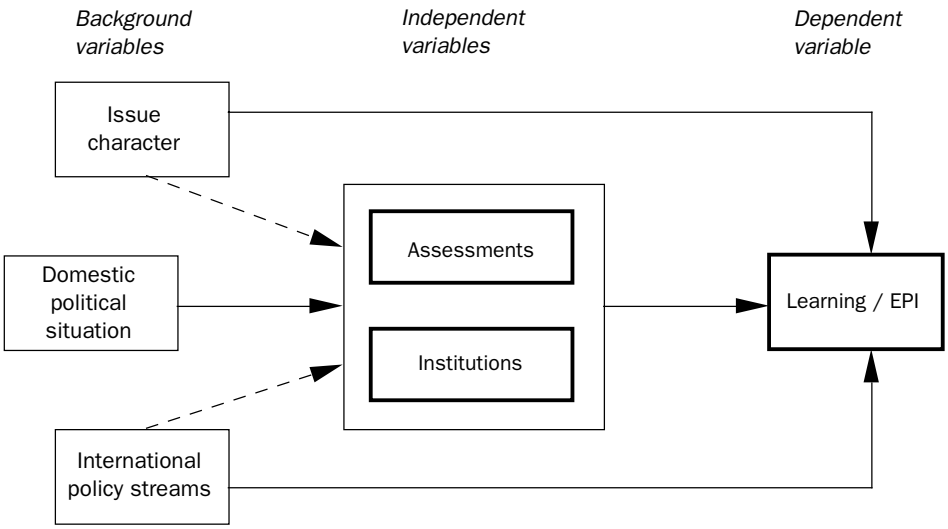


Figure 1. Simplified representation of framework (adapted from "*Framework*")

Empirical approach

Studying policy learning requires analysis over at least a decade (Sabatier, 1988). Furthermore, identifying learning as the dependent variable empirically poses difficulties and exploring the interface between assessments and policymaking as causal structures makes for a complicated analysis that requires in-depth familiarity with the case and its issues. Therefore a comparative research design across countries or across sectors would have been too resource demanding. In the empirical study, the attention is thus on one sector in one country with which the student is familiar. Relying on a study of one sector

in one country as the empirical basis means that the possibility to generalise results is limited. However, there are also strengths in carrying out the research in one context because many factors can be held constant. First, at any point in time, the basic actor configuration is the same, at least within the policymaking system, with the same types of cultures, routines, and frames, and the same configuration of interests. Secondly, the formal regulatory framework is also the same. Policymaking is governed by both informal and formal arrangements. By holding formal arrangements constant, we can say more about the role of informal arrangements.

The case of Swedish energy policy

The empirical focus is on national energy policy in Sweden since the late 1980s. Why is this interesting? Obviously, energy policy is an important arena for policy integration for practical policy reasons. Energy has been central on the Swedish policy agenda for the last thirty years. Energy goes straight to the core of the sustainable development debate. It has been and still is the lifeblood of industrial civilisation. It is a necessary condition for improving the living conditions and opportunities for increased welfare in poor societies. At the same time, the ways in which we harness energy for human consumption today are among the most environmentally disruptive of all human activities (with the exception of war). Energy production and use is a major contributor to many of our most pertinent environmental problems.

What makes energy policy an interesting candidate for analysis from a scientific perspective? First, Sweden can be considered a critical "most-likely" case for EPI. If it does not work here, it is unlikely to work elsewhere. First, Swedish policymaking is usually considered to be strongly coloured by a rationalistic "seminar culture", in which political processes are highly influenced by expert knowledge. Second, when it comes to EPI measures, Sweden is consistently considered to be a forerunner which leads us to believe that decision making has indeed been sensitive to policy integration (Lundqvist, 2004). Third, Sweden's corporatist model of decision making has been shown to be conducive to EPI in international-comparative studies. Fourth, the energy sector has undergone rapid institutional and market changes, inducing strong pressures for policy change. The development of the energy sector in Sweden in the 1990s can be considered an institutional revolution, with new regulatory frameworks, the global conventions, new actors in the sector, and an ideological change towards market mechanism and internationalisation. Norway, Finland, and Sweden have been forerunners in establishing an international exchange market for electricity. Furthermore, the European directive on the electricity market has led to deregulation of the domestic electricity market, meaning that the power industry has left the protected parts of the economy and is now exposed to trade and competition.

Although the energy sector presents particular challenges when it comes to policy integration, several sectors face similar institutional, political, and ideational changes, and lesson learned about policy integration in the energy sector will to some degree be relevant to other sectors, in particular natural resources-related ones such as agriculture, forestry, and fisheries. Can the lessons learned also be applied in other countries? This is tricky, because Swedish bureaucracy and decision-making cultures have several features

that are more or less unique. As a general rule, I do not claim the recommendations are applicable in other countries or in EU decision making. However, they constitute promising avenues to explore. What works in Sweden might work elsewhere too. I will however return to this question when discussing the results.

Empirical research design

The main empirical research has covered one overarching analysis of framing and learning in energy policy as a whole ("*Learning*"), and two more specific mappings of differential learning; one "wicked" problem with highly conflicting values: the nuclear policy case; and one more structured problem where uncertainties are large but where value conflicts are less pronounced: the climate policy case ("*Role*"). The research employed process tracing, and mapped decisions and events in detail, along with arguments and positions taken by different actors. These policy processes, being relatively long-term, go through several rounds. In each round, certain sets of rules, actors, ideas, and agendas dominate the process. Across rounds, there are differential learning patterns as issues move between levels and contexts. Variations in variables are therefore observable both within and between cases ("*Role*"). Concerning the background variables, these are more likely to vary over time rather than across issues or rounds. In particular, EU policies of both regulations and deregulations are of critical importance. The strategy here is to make a process tracing across the whole sector of key current policy processes from the late 1980s and to today (*"Learning"*).

The second empirical research component is a policy-assessment exercise. This exercise is not directly linked to the theoretical framework developed, but approaches the assessment problem from a policy-analytic practitioner perspective. It involves the application of a range of assessment tools and methods such as environmental-economic valuation, life cycle analysis, and risk assessment, with the purpose of understanding and discussing how generic principles for what makes assessments work for learning can play out in practice. This work, presented in "*Testing*", is the result of two years of interactions and workshops in a multi-disciplinary team of experts in scenarios, SEA, LCA, and economic valuation including developing the framework as well as a full-scale application. The SEA framework, on which the work is based, allows a choice between different analytical paths. It is more fully described in a previous paper (Finnveden *et al.*, 2003).

Data collection

Data was collected through examination of official documentation and reports from government, researchers, and interest groups; combined informant and respondent interviews, attending hearings and meetings, secondary sources of published studies, and articles in newspapers and journals. I selected documents to represent perspectives of key actors in each policy round, as well as key policy decisions made. Concerning documents and assessments coming from outside the government, the criteria for selection was that it had to be understood as an ambitious study, as opposed to a mere commentary in the debate. The line between them is a blurry one in theory but in practice the relevant studies are easily traced. Documentation reviewed includes: official reports from committees of inquiry (SOU), government bills (budget-, energy-, climate-, environmental-), gov-

ernment publications (Ds, Skr), parliamentary records of debates and reports (available online), political party publications, pamphlets and brochures, public agency reports, interest group and think tank publications, university research publications, consultancy reports, and debates in the national newspapers (DN and SvD). Some findings rely on interviews, since many informal aspects are studied. For instance, on what ground decisions are taken, or whether, and for what purpose, various assessments are effectively used, is rarely adequately documented. I needed a few centrally placed information sources that understood the informal processes, were available, and willing to talk. This criterion is difficult to predict in advance, but was achievable for all relevant rounds that had closed. It did preclude, however, any insights into ongoing processes such as the nuclear phase-out negotiations.

To find plausible explanations and factors in developing the framework, I conducted preliminary investigations with document studies followed by a set of pilot interviews: I asked informants in the national policy arena including politicians, ministry and state agency officials, and interest group representatives, about their perceptions of the issue. These preliminary findings were used to adjust the framework for analysis and develop more precise questions in the main empirical phase. In this phase, a sample of documents was analysed systematically along with a more comprehensive set of interviews. These interviews had two main purposes. First, they served to capture the perspectives and ideas of actors in the policy process. Second, they served as informant interviews to explain the informal institutions and other aspects of policymaking that were not detectable in the documentation. Respondent were asked to describe and formulate, for instance, their relevant decision parameters, their understandings of the policymaking machinery as well as their preferences within it, what they expect from assessments, what type of information they use and to what extent they trust it; and what types of analytical methods they tend to rely on.

In total, 38 interviews were conducted from spring 2002 to spring 2004.[5] Each interview, which typically took around one hour, was recorded and transcribed (with a few exceptions where the Minidisc recorder went on strike). Interviews were mostly anonymous to facilitate an open discussion on potentially sensitive issues. The interview methodology was designed as semi-structured with in-depth probing. A template protocol for the interviews was used.

Data analysis

The analysis of frames and learning was carried out through qualitative analysis of official documentation and interview transcripts in a "frames analysis" (Rein and Schön, 1993). As suggested by its name, it focuses on capturing the beliefs, values and perspective through how issues and problems are framed, articulated, and argued over. It involves searching for ideas explicitly or implicitly expressed in a text. A set of questions to guide this analysis of texts and interview transcripts was organised into a limited set of themes.

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[5] I am grateful to my colleague Dr. Åsa G. Swartling who carried out some of the interviews.

Second, a qualitative content analysis was made for understanding policy integration in outputs and in arguments. Content analysis is normally a quantitative form of analysis, involving for instance doing a count of how often certain words or expressions emerge. This obviously risks being mislead by rhetoric and may not at all reflect any policy learning. In studying learning, a more complex interpretation of the material was required, which called for a qualitative content analysis. This analysis should tell whether and what type of learning process has occurred and whether it had any consequences on actual policy. For conceptual learning in outputs, not only must there be new ideas in the process, but also actors advocating for these in the policy process, and decisions in substance reflecting these new ideas – i.e. a substantively new policy. These iterations between process and output in the empirical study of learning imply that the distinction between independent and dependent variables suggested in the framework is not as clearcut in reality. The framework is therefore a way of rather crudely presenting the main approach and concepts, rather than a precise guide for organising and relating different data sets. The empirical analyses in "Learning" and "Role" demonstrate this further.

Studying policy outputs, three major attributes were registered: substantively new policy instruments or goals; referrals to new causal understandings based on experiences or new ideas / frames; and referrals to new rationalities in terms of social goals or in terms of new national or international initiatives. When they appear to be "new", as in significantly different from the traditional style, content, and structure, this is as an indication of conceptual learning in government. Learning on behalf of other actors is observed in their positions and strategies in the process, and here there is no clear distinction between outputs and process as there is with the governmental decision makers. Ultimately, however, what is new or not is a case for argumentation. Jordan *et al.* (2003) consider market-based instruments, such as environmental taxes, as new instruments whereas in the Swedish context, given the policy tradition, true novelties could be more restricted, including tradable quota systems, voluntary agreements, and monitoring requirements. New policies are very rarely new in the debate. Researchers, advocates, think tanks, and policy entrepreneurs have often advocated for them for many years. "*Learning*" and "*Role*" provide more detail on how I detected learning empirically.

Main results and discussion

Since each article presents and discusses results, this section does not provide a comprehensive account. First, it draws out a selection and discusses it more broadly. Referrals for further detail are made to each of the articles. Second, it presents what policy implications can be drawn from the findings. Finally, it reflects on what has been learned and discusses the limitations and strengths of the approach taken.

Discussion on main findings

The first three sections below correspond to and discuss the three central variables in the analytical framework: policy integration, institutions and assessments. The fourth section discusses some of the more overarching premises relating to the network approach and rationality.

Policy integration: learning or "powering"

"*Framework"* gives a justification and theoretical foundation for how the principle of policy integration can be conceptualised and researched in processes and outputs. Essentially, I have interpreted the core of the EPI principle as aiming for a conceptual learning process. Digging deeper in the analysis and empirical work, some further theoretical clarifications are made in *"Learning"*. Here the thesis proceeds to build on established concepts in policy-learning literature, which covers reasonably well the key qualities of learning within and across frames. It also specifies more clearly what distinguishes EPI from other types of learning; namely the normative reorientation towards certain values. The dependent variable of EPI is here defined as "…a policy-learning process in which perspectives evolve and sectoral actors reframe their objectives, strategies, and decision-making processes towards sustainable development" (p. 207). Although the analysis is largely ideas-based, it also had to be specified how learning-based policy change is distinguished from – and related to –changes due to, for instance, power shifts among interest groups or in parliament ("*Learning*").

The first task for understanding whether conceptual learning and EPI had occurred was to identify and characterise the set of existing policy frames. Three overarching frames were identified as co-existing in Swedish energy policy; *energy-as-infrastructure* that dominated the agenda up to the 1980s, *energy-as-risk*, and, *energy-as-market* that dominates today ("*Learning*"). Each frame has an identifiable set of problem understandings, core objectives, and policy preferences guiding different actors' policy positions. As frames are sticky and co-exist, they cause tensions between actors and resistance against policy innovations, but over time conceptual learning across frames has been possible. Furthermore, several cross-cutting dimensions of sustainable development have become integrated within the dominant frame, including regional-spatial enlargements and a widened recognition of different stakeholders. In particular, the integration of the climate issue into energy policy represents a powerful conceptual learning and EPI process among all actors. This policy-integration achievement does not appear for any other environmental issue in energy policy. Industrialists see the climate issue as a key concern and its

mitigation as a natural part of the sector's policy objectives. At the same time, environmentalists have taken to acknowledge the new market context for energy policy, with its particular constraints and opportunities. "*Learning*" and "*Role*" identify an embedded reciprocity in the integration principle: when successful, EPI is as much a matter of environmental actors understanding sector policy issues and priorities as sector actors relating to environmental issues and priorities. This is in contrast with the mainstream discourse in EPI studies, which considers EPI as a primarily unidirectional flow whereby sector actors become enlightened about environmental concerns.

As a politically-constructed concept, environmental policy integration has, just like sustainable development, been subject to different interpretations and conceptual confusion. In some ways, the applied learning concept contrasts this study with mainstream EPI analysis. First, policy-integration literature has suffered from a tendency of not differentiating between definition and operationalisation of the end objective, and factors that supposedly contribute in a causal way to it, such as management systems, organisational arrangements, and reporting requirements. This might be fine for monitoring purposes in governments or the EU. However, if the aim is to contribute to causal insights it is clearly insufficient. The conceptualisation made here is an obvious improvement in this regard. Second, also in more sophisticated approaches, environmental policy integration is often thought of as a matter of giving priority to environmental over other objectives in policy decisions (Lafferty and Hovden, 2003). However, such measures do not differentiate the causes behind how environmental issues are brought in. This is problematic because long-term implications can be very different if it is the result of power shifts rather than a more evolutionary and cumulative learning process. "*Learning*" and "*Role*" show that now and then in the last 15 years, power shifts have lead to sudden surges in environmental priority where environmental interests have been able to exploit a temporary power situation and win short-term victories. Alas, many of these have been of primarily symbolic nature and have disregarded that environmental policy, as any other policy, must be cost effective. According to the view taken in this study, this is not EPI. Furthermore, by violating a basic value premise of public policy (i.e. be cautious with how you spend tax-payers' money), the long-term effect of environmental victories can be the opposite; undermining the legitimacy of environmental policy among sector actors as well as in the public eye and thus working against a broader EPI process over time. On the other hand, we also see that power shifts can be necessary to induce learning by breaking up coalitions and dominant frames (see below and "*Learning*").

The complexity of the decision premises, with many goal conflicts between environmental issues, makes it difficult to use the notion of environmental interest priority empirically. For instance, a central goal conflict in energy is between climate mitigation and phasing out of nuclear power, which many environmentalists consider an important objective. Imported coal-condensing power is usually the power source on the margin in the Nordic electricity market and decisions affecting the system as a whole will lead to changes in the use of coal power. Is, then, the environment prioritised in nuclear phase-out decisions? And even if climate change mitigation instead leads to massive biomass production, with its own set of environmental problems, what is the level of EPI? In contrast, the learning conception of policy integration is not primarily concerned with envi-

ronmental priority, only that priority-setting in decisions is informed insofar as sustainability implications are understood in as many dimensions as possible.

In general, power and interest-based perspectives appear to offer explanatory value for policy change in the short term, but because currents that shape actor preferences and belief systems are left outside the analysis, long-term changes are missed. The longitudinal analysis in "*Learning*" clearly indicates that ideas have been changing with a powerful influence on policy, involving reframing as well as encroachment of environmental values into the policy system over the last 15 years. The emergence of *energy-as-market* in the energy policy arena was at a fundamental level driven by an overriding internal market policy frame and rules that form the backbone of the European Union. This was grounded in fundamental principles of capitalist democracy, which after the dismantling of the Socialist systems in the former Soviet States appear to have become dominant globally. The power of this framing is such that although Sweden's political system is probably situated at the far left of the current European spectrum (in terms of e.g. the share of GDP appropriated by the public sector and tax rates), the deregulation of formerly state-controlled systems into competitive markets, such as electricity, telecom, and railways, has been swift and rapid during the last 10 years, rarely looking back or forward at consequences on public goods or interest groups.

Institutions: settings and ownerships

Some results from this thesis could be sobering for hard-nosed institutionalists (if there are any). The notion of institutions for learning suggests that the evolution and adoption of ideas can somehow be governed, but the empirical work in "*Framework*", "*Learning*", and "*Role*" show that the evolution and transformation of ideas is largely an unpredictable process whose direction cannot be easily steered, depending more on changing political winds than appropriate institutions or assessments put forward. Indeed, despite major efforts to advance institutional procedures for EPI in the last decade, energy policy decisions have not followed suit in any systematic way. More importantly, deregulation, privatisation and new EU regulations set new constraints to policy, which forced developing new solutions and ways to effectively deal with environmental issues in policy. This study thus confirms mainstream wisdom: external events, focusing events, crises, or other pressures are typically needed to induce fundamental change (Sabatier and Jenkins-Smith, 1999). Building and breaking actor networks and alliances, developing the European Union project, and the global agendas appear as important factors behind policy learning in Swedish energy policy. They trigger and set in motion learning processes, and the policy system eventually adjusts. As these are not in any way the exclusive territories of governments, this also means that actors other than the government are major players in EPI. Policy integration thus depends on major ideational and contextual changes over which any given government does not have full control. Policy analysts are therefore right, as the network approach suggests, in shifting the focus to actors outside government; something that this thesis may not have done enough.

However, although windows open in largely unpredictable ways, in order to capture them, institutions and knowledge provisions must be arranged in ways conducive to learning. What, then, is the relevance of institutions in the context of policy learning and

EPI? First, a few particularities in Swedish government must be noted. Ministries are very small by international standards, normally employing around 200 persons or so. For energy issues, around 15–20 people are involved. Governmental agencies and authorities, falling under ministries, can be significantly bigger. Ministries are focusing on policy formulation whereas agencies are responsible for implementation. Ministries further depend on agencies to provide the factual basis for policy preparations. From time to time, ministries appoint "committees of inquiry" to investigate and prepare issues more in-depth. EPI efforts have largely been steered towards agencies and to a lesser extent committees and ministries, whereas actual major policy decisions are being prepared and made at the political level, in particular when nuclear phase out is on the agenda, or else in ministries and sometimes in committees. The measures taken at "lower" levels do not necessarily support or advance EPI in actual policymaking, and learning occurring at agency levels is not generally mirrored at ministry and political levels. "*Role*" shows how existing formal and informal institutional rules are more important in influencing the potential for learning. These rules change across administrative levels: the rules and procedures for ministry decision making are different from those for preparation processes at the agency level. Decision making becomes more bargaining oriented, which affects the potential for policy learning. As the bargaining element accentuates, lesson drawing becomes increasingly constrained.

However, not only policymaking rules, but also capacities and incentives in central government, pose a constraint on policy learning. The administrative culture and career path in government does not promote learning from experience. Instead, looking ahead, creating new initiatives, new bills, new funding mechanisms, and indeed new organisations, is the preferred *modus operandi.* Capacities, in terms of resources for policy analysis, foresight, and strategic planning in the government, particularly at ministry levels, are seriously constrained. Individuals are often skilled but over burdened and bogged down by day-to-day affairs. The work situation is aggravated as the environment becomes but one of many "horizontal requirements"; including gender, ethnic diversity, equity, and regional-political aspects, that must be taken into account in governmental processes. The concern for all these issues becomes a significant burden that complicates the policy process and puts unattainable demands on officials.

"*Role*" also shows differences in the model of choice for the policy preparation for different issues. The common routine is that agencies and committees are tasked to do preparatory groundwork but for nuclear policy this has rarely been the case. Instead it has mostly been treated as a purely political negotiation item – bounded by no formal procedures for interacting with stakeholders or considering new evidence. Thus, in the nuclear case, rules constrained learning. Functions for acquiring ideas and lesson drawing were disabled. How come? It seems as if the nature of the issue affects the political will to control the outcome of the process, and therefore the choice of institutional arrangements for the preparation. Issues in which there are strong conflicts are politically explosive and the political will to control the process becomes strong. Then, learning and knowledge assimilation can be seen as obstructive, delaying and complicating an already politically complicated process. Learning-based interactions are costly because they might weaken the argument or force actors to reveal their positions or even high-

light opponent arguments. Self examination may lead to unwanted displays of weaknesses and failure. Thus, the inherent resistance against learning in the current institutional system, a pattern well known from research on organisations (Argyris and Schön, 1978), is reinforced for wicked issues.

This thesis does not provide a systematic comparative sample of wicked problems versus more structured issues to give conclusive results on the importance of issue characteristics. However, "*Role*" demonstrates that it makes sense to differentiate between conflict of interests and conflict of values. In the nuclear case, learning potential was constrained because there was no acknowledgement of each other's problems, and no trust. Without trust, and an agreement on where to start the discussion, nuclear policy deliberations appear destined to go nowhere. The climate case, on the other hand, illustrates that for an issue of high economic interest conflict, under conditions of trust, actors are willing to interact, reframe and eventually accept forceful policy constraints because they can agree on a problem and policy dilemmas at hand. It is noteworthy that also non-conflicts appear problematic for learning. A case in point is the way issues related to renewable energy expansion, a backbone of energy policy, remain off the agenda. Latent disagreements concerning renewable energy impacts on landscape, pollution, and supply security, are suppressed and knowledge is not being assimilated. It appears that policy learning needs fuelling by some moderate level of conflict.

The analysis in "*Role*" shows that certain rounds and processes within climate policy formation have induced breakthroughs in policy learning among the involved actors. This allows drawing some more specific institutional lessons. Conventional committees were used extensively, but also novel arenas such as the Climate Delegation. Some of these arrangements were instrumental in facilitating policy learning and integration of climate into energy policy. The specific features that enabled this are difficult to isolate, but aspects such as trust and ownership and selective participation appears critical. In "*Role*" the, from a policy learning perspective, "successful" processes were managed by process managers that spent considerable energy on building trust so as to enable an open exchange of concerns and knowledge. In "*Learning*", the entry of a wider range of actors facilitated a wider inclusion of perspectives in the energy sector as a whole, which catalysed an eventual reframing of energy policy. Such contrasting of different perspectives and interests appears important also in specific preparation processes, such as committees. However, this does not imply prescribing open or very broadly-involving processes. Rather, one needs to think about what actors to involve in order to facilitate trust building. "*Role*" showed that a significant part of trust building was the involvement of trusted sector actors, rather than actors perceived as environmentalists, as process managers in environmental policy processes. When the right of initiative, resources, and responsibility resided with mainstream sector actors, it gave more pronounced learning and EPI outcomes. In contrast, shifting powers to the environmental ministry in the late 1980s lead to radical but temporary agenda shifts and was never embraced or accepted by the sector actors ("*Learning*").

These findings offer a comment to the central but yet unresolved dilemma of ownership and allocation in EPI: a higher degree of responsibility and ownership in the sectors contribute to EPI in that a broader acceptance and reframing is likely to occur, which

leads to improved environmental policy performance. This might, however, lead to incremental rather than fundamental changes, or even "burial" of environmental issues, because traditional policy goals in the sector are still of overriding importance. Do the positives of putting the sectors in the driving seat outweigh the negatives? In Swedish energy policy, it appears that policy integration has benefited when environmental actors have let go of their babies. Short-term environmental agendas in the sector might have been less forceful, but through building ownership and accountability within the sector, the issues get engraved and get a life on their own, in other words, they get integrated. This point towards a paradox for EPI: you can get more environmentally-integrated policies when the environmental interests cede regulatory competency (power) to the sectors, given, of course, that ownership and accountability if properly transferred. This implies the opposite prescription from the mainstream political thinking that EPI is about winning a battle of powers and interests. However, this paradox merits further research: by only looking at Sweden, this thesis obviously does not resolve the issue. It is plausible that for ceding powers to be a successful strategy, certain conditions must be in place, such as a certain baseline of normative acceptance in the economic sectors, which probably correlates with the generic level of environmental awareness in the country. This condition can be a delicate one: if other pressures mount, due to decreasing public finances or other overriding priorities, the normative acceptance can erode. The normative basis in the sector has to be maintained and nurtured in a continual organisational learning process, for instance through follow-up systems and accountabilities that require maintaining organisational capacities. Another issue is whether environmental bureaucrats and politicians are prepared to let their issues go and assume another role in the administration. On this, it is evident that the agency level, i.e. the Swedish EPA, has embraced a new role, as facilitator and partner rather than regulator ("*Framework*"). At the ministry level, the tendency is the opposite, enhancing the environmental legislative turf, through the recent enhancement of the Ministry for the Environment into the Ministry for Sustainable Development.

Assessments: if and how they matter

At a general level, it is clear that knowledge plays an important role for learning and EPI. In the climate case, reducing uncertainty was an important condition for advancing EPI across actors. Back when facts were more uncertain, actors could more easily challenge the emerging knowledge – and so they did if they gained from it. The gradual strengthening of the knowledge base over the course of the 1990s made it increasingly difficult for opponents to challenge it. Finally, a relative agreement surrounding the knowledge base provided the basis for a general acceptance for introducing tough policies.

However, this thesis also aims to say something in more detail about assessments and under what conditions they can play a constructive role. Arguing that assessment designs should explicitly mirror and support a policy-learning process, it aligns with a growing body of work that is carving out new views on the role of policy analysis[6] and environ-

[6] I here use the term policy analysis broadly, encompassing a range of various forms of analytical and data support to policymaking of varying complexities and qualities.

mental assessment in particular (Shulock, 1999; Cashmore, 2004; Mayer *et al.*, 2004; Owens *et al.*, 2004). "*Decision making*" shows how assessments have implicit perspectives on decision making built into them, to date often underpinned by a rationalistic step-wise view on decision making. Official accounts of how policy decisions are taken follow a similar logic, giving the impression that decision makers methodically pursue the solution of commonly identified societal problems that everyone agrees on. However, as "*Learning*" shows, policymaking is more chaotic. Actors with different interests and ideas fight for attention and put forward competing problems and solutions. Given the mismatch between the theoretical design of assessment processes and the realities of policymaking, the results in "*Role*" came as no surprise: most assessments are ineffective in contributing to advancing public policies. The empirical study showed that far from trying to give a neutral knowledge input, assessment systems usually take an advocative role, trying to stand up for the environmental or other interests in a strategic battle. This includes legitimising positions or giving strategic ammunition against competing positions. "*Role*" further shows that, in line with this advocative role, assessments mostly take very narrow perspectives, reducing complex problems to single parameters. Environmental policy assessments often reduce sustainability to a matter of CO_2 reductions. Within their bounded rationality and special competencies, analysts and officials focus on what they know. This is a cognitive problem as well as a governance problem: as one respondent pointed out, "We have to steer towards *something*".

Interview materials and the analysis in "*Role*" give the somewhat trivial finding that assessments that cover broad sets of sustainability factors rather than provide narrow analyses of particular aspects can more effectively contribute to learning in the policy process. However, "*Role*" shows that partisan single-parameter assessments are abundant and constitute the mainstream of the information flow into the policymaking system, and that they do play a role for learning. Furthermore, in sustainability assessments (broadly defined) there has been a pre-occupation with win-win and eco-modernization framings of environmental policy issues, and a relative abundance of highly-aggregated assessments including long-range scenario exercises. This study has not been able to trace any substantive interest among policy actors from the rather impressive production of books, reports, and analysis in this direction ("*Role*"). This finding seems to contradict mainstream conceptions among many researchers and analysts of how to induce interest and engagement within the policy system. One often-stated premise of these assessments is that if we use a long-enough time horizon, today's structural constraints can be assumed away. We can then avoid current political stepping stones in the deliberations and sectoral actors will be prepared to engage. However, often concrete, near-term concerns of important constituencies are neglected. It appears that these types of integrated assessments, since they cloud rather than illuminate the political parameters that are so important for policymakers, lack real relevance and therefore contribute very little to learning processes. Possibly, they have a role in other processes, such as in agenda setting or for general orientation for leading politicians.

Although the evidence is somewhat sparse, the interviews suggest that the assessments most useful for policy learning in the studied processes were those who integrated different objectives in such a way that they explicitly accounted for and highlighted trade offs

and policy dilemmas ("*Role*"). Policy dilemmas appear when decision makers face connected problems and when addressing one problem causes the amplification of other important problems. They constitute decision situations in the face of goal conflicts. Contrary to what appears as mainstream perceptions among environmental advocates and policy analysts, open recognition of dilemmas can lead to reduced conflict as actors find their views and perspectives are respected and on the table. Framing an issue as a dilemma means recognising other actors' perspectives on the problem and prompts actors to reflect on their own problem perceptions (de Bruijn *et al.*, 2002). Assessments that include the concerns of different actors, and processes that seek to address these concerns, can help advance such reflections. For instance, economic parameters resonate with core values and interests of most affected actors. Therefore, it is not surprising that the inclusion of economic parameters in environmental assessment, both in terms of costing and valuating the benefits, tends to make it influential ("*Framework*"). However, the key is not economic costing, but to recognise and protect the core values of the stakeholders that participate. "Values, as embodied in social structure, also limit the scope of change. Policy analysis, far from being a presentation of utopian scenarios, must remain anchored in the current pattern of social relationships" (Wildavsky, 1987; p. 396)

This links to the point made earlier that building trust and agreement on basic problems is a key condition for learning. Several literatures have suggested that different combinations of social conflict and uncertainty require different types of policy analysis and stakeholder involvement (Funtowicz and Ravetz, 1991; Stern and Fineberg, 1996). The common argument is that traditional expert-oriented assessments that exclude stakeholder deliberations are inappropriate in policy settings characterised by uncertainty and conflict, which is arguably the case for most environmental issues. As conflict and uncertainty increase we would need less expert and more stakeholder involvement, and less analysis and more deliberation (Funtowicz and Ravetz, 1991; USEPA, 2000). These claims do not find any direct support in this study, although the material is not conclusive and it has not been an explicit purpose of the thesis to test them. Although lacking empirical evidence, "*Testing*" found in the "laboratory" setting that broad-based stakeholder deliberation methods that explicitly try to forge cooperation among stakeholders do not necessarily fare better than traditional expert-oriented "rationalistic" methods in terms of supporting policy-learning processes. Deliberative approaches have more going for them in terms of accommodating in themselves social interactions, but can be more easily challenged and dismissed. This might have to do with a traditionally rationalistic culture in Swedish environmentalism and environmental policy (Strandberg, 1995), but can just as well be a generic issue of strongly deliberative approaches suffering credibility losses. Furthermore, the outcomes of such deliberative exercises may tend to be lowest-common denominators and abstractions that give little guidance to real decisions. Expert-oriented analytical methods, on the other hand, often lack deliberative elements but may still be an excellent basis for deliberation.

In the end, what matters is not to choose a deliberative over an analytical assessment or vice versa, but to think carefully about how the assessment contributes to building trust and how it fits the decision-making issue at hand. I would be inclined to agree with the notion that "the underlying processes used to solve ill-structured problems are not

different from those used to solve well-defined problems" (Simon, 1997; p. 128) The perhaps trivial empirical finding discussed earlier is that building trust between actors is necessary under all circumstances. Trust building is however much more difficult in cases of value conflict. In fact, since nuclear-policy processes have failed in this regard, there is no empirical basis for giving recommendations. Here is ample scope for further work, both in terms of the relevant characterisation of the issues at hand, and in terms of prescribing appropriate procedures to deal with them.

"*Decision making*" argues that since assessment and policymaking are social processes, the social context within which the assessment takes place is of utmost importance in the scoping of the assessment. Unfortunately, the empirical material suggests that most assessments are made in settings well insulated from any understanding of the user context. It is very rare that user needs are taken into account in planning environmental assessments. Instead, analysts and researchers often make a point of being carefully bounded so as to safeguard scientific quality, credibility, and neutrality. However, the mileage in status obtained from focusing on providing impartial and carefully bounded scientific input appears to be limited ("*Role*"). In practice it is recognised among policymakers that no one is neutral and that scientific models have important limitations that preclude taking their conclusions for policy recommendations. The notable exception is the extremely well-resourced global assessments carried out under the Intergovernmental Panel for Climate Change (IPCC), which lent an unprecedented scientific weight to the arguments, and also had prominent contributors in Sweden advocating this.

Still, an important finding in "*Role*" is that policy learning has in fact not been primarily constrained by inadequate designs of assessments. Instead, the critical constraints are the policymakers' rules, capacities, and incentives, in particular at ministry and political levels, discussed in the preceding section.

Networks and rationality towards the public interest

"*Learning*" confirmed that the network perspective is useful to understand national policymaking, also in combination with a learning approach. A focus on changes in pluriformity, closedness, and interdependence of actors, and the interactions and exchanges that occur, offered a strong framework for explaining what was going on (de Bruijn and ten Heuvelhof, 2000). In "*Learning*", although policy change from learning is distinct from policy change based on power shifts, the observed learning was actually indirectly linked to network changes. At a macro scale, these were driven by both actor changes and external factors related to the change from a nationally-planned system towards a partly internationally-governed market system. In the early 1990s, the internationalisation and privatisation of energy markets led to weakening and disaggregating the tight sector coalition that had traditionally dominated energy policy. This gave way to more open access for actors that introduced new interests and perspectives, which was necessary for conceptual learning to occur. The network characteristics thus appear to have explanatory value, confirming what earlier studies have shown: tight networks are usually more powerful than loose ones in maintaining status quo and effectively hindering policy change (Lenschow, 1997; Daugbjerg, 1998). Still, the "shadow of hierarchy"

remains: most of the process occurs in preparation for what are ultimately hierarchical decisions and implementations. The government plays a strong coordination role in defining actor access, knowledge provisions, and the rules of the game.

Does the study also confirm that power hegemonies more generally impede policy learning? Political observers have suggested that we witness a successive depreciation of knowledge use in policymaking, as a consequence of the unique hegemonic power of the Social Democracy in Sweden, who has actually been in government since 1932 with only two brief interruptions (1976–1982 and 1991–1994). Similar concerns have surfaced recently in the United States with the relative hegemony of the Bush Administration in advancing its policy agenda without much concern for knowledge. More power – less rationality, goes the argument. I have not gathered the longitudinal evidence to support the claim that policy learning is on the decline generally, much less that such a decline would be linked to hegemonic power structures. A much longer time frame would be needed to draw such a conclusion. If anything, the tendency in the last fifteen years has been that some parts of the policymaking system, in particular at agency and committee levels, have become more evidence based with evaluation knowledge playing an increasing role, which suggests technical learning is going on, although results in terms of policy revisions are not yet discernible. ("*Role*")

Although power distribution was not a key variable in the analysis, "*Learning*" and "*Role*" showed that power is linked to institutions. Institutions help define power structures by defining the rules of the game (and who gets to play). By changing institutional rules, power structures in the network can be modified, and learning can take place. This can happen at larger scales, as it did through the deregulation process in the sector as a whole, but also in particular committee processes, in which it can be defined in what ways and to what extent policy actors can have access.

The network approach taken in this study distinguishes it from some of the more technically-oriented policy learning literature. With a network perspective, not only knowledge assimilation but also social interactions are crucial components of policy learning. Indeed, social interaction, a core concept in sociology since the early 1900s, is embedded in network theory, in which exchanges within and across networks are central elements for understanding policy change (Peters, 1998). Although they come from partly competing theoretical perspectives it seems necessary to combine both mechanisms, in particular for conceptual learning, because it is in the confrontation and interaction with other perspectives and frames that actors will reflect on their own frames and enter a reframing process.

This links to a central network-theoretical proposition that merits a comment. Network theorists suggest that since the policy process involves a variety of actors, and since these actors hold different (but justified) positions based on their perspectives, interests, and values, one cannot assume that there is one set of objectives, i.e. a "public interest", that can be used as yardstick. Furthermore, because actors shape their preferences and objectives during interactions, policy objectives cannot, and should not, be determined *ex ante.* Instead, criteria must be used which capture the multi-actor dynamics (Klijn and Koopenjan, 2000). I maintain that there *is* something called the public interest and that it *can* be determined *ex ante*. It has been shown that citizens in fact share a large

number of fundamental values that can be thought of as a public interest (Bok, 2001). Furthermore, many of these values are commonplace components of sustainable development definitions. However, the network-theoretical point is certainly taken that the precise qualities of the public interest, when put into practice in the sectors, cannot be determined solely in governmental-led political processes. As we see in "*Learning*", the actors that can access these processes do not necessarily reflect the public interest, and this goes for the legislators as well as for industrial-, labour-, and environmental lobbyists. Although legislators are democratically elected, they are not typically elected on a position in one particular issue, and most certainly not on the environmental issue. What the government and parliamentary majority say is the public interest by passing through parliament might in fact be the interest of a small subset of a bargaining constituency. Furthermore, the political process tends to lead to certain outcomes more often than others: winning some points in the short term can become more important than taking responsibility for long-term sustainable development. Therefore, from a normative perspective the centrality of governmental preferences as a reflection of the public interest can be argued to be overemphasised in the policy-formation process.

Intuitively, a more active and better-informed public seems the logical prescription for a stronger account of the public interest. In fact it has been found that, given the opportunity and proper resources, members of the general public are, just like experts and politicians, often capable of dealing with relatively complex and technical policy issues and use their knowledge, values, and preferences to assess public policy issues (Gerger Swartling, 2002). However, what might induce such an active citizenship, and what it might lead to, is beyond the scope of this thesis. However, a minimum requirement is to open to public scrutiny the policy programmes and their underlying programme theories to be able to deliberate upon how the political system performs. Such scrutiny would be enhanced through the institutionalisation of sustainability assessment systems; both *ex ante* and *ex post* the political decisions. As "*Role*" shows, under the right conditions, where trust can be built through appropriate institutional rules, accountabilities, and commonly-accepted concerns and systematic gathering of knowledge, network actors can pursue rational discourses, assimilate knowledge, and engage in learning-based social processes in pursuit of resolving commonly-agreed problems. In short, the task is to develop a hybrid model "which uses intellect to help guide rather than replace social interaction" (Wildavsky, 1987; p. 124), but today, institutions and assessment systems are not generally arranged to support this process. Many policies in the energy domain do not undergo scrutiny, trade offs are not made explicit, and the government is not held accountable for how they make the trade offs.

The overall implication of the theoretical and empirical work in this thesis is that networks and rationality towards public goals are not incommensurate perspectives, and the critique against rationalism as a prescription, discussed in "*Decision making*", appears abstract and not altogether relevant. What is often forgotten is that most actors in a social setting are not only trying to maximise individual or organisational self-interest, but also contributing to the accomplishment of overarching goals; related to their organisations as well as to society at large (Simon, 1997). An explanatory theory of policy change must include both incentives based on self-interests and common values and priorities at these

different levels, as is highlighted in the normative school of new institutionalism (March and Olsen, 1989). A prescriptive theory must enter knowledge as well as appropriate institutional rules to guide the way choices are made towards commonly-held values. To paraphrase Sir Winston Churchill's comment on democracy: rationality is the worst form of governance except all those other forms that have been tried from time to time.

Six policy implications

The partial character of the study makes it inappropriate to make firm and conclusive policy recommendations that for instance condemn certain institutional arrangements and promote others. Alternatives to the current situations are not fully assessed in terms of indirect impacts on aspects beyond policy learning and EPI. Therefore, the suggestions should be seen as promising avenues to explore, in particular in contexts other than the Swedish one. Under that qualification, six such policy implications are delivered below. This is not a list of preconceived recipes; it builds on the empirical findings regarding what aspects of institutions and assessments appear to have been enabling conditions for policy learning and policy integration. It should be clarified that these are enabling but not sufficient conditions. As shown, broader contextual factors that are more difficult to control have a large role in determining the potential for policy learning. The suggestions could at a principal level be worth exploring also in other places. However, it should be clear that specific institutional solutions must be adapted to their cultural and administrative context.

Put ownership in the sectors

For reframing to occur, ownership and accountability of sustainability issues must land firmly within the sectors. This means ceding competency. There is a strong reluctance to do this from the environmental side, and there is still mutual distrust and a fear that sustainability issues will be diluted and de-prioritised because mainstream sector goals will be overriding in the end. Although there can be some truth to this, this study suggests that having mainstream sector interests taking the lead in environmental policy processes can be a powerful way to gain legitimacy and trust and make actors buy into the process and eventually its outcomes ("*Role*"). It even appears as if the normative orientation necessary to secure the process, i.e. that there is a buy-in from the leaders into sustainability, takes care of itself when the mandate is given. In particular, the good examples were linked to processes with strengthened national frameworks with clear substantive targets such as the national environmental objectives and the climate change policy agenda. Environmentalists have complained about dilution, and about being excluded from the process, but it still appears far better than the alternative, where radical agendas nurtured by fractions in the bureaucracy crash and burn when it is decision – and implementation – time ("*Learning*"). Constituencies for sustainability must be built over the long term in the policy sectors as well as in society as a whole.

Strengthen analytical capacity and incentives in government

Analytical capacities necessary for strategic outlooks, bundling with science, and knowledge processing and assimilation, must be enhanced, in particular at higher levels of gov-

ernment. A downsizing of central government in Sweden has been going on for a long time. This has broken down one of the most important mechanisms for learning: ministries lack the capacity and incentives to reflect and think strategically about long-term policy directions and acquire new knowledge ("*Role*" and "*Framework*"). Sweden being a very small country, coordination is possible in an *ad hoc* manner, just because people happen to know each other. But in the long run, this is untenable, in particular when considering the complexities of the task of developing sustainable policies. At the level of committees, presently the main arena for policy learning, better use must be made of the analytical capacity available in agencies, academia, think tanks, and research institutes. The generic requirements for committees must be made more specific and coupled with more resources for policy analysis on both supplying and receiving ends. Furthermore, government should invest in new arenas for policy learning. This can entail governmental-appointed delegations without a particular policy issue to resolve, building on the Climate Delegation model, and providing opportunities for think tanks, which is currently an underdeveloped branch in Sweden. Advisory delegations have their pitfalls and experience from other countries have shown they can have difficulties getting access to policymakers but at least they have the potential to develop strategic views in a bundling situation.

Institutionalise assessments

Institutionalising assessments for lesson drawing is necessary to build continuity and accountability in the learning process. It is both more important and more difficult than is commonly understood. First, there is an inherent resistance against self reflection in any organisation. Second, in the policy system, the incentive to surround yourself with assessments is particularly weak, partly because it is not considered rewarding and partly because such procedures impede the political manoeuvring space ("*Learning*"). At present, impact assessment in policy preparation in ministries is restricted to a checklist, which is clearly not enough to account for the complex consequences of policy decisions. How could a checklist tell us what are the real impacts of different energy technologies and what are the impacts of policy on our choice of technologies? Furthermore, the results of applying the checklists are not open to public scrutiny. Application of serious *ex ante* policy-level assessments does occur but *ad hoc* and subject to personal interest and political will ("*Role*").

When assessments get institutionalised (which has happened for *ex post* assessments in some processes) more consistent and continuous learning processes are facilitated. A common objection is that relying on such measures would constrain the democratic process and lead to a more technocratic power structures and "expert ruling". I argue that to the contrary, democracy would be strengthened. Institutionalised assessments are not only a learning mechanism but also a safeguard mechanism for dealing with situations where the government does not follow its own strategies. Assessments become checks and balances to improve scrutiny and quality that would not only force policymakers to reflect on their decisions but also aid in enhancing democracy as voters and stakeholders can hold politicians accountable through an improved knowledge base in relation to planned and executed policy ("*Role*"). Further measures for this are warranted, particu-

larly at ministry and parliamentary levels, and in budget negotiations and other political deals. One concrete measure could be to arrange the budgetary process so that there is room for scrutinising relevant aspects of the draft political "bargains" with sustainability assessments before they are concluded and passed in parliament. Depending on the outcomes of such assessments, one might put in place automatic mechanisms; for instance that under certain outcomes the government is requested to move into formal hearing at the parliament. These could be further enhanced if the parliament appoints an independent expert council with the task of scrutinising and commenting on the assessments to ensure their quality and consistency with overarching objectives. Herein, the independence and autonomy, rather than a bundling potential, is of utmost importance, as it has to do with checks and balances of the political arena.

Move assessments upstream and bundle carefully

Strategic assessments should assume a more strategic role, further up-stream in decision making, than is the case today. First, impact assessment procedures are today established at agency levels, but looking at where decisions are really being made, it becomes clear that further facilitating assessment (as well as more general administrative measures for policy integration) at agency levels is partly missing the target, and that measures need to a larger extent address ministry and political levels ("*Role*"). Second, most *ex ante* assessments are limited to impact prediction of draft policies. However, this is only one entry point for integration of sustainability concerns into decision making. In order to become truly strategic in influencing the process before the key parameters have been fixed, it should not only work on predicting impacts of a decision, but contribute to framing the problem, formulating objectives and generating alternatives. It is not surprising that assessments are ineffective if they give their input after the major sub-decisions have been taken ("*Decision making*"). Third, becoming an effective assessment in such an upstream mode relies on understanding the institutional context in which the assessment will function. SEA must become more concerned with the bounded rationalities of the decision-making process, i.e. become "decision-centred" rather than "impact-centred". This means building into the assessment an analysis of the decision-making process, the institutional context and the actor-network configuration. This also implies that assessments as a rule need customised design. The choice of tools and combinations of tools will be contingent on the role of the assessment, the issues it deals with and the decision context that it tries to influence ("*Decision making*"). Guidance can be given by establishing flexible frameworks and toolkits, still based on standard methods and data sets, but allowing a number of context-dependent choices to be made ("*Testing*").

Focus on dilemma sharing and joint-problem perceptions

Assessment processes should explicitly account for and address the goal conflicts and dilemmas that policymakers face, involving multiple perspectives and priorities. Partial descriptions of reality fail to address the decision makers' concerns. However, so do most integrated assessments, in which utilities are aggregated and projected far into the future. Sustainability assessments should give an explicit and open treatment, systematic articulation, and incorporation of different actors' values at stake ("*Role*"). They should

be integrated in such a way that they highlight and explicitly account for the competing objectives, trade offs, and ultimately dilemmas that the decision maker faces, not only between competing economic, social, and environmental goals, but also between different environmental objectives. To borrow from process-management literature, this means to account for and protect the core values of different stakeholders. Many analysts couple this need to account for the plurality of perspectives, interests, and knowledge with the need for broad-based participation and deliberation among stakeholders and citizens. While this might have immediate appeal in principle, as enhancing democratic qualities of policy preparations, the empirical evidence points towards some qualification if the intention is more specifically to support policy learning. Open processes are not necessarily the most conducive arenas for policy learning because they risk becoming position games. The most critical aspect of dilemma sharing is to establish trust in the process, and this can be hard to obtain in all-open processes. It is necessary to think about this when determining who should participate – and how, suggesting a trade off must be made between fully-open access and policy learning among policymakers.

Build a learning platform from a variety of tools and methods

Because tools and methods fulfil partly different purposes, cover different angles, have different underlying theories and presuppose different types of analytical deliberation, policy-learning processes need support from a variety of tools and methods. Decision-makers know that all assessments are sensitive to important framing effects that determine what understanding of reality they convey and this goes for all kinds of assessments ("*Role*"). Deliberative assessments show as much latitude for framing effects and agency as more expert-oriented ones. Unintended bias and deliberate power influence can play a large role in determining outcomes. Most tools therefore complement rather than compete with each other. Each gives small pieces of the puzzle which, taken together, offer more insights and opportunities for learning ("*Testing*"). Applying a variety of methods sheds light on a problem from different angles. This is more likely to contribute to the common understanding of trade offs and sharing of dilemmas. Therefore, the quest for unifying "mega tools" for assessment that are currently pursued with vigour by the European Commission through its research programme to support the application of their new impact assessment procedure, is somewhat puzzling. While there is a need for organising frameworks that can situate tools in a larger context, "mega tools" do not seem to offer very promising prospects of giving an adequate account of the concerns, trade offs, and dilemmas that policymakers face ("*Role*").

Methodological reflections

The policy-learning perspective on policy change emphasises a view on policymaking as a network within which social interactions are the most important aspect of governance; and a system where knowledge is key for advancing public policies. The learning perspective on policy integration has conceptual advantages: it seems to capture the essence of the intentions behind the political principle, it is compatible with the increasingly established network perspective on policymaking, it avoids some methodological and

conceptual pitfalls of competing perspectives (discussed above), and it acknowledges the importance of both social interactions and analytical knowledge. However, it also poses significant challenges. At the theoretical level, working with concepts of learning and framing, I entered a "conceptual minefield" (Levy, 1994). In this literature, what appears to the non-expert as subtle nuance between different concepts are considered by scholars to be unique theoretical contributions. It has not been a main concern to account for the exact differences in the literature between concepts such as frames, value premises, belief systems, and paradigms; or between instrumental and technical learning. The advancement of new theoretical concepts seems to be self-propelling as a way to advance academic careers and make a name for one self. I have instead tried to develop a framework for learning and frames that covers the main concepts in a pragmatic way. In doing so, I have certainly missed a lot of theoretical nuance, which means I open the work to critique from theorists. However, the empirical application has given new pragmatic insights that make up for this loss in theoretical sophistication. My bias for future research agendas would be to continue in that style. Rather than theoretical hair splitting, the way forward should be more distinct operational representations of different components of learning and confronting this with empirical data.

The study has given causal insights. However, the *mechanisms* behind learning have been beyond reach in this thesis. A learning approach to policy integration opens the student to many other fields of research, such as organisational learning, business management, and social psychology. Organisations learn through the learning of its members, i.e. through what goes on inside the heads of people that inhabit the policy system. Indeed, scholars like Herbert Simon accepted this consequence and worked towards an in-depth understanding of social psychology (Simon, 1991). I cannot claim to have touched upon those aspects. Nevertheless, I maintain that by examining an aggregate level of policy learning I can, also without understanding the mechanisms of social psychology and administrative behaviour, or indeed how individual learning is connected to organisational learning, still get causal insights. However, a further unpacking of learning, building on organisational learning literature remains a useful path ahead for future research (Huber, 1991).

The learning approach implies that the self-serving incentives of policy officials are not part of the model, although such incentives (in terms of career, financial reward or status) have shown strong explanatory value in other contexts, according to e.g. theories of bureau-shaping. However, the initial interviews as well as my prior understanding of the way in which bureaucracy in Sweden works suggest that there is not much room for such incentives. Without having any cross-country comparison, the assumption is that Swedish policymaking is, relative to most other countries, governed more by an institutional "logic of appropriateness" than utilitarian self-interest. However, the study does indicate that the political leadership reasons in quite different ways from the administrative parts of the governmental machinery. It has not been an objective to trace these differences systematically, but they constitute an important avenue for further work into understanding policymaking.

The relationship to theory taken had implications for empirical research design. If I were interested in testing a particular theory I would probably want to have a wide range

of material, with high variability in the variables but homogeneity in the units of analysis. Were the purpose to develop new theory, it would need much more testing with multiple designs. This thesis is however not primarily occupied with theory construction or testing but uses theory to help describe and explain reality. However, differences in how to relate to theory are often a matter of degrees: since there is always some kind of idea about where to look for explanations, all explanatory studies will to some extent test theory. Theories and associated analytical frameworks reduce the complexity of the real world. This is their role and a necessity; without filtering empirical facts it is impossible to comprehend reality. The downside is that the more we filter and reduce variety, the more information is lost. What is considered an appropriate level of complexity is influenced by scientific traditions and styles. Research literature in policy analysis display an enormous variety, ranging from pure narratives with little structure or concern for variables and correlations; via semi-formalised analysis where stories and descriptions are coded into variables, to fully formalised numerical variable thinking and statistical analysis. I have tried to situate this thesis somewhere in the middle, by organising concepts and variables in a causal structure, but keeping the analysis of these variables qualitative. Detecting and distinguishing learning empirically has not been straightforward and is also an issue of considerable scientific disagreement. Some scholars demand going deeper into discourse structures, whereas others only take an interest in the policy outputs of the process. Empirical proxy measures for learning in either argumentation or policy outputs are prone to manipulation, and controlling for other factors becomes of overriding importance. The strength of this empirical study lies in the combination of the argumentative analysis and a study of outputs. This enabled me to capture learning in a meaningful way as well as distinguishing it from other phenomena such as strategic behaviour (in arguments) or power shifts (in outputs).

A potential problem with the approach taken is that it risks gathering plenty of impressions rather than evidence. This combined with the qualitative approach means there will not be definite falsifications of any hypotheses, i.e. no proof in a scientific sense. The analysis is embedded in selective descriptions. In addition, a fundamental premise of the approach is a prior in-depth understanding of the issues and subtleties of policymaking. It would therefore be difficult for another researcher to replicate the results with the same approach, which is a problem from a traditional scientific perspective, although it is a common fallacy in social sciences, and indeed one that many social scientists remain unconcerned with. However, the logic of the argument, the combination of data sets, and illustrative displays of evidence should give a sufficient basis for drawing some conclusions.

A quantitative approach was considered but the inherent qualities of the learning concept seemed to argue against such an approach. Highly formalised operationalisations of the variables risked missing some critical conceptual qualities. The low number of observation units would also have weakened the basis for statistical analysis, especially since they are connected chains of events rather than independent observations. There are examples of more quantitative analysis in institutional environmental policy studies. A quantitative analysis and stronger formalisation of the analytical model will lead to explanations that are more precise, but even with more precision and formalisation expla-

nations will remain partial and need embedding in larger narrative descriptions. Furthermore, quantitative approaches must be thought through very carefully in relation to how the variables are operationalised. Often, the quest for something that is quantifiable and measurable becomes more important than the conceptual fit with the variable.

Nonetheless, more quantitative approaches should be further explored in future work. They are needed for governments or the EU to trace progress, in particular in cross-country comparisons. For instance, classical content analysis, where recurring words or concepts are counted in texts, could be considered to measure the independent variable such as the use of assessments as numbers and types of citations of assessments in committee reports or government bills. However, each citation must still be judged: how is it being used – is it merely a legitimising device of existing positions or does it contribute to learning? Another promising avenue is to use systematic survey data to capture framing over time. Such projects require further methodological insights from other disciplines such as organisational studies and social psychology. Nevertheless, there is an increasing wealth of survey data on opinions, attitudes, and values with regard to different types of issues. This provides an opportunity to create more in-depth research programmes to trace the intricate relations between cognition and action, or indeed between policymaking and the psychological reactions of the "target populations".

Are the conclusions valid in other contexts?

One could argue that by looking only at a most-likely case like Sweden, the conclusions drawn in this study might not be transferable to other places. I do not claim that the conclusions are generally valid in any sector or society. Still, findings should have significance in other countries and at other levels of governance. Sweden has its particularities but so do all other countries. Social interactions and knowledge assimilation are generic phenomena. Underlying psychological mechanisms have not been addressed but should not be very different in other settings. Furthermore, in many ways, the Swedish case appears as less most likely for learning than is normally assumed. Although Sweden is often put up there among the frontrunners, both in terms of public administration reform and environmental policy integration, it is really not that special. Sweden has a high environmental awareness among the public, businesses, and policymakers, but on the other hand knowledge has a weaker role in policy than in many other countries and environmental issues are nowadays very low on the political agenda. An administrative consensus culture appears at first to be rather conducive for learning, since it facilitates social interactions. However, social consensus can have a conserving and rigidifying impact as well, inhibiting learning. The Swedish consensus style relies on corporatist set-ups where only actors that are "in" get to participate. If there is no established interest group, issues are off the agenda. Furthermore, coupled with the consensus culture there is a certain amount of intolerance towards external policy analysis and advice. For instance, independent think tanks are conspicuously missing in the Swedish arena, with a few exceptions. There is a monopolisation of expertise within the system. With most knowledge development occurring within the structures, there is a lack of competition of ideas, inhibiting reframing. Therefore, Sweden is far from offering a panacea to which others country should aspire.

Reflecting on fulfilment of objectives

Contribute to theoretical and conceptual understanding of policy integration

A relatively simple theoretical construct was developed and applied to define EPI and differentiate it from other processes of learning and powering. The construct served its purpose to guide the empirical analysis into the relations between institutional arrangements, assessment processes and EPI in national policymaking. It also appears to have some conceptual and methodological advantages compared to other conceptualisations of policy integration.

Contribute to research methodology for analysing policy integration

Based on the concept, a qualitative methodology was applied, whereby learning patterns were detected in the combination of arguments and policy decisions in a study over time and across rounds. The qualitative approach had some formalisation weaknesses but on the other hand it allowed the empirical analysis to remain relatively close to the theoretical construct as well as distinguishing observations from strategic behaviour or power-based policy change. Still, there is scope for increasing the precision in future work.

Enhance empirical understanding of policy learning in the national context

There has been a lack of empirical data on policy integration at the national policy level and virtually nothing in Sweden so far. This thesis has provided rich empirical material on what makes or breaks policy integration in a real sector context rather than at a generic procedural level. I consider this a notable contribution to EPI literature.

Give design principles for assessments in a context of policy learning

Although this study found that the overall role of assessments for policy learning is rather weak compared to other institutional, political, and exogenous trends, it has been able to study the successful processes in some detail and identify certain circumstances, under which assessments contribute to policy learning. This has generated a number of recommendations, as regards both the process and substance of assessments, as well as some institutional recommendations.

Apply some existing environmental policy-analytic tools

The empirical investigation from a political-science perspective gave key insights into processes in the policy arena. This is useful in itself, but the thesis was enriched from adding an operational assessment perspective with insights from assessment literature, past experience, and "laboratory" testing of analytical methodologies on a real policy case. Approaching the problem from such different angles gave additional insights and enriched my understanding of mechanisms for and barriers to making assessments useful. The assessment recommendations are based on empirical work but also "reality checked".

Concluding comments

This study has demonstrated that policy learning is a meaningful and analytically-tractable perspective on EPI. It is not the only way to look at it and it is not the only, or even the principal, mechanism behind policy change, at least not in the short term. It, however, offers a useful lens for examining and understanding policy change over longer time periods ("*Framework*"). Over the last two decades, learning has contributed to major shifts in Swedish energy policy. In this process, partial EPI has occurred, primarily related to the climate change issue. Other environmental concerns, however, appear to have been crowded out in the process.

Largely, conceptual learning by policy actors appears driven by external pressures. The more important learning and reframing patterns in energy policy overall were linked to changes in power structures in the policy network: as the dominant actor networks dissolved or weakened in the early 1990s, new interests, ideas, and institutions emerged and blended in, a necessary basis for conceptual learning ("*Learning*"). Behind these network changes, a wider context of international market and policy drivers can be discerned: the development of Nordic electricity market, the EC's internal market rules, and the commitments to the global climate change convention.

Nonetheless, also institutions of policymaking shape the potential for policy learning. Although other factors, e.g. the domestic political majority situation, international policy trends and commitments, and issue characteristics have a significant and in fact often overriding influence on learning, institutional rules act as filters for how these factors play out. In particular, policymaking rules constrain policy learning more at higher levels in the governmental machinery. Politicians, and to some extent ministry officials, are preoccupied with working the system to maximise their organisations' interests rather than reflecting upon them. And even when the willingness to learn is there, capacities are constrained. The parliamentary situation over the last decade has forced the government to seek coalitions for majority in bills. Lifting also energy-political decisions from routine procedures to political negotiations has been problematic for learning, particularly in the case of the "wicked" nuclear issue where there is very little indication of learning. Climate policy, as a less wicked problem, has been prepared more in agency and committee processes, with in some cases elements of both technical and conceptual learning. In these arenas, social interactions can, if properly managed, take a more constructive form, and there is more capacity for knowledge assimilation ("*Role*").

Thus, issue characteristics affect learning through the selection of institutional arrangements, where "wicked" problems are dealt with at political levels whereas less problematic issues can be allotted to preparations in agencies and committees. There is however no evidence that such a treatment of nuclear policy would have made it more liable to learning. A fundamental lack of trust has developed, as a result of the value conflict embedded in the issue as well as ambiguous political positioning over the years. This issue of trust is popping up here and there in the analysis although it was not an explicit variable in the framework. "Successful" processes from a policy-learning perspective were managed by process managers that were relatively established and trusted actors in the

sector mainstream, and that also spent considerable effort on building trust ("*Role*"). Building trust appears to be foundation upon, or indeed the mechanism by, which the whole learning and integration enterprise relies. Coming to grips with the nature of the issue is a necessary part of the analysis, such as distinguishing between value conflict and interest conflict.

In the short run, existing institutions can limit learning, but in the long run, institutions can, and do, change. In the studied processes, new organisations were created, new mandates given, new committees formed, and new procedures put in place, which enabled drawing some further lessons. The allocation of responsibility for preparing policy issues is one important issue. The empirical material suggests that ceding competency is more constructive for EPI in the long term than expanding the turf of environmental bureaucracies ("*Role*" and "*Learning*"). It points towards a paradox that requires more in-depth investigation: if the environmental bureaucracy loses the mandate over certain issues, they become less powerful. Yet, this might lead to more sustainable outcomes in the long run. This creates a tension and an implicit barrier against EPI among environmental interests. However, we need to understand more about under what conditions this is the case, and find out what is the longitudinal evidence in other contexts.

The role of knowledge in decision making is often misunderstood. A mainstream assumption is that assessments should support a rational choice between alternatives to reach a commonly-agreed objective. However, at least at the policy level, such assumptions are flawed ("*Decision making*"). Most of the time, assessments are carried out without a clear sense of how they are going to be relevant. Often, they are used as strategic ammunition. In many cases, awareness raising and stimulating interaction among stakeholders, which are important components of policy learning, are more tenable roles worth pursuing in their own right. This thesis argue that for assessments to have some positive contribution to policy learning, they must a) be bundled with the decision-making process and b) make an honest attempt to comprehensively address the key concerns and values of the actors involved in the process. They need to support the development of joint-problem perceptions, through an explicit recognition of concrete policy dilemmas, trade offs, and winners and losers of policy, factors which constitute the key concerns of policymakers today ("*Role*").

To play such a policy-learning role, environmental assessment has much to learn from more developed research fields in decision-making sciences, policy analysis, and risk management. This requires becoming aware of the decision-making context, e.g. by including a decision-making characterisation in the assessment framework; and making explicit the values and criteria that are operational ("*Decision making*"). At the impact-analytical stage, rather than trying to device one "macro-macho" tool, it involves combining a variety of assessments methods, including both a range of formalised and informal tools, qualitative and quantitative tools, and site-dependent and site-independent ones ("*Testing*"). Methods usually complement each other rather than compete. Different analytical styles and different framings are built into different methods and tools. Some are built around social interactions, and others inhibit them. Formalised "expert tools" are usually not conducive for deliberations in themselves but their outcomes are needed for learning-based deliberations. They do however as a rule give partial accounts and need com-

plementing with non-formalised qualitative analyses. ("*Testing*")

However, explanations for how assessments are used and contribute (or not) to learning is found more in the institutional context than in the assessment designs. Knowledge is a precondition for learning but the institutional incentives and capacity, and the procedures established for developing policy, appear more important for policy learning that what form the inflow of expert knowledge takes. What matters is that assessments are institutionalised to ensure that policymakers can and will base their decisions on knowledge, and that other stakeholders get a basis for evaluating the performance of the political system. Promising efforts include the monitoring and evaluation of policy objectives and programmes, and new arrangements for interactions between ministries and agencies created in the 2000s ("*Role*").

Final reflections

I embarked on this study believing that learning was in a bad shape in policy processes. Policy makers appeared to take little notice of new knowledge on environmental issues, and decisions were made on the basis of balancing economic and political interests and staying clear of public opinion – regardless of new ideas, insights and perspectives. In a way, I was proven wrong, at least over the long term. Studying the evolution of energy policy revealed that knowledge and new ideas were being assimilated in the system, albeit slowly and indirectly, and often not where we think. The troubling news was that learning at higher levels is so constrained, not only by how different constituencies construct knowledge differently to support their already-fixed positions, but also, in the case of nuclear policy, how knowledge is altogether disregarded as soon as it conflicts with political priorities.

This unfortunately means that, despite promising elements in the climate policy case, the potential for policy integration and learning in energy policy is weak, because in many ways, nuclear policy *is* energy policy. It is the key issue behind all major energy-political agreements, overshadowing other policies on for instance, renewable energy, natural gas, and climate mitigation. The way it has been treated, without accountability or respect for public opinion, has left many actors disillusioned with energy policy in general. Although the public has moved on from the nuclear trauma since many years, it seems as if the value conflict has been artificially maintained in the political system, primarily as a powering instrument for the government. An ambiguous outcome of a 25-year old referendum is blocking serious thinking although the world is a completely different one today, with issues like climate threats and international interdependencies that were not even on our radar screen in 1980. Sweden is among the industrialised countries that have the least per capita CO_2 emissions, thanks to nuclear and hydropower. As long as goal conflicts between for instance nuclear phase-out and CO_2 emissions, or between electricity prices and competitiveness, are not discussed as serious issues, energy policymakers come across as irrational and even two-faced. It is time to put an end to this thirty-year old value conflict and fundamentally reassess the issue based on the new premises. Otherwise, the little steps of learning and integration will continue to be dwarfed.

Sweden used to be considered a forerunner in public administration and evidence-

based policymaking. It was claimed that the government made decisions based on the best available knowledge and that environmental policymaking in particular was strongly driven by scientific discovery. If this was really the case, something changed on the way. Leading politicians have stopped asking questions, and the "seminar culture" has slowly eroded along with the analytical capacities. In light of the EPI imperative, these are problematic tendencies. I hope that the very few people who have read the whole thesis agree that Sweden needs to strengthen and institutionalise a constructive interface between expert-based knowledge and the policy process for scrutinising, challenging, and bringing in new ideas and perspectives. This interface must to a larger extent than today be based on a real understanding of the decision-making context by the policy analyst and enhanced capacities for knowledge processing and assimilation with the policymaker. It should be possible to have a somewhat intellectual attitude towards public policy that allows us to build on and learn from knowledge in making policies for the future, develop the ability to discover and understand new conditions, explain the difficult goal conflicts, and not be afraid to admit that there are no simple solutions to complex problems.

This thesis has argued that understanding trade offs and facing policy dilemmas upfront is key for policy integration and learning. The larger point is that gathering knowledge and deliberating on the trade offs is not just a matter of making better decisions, it is about transparency, accountability, and ultimately democracy. Indeed, we elect politicians precisely to trade off between different interests. Therefore, the fear of deliberating on choices at political levels is puzzling. Olof Palme's most famous, although somewhat bewildering, quote is: "*Politics is about willing*" ("Politik är att vilja"). What does this mean? I suspect it means we should be able to count on politicians making the choices and then stand up, and be held accountable, for them. When criticised for not pushing industry harder on environmental issues, politicians should say up front: "We are not a special interest. We do care for the environment, but we have to balance this against jobs, welfare and mobility. We could change the vehicle taxation scheme to punish large cars, as the green lobby demands, but that would mean jeopardising a major engineering industry, and the jobs of 300,000 people in Sweden. On balance, we consider that it is not worth it. We are elected to make those calls and if you do not like it, vote for someone else." But they never do that. Instead of clarifying the trade offs and positions taken, and let the voters judge if they agree with that balance, politicians avoid showing their cards. It seems to be outside the realms of the political game – if you concede that you prioritise one thing over another you are immediately jumped upon. The result is that the public does not know what they stand for, or indeed for what they should be held accountable.

Here, assessments must play a larger role, but we should rethink what role this is. However, this does not mean to follow the advice of the post-normal science advocates who see science and expert analysis as elitist and undemocratic and they should give way to stakeholder deliberations and public participation. In Sweden, this has gained support among many environmentalists, where there is nowadays strong scepticism towards science. However, outside the hard core of "post-normalists" most people probably agree that their critique becomes less relevant as we move towards the pure natural science do-

mains. Although they do operate within certain paradigms and beliefs, there are also rules of the game that provide safeguards against manipulations and biases. Nevertheless, as we approach the zone where politics and science meet, the analysis of scientific-political problem constructions must be given increasing attention. There are strong framing effects on the analysis from who we are, the analytical tools we deploy, the choice of questions, the inclusion of disciplines, the recruitment of analysts, the choice of variables, and the interpretation of uncertainties, and these all exert a strong influence on results – yet they are rarely discussed. Even less discussed is the fact that the prescribed participatory and deliberative assessments are just as apt for framing effects and biases. As Bourdieu stated, we must also turn the analysis against ourselves and the world we live in; examine our own point of perspective, and the frame within which we act, the rules by which we accept newcomers, what ideas are represented, what values are at stake and what symbolic and material benefits are at stake for us.

Sustainable development must be seen as a long-term building of a value system, not short-term victories that alienate the societal mainstream. Policy analysis needs to align with this perspective, because although powers and interests may shape policymaking in the short run, ideas are more powerful in the end. As John Maynard Keynes once said (Quoted in Cambridge History of 20th Century Political Thought):

> The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed, the world is ruled by little else. I am sure that the power of vested interests is vastly exaggerated compared to the gradual encroachment of ideas.

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Paper I

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Framework for Analysing Environmental Policy Integration

MÅNS NILSSON & ÅSA PERSSON

ABSTRACT *Environmental policy integration (EPI) has been broadly embraced as a principle in European policy making. Yet, what it means in practice is far from clear and its translation from rhetoric to action has been shown to be complex and politically difficult. This paper provides a conceptual clarification of EPI based on a review of current research. It then develops an analytical framework for analysing EPI from a policy networks perspective, with a set of variables based on existing theoretical and empirical research. In explaining EPI, the analytical framework focuses on policy-making rules and assessment processes as independent variables, but includes background factors such as problem characteristics and the international policy context. The framework is tested in a preliminary study of EPI in energy policy making in Sweden, and some elaborations to the framework are suggested based on the empirical findings.*

Introduction

The principle of Environmental Policy Integration (EPI) as an element of sustainable development has been broadly embraced and agreed upon in European policy making during the last decade. Addressing and integrating environmental concerns in sector policy making has been advocated from a normative viewpoint in that the environment needs better protection and all sectors of society should help to achieve this. EPI has also been promoted from a perspective of increasing the rationality and effectiveness of policy making. When different policy actors are brought together the pool of knowledge grows and chances for identifying previously unknown 'win–win' or more cost-effective opportunities increase. Even if such opportunities do not exist it may still be possible to avoid obvious policy contradictions. More integrated policy making may also serve democratic objectives since critical and potentially unavoidable trade-offs can be made more transparent. However, while EPI is appealing at the conceptual level, its translation from rhetoric to action has been shown to be complex and politically difficult. The high level of abstraction in the sustainable development debate means that contentious issues are often manifested only at the sector or sub-sector levels (Lenschow, 2002a). Economic, environmental and social concerns may seem compatible at a generic level, but in sector policy making difficult trade-offs are inevitable (Naturvårdsverket, 1999). Analysing the concept and practice of EPI is, therefore, important for understanding

Corresponding author: Måns Nilsson, Stockholm Environment Institute (SEI), PO Box 2142, SE 103 14 Stockholm, Sweden. Email: mans.nilsson@sei.se

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barriers to sustainable development. A theoretically consistent conceptualization of EPI is needed to provide the basis for such an analysis.

The aim of this article is to develop an analytical framework for the analysis of EPI—what it is and what drives it—and to test this framework in a preliminary empirical analysis. In this article, EPI will first be discussed at a conceptual level and different understandings will be highlighted, with brief overviews of EPI as practised within the European Community (EC) and in national policy making in Sweden. Building on this discussion, a theoretically based framework for EPI analysis is developed. As will be discussed further, EPI can be studied in the policy process as well as in actual policy outputs. The framework combines recent advances in the institutional tradition of political sciences, network analysis, policy analysis and social studies of science–policy interactions.

The framework is applied in a preliminary analysis of energy sector policy making in Sweden. The preliminary analysis has focused on the overall policy-making context as well as on a comparison of different policy processes in the energy sector in Sweden. The data analysis is based on observations in articles, debates, speeches, communications, committee reports, governmental bills and plans and interviews with policy makers and other actors active in the national policy arena, including officials from the Ministry for Industry, Ministry for the Environment, Swedish Energy Agency, Swedish Environmental Protection Agency, Association of Swedish Enterprise and the Swedish Energy Association (12 in total). Results should be seen as preliminary and only illustrative for the purpose of demonstrating the usefulness and limitations of the framework as a tool for analysis.

Why is EPI Necessary?

When discussing the rationale for EPI, a useful distinction can be made between *organizational* and *normative* motives. The organizational motive for EPI is based on a concern with effectiveness (Lundqvist, 2004). Rather than react to environmental problems, EPI involves consideration of positive and negative environmental aspects at an earlier and more anticipatory stage and hence contributes to greater effectiveness in achieving environmental goals, as well as more rational policy decisions in general. This concern is reflected in Underdal's (1980) conceptualization of policy integration, which can be ensured if inputs are comprehensive, processing occurs by aggregating inputs to a common measure and outputs are controlled for consistency. Collier (1994, p. 36) also articulates a mainly organizational understanding when identifying the objectives for EPI as, "achieving sustainable development and prevent environmental damage; removing contradictions between policies as well as within policies; and realising mutual benefits and the goal of making policies mutually supportive". The first objective is of a more normative character, but it rests on a rather modest definition of EPI: "an approach which requires the inclusion of the environment amongst the set of values being considered" (Collier, 1994, p. 35). The others relate to the rationality of policy making and could thus be interpreted as general principles for rational policy making and not necessarily EPI-specific objectives.

Other authors tend to recognize a predominantly normative rationale for EPI, based on a specific concern for the integrity of the environment, i.e. the weight attached to environmental objectives in relation to sectoral policy objectives. Liberatore (1997, p. 119) qualifies EPI by arguing that, "… the concept of integration assumes a form of reciprocity". Reciprocity here means (at least) equal weighting of sector and environment policy

concerns, as there would otherwise be 'dilution' rather than integration. In a similar vein, Lafferty & Houden 2003 understand EPI not merely as "good policy making strategy" in terms of removing contradictions and realizing mutual benefits, but as making environmental objectives the overarching ones. They define EPI as implying:

> (i) the incorporation of environmental objectives into all stages of policy making in non-environmental policy sectors, with a specific recognition of this goal as a guiding principle for the planning and execution of policy;' (ii) accompanied by an attempt to aggregate presumed environmental consequences into an overall evaluation of policy, and a commitment to minimise contradictions between environmental and sectoral policies by giving priority to the former over the latter (p. 9).

However, it is also recognized that the priority given to environmental policies must be subject to a democratic decision-making process. Lafferty and Houden, therefore, argue that the ultimate trade-off for EPI is between democratic norms and the operational goals of sustainable development.

A question at the conceptual level is, thus, whether the study of EPI should reflect a normative position or not, i.e. include a prioritization of environmental over sectoral objectives. A normative understanding of EPI would imply some kind of benchmark for what situations should qualify as integration and what is simply dilution, whereas a predominantly organizational understanding is more open in this regard. An organizational understanding, on the other hand, could be seen as superfluous since it amounts to nothing more than a general principle for good decision making. However, the two understandings may not be incompatible in reality, since the actual priority given to different objectives can be difficult to measure and they are both amenable to analysing EPI as a matter of degree (Metcalfe, 1994; Peters, 1998).

EPI as Process, Output and Outcome

EPI can be studied from different perspectives. To date, EPI has been understood mainly as an issue of *process*, with a focus on policy co-ordination between agencies, intra-governmental relations, communication processes and systems for issue mainstreaming into sector decision-making procedures (Doern, 1993; Fergusson *et al.*, 2001; Jordan, 2002b). Within this perspective, analysts study both broader initiatives and discourses and particular administrative measures. However, EPI can also be studied in the policy *outputs*; the statements, objectives, strategies, actions and regulatory instruments put in place. The reason for paying extra attention to the policy output as a separate analytical entity is that the actual policy outputs sometimes result from bargaining that have little to do with the substantive preparation process, and the assumed link between process and output might be weak in reality (Falkemark, 1999).

Furthermore, as the ultimate purpose of EPI is to contribute to a better environment, it has been argued that a thorough analysis should also include *outcomes*, i.e. an examination of how policy has stimulated changes in environmental behaviour. As Lenschow (2002b, p. 7) argues, "the integration process currently faces the challenge of ensuring that substance follows from procedure". Implementation and actors' interpretations and behavioural changes in reaction to policy measures can, therefore, be seen as important elements of EPI. Do environmental considerations maintain their status or is there an 'implementation deficit' (Jordan, 2002b)? To analyse outcomes and get a

comprehensive view of where and how environmental pressure is exerted, undertaking 'sector policy assessments' has been suggested (European Environment Agency, 1999).

The International Policy Background

The recent impetus to actively pursue EPI in countries and organizations builds on a long-standing debate at global, European and national levels. The necessity of considering economic and environmental policy together was emphasized by the Brundtland Commission:

> The ability to choose policy paths that are sustainable requires that the ecological dimensions of policy be considered at the same time as the economic, trade, energy, agricultural, industrial, and other dimensions on the same agendas and in the same national and international institutions. That is the chief institutional challenge of the 1990s (World Commission on Environment and Development, 1987; p. 313).

Broader strategies for integration of environment and development in decision making were then proposed in Chapter 8 of Agenda 21 (United Nations Conference on Environment and Development, 1992). These UN documents legitimized EPI as a cornerstone in the pursuit of sustainable development and provided a basis for countries to develop their own EPI strategies. Applied work of the OECD on policy approaches towards sustainable development has also been a driver of EPI internationally (OECD, 1996, 2001a).

The evolution of EPI within the EC has been given increasing attention both politically and academically (Lenschow, 2002b; Lenschow & Zito, 1998; Liberatore, 1997; Weale & Williams, 1993). The EC has established a number of EPI mechanisms in its own legislation and operations. The Single European Act (1987) (Article 130r) and the 'Maastricht Treaty' of 1992 gave EPI a legal basis. Article 6 states that, "environmental protection requirements must be integrated into the definition and implementation of the Community policies and activities referred to in Article 3 in particular with a view to promoting sustainable development". The Third, Fourth and Fifth Environmental Action Programmes have articulated the need for environmental integration in EC sectoral policies. Furthermore, the Council adopted the EC 'Strategy for Sustainable Development' in June 2001 (European Commission, 2001). EPI has a central role in the strategy, in which it is argued that "the absence of a coherent long-term perspective means that there is too much focus on short-term costs and too little focus on the prospect of longer-term 'win–win' situations" (p. 5). The strategy states that "Sustainable development should become the central objective of all sectors and policies" (p. 6). However, while the strategy reflects a commitment to changing EC policy making, it remains an open question how this commitment will be implemented.

The European Council decided in Cardiff in 1998 that, in order to achieve more effective EPI, the various Council sectoral configurations should adopt their own strategies for integrating environment and sustainable development into their respective policy areas (European Commission, 1998). External evaluations of the Cardiff process have so far found that progress varies considerably. It is noted that some strategies build on incomplete or absent sector assessments, little external consultation, and consist of little more than recapitulation of existing measures (Fergusson *et al.*, 2001; Kraemer, 2001). Since these evaluations, further measures have been taken. After a lengthy

preparation, in 2001 the EC issued the *Directive on the Assessment of the Effects of Certain Plans and Programmes on the Environment* (Directive 2001/92/EC, OJL 197, 21 July 2001, pp. 30–37) for transposition into national legislation. However, in its final form it came to exclude the policy level. In 2002 the EC also declared its intention to use impact assessments in the preparation of all EC legislation (European Commission, 2002).

Thus, a political legitimacy of EPI has been established internationally, essential for integration to be pursued seriously and effectively. However, relatively little attention has been given to conceptual clarification and definitions (Lafferty & Houden, 2003). Furthermore, attention has been focused on introducing measures in the policy process rather than trying to ensure that EPI is attained in actual policy outputs, and the hierarchy of policy objectives seems to remain unchanged.

EPI in Sweden

The ambiguity of EPI has resulted in different interpretations at the national level. For example, in the Netherlands it is perceived mainly as a bottom-up attitudinal change, in Germany as a chance to correct market failures and in the UK as an impetus for rationalizing government and eliminating contradictions (Lenschow, 2002a). In Sweden, environmental policy was, since the 1960s, characterized by a regulatory, end-of-pipe approach in which maintaining a balance between environmental and other societal interests was a key theme (Lundqvist, 1998). The approach shifted towards EPI with the 1987/88 Environmental Bill, which emphasized that environmental policy should be preventive and cross-sectoral. The principle of EPI was given strong political support when Prime Minister Göran Persson declared in 1996 that ecological modernization was to become a new profile issue for the Social Democratic government and that Sweden should be a role model for efforts to achieve ecological sustainability. The new Social Democrat project, after building the welfare state, was to build the 'green welfare state', *det gröna folkhemmet* (Lundqvist, 2000).

In recent years, several measures for EPI have been put in place in Sweden. The government has issued a *sustainable development strategy* that includes objectives and activities for the three dimensions of sustainable development (Regeringens Skrivelse, 2002). The *sector responsibility scheme* is arguably the most important measure (Naturvårdsverket, 2000). A Government Communication in January 1997 on the state of the environment stated that "different societal sectors must assume an increased responsibility" (Regeringens Skrivelse, 1997, p. 4). The outcome was a legal responsibility for the Director-Generals of all governmental agencies to take into account not only environmental considerations but also the objective of sustainable development in their activities. More generally, the agencies "shall integrate environmental concerns and resource management in their activities and promote ecological sustainability within their sector" (Regeringens Skrivelse, 2000a). Linked to sector responsibility are the fifteen *national environmental quality objectives* (NEQOs) that were adopted by the Parliament in 1999 to act as a framework for Swedish environmental policy (Regeringens proposition, 1997, 2000). They were intended to provide a basis for different policy sectors to develop their own environmental objectives. Twenty-four governmental agencies have been identified as having a specific responsibility for the NEQOs. However, success with developing sector objectives based on the NEQOs has been limited, among other things due to disagreement on the usefulness of such objectives and limited interest by sector actors (Naturvårdsverket, 2000).

In addition, the Swedish government has put in place a range of EPI measures of a more concrete character. *Environmental management systems* for governmental agencies and *green public procurement procedures* have been introduced (Delegationen för Ekologiskt Hållbar Upphandling, 2001). Monetary and physical *environmental accounts* are routinely assembled (Konjunkturinstitutet and Statistiska Centralbyrån, 1998; Statistiska Centralbyrån, 2001). Finally, the government publishes annual reports on the progress towards ecologically sustainable development (Regeringens proposition, 2000a; Regeringens Skrivelse, 1998, 1999, 2000). At the regional and local levels a range of EPI measures have been introduced, such as *local investment programme*, guidelines for EPI in regional development and impact assessments of municipal planning (Nationalkommittén för Agenda 21 och Habitat, 2002).

In Sweden there is an emphasis on administrative, informational and institutional measures for EPI, such as capacity building and learning, policy dialogues, leadership, representation of environmental interests in committees and communications (Naturvårdsverket, 2001). However, while measures are in place, it is unclear whether environmental concerns are now given more weight in sector policy making and whether this has to do with these measures or other forces. Fudge & Rowe (2000) point to the historically impressive record in Swedish environmental policy as well as to many favourable conditions as promising for further progress. However, Sweden also suffers from many of the same problems as the rest of Europe when it comes to conflicts between different goals. Naturvårdsverket (1999) suggests that an overall priority setting of environmental and societal goals to guide the decisions concerning trade-offs has not been made by the government. Instead, trade-offs are currently dealt with at the administrative levels. It remains to be seen what powers the Swedish Parliament and Cabinet Office will use to signal the preferred order of prioritization of policy objectives.

An Analytical Framework for EPI

EPI is a politically constructed term (just like sustainable development) and people will have different interpretations of it. The imprecise character and multiple interpretations of EPI have been a problem for both practitioners and researchers. Hence, EPI can be studied from various social science perspectives and different academic disciplines approach it differently. To economists, it can mean application of economic instruments that correct market failures and adjusted prices to reflect social costs (Commission for the European Communities, 1994). Communicative action theorists could construct it as a matter of creating inter-subjective meaning; social systems theorists might emphasize organizational co-ordination and political economists could construct it as bargaining process and struggle between different interests (Shannon & Schmidt, 2001). Peters (1998) makes a distinction between "policy coordination" and "administrative coordination". The former rests on the assumption that it is more effective to co-ordinate from the very beginning, in a top-down manner and that clear overall priority setting is more important than implementation concerns. The latter represents a bottom-up orientation towards making government policy outputs more coherent and easily absorbed for those they influence and, thus, stems from an implementation perspective. Peters shows that the view of the policy context has fundamental implications on how EPI is conceptualized. To make a full conceptual and operational definition, one thus needs an approach to understand the complex mechanisms that shape policy making, including how policy preferences are formed (Wildavsky, 1987).

A Network Perspective on Policy Making

In one of the earlier attempts to understand the basic features of policy integration, Underdal (1980) formulated three criteria for a policy to qualify as integrated: *comprehensiveness*, in terms of inclusiveness of space, time, actors and issues in the processing of inputs; *consistency* in that all the components of the policy outputs are in agreement; and *aggregation* in that an overarching criterion is used to evaluate different policy elements. An integrated policy is one where "all significant consequences of policy decisions are recognized as decision premises, where policy options are evaluated on the basis of their effects on some aggregate measure of utility, and where the different policy elements are in accord with each other" (Underdal, 1980, p. 162). *Comprehensiveness* is the scope of policy premises; the knowledge base used for policy making, the actor representation in the process and the temporal and spatial scope of alternatives. *Aggregation* has to do with the weighting, priority setting and evaluation of information and alternatives. *Consistency* has to do with outputs and can be studied in a vertical dimension—the accord between general policy goals and statements and the actual implementation programmes—and in a horizontal dimension—the accord between multiple policies affecting the same issue. Underdal suggests that there are trade-offs in terms of maintaining aggregation and consistency when increasing the comprehensiveness of decision inputs.

Although Underdal's representation of policy integration is clear and consistent, it is based on a hierarchist model of the policy process, which today is considered to have limited descriptive value in many policy contexts. This is because hierarchical perspectives do not adequately address contexts of multiple actors and competing paradigms (Hogwood & Gunn, 1984). An increasingly well-documented alternative to the hierarchist view is the *policy network* perspective, used to describe policy systems characterized by multiple actors, interests and interactions (De Bruijn & Ten Heuvelhof, 2000; Marsh, 1998). Networks are an idea-based approach to understanding political actors and interactions and their role in policy making. Networks are characterized by *pluriformity*, as actors have different perceptions, interests, beliefs and preferences; *closedness*, as actors are to some degree closed to external influences; and *interdependence*, as actors depend on each other for reaching decisions (de Bruijn & ten Heuvelhof, 2000).

Within networks, different stakeholders can be aggregated into coalitions that are glued through belief systems concerning issues such as the relative importance of various issues, understanding of causalities involved, and policy preferences (Sabatier, 1988).[1] These can also be described as policy frames: "… a way of selecting, organising, interpreting, and making sense of a complex reality to provide guideposts for knowing, analysing, persuading, and acting" (Rein & Schön, 1993). Frames are connected to belief systems about problems, their causal relationships and the desirability of certain outcomes. To facilitate analysis, frames and belief systems are frequently structured into a hierarchy, such as deep core, policy core and secondary aspects (Sabatier, 1988), rhetorical frames and action frames (Rein & Schön, 1993), or the stable policy core and flexible and adaptive periphery (Majone, 1989). Moving through the structure, the stability and closedness change. The deep core, concerning fundamental beliefs on issues such as distributional equity or people's relationship to nature, are not easily changed or compromised. Policy cores and secondary aspects, on the other hand, can change more easily and can, thus, be negotiated to form alliances across actors and coalitions. Related to networks is the concept of epistemic communities (Haas, 1992). According to this

concept, scientific knowledge, when properly organized in professional networks, exerts significant political influence. While advocacy coalitions rely on political values, epistemic communities are based on common understandings of scientific knowledge.

The Dependent Variable: EPI as Learning

The attempt to analyse EPI—to what extent it exists and what influences it—requires its clear conceptualization as the dependent variable in the framework. Network theories in political sciences often talk about learning as the mechanism for policy change. Already in the 1970s, learning concepts emerged in a critique that the process of policy change should be seen more as a process of learning than conflict resolution (Heclo, 1974). In fact, understanding EPI as learning in common in literature (Carley & Christie, 2000; Hertin & Berkhout, 2001). Hertin & Berkhout (2001) argue that EPI is about, "social learning in the wider sense of a change of world views, norms, and values". The EC's Environment Commissioner Margot Wallström described the integration strategies in the fifth Environmental Action Programme as, "the beginning of a learning process in our thinking and attitudes" (Lenschow, 2002b). With this perspective, EPI can be thought of as learning between actors in the policy network leading to changes in sector policy-making processes and outputs as a result of new mandates of environmental concerns and knowledge about environmental consequences.

Building on the idea-based approach of networks and associated frames outlined above, learning can take place at different levels in the belief system. One level feeds into existing beliefs, norms and patterns of understanding, permitting the system to achieve its present objectives (*single-loop*). Secondly, it can bring about changes to these frames (*double-loop*) (Argyris & Schön, 1978; Lee, 1993). Learning can, thus, occur *within* frames and coalitions that share the same world-view or *across* frames where world-views are challenged (Sabatier, 1988). Learning that takes place within frames and confirms existing belief systems is easily assimilated, whereas across-frame learning is trickier. It is a well-known thesis that organizations tend to resist knowledge that calls into question their belief systems (Argyris & Schön, 1978). On these accounts, learning results in a conceptual evolution of frames and belief systems of actors that would be measurable by analysing discourses, rhetoric and debates. However, Hall (1993) adopts a more output-orientated approach when he identifies three orders of instrumental policy change as a result of learning: (a) change the setting of existing instruments (normal policy making); (b) change the instruments themselves; and (c) change the hierarchy of goals themselves (paradigm shift). Bennet & Hewlett (1992) argue that it may be impossible to empirically distinguish learning in the process from policy change. However, as this paper is concerned that the link between policy rhetoric and actual outputs might be rather weak, this difference should be captured in the analysis. This means that one can separate between EPI in the process—a conceptual change; and EPI in the policy outputs—an instrumental change.

Combining these conceptualizations of EPI (learning across frames versus learning within frames, and conceptual change versus instrumental change), the EPI variable can assume four main values (Table 1). These different orders can also be seen as levels of 'embeddedness' of EPI; to what extent it really changes actions as opposed to being superficially imposed and leading to adjustments in the rhetoric. The distinctions of the dependent variable also relate to incrementalism as an important feature of policy making (Lindblom, 1959; Majone, 1989). Incrementalism relates directly to conceptual or instrumental change *within* existing frames.

Table 1. Four levels of Environmental Policy Integration

	What is learned?	
To what effect?	WITHIN FRAMES	ACROSS FRAMES
CONCEPTUAL	1 Policy debate adjusting incrementally	3 Policy debate changing fundamentally
INSTRUMENTAL	2 Outputs adjusting incrementally	4 Outputs changing fundamentally

The Independent Variables: What Causes EPI?

While conceptual clarification has so far been poorly addressed in the EPI literature, more attention has been given to influencing factors and how it could be achieved, i.e. the independent variables in the analytical framework provided here (in contrast, very little of the learning literature actually addresses what factors affect learning). Literature contains both concrete strategies and measures for EPI at a practical level and more theoretically orientated analyses. This also touches upon more generic explanations about what shapes policy making, of which there are many competing hypotheses.

Institutional Perspectives

Since the late 1980s, new institutionalism has become an influential approach for analysing political life and policy decisions. Institutionalism emphasizes the role that formal and informal rules have in shaping and constraining, if not determining, policy outcomes (Scharpf, 1989). 'Old institutionalism' focused on the machinery of the government and the formal rules and constitutions that governed policy, in particular the law. It had little concern with individual agency, so if one could identify the structures, one could predict the behaviour (Peters, 2000). In the 1960s and 1970s, rational choice and behavioural theories led political sciences in directions that, to an increasing degree, focused on individual agency, rationality and bargaining of interests, as expressed in theories such as public choice. The concept of 'new institutionalism' developed as a critique against this, by then dominating, direction of political sciences (March & Olsen, 1989). New institutionalists argued that there was an increasing discrepancy between these agency-orientated theories and empirical findings. They wanted to bring back some of the features of institutionalism to the frameworks of analysis. The important difference was the theoretical shift from formal structures to informal aspects such as norms, values and traditions.[2] Today, institutions are commonly considered to include *rules* that allocate authorities, *norms* that govern the preferences of various actors and *practices* that govern behaviour (Weale *et al.*, 2000). Some scholars prefer to talk only about rules but with a broad connotation including formal as well as informal rules (Ostrom, 1990). Young (2002) talks about the 'thickness' of institutions, where the institutions in a thin sense are the formal systems rules, and procedures, whereas institutions in a thick sense also include informal understandings and frames. Institutionalism is, thus, rather than a theory itself, an approach within which several theories and approaches exist.

There are two principal models for explaining how institutions affect behaviour. *Rational institutionalists* subscribe to the *collective action* model for human behaviour, with an emphasis on the analysis of how utilitarian actors act to optimize their gains

within the constraints of rules. This has been used to policy problems primarily in the USA (Scharpf, 1989). Ostrom (1990) has used it successfully in researching common property resource management, although its predictive powers in public policy have been challenged (Sabatier, 1999). Another school of thought, *normative institutionalism*, subscribing to a *social practice* model, have other assumptions about the character of actors and to what extent they are governed by social constraints. In this school, institutions can only be understood if one analyses their embedded normative structures, or their 'informal logic' (Dryzek, 1996). March & Olsen (1989) argue that behaviour is governed by the 'logic of appropriateness' connected to the interpretation of meaning, values and belief systems. In essence, values and norms are the central factors in explaining behaviour. Actors do not act for utility maximization but to conform to values and practices. The central element of institutional evolution is the development of meaning, learning and processes of comprehension and interpretation. In this sense, it is related to the concepts of belief systems, frames and policy networks discussed earlier. The network approach has been seen as an actor-centred normative institutionalism because there is stability in network interactions and compositions, predictability in behaviour and supporting normative structures (Goodin, 1996). Common frames and belief systems are the glue that holds together coalitions in the network.

Institutionalism in EPI Studies

According to institutionalism, formal and informal rules would also shape and constrain EPI. Various institutional approaches have been used in existing EPI studies. One set of studies focuses on normative aspects of institutions, such as political commitment and leadership, as well as actors' understanding and acceptance of sustainability objectives and principles. With an idea-based approach, Lenschow & Zito (1998) applied the policy frames concept to explain the evolution of EPI in the EC. Changing policy frames can offer opportunities for creating new agendas for EPI. Many emphasize the need for high-level political commitment to make EPI credible and an active aspiration, as opposed to a principle on paper (Hertin & Berkhout, 2001; Jordan, 2002a, 2002b; Lafferty & Houden, 2003; Lenschow, 2002b). When discussing EPI in the UK Jordan (2002a) and Weale & Williams (1993) find that the 'hardware', i.e. the organizations and procedures of governance, and the 'software', i.e. the knowledge needed to implement EPI, are both in place but that the 'electricity', the political will, is lacking. Evaluations of the Cardiff process revealed that EPI mechanisms sometimes are implemented without supporting belief systems among actors in the network (Kraemer, 2001; OECD, 2002). Norms and values are difficult to change. Concrete means suggested to make policy traditions and cultures more conducive to EPI are to initiate research and learning efforts among decision-makers that would lead to "more comprehensive and holistic perspectives" (Underdal, 1980; p. 167).

Other studies emphasize the need for changed procedures and rules of policy making (Lenschow, 2002b; Lundqvist, 2004; Underdal, 1980). Studying rules for interdepartmental co-operation in Germany, Müller (2002) found that administrative rules prevent EPI in Germany. The budgetary and accounting procedure can be an important tool for EPI in a given context. It affects all sectors, provides a cyclical opportunity for revision and operationalizes the government's priorities in a very concrete way (Peters, 1998). Also of importance to EPI are policy appraisals and assessment procedures. Strategic Environmental Assessment (SEA) is frequently mentioned as a promising and practical instrument for EPI (Eggenberger & Partidario, 2000; ICON, 2001). However, simply

establishing a procedure is likely to be insufficient. Factors such as the capacity for undertaking the assessment and its perceived relevance and validity will determine its effectiveness for EPI (Naturvårdsverket, 2001; OECD, 2002).

Peters (1998) and Hertin & Berkhout (2001) address organizational issues obstructing EPI in governments. Sectoral specialization within government is commonly seen as a barrier to EPI. Introduced to reduce complexity and increase efficiency it has been shown to fragment decision making and give rise to a turf mentality. According to Jordan (2002b), the competition tendency has become an entrenched philosophy that precludes any 'rational' assessment of a new policy problem. Prescriptions for EPI should, thus, improve communication processes; integrate departments and functions, establish new institutions, or assign existing institutions a new mandate, responsibility and accountability. For example, a minister with a co-ordinative portfolio can be installed, a central committee or board responsible for overview can be established to monitor sectoral departments, and 'super ministries' can be created (OECD, 1996; Peters, 1998). However, many regard the effectiveness and desirability of such measures with scepticism since they are disruptive and it takes time to adjust to new structures. Another approach is to increase co-ordination and communication without changing organizational relationships by creating inter-ministerial committees and task forces or sending 'environmental correspondents' to sectoral departments (OECD, 2001a).

Political and Problem-based Approaches

In contrast to focusing on international factors some studies examine the role of interests and power structures for the achievement of EPI. Hertin & Berkhout (2001) make three observations in studying intra-governmental relationships. First, the representation of interests is unequal. Polluter interests have strong economic motives and are represented by advocacy groups with good access to the political system, whereas environmental interests tend to be more dispersed and less well represented. Secondly, the timing of representation is different in that environmental departments tend to be involved during later stages of decision making, hence environmental concerns come to be seen as restrictions and costs. Thirdly, departmental interest conflicts are often 'resolved' through bargains that satisfy both interests but are inefficient, for example by parallel implementation of contradictory policies or costly end-of-pipe solutions. Also focusing on actors and their interests and resources, Hey (2002) develops a network analysis in which regulatory capacity and balance of power between interests are the two essential factors for EPI. The former depends on resources (finances, legal competencies, legitimization, target group support and information) to achieve change in the sector. The latter depends on the capacity to mobilize and form broad coalitions, the access of those coalitions to the policy-making system of the sector and its responsiveness.

There is a broad scholarship that does not explicitly address EPI, but shares many of the analytical challenges and, as such, deserves to be mentioned here. For instance, the policy learning literature emphasizes the use of policy analysis; knowledge flows between the scientific community and decision makers; and mechanisms for processing and interpreting conflicting knowledge. Sabatier (1988) argues that learning in terms of changing the policy core frame happens rarely and is associated with macro-economic conditions or the rise of new coalitions. Regime analysts have studied problem character and problem-solving capacity as key variables to explain the effectiveness of environmental regimes (Miles *et al.*, 2001). Weale *et al.* (2000) identify four main classes of variables for explaining differences between countries in environmental governance in

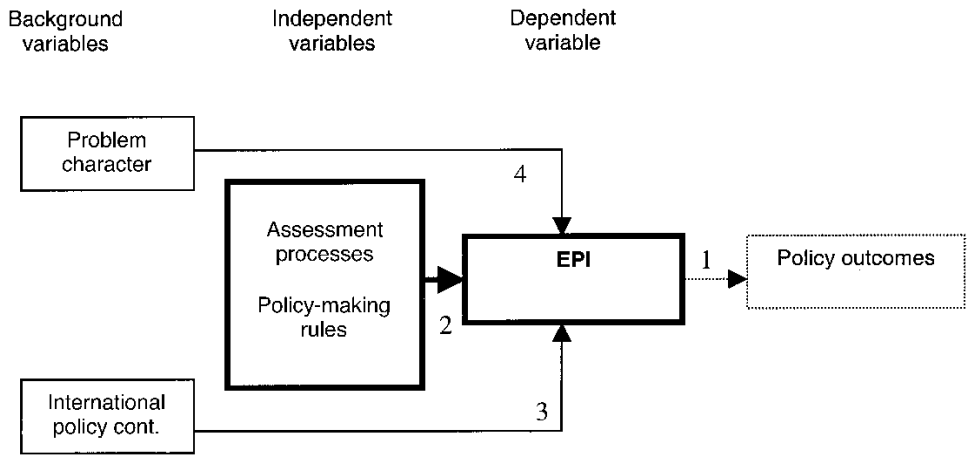


Figure 1. Preliminary framework for EPI analysis.

Europe: issue characteristics; state variables (institutions); societal variables; and international context. Zito (2000) explains policy outputs at the European level by deploying an analysis of ideas, interests and institutions. In the implementation literature, relevant to EPI as outcome, factors that are commonly described include: imprecision of policy; unclear organizational responsibilities; lack of administrative capacity; inconsistent legislation; lack of feedback procedures; insufficient resources; obstructive alliances; and knowledge gaps (Lundqvist, 1994; Pressman & Wildavsky, 1973). From this rich variety of approaches and factors, a limited set of key background variables can be identified.

Independent Variables for EPI

The paper has so far identified a range of perspectives relevant for EPI. Precise variables differ but most research, as well as concrete measures taken, point towards institutions as a useful point of departure. Some emphasize organizational structures, formal mandates and accountabilities and allocation of resources. Others emphasize procedural dimensions, such as policy-making rules and assessment processes. The latter has been chosen as the focus in the further development of the framework, summarized in Figure 1.

Policy-making rules. Policy-making rules here refer to the formal arrangements for reaching a policy decision but also informal aspects tied into these arrangements. In institutionalism, these *decision rules* and *decision styles* are often portrayed as particularly powerful predictors of policy outcomes (Scharpf, 1989) and can be expected to lead to differential EPI. Decision rules are about who is involved (boundary rules) and how decisions are taken (aggregation rules). Boundary rules in terms of openness of a policy forum, who is involved, and who is left out, and to what extent it interacts with the outside world are expected to affect the potential for EPI and learning. Decision styles are about whether decisions are reached through bargaining between conflicting interests or through collaborative problem-solving processes. When policy making takes place in a bargaining mode, one expects to have lower levels of EPI than when it takes place in a collaborative problem-solving mode. The reason is that in a bargaining situation, actors cannot share and deliberate openly but need to use knowledge strategi-

cally. An empirical analysis would seek to link EPI outcomes to different sets of rules and styles, through comparing and following cases over time. Any particular policy issue will pass through a number of rounds in its life and rules often change from problem solving to bargaining as issues move through preparations at different levels in the administration and finally to political decision making.

Assessment processes. Assessment processes in this context are broadly interpreted as including policy analyses, SEAs, scenario analyses, research studies and impact assessments that are put forward on the policy arena by various actors. Perceptions of relevance, validity and legitimacy have been shown to be the important mechanisms explaining assessments' effectiveness in influencing decisions (Cash *et al*., 2002). Hence, EPI would be enhanced when assessments relating to the environment are considered relevant, valid and legitimate. Validity and legitimacy issues can have to do with who is providing the assessment and for whom and with the transparency and openness of the assessment process. Relevance has to do with the degree to which the assessment's function and role fit the needs of the decision makers, and parameters might include degree of quantification, decomposition of causes behind impacts, the type of parameters, costing of suggestions and inclusion of regional and socio-economic dimensions. An empirical analysis should find out to what extent assessments have played a role in policy making and try to link this to these specific features of the assessments, both in terms of process and substance. However, generic criteria of relevance and validity are difficult to establish because actors will have frames that may be in conflict with the basic perspectives upon which assessments are based. If assessments are ineffective despite being seemingly relevant and valid from one actor's perspective, this might be because of a frame conflict (Tukker, 1999).

Background Variables

A limited set of key background variables will be addressed, allowing one to go deeper into some of the further complexities behind EPI. The focus is on the characteristics of the policy problem and on the international policy context that might have overriding impacts on EPI, basically regardless of institutional aspects (Weale *et al*., 2000).

Problem characteristics. Much research suggests that EPI might ultimately depend on the *problem characteristics* (Miles *et al*., 2001; Weale *et al*., 2000). The idea has been applied in literature on regime effectiveness, risk management and environmental decision making. In the framework here it means that one can, with the same institutional structures, get differential EPI depending on the type of problem. Problem characteristics can be described in terms of the uncertainty in the knowledge base and the social conflict potential (Thompson & Tuden, 1959). Research in risk management and policy analysis has demonstrated that a policy issue can display four different combinations of these dimensions (Figure 2), which have been shown to have different implications for the appropriate institutional response (Nilsson & Segnestam, 2001; USEPA, 2000). Problems of high conflict potential can, according to existing evidence, be expected to have lower levels of EPI than problems of low conflict potential, because when core values are at stake on an issue, actors are not willing to interact. Also, problems for which the knowledge base is uncertain are expected to have lower levels of EPI than problems of scientific consensus, because when facts are uncertain, actors can challenge every bit of information and will do so if they gain from it. A great deal of fundamental conflict,

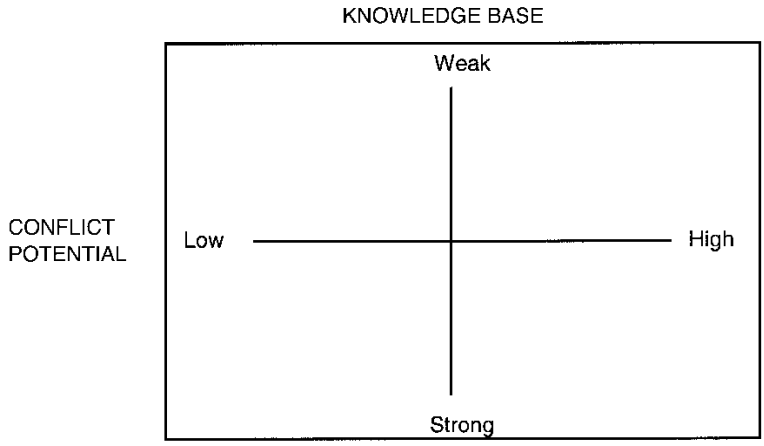


Figure 2. Problem characterization framework. *Source*: Adapted from Douglas & Wildavsky (1982), Stern & Fineberg (1996) and USEPA (2000).

combined with uncertainties in the knowledge base, in so-called malignant issues, is expected to create particularly difficult conditions for EPI and learning. Analysing problem characteristics and EPI likely requires a comparative case study approach.

Institutional structures can have an impact on the problem characteristics by contributing to the development of consensual knowledge around an issue through various learning processes and interactions such as joint fact finding, consensus building and dissemination, although this does not necessarily remove basic value differences (Miles *et al.*, 2001). However, many other factors determine problem characteristics more forcefully, unrelated to institutional structures. This linkage is, therefore, left out of the framework.

International policy context. The international policy context affects national policy making at several levels. Trends and ideas in Europe and globally create new framings of problems and issues. Also, new EC regulations set new constraints on policy, which spur innovative solutions and new ways to effectively mainstream environmental issues in policy. Lenschow & Zito (1998) observed how the tight policy community around the Common Agricultural Policy (CAP) lost control over the agenda when systemic shifts in regimes such as the World Trade Organization trade talks occurred. Similarly, internationalization, deregulation, privatization and the entry of new actors on the energy policy arena opened up alliances and networks that led to a weakening of the Swedish 'iron triangle' coalition (Kaijser, 2001) and spurred the development of new coalitions and integration of frames (Nilsson, 2003). International policy streams are usefully analysed in studies over relatively long time periods—a decade or more—in order to allow for fluctuations in the variable.

EPI in Swedish Energy Policy: Testing the Framework

The preliminary empirical analysis has focused on a qualitative application of the framework and a process view on EPI. It has, thus, not allowed a systematic analysis of

all aspects of EPI but only makes a generic distinction between weaker and stronger EPI. The empirical material, however, indicates that it will be possible to fully apply the dependent variable in a more in-depth analysis. The full view of EPI, including the potential to instrumentally change outputs, will be part of the full case study analyses in the next stage of the project.

Introduction to the Swedish Energy Policy Sector

During the last decade, a number of energy policy processes have been on going, such as discussions on nuclear phase-out, reforming energy taxation, promoting renewable energy sources, developing tradeable permit schemes, improving energy efficiency and implementing flexible mechanisms according to the Kyoto Protocol. The responsibility for developing energy policy in Sweden lies with the Ministry of Industry, Employment and Communications (MoI). However, on any particular policy issue, ministries are obliged to consult with other ministries and decisions must be taken in agreement with, for instance, the Ministry for the Environment (MoE) and the Ministry for Finance (MoF). At the central level, there are some 10–15 ministries that develop high-level policy and prepare legislation. Upon agreement, policy bills are submitted to the parliament, which is elected by proportional representation. Fifteen parliamentary committees discuss and report to the plenary on all bills and proposals on their topic area, after which the plenary votes. A relatively small number of civil servants staff the ministries. Detailed design and implementation of policy programmes is, instead, undertaken by government agencies that range in size from 1000 to 55 000 employees. A Director-General, appointed by the government, heads the agency. The National Energy Agency is responsible for implementing energy policy since its creation in 1997. Up to then, the Swedish National Board for Industrial and Technical Development handled energy policy, but the restructuring of the Swedish energy system, including phase-out of nuclear power and introduction of major-scale renewable energy solutions, was seen as such a fundamental task that a new authority was needed. Other public agencies are also involved in energy policy implementation, such as the Swedish Board of Housing, Building and Planning, responsible for issues related to household energy use; and the Swedish Environmental Protection Agency (EPA), responsible for the monitoring of environmental issues in the energy policy programme.

A General Remark on EPI

Procedures for EPI are rather well established in Sweden. Most respondents agree that the development in the 1990s has been a continual long-term trend of increased EPI. This indicates some kind of institutionalization that does not seem to fluctuate with the general political attention for the environment. However, the way in which EPI happens in practice does not always mirror the way legislators intended it. For instance, environmental assessments in committees and bills typically range from being poor to non-existent. In fact, the level of any substantive input that could contribute to learning across frames is highly variable. On the other hand, the findings indicate that the representation of environmental officials in sector policy making is often quite strong but that there are rather strong variations in the level of interaction and engagement between sector policy makers and environmental experts and stakeholders. How can these variations be explained?

Policy-making Rules

In the framework it has been hypothesized that the policy-making rules play a potentially big role for EPI. The focus includes both formal rules for reaching a decision and informal rules and styles. In the Swedish policy system, the preparation of an issue can follow different rules, e.g. by setting up (a) an expert committee, where an expert is appointed to investigate an issue and find the best solution; (b) a parliamentary committee, where a mixture or parliamentarians and experts is set up to investigate an issue and reach a recommendation supported by a majority, or (c) a negotiation where a senior official from within or outside government is appointed to reach a solution through bargaining with the parties and, sometimes, external stakeholders. These models can also be said to represent different levels of politicization. Variations in EPI seem, to a large extent, correlated with the type of policy-making rules chosen in the policy system in that the level of learning is lower in the negotiation model than in the expert committee. There also seem to be big differences in conditions for EPI between different agencies, between the ministry level and the agency level and between processes among ministries. Respondents at agency levels described that there is a strong sentiment that when issues are handed over to higher political levels of administration, EPI is weakened: "The issue has now gone up one level—we are not allowed there" (EPA official).

The decision-making mode of central government seems to be a problem for EPI. Systematic and scrutinized knowledge has greater difficulty in becoming part of the process. EPI is much easier to achieve at the agency level: "RK [the ministries] is a war organization, a negotiation organization; this is the whole idea. It is not like the agencies, where we can actually cooperate… When it is a political matter, knowledge is not needed" (EPA official).

This is also a matter of capacities and staff resources. An interesting remark concerned how the ministries are supposed to draw the major lines and long-term visions and ideas, whereas agencies are supposed to execute policy. In many ways, the system today works the other way around, where the agencies have staff resources and time to think long term, whereas ministries are caught up in day-to-day administration. The lack of capacity and resources, therefore, seems to limit learning at the ministry level. Also, EPA officials noticed wide variations among sector agencies in how they are able to deal with the sector responsibility. The horizontal requirements are manifold:

> We are supposed to always consider ethnical diversity, gender equality and work safety, and of course we don't, and we are supposed to work for regional balance, we don't, because we think it is wrong with long transportation and low electricity prices (EPA official).

In terms of informal rules, the 'logic of appropriateness' is strong insofar as people are very loyal to their organization. Although it is common for civil servants to change employer within government, they quickly adjust their frames as they start working for another ministry within government. These frames seem to become more engraved with time, because several respondents describe the need for the on-going process of shifting generations. Environmental groups see a lot more understanding of their points-of-view among the more junior staff of MoI, whose staff, in turn, see a generation shift at environmental agencies as very positive for their collaboration. Many respondents point to the Swedish 'consensual model', a policy style that means there is a strong understanding for the other side's arguments and willingness for problem solving, as an important factor in agency work and in political life between government and other

stakeholders. This style seems to have been conducive to EPI and across-frame learning. It is also seen as a highly effective model in terms of influence and the possible downsides are well compensated by a real and active participation. It is considered to be more rational, whereas confrontational policy styles are seen as resulting in sub-optimal solutions: "In the USA they were supposed to build a dam to secure electricity supply to southern California, but then they thought some stupid fish would disappear, so then they did not build it. That is totally crazy" (EPA official).

However, behind a decision to go a certain way as regards the preparation of a policy can be a lack of trust. From the MoI perspective, EPI has taken the unfortunate turn that instead of increased responsibility for environmental issues in the sectors, MoE is increasing its scope of attention and its powers. MoI respondents commented that their 'space' was seriously limited as a result of MoE interactions—EPI has meant decreased rather than increased scope of responsibility: "We had to give up a lot—this was a pull-back from sector integration" (MoI official).

MoI, thus, requests changed rules in terms of a stronger mandate as a result of EPI, where MoE returns to being an 'issue ministry' that presents the environmental targets and limits within which societal activities must remain. After this it is up to the sector ministries to devise economic instruments that will enable market actors to reach those absolute targets. This means that the MoE must let go and not interfere with the choice of instruments that should be left to the sector ministry, or even worse, choices of technology, which should be left to the market actors. Furthermore, MoE respondents claim there is little reciprocity in terms of how the environmental bureaucracies admit other interests onto their own turf. The previous state secretary for the environment clearly pointed out that EPI was not to diminish the power and position of the MoE. On the other hand, MoE respondents were very surprised to hear this, viewing the interaction as a frustrating struggle with very few impacts. There appears to be two partly conflicting views on EPI. An instrumental view of delivering the goods is contrasted with a normative view that sees a slow-moving process of changing views and perceptions, which requires involvement and interaction and being 'intrusive'.

Assessment Processes

Policy assessments in general and research-based knowledge in particular are considered by respondents to be highly important for the policy process. However, in practice, in most policy processes, little environmental information seems to be taken in at all. Respondents confirm that assessments are not being made to a sufficient degree and that this is a barrier to EPI. This is partly because there are few institutionalized mechanisms for assessments. Admittedly, there is, in principle, a requirement for impact assessment (including environmental, social and economic) for all legislative proposals in Sweden. At the agency level this is a legal requirement. At the central government level, this is more *ad hoc* and should be, but is not always, given in the instructions to the committees preparing proposals, which renders the use of assessments highly variable. In committee work and the 'normal' process of policy making, the principal requirement to do an impact assessment is more or less present, but it all depends on how the issue is framed and the composition of the committee and its chairperson. Respondents described that although committees have instructions for impact analysis, little assessment takes place anyway due to time and resource constraints, and that when it does happen, environmental aspects are treated very superficially. One respondent referred to this as due to the existence of a 'main knowledge stream', which pushes out other issues:

> This thing with knowledge and politics does not always fit together. It is believed that decisions can be made on the basis of a main knowledge stream and then you only pay attention to that knowledge, for instance the labour market, and do not care about the other aspects (EPA official).

However, it is possible to find examples of assessments being effective in some processes. What is it that makes the use of assessments so variable? Different types of knowledge are clearly valued and used differently. Functional relevance and validity stand out as major factors in the preliminary analysis. Legitimacy, on the other hand, does not seem to be a major concern. Public participation is virtually non-existent and not really in demand. This might have to do with what one respondent called the "rationalistic seminar culture" in Swedish politics. As regards relevance, assessments must communicate with relevant parameters. Each target group needs information that is important for them. Experts must work with scientific parameters for the experts, policy makers need political parameters as information carriers, and the public needs other types of easily communicated indicators. Political parameters mean that for an assessment to be relevant in sector ministries and agencies, an emphasis on costing and economic theory is often seen as critical, because cost calculation and economic impact are the focus of attention. Thus, costing appears to be important for assessments to contribute to EPI. This is not a just matter of getting the environmental values right; it also helps the process: "The planning documents that tend to be instrumental are those that have the economy there, those who deal with economic and social development are likely to become governing" (MoE official). "The best thing about the calculus is that it makes you structure the problem, that you get all the factors on the table—then the result is not so important, if it becomes plus or minus in the end" (EPA official).

Respondents pointed out that there is a considerable mismatch between what the research community is prepared to supply and what the policy system demands. Although in high demand from policy makers, few attempts exist to integrate the different sustainability dimensions and there is resistance against carrying out integrated studies. The focus in impact assessments is usually on regional economic effects (growth, employment) and the focus in SEAs is on the environment. This appears to be due to a trade-off between relevance and validity. Academic careers are connected only to the attainment of scientific goals, in which validity of research is key, whereas effective assessments are connected also to goals outside of science, namely relevance of research as a decision premise. Still, scientific validity of assessments is seen as key to their usefulness. Respondents point out that the material is scrutinized for consistency, data quality and quality of argument. Some of the environmental interest groups were said to provide lower-quality material. This should, at least in part, have to do with the resources available to different interest groups in supplying assessments (Uhrwing, 2001). Energy and industry stakeholders tend to have more resources to make valid assessments than environmental stakeholders. This is likely to have caused a systematic EPI deficiency in many policy processes.

Problem Characteristics

In the preliminary comparison of EPI in different energy policy issues, it appears as if issues with a supposed potential for social conflicts would hinder EPI. Such issues, including nuclear policy and some aspects of climate policy, have had very few

deliberations around environmental issues as compared to more benign issues. The mechanism for this can be the policy-making rules. For 'sensitive' issues, a negotiation process is sometimes established instead of the conventional open committee process. Around those negotiations, nothing gets out and very little gets in. A negotiation model was selected for the nuclear issue because of its conflict potential. The argument is that when you really need to get an issue resolved, you keep the number of people involved small.

On the other hand, and perhaps surprisingly, processes free from conflict are not conducive to EPI either. In cases where everyone with access to the process agrees, there is no perceived need to assemble information on environmental concerns. Also, the initial framing of an initiative as 'environmental' has resulted in low levels of EPI. For instance, the process of preparing and implementing the tradeable renewable electricity certificates has included very little environmental knowledge. Reports on important environmental side effects of renewable energy sources, such as biomass and wind power, have had difficulties reaching the discourse and policy learning on these aspects has been weak. It is simply taken for granted that the environment is the reason for the initiative to start with and it, therefore, does not need further attention. It appears as if political agreement in some cases substitutes for analysis (Wildavsky, 1987).

In general, policy makers are faced with increasing uncertainty, speed of change and complexity. The international and market-orientated policy context puts new demands on the knowledge base. There is often an array of regulatory instruments that addresses the same issues. In climate policy, one now has tradeable permits, green certificates and taxes. Industrial as well as environmental officials express great frustration that it is impossible to predict how the portfolio of instruments will interact or what their outcome will be. In contrast to expectations, this uncertainty does not seem to affect the process, a finding that is confirmed by respondents. Decision making is not particularly hindered in the face of uncertainty; rather, decisions are being implemented and then further evidence is collected. It could be that it is the informal nature of policy making in Sweden that makes it possible to take decisions in the face of great uncertainty. However, this needs to be investigated further.

International Policy Context

The European and international policy context have greatly influenced EPI in the energy sector over the last 15 years. All respondents expressed similar viewpoints: EU processes and deregulation of markets have created windows of opportunity for EPI through breaking up alliances in the policy network and creating openings for new solutions and new ways of learning. The EC has created opportunities but also constraints. European directives and competition rules place constraints on policy instruments such as the use of tax exceptions or subsidies. Traditional ways of doing environmental policy have, to some extent, become obsolete as the deregulation process and the political integration of the EU has set new conditions for policy making. Regulating national energy producers in traditional ways will no longer have a real impact on the outcomes, because production shifts abroad. In this new political landscape environmental interests must adjust their strategies and adopt an international outlook. This is also a learning process of changing perceptions and frames to face a new reality with new requirements on policy. A national focus and tendency to view the process of European integration and deregulation as a threat rather than an opportunity is commonly said to have limited the

influence of environmental interests in energy policy, and this is only recently changing. "Now, with our open borders, the environmental concerns must be taken in a different way. It requires more international cooperation. There is still a low understanding for this in certain groups" (energy industry representative).

The international deregulation trend has also resulted in the end of what can be called 'political projects' in the energy sector. Before, the municipalities and state power producer, Vattenfall, would sometimes make investments on political grounds, such as demonstration facilities, but this is now largely a thing of the past. Today, shareholder value is what matters for energy firms and price mechanisms dominate as policy instruments. This also provides for a changed role for interactions between government and producers. "Before you could have more actor cooperation but now it is all about these economic instruments" (EPA official).

On the other hand, the entry of Sweden into the EU has created a tendency for previous antagonists to join forces. Since industry has been under heavier environmental regulation in the past than their European counterparts, it is in their interest, from a competition perspective, to join hands with government and environmentalists in pushing for heavier regulation at the EU level. This might have had a positive impact on EPI. "Now that we have a nice external enemy to fight against, old combatants are joined together" (industry representative).

Political Factors

Ultimately, the battle between different political and economic interests is driving policy making. Most respondents state that there are legitimate interests opposing their own interests, politicians must address these interests, and goal conflicts are the ultimate barriers to how far EPI can go. The general perspective given in many interviews is how important interests, largely fixed and in opposition, swing up and down in influence depending on the political manoeuvring space they have. Studying the environmental content in energy policy over time, the actual policy decisions, as opposed to processes, still seem at least partly correlated to the overall political saliency of the environment. Today, the energy-intensive base industry is back in the game, after having been out of the radar screen during the high-tech and IT boom in the late 1990s. Industry, labour unions and parts of the Social Democratic Party and Socialists form a powerful coalition of industrial interests that set the agenda for committees and bills preparations. On the other hand, the government is relying on the Green Party for a parliamentary majority, which acts as a counter-force. "There are very strong lobby groups and very strong parts in government who provide for these groups. This is compensated by the political situation today" (EPA official).

In this balancing act, leadership from the Prime Minister, as well as in agencies and ministries, is very important. Several initiatives sent signals from the Cabinet about political priorities to environmental issues and environmental officials have been able to refer to the highest possible level in pushing EPI. The latest attempt in this direction is to develop a high-level political co-ordination unit for sustainable development. Also other individual factors seem to play a role. At the agency level, the Director-General is said to have a very important role through his/her own leadership and through the annual negotiation of the instructions from the Cabinet. And some ministries are less inclined to give instructions to consider environmental issues. In the past, it was common that agency staff were not allowed to interact with ministries other than 'their own'. Today this has changed, which has led to a gradually strengthened collaboration

Table 2. Schematic summary of some examples of factors leading to stronger and weaker EPI

	Example of cause of predicted effect	
Type of variable	Weaker EPI	Stronger EPI
Policy-making rules	Bargaining model of decision making leading to lack of sharing Allocation of responsibility to environment officials leading to territories	Problem-solving model of decision making leading to mutual learning Allocation of responsibility to sector officials leading to enhanced trust and responsibility
Assessment processes	Functional parameter mismatch leading to low relevance Poor quality leading to low validity	Functional parameter match leading to high relevance High quality leading to high validity
Problem malignancy	Malign issue leading to strong political will to control outcomes leading to bargaining	Benign issue leading to weak political will to control outcomes leading to problem solving
International context	Static conditions cementing networks and frames	New conditions breaking up networks and forming new frames

between, for instance, the MoI and the EPA. Also, civil servants in Sweden can often act individually and push certain issues to the agenda and there is a lot of confidence in the material that is developed (Peters, 2001). Within the framework of allocations, a committed and skilled individual can have a lot of influence on EPI. The investigators that chair various committees are always biased in some direction and they can often interpret the directives and put the emphasis a bit differently. Obviously, the Cabinet officials who make these appointments are well aware of these biases and select committee chairpersons according to the agenda that they wish to pursue. In more complex matters parliamentary committees are activated but they are still governed by an appointed chairperson.

Table 2 summarizes some examples from the preliminary empirical findings.

Conclusions

The presented framework for analysing EPI proposes a conceptualization of the mechanisms through which EPI occurs and helps us to design a consistent and systematic empirical investigation into some of the key barriers and leverage points for EPI in a field where well-developed theories do not yet exist. In summary, the dependent variable of EPI is conceptualized from a network perspective, where actors and actor coalitions are positioned according to their belief systems/frames, and EPI occurs through learning across frames when actors meet and create new debates and deliberations in the policy network or change actual policy outputs, including policy instruments, objectives and strategies. The difference between EPI and environmental policy in general is, thus, the importance attached to learning taking place across frames.

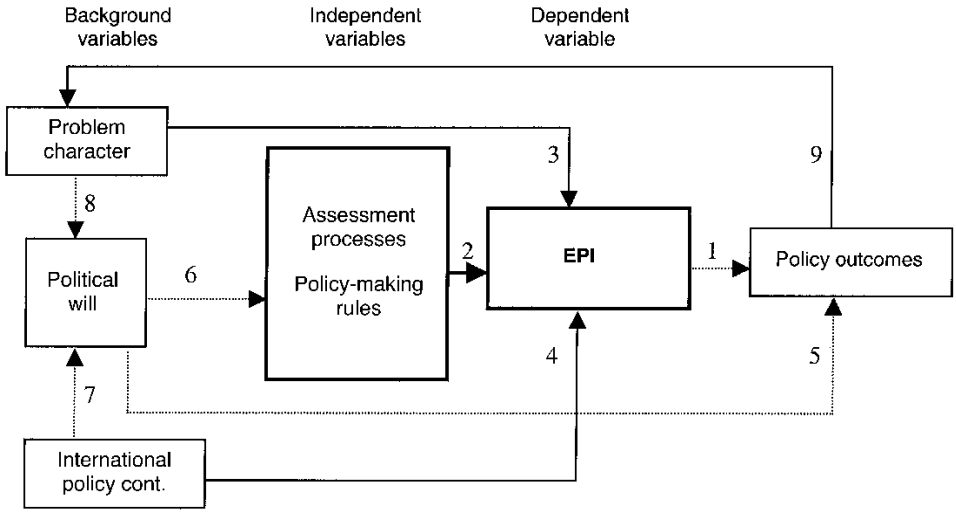


Figure 3. Revised framework for EPI

Having prioritized environmental concerns does not *per se*, in these analytical terms, qualify as EPI.

There are competing hypotheses about what shapes policy making, but the existing body of work seems to point quite strongly towards the importance of institutions. Scholars argue about whether institutions in themselves have significant effects on outcomes or whether they merely establish a framework within which interests, ideas and individual action determine policy making. The extent to which they determine outcomes also depend on whether preferences and perceptions are seen as separated from or embedded in institutions. The institutional focus is also linked to a prescriptive ambition: connecting institutions to EPI in an analytically sound way will allow us to provide prescriptions on institutional change based on empirical research findings rather than preconceived notions about good and bad institutions. It is recognized that linking institutional variables to outcomes is likely to generate unstable theories (Scharpf, 1989). In exploring the causal factors, the framework therefore combines institutional variables with background variables addressing the underlying political context. As demonstrated by Jordan *et al.* (2003) both have explanatory power and need consideration. The analysis confirms the role of factors such as international policy context and problem characteristics. This broader approach complicates the empirical research, but one could argue that it adds considerable value to the relevance of the analysis. Also addressing these underlying factors helps one to understand the context in which institutions function.

Based on the preliminary work, a few elaborations to the framework are suggested (Figure 3). Numbers refer to connecting arrows in the figure.

1. The analysis of policy-making rules points towards further issues of a more normative character and allocation rules. When the responsibility for a policy initiative lies with the sector actors, the opportunity for EPI seems stronger than if the initiative lies with environmental actors. This is because the feeling of empowerment, trust and

responsibility is enhanced. So, if EPI is weak in spite of having a problem-solving type of policy-making process, it is worth checking for where the issue has been allocated horizontally in the system.

2. Since the institutional variables are social constructs that are shaped and modified through decisions, learning and change, they are not truly independent variables. The preliminary findings, as well as existing literature, indicate that institutional arrangements such as policy-making rules are affected by problem characteristics (Andresen *et al.*, 2000). This is because the political system tends to treat malignant problems differently from benign problems; it easily becomes a power struggle and bargaining process characterized by a battle between entrenched interests and isolated decision processes rather than joint problem solving. It seems as if a problem is a cause for social conflict, the political will to control the outcomes is likely to be stronger. If politicians want something they will also select the model that is most likely to get that result (Lundqvist, 2001). Therefore, political will is added as a background variable to the policy-making rule (6) and connected to problem characteristics (8). The political will is also affected by the international political context (7) as the stakes of the global conventions and EC processes are high in a small country like Sweden.
3. A strong political will, related to, for instance, political pressure, balance in parliament and public opinion can, induce a stronger control of the outcome of the process (5). In these cases, policies reflect a political agenda and not a purposeful process of EPI. With a strong political will, the potential for environmentally sound outcomes can be limited or strong, regardless of the types of assessments and institutions in place. EPI can also be influenced by public opinion and by focusing events. For instance, OECD (2001b) identifies awareness-raising and cultural shifts amongst the general public as key to the shift towards EPI.
4. The analysis of problem characteristics can be refined by linking to outcomes through *sector environmental assessments* (9). These provide a comprehensive view of the environmental pressure from a sector and then discuss key environmental issues in terms of how different interest groups are impacted by a problem and its solution, geographical distribution of impacts, timing of impacts, visibility of impacts to the public, and if there is a feasible solution in sight (solvability) (Underdal, 1989). These all affect an issue's conflict potential. Another important consideration is whether actors that bear the costs of the environmental problem are concentrated and hence are, or can be, organized into influential coalitions or, conversely, whether actors that would bear the costs of the intervention, and hence opposing it, are concentrated (Skjaerseth & Wettestad, 2002). The level of uncertainty as perceived by the actors at the time can also be addressed with the sector environmental assessment. It is a function of, for example, the analytical tractability of an issue, how rapidly it develops and the level of consensus on its status. By making the link between physical outcomes and the policy arena through problem characteristics it is hoped that the framework will add value to scholarly discussions as it represents an interdisciplinary element of EPI analysis that has yet to be explored.

The next stage of the research process will explore these aspects in further detail as well as fully apply the framework in case studies in the agricultural and energy policy sectors in Sweden, with connections to the European policy arena. Variables in each part of the causal framework will be operationalized into sets of measurable attributes. This will allow a more rigid test of the relevance and usefulness of the framework, and discrepancies between variables will provide interesting research tasks for the future.

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Notes

1. Networks can be more or less closely tied in their value systems. Marsh (1998) distinguishes between closely tied *policy communities* with shared values and problem perceptions and frequent interactions and *issue networks*, larger communities with less communication and frequently a lack of value agreement.
2. In economics, there was a parallel reaction to the individualistic focus of conventional microeconomics. The institutional economists saw the importance of studying larger structures and collective properties and how they influence individuals (North, 1990).

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Paper II

Paper III

The role of assessments and institutions for policy learning: a study on Swedish climate and nuclear policy formation

Måns Nilsson*

*Stockholm Environment Institute (SEI), P.O. Box 2142, SE 103 14 Stockholm, Sweden

Abstract. This paper is concerned with two challenges related to the integration of environmental concerns into public policy-making: how to shape institutions that facilitate policy learning in national policymaking processes, and how to create effective supporting assessment processes. A simple construct of policy learning is applied empirically; distinguishing what is learned in terms of conceptual and technical learning, and unpacking the process of learning into three elements: knowledge acquisition, lesson drawing, and institutionalization. Two empirical policy cases, climate and nuclear policy formation in Sweden, are analyzed over two decades, detecting patterns of learning and investigating what institutions have contributed to or obstructed them. The analysis is based on a study of actual policy outputs, an examination of reasoning and argumentation in policy reports, and evidence from testimonial interviews. Results indicate that climate policy has undergone fundamental learning processes whereas nuclear policy has been more intractable. Most learning has occurred in some agency and committee processes, while ministries and political levels have suffered from weak capacities and incentives to learn. Key drivers of learning included trust building among key agents coupled to international driving forces. Ultimately, institutional rules, capacities, and incentives, are more important factors for enhancing learning than what types of assessments feed in.

Introduction

According to the principle of environmental policy integration (EPI), all sector policy should be prepared with due consideration for environmental sustainability. However, despite strong supporting political rhetoric in international and national settings ever since the Brundtland Commission, and despite constitutional support in e.g. the European Treaty, recent evaluations have shown that the practice of EPI has been poor in most sectors (European Commission, 2004; European Environment Agency, 2005). This is not surprising because the quest for policy integration poses formidable challenges to public administration. It implies that policy formation must occur across institutional orders, which not only poses coordination problems (Peters, 1998) but also challenges established norms and beliefs of different actors (Hajer, 2003). Looking in particular at the latter, some analysts have conceptualized EPI as an endeavor towards a "sustainability reframing" of sectoral policy where norms and beliefs that shape sectoral actors' policy preferences and positions evolve in profound learning processes (Schön and Rein, 1994; Jachtenfuchs, 1997; Lenschow, 2002; Nilsson, 2005). This paper examines the links between policy learning processes, the institutional context within which they occur, and the knowledge that feeds them through policy assessments. Through this examination, the paper addresses more general concerns in environmental policy research: how to create effective assessment processes, and how to set up institutions that address sustainability governance challenges (Brewer and Stern, 2005). In what ways do different institutional settings affect the potential for policy learning? Are differential learning patterns linked to different decision procedures? How does the knowledge acquired through assessments relate to policy learning? In essence: what works – and why?

Originally, policy learning was put forward as an alternative to powers and interests in explaining policy change and as a more optimistic view on policymaking; based on facts and arguments rather than catering to vested interests (Heclo, 1974). However, today learning theorists tend to see power relations and bargaining between interests as normal elements of political life, and as a context within which learning takes place (or not)

(Fiorino, 2001). Policies often change for reasons other than learning, such as changes in power balances, or through bargaining improvisations between political interests. This paper is not a primarily concerned with testing the learning hypothesis as an alternative explanation for policy change. Instead, it uses learning as a normative concept essential for policy integration in a context of competing interests and beliefs, distinguishes learning patterns within policy change over time, and examines their causes. The article is however explorative and does not provide a systematic coverage of instances of learning. Instead, it takes a broad view and highlights some interesting patterns that emerged in the research.

Two cases, the formation of climate and nuclear policy in Sweden, are analyzed over the last two decades, as learning studies require long time frames of at least a decade (Sabatier, 1993). Energy policy in Sweden is interesting as a case, for several reasons. First, Sweden is known to have a "seminar" culture and tradition of evidence-based policy-making and is commonly portrayed as a forerunner when it comes to EPI, with measures accumulating in the 1990s, including changes in governmental organization and governance procedures (Lundqvist, 2001). Its "corporatist model" of policymaking is often considered conducive to environmental policy performance (Jänicke and Weidner, 1997; Jahn, 1998). Second, energy policy is a salient issue with a range of goal conflicts that pinpoint the challenge of EPI for most countries. The Swedish government pursues the same objectives as most other industrialized nations; under overarching policy objectives such as security of supply, industrial competitiveness through low prices, and environmental sustainability, specific goals include increasing the share of renewable energy, phasing out nuclear power, developing the electricity market, enhancing the grid capacity to promote cross-border electricity trade, and mitigating CO_2 emissions. Frequently, the pursuit of one goal constrains the possibilities to pursue another.

Policy learning revisited

This section develops a simple and pragmatic framework for analyzing policy learning. Borrowing basic concepts from organizational learning literature, it unpacks the learning concept in four dimensions: who is learning, what is learned, what are the key elements of learning, and how can learning be induced?

Who is learning? This paper is primarily concerned with the different levels of central government: agencies, committees, ministries, the politicians in parliament, and the Cabinet, but also the wider network of participants in policy development. In Sweden, interactions across levels are important. Ministries, which are responsible for policy formulation, are very small by international standards. Governmental agencies and authorities, responsible for implementation, and reporting to ministries, can be significantly bigger. Ministries therefore depend on agencies to provide the factual basis for policy formulation. From time to time, they appoint "committees of inquiry" to investigate and prepare issues more in depth. Committees are of particular interest here, as the traditional learning and conflict resolution mechanism in Swedish politics. They usually mix politicians and civil servants with actors outside government, such as industry, academia, and NGOs, who are selectively invited to participate and provide facts and assessments. They report to the ministries that then prepare the draft bills for the government to submit to parliament. In addition, political parties are continually engaged in negotiations that may or may not be linked to these processes at lower levels.

What is learned? Organizational theorists have differentiated "single-loop" learning, that helps organizations to better meet their present goals (but where these goals and priorities are not modified) from "double-loop" learning, as a more comprehensive, higher-order and systemic learning that also scrutinizes and challenges goals and priorities as well as

fundamental assumptions about problems and causal relations (Argyris and Schön, 1978). Students of policy change have adopted a similar approach. In his account of macroeconomic policymaking, Hall (1993) sets out three orders of policy change, entailing learning about: 1) the overarching goals that guide policy, 2) the techniques and instruments of policy, and 3) the precise setting of these instruments. Striking a similar note, Glasbergen (1996) distinguishes *technical learning* from *conceptual learning*. Technical learning involves the search for policy instruments, and how to tune them to improve their impact, but in a context of fixed objectives. The result is typically that policies change incrementally whereas fundamental understandings of policy problems, objectives, and causal relations tend to remain stable. Conceptual learning, on the other hand, involves redefining problems, goals, and strategies. The result, when carried through, is fundamental changes in policy, based on new paradigms about what policy is supposed to achieve - and by what means. Glasbergen points out that learning appears to be cumulative in that conceptual learning builds on technical learning rather than replaces it. Nilsson (2005) argues that EPI, in its essence, depends on such conceptual learning processes among sectoral actors and policymakers, ultimately leading to reframing and policy reorientations towards sustainable development. Whether policies actually change because of learning or because of other reasons such as power shifts remains, however, a tricky question.

What are the key elements of learning? Huber (1991) articulates four basic constructs, relating to both cognitive and behavioral dimensions of learning: knowledge acquisition, information distribution, interpretation, and organizational memory. These form a sequence of learning elements to be distinguished empirically. This empirical study condenses them into three elements (see also Dekker and Hansén, 2004):

- *knowledge acquisition,* assimilation of experience as well as new ideas and concepts from other actors;
- *lesson drawing,* interpretation of knowledge, gaining new understandings of cause-effect relations of policy problems and how to resolve them – and making into lessons for their own goals, strategies and activities; and
- *institutionalization,* incorporation into procedures, rules, policies and other tangible outputs for implementation.

In reality, policy learning is however not a linear process in which cognitive developments always precede policy change. There are iterations and reciprocities so that policy outcomes inform understanding as much as understandings guide policy. Furthermore, as mentioned earlier these learning processes need to function not only at different levels but also across levels of government, for instance from agencies to ministries and to the politicians. Nonetheless, this "phased" view of learning helps to distinguish decision making between the two empirical cases.

Finally, how can learning be induced? Organizational research has showed that the ability to incorporate new understandings and learn is constrained. Organizations tend to accept knowledge that confirms their own worldviews and resist such that challenges them: "*Both individual and organizations try to protect themselves from the unpleasant experience of learning by establishing defensive routines"* (Easterby-Smith and Lyles, 2003, p. 10) Therefore, it is often held that external perturbations are needed to ignite higher-order learning (Sabatier, 1988; Hall, 1993). Indeed, earlier studies in Sweden have shown that reframing in energy policy depended on external triggers such as internationalization, deregulation, and new actors enterring and challenging a previously closed sectoral "iron triangle" (Kaijser, 2001; Nilsson, 2005).

The provision of knowledge from scientific and policy-analytic assessments, including evaluations of past experience, is an important factor for learning (Bennet and Howlett, 1992; Easterby-Smith and Lyles, 2003). Assessment proponents often expect that this will induce conceptual learning: "*...it implicitly broadens the mission of regulators […], it is a method of transforming the view of what is appropriate action, indeed, what is the proper role of the state*" (OECD, 1997). Whether this is a realistic expectation is an empirical question. It is also an open question whether conceptual learning relies on different types of knowledge acquisition than more standard technical learning. However, there are relatively few empirical studies on how assessments are used in national policymaking. We know that connections between knowledge and policy are complex and ambiguous: empirical work shows that knowledge is mostly used strategically, for instance to legitimize already established decisions and positions, as ammunition against opponents, and to enhance rhetorical and symbolic impacts (Wildavsky, 1987; Shulock, 1999). Governments know this and act on it: for instance, they may choose to formulate the analytical scope of investigations so as to avoid policy analysis that could challenge a taken or anticipated policy position. Knowledge becomes a tool for power: actors that can present credible and systematic knowledge supporting their arguments tend to become influential. Furthermore, it has been shown that assessments are subject to strong framing effects from analysts' professional interests, biases, and beliefs (Korfmacher, 1998).

According to network theory, different actors within and outside government, who have different interests and beliefs, engage in interactions to be able to advance their objectives in the policy arena (de Bruijn and ten Heuvelhof, 2000). These interactions might entail learning processes across belief systems (Sabatier, 1988). Policy learning then depends not only on analytical knowledge but also on insights gained from these social interactions (Jasanoff, 1997). The extent to which this happens is influenced by formal and informal institutional rules surrounding decision making, such as how and where decisions are being reached, who is in charge, and who gets to participate (Scharpf, 1989)? Furthermore, institutional rules shape power relations and changing institutions can affect learning as they modify power structures. In the Swedish system, different rules apply to different parts of the process and levels of government and depending on the level of politicization, issues get different treatment. In the following section is described the approach for differentiating, across issues and over time, institutional rules and uses of assessment, in the formation of nuclear and climate policy, and examine in what ways differences in learning can be attributed to these differences in institutions and assessments.

Empirical approach

As most theoretical constructs, policy learning is not directly observable. Studying policy learning "*...requires painstaking archival work, supplemented by elite interviews with key informants. The task is to discover the 'core beliefs' of the key agents – in whichever societal or state institutions they reside – as well as the more specific evidence that was marshaled to explore or justify policy decisions*" (Bennet and Howlett, 1992, p. 290) Challenges of detecting learning have often led to simplifications. Some simply take policy change as an indication of learning (Hall, 1993). Others argue that learning must not result in behavioral change (Huber, 1991). As explained above, the departure point here is that learning should be distinguished by enhanced cognition linked to behavior (Argyris and Schön, 1978; Dekker and Hansén, 2004). Technical learning will be differentiated from conceptual learning, looking at both actual policy outputs (representing behaviour) and the underlying argumentations (representing cognition). Technical learning is distinguished by policy redesigns entailing changes in instruments or their tuning, and argumentation that shows an enhanced understanding of what works, based on experience. Conceptual learning is distinguished by enduring changes of policy goals, as well as effective and lasting strategies in pursuit of these goals, and supporting argumentation in problem descriptions,

causal understandings and views on the basic properties and aims of policy. The distinction of policy learning from other sources of policy change, such as power shifts and bargaining, is a methodological difficulty. This is partly addressed by using a sufficiently long period and by looking at how different interest groups align with or buy into a common frame of understanding the issue. When powers change again, it can be detected whether previous policy change was really engraved among key actors (Nilsson, 2005).

Table 1 *Five important processes in each case study*

	Institutional process	Major bill	Main committee work
Nuclear			
1988-1990	S government policy on nuclear phase out	"Energy policy for the 1990s" 1987/88:90 and "Environmental policy for the 1990s" 1987/88:85	n.a
1991-1995	1st energy agreement between S-Fp-C	"On energy policy" 1990/91:88	"EL90" under Min for Industry, SOU 1990:21
1995-1998	2nd energy agreement between S-C-V	"A sustainable energy supply 1996/97:84	"Energy Commission" under Min for Industry, SOU 1995:139-140
2002-2003	Special nuclear policy evaluations and review of S-C-V agreement	"Cooperation for a sustainable…" 2001/02:143	"Lången" 2001-2003; under Min for Industry, SOU 2003:80
2003-2004	Phase out negotiations between government and industry	n.a.	n.a
Climate			
1993-1998	Climate Delegation, forum to deliberate and give policy advice	n.a.	"Climate Delegation" (1994, 1998)
1998-2001	1st comprehensive climate policy, preparing and passing bill	"Sweden's climate strategy" 2000/01:55	"Climate Commission" under Min for Environment, SOU 2000:23
1999-2000	Environmental objectives, preparing and passing bill	"Swedish environmental objectives…" 2000/01:130	"Environmental Objectives" under Min for Environment, SOU 2000:52
2002-2004	Emissions trading, preparing and passing bill	"Trade with emissions rights" 2003/04:132	"Flexmex" under Min for Industry, SOU 2003:60, 2004:62
2003-2004	2nd comprehensive climate policy, review and preparing bill	Under preparation, due 2006	"Climate Control Station": STEM and NV (2004) ITPS (2004)

The empirical strategy is to trace two cases of policy formation in the energy sector over two decades (Table 1). The presentation is organized in three sections for each case, following a backward tracing of the learning process. "*Institutionalization*" examines the actual policy evolution over time. The main source for this is the major policy bills. "*Lesson drawing*" examines the interpretation and framing of the policy issues as policy recommendations are put forward. This involves tracing the evolution of new concepts and

causal understandings as well as policy positions of different actors in reports and statements. Main sources are committee reports and other major "decision material". "*Knowledge acquisition*" examines the assessment input in each of the rounds. This involves tracing the use of commissioned policy assessments, agency reports, and independent expert studies. About 30 informant interviews carried out with ministry and agency officials, parliamentarians, and interest group representatives, complement the document data. Observations of learning are qualitative, which could be seen as a methodological weakness, but the combination of data sets should give a sufficient basis to develop a representative account, of which the essence is presented in the empirical chapters.

Introduction to the cases

Hydropower and nuclear power deliver most of the Swedish electricity. 10 (previously 12) nuclear reactors cover about 45% of total electricity use and hydropower delivers about as much. This means that for the last decades electricity production has been almost CO_2-free and relatively cheap; a comparative advantage for Swedish industry that has developed and specialized in many electricity-intensive sectors. With wide areas of forested land, supply opportunities for renewable heat and power production are also comparatively good. To facilitate a move away from nuclear electricity, the government has promoted the development of district-heating systems with municipal (although now often privatized) heat and co-generation plants. Differential taxation has then facilitated a fuel shift towards renewable fuels in the system. Thus, the two cases are intertwined. Nonetheless, policy develops in separate processes that can be analyzed separately. The analysis begins in the late 1980s as the climate issue first makes it appearance in national policy, and nuclear power reappears on the agenda after the Chernobyl accident of 1986.

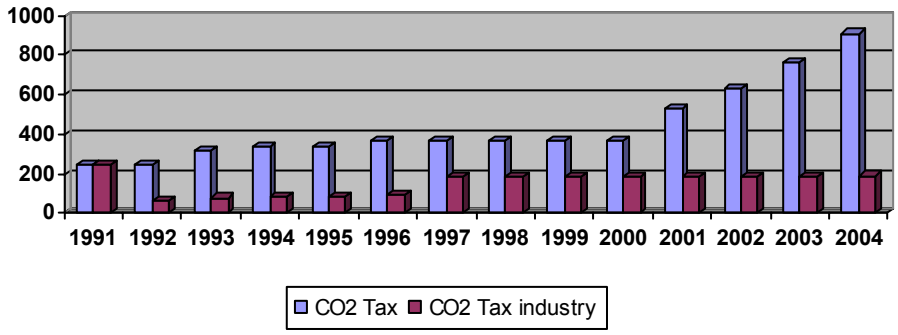
The climate policy case

Institutionalization: climate policy evolution

Over the last 15 years, climate policy in the Swedish energy sector has developed and transformed in several dimensions. A broad portfolio of policy instruments has accumulated, including CO_2 taxation, investment subsidies, information campaigns, emissions trading, renewable certificates, R&D support, and regulation in governmental concessions. More and more stringent and powerful instruments have been put in place, but there have also been fundamental shifts and reorientations in relation to, for instance, the geographical and contextual framing of the policy.

In the late 1980s, the governmental bill "Environmental Policy for the 1990s" gave the first main reference to climate in Swedish policy (Regeringens proposition, 1988a). It however lacked clear targets and measures. Instead, unusually, a parliamentary majority of opposition parties to the left and right adopted a CO_2 target in 1988, thus going against the government, who set out nuclear phase out as first priority in the bill "Energy Policy for the 1990s" (Regeringens proposition, 1988b). In the early 1990s, both climate and nuclear policy objectives were downplayed as a result of heavy opposition from industry. Still, in the bill "On energy policy" (Regeringens proposition, 1991) the government launched various initiatives, including a CO_2 tax (although with strong exemptions for industry) and also took a proactive role in international negotiations on climate change. The CO_2 tax has since then gradually increased (see Figure 1). The first main climate policy bill was presented in 1993, in response to the international commitments from the Rio Conference (Regeringens proposition, 1993).

Figure 1 *The evolution of the CO_2 tax in Sweden in SKr 1990-2004 (1 SKr ≈ 0, 12 USD)*



The late 1990s witnessed a general trend of greener government, and a new phase of climate policy development took place. In particular, subsidies and R&D support for renewable energy were enhanced, although these were primarily motivated by a new political agreement for nuclear phase-out (Regeringens proposition, 1997). Furthermore, a second major climate policy bill was set in motion, first prepared by a parliamentary committee, the Climate Commission (Statens Offentliga Utredningar, 2000a), and then presented as a bill (Regeringens proposition, 2002a). In parallel, a bill was put forward for establishing the national environmental objectives, in which climate was presented as a key and overriding concern (Regeringens proposition, 2000). The policy as represented in these bills had a distinct national emphasis. It contained an information campaign and a launching of "local investment programmes", which initiated 6,2 billion Skr in government subsidies for climate-friendly investments in municipalities. The thrust of policy now deviated from the EU strategy and the Kyoto Protocol, establishing a -4% target for CO_2 emissions (by 2010) instead of, according to the EU allocation, an increase by 4%, this goal to be reached without using the flexible mechanisms (which is a corner stone in the Kyoto Protocol).

However, in the 2000s, Swedish climate policy shifted gears towards a more international and market-oriented approach. When the European Union motioned forward in fulfilling its Kyoto commitments (European Parliament and Council of the European Union, 2003), Sweden put in place a climate policy based on emissions trading (Regeringens proposition, 2004) as well as a scheme of tradable certificates to force the introduction of renewable energy in the electricity production system (Regeringens proposition, 2003). Through these measures, climate concerns became strongly integrated into energy policy as a whole. They also represent the most powerful policy instruments to date. In the latest budget bill (September 2005) the CO_2 tax was suggested to be removed for plants that are subject to emissions trading.

Lesson drawing

Lesson drawing across actors has been an important element in reshaping climate policy. The evolution of arguments in committee reports from the early 1990s to today reveals changing and converging perceptions among key actors. In recent processes, such as the Climate Control Station (Naturvårdsverket and Energimyndigheten, 2004), and the Energy Taxation Committee (Statens Offentliga Utredningar, 2003a), environmental groups, industrial interests, and groups within government departments and agencies have grown closer in their understanding of both underlying problems, objectives, and what types of policy instruments are appropriate. In contrast to the rhetoric in the early 1990s (see e.g.

Statens Offentliga Utredningar, 1990) industrial interests have for the most part come to accept climate change mitigation as a core objective of energy policy, including energy-intensive industries who have high stakes against a strong policy. Industrial spokespersons confirm a wholesale acceptance: "*Yes, climate is accepted…It is taken for granted that there are framework conditions in terms of climate goals. There is very little debate from industry's side, it is not an issue anymore. In general, there is agreement that we must decrease impacts, and then we can discuss how, but that is mostly fine-tuning."* (Interview, 2003)

Committees have for the most part prepared climate policy. The somewhat particular Climate Delegation (1993-1998) appears to have played a notable role. Although a formally set up as a committee, it did not have the usual mandate to prepare a particular policy. It was to provide a non-political platform for deliberations, joint fact finding and lesson drawing across key actors, to channel emerging concepts on the international agenda into the Swedish political arena, and to present syntheses to the government on a regular basis (Klimatdelegationen, 1995; Klimatdelegationen, 1998). It established an enduring process of lesson drawing from the major analytical work carried out within IPCC as well as with key academic competence in Sweden. Respondents who participated testify that the Climate Delegation was a source of reconceptualising climate policy for environmentalists and industrialists alike; *"It carried with it into each agency an increasing interest and it was very tangible in the Energy Agency. XX was very engaged and I think the Agency still is… normally technicians and energy people they don't think about these issues."* (Interview, 2004) Lesson drawing from environmental actors was also significant, inducing a shift in perceptions of market-based instruments. Today, the flexible mechanisms are accepted as the backbone of policy, but in the early 1990s, climate experts and environmentalists saw them as a morally-questionable way of buying oneself out of the problem: *"We had different perspectives, I mean XX had very…saw it from an economic perspective and whilst we from the natural sciences never really saw the point…. He wanted all the time to use the market and sort of have reductions where it is cheapest through these trading mechanisms. As I said we were questioning, felt one should not be able to buy out of it but we should also contribute."* (Interview, 2004)

In addition, many respondents identify the Flexmex Committees (2001-2004) as particularly important for getting industrial actors on board in the early 2000s. The Flexmex committees were put in place to craft a policy response to the European directive on emissions trading. They channeled these demands in a way that allowed policymakers to adopt potent instruments, and sector industries accepted potentially very powerful restrictions on their activities (Statens Offentliga Utredningar, 2003b; Statens Offentliga Utredningar, 2003d; Statens Offentliga Utredningar, 2004). An interesting flipside to this is that environmental actors complained that they were being excluded from the process. More inclusive processes from an environmental perspective include the Environmental Objectives Committee (1999-2000) (Statens Offentliga Utredningar, 2000b) and the Climate Commission (1999-2000). The former was also able to bring about a broadly-shared problem perception, but this time it manifested as a broad political majority of parties (only excluding the Conservatives who by principle would not support a Social Democratic bill).

In addition, lesson drawing of a more technical nature occurred in committees that were put in place to evaluate the energy policy programme of 1997 (Statens Offentliga Utredningar, 2003c) and to examine the functioning of energy taxation in the new international setting (Statens Offentliga Utredningar, 2003a). Without deliberating on or reconsidering the policy goals themselves, they played a role to rethink what types of instrument can most effectively address the policy goals. Recommendations, subsequently implemented,

entailed an abandonment of investment support for renewable energy, reform of energy taxation, and introduction of trading systems. In recent years, such lesson drawing in climate policy has become more systematically practiced outside the committee system as agencies nowadays carry out systematic and repetitive evaluation schemes often referred to as "Control Stations" (Energimyndigheten and Naturvårdsverket, 2004; Naturvårdsverket, 2004).

However, the consensus around climate policy seems to have become a barrier to learning on other sustainability concerns. For instance, an overwhelming knowledge has been acquired over the years about impacts of expanding small-scale bioenergy, which can cause major health problems through pollutants such as NO_X, PM_{10} and benzene (Kågesson, 2003; Sjöberg, 2004). Other concerns relate to, for instance, landscapes and biodiversity. Seemingly, these are crowded out by the overriding climate agenda, and despite a growing knowledge base, politicians have not been very interested to pay attention. Without active interest groups or an opinion, there is little incentive for lesson drawing on these aspects. It appears that a moderate level of conflict is required.

Knowledge acquisition

The committees and in later years "Control Stations" have been the main vehicles through which lessons have been drawn. However, these in turn depended on multiple assessments feeding into the process. With each process, different interests presented their arguments in assessments. In addition, the government commissioned researchers and analysts to perform studies. Typically, between 10 and 20 different substudies were delivered in each process. Although there is considerable variety in this rich palette of policy analysis, the dominating tendency was the provision of partisan and partial knowledge by different stakeholders to underpin their interests and positions in the policy process. From the industrial side, private sector organizations, the Ministry for Industry, and labor unions routinely commissioned economic-modeling assessments to assess impacts on competitiveness, export volumes, profitability, and demand; always with similar results of negative impacts associated with climate mitigation. A clearly distinguishable community of Swedish economists performed these assessments: e.g. Runar Brännlund in the Climate Commission and Flexmex rounds (Brännlund, 2000; Brännlund, 2003) and Lennart Hjalmarsson in the Climate Control Station (Institutet för Tillväxtpolitiska Studier, 2004). Results predictably came out roughly the same time after another: "*...severely diminished competitiveness effects with impacts on exports as well as production and employment....regional impacts can be significant*." (Institutet för Tillväxtpolitiska Studier, 2004): p. 12) As the seasoned Ministry of Industry official put it: "*Now I have done this for so long. It struck me in the Flexmex that when they did this model run, all results they got I knew they were going to get."* (Interview, 2004*)*

From the environmental side, the Ministry for the Environment and its agencies, alongside environmental scientists and NGOs, brought their side of the story. Their conclusions also came out rather predictably: that an environmentally-safe and sustainable energy system free of nuclear and CO_2 could be reached. In the strategic build-up of knowledge, the volumes, as well as the analytical rigor of the reports, indicate that the industrial interests have had a lot more resources to deploy, as the EPA official put it: "*I think that the Ministry for Industry is much more strategic than Environment… And I am sure they have a plan for what they want to achieve from the start. And there it is a really important part that is hard to detect, about what will be investigated, what material is presented, who is carrying out the assessment and with what angle. That, you can control fully."* (Interview, 2004)

Some analysts and researchers have taken to conducting broader "integrated" assessments. Some of these were commissioned to support committee work e.g. in the Climate

Delegation (1994-1997) but most were carried out as independent research studies. These were usually designed to transcend day-to-day politics and take a long-term view where short-term conflicts and barriers can be overseen, supposedly enabling actors to open for new ideas and frames (Azar and Lindgren, 1998; Ingenjörsvetenskapsakademin, 2003). Committee reports have often cited these assessments. However, the interviews revealed that they generally have enjoyed limited acceptance or recognition from mainstream sector actors because the analyses, although sophisticated in technical terms, frequently ignore the political and economic constraints that constitute the core values of many actors.

The nuclear policy case

Institutionalization: nuclear policy evolution

Ever since public resistance started growing in the 1970s, nuclear phase out has been a central concern and point of conflict in Swedish politics. The Centre party (C) reached historical heights in the 1976 election after having positioned itself as the main anti-nuclear party, and a C-led coalition government was installed after over 60 years of uninterrupted Social Democratic rule. In 1980, after the Three Mile Island accident, the parliament decided to hold a referendum about nuclear power in Sweden. Its outcome was that nuclear power should be phased out eventually, but not until supply from other sources had been secured. However, not much happened until 1986 when the Chernobyl accident put phase out back on the political agenda. Since 1988, substantive policy decisions regarding phase out have shifted several times (see Table 2)

Table 2 *Main nuclear phase out decisions 1988-2004*

	Timeline for full phase out	Commencement of phase out
1988	Phase out timeline by 2010	1st reactor to be closed in 1995 and 2nd in 1996
1991	Phase out timeline by 2010	No defined closure, new conditionalities established
1997	Phase out timeline dropped	1st reactor to be closed in 1998 (realised in November 1999) and 2nd in 2001
2002	Phase out timeline to be negotiated with industry	2nd reactor to be closed in 2003
2004	No phase out timeline	2nd reactor to be closed in 2005 (realised in June 2005)

In the 1988 energy bill, the government launched a radical agenda by which nuclear phase out should be commenced by closing the first reactors in 1995 and 1998 (Regeringens proposition, 1988b). However, this decision stirred up a lot of resistance among powerful groups within and outside the party. In the 1991 energy-political agreement, between S, C, and the more pro-nuclear Liberals (Fp), the decision was revoked. Now, the overarching goal was not nuclear phase out anymore but a safe and competitive electricity and energy supply (Regeringens proposition, 1991).

For a couple of years after this, the government took no substantive initiatives. However, most actors agreed that Sweden needed a long-term energy policy agreement across the right-left divide. A very well-resourced committee of inquiry ("The Energy Commission") was set up to prepare for this. In 1997, an agreement was negotiated between the Social Democratic minority government and the (anti-nuclear) Centre and Socialist parties

(Regeringens proposition, 1997). Mr. Olof Johansson, then Centre party leader, remembers: *"Because the truth about the 1997 energy agreement was that I and Göran Persson after 8 hours discussion out in Harpsund (the PM residence) made a deal about it. So we did that on a winter day in January... If I could convince the Social Democrats they had a moral responsibility since they were considered to be winning the referendum... That possibility was probably greater with Göran Persson as party leader than ever before because he feels untied by earlier generations' reactor hugging in the party..."* (Interview, 2004)

This agreement swung the pendulum back to phase out again and planned for a dramatic transition of the Swedish energy system, kick-starting by quickly closing the two "Barsebäck" reactors (Regeringens proposition, 1997). Barsebäck 1 was closed in November 1999 after a court case and costly compensations to the owners. The government also decided on the closure of Barsebäck 2 but made it subject to the condition that alternative sources or efficiency improvements must fully compensate for the loss of electricity supply. In 2003, the government attempted to find a long-term resolution through negotiating a deal with nuclear industry about a detailed phase-out timetable. Negotiations proceeded quietly for almost two years. In 2004, the government however announced that it had not been possible to reach an agreement and that instead they had reached a political agreement with the anti-nuclear parties to close Barsebäck 2 in 2005. They executed the decision in June 2005.

Lesson drawing

In contrast to climate policy, all major nuclear policy decisions have been prepared and negotiated at the highest political levels, rather than going through the "normal" agency and committee work before going to the political level. However, this does not mean that there has been no lesson drawing. In the energy bill 1988, the government took for the first time a radical anti-nuclear position. It openly criticized fundamental assumptions and rationales of energy policy and adopted new arguments and interpretations of the issue, reframing the discourse from risk-based and concerned with accidents and waste problems towards focusing on aspects that the pro-nuclear advocated had traditionally "owned": economics, rationality, and technological innovation. Nuclear was presented as a "dinosaur" technology and solar and bioenergy were the truly modern technologies (Anshelm, 2000).

However, governmental arguments and policy positions soon took another major turn, this time to a pro-nuclear agenda. This shift was supported by the many pro-nuclear assessments that various actors brought forward after the 1988 bill, in order to make sure their interests were on the agenda. These argued that Swedish nuclear was safer than in other countries; phase out was going to augment other environmental problems; competitiveness and jobs were endangered; and there was no scientific basis for the decision (Regeringskansliet, 1991). Even the highest political leadership presented a report in which the main message was the complete opposite to the bill two years earlier. Now nuclear could not be closed without replacement even if efficiency measures were taken (Socialdemokraterna, 1990). Through the 'EL90' committee these thoughts were synthesized and following its recommendations, the 1988 decision could be revoked (Statens Offentliga Utredningar, 1990). EL90, interestingly appointed *after* the decision in 1988, appears to be set up to support a reversal in policy rather than as a more open-ended inquiry. How come? Maybe the earlier decision, in 1988, was not seriously meant but rather a passing political maneuvering? Conveying the message that "we really want to get rid of nuclear but can't" was a way of catering to both sides in the conflict (Vedung and Brandel, 2001). An alternative explanation is that the phase-out agenda was indeed seriously meant, but stirred up such conflict within the S party that the political leaders started to retreat due to pressures from the unions and industry-friendly wings. To calm the unrest in the party, the government had to shift their policy and needed assessments to

support this shift. Then-Minister for Environment and Energy, Birgitta Dahl, remembers: "*At that time Ingvar Carlsson (Prime Minister) and the party backed a little bit when it came to nuclear phase out. By then the critique in not the least the unions, Stig Malm (union boss) did all he could to tear up the decision and many with him. It had grown in strength"*. (Interview, 2004)

The last attempt at a making a more systematic inquiry was the Energy Commission (1994-1995). This parliamentary committee, set up to prepare for new political agreement, attempted to synthesize all available evidence that could support a rational and effective long term policy (Statens Offentliga Utredningar, 1995). It presented a broad factual basis and negotiated a political agreement between three moderately pro-nuclear parties: the ruling Social Democrats, and the two small opposition parties Christian Democrats and Liberals. However, instead of following the recommendations of the Energy Commission, the government negotiated an alternative agreement with the anti-nuclear Centre and Socialist party. Because the mainstream and leadership of the Social Democracy was never against nuclear power many saw this as political tactics; to break up the liberal opposition in which the Centre party was the only anti-nuclear force, at the same time as catering to the anti-nuclear forces within its own party. Critics saw the closure of Barsebäck as a "pawn sacrifice" to appease the Centre in exchange for a more obscure phase-out program for the remaining reactors. During the bill preparation, the government openly rejected suggestions for carrying out any impact assessments of the proposed course of action, and critics pointed out that this was because clarifying facts would open up "unwanted debates" (Virgin, 1998). Subsequent policy preparations entailed consultations but essentially had more of a symbolic function because the issue had already been decided (Uhrwing, 2001).

After the 1995 Energy Commission and onwards, all subsequent energy policy decisions have been taken in negotiations between the Social Democrat government and the two anti-nuclear parties. Within these processes, assessments have had no discernible role in influencing arguments and interpretations of the issue. Still, already in the 1991 energy bill, an evaluation arrangement was put in place whereby monitoring on progress towards energy efficiency and alternative energy supply was intended to determine the speed of phase out. However, not until after the 1997 agreement, a systematic approach for this was developed. Several assessments were carried out between 1998 and 2004, concerned with the working of the electricity markets (Statens Offentliga Utredningar, 2002), R&D programs (Statens Offentliga Utredningar, 2003c), and the impacts of closing nuclear reactors (COWI, 2000; J&W, 2002; ÅF Energikonsult, 2002). Unusually, the government used mostly external suppliers. This was seen as necessary to increase the independence, and hence the perceived credibility of the assessment, due to the embedded conflicts and distrust. These consultancy studies were commissioned to support decision making on nuclear phase out, but there are large discrepancies between these reports and what the government decided. For instance, the assessments that fed into the 2002 energy bill established that the environmental and supply safety conditions for closing Barsebäck 2 had not been fulfilled. Nevertheless, the position of the government remained fixed: it should be closed (Regeringens proposition, 2002b). However, although policy decisions have been delinked from these assessments, suggesting there was little or no lesson drawing, their establishment was still an important step to enhance scrutiny and accountability of decision-making. The responsible Minister's press conference in April 2003 demonstrated how hard it had become to explain away the environmental conditions, once they were upfront: "*We think it is so little of… eh… that it does not longer constitute a barrier so they are… eh… almost reached… we think but the requirement is that it should be significant degree…"* (Press conference with Minister for Industry, April 2004)

Knowledge acquisition

Assessments and studies for supporting or attempting to influence nuclear policy have not been lacking. The 1988 energy bill was analytically supported by a new generation of energy systems analysis who argued that the nuclear issue should be reframed, that phasing out nuclear and phasing in energy savings and alternative sources was not a technical problem but rather a social one (Lönnroth *et al.*, 1978; Steen *et al.*, 1978; Kaijser *et al.*, 1988). This directly supported the governmental positioning and rhetoric. 15 major reports and books can be linked to the 1988 bill. In its immediate aftermath, in 1989-91, 16 significant investigations were commissioned within the governmental system (Regeringskansliet, 1991). The Energy Commission contained more than 60 subreports, involved more than 100 experts, and published five volumes. In addition, many studies from interest groups and researchers added to the knowledge. After this, as the issue has not been treated in the "normal" committee system, knowledge acquisition has depended more on lobby groups and consultancy reports. The overall volume of assessments from interest groups has diminished dramatically in recent years.

As in the climate case, the characteristics of these assessments and the debates surrounding them clearly suggest that their primary role was as strategic ammunition. A rather distinct set of analyses, carried out by different interests, dealt with the environmental and economic consequences of nuclear phase-out, because the official policy is that nuclear phase-out must not lead to significant adverse consequences economically, environmentally, or on the effect balance (Södersten, 1991; Leijonhufvud, 1994). In later years, since the Nordic electricity market have come into effect, such analysis must take into account the marginal production in that system, and here we see clearly how choices are made to get the intended result. Those who wish to promote nuclear power assume that imported coal-condensing power is the marginal-replacement power (which is true in the short term); and those who are against assume that biomass expansion in municipal systems will make up for the losses (which might be true in the long term). When the commissioned consultancy report showed that closing a second reactor would give rise to increased emissions of CO_2 from coal-fired power in Denmark, the Energy Agency (led by a Centre politician) argued that their assumptions were flawed and that a general mix of the international markets could now be seen to provide for the compensating production (ÅF Energikonsult, 2002). The government commissioned a second report making different assumptions about marginal production and therefore reaching different conclusions, which opened the room for the government's political maneuvering (COWI, 2000).

Discussion

There are similarities between the climate and nuclear cases in terms of the dominant types of knowledge acquired. However, the two cases display distinctly different patterns when it comes to lesson drawing and institutionalization. Climate policy developments over the last fifteen years show that lesson drawing has indeed led to institutionalization over time. There are links between the provision of new ideas and analytical knowledge, deliberations and processes that interpret this knowledge, and policymaking. For instance, some years after the Climate Delegation, its concepts and deliberations had more or less reshaped climate policy. Furthermore, this learning occurred across actors. In contrast to the early 1990s, arguments and positions among virtually all policy actors within Sweden today tend to share a joint-problem perception, a wholesale acceptance about both the need for strong action and the viability of flexible mechanisms. In the nuclear case, there appears to be a lack of lesson drawing preceding the main nuclear policy decisions. The learning process is disrupted by party-political concerns where building and breaking coalitions have an overriding priority. Arguments and positions are based on these concerns rather than on

lessons learned. The assessments that are taken in therefore have little role beyond underpinning decisions already taken in the political negotiations. As a result, policies have also failed to gain support across key actors in the sector and with the public (Löfstedt, 2001).

Looking at the breakthroughs in climate policy, learning seems to have been induced largely by international policy and market drivers. The EU's internal market rules and the commitments to the Kyoto Protocol forced action, and the creation of the integrated Nordic electricity market brought about a pressure to rethink policy. As the electricity market deregulated, the opportunities to act through conventional instruments became ineffective. In particular, the scope for conventional production taxes on co-generated power narrowed considerably. Such a policy had instant spillover effects on power production in the system as a whole and merely shifted the problem abroad. Thus, Sweden needed new types of market-based policy designs, creating an important window for policy learning not only for this particular issue but also for how one generally can govern a deregulated and internationalized sector. The energy industry representatives could make a clear case to the politicians and rapid policy change took place in the realization of this in the early 2000s: *"We went through this with the Greens, and we discussed the problem with the co-generation, and they were enlightened. The Greens in the south and west totally accepted that if you put taxes on Swedish co-generation you will deteriorate the European environment."* (Interview, 2002)

Trust and learning

Although the international driving forces created an overriding incentive to reform climate policy, certain "triggering" processes can be identified that facilitated lesson drawing and institutionalization, for instance the Climate Delegation, the NEQO Committee, and the Flexmex Committees. Although far from creating consensus, these processes enabled the advancement of joint-problem perceptions across major actors, enabling them to engage in constructive policy processes. Interviews with the these three committee chairs confirm that the most important factor underpinning the policy advancement was the process of building trust: *"Creating a majority and getting people to trust the process – when it comes to environment I am convinced this is necessary. If it is questioned, then momentum is lost. It is about gaining stability and trust in the process, and getting a broad anchoring and support."* (Interview, 2004) They as process managers had to ensure that actors found views and perspectives respected while at the same time pushing them to recognizing other actors' perspectives. Through such as process, joint-problem perceptions could develop, trust was gained, and interactions and lesson drawing could proceed. It can be noted that most effective committees in terms of reaching broad acceptance and stringent policy measures were led by persons associated with non-environmental interests in the sector "mainstream" (eg Flexmex and NEQO committees). In these cases, it appears to be easier to get trust in the process (from industrial interests) than when actors perceived as "green" were in charge (eg the Climate Commission).

Viewing trust as a prerequisite for learning also helps explain the barriers for learning in nuclear policy. It appears that value conflicts are real constraints whereas interest conflicts are, under certain circumstances, more tractable. There are strong conflicts of interest in both nuclear and climate policy. Like nuclear phase out, climate mitigation is potentially very costly, with goal conflicts against industrial competitiveness in paper & pulp-, iron & steel-, cement-, and heavy-engineering sectors (Nilsson and Nilsson, 2005). In the nuclear case, however, there are not only economic conflicts at stake, but a more fundamental value conflict. When actors dispute each others' core values, problems and motives are not acknowledged, inducing distrust between actors. Thus, climate policy actors have come to agree on the basic problems and policy dilemmas at hand, whereas the latest attempt at

anchoring a nuclear policy in a dialogue with key actors was abruptly shut down with the words: *"My assessment is that it was not meaningful to go on. This is because we do not feel enough confidence and trust about each others' willingness and long term ability to live up to an agreement."* (Press conference with government's negotiator, 2004)

Furthermore, the "wicked" nature of the nuclear issue makes it liable to fuel conflicts with political consequences (i.e. affecting the next election). When such political outcomes are at stake, the Cabinet normally wants to control the issue more tightly, which explains the lack of committees or any significant agency work on nuclear phase-out since 1995. To avoid opening the debate the government forms nuclear policy in closed sessions at the highest political levels, in the Prime Minister's Office, in negotiations with industry, and between the political parties. This distinct politicization constrains lesson drawing not only because of the difficulty to deliberate openly but also because, as respondents testify, at these levels, political considerations, such as facilitating coalition building, holding together party opinions, and isolating opposition parties, sometimes become more important than attaining substantive policy goals. As one Ministry official state: "*In the PM's Office they do not care about resolving issues. That they leave to the issue departments. They look at the next election and how to protect the PM from critique. The first thing they ask is: can this hurt us?"* (Interview, 2002)

Where is learning occurring?

Committees appear as the most important arenas for knowledge acquisition and lesson drawing overall. Most committees are widely cited in the design, construction, and tuning of policy instruments, both when it comes to legal measures such as the nuclear phase-out law and when it comes to economic instruments such as tradable quotas. The committee system of mixing experts and policymakers not only facilitates lesson drawing but also seems to, if managed properly, have a stabilizing and trust-building effect on the process, eg in the Environmental Objectives and Flexmex Committees. The Energy Commission and the Climate Commission made broad considerations and drew lessons for policy. However, the latter cases did not lead to institutionalization because what was deliberated upon in the committees was not well accounted for in the recommendations. This has to do with the political role of the committee: although it engages politicians and experts in a joint learning process, ultimately the chairperson must seek to find a political majority agreement on the main policy recommendations. This process can be disjointed from the major lines of lesson drawing put forward, as one industry representative stated: "*Then we have these 'hot' investigations, like the Energy Commission…. As soon as nuclear is mentioned, it is over – it doesn't matter how much we investigate, because finally someone will sit one night and decide […]."* (Interview, 2003)

Another concern is that since committees are "owned" by certain ministries, they tend to prioritize the key concerns of that particular ministry, and deliberations fall within the conventional framing of issues. In fact, there are in the two cases no instances where a committee has induced a fundamental repositioning of policy. Conceptual learning in the committee system is based more on reaching mutual recognition of dilemmas and problem sharing across actor coalitions than developing new understandings across. Assessments contributing to such conceptual learning have only occurred in more loosely-controlled institutional systems such as the Secretariat for Future Studies, which was home to the energy systems analysis that reframed energy policy in the 1980s, or the Climate Delegation that paved the way for adoption of forceful new policy instruments. In these cases no specific policy issue had to be resolved and actors could deliberate, share knowledge and interact without a particular agenda to defend, hence minimizing the politicization of the process, while remaining closely bundled with the policymaking arena.

Questions of strategy and policy should according to the Swedish political-administrative system be referred up to ministries, whereas agencies should implement. However, the system seems to work backwards. Agencies appear in general better equipped for knowledge acquisition and lesson drawing of strategic nature. Agency reports sometimes display surprisingly unbounded thinking (Energimyndigheten *et al.*, 1999; Vägverket, 2005). This can be partly explained by a relatively large degree of freedom of agencies as well as a larger analytical capacity. Ministry processes are severely constrained by capacity problems: despite a growing complexity in policymaking not least due to the EU entry, ministries remain very small in staff and tend to be caught in day to day affairs with little capacity to engage in knowledge acquisition and lesson drawing (Statens Offentliga Utredningar, 2003e). However, another explanation, which the interviews confirm, can be sought in the decision rules. A model of collaborative problem solving between sectoral agencies has become commonplace in recent years. Agency work in the environmental field nowadays often takes the form of inter-agency collaborations, such as the Climate Control Station (a collaborative effort between the Energy Agency and the Swedish EPA). This has opened up for new perspectives and mutual understanding. In contrast, ministry level preparations are organized as bargaining processes where each ministry looks after certain interests and ignores others. The bargaining limits information-sharing, and prevents adoption of new perspectives, as it might weaken the position of negotiation. Furthermore, incentives for lesson drawing are weak. Both politicians and civil servants tend to perceive their central task as developing new initiatives. Careers are not rewarded for taking stock and draw lessons from the past (Molander *et al.*, 2002). In this light, the lack of committee and agency work in the nuclear case creates further constraints on learning.

Do assessments contribute to learning?

In both cases, most assessments have been partisan accounts from either environmental or industrial perspectives, primarily put forward to serve as strategic ammunition in the political process. Over the years, each side continues to build up the arguments to back their own agendas. Rarely does a study break out of the frame and examine fundamental premises and underlying problem formulations. The power-free and neutral analysis for the common good remains a theoretical construct with little backing in reality. All actors, including scientists, are seen as more or less partisan because of their professional and disciplinary cultures. However, under conditions as outlined above, such as in the Flexmex Committee and the Climate Control station, combinations of partisan assessments can play a vital role in lesson drawing across interests groups and frames.

Independent research studies have a limited role when looking at citations and referrals in policy documents. However, research studies might ignite longer-term learning processes of conceptual nature. In both nuclear and climate policy, agendas were formed in the policy arena years after the emerged in the research domain. In climate, it took up to a decade and beyond for the policy system to acquire, disseminate, draw lessons, and institutionalize knowledge that reshaped the fundamental understandings surrounding problems and goals. In principle, the ideas deliberated upon in the Climate Delegation in 1995 became policy in 2004. In nuclear, the energy systems analysis that started out in the Secretariat for Future Studies in the late 1970s, and was later pursued by independent scientists, became integral to the radical nuclear policy agenda in the late 1980s (although the government quickly abandoned it). Regarding technical learning, assessments are able to in a shorter time span influence policymakers in their understanding of the functioning of policy instruments. A series of assessments throughout the 1990s, which accelerated in the 2000s, led to relatively quick policy revisions, in a time span of 1-3 years (Statens Offentliga Utredningar, 2003c). There has also been a recent evolution towards systematic evaluations (“Control Stations”) relating to the national environmental objectives, climate policy, and nuclear phase out. These assessments are set up to monitor progress towards objectives, evaluate policies, and

give comprehensive accounts of external and internal goal conflicts. This has the potential to enhance policy learning, but it is still too soon to discern any such patterns.

However, there are no institutionalized platforms for more profound rethinking of policy premises and concepts. It has been argued that "integrated assessments" have the potential to play this role. However, there has been little policy interest in the attempts made so far. Such a holistic approach appears to contradict the real logic of the policymaking process. A process of developing joint problem perceptions needs feeding with assessments that do not necessarily transcend current constraints but rather explicitly recognize them: where core values of participants, and trade-offs between them, are taken seriously and analyzed, e.g. on the relationships between environmental targets, industrial competitiveness, employment and regional development.

Conclusions

Why policies change is still not a well-understood phenomenon and this paper indeed demonstrates the limitations of learning as an explanatory concept. For instance, nuclear policy change has been plentiful but with little indications of any learning. Still, this does not allow drawing the conclusion that there is no learning on going. Furthermore, elements of learning can take place without any policy change. To complicate further, power change, which is often portrayed as an alternative explanation for policy change, is linked to learning. Changing institutional rules of the game, and who gets to play, affect learning partly because it modifies power structures. Furthermore, the learning processes underpinning policy reorientations were connected to external driving forces including a wider context of societal change of European directives, markets and policies as well as global policy agendas.

Still, because of the rapidly evolving sustainability challenges that governments face, policy learning has significant appeal as a normative concept. These challenges, and how they can be handled, must be integrated into the policymaking machinery and how it thinks. It is therefore meaningful to pursue analysis that shows under which conditions such policy learning, in particular the conceptual kind, is more likely to occur, and what types of resources these processes need. Based on this study, some indicative conclusions can be drawn. As the study is exploratory in nature, they should be seen as empirically-anchored hypotheses that in a later study could be more systematically examined.

Institutional rules and capacities constrain learning processes in ministries and at political levels. Committees and agencies appear better equipped to learn, through stronger capacities and rules for collaborative problem solving. However, also in committees the knowledge assimilation is often strongly partisan or partial, and framed within existing problem understandings. Furthermore, not all committee processes induce learning. Learning seems to rely on settings that build up the basic trust enabling key actors to develop joint-problem perceptions at the same time as allowing broad sets of considerations and perspectives into the process. This has happened in some climate policy processes but it seems exceedingly difficult in the nuclear case. Here core value conflicts create downward spirals of distrust and cognitive barriers that must be broken. As long as no there is no shared perception of the problem, there is little basis for a learning process.

If individual policy analysts and scientists expect to have a fundamental influence on policymaking and induce significant shifts in perspective, they are likely to be disappointed. Conceptual learning entails confrontation with uncertainties about how reality works, what the major threats and challenges really are, and what society should aim for. It would be naïve to expect that individual sets of analysis or analysts would induce such

reorientations throughout the whole process. Given the ever-present framing effects, it seems more effective to carry out several smaller assessments to get different perspectives on the table. Such combinations of assessments appear able to highlight goal conflicts, shed light on different perceptions, and initiate learning among participants.

Although what governs the extent to which learning occurs remains an elusive question, this study suggests exploring further explanations for differences in learning primarily in the institutional rules that govern the policymaking process. Broadly speaking, the institutional constraints to acquire and draw lessons from knowledge are more serious constraints to policy learning and EPI than the inadequacy of assessments.

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Paper IV

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DECISION MAKING AND STRATEGIC ENVIRONMENTAL ASSESSMENT

MÅNS NILSSON
Research Fellow, Stockholm Environment Institute
Lilla Nygatan 1, Box 2142, SE-103 14
Stockholm, Sweden
E-mail: mans.nilsson@sei.se

HOLGER DALKMANN
Research Fellow, Wuppertal Institute for Climate
Environment and Energy, Döppersberg 19, 42103
Wuppertal, Germany
E-mail: holger.dalkmann@wupperinst.org

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Strategic Environmental Assessment aims to incorporate environmental and sustainability considerations into strategic decision making processes, such as the formulation of policies, plans and programmes. In order to be effective, the assessment must take the real decision making process as the departure point. Existing SEA approaches are frequently tailored after an EIA model conceived from a rational perspective on decision making. However, there are good reasons to assume that most strategic decision making processes are characterised by a bounded rationality. Furthermore, the predictability of environmental consequences generally becomes weaker at strategic levels than at the project level and complexity increases in terms of the numbers of actors involved in the decision. This paper examines various theoretical perspectives to decision making and discusses the implications for decision support in general and SEA in particular. The authors argue that the design of the SEA must be more sensitive to the real characteristics of the decision making context.

Keywords: strategic environmental assessment, decision making, rationality, decision sciences, complexity

Introduction

Environmental assessment (EA) was developed in the 1960s as a tool to bring environmental concerns into decision making in a systematic way. As the public concern for environmental issues increased in the 1960s, among other things through books such as *Silent Spring* (Carson, 1962), the lack of public participation in decision making and the lack of environmental control called for more formalised processes. In 1969 the US National Environmental Policy Act introduced the first provisions for the environmental assessment of major federal actions. Over the following years, it was then adopted all over the world under the label of Environmental Impact Assessment (EIA) at the project level. Recently, environmental assessments of more strategic decisions, such as the formulation of policies, plans and programmes, have been developed, under the label of strategic environmental assessment (SEA) (Partidario, 1999; Therivel *et al.*, 1992; Therivel & Partidario, 1996).

Partidario (1999) defines SEA as "a systematic, on-going process for evaluating, at the earliest appropriate stage of publicly accountable decision making, the environmental quality, and consequences, of alternative visions and development intentions incorporated in policy, planning, or programme initiatives, ensuring full integration of relevant biophysical, economic, social and political consideration."

Current SEA practices are often based on modified EIA procedures and methods, focusing on the 'objective' identification, prediction and evaluation of environmental impacts. Figure 1 depicts a conventional framework for an SEA Procedure, as they are being commonly applied in Europe. Sheate *et al.* define this kind of procedure as an "EIA-inspired SEA" as one of four identified broad models (Sheate *et al.*, 2001). However, SEAs applied to policies, plans, and programmes and to complex decision making processes have highlighted the limitation of current frameworks and practices (European Commission, 1997). In recent years, many researchers have identified the need to better adapt of SEA framework to the actual policy and planning processes (Thissen, 2000; Brown & Therivel, 1999; Renton & Bailey, 2000; ECMT, 2000; Bina, 2001; Sheate *et al.*, 2001).

Therivel & Partidario (1996) pointed out that the links between EA and the decision making process are difficult to identify, but are crucial to the effectiveness of SEA. However, despite the significance of the decision making process for the design of the environmental assessment, few have attempted to relate these processes to each other (Kørnøv & Thissen, 2000). Furthermore, the foundations for EA approaches within decision science have been largely neglected in environmental assessment literature (Weston, 2000).

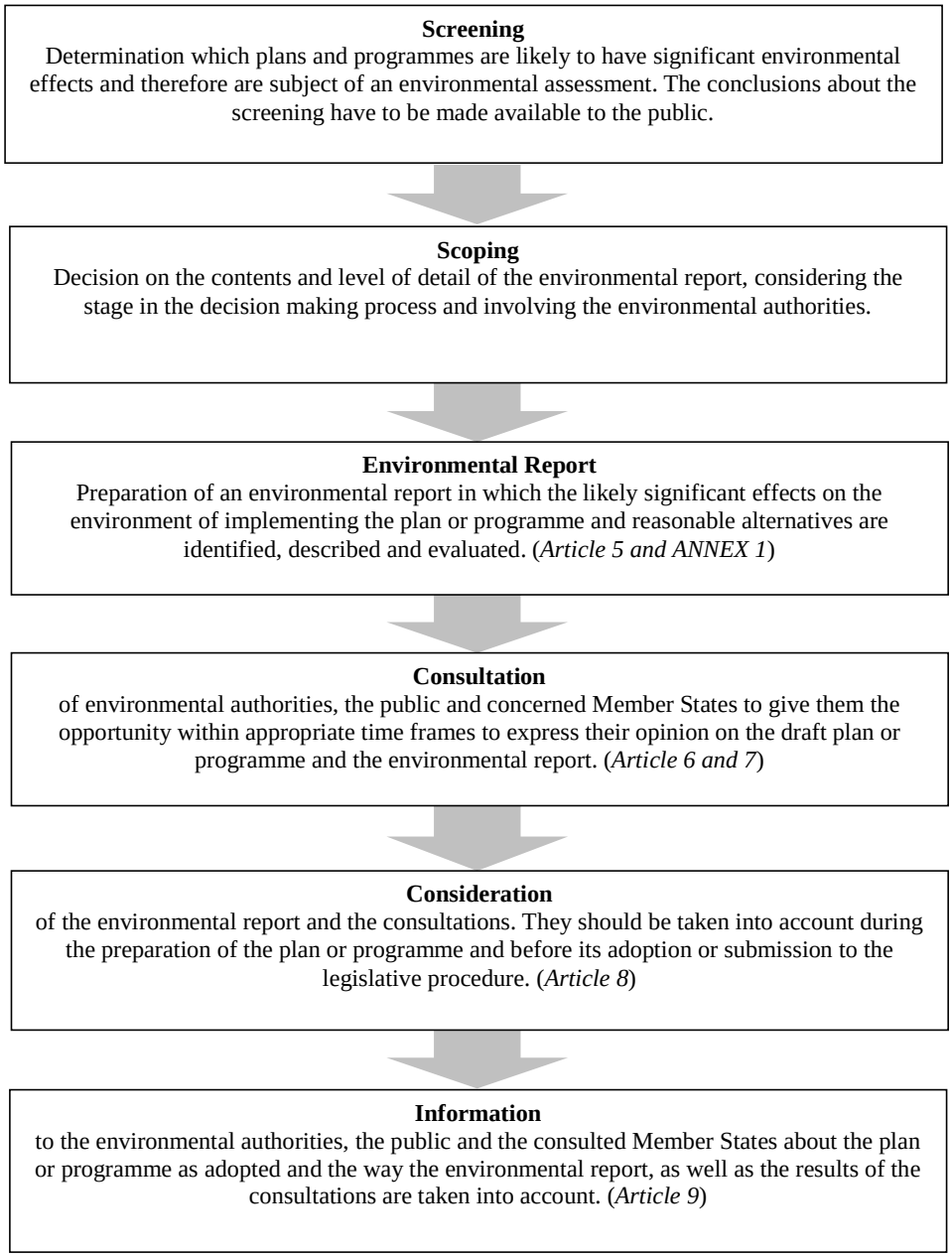


Fig. 1. SEA procedure. (Related to the Common Position of the Council 5685/00).

Decision Making Theory

In order to understand the role of SEA in decision making better, it is necessary to understand the different theoretical perspectives to decision making. Systematic studies of decision making processes are a relatively new discipline, usually named decision science, decision making theory, behavioural decision research, or decision analysis. Theories of decision making do not belong to a single academic discipline; contributions have come from philosophy, economics, political theory, sociology and psychology (Keeney & Raiffa, 1993; Sexton *et al*., 1999). Hence, there is no clear and distinct set of criteria that defines this theory. Theories around organisational behaviour were founded through path-breaking work by Weber (1947). Theoretical advances were made in the streams of behavioural decision theory, put forward in the 1950s and 1960s by Simon (1957).

Behavioural decision making theories can be categorised into qualitative and quantitative approaches. Clearly, decisions can be strengthened through quantitative approaches to decision support, such as multi-attribute utility theory (Keeney & Raiffa, 1993). It is often worthwhile to quantify concepts such as risk and probability, timing and impacts. However, another set of research emphasises the importance of qualitative guidelines in order to improve the decision and sharpen the thinking about values, concerns and trade-offs in the decision making process, rather than relying on mathematical representations of the decisions to be made (Gregory, 2000).

Decision sciences and related methodologies and perspectives can be grouped into three categories. Firstly, the descriptive theories which attempt to explain how decisions are actually being made in practice. Secondly, normative theories that explain how decisions should be made, often based on rationality and consistent methodologies. Thirdly, prescriptive theories that attempt to improve decision making in a specific context through removing limitations and biases identified in descriptive theories (Kleindorfer *et al*., 1993). Prescriptive approaches seek to formulate recommendations that lead to better decisions, reproduce the complexity and uncertainty characteristic of real-world situations and give the true nature of decision makers as we know it (Johnson-Laird & Shafir, 1993). Environmental assessment, in general, aims to provide a prescriptive approach for decision makers who want to think systematically about environmental factors in decision making.

Many theorists see the analysis of the decision making processes as the key to understanding how organisations function. However, research has yielded apparently contradictory analytical frameworks, which range from models that depict decision making as rational and sequential to models that describe decision making as random and anarchical. The differences are also related to the approach taken, which varies from normative to descriptive.

Rationalism

For a long time, literature on decision making was dominated by the assumption that decision making could take place in an entirely rational way. The rationalist perspective, which was developed in the 1950s and 1960s, has its roots in Weber's sociological theory in which he sees the rationalisation of decision making within bureaucratic structures as the dominant approach to organisation (Weber, 1947). The 1950s and 1960s saw organisational theory developing in many directions. Herbert A. Simon introduced decision theory into organisation theory in his book: *Administrative Behaviour* (Simon, 1957). According to Simon, the decision making process is the core of all organisation theory, which should therefore address questions such as: "How are decisions being made?" and "How can decisions be made more rationally?" To decide and to act are the main phenomena in all organisations. Theories should therefore deal with developing principles for securing efficient and rational decisions and actions in organisations.

The basic principles of rationalism can also be derived from utility theory. Utility theory underlies rationality because it defines rational preferences and the choices one ought to choose. However, rationality theory is only concerned with guidelines of consistency, transparency and transitivity, but not about the underlying preferences and values. The roots of rational decision making are also evident in the underlying assumptions of classical and neoclassical economics, where the concept of the rational 'economic man' is an underlying principle. The rational-economic man is one that chooses an action rationally, based on a hierarchy of preferences (utilities) that promises the highest net benefit and the highest probability of occurrence.

According to rationality theory, the decision making process is goal-oriented and rational. At the conceptual level, two propositions underlie this conception. Firstly, people act rationally if their actions make sense with respect to their aims and seem appropriate means for achieving these aims. Secondly, at the individual level, the individual is purposeful and intentional, i.e. there are goals and ends towards which actions are intended (Nida-Rümelin, 1997). When it comes to collective choices, at group, organisational or societal levels, which appear as the most relevant levels of analysis in environmental assessment, most theorists hold that collective choices are guided by aggregated individual preferences alone. In any case, the core proposition is that actions are taken guided by a rational choice among alternative outcomes and that costs and benefits are weighed. It is assumed that actions are undertaken to achieve objectives that are consistent with the actor's preference hierarchy (Zey, 1998). The action will be chosen, based on the hierarchy of preferences that gives an outlook of highest benefit.

There are many variations on rational decision making models. Most of them can be described at a high level of aggregation as a process containing a sequence of steps. Such models are usually the foundation of current environmental decision-support tools, and usually follow the following route:

Framing the problem → Defining key objectives → Establishing alternatives → Identifying consequences → Clarifying trade-offs

This type of model can be seen in many variations in the decision-support literature (e.g. Gregory, 2000; Hammond, Keeney & Raiffa, 1999). The sequence also bears striking similarities to environmental assessment frameworks. When examining present guidelines and practices of environmental assessment, the inspiration from rationalist models is clear. The rationalist paradigm was dominant in the 1960s when the first environmental assessment approaches were developed (Kørnøv & Thissen, 2000; Nitz & Brown, 2000). We would argue that the motivation and foundation behind the development of the environmental assessment concept was based on the notion of rationality in decision making.

However, decision scientists argue that the real decision making processes, notably at the strategic levels, are characterised by rationality limited by cognitive and resource limitations, a wide range of behavioural constraints, as well as many elements that are more intuitive and political in nature. This should have implications for the design of the SEA procedure.

Critiques of rationalism

A variety of critiques to the rationality paradigm have been offered in several contexts and at various levels of analysis. Rationalism has been accused of being a purely normative perspective, portraying an ideal image of the decision making process. Not surprisingly, the rationalist assumption of individual rationality of maximising behaviour to achieve expected utility does not correspond to empirical findings on organisational or individual behaviour (Lindblom, 1959). Although the rational decision making process can be used as a model for structuring decision making, decision scientists have discovered that rationality in real decision making processes is usually very limited. (Nida-Rümelin, 1997). The fact that the rationalist tradition is normative, i.e. that it describes decision making ‘as it should be’, rather than necessarily how it takes place in practice, has been one basic reason for challenging it.

Rationalism has difficulties explaining issues such as power, conflict, trust, solidarity, inequality, communication and legitimacy (Zey, 1998). Especially, it is argued that the rational approach does not do (sufficient) justice to the fact

that real world public decision making takes place in complex systems, characterised by uncertainty; the involvement of mutually dependent organisations; social interaction; unpredictability; divergent problem definitions; and lack of knowledge. Public decisions typically involve a number of stakeholders, that are dependent upon each other in order to come to a decision. This mutual dependence hinders decision making along the lines of a rational model.

Green & Shapiro (1994) offer a far-reaching critique of the methodologies utilised by rational choice theorists. They do not criticise the theory itself, but rather several groups of its implementation. They argue that rationalism is frequently used as an explanation to justify decisions and to legitimise the concept, which tends to be used by politicians and other leaders to lend authority to their viewpoint or action. A second main critique is related to the attempt to portray policy making as value free and objective, while in reality it is known that decision making, and in particular on the environment, is inherently value-laden (Weston, 2000). Thus, there is a discrepancy between the rationalist model and organisational behaviour in political collective action.

Miller (1984) suggests that the relevance of the rational model is connected to the levels of analysis used when studying organisational decision making. Although even at the individual level, human limitations, real and imagined, play an important role, the rational model is a powerful instrument to explore an actor's position in complex decision making processes.

Incremental and process models

To overcome some of the problems connected to the rationalist approach, other models of decision making have been developed. Theories of incrementalism emphasise a decision making process largely reactive to the external circumstances, and more or less driven by political considerations. These theories also state that decision making cannot be value-free, when the means and ends of decision making are politically defined (Lindblom, 1959; Weston, 2000).

Incrementalist models focus on the processes of political negotiations and coalitions and see decision making as a process of gradual change. They hold that decisions are made on the basis of small changes away from the status quo, and see administrative decisions as largely reactive as society adjusts incrementally to changing circumstances. According to this logic, decisions have an incremental character, and new situations differ only slightly from old ones (Lindblom, 1959). In incrementalist models, the decision situation is not assumed to be given, but constructed by the decision maker, who is no longer assumed to be able to oversee all aspects of the decision situation at the same time.

Neither all alternatives nor their consequences can be known and, even if they were, all information could still not be adequately processed (Braybrooke & Lindblom, 1963).

Compared to the rationalist approach, the focus has shifted from the content of the decision to the structure of the process and the determination of its structure. A process concept that builds upon this is the network approach. According to De Bruijn *et al*. (1998), this approach is needed for decision making processes concerning unstructured problems; problems that need to be solved in networks (characterised by mutual dependence and strategic behaviour); and dynamic problems (and solutions). The network approach to decision making promotes the role of a process architect to intervene in the process. For a successful intervention, some basic conditions should be met: the parties involved are interdependent, the parties accept the process-architect and, last but not least, the process-architect is expected to be impartial.

There are many other theories and models that characterise multi-actor processes in various levels, where decisions emerge in more or less unpredictable ways. The "garbage can" model (March & Olsen, 1976) is one extreme model that depicts high levels of uncertainty and complexity, rapidly changing alliances and preferences, and a lack of knowledge of the means and objectives of the process.

Mixed scanning and bounded rationality

Incrementalism has been criticised for giving an image of decision making (in organisations) as something over which decision makers cannot exert any influence. Etzioni (1966) argues that powerful interests and organised partisans dominate incremental decision making, and that they discourage, and even severely inhibit, basic social innovation. Although it is useful to acknowledge the limitations of decision making, it is important to look for possibilities to manage and control the process.

In line with this idea, Etzioni (1967) proposes a third approach, 'mixed scanning', to decision making that synthesises the rational and incremental approaches. A system of fundamental and incremental steps should overcome the faults of rational or incremental methods alone. Fundamental decisions set the context for numerous incremental ones, which in turn lead to new fundamental decisions. Etzioni sees the actual process of decision making as an attempt by decision makers to identify the most appropriate and effective course of action. This requires a combination of approaches to decision making: this 'mixed scanning' method of decision making utilises rational techniques of assessment, such as environmental assessment, cost-benefit analysis or goals-achievement matrices,

as well as more intuitive judgements that are based upon experiences, codes of practice and political values. Thus, 'mixed scanning' is based on the normative assumption that there is a need for structured and rational decision making in policy processes, while acknowledging the necessity to take multi-actor complexity into account.

Somewhat related to the mixed scanning concept is the concept of bounded rationality (Simon, 1957). Bounded rationality implies that a rational decision making process takes place within the boundaries of the limited capability of human beings to be entirely value free and objective. According to Simon, since individuals' decisions are limited in their rationality, full rationality can never be achieved. Rationality is also constrained by institutional norms such as laws, policies and codes of conduct. Bounded rationality also embraces the limitations of information processing, perception, memory and judgement.

Simon (1976) states that imperfect rationalism results in decisions that are a compromise decisions, based on criteria of 'satisficing' rather than on 'maximising'. That means, from a limited range of known alternatives, amongst others because of the extra costs involved in striving for optimal solutions, that a decision maker comes to a decision that is 'good enough'. In situations involving more than one stakeholder, feasibility criteria have a central position in the debate. In other words, decision makers use 'procedural rationality'; finding the solution that is satisfying enough and can be reached in the most efficient way. This approach has been seen as the way in which most decisions are taken in practice.

Hardin (1982) embraces the critique of rationality in his definition. He defines rationality as: "one is rational if one, after considering all of one's concerns, including moral, altruistic, familial, self-interested, then chooses coherently in trading-off against the other, or even in refusing making certain trade-offs". By introducing "all of one's concerns" into the formula, he comes close to the bounded rationality concept.

Decision Making, Decision Support and SEA

Decision support tools are often based on assumptions of rationality in the decision process. Much of the advanced literature on decision support often makes very explicit and perfectly justifiable claims for the need for rational decisions as a basis for the methodologies described (Keeney & Raiffa, 1976; de Vries, 1999). In EIA literature, this is often implicit, since decision theory is seldom discussed at all. Nevertheless, the foundation of the environmental assessment concept is clearly based on the notion of rational decision making. At the time of environmental assessment development, the rationalist school was the dominating stream of decision making theory and methodology. Early literature on EIA emphasises

rationalism and the language is dominated by rationalist concepts such as "objective", "systematic", and "comprehensive" (Petts, 2000). However, decision support tools based on rationality are based on a perspective to decision making that poorly reflects how strategic decisions are being made in reality. As discussed earlier, empirical research has shown that most decision making processes are characterised by varying degrees of bounded rationality.

One might distinguish two generic approaches towards SEA today: the impact-driven approach and the decision-driven approach. Bina (2001) identifies major challenges in the comprehension of SEA based on an analysis of different definitions through the years, e.g. from 'consequences' to 'considerations', from 'evaluation' to 'integration of environmental concerns', 'to the strengthening of SEA and sustainable development'.

As explained in the introduction, past SEAs have typically applied impact-driven approaches, largely resembling the typical EIA procedure with predetermined stages of screening, scoping, predictions, and evaluation (Fig. 1). There have been success stories with such SEA, particularly in well-structured planning processes that display rationalistic features (e.g., Partidario, 2000; Fischer, 2000). However, in other processes, the impact-driven approach seems to have been rather ineffective (Rees, 1999). For the environmental assessment of higher-level PPP, attempts to apply project-level EIA methodologies have generally proven inadequate. The assessments have not been able to meet the requirement of an effective integration of environmental considerations into the decisions.

By applying a procedure that is not tailored to the decision context, the SEA many times seems to fail influencing the real decisions. It is not a coincidence that very few SEA experiences have been documented on policy-level decisions, which are typically characterised by non-rational processes where a predetermined procedure will be virtually impossible to follow. Research about policy making in Australia found that no clearly defined sequence of stages is apparent. Rather, policy development is either unstructured or follows a mixture of structured and unstructured approaches (Renton & Bailey, 2000). These findings confirm the limitation of a rational model. As a consequence of recent research, SEA practitioners and researchers today are beginning to acknowledge the importance of a decision-centred approach towards SEA that gives more attention to the institutional context and attempts to integrate the environmental considerations into all stages of the decision making process. We argue that this approach should draw its methodological basis from policy analysis and decision theory rather than from EIA traditions (e.g., Government of South Africa, 2000; Danida, 1999; Kørnøv & Thissen, 2000; Nilsson *et al.*, 2001; Bina, 2001).

It is worthwhile to note that the implications drawn out for SEA in this paper are equally valid for many project-level decisions, where conventional

EIA is applied today. Indeed, the distinction between when to apply EIA and SEA is not crystal clear, and the need to reorient environmental assessment practices towards a decision-driven approach is valid for EIA, as well as for SEA. Project-level EIA processes, as well as SEA processes, also demonstrate varying levels of rationality and incrementalism. Behavioural and cognitive aspects and limitations come into play at all levels of decision making, all the way from projects up to policy decisions.

As a result, it will not be appropriate to apply purely and exclusively rationalistic support tools to these decision making processes. Decision support tools, such as SEA, must be adaptive and flexible to variations in the decision rationality. For instance, one can imagine different decision situations that display different levels of social consensus and risk of conflict, and different degrees of uncertainty in the analysis. Each combination requires a different support approach and a different approach to the deliberative process (Table 1).

Table 1. Four combinations in decision situations.

	Social Consensus — Low Risk of Conflicting Interests, High Value Agreement	Social Conflict — High Risk of Conflicting Interests, Low Value Agreement
Strong Knowledge Base – Low Uncertainty in Decision	Rational problem solving — engineering solution, expert deliberation	Mediation and negotiation support, integrated deliberation
Lack of Knowledge – High Uncertainty in Decision	Additional research, risk assessment approach, oversight deliberation	Facilitation of a political process, stakeholder deliberation

(Adapted from EPA, 2000; Stern & Fineberg, 1996; Kørnøv & Thissen, 2000)

A strategic decision making process

To improve the future integration of SEA in the decision making process, it will have an added value to characterise the kind of decision making process *a priori*.

Only by understanding the true nature of each specific decision making process, we can hope to improve the environmental considerations as an output of the process.

Based on twenty case studies in a published EU-funded project, Sheate *et al*. (2001) illustrates how different elements of a policy process can be linked together

to form a more systematic SEA process. The following description of a strategic decision making process explains how the rational model of decision making can be bounded in real decisions and discusses in what way incremental decisions are a natural part of any decision. Another example of a linkage between the decision making process and the SEA steps provides the scheme of the SEA of the Regional Structural Development Fund carried out by the EU (ECMT, 2000).

These steps do not necessarily take place in the sequence presented here. As Geurts & Vennix (1989) put it, policy is "a stream of connected activities of development, selection and implementation". The description adopts ideas of existing models (Tonn *et al.*, 2000; Noorderhaven, 1995; Sexton, 1999).

Environmental and social context

The entire scope of implicit and explicit information influences the final specification of the decision context. This element is analogue to the model developed by Tonn *et al.* (2000), which, contrary to most other models, starts early in the process. All socially constructed concepts connected to the way the environmental reality is defined are included in this element. Examples of factors that make up the context are trends and developments, obvious problems, former solutions to problems, and the general political setting. Although awareness is rooted in the environmental and social context, the context does not determine which issues are specified as calling for action. This step is hard to influence directly through decision-support tools, but it has to be kept in mind while evaluating the process through an SEA.

Specifying the issue

Once there is awareness that something requires action, the issue needs to be specified. This means that the decision maker bounds the problem and a workable definition is agreed upon. In this way, societal problems are brought to the attention of the broader public and policy makers who deal with this specific issue (Van den Herik, 1998). This diagnosis is very important, as it plays a pivotal role in determining what and who will be included in and excluded from the further course of the decision making process. Careful analysis of a problem also matters because it often triggers a line of thoughts that generates alternatives that might have been overlooked (Keeney, 1976). In practice, in many public policy or planning processes, the issue will be redefined over and over again in an incremental way as the process goes on and new people and organisations become involved. In the above mentioned research (Sheate *et al.*, 2001), the

SEA screening stage takes place through expert panel/round table, etc. in some case studies.

Goal setting

Goals can be open (formulated in such a way that actual achievements cannot unambiguously be measured against them) and closed (performance towards them can be measured). Goals may also be either conscious (official) or unconscious (implicit) (Noorderhaven, 1995). According to the rationalist model, a decision maker will always be able to express a preference for one of two outcomes, or to state indifference. Furthermore, preference orderings are assumed to be stable over time. In practice, goal setting often takes place in close interaction with the development and evaluation of alternatives that in return may modify them. Preferences are often inconsistent and imprecise and change over time. Decision makers will set goals that enable them to take shortcuts and to economise on information requirements. Thus they focus on a target stating acceptable levels of achievement in specified dimensions (satisficing) (Noorderhaven, 1995). In SEA studies, this stage sometimes also called as objective setting, is often linked with the scoping step (Fischer, 2000; Sheate *et al.*, 2001).

Information collection and processing

The collection and processing of information will reduce the complexity of the problem. After exploring and structuring problem causes and effects, the information needed must be specified. Literature searches are made, experts invited, and analysts hired to do research on particular topics. Consultations of stakeholders may also take place. In practice, there are often preferred options prior to the information gathering and decision makers, and other stakeholders tend to request more information on the issue to gain better arguments in favour of their preferred decisions. In reality, there is also resource constraints associated with the information gathering process. A decision maker will gradually have to invest more and more time and money for acquiring additional information. On the other hand, the benefits of the additional information gathered may only be marginal. This means that there are limits in the process of information gathering. This may lead to typical incremental decision making, where decision makers try to find shortcuts to the nearest possible solution (Noorderhaven, 1995). Actually the detail of analysis varies in the different countries, e.g., in the overview of SEA in transport in EU countries, only in some countries like Denmark and Finland, SEA is often linked with CBA, in other member states, such approach is avoided (Environmental Resources Management, 2001).

Alternatives

Based on the information presented, different alternatives are developed. The alternatives may be drafted first and acquire their final form after consultations. A dynamic strategy for action should be adaptive and exploit the gradual, time-dependent, unfolding of uncertainties (Keeney, 1976). Therefore, in constructing options, preference should be given towards options that are reversible, robust and multi-pronged, i.e. a portfolio of actions that will enable learning over time and will guard against unexpected events; and incrementally integrated, which means entailing a strategy of small steps, monitoring, reassessment, adjustments as necessary, and additional small steps (Tonn *et al.*, 2000). In reality, decision makers often fail to sufficiently exploit the usage of adaptive and process-oriented alternatives. The comparison of SEA methods developed in five countries to address the same type of plan found out that in some cases the development of alternatives is very limited (Environmental Resources Management, 2001).

Evaluation

Various alternatives are evaluated at this step. The *a priori* setting of criteria for the evaluation of the various alternatives is required. In a rational approach, the relative weights of the criteria also need to be established. The criteria used, and their relative weights, contain substantial information about the importance that the environment has in the evaluation process. In practice, alternatives will often be developed and evaluated sequentially rather than simultaneously. Or it may be the case that only a single alternative is developed and considered for evaluation. Only in the case that this alternative is rejected in the evaluation process, other solutions will be searched for (Noorderhaven, 1995).

Decision

The decision indicates a commitment to action. Various rational decision techniques, such as multi-criteria analyses or analytical hierarchy processes, can aid selection between policy alternatives. Forecasting techniques can also reduce the uncertainty of policy effects. Extrapolative techniques, theoretical and judgmental forecasting techniques can be used to support the decision maker in estimating the effects of potential or intended policy measures. The selection of and commitment to a particular solution constitutes a fact that forms a barrier against returning to the earlier stages in the process. Thus, re-opening the issue is discouraging. In practice, decisions are often made only partly based on rational decision techniques. More often, political concerns, preconceived ideas and preferences

are the critical factors. Furthermore, in real processes, there is a lack of taking the results of SEA into account (Environmental Resources Management, 2001).

Implementation

To execute the chosen strategy resulting from a given analysis, budgets are assigned and concrete actions are planned and executed based on the decision. The decision turns into a commitment of time, energy and resources, and responsibilities are demarcated. Though the implementation phase usually consists of more operational activities, some decisions still have to be done on implementation issues. Major budget overspending or political turmoil can also start a new process. In this stage, the decision must gain acceptance from people who often have had no say in the decision, and there may be resistance against the implementation of the decision. It may also occur that the situation changes so drastically that the decision taken is no longer a good solution at all. To take this possibility into account, it is of utmost importance to design the implementation process in such a way that it ensures continued surveillance of the environmental aspects and enables flexible responses to unforeseen circumstances (Noorderhaven, 1995; Van den Herik, 1998). In practice, the identification and analysis of a problem will not be separated from its implementation. When a suggested solution cannot be implemented realistically, parts of the process must be redone with some attention paid to constraints imposed by the implementation phase (Keeney, 1976). Sheate *et al.* (2001) pointed out that appraisal-inspired SEA at policy level is extremely difficult to assess, regarding effectiveness of environmental integration cause of the long-time scale. But they also pointed out, that SEA helps to implement the principles of sustainable development and achieve environmental integration (Sheate *et al.*, 2001).

Implications for SEA

The previous section described some rational, as well as some incremental features of a typical strategic decision making process. Clearly, there are aspects of such processes that are rational in essence and therefore, should be supported by objective measurements and criteria. However, while it is justified to embrace a set of analytical support tools in a decision making process characterised by a bounded rationality, it is clear that such a process also requires tools and approaches that address behavioural, cognitive, informational and political constraints. The decisions taken will be based on rational techniques of assessment and choice with tools such as cost-benefit analyses or goals-achievement matrices, as well as on codes of practice or the political ideology or the political values

held (Petts, 2000). Tests for significance and trade-offs will always be made based on value judgements and within a political context.

Decision making in governmental planning is inherently political. It always involves value judgements about the relative importance of different, often competing, environmental receptors. It is even argued that environmental assessment tools such as screening and scoping are also inherently political decisions and should be recognised as such, rather than given the dubious distinction of being 'rational' and therefore attributed as objective and of non-political status (Weston, 2000).

Decision support tools must focus their efforts on both content and process. This can take place through the systematic application of participative and interactive approaches to decision making. The process design must then be based on more open and deliberative approaches and include an analysis of not only the decision making sequence itself, but also the multi-actor characteristics of the process, including the actors, their powers and interests.

In the field of environmental decisions, decision makers have to deal with large amounts of information, often of very low quality. In other words, while there might be a wealth of *information*, however, there is often very little *knowledge*. In the sorts of issue–driven science relating to environmental debates, typically facts are uncertain, values in dispute, stakes high and decisions urgent. In fact, policy formation is itself embedded as a subsystem in the total complex system of which its environmental problem is another part (European Commission, 1997; EEA, 1999).

Seen as a political process, decision making typically involves multi-stakeholder deliberation and compromise. In other words, we deal with systems that are characterised by complexity of a technical and multi-participatory nature (Van den Herik, 1998). EA has traditionally been limited to look at only one environmental consideration, namely the likely environmental consequences. However, in a bounded rationality process, the likely environmental consequences are only part of the environmental aspects of their decision. SEA must then go beyond the analysis of the environmental impacts: it should also influence the process and content of priorities, issues and values in decision making. Therefore, focusing exclusively on the environmental impacts at the PPP level does not ensure the full integration of environmental values in the PPP decision making process.

Structuring the SEA process is not a matter for standard procedure. Still, certain principles must underlie the approach. Stern & Fineberg (1996) outlines a set of principles for risk assessment that are all relevant in the SEA context:

(i) *getting the right science*: addressing the significant concerns of officials, the public and affected parties;

(ii) *getting the science right*: meeting scientific standards in the process;
(iii) *getting the right participation*: ensure all relevant information, concerns and perspectives have entered the process;
(iv) *getting the participation right*: ensure that these perspectives are adequately taken into account, having affected the decision system;
(v) *developing an accurate, balanced and informative synthesis*: using the right tools.

Towards a Decision-centred SEA Framework

An SEA framework cannot rely solely on rationalist approaches to decision support. Decisions have to be based on rational objective assessments and measurements, but ultimately be taken based on the values that society assigns to the environment. In fact, SEA must not only function in a value-based and political process, it is also in itself based on a mixture of value judgements and rational criteria. Therefore, we argue that an SEA framework should be developed to be adaptive to variations in the decision context and to emphasise the mixed scanning and bounded rationality features in the process design. To illustrate this, Table 2 presents a few decision-theoretical models and some preliminary implications for decision support and environmental assessment.

Recognising that decisions taken in a process can almost certainly not be based on purely rational principles of value-free objectivity, an SEA should give a more sophisticated view of the function of environmental information and values in decision making. While acknowledging a bounded rationality, the quality of decision making can still be enhanced through a more conscious, well-considered approach than is typical today. This can be achieved through developing an adaptive framework for a conscious, well-considered environmental decision making support process that recognises the bounded rationality and other behavioural constraints of the decision making itself. The need for adaptability in the SEA is a key consideration in this framework.

What are the characteristics of such a decision-centred SEA framework? The following features we see as crucial to explore further in the development of SEA.

Characterisation of the decision making process

A future improvement of SEA could be the descriptive analysis of the decision making process (Renton & Bailey, 2000).

The characterisation of the decision making process should be the departure point for the SEA. The extent to which an assumption of rationality in the

Table 2. Decision making theories and implications for SEA.

Decision Theory	Decision Basis	Implications for Decision Support	Implications for SEA
Rationality (Simon, 1957)	Scientific evidence and formulated objectives lead to "optimal" decision.	Technical and analytical support for optimising impacts of the decision.	Formalised procedure for analysis. Impacts completely identifiable and predictable.
Bounded Rationality (Simon, 1957)	Separation ends-means, leads to "satisficing" decision.	Technical and analytical support to the extent that it can be processed in the decision context.	Formalised procedure ensuring analysis and deliberation. Impacts are partially identifiable and predictable.
Mixed Scanning (Etzioni, 1966)	Muddling through leading to "satisficing" decision.	Technical and analytical support, as well as process management.	Adaptive procedure ensuring analysis and deliberation. Impacts are moderately identifiable and predictable.
Incremental (Lindblom, 1959)	Unpredictable rounds determined by available means and solutions leading to socially acceptable decision.	Process management for exchange and compromise.	Flexible procedure ensuring deliberation. Impacts are not identifiable and predictable.
Garbage Can (March & Olsen, 1976)	No ends-means relationship, coincidence principle.	No basis for decision support.	No procedure can be established.

(Developed in collaboration with Rodrigo Jiliberto, TAU)

process is valid must be assessed. The SEA must adapt to the way in which sustainability considerations are dealt with in the process. The actor configuration must be mapped and analysed, including their interests, values and powers. Then, the SEA can choose a role and function in the process, and make an informed decision on the SEA process design.

Environmental impacts and beyond

The assessment process must be able to identify not only the likely impacts of various alternatives but all the relevant environmental considerations in the decision making process and how the whole set of procedures through which the decision is made is linked to the outcome of the process. At project-level

EA (EIA), impacts are relatively easier to model and predict, and the system boundaries are clearer (Canter, 1996). At the strategic level, impacts become more difficult to predict and information becomes a bigger constraint. Uncertainties in the calculi and models become overwhelming. SEA should therefore deploy a systematic iterative process, where the measurement of quantifiable environmental attributes has a role. Nevertheless, it is not considered of higher importance in decision making than non-quantifiable values of environmental quality or the treatment and formulation of alternatives and criteria in the process.

Adequate treatment of criteria and values

Central to the assessment process is an understanding of the values that are relevant and at which stages of the decision making process, they come into play. Decision sciences have acknowledged the inherently political and value-laden nature of decision making, recognising trade-offs between different impacts of the project on social, economic and environmental values. SEA must accept and handle explicitly the presence of values in decision making. A more adequate treatment of the values and criteria must be ensured, through their systematic articulation and incorporation in the decision making process. The explicit treatment of values requires the decision maker to make explicit choices between different options based on explicit criteria, which will make the decision process more transparent and controllable (Keeney & Raiffa, 1993; Gregory, 2000).

While referring to realms of rationalism, existing EA procedures are already forced to accept value preferences in its implementation. For example, the economic valuation of environmental impacts, which allows the environment to be handled within an economic framework as costs and benefits, is seen as a rational approach (e.g., ADB, 1996). However, economic valuation in its logical foundation is nothing more than an expression of societal values. Policy makers must capture the costs and benefits from a societal perspective and determine their distribution. The subjective element in the decision making process assigns weights to criteria based on these environmental values.

Responding to the cognitive limitations

Refining the analysis to more alternatives and more details, will not necessarily lead to a better or more informed decision. SEA should not aim at advancing the science and analysis. Instead, the SEA must make sure to be effective in the decision context. This can be achieved by focussing on a limited number of key factors and make sure they are communicated and processed in such

a way that they are actually an effective factor in the decision. This means that the information must be "tuned to decision maker's capabilities, interests and timetables" (Kørnøv & Thissen, 2000).

Broad deliberation process

Deliberation is the process for communicating and collectively considering issues in decision making. It is close to public participation but also involves officials, experts and other stakeholders. It is as critical to the SEA as the analysis. Today, there is a wide recognition among policy makers, as well as among academicians, that the SEA process must include public participation. There are three basic arguments supporting this, i.e. the normative, substantive and instrumental argument (Stern & Fineberg, 1996). The *normative* argument is that citizens have the right to participate in public decision making and to be informed according to democratic principles. The *substantive* argument is that not only experts and officials have relevant knowledge and wisdom on the issues at stake. Rather, the public can often add essential insights and information into the assessment that would have been missed otherwise. The *instrumental* argument is that through a participatory process, the acceptance, trust and ownership of the decision will increase dramatically compared to a top-down decision making process.

Concluding Remarks

Current SEA practices are a mixed bag of different formats, levels of ambition, and focus. In fact, the application of SEA is still difficult in many countries, because the actors involved have difficulties seeing the added value of the approach. As long as SEA continues to mimic the basic features of the EIA procedure, it becomes little more than an EIA that looks at a somewhat bigger picture, which a well-implemented EIA should do anyway. We believe that SEA must adopt another role, and would like to see SEA develop into a dynamic and adaptive decision support tool for the incorporation of environmental factors into strategic decisions. We have begun exploring this path by some theoretical explorations. But there is no need to reinvent the wheel. We believe that environmental assessment in general, and SEA in particular, has a lot to learn from decision making sciences, policy analysis, risk assessment and other important fields of research where development has been on-going for many years already. A decision-centred SEA recognises the bounded rationality and behavioural constraints of the decision making itself.

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Paper V

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Testing a SEA methodology for the energy sector: a waste incineration tax proposal

Måns Nilsson[a,*], Anna Björklund[b], Göran Finnveden[b], Jessica Johansson[c]

[a]*Stockholm Environment Institute (SEI), P.O. Box 2142, SE 103 14 Stockholm, Sweden*
[b]*Centre for Environmental Strategies Research (fms), Royal Institute of Technology, Drottning Kristinas Väg 30, SE 100 44 Stockholm, Sweden*
[c]*Department of Environmental Strategic Studies, Swedish Defence Research Agency, SE 172 90 Stockholm, Sweden*

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Abstract

Most Strategic Environmental Assessment (SEA) research has been preoccupied with SEA as a procedure and there are relatively few developments and tests of analytical methodologies. This paper applies and tests an analytical framework for an energy sector SEA. In a case study on a policy proposal for waste-to-energy taxation in Sweden, it studies changes in the energy system as a result of implementing the suggested tax by testing three analytical pathways: an LCA pathway, a site-dependent pathway, and a qualitative pathway. In addition, several valuation methods are applied. The assessment indicates that there are some overall environmental benefits to introducing a tax, but that benefits are modest compared to the potential. The methods are discussed in relation to characteristics for effective policy learning and knowledge uptake. The application shows that in many ways they complement each other rather than substitute for each other. The qualitative pathway is useful for raising awareness and getting a comprehensive view of environmental issues, but has limited potential for decision support. The precision increased as we went to LCA and to site-dependent analysis, and a hierarchy emerged in which the qualitative pathway filled rudimentary functions whereas the site-dependent analysis gave more advanced decision support. All methods had limited potential in

* Corresponding author. Tel.: +46-8-4121415; fax: +46-8-7230348.
E-mail address: mans.nilsson@sei.se (M. Nilsson).

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supporting a choice between alternatives unless data was aggregated through a valuation exercise.
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1. Introduction

1.1. Background

The integration of environmental concerns into strategic decision-making and policy-making has been widely recognised as an essential feature for moving towards a more sustainable development in all policy sectors. Strategic Environmental Assessment (SEA) is a tool with the purpose of integrating environmental aspects in a structured manner into strategic decision-making processes. A commonly used definition of SEA is: "a systematic process for evaluating the environmental consequences of a proposed policy, plan or programme initiative in order to ensure they are fully included and appropriately addressed at the earliest appropriate stage of decision-making on par with economic and social considerations" (Sadler and Verheem, 1996). The recent European Directive on assessments of certain plans and programmes provides a legislative framework for SEA that will be implemented in national legislation all over the European Union in the coming years (European Parliament and Council of the European Union, 2001). What makes the SEA strategic? The first connotation is that the objects of the assessment are policies, programmes and plans that have long-ranging implications on broad societal aspects. Although the European Directive finally excluded the policy level, other initiatives at European and national levels cover this level (European Commission, 2002). The second connotation is the up-stream focus. By taking early environmental considerations into account when preparing for strategic decisions, new possibilities are opened for influencing choices and directions towards a more sustainable society (Therivel et al., 1992). More options for mitigation of harmful effects may be feasible the sooner these aspects are considered in the decision-making process.

SEA frameworks vary, but the general template often includes the following main components. These are not necessarily followed in a step-by-step process, although the general stream of activities is easy to follow (Fig. 1).

Scoping handles what to include in the SEA, the temporal and spatial boundaries, the institutional context and decision scope, and delimitations in terms of issue coverage and stakeholder participation.

Situation assessment provides a baseline to determine the environmental concerns, challenges and opportunities in the areas or sectors that are affected

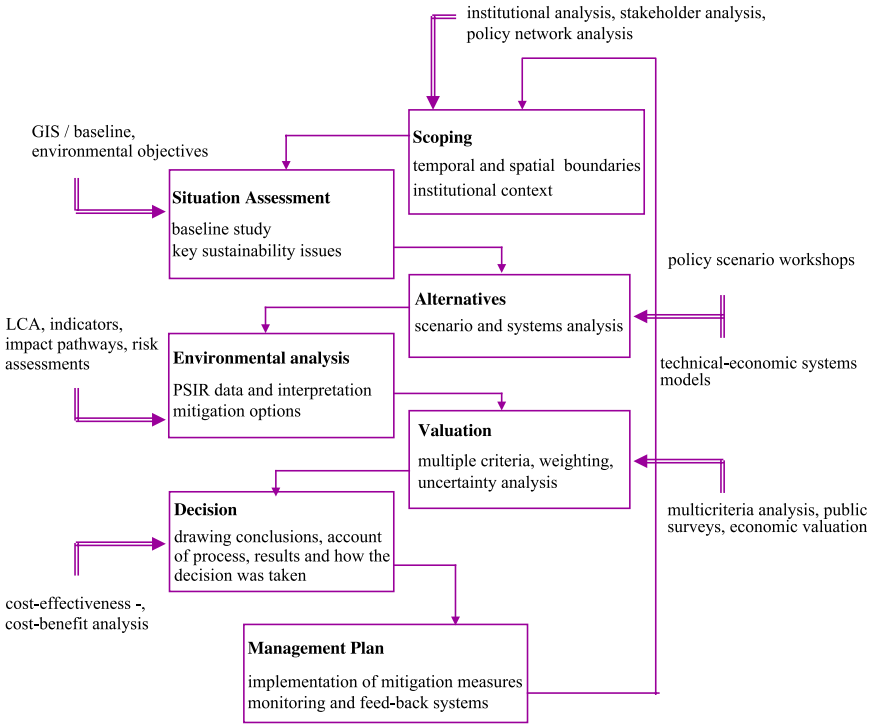


Fig. 1. Overall SEA framework and methods.

by the proposed intervention. It formulates objectives, criteria and indicators for subsequent components.

Alternatives generate the decision alternatives for analysis in close deliberation with the decision-makers, often through applying a scenario analysis. In some cases, it is possible to introduce 'sustainability alternatives' as part of the package.

Environmental analysis deals with the identification and analysis of environmental pressures and impacts of the various alternatives. Often, it works with checklists and matrices although more refined options include LCA and risk analysis to give substantive predictions.

Valuation makes a transparent and deliberated weighting of impact information through, for instance, multi-criteria analysis or economic valuation. It also includes analysis of uncertainties to account for the robustness of results.

Decision is concerned with the structured presentation of the SEA process and results, in what ways the decision has taken environmental concerns into account, and the motivation for the choices made.

Management plan provides a system for monitoring, evaluation and feedback of performance in the implementation of the selected alternative as well as measures to improve the environmental performance.

Most SEA cases in literature to date have been performed in municipal and spatial planning, and SEAs at the policy level have been conspicuously missing. Overall, SEAs have been criticised for their limited effectiveness in terms of affecting decisions (Therivel and Partidario, 1996). Two principal reasons for these problems have been put forward. First, SEA developed out of the conceptual basis of environmental impact assessment (EIA). The planning model underlying EIA has been extensively criticised in the literature and this model is nowadays considered largely irrelevant for most policy-level decision-making (Deelstra et al., 2003; Kleindorfer et al., 1993; Zey, 1998). Alternative perspectives, including policy networks, policy streams and policy rounds, are considered more pertinent for understanding strategic decision-making (de Bruijn and ten Heuvelhof, 2000; Kingdon, 1995; Marsh, 1998; Teisman, 1992). Some argue that there is a general tendency that the level of rationality in decision-making processes decreases at more strategic levels, and hence is lower at the national policy-making level than at the local planning level (Renton and Bailey, 2000). Recent literature has argued that in order to be effective in strategic decision-making, SEA must be more adaptive to the context (Deelstra et al., 2003; Lawrence, 2000; Nilsson and Dalkmann, 2001; Nooteboom, 2000; Nooteboom and Teisman, 2003; Weston, 2000). Instead of addressing the assessment from a research perspective, asking: "How dangerous is this and how many will be impacted", the analyst should seek to address the policy question: "I face these political alternatives. What shall I do?" (Lundgren, 2000).

Second, SEA is a framework within which a range of different analytical tools and methods can be applied (Finnveden et al., 2003) (Fig. 1). Developing from an EIA tradition lead to certain informational and methodological biases towards local, direct and place-based impacts as opposed to global, indirect and systems effects (Canter, 1996; Petts, 2000). As a result, there are today great uncertainties regarding appropriate methods for SEA. Although the environmental analysis is central in most SEA frameworks, it is remarkable how little analytical and methodological guidance is given in literature and guidelines. The lack of methodological guidance for SEA is presently a barrier to the implementation of the European directive (see above). To make SEA an effective tool for environmental policy integration and learning, it must be seen to add value to decision-making instead of being yet another administrative requirement. Such developments should draw upon the many years of experience in dealing with the assessment-to-policy interface in the field of policy analysis (Dunn, 1994; Hogwood and Gunn, 1984; Miser and Quade, 1985; Patton and Sawicki, 1993; Wildavsky, 1987). In recent years, increasing attention has been given to combining analytical tools, although research regarding for which problem which

tool is appropriate, or whether more than one tool should be applied in certain situations, is still in its infancy (Wrisberg et al., 2002).

We have, in an earlier paper, developed an analytical framework for SEA with a special focus on applications for the energy sector that incorporated a set of methodological components and their linkages within an SEA process (Finnveden et al., 2003). This framework allows a selection of one or several analytical pathways that link different analytical methods to each other and to each stage of the SEA process (Fig. 2). For instance, alternative formulation may contain some kind of scenario or forecasting approach; environmental analysis may contain an LCA or a risk assessment; and valuation may contain an economic valuation method or a multi-criteria analysis. The full range of analytical methods in the framework is presented in Finnveden et al. (2003).

The aim of the present study is to get an empirical basis for understanding how these analytical methods function in the context of an SEA. This is done by testing some key aspects and methods in the framework in a case study on a current policy proposal in the energy/waste sector in Sweden. We also provide some conclusions regarding outcomes of the policy proposal. The article presents a summary version of the results. For a full account of the analysis, see Björklund et al. (2003). The more pronounced focus of this article is to discuss the application of the methods in relation to a set of characteristics that are likely to render assessments more effective for policy learning and knowledge uptake. These characteristics, derived from existing research, are introduced in the next section.

1.2. Criteria for testing the SEA framework and methods

Assessment methods can be evaluated from different perspectives, depending on the *role*, *purpose* and *mechanism* of the assessment (Kørnøv and Thissen, 2000; Nooteboom and Teisman, 2003). For instance, should it provide a neutral decision basis, or should it act as an environmental advocate? Fischer (2003) argues that the role can be linked to three tiers of decision-making: (1) a policy-SEA would function as a policy mediator in a negotiation process; (2) a plan-SEA would act as an advocate of environmental values and norms in new institutional contexts; and (3) a programme-SEA is related to a more technical role of priority setting. Each role implies a certain understanding of the underlying mechanisms by which the assessment is effective (Cashmore, 2004).

This study is concerned with assessment effectiveness in informing and influencing policy-level decision-making through facilitating policy learning and knowledge uptake in the process. Earlier research in this field has been approached from political sciences, policy analysis, and environmental assessment research (Andresen et al., 2000; Clark et al., 2001; ten Heuvelhof and Nauta, 1997; Hogwood and Gunn, 1984; Mazmanian and Sabatier, 1980; Nilsson and Persson, 2004). With some variations, most literature points towards three basic properties of assessments for them to be effective; policy *relevance/*

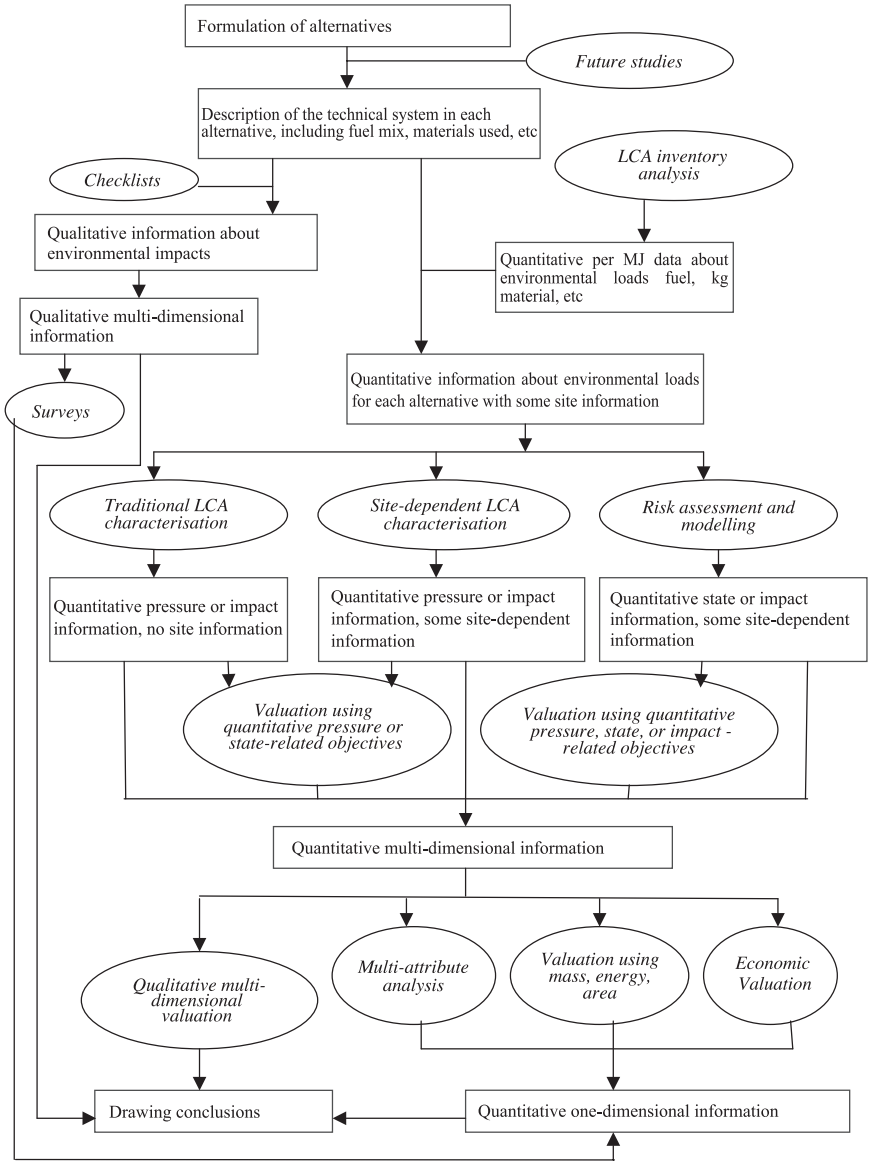


Fig. 2. Methodological framework (source: Finnveden et al., 2003).

saliency, scientific *validity*/*credibility* and stakeholder *legitimacy* (Cash and Clark, 2001; Eckley et al., 2001). Effective functioning of assessments has been found to require simultaneous attainment of sufficient levels of relevance, validity, and legitimacy. There are many variations on these themes, such as

autonomy/integrity and responsiveness/involvement in explaining scientific knowledge use in policy (Andresen et al., 2000), quality and relevance as the corner stones of policy analysis (Lundgren, 2000), and technical adequacy, value and legitimacy, as key meta-criteria for usefulness (Clark and Majone, 1985). Others talk about *trust* as a combination of credibility and legitimacy. Environmental systems analysts, concerned with the development of tools such as LCA, input–output analysis and risk assessment, have also begun to consider aspects of relevance and functional fit (Wrisberg et al., 2002). Also, practical experience in Europe points to these criteria in current critiques of policy analysis (Jiménez-Beltrán, 2002).

Relevance in terms of a fit with between the assessment and the decision-maker's needs should be ensured in the scoping stage. The function of the method must be related to the purpose of the assessment and to the institutional and actor setting. SEAs can be used to select or prioritise alternatives; to provide information on aspects of a given alternative that are more critical, hence where mitigation measures might be more efficient; or simply to raise awareness among decision-makers (Naturvårdsverket, 2000).[1] Narrowly defined assessments of scientific nature, such as LCA, have been argued to be more helpful when establishing scientific consensus is crucial, whereas broader qualitative assessments would be beneficial when multiple actors are supposed to consider it relevant and form a common understanding (Eckley et al., 2001). The role should thus be defined before the analytical method can be selected.

Local, regional and national levels each present their own institutional settings, sets of actors, and information needs (Dale and English, 1998). For instance, local energy planning is likely to involve local businesses, energy companies, the municipal administration, the Agenda 21 office, and interested citizens. National energy policy making, on the other hand, is likely to involve parliamentarians, government experts, scientists, large national industries and industry organisations, national NGOs and other interest organisations. Meaningful deliberations between these diverse actors will require different analytical inputs, which in turn leads to certain qualities in the tools. LCA, which is based on a rationalistic paradigm has been argued to be ill-fitted to a multi-actor setting such as a policy network (Bras-Klapwijk, 1999). The challenge for the analyst in a multi-actor context is that different actors will have different perceptions on what is relevant and credible. Thresholds for what is considered sufficient vary from case to case and place to place, and attainment is dependent on numerous shifting actor-, goal-, and time-bound circumstances (Vedung, 2000). Recent research points towards integration of economic and social dimensions and the

[1] It has been argued that here are in total six principal functions of policy analysis: Research and Analyse; Design and Recommend; Provide Strategic Advice; Clarify Arguments and Values; Democratise; and Mediate (Mayer et al., 2002).

combination of perspectives present in the assessment to enhance its effectiveness (Nilsson and Persson, 2004).

Validity is usually relating to classical 'good science' criteria, for instance, that the study should be formalised and transparent enough to be reproducible by other researchers. This is a real challenge because assessment are often qualitative, selective, constrained, and can be seen as a social construction (Nooteboom and Teisman, 2003). This relates to what extent it is possible for an independent assessor or user of the SEA to check the analysis in detail. Therefore, transparency becomes a key issue.

The existence of political cultures and policy frames that differ between sectors and between countries, and the potential for frame conflict, has recently emerged as a major factor explaining insufficient uses of analysis (Cowell et al., 2002; Peters, 2001; Rein and Schön, 1993). In the case of chemicals, industries often act within a 'risk frame' where risk assessments are considered adequate and meaningful and management is based on results from such studies, whereas environmental movements typically rely on a 'phase-out frame' based on a precautionary approach (Tukker, 1999). Different actors would thus consider as valid different methods and types of information. Approaches that account for material flows into the environment are meaningful for the "phase-out frame", whereas the "risk assessment frame" implies indicators on an impact level. Underlying these frames are often more fundamental values and beliefs regarding the role of science in policy-making (Andresen et al., 2000; Jasanoff, 2000). Choices of methods need to be informed by a clarification of actor perceptions and cognitive frames on the one hand and the frames and perspectives that underlie the methods on the other.

Legitimacy has to do with the extent to which interests, perspectives, concerns of various stakeholders have been given adequate weight and consideration in the assessment (Cash et al., 2002). It usually relates to process concerns of the assessment, such as openness and transparency and involvement of different stakeholders in the assessment process.

In summary, we will focus on the following issues in our methodological discussion. These questions can be addressed only partially from our prior understanding of and experience with the methods. The questions must be related to how they play out in an SEA application rather than to their properties in theory.

- What functions do the various methods provide and to what extent are they fulfilling them?
- In what ways are the methods able cover sustainability concerns and how can they be combined to broaden the scope across more dimensions of the problem?
- Are the methods transparent and formalised enough to enable peer review and reproduction of results by an external team?

– Are the methods likely to be considered valid, legitimate, and trustworthy by multiple actor constituencies, given their underlying frames?
– To what extent do the methods facilitate a broader process of involvement of different types of expertise and stakeholders?

2. Case study: a Swedish waste incineration tax proposal

Swedish waste policy is developed in accordance with EU policy. At the core of the EU waste policy is the 'waste hierarchy' that states that waste should be treated in the following order of prioritisation: reuse, recycling (when environmentally motivated), energy recovery, and landfilling. Another important principle in EU waste policy is that waste should be treated as close to its source as possible. In 2000, Sweden introduced a tax on landfilling, with the purpose of making it less economically attractive than other waste treatment methods that are considered preferable from an environmental point of view. The tax was set to roughly 30 €/tonne in 2002. In 2001, a governmental committee was appointed to analyse and assess the economic and environmental impacts of introducing a similar tax on incineration of waste (Statens Offentliga Utredningar, 2002).[2]

The proposed tax on waste incineration is one of several measures aiming to influence waste management towards the waste hierarchy. Other important measures applied directly to reduced landfilling are the ban on landfilling of sorted combustible waste from 2002, combined with an obligation to separate combustible and non-combustible waste, and the ban on landfilling of organic waste from 2005. To promote material recycling, a producer responsibility to take back packaging was introduced in 1994. It has been successively expanded to include more packaging materials, higher recovery targets, and waste fractions other than packaging (electronic waste, tyres). The proposed waste incineration tax is related to energy, environmental, waste and general tax policy objectives. The committee report mentions five reasons to introduce a waste incineration tax:

- Harmonisation with energy and CO_2 taxation of fossil fuels.
- Neutralise the advantages that waste incineration enjoys as a result of the current design of taxation of fossil fuels.
- Improve the economic conditions for material recycling and biological treatment.
- Reduce the current capacity shortfall for waste treatment, by increasing total capacity.
- Eliminate the economic incentives for import of waste from other countries.

The background for the first two reasons is the design of taxation of fossil fuels in Sweden. Fossil fuels used for district heating are taxed in relation to the

[2] Hereafter referred to as 'the committee report'.

amount of distributed energy and the amount of CO_2 emitted (with certain exceptions made, e.g. for industry and farming). Waste is incinerated mainly for heat production, but is considered a renewable fuel and is thereby exempt from both energy and CO_2 tax. It is thus economically attractive to produce heat from waste. Many waste fuels however contain fossil carbon. A waste incineration tax based on the fossil carbon content in waste could harmonise waste incineration with the taxation of fossil fuels and neutralise its relative advantage. The third reason views a waste incineration tax as a direct complement to the landfill tax, with the purpose to influence waste management in direction of the waste hierarchy. Material recycling and biological treatment are often more expensive and yield less revenue than waste incineration. A waste incineration tax would make these treatment methods more economically attractive by enabling them to charge higher reception fees. This may also stimulate the expansion of more expensive treatment methods, and reduce the current overall shortfall of waste treatment capacity. The last reason relates to the principle of treating waste as near its source as possible. Currently, there are economic incentives for some European countries to export waste to Sweden. A tax on waste incineration could eliminate these incentives, thus ensuring that Swedish incineration capacity is used for Swedish waste.

2.1. Alternatives

The committee report analyses the consequences of three different tax levels relative to a no-action alternative. This forms the basis of this study. The committee suggests a weight-based tax, motivated by administrative simplicity and the fact that many non-combustible waste fractions are heavy, thus giving a strong incentive to treat these by other means than incineration. The committee analysed three levels of a weight-based incineration tax. At the lowest level, around 10 €/tonne, the effects of energy taxation were supposed to be neutralised. The mid-level, around 45 €/tonne, is presented as the most realistic and effective tax level for several reasons; it makes large-scale composting economically competitive, the revenues from heat production from waste are about this high, it is the level of the waste incineration tax in Denmark, and it would eliminate the economic incentive to import waste from other European countries. The highest level, around 80 €/tonne, was included mainly for the purpose of studying possible negative consequences of a high tax level.

For the purposes of our SEA study, we have analysed four alternatives. The no-action alternative (Alt 0), and the 45 €/tonne tax alternative (Alt 1) are taken as described in the committee report. Alternative 2 is developed to explore the potential to achieve more far-reaching goals concerning optimisation of energy recovery (Alt 2a) and reduction of greenhouse gas emissions (Alt 2b). It is assumed that the different waste strategies represented by the case study alternatives have no influence on waste generation. Thus, the same

amounts of waste with the same composition are treated in all alternatives. The alternatives only differ in the way waste is treated. There is considerable uncertainty in the different alternatives. All alternatives are placed in the future, so even the no-action alternative is uncertain. As SEAs are normally set up to make assessments at an early stage in a planning process, this is a common problem.

Estimating the effect on waste flows of introducing the waste incineration tax is a delicate task although this is, to some extent, already done in the committee report. The committee report contains data on waste flows in the no-action alternative and changes that are expected to occur as a result of the possible waste incineration tax at different tax levels, but data is very aggregated and not comprehensive. For the purpose of this study a more detailed quantification was made. First, we identified how the case study should be delimited with respect to waste flows, so as to correspond to the considerations of the committee report. Second, we made an inventory of waste amounts and composition. All case study alternatives apply to estimate waste amounts in 2008. These estimates were reached by making inventories of current (1998–2000) waste amounts, which were then extrapolated to 2008 based on different growth rates for different waste categories. Inventories of current waste amounts and growth rates were, as far as possible, based on data presented in the committee report but data from other sources and some assumptions were necessary to complete the picture. Third, the different alternatives were described in terms of anticipated degree of source separation and amounts of waste treated by different means. Some assumptions of the four alternatives are described in Table 1. Further details are given in the technical report (Björklund et al., 2003).

2.1.1. Alternative 0: no tax

Alternative 0 depicts a waste management system in Sweden in 2008 if no waste incineration tax is introduced, but all other means of control are introduced as planned. Waste treatment capacities have been estimated for

Table 1
Summary of a few key assumptions in the four alternatives

	Alt 0, no tax	Alt 1, 45 €/tonne tax	Alt 2a, maximise energy recovery	Alt 2b, minimize GHG
Total waste incineration	4.0 million tonnes	3.8 million tonnes	3.3 million tonnes	2.6 million tonnes
Total landfilling	2.6 million tonnes	2.1 million tonnes	1.2 million tonnes	1.2 million tonnes
Composting and anaerobic digestion	423,000 tonnes	620,000 tonnes	0 tonnes (all organic household waste incinerated)	678,000 tonnes
Source separation rates	Same as today	6.8% increase	90% source separation	90% source separation

2008 based on current plans. Alt 1 takes the committee report assumption that by 2009, the total waste incineration capacity will be 4.68 million tonnes per year compared to 2.25 million tonnes in 1998. Further, the committee report assumes that large-scale biological treatment (composting and anaerobic digestion) will increase from 392,000 tonnes in 2000 to 500,000 tonnes in 2008. The biologically treated amounts are also increased by this percentage. No increase of home composting is assumed. We assume that rates of source separation for material recycling within all waste categories remain at the same level as today. That is, the percentage of source separation remains the same, leading to increasing amounts as waste amounts increase. This is a conservative assumption based on the fact that source separation rates have been increasing by 9% per year over the last years, but may be difficult to increase further as the most simple measures have already been taken (Profu, 2001). Furthermore, we assume that efficient sorting of combustible waste has been achieved at this point, and that the ban on landfilling of combustible waste is complied with. As a consequence, waste that is not source-separated for recycling or biological treatment is separated in combustible and non-combustible fractions and 100% combustible waste is incinerated, while 100% non-combustible waste is landfilled.

2.1.2. Alternative 1: 45 €/tonne tax

Estimates of treatment capacities in this alternative are made by the committee report, based on the assumption that the tax is introduced in 2004. In parallel with introducing a waste incineration tax, the existing landfill tax will be raised correspondingly. This will be a driver to reduce landfilling by increasing materials recycling and biological treatment. The committee report assumes that source separation in households will increase by 70,000 tonnes compared to the no-action alternative (Alt 0). There are no estimates of how this increase may be distributed over different material fractions. We assume 6.8% increase for all recyclable material fractions in household waste, which gives an additional 70,000 tonnes of source-separated materials. In lack of other data, we use the same assumption for recyclable materials in industrial waste. For building and demolition waste, the committee report assumes 160,000 tonnes of reduced landfilling. Assumptions regarding recycling rates were estimated for different waste fractions. The committee report assumes 500,000 tonnes (90.9%) increase of total large-scale biological treatment capacity in Alt 1 compared to Alt 0. This corresponds to realisation of existing expansion plans, and requires a large increase in source separation rate of organic waste. As explained for Alt 0, the percentage increase rather than the absolute increase is used to calculate the capacity in Alt 1. Home composting is not assumed to increase. As a result of the waste incineration tax, the committee report assumes 140,000 tonnes (3%) reduction of total incineration capacity in Alt 1 compared to Alt 0. As for Alt 0, the relative, rather than the absolute, decrease, is used to calculate the capacity in Alt 1.

2.1.3. Alternatives 2a—maximise energy recovery; and 2b—minimise greenhouse gas emissions

Two alternatives explore the potential to achieve more far-reaching environmental goals than achieved by the tax alternative as described in the committee report. Alt 2a is designed to maximise energy recovery, and Alt 2b to minimise greenhouse gas emissions. The design of these two alternatives is based on experience from earlier environmental systems analyses of waste management systems (Finnveden et al., 2004). The main difference between Alt 1 and these two alternatives is in increased source separation rates (90%), and as a consequence of that, reduced landfilling and incineration. Ninety percent source separation may be practically achievable for some, but not all material fractions. As these are explorative scenarios, a high and equal source separation rate for all material fractions was however deemed reasonable. The only difference between Alt 2a and Alt 2b is in the treatment of organic waste from households. In Alt 2a, which aims to maximise energy recovery, this fraction is incinerated. Incineration has a very high efficiency of energy recovery. The recovered energy is assumed to replace primary energy, in this case biofuels. In Alt 2b, which aims to minimise greenhouse gas emissions, this fraction is anaerobically digested. Anaerobic digestion has a lower efficiency of energy recovery, but on the other hand the recovered gas can be used as vehicle fuel and thereby replace diesel.

2.2. Environmental analysis

From the description of the technical system in each alternative, three principal analytical pathways in the framework are explored: a qualitative pathway, an LCA pathway, and a site-dependent pathway. The risk assessment pathway is not tested in this case study. One reason for this is the resource requirements: the resources for this study did not allow a full test of this pathway, which is substantially more demanding in terms of modelling and expertise than the others. Risk assessment tends to focus on formal quantification of probabilities and uncertainties whereas EIA tools typically provide more simplistic estimates if at all addressing the impact side. Not surprisingly, the risk community considers the assessments made in regulatory EIA to show serious inadequacies, in terms of exposure assessments and risk characterisation (Snary, 2002). Second, questions were raised regarding the usefulness of such a site-specific pathway in a case dealing with national policy. Assumptions concerning specific sites would have an overwhelming influence on results and siting is not the issue in this case of policy making. It should be noted that the methods used in this case study do not estimate first-order effects of a strategy or policy; that is in our case, the changing waste flows as a result of introducing the waste incineration tax, since the committee report already included such estimates.

2.2.1. Qualitative pathway

The qualitative pathway is based on qualitative and quantitative information related to the 15 national environmental objectives established by Swedish Parliament as guiding principles for environmental policy (Regeringens proposition, 2000). The objectives specify the conditions, or states, towards which actions should be directed[3]:

Reduced climate impact
Clean air
Natural acidification only
A non-toxic environment
A protective ozone layer
A safe radiation environment
Zero eutrophication
Flourishing lakes and streams
Good-quality groundwater
A balanced marine environment and flourishing coastal areas and archipelagos
Thriving wetlands
Healthy forests
A varied cultural landscape
A magnificent mountain landscape
A good built environment

The objectives are stated in almost philosophical terms, and as such lend themselves to qualitative analysis. However, they are also an important input to establishing the information needs in quantitative assessments. The government has developed a more detailed framework with interim targets for each objective, at the levels of pressures, states, impacts, and responses. Targets for environmental pressures and responses are the most common ones. It can be noted that there is a mixture of quantitative and qualitative targets. When assessing against a ''pressure'' objective, a different tool might be required than if we study against a ''state'' objective. Although plans and policies in the energy sector have a more profound influence on some of these objectives, all of them can be affected by different energy policies. The qualitative assessment should indicate whether the alternative would contribute positively or negatively towards achieving objectives, and possibly the strength of that contribution (in qualitative terms).

The assessment was made through an expert group deliberation on recurring occasions, between which an individual researcher collected data and information and presented to the group. Each environmental objective was discussed qualitatively for the major stages in each of the alternative waste management systems: transportation of waste; electricity production from coal, heat production

[3] For more information, see the official website: http://www.miljomal.nu/english/english.php.

from forest residues; anaerobic digestion; composting; incineration, recycling, and landfilling. An argument was made about pros and cons for each environmental quality objective due to changes in the waste management system of each policy alternative. The resulting effects on each objective from the different scenarios were then compiled. The findings that are regarded most important for a decision are summarised in a non-technical summary (Table 2). Having chosen a set of objectives and/or targets and assembled the required information, the analysis, in terms of measuring attributes, can then take place in a simple matrix with more or less space for comments. In the matrix, the objectives are on one axis and the different policy alternatives on the other. Results can be reported per target and a summarising assessment can also be made for the headline objectives if appropriate. However, as alternatives are quite complex and contain many components, this proved a difficult task. Nevertheless, the process of deliberation was seen as highly useful in the group and added to the common generic understanding of the pros and cons of different options.

2.2.2. Conventional LCA pathway

The LCA pathway is based on quantitative information about environmental loads for each alternative, with a traditional LCA model of the waste management system in Sweden. The LCA model includes the life cycle of all processes, including waste sources, process models, and resources recovered from waste. For instance, the production and use of fuels and electricity for transports and waste treatment is included. The model, which is implemented in the software tool 'SimaPro', is in many parts based on earlier developments (Finnveden et al., 2004) and described in detail in Björklund et al. (2003). Some data from SimaPro data bases were also used. The functional unit, which is the basis for calculations to which all data is related, was defined as the treatment in 2008 of all waste fractions that are covered by the committee report. For each environmental impact category, the no-action alternative (Alt 0) was described in terms of processes and pressures that dominate that category. Alternatives 1, 2a, and 2b were then compared to the no-action alternative to identify the most significant changes.

Fig. 3 displays a comparison of environmental impacts in the alternatives. The following environmental impact categories are included: energy consumption, global warming potential, ozone layer depletion, photochemical oxidation, acidification, eutrophication, freshwater aquatic ecotoxicity, marine aquatic ecotoxicity, terrestrial ecotoxicity, and human toxicity. It is important to note that a large relative change between two alternatives does not imply that the change is large in absolute numbers.

Waste treatment as a whole has a net negative environmental impact for most impact categories in the analysed waste management alternatives. The proposed waste incineration tax, as represented by Alt 1, leads to small relative improvements compared to Alt 0, except for terrestrial ecotoxicity. However, improvements achieved as a result of the waste incineration tax seem relatively small. The

Table 2
Summary of advantages and disadvantages of different waste treatment options

	+	−
Digestion	Biogas is produced that can replace fossil fuels. The digestion residues can be used as fertiliser and may then replace synthetic fertiliser. Energy can be saved when less synthetic fertiliser has to be produced. When applied to farmland the residues also improve the soil structure. The residues also contain more micronutrients than synthetic fertiliser does.	Increased leakage of nutrients and other substances that may be present in the residues from farmland when residues are used as fertiliser. If toxic substances are present in the residues they may enter into food crops. Requires technically advanced facilities.
Composting	The compost residues can be used as fertiliser and may then replace synthetic fertiliser. Energy can be saved when less synthetic fertiliser has to be produced. When applied to farmland the residues improve the soil structure. They also contain more micronutrients than synthetic fertiliser does. Fairly simple facilities are sufficient.	Greenhouse gases may be emitted from the compost. Increased leakage of nutrients and other substances that may be present in the residues from farmland when residues are used as fertiliser. If toxic substances are present in the residues they may enter into food crops. There may be problems with odour and vermin.
Incineration	Heat can be recovered and thus it may replace other fuels in district heating production. Harmful substances present in the waste may be destroyed in the combustion process.	Fossil greenhouse gases are released when waste of fossil origin is incinerated. Sulphur and nitrogen compounds are emitted. It is however unclear if the amounts involved are greater than those from incineration of other fuels, such as forest felling residues. Toxic substances are formed and released. A lot of slag and ash is formed. Requires large and technically advanced facilities. A lot of transports are generated.
Recycling	Natural resources are saved. Energy is generally saved compared to virgin production. Environmental effects form extraction; production and transports of raw materials can be avoided.	Generally requires careful source separation. This also makes waste collection more problematic. It may sometimes be hard to achieve sufficient quality in the recycled products. Toxic substances in the waste materials may enter unnoticed into the recycled products and new toxicants may be formed in the recycling processes.
Land-fill		Fossil greenhouse gases are released over time as waste of fossil origin degrades. Leakage of various substances. Requires a lot of space. Often considered bad management of natural resources.

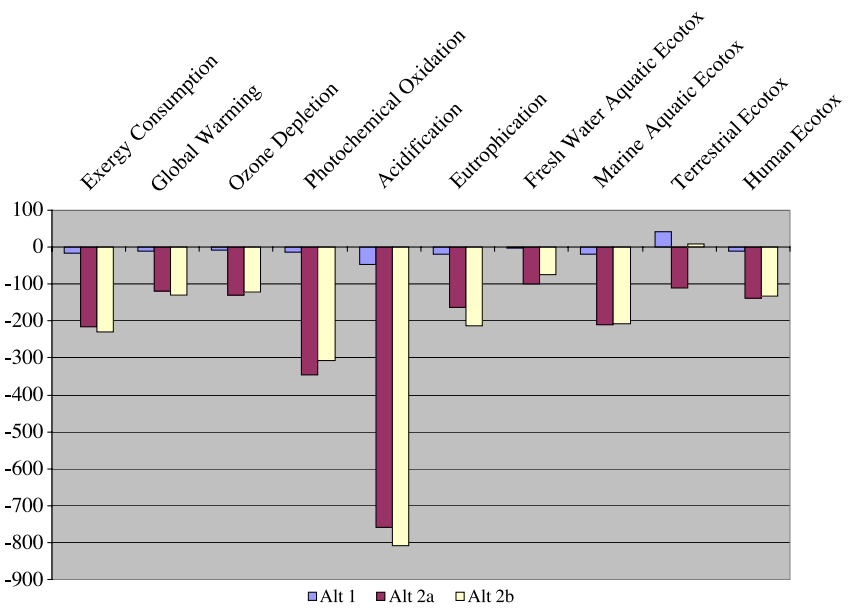


Fig. 3. Comparison of alternatives 1, 2a, and 2b relative to 0 in the LCA (% change).

two more explorative scenarios represented by Alt 2a and Alt 2b lead to potentially much larger improvements, indicating that there is a strong potential of the strategies represented by these alternatives to reduce environmental impact.

In the base case, the model only includes emissions from landfills and ashes from incineration of forest residue for a time period of 100 years. With this temporal cutoff, large amounts of heavy metals (and some other substances) are not released and thus cause no environmental impact. To assess the importance of these substances as a potential future emission source, the model was also run including the remaining time period (RT). This is a worst-case scenario, which allows all substances in landfills and ashes to be released to the environment. It is nevertheless an important scenario to consider. Although the fate and impact of these pollutants is not very well known, the possibility cannot be disregarded that they will actually be released and cause harm to future generations. The main results hold also in the case of including long-term impacts of leaching from landfills and ash from incineration of forest residue. By including the remaining time period, the ranking between alternatives is changed only for eutrophication, freshwater aquatic ecotoxicity, and terrestrial ecotoxicity. However, the absolute values for several impact categories are strongly affected.

The contribution by waste category to each environmental impact category is important in understanding the role of different waste flows. Most impact categories are dominated by net reductions achieved by treatment of household waste. This is because more is recovered from household waste. More net savings

are also achieved per amount of resources recovered. Because of this, the contribution of household waste increases as resource recovery increases in Alt 2a and Alt 2b. When analysing the different impact categories in detail, we also see that the largest improvements are achieved by reducing landfilling to the benefit of increased recycling. The landfill tax raise that is done in parallel with introducing the incineration tax causes this shift in waste flows. Thus, much of the improvements are only indirectly linked to the introduction of the waste incineration tax.

2.2.3. Site-dependent pathway

The site-dependent pathway analysed environmental implications of waste management in terms of emissions of SO_2, NO_x, and PM, and the corresponding environmental impact categories, for two different regions in Sweden; Skåne (a densely populated area in the South) and Jämtland (a scarcely populated area in the North). The analysis is based on the conventional LCA, but with some important differences. First, all processes were defined as being situated either locally in the analysed region (Skåne or Jämland), or at an unknown location. The total waste flows were modelled as being treated in either Skåne or Jämtland, rather than distributed over the country, depending on population density and industrial activities. Local process models were defined as being all waste treatment processes except recycling processes, waste transports, and the avoided use of diesel when biogas vehicles use biogas from anaerobic digestion, as well as the avoided use of biofuels for district heating when heat is recovered from waste incineration. All other processes were defined as having an unknown location. The model applies other transport distances than were used in the conventional LCA. A set of shorter transport distances are used to represent Skåne, while a set of longer transport distances are used to represent Jämtland. This is the only actual difference introduced in the model of the waste management system and it results in different emissions from the two regions. While this is an overly simplified model of waste flows in Sweden, it serves the purpose of demonstrating what the site-dependent methodology can offer. As a consequence, the total impact of each region is not relevant. Still, the impact per amount of treated waste and the relative difference between the two regions allow us to evaluate the impact of the same waste management strategy in different regional contexts.

The potential environmental impact of local processes was calculated with characterisation factors for the specific region. The impact of processes with unknown location was calculated using average characterisation. Characterisation factors for impacts were developed by calculating the environmental impact caused by emissions from a well-defined emission source in a hypothetical location. The characterisation factors were developed for emissions of SO_2, NO_x, and PM by using an integrated impact assessment model, EcoSense 2.0 (IER, 2000). This model follows the sequence from emissions of pollutants, through to

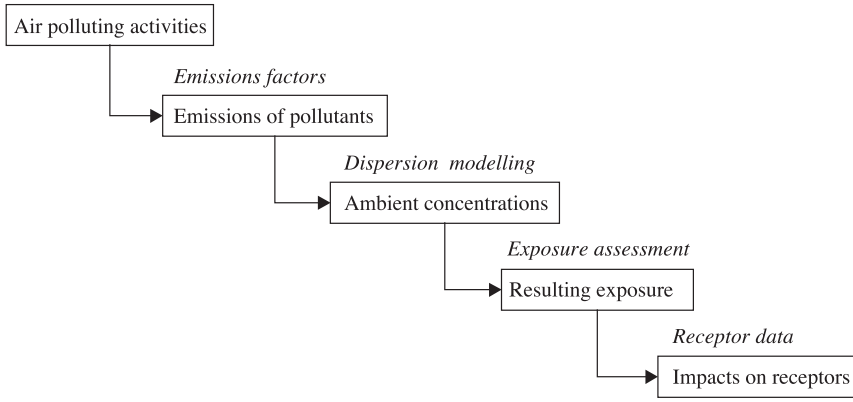


Fig. 4. The impact pathway approach (source: Finnveden et al., 2003).

impacts on receptors (Fig. 4).[4] By using impact models with linear dependence on amount of emitted substance, the resulting impact could be divided by amount of emission to derive the characterisation factors.

Model runs were done in which a hypothetical incineration facility was located in the two different locations. The EcoSense model contains one local-level and one regional-level atmospheric emission dispersion model. Ecosystem impacts are calculated only at the regional level, whereas human health impacts are calculated at both the regional and the local level. At the local level (corresponding to an area of 100 * 100 km around the emission source), the Industrial Source Complex Model (ISC) is used to calculate dispersion. At the regional level (covering Europe), the Windrose Trajectory Model (WTM) is used to calculate dispersion and atmospheric transformation into nitrate and sulphate particles as a result of reacting with regional background concentrations of NH_3 (Krewitt et al., 2001). The resulting concentrations are linked to human health impacts and ecosystem impacts through a set of exposure–response functions. Ecosystem impacts are based on the critical loads concept. The indicator used is the change in actual exposure in an ecosystem area divided by the critical load or level of exposure in this area. This indicator is chosen instead of change in exceedance area because it allows us to account for the pollution that affects areas that are already above critical loads. Human health impacts are based on risk assessment approach and the functions used are the ones recommended by the ExternE project (Commission for the European Communities, 1999).

The dispersion of emissions vary depending on the height of the emission source (Potting, 2000). Therefore model runs were made for each site with low and high stack heights to derive characterisation factors for ground level and high

[4] As a measure of human health impact, emissions of SO_2, NO_x, and PM may not be entirely representative. In a conventional LCA, this impact category is dominated by emissions of other substances, mainly hydrocarbons (C_xH_y), that are not captured by the model.

level sources. Then, every process was defined as being either at ground level or at high level. All energy conversion facilities, both waste incineration and other fuels, were defined as being high level. All other processes were defined as being ground level.

The characterisation factors reflect small differences in ecosystems impacts. Jämtland displays somewhat greater impacts, which is probably attributable to being inland emissions rather than coastal emissions. Concerning health impacts, there is a clear tendency for lower impacts further north, close to a factor 10 between Skåne and Jämtland, due to lower population density. There are two kinds of significant site-related differences between the two regions. First, the total emissions of SO_2, NO_x and PM are higher in Jämtland than in Skåne due to the much longer transport distances in Jämtland. For SO_2 and particulates, the net emissions are negative in both regions, whereas for NO_x, the net emissions are negative in Skåne but positive in Jämtland (Fig. 5). However, the ranking between the different alternatives remains the same in both regions, with Alt 2a and Alt 2b having lower potential environmental impact than Alt 0 and Alt 1.

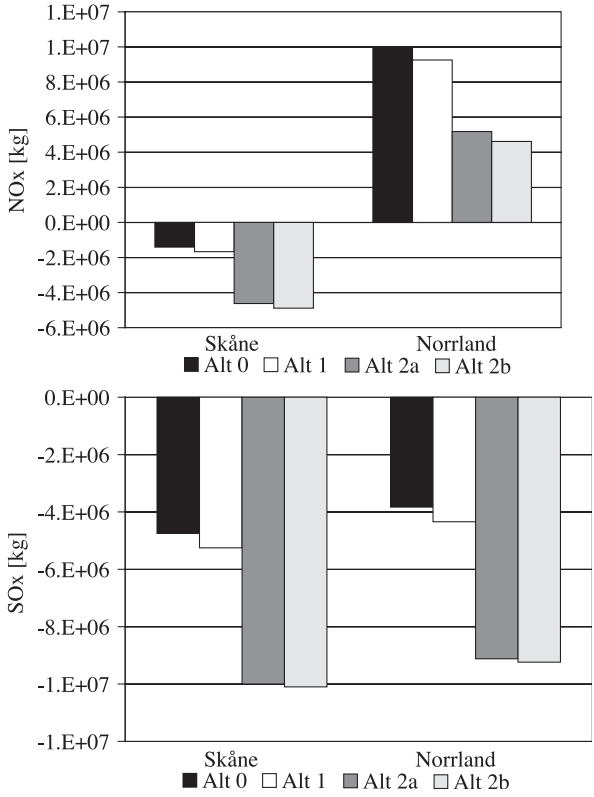


Fig. 5. NO_x and SO_x emissions (kg) in Skåne and Jämtland.

Second, the human health impact per amount of emitted substance is lower in sparsely populated Jämtland than in densely populated Skåne, so the site-adjusted human health characterisation factors are much lower for emissions in Jämtland. Despite the fact that emissions would be higher in Jämtland than in Skåne, the net human health impact is therefore lower in Jämtland.

2.3. Valuation

Valuation in an SEA can help visualising some environmental values at stake, and trade-offs and weightings that need to be made. This visualisation can take different forms. Some policy analysts suggest that an economic valuation approach of net present value is needed to evaluate the relative merits of the various decision alternatives (Asian Development Bank, 1996; Bojö et al., 1992). Such a valuation tries to visualise the aggregation of environmental costs and benefits of the alternatives. Others suggest multi-criteria analysis, or translating impacts into another common measure such as Ecological Footprints. In this case study, a selected set of valuation methods are tested, including Eco-indicator 99 and EPS 2000, commonly applied in LCA systems; Ecotax 02; and ExternE values developed with applications of the EcoSense model introduced earlier. The format of this article does not allow a lengthy description of the individual methods, which are summarily introduced below.

2.3.1. Ecotax 02

The idea behind Ecotax 02 is that we can use taxes and fees as expressions of the value society places on damages relating to the environment. In such reasoning there are underlying assumptions concerning policy-makers' rationality and motives behind the taxation that might not be entirely reflective of reality. Nevertheless, it is one established approach to valuation. The applied values for Sweden are described in detail in Eldh (2003). The method links a tax or a fee to a relevant impact category. This means that even when the tax or fee only is expressed in one substance, characterisation factor conversion makes it possible to get a reference equivalent weight (Table 3). Weighting factors are in some cases expressed as minimum and maximum values, to indicate uncertainties.

2.3.2. Eco-indicator 99

The Eco-indicator valuation is performed by expert panels (Goedkoop and Spriensma, 2000). To be able to work effectively with panels, the Eco-indicator 99 developers have prioritised to keep the subjects low in number and easy to explain. Thus, the panels only weigh three types of environmental endpoints: *human health*, *ecosystem quality*, and *resources*. Climate change, ozone layer depletion, ionic radiation, respiratory and carcinogenic effects have been modelled in different ways to address damages to human health. In damages to ecosystem quality, ecotoxicity is expressed as the percentage of all species presently living under toxic stress. Acidification and eutrophication and land

Table 3
Weighting factors for Ecotax based on taxes and fees in Sweden 2002[a] (source: Eldh, 2003)

Intervention	Weighting factor	Tax or fee base
Extraction		
Fossil energy	0–0.15 SEK/MJ	Tax on fossil energy
Biotic energy	0–0.069 SEK/MJ	Tax on biotic energy
Emission		
CO_2	0.63 SEK/kg	Tax on carbon content in fossil fuel
Ozone depleting substances	1200 SEK/kg	Fee for using prohibited ozone depleting substances
Nitrogen	12 SEK/kg	Tax on nitrogen content of fertiliser recalculated due to leakage of 15% (tax 1.80 SEK/kg)
HC	20–200 SEK/kg	Emission fee for air traffic
Sulphur	30 SEK/kg	Tax on sulphur content in fossil fuels
Toluene	17.65–36.07 SEK/kg	Tax differentiation on petrol qualities (unleaded petrol vs. alkylate petrol)
Cadmium	30,000 SEK/kg	Tax on content of cadmium exceeding 5 g/1000 kg phosphor in fertiliser
Pesticides/copper	20 SEK/kg	Tax on active substance in pesticides

[a] 1 Euro is approximately equivalent to 9 SEK.

use and land transformation are also included in this damage category. *Resource* extraction is related to a parameter that indicates the quality of the remaining mineral and fossil resources.

2.3.3. EPS 2000

Environmental Priority Strategies (EPS), commonly applied in Swedish LCA, evaluates impacts on the environment via its impact on several safeguards subjects; human health, resources, ecosystem production capacity, biodiversity, and aesthetic values (Steen, 1999). The default weighting method is willingness-to-pay surveys to restore impacts on the safeguards subjects.

2.3.4. ExternE

The European research programme ExternE estimated the external environmental cost per unit of energy for different energy types, as well as the cost per tonne of various emissions (Commission for the European Communities, 1999). It used an impact pathway approach with exposure–response functions to estimate the impacts and damages of SO_2, NO_x, and PM on human health, crops, materials, and ecosystems. Furthermore, it used results from the most updated environmental economic research studies for applying Euros per impact case.[5] In the case of health impacts the values are based on willingness-to-pay studies for various health cases. For crop production, the market value of the

[5] The most updated dose–response functions and monetary values used as in-data in the project are available in Friedrich and Bickel (2001).

production loss was used, and for material damage, the costs of restoring corroded materials were used. For non-air pollution impacts, willingness-to-pay studies were made for issues such as cultural landscape effects, visual intrusion and noise. For climate change, special modelling was made with the FUND and Open Framework models. We have used the average of damage cost estimates made for Sweden for SO_2 (2500 €/tonne), NO_x (2056 €/tonne), and PM_{10} (3150 €/tonne) (Nilsson and Gullberg, 1998). A CO_2 damage cost estimate of 2.4 €/tonne is used with an indicative range from 0.1 to 16.4 (Krewitt, 2002).

3. Discussion

3.1. Results on the waste incineration tax

The results indicate that an introduction of a waste incineration tax is likely to result in environmental improvements. The qualitative pathway displays a complexity that makes it hard to draw conclusions. The LCA and the site-dependent analysis point to improvements in most environmental aspects. However, not all environmental issues are represented in the analysis. The site-dependent analysis gives roughly the same answer as the conventional LCA analysis, but with more refined information in some aspects. It shows that while transportation emissions increase when waste incineration is placed in the North, the environmental impacts per unit of emission are smaller. This can largely be attributed to lower population densities and hence lower health damages. The site-dependent analysis thus indicates that the ranking between different alternatives are similar in different parts of the country.

With valuation methods we have the possibility to compare heavily aggregated data. Table 4 and Fig. 6 show that all applied weighting methods indicate that Alt 1 is favourable compared to Alt 0, except in Ecotax 02 min. Furthermore, Alt 2a and Alt 2b make for greatly reduced net environmental burdens compared to Alt 0 and Alt 1. Differences between Alt 0 and Alt 1 are small as they are between Alt 2a and Alt 2b, but there is a significant difference between these groups with all methods. Thus, the results are pointing in the same direction. However, there is a large diversity in categories. Substances in air, soil, and water dominate

Table 4
Total single scores of all methods and alternatives (in Euros)

	Alt 0	Alt 1	Alt 2a	Alt 2b
Ecotax 02 max	– € 3,366,666,667	– € 3,788,888,889	– € 9,544,444,444	– € 9,155,555,556
Ecotax 02 min	– € 165,555,556	– € 123,333,333	– € 1,222,222,222	– € 900,000,000
EPS 2000	– € 22,666,667	– € 30,888,889	– € 105,555,556	– € 112,222,222
Eco-indicator 99	€ 314,444,444	€ 283,333,333	€ 120,000,000	€ 118,888,889
ExternE	– € 1,197,778	– € 6,535,000	– € 51,796,667	– € 53,941,222

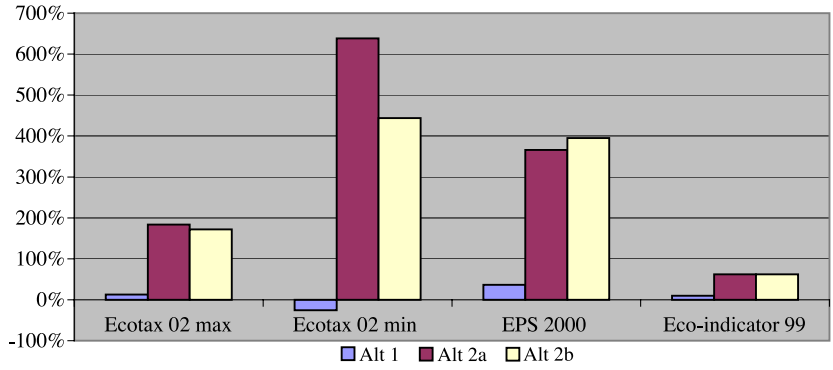


Fig. 6. Reductions in environmental burdens relative to Alt 0 for different valuation methods.

Ecotax 02 and Eco-indicator 99, whereas for EPS 2000 and ExternE, air emissions dominate.

The environmental improvements are partly accomplished by diverting materials from landfills to recycling as a result of the expected increased landfill tax, and partly by diverting materials from incineration to recycling. Although the studied alternative of a waste incineration tax of 45 €/tonne is likely to lead to environmental improvements, these are small compared to the potential improvements in Alt 2a and Alt 2b. In order to go in the direction of these visionary alternatives, a differentiated incineration tax, based on the content of fossil carbon in the waste, would be useful. An incineration tax of approximately 200 €/tonne of plastic materials would harmonise the waste incineration tax with the carbon dioxide tax. Such a tax would make recycling of plastic materials economically attractive.

3.2. Characterising the methods

Having applied a range of methods in a 'real' assessment, we can now relate our experience to our set of questions about characteristics that are commonly considered as contributing to more effective uses of assessments.

3.2.1. What functions do the various methods provide and to what extent are they fulfilling them?

The different methods seem to provide different functions in an SEA application. An important function in a multi-actor policy context is raising awareness and encouraging deliberation among stakeholders and decision-makers. In our case, the qualitative assessment was clearly useful for raising awareness concerning the complexity of impacts from policy decisions. This might sound meager from an analytical perspective, but it is key to policy learning. However, also the LCA and site-dependent analysis contributed to this function in substantive way with more precision. In LCA, the amount of output

data may be overwhelming and difficult to interpret, but with careful analysis it revealed aspects of the system that could not be intuitively understood. This is unlikely to happen in the qualitative assessments where the conventional knowledge base tends to set the frame of the analysis.

Another important function commonly assigned to SEA is the comparison between and within alternatives. This requires some quantified analysis and/or some kind of valuation basis. LCA is largely a comparative analytical tool that will quantify each environmental impact category but not show what impacts are more important. Results could be used to assess the system at different levels of aggregation. At a lower level, the pros and cons of treating a certain waste fraction in a certain way could be assessed, or the dominating contributions and savings in terms of processes or emissions of a certain impact category could be identified. The LCA contained information on many aspects of the system, such as what is the net impact of recycling a certain material, how may a certain recycling system be improved, and what is the total burden of transports within the system. One may argue though that looking into details is not necessary for policy level SEAs. If the strategy as a whole leads to general improvement, trade-offs within the system may not be important. However, if one is to better understand the strengths and weaknesses of the strategy, when it works efficiently and when it does not, and what mitigation measures are needed, the details of the system need to be understood. By being modular, the LCA model allows the kind of disintegrated analysis that this would require, but using the model in that manner is time-consuming and actually may not be within the scope of an SEA.

Yet another function is the analysis of absolute impacts or risk levels for finding out policy priorities and to assess whether critical thresholds are surpassed. Because LCA is not site-specific, it is very difficult to fully assess impacts as they typically depend on site and concentrations. Priorities should preferably be assessed through some sort of risk assessment as well as valuation, in particular when we wish to compare different impact categories and find out what impact categories matters the most. Site dependent analysis is a step in this direction. When we introduced site dependency in the assessment, the information got substantially more refined, with the qualification that this analysis was only possible to develop for some limited processes and pressures, in our case key local and regional air pollutants. The site-dependent analysis revealed patterns that could not be understood in the other approaches, and as such it added value to the conventional LCA. This should be useful not only when discussing localisation of particular facilities or infrastructures, but also concerning national policy decisions. Regional political considerations, which are a key decision premise in Swedish politics, can also be addressed through site dependent analysis. Risk assessments could also be used for answering other types of questions and for identifying certain types of critical issues that cannot be handled with other methods. It could, for example, be used to study whether air quality norms are exceeded. This is particularly interesting in energy and transport sector assessments.

3.3. In what ways are the methods able to cover main sustainability concerns and how can they be combined to broaden the scope across more dimensions of the problem?

The methods differed substantially in terms of issue coverage and precision in our SEA application when they were applied under resource constraints. The LCA addressed many (but not all) impacts that are part of the national environmental quality objectives. Impacts on biodiversity, land use and the built environment are not well covered in LCA. The qualitative assessment, on the other hand, was open to inclusion of all known environmental problems. Any information perceived relevant and credible could be included, as it is not bound by particular data formats. However, the depth at which different topics are handled depends on the capacity and resources available to the analyst. There was often a trade-off between coverage and precision in the assessment. The LCA could be usefully combined with a qualitative analysis to check that important issues are covered in the overall assessment. All methods are based on environmental data but they can all easily assimilate valuation factors and costing estimates so as to integrate economic concerns in the assessment.

3.3.1. Are the methods transparent and formalised enough to enable peer review and reproduction of results by an external team?

Our qualitative assessment would not be easily reproduced. The result depended on which information could be easily obtained and which experts were consulted, and the conclusions are sensitive to different assumptions. Cognitive limitations also played a big role in our SEA application where the studied system was a complex one and there was a multitude of pros and cons of very different natures and of different degrees of certainty. What gets selected in a qualitative assessment is likely to depend on the background, interests and prior knowledge of the assessor. This is less of a problem if there is little scientific uncertainty concerning which environmental problems that are expected and how severe they are. A way of compensating this is to be transparent, to demonstrate to the audience what have been seen, and to make a transparent and plausible argument for the conclusions.

LCA, on the other hand, relies on a standardised methodology and should therefore, in principle, be reproducible. However, although standardised in theory, data sets are usually not standard and our application included many more or less subjective elements. In practice there is a real risk that different analysts will come to different conclusions although comparative studies have shown that LCAs are reproducible if key assumptions are replicated (Finnveden and Ekvall, 1998). In our specific case of analysing many different waste flows and fractions, treatment options, and avoided processes at the national level, data problems were accentuated. Overlaps, data gaps, and inconsistencies in terminology used by different data sources complicated the task of getting a comprehensive quantified picture. Undoubtedly this also leads to a greater risk of introducing unnoticed data gaps, which in turn may lead to under-estimated burdens associated with processes

for which emission data is lacking, as well as over-estimated importance of processes for which better inventory data is available. To minimise this risk and to reveal any subjective choices, the standardised procedure requires peer review and full transparency in the results presentation. It however requires technical expertise to be able to interpret this information.

Doing a site-dependent analysis in an SEA may weaken reproducibility. Standardised methodologies and models exist, but in reality it is unlikely that another assessment team would have access to the same models. When it comes to air pollution modelling as well as land-use modelling, a large range of competing models exist in Europe, and their application is often associated with major costs in terms of licenses, training and data collection. Most valuation methodologies, on the other hand, are directly reproducible since they are based on secondary applications. Applicability for Ecotax 02 is limited to Sweden because of the link to Swedish fees and taxes. Depending on the availability on fees and taxes the approach could be used elsewhere, but the same data sets may not be available in some countries or areas. Similarly, the ExternE values are based on calculations made in Sweden, and when reproducing this in other countries, national results should be used. Transparency in valuation methods is connected to how well procedures and calculations are documented rather than the type of methods. Transparency appears to be higher in some methods, such as ExternE and Ecotax, whereas underpinning data is often unavailable for methods traditionally applied in LCA such as Eco-indicator and EPS 2000. Since different valuation methods have different data gaps, it is useful to triangulate by using a set of valuation methods to increase validity.

3.3.2. Are the methods likely to be considered valid, legitimate, and trustworthy by multiple actor constituencies, given their underlying frames?

As discussed in the introduction, validity is a relative concept. Actors tend to have different frames and hence perceptions of what types of analytical input are valid (and legitimate). Regarding LCA and risk assessment, the underlying paradigms are clear but we need more empirical evidence to be able to say anything about whether this influences their uptake in different contexts. On qualitative assessments, validity problems were clearly recognised throughout the project precisely because the frames of the assessors become so influential. Furthermore, we have found that in many cases, economic valuation lacks acceptance among decision-makers in the Swedish context. While established as a legitimate tool among some government actors, such as the Ministry of Finance, it remains contested among most environmental officials. The use of valuation methods in the assessment tends to raise a lot of questions and complicates discussions—for good and bad. An alternative can be to work with multi-criteria decision analysis based, for instance, on the national environmental quality objectives. This can offer an alternative valuation basis of a multi-dimensional and partly qualitative nature that might be more acceptable as a decision premise (Keeney and Raiffa, 1976).

3.3.3. To what extent do the methods facilitate a broader process of involvement of different types of expertise and stakeholders?

This question is connected to the analytical 'style' of the methods but also resource requirements because expertise, time and financial resource requirements lead to constraints on the process. Obviously, resource requirements also depend on the level of ambition and the existing knowledge base. A qualitative assessment can be everything from a simple group discussion summarised in a briefing note to exhaustive surveys and a broad process of involving different experts, stakeholders and the public. Other pathways are inherently more confined to the scientific arena in their style. LCA is a resource-intensive methodology that does not typically facilitate broader expert or stakeholder involvement. Data requirements are significant, which may be both time-consuming and expensive although it is to some extent facilitated by the use of available databases. The large amount of data in LCA, both inventory data and generated results, is actually both a strength and a weakness. Collecting inventory data may be costly but once collected it enables quantification of a complex system like few other methods. Such quantification played an instrumental role in our deliberations. The risk assessment approach was not tested in this study, partly because of resource requirements. While an important methodological basis, it therefore remains problematic in the SEA context. Site dependency, if factors are available, seems to provide significantly more sophisticated results with little extra effort and also a platform for discussions with a broader range of stakeholders and experts. However, the development of such factors is in itself quite costly, as they typically rely on risk assessment methodologies. Similarly, valuation methods do not typically require a lot of efforts or opportunities for involvement if only applying existing factors. New studies, on the other hand, can often be designed to a very high degree of stakeholder involvement, through methodologies deployed such as contingent valuation or expert panels. However, these tend to be very costly and beyond the scope of SEA resources.

4. Conclusions

In many ways, the pathways and methods applied in the SEA complemented each other, a conclusion supported by previous studies (Olsen et al., 2001). The qualitative pathway was useful for raising awareness and deliberate at a generic level. However, in terms of drawing conclusions about alternatives, it did not provide stable decision support as it could be easily contested. The LCA pathway showed critical aspects of the system as well as facilitated a discussion about the relative merits of each alternative. The site-dependent pathway helped us understand the absolute risks involved as well as regional considerations. Thus, the precision increased as we went from qualitative to LCA to site-dependent analysis, and a hierarchy emerged in which qualitative approaches could only fulfil certain rudimentary functions whereas the site-dependent analysis gave

more advanced decision support. However, there is a clear trade-off. While precision increased in the latter pathways, coverage decreased. The quantitative methods needed to be complemented by the structured qualitative method with the aim of identifying critical issues that went unnoticed in the quantitative analysis. In general, in cases where the causal link between policy and environmental impacts is indirect and weak, quantitative impact prediction is difficult and prone to criticism. In these cases, the qualitative pathway might provide the only valid analysis.

There are also different styles of interaction and analysis built into the methods, which will influence their role within and effect on the decision-making process. A mainstream wisdom is that a hierarchical and expert-based context would be more fitted to expert methods whereas deliberative situations of multiple actors and networks require more participative and deliberative methods (Bras-Klapwijk, 1999). Indeed, it seems intuitively plausible that the qualitative pathway, which is largely based on group discussions, workshops, and deliberations, is likely to be more effective for a policy learning across actor constituencies than the more desk-research oriented LCA method. However, our sense is that this is too simplistic and not accounting for the mechanisms behind policy learning and knowledge uptake. Just as often, the opposite is true. Several parties within a multi-actor and multi-frame policy network can effectively use quantitative and 'rationalistic' methods, whereas qualitative assessments are more easily dismissed and therefore not used. Also, we have noticed that valuation methods, although usually reluctantly applied by environmental assessors, are often necessary to enhance the effectiveness of the assessment in a policy context where economic interests are high on the agenda—which is usually the case. The choice of whether to use valuation and risk assessment methods in an SEA must eventually depend on the frames of the actors the assessment is intended for. To be viewed as valid and relevant, the SEA methodology needs to be adapted to different roles, sectors, levels of governance and political cultures. The choice of analytical methods in the SEA therefore requires a strong understanding of the decision context. What are the actors and institutions involved? What are their underlying frames, preferences, and priorities? What methods can be used to facilitate learning across these frames and processes of joint fact-finding? Such questions should be a departure point for the scoping of the SEA as regards the choice and adaptation of analytical methods for alternatives, environmental analysis and valuation.

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Samenvatting

Het koppelen van rede aan macht: evaluaties, leren en integratie van milieubelangen in het Zweedse energiebeleid

Deze dissertatie beoogt bij te dragen aan een beter begrip van de wijze waarop duurzaamheidsoverwegingen in beleidsprocessen geïntegreerd kunnen worden. Drie doelstellingen staan hierbij centraal. Ten eerste, het onderzoeken van het probleem: hoe kan integrale beleidsvorming analytisch gezien opgevat worden en wat is de actuele stand van zaken op dit gebied in sectorale beleidsvorming? Ten tweede, het verklaren van empirisch geobserveerde patronen: welke omstandigheden hebben beleidsintegratie mogelijk gemaakt dan wel tegengewerkt? Ten derde, het doen van aanbevelingen: hoe zouden instituten en evaluatiesystemen opgezet moeten worden om de kansen voor integrale beleidsvorming te verhogen?

Integrale beleidsvorming is naar voren gebracht als een soort "heilige graal" van overheids beleid in Europa en wordt zelfs vermeld in het Europese Verdrag. Toch lijkt er vooralsnog slechts sprake van trage en gedeeltelijke vooruitgang. Bovendien zijn noch analisten, noch beleidsmakers het er over eens wat integrale beleidsvorming daadwerkelijk inhoudt. Een startpunt is om het concept van integrale beleidsvorming nader uit te werken vanuit een theoretische invalshoek. De dissertatie ontwikkelt langs deze lijn een model voor het analyseren van de integratie van milieubelangen in beleidsvorming als een tweede orde leerproces waarin sectorale beleidsmakers hun begrip van kernproblemen, doelen en strategieën met betrekking tot duurzame ontwikkeling herformuleren. Dit model combineert theoretische perspectieven omtrent beleidsnetwerken, leren en leerprocessen, instituties en gebruik van kennis in beleidsvorming.

De empirische analyse concentreert zich op het analyseren en, voor zover mogelijk, verklaren van het ontstaan en de ontwikkeling van leerprocessen en van beleidsintegratie in het Zweedse energiebeleid, en het nader analyseren van de beleidsprocessen en hun uitkomsten in verschillende ronden en stadia van beleidsformatie gedurende de laatste twee decennia. De analyse is gebaseerd op drie verschillende bronnen: a) kwalitatieve analyse van argumenten en redeneringen in openbare documenten; b) analyse van de inhoud van beleidsbesluiten; en c) aanvullende informatie uit 30 semi-gestructureerde interviews met actoren uit de beleidsarena, uitgevoerd tussen 2002 en 2004.

Het Zweedse energiebeleid in het algemeen heeft sinds de late jaren 80 grote veranderingen ondergaan, van een uitgesproken gecentraliseerd planningsmodel naar een sterk internationale en marktgebaseerde oriëntatie van de sector en naar gedeeltelijke integratie van milieubelangen. Dit heeft tot belangrijke beleidsveranderingen geleid, voornamelijk in relatie tot klimaatbeleid, maar ook ten aanzien van de wijze waarop de sector wordt bestuurd in het algemeen: zo heeft bijvoorbeeld een belangrijke verschuiving plaatsgevonden van het gebruik van belastingheffing en subsidies op nationaal niveau naar meer marktgebaseerde systemen en vrijwillige afspraken. Van alle milieuoverwegingen is echter alleen het klimaatprobleem echt geïntegreerd in het sectorbeleid en het lijkt alsof dit probleem andere mileuproblemen heeft weggedrukt. Nieuwe actoren

configuraties en toenemende onderlinge afhankelijkheden bleken in de praktijk noodzakelijk als aanzetten tot leerprocessen, waarbij nieuwe modellen en perspectieven in het sectorbeleiddebat werden opgenomen. Dit werd mogelijk gemaakt door het uiteenvallen van de machtige industrieel-politieke "ijzeren driehoek" die de beleidsvorming in de sector in de jaren 70 en 80 beheerste. De re-configuratie van actoren, vervolgens, werd in belangrijke mate gestuurd door externe factoren zoals Scandinavische- Europese-, en wereldwijde markt- en beleidsontwikkelingen.

In een meer gedetailleerde empirische analyse van de ontwikkeling van nucleair- en klimaatbeleid in Zweden, wordt het al of niet tot stand komen van leerprocessen onderzocht en gerelateerd aan institutionele regels (zoals waar, hoe en door wie besluiten worden voorbereid en genomen) en aan beleidsevaluatiestudies (in welke soorten van duurzaamheidgerelateerde kennis wordt voorzien, voor welk doel en in welke vorm). Leerprocessen blijken met name te zijn opgetreden bij onderwerpen die niet zeer omstreden waren of een sterk politiek karakter hadden, met gematigde niveaus van belangenconflicten en met een internationale druk op de agendavorming; voorts bleek het belangrijk dat initiatief en leiding lagen bij de "mainstream" uit de sector; dit gaf geloofwaardigheid en vertrouwen aan het proces en die leidde tot een focus op het ontwikkelen van afspraken over gemeenschappelijke problemen en het expliciet maken van conflicterende doelen en beleidsdilemma's.

De dissertatie gaat ook nader in op de veelgenoemde mismatch tussen evaluaties en besluitvorming die als belangrijke belemmerende factor wordt gezien voor effectief gebruik van evaluatiestudies. Gebruikmakend van lessen die getrokken zijn uit beleidswetenschappen, beleidsanalyse en risicomanagement, wordt betoogd dat evaluaties veleer een adaptieve beleidsprocesondersteunende rol zouden moeten vervullen, in plaats van volgens een gereguleerde procedure voorgeschreven input. Dit betekent onder andere dat een karakterisering van en afstemming op de besluitvormingscontext noodzakelijk zijn bij het ontwerpen van de studie, dat niet-kwantificeerbare data meegenomen moeten worden, en dat aandacht gegeven moet worden aan alternatieven en criteria en aan het expliciet maken van de behandeling van waarden. De keuze van gegevens en evaluatiemethoden zou moeten afhangen van de prioriteiten van de beoogde gebruikers.

Tenslotte is een toegepaste beleidsanalytische vingeroefening uitgevoerd om te illustreren hoe factoren, waarvan vermoed wordt dat ze bijdragen aan leren, hun plek kunnen krijgen in echte applicaties van bestaande evaluatiemethoden. De op deze vingeroefening gebaseerde suggestie is dat methoden elkaar eerder aanvullen dan met elkaar wedijveren, dat de nauwkeurigheid wordt vergroot door van levenscyclus analyse meer naar risico-evaluatie te gaan en dat kwalitatieve methoden een zeer belangrijke rol spelen. Bovendien wordt betoogd dat, wanneer het gaat om beleidsgericht leren, conventionele analytische technieken het niet noodzakelijk slechter doen dan specifiek op interactief leren gerichte benaderingen. Conventionele technieken gaan niet goed samen met actorenparticipatie, maar hun resultaten kunnen een sterkere impuls voor discussie geven. De oefening bevestigt dat kennis van de besluitvormende context noodzakelijk is als een integraal onderdeel van de evaluatie.

Het vergroten van het potentieel voor integratie van het milieubelang in beleids-

vorming vereist het opbouwen van milieukennis binnen de sectoren, het duidelijk verankeren van het probleemeigenaarschap in de sectoren, het strategisch selecteren van procesleiders, het vergroten van overheidscapaciteit en het instellen van bonussen voor leren, het bevorderen van de ontwikkeling van gedeelde probleem percepties en het delen van dilemma's en het institutionaliseren van het gebruik van zowel ex ante als ex post evaluaties op hoge overheidsniveaus. Evaluaties kunnen leerprocessen ondersteunen als ze geïnstitutionaliseerd worden en beter verbonden met beleidsvormingsprocessen en als er gebruik wordt gemaakt van uiteenlopende analyses met meerdere perspectieven en uitgesproken conflicterende doelen. Geïntegreerde duurzaamheidsevaluaties, in tegenstelling tot meer gefocuste milieuevaluaties, zijn daarvoor noodzakelijk.

About the author

Måns Nilsson is a Research Fellow with the Stockholm Environment Institute (SEI), a policy research institute specialising in environmental and sustainable development issues. He currently leads SEI's research programme on Policy and Institutions. He holds a MSc in International Business Administration and Economics from the University of Lund (1990–1994). Prior to joining SEI, he worked with the United Nations Development Programme and Vattenfall Energisystem. The research for this PhD thesis was undertaken at SEI between 2001 and 2005, under the auspices of the Policy Analysis Section of the Faculty of Technology, Policy and Management at Delft University of Technology.