The Role of Non-Utility Investors in Offshore Wind Farms

A framework to analyse interactions between project governance, investor characteristics, and policy instruments

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Glossary

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Executive Summary

Introduction

In 2007 Europe formulated ambitious goals in terms of a growing share of renewable energy sources for the horizon of 2020 and onwards. For offshore wind, policy makers in Europe introduced various policy instruments to promote investments. As a result, an increase in total installed capacity from just 1,123MW in 2007 up to 8,045MW in 2014 has been realised. Utility companies have historically driven these investments, but the remaining investment requirements of EUR 90 – 120 billion will require other, non-utility investors to enter the sector.

There have been new successful forms of financing offshore wind developments through project finance, with capital at times provided by non-utility investors. Such trends provide the possibilities for new investments. In this research it is advocated that the interactions between the governance of these projects, the characteristics of investors, and the support of policy instruments will be the defining factors in realising the entry of (more) non-utility investors in the offshore wind sector. Therefore, the main research question in this study is:

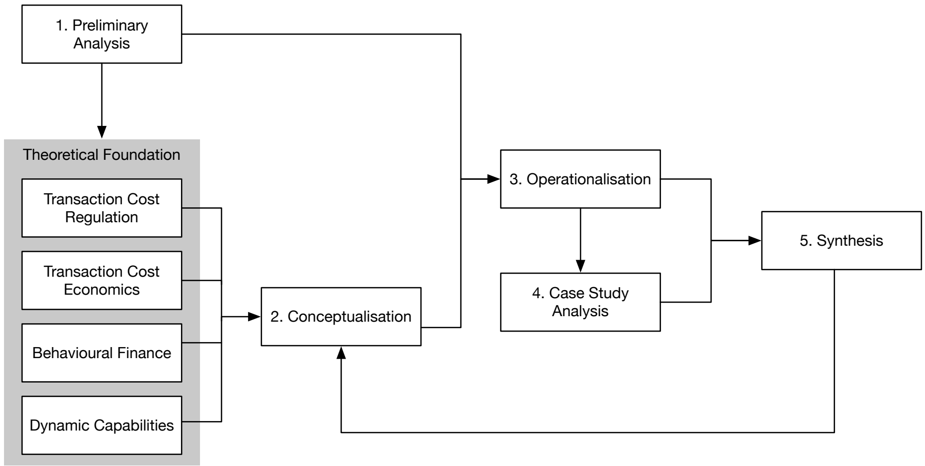
> How can policy makers enhance the role of non-utility investors in offshore wind farms by improving the interactions between project governance, investor characteristics, and policy instruments?

What seems to be missing in existing literature is a perspective of these *combined* elements that seem vital in realising offshore wind farm (OWF) investments. Different scholars have addressed governance in utility sectors or other project-based industries. Similarly, the policy instruments that are aimed at accelerating renewable energy developments and the role of non-utility investors in renewable energy have both been assessed in many studies. However, never before were these elements combined. Taking a classical economic perspective does not seem appropriate to describe their interactions. The assumed rationality of governments capable of steering investment decisions of investors through a removal of externalities and affecting profitability of projects does not satisfy the real-world difficulty observed with governments to implement optimal policy instruments. Likewise, rational investors with perfect information would find no barriers to invest in OWF projects supported by these policy instruments. However, a reluctance of new investors entering the sector is observed. The new institutional economics school seems more fit in explaining the observed issues as it acknowledges the existence of bounded rationality and imperfect information. The added value of combining several theories into a single framework is explored in this research. The resulting framework is applied to answer the research question. Therefore, the scientific goal to conduct this study is:

> To develop and test a framework for describing and analysing the role of non-utility investors in offshore wind farms

Methodology

This research consists of five steps. The figure below provides an overview of their order and how they relate.



In the preliminary analysis, theoretical concepts and several studies that have applied those concepts were reviewed in order to find suitable theories that could be used to answer the main research question. Additionally, during this part of the research, an analysis of 155 investments in Europe's 59 currently installed OWFs is performed to get a better understanding of currently active investors and investment strategies in OWFs.

During the conceptualisation, an application of notions from selected theories is chosen and integrated into a single framework. The theories used are transaction cost economics (TCE), transaction cost regulation (TCR), behavioural finance (BF), and dynamic capabilities (DC).

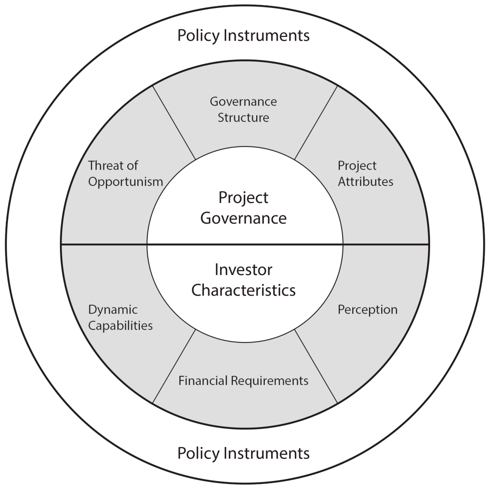
The operationalisation of the theoretical concepts in an extensive analysis of OWF investments in Europe forms the main analytical part of this research. By looking into the concepts of the individual theories, possible interactions between those concepts are explored when the assumptions of a single theory do not satisfy the real-world observations. Besides the results of the preliminary analysis, several sources are used including sector reports, scientific publications, and news articles. Additionally, to support this part of the research, two expert interviews are conducted to deepen the author's understanding of the European OWF market.

Case studies are the source of empirical findings in this study. The case studies are structured to review the possible interactions that are suggested based on the operationalisation of the framework. Three OWFs from different EU countries are selected; these are Belwind (Belgium), Gemini (Netherlands), and Butendiek (Germany). The cases are supported by semi-structured stakeholder interviews with investors from these projects. The comparative case studies are essential in the effort to validate the framework and its interactions.

In the synthesis part, the findings from the operationalisation and the empirical case studies are compared to validate the framework and its interactions. Additionally, the scientific added value of the research and the limitations of the framework are reflected upon.

Conceptual Framework

The developed framework allows for the exploration of interactions between governance challenges in OWFs, the characteristics of different investors, and the effects of policy instruments on these projects. The framework is illustrated below.



Project Governance

The upper half of the framework's inner circle illustrates the project governance of OWFs. Following the concepts of TCE, a project may be seen as a bundle of various transactions between investors and other stakeholders. In line with the theory of TCE, the characteristics of the transactions in OWF projects (project attributes) and the governance structures of those transactions should be aligned. In practical terms, this means that suitable structures to govern the shared investments, electricity offtake, and contracting of engineering, procurement, and construction (EPC) companies and original equipment manufacturing (OEM) companies are needed. As OWF projects are characterized by several uncertainties (from counterparties in transactions and environmental uncertainties that stem from markets, technologies, financing, and regulation) and require very specific assets (large physical investments and specific sites), theory of TCE would prescribe vertical integration (hierarchical governance structures). However, in reality, this integration is not observed. Investments in OWFs involving non-utility investors are governed through equity alliances with other investors, because balance sheet investments are too risky and too large given typical project characteristics (size and costs). Notably, there are several variations possible in terms of division of roles and responsibilities within these equity alliances. Moreover, in the absence of a utility investor, offtake of electricity cannot be vertically integrated. Therefore, the offtake of electricity is often governed through either spot markets or long-term power purchase agreements. The governance of contracts with EPC and OEM companies offers some variations with the possibility of wrapping multiple (sub) contracts into one to reduce interface risk for the investors and shared ownership to create commitment. A high degree of mutual trust is required, as all of these transactions require coordination between several parties. Although the characteristics of OWF projects (project attributes) may in many cases be similar, different governance structures are observed. Following only TCE –assuming the governance structure to be a reflection of just the project's attributes- does not explain this difference. Therefore the joint effect of policy instruments and investor characteristics may offer a more satisfying explanation. This would not be to disprove the relation between transaction attributes and governance structures, but rather expand this view with other elements.

Investor Characteristics

The lower half of the framework's inner circle defines the investors through their characteristics. Non-utility investors can be independent developers, private equities, corporates, local partners, municipalities, oil & gas companies, OEM and EPC companies, and institutional investors. Each investor may have technical and/or managerial experience; technical, financial or relational resource endowment; and different motives to invest in OWFs. The dynamic capabilities that stem from these characteristics define investors' ability to be successful in OWF investments, but none of the investor types shows all of these characteristics. This suggests that partnerships in project governance would be required to complement their capabilities and would explain the large observed role of equity alliances. Moreover, investors have different financial requirements in terms of risk and return. This could affect their willingness to participate in certain (parts of) a project (each characterised by other risks and returns) and determine their moment of investment or divestment within a project. Finally, perception of a policy regime is an important implication of acknowledging the bounded rationality of investors.

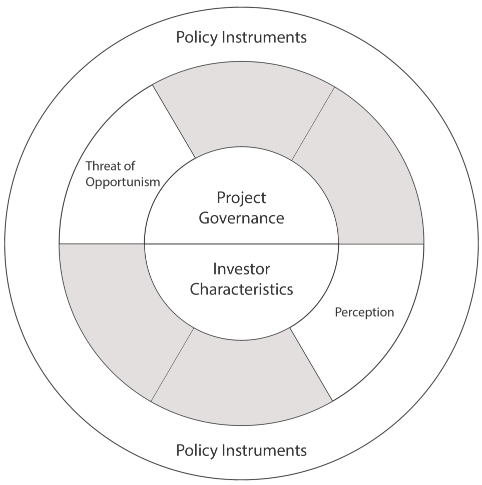
Policy Instruments

The outer ring of the framework illustrates the intended role of policy instruments, bringing together project governance and investor characteristics. Policy makers in Europe apply permitting consent procedures, grid connection policies, up-front and exploitation subsidies to promote OWF investments, but there may be several limitations in how these are designed. Simply creating attractive returns and stimulating certain areas for OWF development (removing the externalities) may not be enough to attract new investors. In fact, a threat of third party and governmental opportunism should be acknowledged as a possible barrier to invest. Retroactive changes in permitting consent procedures (withdrawal of permits) and subsidy regimes (changes in remuneration) are the primary causes of these threats. Moreover, it was found that different policy instruments have trade-off effects on the project's asset specificity and uncertainties (project attributes) of OWFs. This effect was primarily identified in the responsibility of grid connection and in the permitting consent procedure. This suggests that different investors may prefer different policy regimes, which could be explained by their characteristics.

Interactions to Enhance the Role of Non-Utility Investors

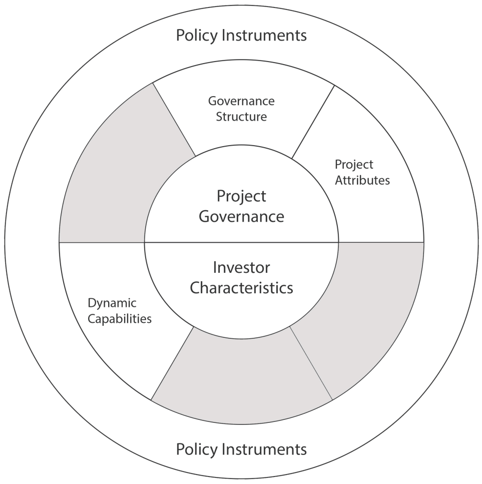
The analysis of the framework's individual concepts suggested that there are interactions between those concepts that could give policy makers an insight in how to enhance the role of non-utility investors in OWFs. To do so, policy makers should consider three interactions that relate policy instruments to project governance and investor characteristics:

Through Threat of Opportunism and Perception



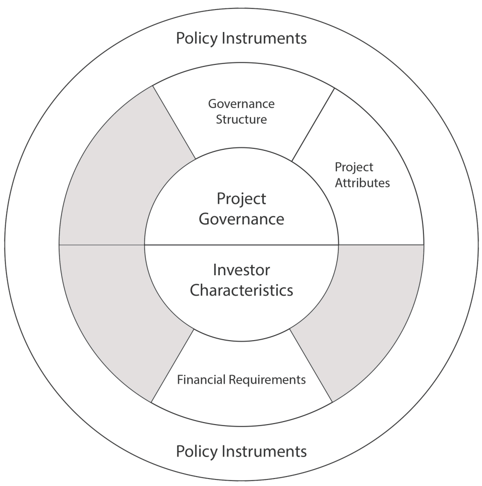
Policy instruments should pose a minimal threat of governmental and/or third party opportunism. As mentioned, retroactive changes in permitting consent procedures and subsidy regimes are the primary causes of these threats. This means that *stability of policy instruments* is preferred to *radiate credible commitment to policy goals*. Contrary, policy instability could form a barrier to investors. Notably, it is not the actual threat of this opportunism that determines the involvement of investors, but rather their perception of such threats. The three cases displayed no major threats of opportunism or damaged perceptions, which contributed to their success. However, illustrated in the Gemini case, an inevitable withdrawal of several Dutch OWF permits somewhat damaged the investors' perception of the policy regime, but the investors remained confident of the government's support of their project. The perception of investors therefore also strongly depends on their earlier experiences with a policy regime.

Through Dynamic Capabilities, Project Attributes and Governance Structure



Policy makers should consider that investors will structure projects in accordance with their combined dynamic capabilities; policy instruments can then be designed to account for this. The combination of several investors in a project seems logical as their individual experience is generally low and resource endowment and motive will likely substantially differ per investor. The governance structures can be optimized to fit investors' complementary experience, resources, and motives. Expertise in dealing with certain aspects of a project (like the construction) can be exploited by involving the right investors in the right part of a project. In other words, the dynamic capabilities of investors should match the role these investors take within the governance structure (e.g. developer, contractor, strategic or financial investor). In all case studies, this reflection of dynamic capabilities was observed in the division of roles and responsibilities within the governance structure. Moreover, experienced, but asset-light developers formed partnerships with investors that had either complementary financial or relational resources. The ability to deal with certain asset specificities or uncertainties (project attributes) would determine investors' preferences for certain policy instruments with trade-off effect on those project attributes. To illustrate, investors capable of managing the grid connection preferred to be independent of a (semi-)public party to manage the grid connection. Therefore, to avoid the unintended negative effects of policy support, policy makers could either design policy instruments to *target the needs of specific investors* (e.g. consider their expertise) or consider *flexible policy instruments* wherein investors can choose the level of governmental involvement (tailored for specific project needs).

Through Financial Requirements, Project Attributes and Governance Structure



Policy makers must consider the differences in financial requirements of investors, because policy instruments (in particular subsidies) are essential in ensuring that OWF projects receive the necessary return to be competitive with other energy investments. However, as observed in all cases, investors that are uncomfortable with specific risks (associated with uncertainties in project phases) can be safeguarded from these by project governance solutions (e.g. EPC wraps that shield them from construction risks) and equity alliance structures that allow changes in ownership. That way, investors that have certain risk or return goals or investors that are bound to an investment horizon (to free up capital) can enter or exit a project to match these requirements. This indicates that the investors can find many solutions to meet their financial requirements on their own through mutual agreements. Policy instruments are then not required to align risks and returns of each project phase with investors' financial requirements, but only have to ensure that OWF projects are competitive over their entire lifecycle.

Recommendations

The last two interactions showed that the *alignment of project governance and investor characteristics* is critical to successfully involve (more) non-utility investors in OWFs. Unfortunately, the *effects of policy instruments on this alignment are limited*. However, as concluded from the case studies, investors are capable of forming governance structures to match their characteristics, provided that policy makers create the right regulatory framework. Therefore, as already discussed through the observed interactions, policy makers are recommended to *strife for overall stability of policy regime, consider to target the needs of specific investors or apply flexibility in certain instruments,* and *provide attractive remuneration for projects over their entire lifecycle*.

Investors within OWF project are recommended to *find governance structures fit for their combined characteristics*. Successful projects are built upon strong consortia; therefore investors should actively seek the right partnerships. Given the size and complexity of OWF projects, non-utility investors require partnerships based on dynamic capabilities that are complementary. Moreover, Investors are recommended to consider the financial requirements of themselves and others within a consortium when arranging the project's governance structure.

Scientific Added Value

This research has contributed to existing literature with an integrated perspective of the elements that determine the involvement of non-utility investors in OWFs and by making a strong case for the added value of combining theories (*theoretical pluralism*). The combination of several theories to analyse project governance, investor characteristics, and policy instruments resulted in a more complete view of these elements. Moreover, the interactions *between* these elements were only found once we detached from single theories' assumptions and look into combinations of concepts that transcend a single theory. Combining TCR with behavioural finance teaches us that it is not the actual threat of this opportunism that determines the involvement of investors. Rather, the *perception of a threat of opportunism is more important than the actual threat*. Following the discriminating alignment hypothesis from TCE, a governance structure is a consequence of the transaction attributes, while it seems that *governance is also a reflection of investor characteristics*. Similarly, theory on dynamic capabilities assumes that only the competitive advantages of a single firm determine its success, while in fact there is *interdependency in strategic alliances* between investors with *complementary capabilities.*

Beyond the practical implications of this research, it has thus been shown that theoretical pluralism is a valuable application in similar issues. Future research could apply the framework in other contexts wherein project governance, investor characteristics, and (a large role for) policy instruments are important to see if similar interactions are observed. Primarily, other large-scale (renewable) energy projects like concentrated solar power (CSP), solar-PV, and onshore wind may be reviewed based on the same concepts. In general, other project-based industries with a large role for government intervention (e.g. real estate, infrastructure, or other utilities) could show interactions similar to those suggested in the framework.

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PART I: INTRODUCTION

1. Research Problem

1.1 Context

Ever since the signing of the Kyoto-protocol in 1997, policy makers worldwide have officially acknowledged the need for reduced greenhouse gas emissions and since then have implemented more and more (inter)national policies in promotion of renewable energy sources. Within the European Union (EU), this has translated into an internationally harmonised emission trade regime and different national policies in favour of promoting and making more economically viable of renewable technologies. In 2007 Europe formulated ambitious goals in terms of a growing share of renewable energy sources for the horizon of 2020 and onwards. For offshore wind, policy makers in Europe introduced various policy instruments to promote investments.

As a result, activities in the offshore wind sector took off from then. In Europe an increase in total installed capacity from just 1,123MW in 2007 up to 8,045MW in 2014 has been realised (EWEA, 2015). Historically, utilities have been the traditional investor in large energy projects like offshore wind farms. Technological advances and economies of scale have resulted in larger wind turbine capacity and larger overall wind farm sizes. Moreover, a growing scarcity of available sites; environmental laws; and the search for higher and more constant wind speeds drives the increased average distance from shore. So although the average cost per MW is now at +/- EUR 3,5 million, costs per project have in fact increased. To illustrate, four out of nine offshore wind projects that reached the final investment decision stage in 2014 were budgeted for over one billion Euro (EWEA, 2015). To meet the 2020 targets the required share of offshore wind is estimated at 40 GW and based on several studies this amounts to additional investments of EUR 90 – 120 billion (BCG, 2013; EWEA, 2013; PWC, 2010).

However, legal unbundling of (parts of) the energy value chain; the integration of energy markets towards a single market; and the downwards effect on prices of the growing share of renewable energy sources and the aftermath of the economic crisis of 2008 have changed the European energy sector. These changes in the energy sector have caused the need for changes in the classical utilities' business model as they have been increasingly faced with a more competitive environment in various parts of the energy value chain. Consequently, an increased focus on credit rating has made balance sheet investments and corporate funding more difficult to realize large offshore wind farms (OWFs) by these traditional investors (Green Giraffe, 2013). This means that the traditional investors in OWFs, utility companies, will not be able to fund the future OWFs needed to meet policy goals and new investors are needed.

1.2 Problem Statement

Offshore wind is expected to play an important role in the transition towards a significant share of renewable energy sources (RES) in the future energy mix of Europe. As mentioned in the introduction, the estimated required funding in offshore wind in Europe for meeting 2020 targets is somewhere between €90 – €120 billion (BCG, 2013; EWEA, 2013; PWC, 2010). However, several factors limit the possibilities for traditional investors (utility companies) to provide this funding. With the large investment requirements in all of Europe and a limited availability of funds with utility investors, an important role is expected for non-utility investors.

The situation in the Netherlands exemplifies the need for additional funding: Within the Netherlands, currently installed capacity is still at only 247MW of the required 4GW to meet 2020 targets (EWEA, 2015). The political aim in the Netherlands is to have an annual 700MW tendered over the next 5 years (Eneco, 2015). Assuming an average cost per MWh of EUR 3,5 million (based on average recent project costs), the Dutch offshore wind market alone will need almost EUR 2,5 billion of investments annually for the coming 5 years. As illustrated in the previous section, such projects will require the involvement of non-utility investors.

There have been new successful forms of financing offshore wind developments through project finance, with capital at times provided by non-utility investors. Such trends provide the possibilities for new investments. In this research it will be advocated that the interactions between the governance of these projects, the characteristics of investors, and the intervention of policy instruments will be the defining factors in realising the entry of (more) non-utility investors in the offshore wind sector. The problem statement thus reads:

> Realising the entry of (more) non-utility investors in the offshore wind sector requires a more thorough understanding of the interactions between project governance, investor characteristics, and policy instruments

1.2.1 Project Governance

Empirical findings as well as academic research has shown that OWFs can be funded with different project governance structures involving non-utility investors. The energy sector –and therefore offshore wind- can in principle provide long term stable cash flows, which is key in attracting alternative investors like pension funds (PWC, 2010). Elsman (2014) showed that the risk/return profile of institutional investors matches the operational phase profile of OWFs (Elsman, 2014). This suggests that different parts of a project may attract different investors, meaning that the structuring of these projects should support that. Notably, debt financing has become increasingly competitively priced as banks have grown more and more accustomed with project financing of OWFs (EWEA, 2013). Together, the shift in the types of investors involved in OWFs as well as the arrival of non-recourse financing by commercial debt providers constitute a change in project governance. Moreover, the challenge of governing the various contracts involved in OWF projects with shared ownership is critical for the successful completion of projects.

1.2.2 Non-Utility Investors

If the targets set for offshore wind are to be met, policy makers should anticipate the changes in the spectrum of investor types. Mignon & Bergek (2011) argue that the debate of policy instruments in promotion of renewable energy has had insufficient attention to “non-traditional” investors. In reality, reports by BCG (2011), Green Giraffe (2013) and EWEA (2013) show that new classes of investors are increasingly willing to invest in offshore wind (BCG, 2013; EWEA, 2013; Green Giraffe, 2013). Remarkably, in most scientific publications investors are implicitly assumed to be traditional utilities, while renewable investors are in fact a heterogeneous group. The heterogeneity of possible non-utility investors may be expressed in terms of their defining characteristics. Differences in characteristics could in turn affect different responses to policy or preferences for certain project governance structures.

1.2.3 Policy Instruments

The policy instruments applied by policy makers may be unsuitable for attracting non-utility investors to OWFs. The political goals of policy makers throughout Europe to increase the share of offshore wind energy have been translated into different policy instruments. These include different exploitation subsidy schemes, permitting procedures, attribution of grid connection cost and responsibility, and various forms of up-front subsidies. However, governments are under pressure from consumer concerns about high subsidies. Drawing again upon the example of the Netherlands, the Dutch offshore wind subsidy scheme may not have been in favour of attracting new, inexperienced investors as it has been characterised by its complexity in application procedure, which makes application outcomes rather uncertain (PNO Consultants, 2015). Moreover, the Dutch government recently withdrew a series of permits and prematurely closed its subsidy application window for 2014 (Energiebusiness, 2014; NWEA, 2014). Overall, a conflict of interest between (new) investors' wish for decreased uncertainty (private values) and the government's goal of cost-efficient deployment of renewable energy (public values) can be observed.

1.3 Knowledge Gap

Different scholars have addressed governance in utility sectors or other project-based industries. Moreover, because of the widespread acceptance of the importance of a larger share of renewable energy, the policy instruments that are aimed at accelerating renewable energy developments and the role of non-utility investors in renewable energy have been assessed in many studies. However, never before were these concepts integrated.

1.3.1 Utility Sector and Project Governance Studies

The governance of contractual relations in utility sectors has been examined by several scholars. Joskow (1987) found that long-lasting contracts or even vertical integration is the efficient mode of governance in sectors characterised by a high asset specificity (Joskow, 1987). Niesten (2009) examined the regulatory changes in the European electricity value chain and concluded that this has transformed those governance structures (Niesten, 2009).

To realise investments in OWFs in the context of these regulatory changes, project governance may offer a solution. Different scholars have studied the governance in project-based industries, but never before were these aimed at a specific sector (Esty, 2004; Levitt, Henisz, & Settel, 2009; Oxley, 1997; Winch, 1989).

1.3.2 Investor Characteristics Studies

There have been studies on other renewable energy investments that have shown that different investors will have different attitudes and responses to policy instruments (Bergek, Mignon, & Sundberg, 2013; Wüstenhagen & Menichetti, 2012). However, never before were such studies aimed at explaining this relation for OWFs in particular. Darmani et al. (2014) have focused solely on the heterogeneity of the main developers in onshore wind in Sweden (Darmani, Niesten, & Hekkert, 2014). Based on the very large investment requirements and project sizes in offshore wind, the inclusion of all possible investors –including financial investors- seems important.

1.3.3 Offshore Wind Policy Studies

There have been a lot of scientific publications on the functioning of policy instruments and in particular on exploitation subsidy schemes and the various effects on risks and returns in OWFs. A great deal of these studies would entail mainly empirical analyses based on survey results (Abolhosseini & Heshmati, 2014; Butler & Neuhoff, 2008; Couture & Gagnon, 2010; Green & Vasilakos, 2011; Mani & Dhingra, 2013; Prässler & Schaechtele, 2012). Other studies made a quantitative model of supportive policy regimes by looking into the effects on project costs or cash flows. These models did not however capture the effects of policy instruments that do not affect cash flows. Notably, these studies often did not consider differences in the investor types and their characteristics. In the question of how attractive a country's offshore wind investment climate is, these studies did not consider the broad possible range of investors that may be needed to enter the market (Alishahi, Moghaddam, & Sheikh-El-Eslami, 2012; Blanco, 2009; Gross, Blyth, & Heptonstall, 2010). Such studies analysed the investment opportunity assuming the possible investors to be homogenous.

1.3.4 Lack of an Integrated Perspective

What seems to be missing in existing literature is an integrated perspective of these elements that all seem vital in realising OWF investments. Taking a classical economic perspective does not seem appropriate for describing this. The assumed rationality of governments capable of steering investment decisions of (new) investors through a removal of externalities and affecting profitability of projects does not satisfy the real-world reluctance of new investors entering the sector. Likewise, rational investors with perfect information would find no barriers to invest in OWF projects supported by these policy instruments. However, frictions of new investors entering the sector are observed. The new institutional economics school seems more fit in explaining the observed issues. Therefore, notions from transaction cost economics (TCE), transaction cost regulation (TCR) behavioural finance (BF), and dynamic capabilities (DC) are combined. A detailed motivation for the selection of these specific theories is given in chapter 2. This section will give a brief introduction to the theories.

The central notion in TCE, the discriminating alignment hypothesis, assumes that governance structures will adapt to the transaction attributes (Williamson, 1985, 1996, 1998). TCE can be used to describe adaption of governance structures to changes in the external environment (Rindfleisch & Heide, 1997). Policy instruments in promotion of OWF developments could be seen as an effort to facilitate this adaption. Within the electricity sector, the possibilities for different governance structures are significantly limited by legal unbundling of electricity value chain and the capital constraints of investors.

TCR describes investments in the traditional utilities business model (Levy & Spiller, 1994; Spiller, 2013). Looking into private-public interactions, TCR provides an interesting focus on governmental and third party opportunism that may explain reluctance to invest in OWFs. However, this theoretical framework does not consider the unique characteristics of OWFs or the institutional context of the unbundled electricity value chain within Europe.

Behavioural finance explains the effects of bounded rationality and information asymmetry in an investor's perspective and also considers traditional aspects of finance. Given their bounded rationality and imperfect information, investors ultimately review investments on the expected return, risks, and possible portfolio effects. It may therefore be a complementary way to include investor heterogeneity and cognitive factors in the investment decisions by non-utility investors.

Theory on dynamic capabilities may also be used to address the existence of investor heterogeneity. DC describes investors' unique characteristics that allow them to be successful in markets that undergo constant changes.

1.4 Research Goals

Integrating different theoretical notions should provide a useful framework to describe and analyse the relations between project governance, investor characteristics, and policy instruments in OWFs. The added value of combining different theories is explored in this research. Therefore, the scientific goal to conduct this study is:

> To develop and test a framework for describing and analysing the role of non-utility investors in offshore wind farms

Additionally, this study aims to provide policy makers with an insight in the role of policy instruments in stimulating more investments in the offshore wind sector -particularly within Europe. As the required role for non-utility investors is significant, this study aims to better understand the effects of policy instruments in investment decisions of non-utility investors in offshore wind. This second goal is thus defined as:

To better understand the adequacy of offshore wind policy instruments in supporting investments of non-utility investors in offshore wind farms

1.5 Research Questions

The research will be conducted by answering a series of research questions to provide structure and ensure that the research goals are covered. The main research question is:

How can policy makers enhance the role of non-utility investors in offshore wind farms by improving the interactions between project governance, investor characteristics, and policy instruments?

The main research question can be further divided into sub-questions. Each sub-question will be answered in a different chapter of this report.

The first question concerns the exploration of literature and suitable theoretical concepts to describe the interaction between project governance, policy instruments, and characteristics of different non-utility investors in OWFs in an integrated framework.

SQ 1. *Which theoretical concepts can explain the role of non-utility investors in offshore wind farms?*

The next questions concern the operationalisation of the conceptual framework to analyse governance challenges in OWF investments, the effects of policy instruments and the differences between non-utility investors. By looking into these three elements in-depth, possible interactions between them can be found.

SQ 2. *What are project governance challenges in offshore wind farms?*

SQ 3. *How may policy instruments affect offshore wind farms and investors?*

SQ 4. *Which investor characteristics determine the (successful) involvement in offshore wind farms?*

Next, the framework is empirically applied to analyse the investments of non-utility investors in three case studies and see if we observe the same interactions.

SQ 5. *How have non-utility investors been involved in existing offshore wind farms?*

1.6 Scope of the Research

1.6.1 Geographical Focus on Europe

The focus of this research will be on OWF projects and active OWF investors in Europe. The European offshore wind sector is the most mature one worldwide. Therefore, the broadest range of (non-utility) investor classes is active in Europe and countries apply active supportive policy regimes. Although environmental and regulatory conditions are comparable among EU countries, the applied policy instruments differ in multiple ways. The North-European countries, in particular, are faced with (to a considerable extent) similar environmental conditions (e.g. wind speeds, water depths, seabed) on offshore wind sites. The availability of supply chain is also similar across countries, so the policy regimes applied by countries are the main differences that affect the investment opportunity. Moreover, the need to develop more OWFs is acknowledged by policy makers within Europe, which is translated in targets for 2020, 2030, and onwards.

1.6.2 Focus on Equity Investors

OWF funds may come from either investors (equity) or lenders (debt). This research focuses on the investors as these are exposed to higher risks and much more responsibilities in OWF projects. Moreover, lender characteristics are typically more uniform as the stability of cashflows is their primary concern.

Equity investors are the active investors in an OWF. The return on their equity, being the effective profit of the project, is only received after the lenders have been paid their debt service. This means that as an owner of the project, an equity sponsor bears the highest risk but also receives the largest share of a project's profit if it's successful (Yescombe, 2014). Investors may be strategic and/or financial. Strategic investors are responsible for the management and successful completion of a project as they bring in their expertise and experience in managing the technical and institutional challenges of developing an OWF. In OWFs, the responsible party for the development is often called the project's sponsor, or the equity sponsor. Project management theory acknowledges the need for a single point of responsibility and accountability for the successful completion of an OWF project (Nicholas & Steyn, 2012). A financial investor is exposed to the same risks and will enjoy the same return as the strategic investor, but such party is seldom actively involved, responsible, or accountable for carrying the project to a success.

Lenders play an important role in financing OWFs, but are not exposed to the same risks as investors. The security of receiving the principal payment and interest is determined by looking at the Debt Service Coverage Ratio (DSCR). The DSCR is the ratio between the cash flow generated by production and the money needed for debt service (the principal payment plus interest). Depending on the project risks, the lender determines the required DSCR. If the project performs below this ratio, the lender is granted the privilege to set aside the money that was otherwise distributable among the equity sponsors (ING, 2013). This allows for the lenders to have a greater certainty of their guaranteed repayment of the debt.

1.6.3 Focus on Policy Instruments with a Direct Effect

Policy goals of an increased share of offshore wind energy can be translated into different policy instruments to support and promote the offshore wind sector. Policy instruments may be either direct or indirect. Policy instruments with a direct effect on a project level that affect the development, construction or operations of a specific project by intervening in activities required to realize the OWF or by changing the costs and revenues of that specific project. Policy instruments with an indirect effect would typically be aimed at supporting R&D in technologies, support by helping the supply chain (equipment manufacturers, ports), or promotion of technologies or renewable energy use by consumers through fiscal or financial incentives (Polzin, Migendt, Täube, & von Flotow, 2015).

For the scope of this analysis, the focus will be on the first type of policy instruments that have a direct effect at the project level. The second type of policy instruments will reduce the costs of offshore wind over time and may stimulate investment indirectly, but such effects are more difficult to measure. Moreover, the cost reduction of offshore wind through technological innovations and supply chain improvements is highly dependent on the capacity that is being deployed: A steady project pipeline with many new projects being commissioned over the coming 5 years may result in up to 7% cost reductions (Henderson, 2015). Therefore, there is a need for policy instruments that directly stimulate investments by affecting the business case of OWFs (Mills-Davies, 2015; Wilkes, 2015). Developers, investors and financiers agree: "policies must affect cashflow if businesses are expected to respond". Policy that is based only on political aims puts too much uncertainty in the business case for renewable technologies. "Investors […] will [then] demand high or venture capital level returns" (Hamilton, Gardiner, Greenwood, Hampton, & Hobson, 2009).

1.7 Methodology

This research consists of five parts, being a preliminary analysis, the conceptualisation, operationalisation, case study analysis, and the synthesis. Each part is supported by different research methods. Figure 1 provides an overview.

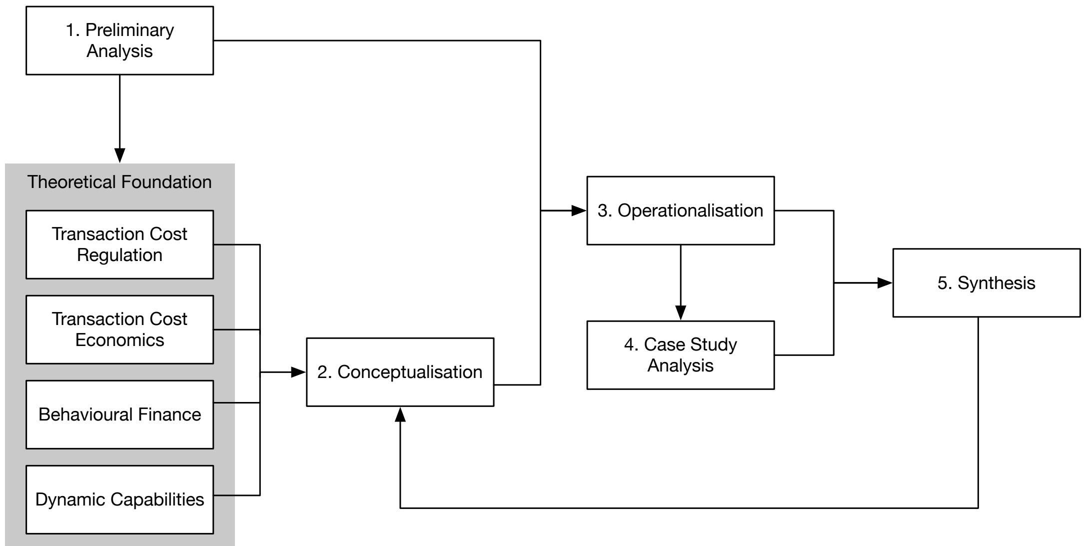

Figure 1: Methodology

In the preliminary analysis, theoretical concepts and several studies that have applied those concepts were reviewed in order to find suitable theories that could be used to answer the main research question. Additionally, during this part of the research, an analysis of 155 investments in Europe's 59 currently installed OWFs is performed to get a better understanding of currently active investors and investment strategies in OWFs. Appendix A provides an overview of this analysis.

During the conceptualisation, an application of concepts from different theories is chosen that could be used to answer the main research question. The theories used are transaction cost economics (TCE), transaction cost regulation (TCR), behavioural finance (BF), and dynamic capabilities (DC). The concepts are integrated into a single framework. Desk research and a large literature review support this phase.

The operationalisation of the theoretical concepts in an extensive analysis of OWF investments in Europe forms the main analytical part of this research. By looking into the concepts of the individual theories, possible interactions between those concepts are explored when the assumptions of a single theory do not satisfy the real-world observations. Besides the results of the preliminary analysis, several sources are used including sector reports, scientific publications, and news articles. Additionally, to support this part of the research, two expert interviews[1] are conducted to deepen the author's understanding. These interviews are found in appendices B and C. Both experts have substantial sector experience providing valuable insights on expectations of future developments within the sector. Moreover, the selection of comparative case studies, in particular the choice in the

[1] Expert interviews:
Leon Pulles – Senior Investment Advisor at RoyalHaskoningDHV
Niels Jongste – Director and Founder at Green Giraffe

OWF's countries, is discussed with these experts. Additionally, multiple interviews and informal conversations have been conducted with ING Bank's Structured Finance Utilities, Power & Renewables team to get a better understanding of the European OWF market.

Case studies are the source of empirical findings in this study. The case studies are structured to review the possible interactions that are suggested based on the operationalisation of the framework. Three OWFs from different EU countries are selected; these are Belwind (Belgium), Gemini (Netherlands), and Butendiek (Germany). The choice of these cases is further motivated in chapter 6. The case studies are supported by semi-structured stakeholder interviews with investors from these projects[2]. The comparative case studies are essential in the effort to validate the conceptual framework.

In the synthesis part, the findings from the operationalisation and the empirical case studies are compared to validate the framework and its interactions. Additionally, the scientific added value of the research and the limitations of the framework are reflected upon.

1.8 Relevance

Scientific relevance is found in the combined application of different theories to analyse project governance, investor characteristics, policy instruments and their interactions in the offshore wind sector. Besides an analysis of the different investors and policy instruments applied in the offshore wind sector in Europe, this research will thus aim to provide a framework that can be used to evaluate the role of policy instruments in investment decisions in OWFs from different countries and provide a guiding framework for policy makers to develop new policy. The emphasis of such a framework is on understanding, rather than prediction (Jabareen, 2009). The research aims to explore the possible relations between governance, policy, and investors. Moreover, taking the perspective of the stakeholders within a project structure in evaluating and analysing policies contributes to the field of policy analysis that plays a central role at the faculty of System Engineering, Policy Analysis and Management at the TU Delft.

Additionally, the research is aimed at contributing to a better understanding of the effects of policy instruments on offshore wind investments by non-utility investors in Europe. Increased investments in offshore wind will contribute to national governments' targets and thereby forms the societal relevance of this research.

Beyond the scientific and societal relevance, this research also has a particular relevance for ING Bank, where the research is conducted as part of a 6-month graduation internship. ING Bank's Structured Finance Utilities, Power & Renewables (SFUPR) team participates in OWF project finance throughout Europe with experience in many large offshore wind projects. This research will contribute to a deeper understanding of the various policy instruments in EU countries and their direct and indirect implications for the feasibility of new project structuring and project finance.

[2] Comparative case studies and investor interviews:

Belwind (BE)
- Ralf Bauer – Development Manager Finance at Parkwind N.V.
- Willem Smelik – Director at Meewind

Gemini (NL)
- Bernard van Hemert – Technical Manager at Typhoon Offshore
- Wouter Dirks – Offshore Wind Project Manager at Van Oord

Butendiek (DE)
- Jacob Lynsgaard – Senior Investment Manager at PKA AIG
- Pedro Azevedo – Investment Manager at Siemens Financial Services

1.9 Report Structure

Figure 2 provides an overview of the structure of this report and represents the different parts of the research, corresponding with sub-questions addressed. In the next chapter, the conceptualisation of notions from the applied theories is described. Thereby, an answer is given to sub question one. Next, chapters three, four, and five represent the operational phase of the research, answering the next three sub questions. The elements from the framework are also studied in an empirical analysis of three case studies in chapter 6, giving an answer to sub question five. In the seventh chapter, the findings from the operationalisation, and case study analysis are compared to reflect on the interactions and answer the main research question. Chapter nine presents the conclusions and recommendations. Chapter ten reflects on the research.

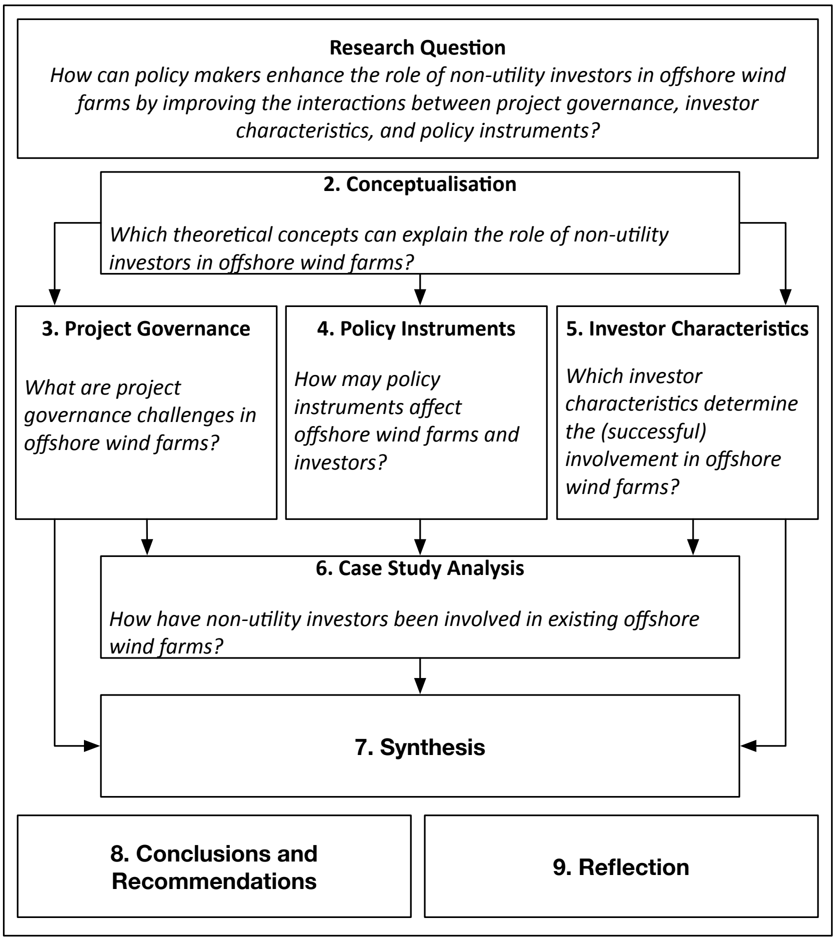

Figure 2: Report Structure

PART II: CONCEPTUALISATION

2. Towards an Integrated Theoretical Framework

The research applies transaction cost economics (TCE), transaction cost regulation (TCR), behavioural finance (BF), and dynamic capabilities (DC). This chapter starts with a motivation as to why these theories are combined in order to answer the main research question. The next parts of this chapter describe the foundation of each of these theories and their applicability to study the interactions between project governance, investor characteristics, and policy instruments in OWFs. This is a first effort in identifying those interactions. This chapter thereby answers the following research question:

> Which theoretical concepts can explain the role of non-utility investors in offshore wind farms?

2.1 Motivation for Combining Theories

This section motivates the combination of theories into a single framework. The motivations for combining the theories are the purpose of the framework (as stated in the problem statement), the theories' shared underlying assumptions, and the limitations of theoretical monism.

2.1.1 Purpose of the Framework

The framework aims to illustrate how project governance, investor characteristics, and policy instruments may constitute and interact in OWFs. The framework is a means to explore how these three central elements from the problem statement affect each other.

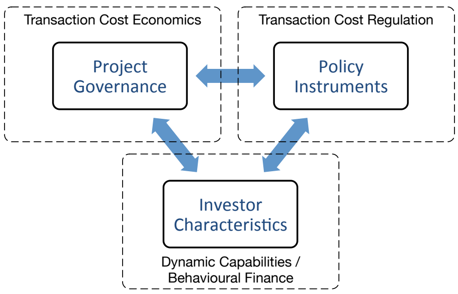

Figure 3: Framework purpose and theories

The applied theories touch upon interesting concepts that seem important in determining the role of non-utility investors in OWFs, but have their limitations in covering all aspects from the problem statement (figure 3). The purpose of this research is to understand the interactions between all of these aspects.

2.1.2 Shared Underlying Assumptions

The applied theories share a similar set of assumptions that form the basis for their compatibility. These similar underlying assumptions originate from the theories' shared foundation in the field of (new) institutional economics. Institutional economics –as an addition to traditional (neo)classical economics- aims to explain economic phenomena by looking at social and legal norms (institutions) in a world of *bounded rationality* and *information asymmetry*.

Williamson identified four layers of economizing challenges that determine the outcome of economic activity. Changes in one of the layers are likely to have its effects on other layers within the model. The layers differ, however, in level of abstraction and typical frequency at which change occurs (both increasing from the lower levels towards the upper layer) (Künneke, 2007; Williamson, 1998). The theories applied in the proposed integrated framework affect different layers within this model (figure 4). TCE looks into governance issues between private actors, but thereby does not have a direct implication for the institutional arrangements. TCE acknowledges the bounded rationality and opportunism of actors and that the importance of that starting point lies in the fact that 'all complex contracts are unavoidably incomplete' (Williamson, 1998). As an extension of this view, Spiller developed the theory of transaction cost regulation (TCR). TCR specifically targets the governance issues in public-private interactions and introduces the presence of bounded rationality and imperfect information of policy makers. DC and BF discuss the characteristics of individual actors and therefore apply to the fourth layer. DC incorporates information asymmetry by acknowledging the importance of information as a strategic resource. BF revolves around actors' bounded rationale in investment decisions and when assessing risks and returns.

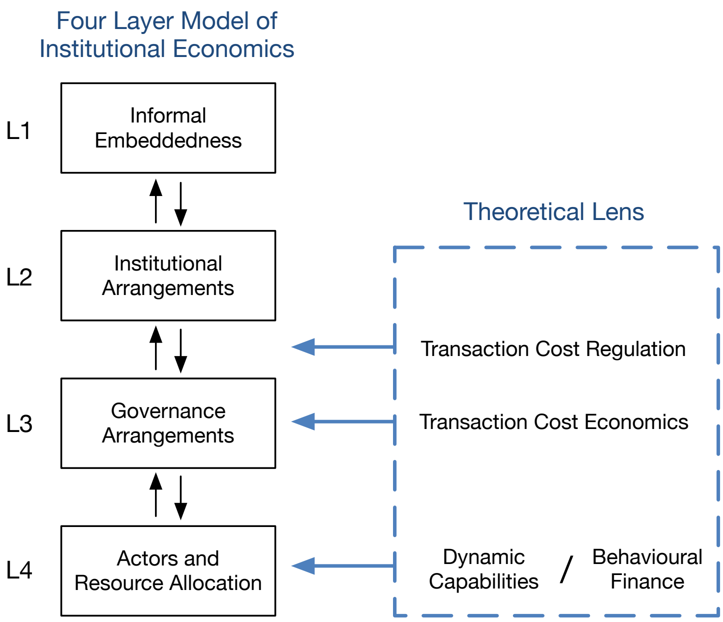

Figure 4: Theory Positions in 4-layer Model (Adapted from: Williamson, 1998)

2.1.3 Limitations of Theoretical Monism

Groenewegen and Vromen (1996) explain that theoretical *monism* is the doctrine that there exists one and only one true theory for any set of phenomena. Looking at earlier studies into OWF investments, it becomes apparent that such one-sided approach does not capture the complexity of aspects that determine whether or not (non-utility) investors decide to invest in OWFs. Groenewegen and Vromen (1996) propose that theoretical *pluralism* can be an interesting solution to problems where a single theory has limitations to grasp all elements that determine a phenomenon. This section will illustrate how all theories have their limitations to cover all aspects that determine the role of non-utility investors in OWFs. Moreover, they seem to be complementary in the elements that they do cover. The limitations in each of the suggested theories are described below.

TCE and TCR do not consider the heterogeneity of non-utility investors that may be active in OWF projects. The discriminating alignment hypothesis leaves out the notion of investor types and assumes homogenous investors that will economize on their transaction costs through alignment of attributes and governance structures. Following merely TCE, a governance structure is thereby independent of investor characteristics. In reality, a broad and diverse group of investors are active in

OWFs and their characteristics are expected to be a in important determinant of how they deal with OWF governance challenges and how they respond to policy. Similarly, TCR is based on research in the traditional utilities' business model that seems incapable of accounting for the diversity of active investors in Europe's power market.

BF and DC assume passive investment opportunities. These theories assume investors seeking investment opportunities, but in fact there are also opportunities seeking investors as a result of political goals and active government policy intervention. Moreover, the characteristics of OWF projects in terms of size, complexity, and costs require the involvement and governance of several investors per project. The concepts of partnerships, alliances, and consortia are not covered in either behavioural finance or dynamic capabilities, while TCE does look into this.

2.2 Transaction Cost Economics

TCE sees the firm as a governance structure rather than a production function, by taking the transaction as the unit of analysis (Williamson, 1998). Firms aim to minimize the costs of a transaction, by creating a governance structure that corresponds with the specific characteristics of a transaction. To put this in more practical terms, firms decide whether they want to 'make or buy' a good or service. The nature of the contracts around a transaction will thereby determine the governance, or -to reflect back at Coase's *The Nature of the Firm* (1937)- the size and organisation of a firm. Nowadays, TCE is also used to study the integration of value chains, transfer pricing, corporate finance, marketing, the organisation of work, long-term commercial contracting, franchising, regulation, multinationals and other contractual relations including large projects and the dynamics of the utilities sector. There is a growing body of empirical research in TCE that confirms the assumptions from the theory (Shelanski & Klein, 1995). Section 2.2.4 will go into more detail on the applicability of the theory is the context of OWF projects and the electricity sector.

2.2.1 The Discriminating Alignment Hypothesis

According to the discriminating alignment hypothesis, characteristics of a transaction (transaction attributes) are reflected in the governance structure of that transaction. TCE acknowledges the bounded rationality and opportunism of actors and that the importance of that starting point lies in the fact that 'all complex contracts are unavoidably incomplete' (Williamson, 1998). To economize on the transaction costs, the nature of the transaction should be aligned with the governance structure applied. This is reached by following the key proposition in Williamson's theory: the discriminating alignment hypothesis. The hypothesis states that the degree of asset specificity, uncertainty and frequency associated with a transaction are reflected in the governance structure applied. Figure 5 illustrates this relation between the transaction, its attributes and the governance structure that results from this, expressed as taking form somewhere on the spectrum between a market and a hierarchy.

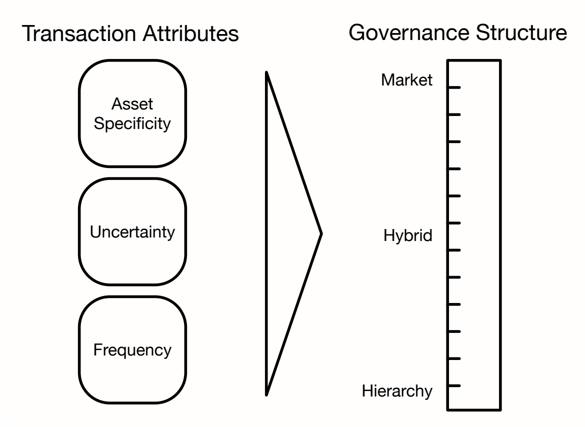

Figure 5: Discriminating Alignment Hypothesis

2.2.2 Transaction Attributes

To participate in a transaction, a firm may need a certain asset to facilitate either the production or the receipt of the product or service that is being transferred. Williamson calls the degree to which an asset can be redeployed to alternative uses without sacrificing the productive value of the asset the asset specificity. Williamson (1985, p. 55) states with respect to asset specificity in general that it: "[…] refers to durable investments that are undertaken in support of particular transactions, the opportunity cost of which investments is much lower in best alternative uses […]".

When participating in a transaction, a risk of counterparty opportunism exists, which creates uncertainty. This risk of opportunism is called "behavioural uncertainty". Uncertainty may also come from other disturbances or changes in the conditions of the transaction. This type of uncertainty often finds its origin in a lack of communication. Asset specificity is often the most challenged characteristic in empirical studies of TCE, but uncertainty is equally important in determining the need for (bilateral) contractual agreements. Williamson (2005) states: " […] bilateral dependency by itself would not pose a problem but for disturbances that induce maladaptation between the parties to an incomplete contract. Indeed, the problem of contracting under fully stationary conditions is uninteresting, […] only when the need to make unprogrammed adaptations is introduced does the market versus internal organization issue become engaging. […] Uncertainty is the source of disturbances to which adaptation is required".

The third characteristic of a transaction that steers the governance of that transaction is the frequency at which the transaction occurs. This may range from a single occasion to a recurring transfer of product or service. This frequency of the transaction is relevant in two respects, namely reputation effects and setup costs (Williamson, 2005). Reputation effects increase as frequency increases, while the net effects of setup costs diminish under a higher frequency. The cost of specialized governance structures or investments in specific assets will be easier to recover from if transaction are recurring (Williamson, 1985).

To understand the governance of various contracts in OWFs, the degree of asset specificity, uncertainty and frequency in these projects may be studied. A high degree of either of these attributes may explain a challenging governance task for the involvement of non-utility investors in OWF projects.

2.2.3 Governance Structures

The different modes of governance that follow from the transaction attributes exist on a range between market on the one hand; hierarchy on the other; and hybrids in between (Williamson, 2005). Many varieties may be observed including joint ventures, strategic alliances, networks, and regulation. As "all contracts are unavoidably incomplete" the governance structures are the means by which order is accomplished in a relation with potential conflicting interests (Niesten, 2009). Governance structures can differ with respect to their attributes, being: two forms of adaptation (the market's adaption through price signals to economize on production costs and the coordinated adaption by firms to economize on transaction costs), the incentive intensity, the administrative control, and the contract law regime. Between the two extreme examples of the market and the hierarchy (e.g. a vertically integrated single firm), differences exist in these attributes (Williamson, 1985, 1991, 1998).

The adaptive power that markets display to price signals are not matched by more hybrid and hierarchical structures. Hierarchies, in turn, are better at economizing on transaction costs through coordinated actions. Incentive intensity can be understood as the degree to which efforts of economic actors have effects on their compensation or revenue (Williamson, 1991). This can be easily illustrated by salary of an employee in a firm (hierarchy). There is no direct effect a single employee can have on his/her salary by working harder. If he/she had offered their services on a market, changes in effort would have a bigger impact. Administrative control refers to mechanisms that support the governance. These mechanisms include dispute settlement, monitoring, information disclosure, and auditing and accounting. Administrative controls come with bureaucratic costs and are better exercised in hierarchies (Niesten, 2009; Williamson, 1996). Contract law regimes exist in three types that respectively support the market, hybrid and hierarchy: classical contract law, neoclassical contract law, and forbearance law (Williamson, 1991). Classical contracts are the most complete contracts, and details focus mainly on pricing. Such contracts are standardised, which allows them to be applicable regardless of the counterparty's characteristics (Niesten, 2009). Neoclassical contract law concerns contracts with a greater degree of flexibility and generally longer duration. Such contracts are useful if continuity of the relation is desired. For example if parties have specific assets and there is some interdependence (Williamson, 1991). Within a hierarchy, there is an internal dispute settlement mechanism and contracts are more elastic (capable of adapting to disturbances) and long-term. This implicit contract law of a hierarchy is called forbearance (Niesten, 2009; Williamson, 1996). Table 1 provides an overview of the governance attributes and their performance in the various governance structures.

	Markets	**Hybrids**	**Hierarchies**
Adaptive power to price signals	High	Medium	Low
Adaptive power of coordination	Low	Medium	High
Incentive Intensity	High	Medium	Low
Administrative control	Low	Medium	High
Contract law regime	Classical	Neoclassical	Forbearance

Table 1: Governance structures and attributes

These governance attributes and structures may be used to characterise the contracts and structures observed in OWF project within Europe. This will be applied in chapter 3.

2.2.4 Transaction Cost Economics to Explore Project Governance Challenges

TCE can be used to study the governance challenges in OWF projects and to see how project governance may be a result of a project's characteristics. In the classic field of TCE the focus is on the firm and how it governs its transactions with other firms. These governance options exist along the spectrum between markets and hierarchies; two extremes that both fail to cover the modes of governance in project-based industries (Levitt et al., 2009). Interesting lessons from studies that apply TCE in large projects can be drawn. These studies generally focus construction or infrastructure projects (Esty, 2004; Levitt et al., 2009; Oxley, 1997; Winch, 1989). TCE seems applicable to projects as these are in fact a bundle of various transactions.

Levitt et al. (2009) discuss the need to focus on those hybrid modes of governance wherein relational contracting governed by trust is key. A threat of opportunism is mentioned as an important risk in project-based industries like OWFs. Opportunism can be seen as taking advantage of opportunities or circumstances, often with little regard for consequences and principles. Williamson (1976, p.26) calls it: to pursue “self-interest with a guile”. In the case of infrastructure projects, Levitt et al. (2009) conclude the existence of opportunism in the presence of displaced agency as a governance challenge. Opportunism due to displaced agency results from possible conflicting interests of parties leading decision-making in each of the successive phases of a project. The supplier and buyer in any transaction could opportunistically shift costs and benefits along a series of transactions. In governance structure where a single party holds all lifecycle project costs and benefits this risk is mitigated. Another mitigating option presented by Levitt et al. (2009) is through carefully specified contractual incentives. Their argument, however, is that these solutions only shift the burden of costs to more distant and diffuse actors that lack the capabilities to discourage opportunistic behaviour (Levitt et al., 2009). It may be argued that the design of suitable policy instruments should reduce this threat in OWFs.

Oxley (1997) looks into the challenges of sharing technological knowledge in strategic alliances among firms and the risks of imitation or reproduction of technological knowledge. She concludes that more hierarchical alliances are chosen when such hazards are present. Equity joint ventures are considered to have governance attributes that are closest to those of integrated firms (Oxley, 1997). This is why the science of studying the organisation of the firm is especially applicable in projects that are organised in this way. Winch (1989) challenges the analysis of a project from Williamson’s framework, because the framework is intended for the analysis of firms’ decisions of resource allocation (Winch, 1989). His focus is thereby on the governance between firms within a project coalition, but does not view the project itself as an economic entity that has to make economizing decisions. However, this former view could provide useful insights in more hierarchical organisations of a project, like the equity joint ventures discussed by Oxley (1997).

Whether TCE as a theory of the firm is applied to the investor in a project or as a way to view a project as an entity economizing on its transaction costs with a counterparty, the notions from the framework provide valuable points of focus for the case of OWFs. As will be shown in this research, the transactions that together form these projects are often governed in rather hierarchical structures that include multiple investors. The framework will be used to analyse the alignment between the project’s governance and its attributes (asset specificity, uncertainty, and frequency).

2.3 Transaction Cost Regulation

Building on the work of Williamson and studying the investor-government relation in different utility sectors, Pablo Spiller has developed the theory of transaction cost regulation (TCR). TCR shows that the determinants of regulatory performance are the risks that characterize the investor-government relation (Spiller, 2010, 2013). In TCR the governance structure is thus the regulatory regime and the transaction takes place between the utility investor and the government. This is the subject of research in several works of Spiller, who looks at investment decisions in power generation and (telecom) infrastructure projects by reviewing the interactions between governments and investors using transaction cost economics as a basic guiding principle (Bergara, Henisz, & Spiller, 1997; Levy & Spiller, 1994; Spiller, 2013). The ability of governments to commit to stable and non-opportunistic policy is particularly limited in non-OECD countries and is correlated to the level of (private) investments in the electricity sector (Bergara et al., 1997). The risk of governmental opportunism could therefore be considered dependent on institutional endowment of a country and it’s ability to provide ‘checks and balances’ through a fragmented polity (Spiller, 2013).

Spiller considers regulation a response to governmental opportunism and a way for utility investors to safeguard against it. These regulations will have to stipulate price setting as well as conflict resolution procedures and investment policies. This does not mean that policy instruments mainly aimed at giving investors a high degree of certainty of returns can be considered efficient or even desirable. The efficient pricing of the product supplied by utilities is key due to its three characteristics mentioned before. For governments, it is thus important to find a suitable balance: "[…] regulatory procedures, if credible, must restrain the government from opportunistically expropriating the utilities' sunk investments. This, however, does not mean that the utility has to receive assurances of a rate-of-return nature, or that it has to receive exclusive licenses." (Spiller, 2010, P. 151). Another important notion in Spiller's TCR framework is the risk of third party opportunism. Third party opportunism requires at least some political contestability of policy and fragmentation of powers within a government (Spiller, 2013).

The governance of investments in utilities can be summarized as a consequence of the inherent attributes of the transaction (uncertainty and asset specificity); the risk of opportunism (governmental and third party); and the institutional endowment of a country (fragmented or centralised) (Spiller, 2013). Table 2 illustrates this relationship between the last two: the institutional endowment and risk of opportunism. What follows from this is that the administrative discretion granted to regulators depends on the institutional endowment (Spiller, 2013).

Institutional endowment	**Biggest opportunism risk**	**Administrative discretion granted to policy maker**
Centralised polity	Governmental opportunism	Should be low
Fragmented polity	Third party opportunism	May be higher

Table 2: Institutional endowment and opportunism risks

Regulatory rules that include relatively high power incentives -like price caps, use of competition, and incentive schemes- will require the trust of putting substantial administrative discretion with the policy maker (Spiller, 2013). Therefore, such policy instruments will best work in a country with a fragmented polity where the risk of governmental opportunism is smaller and investors are better safeguarded.

2.3.1 Transaction Cost Regulation to explore the Effects of Policy Instruments

For the offshore wind sector in Europe, it may be studied whether (non-utility) investors trust policy makers with the administrative discretion or if a threat of opportunism could be a barrier to invest. TCR provides an interest view on policy instruments as they may create a threat of third party or governmental opportunism. In other words, the risk of opportunism by counterparties in a transaction may also occur in the public-private interactions. The question of the effects of policy instruments on private investments is particularly of interest in the domain of utilities. Utilities are characterised by three features that create contracting problems on this private-public interaction. First, the technologies often require large, specific, sunk investments. Secondly, utilities enjoy important economies of scale. Finally, the outputs of utilities are consumed by (almost) all of society (Bergara et al., 1997; Spiller, 2010, 2013). This makes utilities a sector prone to political issues, since there are important (potentially conflicting) interests of (private) investors and (public) consumers. Once built, a utilities operator will decide on the operation of its asset only by looking at the operational costs. If these do not exceed the market price, he will continue to operate the asset, not earning back on his investment, as sunk costs are not regarded in this decision. Sunk costs exist when the alternative use of an asset has (almost) no value. To put this differently, once the investment has been made there is no way to earn back those costs (by reselling the asset or deploying it to a different use) other than by using it for its primary use. This leaves room for strategic behaviour of the policy maker -who often determines the market price in case of regulated monopolies or through the exploitation subsidy granted in Europe (see chapter 4)- called governmental opportunism. Within the framework of TCR, policy makers are seen as no different from other economic agents. Policy makers are neither passive or benevolent, but may act opportunistically (Spiller, 2013). Investors should therefore evaluate the investment proposals of such projects on the likelihood that governments will stick with their promises. In the absence of safeguards against governmental opportunism, underinvestment may occur (Spiller, 2010).

2.4 Behavioural Finance

The concepts financial requirements and perception of behavioural finance will be used to describe the differences in investor characteristics in the framework.

Behavioural finance is a growing field of study in which psychological and financial theories are joined. Whereas the traditional finance paradigm tries to understand investment decisions by assuming investors to be rational, behavioural finance extends the analysis of investment decisions by arguing that investors are not always fully rational. Rationality in this context means two things. First, that investors follow Bayes' law –meaning that they update their beliefs correctly based on new information. Second, that investors make decisions that are normatively acceptable. In traditional finance, an investor would therefore consider the risks and returns of a project (assuming these are known to him/her), the investment horizon, and possible portfolio effects based on his/her earlier investments. This notion of rationality is attractive in its simplicity, but unfortunately not confirmed by real-life data (Barberis & Thaler, 2003). Most of the work in behavioural finance is done in the field of individual private investment decisions in financial markets (Lokhorst & Youn, 2006).

Behavioural finance is built upon the work of Kahneman and Tversky (1979), called prospect theory. It was developed as a reaction to the discussion whether expected utility theory was a good model for choice under risk. The expected utility theory is based on the idea of expected value. Taking into account the size of payouts in a gamble and the probabilities of their occurrences, the expected value would determine the value of the gambling decision. Expected utility theory looks at the subjective expected appreciation (utility) of a gamble by taking the utility of each outcome and the probabilities of those occurrences. The acceptance of the distribution of possible outcomes by investors taking this gamble is referred to as their risk aversion or their risk appetite. Prospect theory shows how the preferences of individuals in such gambles will differ based on how these outcomes are presented (framing) or looked at (reference dependent). Deviations from the expected utility are seen in terms of positive and negative deviations from a neutral reference. Kahneman and Tversky (1979) argue that many investors are not so much risk averse, but rather loss averse (Kahneman & Tversky, 1979).

2.4.1 Behavioural Finance to Explore Investor Characteristics

Following the concepts of behavioural finance, investors in OWFs decide to invest based on their financial requirements and their perception of the policy instruments. According to traditional finance, investment decisions in regulated markets may be assumed to be a function of risk, return and policy. Risks and returns (like in the expected utility theory) have long been the determinants of investments according to traditional finance. Assuming a simple model of the effects of different policy instruments, these instruments may affect the investment decision by either reducing the risk or increasing the return. However, this simplified model does not address investor heterogeneity or account for any of the notions from behavioural finance. Based on central notions of behavioural finance, Wüstenhagen & Menichetti (2012) have extended this model with portfolio aspects, investor heterogeneity (in terms of risk or return requirements), path dependency (experience through prior investments), and perception (Wüstenhagen & Menichetti, 2012). These notions apply not only to financial investors but to strategic investors as well and capture some of the elements that can be used to describe the heterogeneity of investors in OWFs. Portfolio aspects, risk-return requirements and investment horizon are notions form classical finance, whereas path dependency and perception are 'new' investor characteristics from behavioural finance. Figure 6 shows the extended model illustrating the relation between policy and financial requirements.

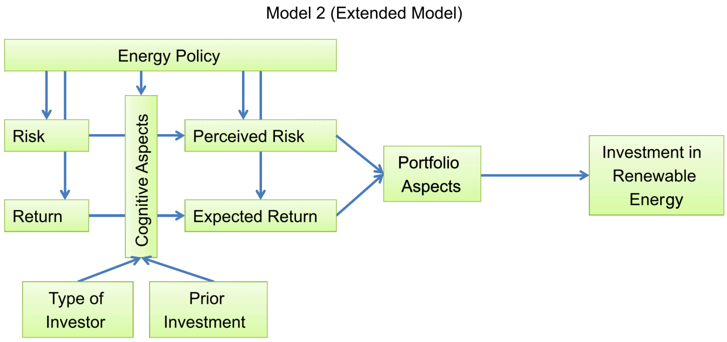

Figure 6: Extended model of policy and investment decision (Source: Wüstenhagen & Menichetti, 2012)

What's clear from the assumptions in behavioural finance is that the investment decisions made by humans are subject to bounded rationality. These investment decisions are not merely a function of the objective values of risk and return, but in fact perceptions matter. Perceptions are dependent on the cognitive factors of (possible) investors. The heterogeneity of possible investors and the path dependency in investment decisions in turn determine those cognitive factors for investors in OWF projects (Wüstenhagen & Menichetti, 2012). The application of behavioural finance should thus be seen as complementary to traditional notions of finance. Cognitive factors could provide interesting insights in the investment choices of OWF investors, but their risk or return requirements and the possible portfolio effects of investments will also likely play an important role.

2.5 Dynamic Capabilities

This section discusses the theory of dynamic capabilities (DC). DC is one of many different theories on strategic advantages of firms. First, it describes the relation with other theories of firms' competitive or strategic advantages. Next, an overview of the central elements of the theory is given: processes, positions, and paths. Third, the applicability of dynamic capabilities to explore OWF investor characteristics is discussed.

2.5.1 Comparison with other Theories on Strategic Advantages

The DC framework may be used as an approach to determine a firm's strategic management. Other such frameworks are Porter's five forces, game theory and the resource-based view (Smit & Trigeorgis, 2012; Teece, Pisano, & Shuen, 1997).

DC and the resource-based view look into the internal capabilities of a firm. The concept of competitive advantage based on the internal competences is often explained from a 'resource-based' view: Companies accumulate valuable technology assets and guard these with an aggressive intellectual property stance. As mentioned earlier, DC builds upon the earlier focus on resources, thereby better accounting for adaptive changes (Teece et al., 1997). Considering the focus on OWFs, a sector wherein technological and regulatory changes occur frequently, the DC framework seems more appropriate than the resource-based view.

Porter's five forces and game theory place a lot of focus on the relations with other (competing) firms. These theories can therefore be seen as the external views of a firm's strategic advantages (Smit & Trigeorgis, 2012). Porter's framework focuses on a firm's strategic advantages based on the external factors: competition with competitors, substitutes, and new entrants and the bargaining power in relations with suppliers and clients. Porter's framework is related to the neoclassical school of economics, wherein information asymmetry and bounded rationality are not acknowledged.

Integrating the perspective with TCE to capture the relation between the investment opportunity and the investor's characteristics is therefore more troublesome. Game theory looks into the decisions of competing firms as a 'play of the game', strategically acting and reacting to each other's actions. However, the degree to which new investors are attracted to the OWF market as a consequence of a country's policy design is not so much a question of the strategic or competitive advantages between them, but rather as their ability to adapt to the investment climate shaped by technological advances and regulatory changes. These external views of strategic advantages of firms are therefore not suitable to describe how investors react to policy instruments.

Concluding, the resource-based view provides only a part of the insights that the dynamic capabilities framework offers. The other views on strategic advantages put too much emphasis on relations with competing firms, rather than on the ability to adapt to regulatory environments. This is why DC is applied in this study to address the investor's heterogeneity in competitive advantages, rather than including these other theories on strategy.

2.5.2 Processes, Positions, and Paths

According to DC, successful firms in markets that undergo constant changes (e.g. due to technological advances) often strongly rely on their so-called dynamic capabilities. The term refers to two aspects, being "the shifting character of the environment" (dynamic) and management's ability of "appropriately adapting, integrating, and re-configuring internal and external organizational skills, resources, and functional competences" (capabilities) (Teece & Pisano, 1994). The DC perspective thus builds on the resource-based view of the firm, but better acknowledges the need for adaptive changes. Teece & Pisano (1994) argue that the strategic dimensions of the firm are "its managerial and organizational processes, its present position, and the paths available to it" (Teece & Pisano, 1994).

Managerial and organisational processes can be seen as the routines within the firm, its current practices and learning patterns. Learning is the process of repeating and experimenting in order to perform more efficient or discover new opportunities. Successful investors have the ability to add value by reconfiguring the firm's asset and resource base as a response to changes in an environment.

A firm's position refers to its resource endowment of technology and intellectual property (in accordance with the resource-based view of the firm) and the customer base and upstream relations with suppliers. The position of a firm is its location with respect to its difficult-to-trade knowledge assets and assets complementary to them, as well as the firm's reputation and relations (Teece & Pisano, 1994). The assets available to investors with such strong positions can be differentiated into categories similar to TCE's notion of asset-specificity: technological assets, complementary assets, financial assets, and locational assets. The reputation of an organisation affects the responses of customers, suppliers, and competitors. The notion of position is the most similar with the resource-based view foundation of dynamic capabilities and illustrates that the dynamic capabilities framework is an extension of -and useful addition to- that view.

Paths are referred to by Teece & Pisano (1994) as the available strategic alternatives and the attractiveness of opportunities that lay ahead. Path dependencies entail the awareness that 'history matters'. The future of a firm or investor depends on its current position and the past decisions that led to the current position.

2.5.3 Dynamic Capabilities to Explore the Characteristics of Investors

Dynamic capabilities of OWF investors may come from their experience, resources, and motive to invest. Bergek et al. (2013) have tried to stipulate the differences of the investors in the Swedish renewable energy market and conclude that they differ in terms of motives (shaping opportunities), background and resources (Bergek et al., 2013). Opportunities, backgrounds and resources can be interpreted as dynamic capabilities that allowed these firms to successfully invest in renewable technologies. The dynamic capabilities that stem from an investor's processes will be expressed as the learning effects of experience in earlier investments in OWFs or other RES projects. The firm's position is most determined by the tangible and intangible resources of the firm. The position of OWF investors will therefore be expressed by its resource endowment in terms of technological and financial assets and its relations (e.g. with suppliers). Path dependency can be seen as the ability to create capabilities based on earlier experiences. The paths determine the opportunities or future options that investors see from making investments in OWFs. This can be expressed as the motive of investing in the OWF.

2.6 The Conceptual Framework

As policy instruments should bring together project governance and investor characteristics, interesting interactions are expected between the various elements discussed in the previous sections. These elements are illustrated in the framework below (figure 7). This figure will be used throughout the report to illustrate when an interaction is discussed.

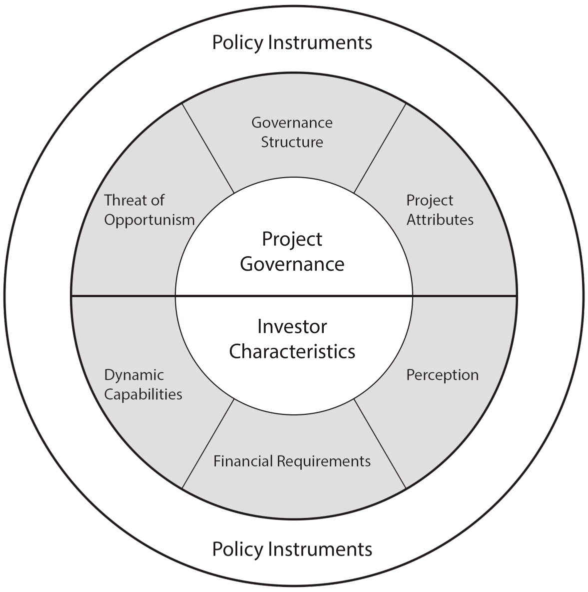

Figure 7: Conceptual framework

The upper half of the inner circle illustrates the project governance of OWFs. As a result of technical configurations (the design of the OWF), external technical (site characteristics) and institutional conditions each project (made up of several contractual transactions) is characterised by different threats of opportunism, governance structures, and project attributes. Based on earlier literature the explored forms of opportunism are governmental opportunism and third party opportunism. Governance structures of the different transactions within a project will be reviewed as a continuum between markets, hybrids, and hierarchies. Project attributes that characterise these different transactions in a project will be expressed as the degree of asset specificity, uncertainty and frequency of the projects.

The lower half of the inner circle illustrates that different investors have different characteristics. The critical characteristics of these investors are expected to be their dynamic capabilities, financial requirements, and perception. From a theoretical point of view, either behavioural finance or dynamic capabilities may provide (enough) useful insights in investor characteristics. However, combining both perspectives is expected to be most in line with empirical findings on investor characteristics in energy. Earlier studies have shown that it is the combination of motives, perception, resources, background, and personal characteristics that typify an investor and determines their response to policy (Bergek et al., 2013; Darmani et al., 2014; Mignon & Bergek, 2011; Wüstenhagen &

Menichetti, 2012). Dynamic capabilities are created by investors' experience, resource endowment, and motive to invest. Financial requirements could be risk or return requirements. Finally, the perception of investors is important in how they perceive the actual attractiveness of project opportunities and policy instrument regimes.

Policy instruments that are effective in promoting investments of non-utility investors in OWF projects should bring together projects and investors illustrated by the ring-shaped structure of the framework. It is expected that policy instruments may –ideally- reduce the governance challenge by affecting the attributes of OWF projects and create a minimal threat of opportunism. Investor characteristics – their dynamic capabilities, financial requirements, and perception- will likely determine the effectiveness of certain policy instruments and vice versa, policy instruments may affect characteristics like an investor's perception. Finally, the differences between investors could result in different governance structures that best exploit investors' expertise and account for their desires. The interactions will be explored throughout the three chapters in the subsequent operationalisation of the integrated framework.

PART III: OPERATIONALISATION

3. Project Governance in Offshore Wind Farms

This chapter describes the project governance in OWFs. First, the OWF project is defined as a series of transactions throughout different project phases. The structures that govern these transactions within a project must be aligned with the attributes according to TCE. Therefore the attributes in OWF projects are analysed. Next, the governance structures in OWF projects are analysed. This chapter thereby answers the following question:

> What are project governance challenges in offshore wind farms?

3.1 Defining an Offshore Wind Farm Project

As this chapter will show OWFs are often structured, organised, and financed as a project. This has important implications for the possible roles that non-utility investors may have. Therefore, this section will first motivate why an OWF could be considered a project. In their book on Project Management, Nicholas and Steyn have listed some characteristics that warrant the classification of an activity as a project. Looking at a few of these, it becomes apparent why development of OWFs can be considered from a project management perspective (Miller & Lessard, 2002), p. 4:

- A project has a *definable goal or purpose,* and *well-defined end-items, deliverables, or results,* usually specified in terms of cost, schedule, and performance requirements.
- Every project is *unique;* it requires doing something different than was done previously. It is a one-time activity, never to be exactly repeated again. Even in a "routine" project such as home construction, variables such as geography, labor market, and public services make it unique.
- Involvement in anything new or different always carries some uncertainty about the outcome. Given that a project is unique, it also involves *unfamiliarity* and *risk*.
- A project is the *process* of working to achieve a goal; during the process the project passes through several distinct phases in the *project life cycle*. Often, the tasks, people, organizations, and resources change as the project moves from one phase to the next.

The well-defined deliverable is the OWF itself, specified in terms of capacity (MW), project costs and cost-attribution, and scheduled start of its operational life. Every OWF project requires a new analysis of site conditions (wind speeds, water depth, distance to shore, etc.) as it has a unique effect on performance and total costs of the project. Risks and uncertainties play a major role in the development of OWFs. Finally, OWFs can be defined in terms of clear phases, which will be further addressed below.

The level of detail in defining project phases for an OWF could vary between a very rough separation of the non-operational and operational phase to a much more detailed separation of all critical steps in the realisation of a new farm. As this research will look into OWFs in particular in terms of ownership and financing, the project phases are defined in accordance with possible changes in stakeholder participation. In Principles of Project Finance, Yescombe (2013) divides a project life into three phases: development, construction, and operation. Based on the needs for defining concepts in this research, these phases will also be used to describe an offshore wind project.

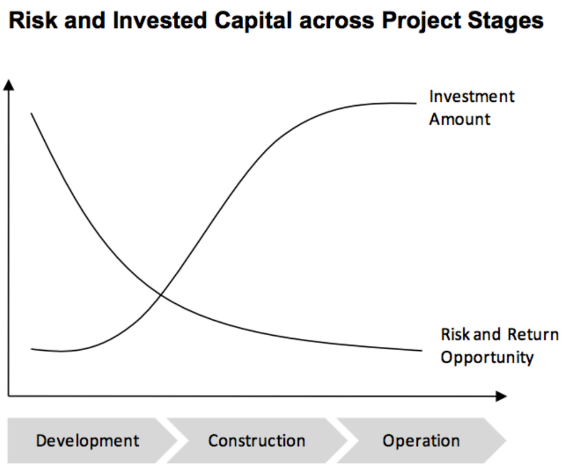

Figure 8: Risks vs. Investments throughout project lifecycle (Source: CPI, 2011)

Development - During the development phase of an OWF, basically all pre-construction activities are done. Typically, this would include performing site feasibility studies (e.g. wind resource measurements); obtaining a concession (for the site development); schedule and cost planning, performing environmental impact assessments and acquiring the necessary permits. Receiving the planning consent from the government is an important milestone in this phase. Additionally, procurement of contracts, (optionally) PPA, and funding is realised. The end of the development phase is typically when reaching the second milestone, the financial closure, meaning that all equity and debt are in place and available for drawing (Yescombe, 2014). The development phase of an OWF takes between 3 to 6 years (Karremans, 2013). This timespan is however greatly dependent on the regulatory environment, especially the duration and complexity of the permitting consent procedure (Mani & Dhingra, 2013). During the development phase, the uncertainty (or risk) of a successful completion of the project is the largest (figure 8).

Construction - The construction phase of an offshore wind farm is the period in which the entire OWF is built – and, thus, afterwards will be ready for operation. Activities include the installation of foundations, towers and turbines; the internal electricity grid; and the connection to the onshore grid (figure 9). The construction phase typically takes between 1 and 3 years (Karremans, 2013). This variation can be explained by differences in size of OWFs as well as environmental restrictions on construction activities (e.g. due to seasonal marine life activity) (Lindeboom, 2013). As figure 8 illustrates, the construction phase requires large capital investments.

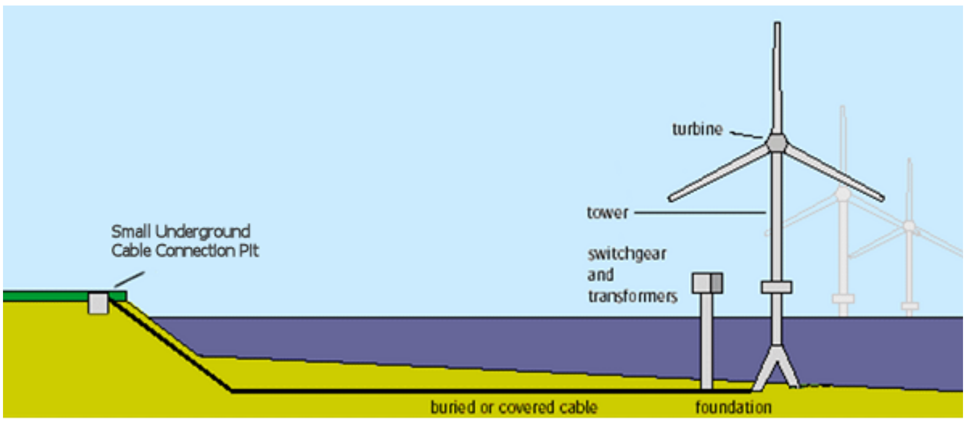

Figure 9: Typical elements in an OWF (Source: UK Department of Trade & Industry, 2002)

Operation - Once constructed, it is vital that the OWF starts producing electricity to earn back the high initial investments made during the earlier phases. The operational expenditures for OFWs are typically very low as there are no resource costs of generation. An important role lies with the maintenance of the turbines, which should ensure that the entire OWF is able to operate at (nearly) full rated capacity, only hindered by fluctuations in wind speeds. Maintenance costs, thus, also are the biggest expense during this phase. OWFs are designed to last an operational life of 20 to 25 years.

What's clear from the definition described in this section is that OWF projects may be seen as a bundle of transactions between different investors and other stakeholders. Different tasks, roles, and responsibility could be identified for each of the project's phases. The governance of these transactions is studied in the next sections.

3.2 Project Attributes

In traditional TCE, transaction attributes are the characteristics of a transaction. In the suggested conceptual framework, these attributes will be considered as the characteristics for the entire OWF *project* being a bundle of a multitude of transactions.

3.2.1 Asset Specificity

From an investor's perspective, the need for highly specific assets to participate in the transaction of selling electricity increases the threat of opportunistic behaviour from counterparties and government, because of the effects of sunk costs (Spiller, 2013; Williamson, 1996). This could therefore reduce the attractiveness of the investment for non-utility investors. Asset specificity according to TCE may exist in six forms being site specificity, physical asset specificity, human asset specificity, dedicated asset specificity, brand name specificity, and temporal or spatial asset specificity (Rindfleisch & Heide, 1997; Williamson, 1996). Figure 10 provides an overview of these forms of asset specificity.

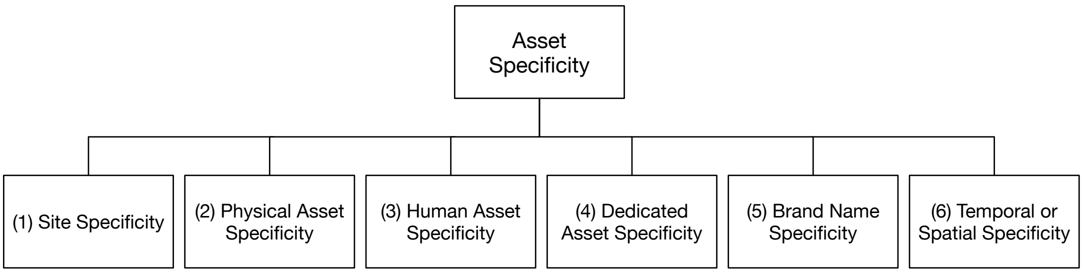

Figure 10: Possible forms of asset specificity

3.2.1.1 Site specificity

Site specificity plays a major role in OWFs. Site specific conditions like wind speeds, water depth, distance to shore and the presence of conflicting other potential uses of a site (fisheries, marine life, recreational, oil & gas fields, and shipping routes) are important factors of consideration during the selection of OWF site and in acquiring the permitting consent. These factors determine the suitability of the proposed OWF site to be able to generate electricity at a high availability and without interferences –also in construction of the OWF. Additionally, the distance to shore determines the investments required in grid connection. Moreover, once an OWF is operational it cannot be relocated: foundations and turbines are too costly to be removed and connection to the onshore grid is at a fixed point and often managed by another party. However, once operational and connected to the grid, there is very little argument to be made why OWF owners would want to relocate as they may sell to any purchaser connected to that grid. So although site specificity is present during the development, it is not so much an issue once the OWF is operational. This is therefore a primary risk that is overcome as the project matures.

3.2.1.2 Physical asset specificity

Physical asset specificity is another important aspect in OWFs. The physical investments in an OWF (foundations, turbines, inter array cabling, substation, and grid connection) solely serve the purpose of producing (renewable) energy. These physical assets are characterised by very large investment requirements and can only be provided or installed by few original equipment manufacturers (OEM companies) (Blanco, 2009). Moreover, the supply of these parts requires the commitment of substantial parts of original equipment manufacturing (OEM) companies' production capacity. This means that such assets cannot easily be replaced.

3.2.1.3 Human asset specificity

The presence of human asset specificity exists for OWF investors. To lead the project, the project manager requires specific knowledge of project management and technical features of OWF projects. Regulatory regimes may be cumbersome to completely understand. Inexperienced financial investors must also invest in human capital to understand safety, technical, and regulatory issues before making the large required capital injections.

3.2.1.4 Dedicated asset specificity

Dedicated asset specificity exists when a supplier in a transaction has to invest in assets for the sole purpose of a transaction with a single purchaser. OWFs are occasionally built for the purpose of supplying to a specified purchaser. Examples include the Westermeerwind project built to supply to local agricultural industry and Google's agreement with Eneco in the Eemshaven to power its datacenter (Google, 2014; Westermeermind, 2014). However, because of the access to national grids and the interconnectivity of transmission grids in Europe, such assets may be appointed to serving other traders. Therefore, the author argues that dedicated asset specificity has little application in OWF investments.

3.2.1.5 Brand name specificity

Brand name specificity is a dimension of asset specificity that has little application for the analysis of OWF projects. Taking the OWF project as the central point of focus -rather than the firms that invest- makes the effects of a brand name less powerful. Moreover, brand name specificity is generally more applicable in investments lower into the value chain where retail companies and consumers meet (Williamson, 1996). However, for the investors within a project, there may be strong reputational effects from earlier experience (see chapter 5).

3.2.1.6 Temporal or spatial specificity

Temporal or spatial specificity refers to investments that are made to facilitate adaptive responses to temporal or spatial needs. In the provision of electricity to the market, OWFs enjoy priority grid access due to the merit order effect. In the electricity market temporal specificity is assumed to play a larger role for generation capacity that is aimed at providing peak loads or for storage capacities. OWFs are not considered to be highly temporal or spatial specific.

3.2.2 Uncertainty

Uncertainty in a transaction can be categorised is different ways. TCE does not provide a uniform overview of types of uncertainty, although Rindfleisch and Heide (1997) make the distinction between uncertainty from the behaviour of the counterparty in a transaction and uncertainties created by the environment of the transaction. In this study, uncertainty as a transaction attribute in the investments in OWFs may stem from behavioural uncertainty, uncertainty from the market, technological uncertainty, financing uncertainty, and regulatory uncertainty. The latter four uncertainties are the external uncertainties affecting OWF projects and correspond with the risk categories applied by banks to study the project propositions in the offshore wind sector (Van Pelt, 2015). These forms of uncertainty are related to the risks that may affect the realisation of an OWF throughout its different lifecycle phases. Behavioural uncertainty comes from the transaction itself, and the compliance of the counterparty with the agreements that govern the transaction. The latter three forms of uncertainty can be classified as environmental uncertainty and are uncertainties affecting the circumstances that surround a transaction (Rindfleisch & Heide, 1997). The common denominator of these sources of uncertainty is that they may lead to unanticipated disturbances. Figure 11 provides an overview of possible forms of uncertainty observed in OWF investment opportunities.

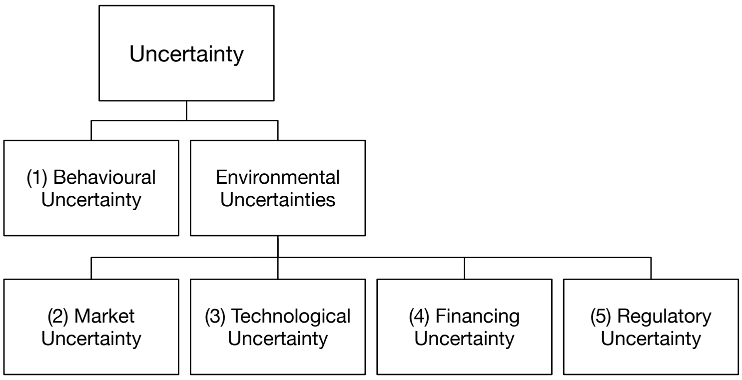

Figure 11: Uncertainty in OWF investments

3.2.2.1 Behavioural uncertainty

Behavioural uncerainty could occur in the transactions within a project (between investors, contractors, and other stakeholders) and between a project and its electricity offtaker(s). The risk of strategic opportunism by the counterparty in any other transaction depends to a great extend on the governance structure applied (Williamson, 1985). Moreover, it depends on who the counterparty in the transaction is. The room for such behavioural uncertainty in electricity sale is therefore often regulated in the structure of the electricity market of a country. For example, in some countries electricity may be sold to the TSO, rather then to the actual consumers. The role of a TSO as a natural monopolist is often strictly regulated and the uncertainty from a threat of strategic opportunism by this counterparty is therefore generally lower. As will be illustrated in later, other offtakers of electricity may be retail companies or large (industrial) end-users. Monitoring the contractual performance of such exchange partners may be more difficult, the applied governance structure must therefore account for this uncertainty. Behavioural counterparty uncertainty may also stem from the many contracts that OWF investors have to make with subcontractors that construct, supply or maintain (parts of) the OWF. Especially during the construction phase of a project, such behaviour could form a major risk to a project as it may affect schedule and costs (Pulles, 2015).

3.2.2.2 Market uncertainty

Different from behavioural uncertainty of the counterparty, uncertainty from a lack of market information is an environmental uncertainty that may come from volatility in demand and supply. This uncertainty is thus not a form of strategic opportunism by the counterparty. The large-scale integration of intermittent renewable energy is known to have a negative effect on the stability of supply and therefore on prices. However, volatility in demand can be considered to be relatively predictable from daily and seasonal patterns. Unanticipated and structural changes in the expected future demand and prices of electricity may have a more stringent effect on investment opportunities. The financial crisis for example led to a lower demand than current projections foresaw at the time. A lower electricity price as a result of this may drastically change the expected payoff of an investment opportunity if this is based on projections of future demand and prices that are too optimistic.

3.2.2.3 Technological uncertainty

Technological uncertainty is typically more present in less-matured markets where the technological changes follow each other rapidly. The offshore wind sector knows a combination of relatively new technologies and the developments in the sector in terms of technology are quickly taking place. A risk of failure or down time that hinders the operations of an OWF is an important uncertainty that affects the sale of electricity. Technical uncertainty is another attribute that is generally overcome as the project matures (Jongste, 2015; Pulles, 2015).

3.2.2.4 Financing uncertainty

Financing uncertainty plays a large role in OWF projects, as the capital requirements per project are very large. Project costs amount to €3,5-4,0 million per MWh on average. Moreover, these up-front investments have to be made prior to any flow of income is generated. Even with a group of committed equity investors, financing from (commercial) banks is a crucial step in the realization of an OWF as debt/equity ratios are typically around 70/30 and higher (Pulles, 2015). Moreover, as individual banks often limit their interest in a single project (ticket size) to €50-150 million and projects continue to grow in size, projects will increasingly require more lenders per project (EWEA, 2013).

3.2.2.5 Regulatory uncertainty

Regulatory uncertainty plays a large role during development, as the permit grant and the award of exploitation subsidies are essential premises for acquiring debt finance and for the start of construction. Additionally, the award of exploitation subsidies could be a source of uncertainty and consequently: different choices in exploitation subsidies may result in different degrees of regulatory uncertainty, as chapter 4 will show. However, also during the operational life of an OWF, regulatory changes can have large effects on the electricity sale. As the profitability of electricity sale is largely dependent on the revenues from exploitation subsidies, changes in the subsidy streams would drastically affect the attractiveness of the investment opportunity. In OWFs, this last form of regulatory uncertainty plays an important role that will be further addressed in chapter 4 on governmental and third party opportunism.

3.2.3 Frequency

Frequency as an attribute of the investment transaction does not seem to play an important role as a determinant of the attractiveness of the investment opportunity in OWFs. The actual capital provision from the (non-utility) investor to the project entity typically occurs only once. Likewise, contracts with EPC and OEM companies are made once for a single project. Moreover, electricity as a commodity can hardly be seen as a discrete unit that is being traded. The frequency at which the supply of renewable energy is flowing is in fact continuous. Moreover, the physical flow of electricity does not necessarily match the contracted transactions. The frequency of the transaction is not considered to play a significant role in determining the attractiveness of the investment opportunity in OWFs. TCE prescribes that a high frequency would require a hierarchical governance structure, but as frenquency is low, it does not prescribe certain governance structures in any of the transactions.

3.3 Project Governance Structures

This project governance structure is the framework in which all decisions in a project are made and includes the primary transactions that shape the project: investments, electricity offtake, and EPC and OEM contracting. Within an OWF project these relations have to be governed with different parties. To understand possible issues in OWF projects the governance of the investments, the electricity offtake, the division of tasks and the contracts with EPC and OEM companies are analysed (figure 12). As this section will show, OWFs are typically realised by multiple counterparties through a complex sequence of interlinked transactions.

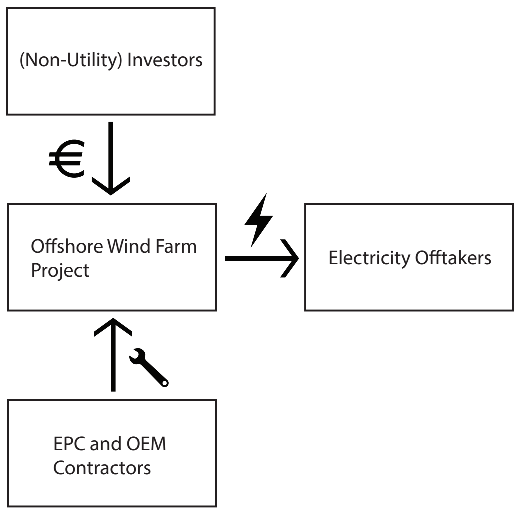

Figure 12: Main transactions that shape an OWF project

3.3.1 Investments

Investments by non-utility investors in OWFs are most likely governed in equity alliances. As mentioned before, historically investments in OWFs or other generating capacity were made by utilities. Such investments were made on the balance sheet of the utility which corresponds with Williamson's archetypical hierarchy structure (Williamson, 1996). As the sole owner of the project, the utility had full control and responsibility over the OWF. Debt could have been provided through corporate finance as a loan to the utility or through project finance in which case the bank cannot claim assets from the utility in case of default (non-recourse). As larger OWF projects require larger investments, this type of project structuring is increasingly difficult to realize for a utility (EWEA, 2013). Currently, the provision of equity by non-utility investors and their commitment in an OWF is governed in other forms. These are hybrid forms of governance, based on equity alliances. Investments through market-like structures are not considered, as these are not applied in OWF projects. Table 3 provides an overview of the governance attributes of equity alliances that govern OWF investments. Appendix E provides an extensive overview of the archetypical equity alliance structures that may be applied in OWFs involving non-utility investors. This illustrates the importance to equity alliances in such projects, these include (un)incorporated joint ventures and special purpose vehicles (SPV).

Governance Structure

Governance Attributes	**Hybrid (Equity Alliances)**		**Integrated in firm's balance sheet**
	Level	**Investor perspective**	
Incentive Intensity	Low/ Medium	Depending on the distribution of responsibilities and possible reward agreements	*Increasingly difficult due to balance sheet constraints and beyond the scope of focus on non-utility investors*
Administrative control	Medium	Administrative control is often exercised by the project sponsor	
Contract law regime	Neoclassical	Equity commitment increases the difficulty and cost of exit	

Table 3: Governance structure and attributes of OWF equity investments

3.3.2 Roles and Responsibilities

Within an equity alliance, a clear division of roles and responsibilities is made between the project sponsor and other (financial) investors. The governance of a project through an equity alliance is often run by a single point of accountability, the project sponsor. The project sponsor may have extra incentives to bring the project to a successful completion. The project sponsor is both owner and accountable (to different degrees) for the success of a project, whereas other (non-utility) investors mainly share in the ownership of a project. These investors are called financial investors. The project sponsor often exercises administrative control on the compliance of agreements. The governance of OWF investments involving non-utility investors is thus the result of collaboration built on trust between investors participating in a single project. The commitment of equity in a project increases the difficulty and cost of exit from the alliance and is an important premise for the mutual trust and alignment of interests of the involved investors. This suggests that a suitable investor team should be brought together to realise an OWF, chapter 5 will further address the possible characteristics of these investors that are part of these governance structures.

3.3.3 Electricity Offtake

3.3.3.1 Changes in the electricity value chain

Because of a change from monopolistic integrated utility companies towards competition in generation, non-utility investors have two options to sell electricity in Europe's current electricity markets without the involvement of a (traditional) utility company.

Historically, the European electricity sectors have been mostly vertically integrated. Many activities in the value chain, from generation to distribution (see figure 13) were largely internalized within a single monopoly. These regional or national monopolies were regulated by national governments in terms of electricity tariffs and requirements to ensure security of supply. From the OWF investors' perspective, there were no interactions within the value chain as OWF investors were part of single monopolist utility companies.

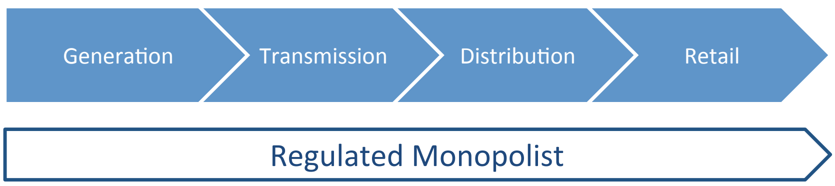

Figure 13: Integrated electricity value chain

As a result of changes in European and national regulations on increased competition within the electricity sector, the structures of monopolists throughout the entire value chain have changed. Two energy directives, issued in 1996 and 2003 by the European Parliament and Council, on common rules for electricity generation, transmission, distribution and retail initiated the changes towards competition (European Parliament and Council, 1996, 2003). National governments have implemented these directives in different ways, but the directives prescribed vertical unbundling of the natural monopolies of transmission and distribution from generation and retail (Niesten, 2009). Thereby, competition was introduced in the generation of electricity (figure 14).

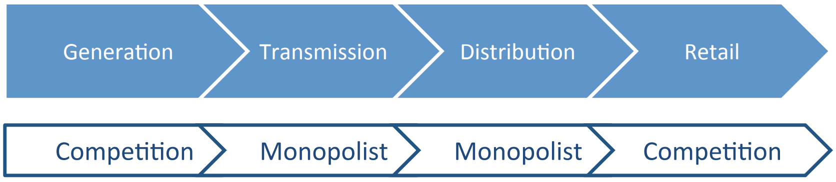

Figure 14: Unbundled electricity value chain

Consequently, the generation and retail of electricity is faced with competition from other incumbents and new entrants. The unbundling and liberalisation of the electricity markets have made investments much more difficult to realise for traditional utility companies (Pulles, 2015). At the same time, however, this allows non-utility investors to enter the market. For the market of generation, in which OWFs operate, this meant that interactions with the transmission system operator (TSO) and with retail companies emerged.

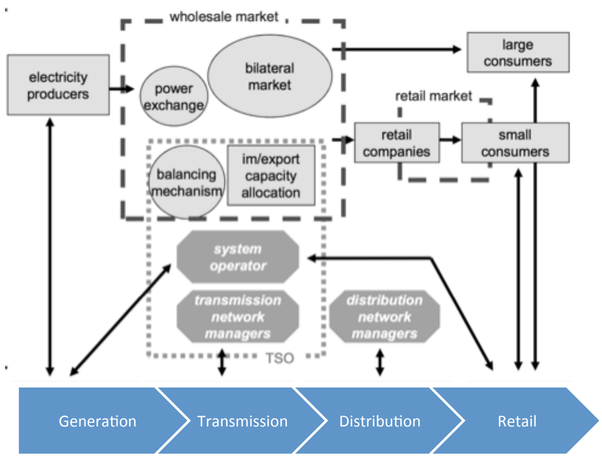

Figure 15: Institutional layer of the unbundled electricity value chain (Adapted from: De Vries, 2014)

Figure 15 shows how these regulatory changes have changed the institutional environment and created new interactions. OWFs that are not owned by utilities need to sell their produced electricity to retail companies and need to coordinate their physical supply to -and balancing upon- the transmission grid with the TSO. Because of the need to balance supply and demand at any point in time, EU regulation requires TSOs to purchase electricity through a balancing mechanism. Moreover, a generation company may 'purchase' export capacity from the TSO.

Without the involvement of a utility investor in a project, non-utility investors thus have two options to sell the produced electricity. These options are to sell the produced electricity on a power exchange or in a bilateral contract (through a long-term contract). These options require other forms of governance that correspond with Williamson's archetypical market (power exchange) and hybrid structure (bilateral contract). For both structures, this section will give a description, and a review of its adaptive power to price signals and through coordination; the incentive intensity for investors; the level of administrative control; and the applied contract law regime. The consequences for these elements will also be discussed from the investors' perspective.

3.3.3.2 The market structure: power exchange

The first option to govern the offtake of electricity produced is through a power exchange. Within a power exchange producers, distributors, traders, brokers and large (industrial) end-users may trade electricity in different transaction types. Transaction may be day ahead transactions (trades made today for the delivery of electricity tomorrow) or continuous. Electricity power markets exist on national (e.g. APX NL and APX UK) and cross-national (Nordpool spot and European electricity Index) levels. A market structure sets the price through balance between supply and demand and therefore gives offtakers a high adaptive power to price signals from that market. On a power exchange, the merit order effect is therefore important to determine the expected income flows. The merit order is a way of ranking electricity-producing units on ascending order of marginal costs of production. Theoretically, the marginal cost of production is the price offered by the individual producers. This order is used to ensure that units with the lowest OPEX are brought online to meet demand. Figure 16 illustrates how this merit order relates production to demand.

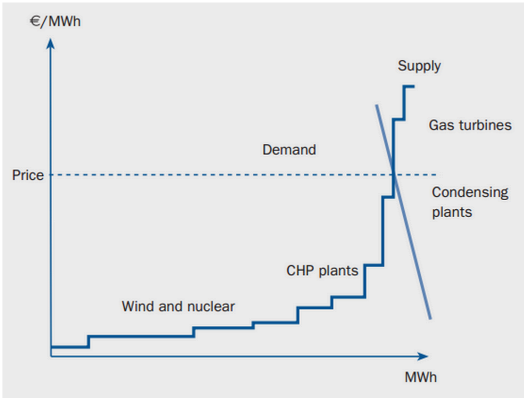

Figure 16: Merit order effect (Source: Risø DTU, 2008)

As an investor in OWFs, this means that the future cash flows generated from the OWF may be more volatile as a result of market forces. This can be considered as a possible downside for investors with a more risk averse profile. The market structure provides little possibilities to coordinate between the OWF and its offtaker(s). For an investor, this means that there is little possibility to make agreements with offtakers in terms of price and volume of future trade as a safeguard against changes in the market. The incentive intensity within a market is generally high. From an investor's perspective, however, there is little to be gained from increased efforts in the operation of an OWF as output is mainly restricted by wind speed and demand. There is however some potential upside from employing extra generation capacity of an OWF in times of higher demand as prices within a market will then be higher. The administrative control that checks the compliance of both parties in a transaction is typically low in a market than through commitment in a long-term contract unless a third party exercises these controls. The bureaucratic costs associated with administrative control can be considered a downside for investors but uncertainty in terms of compliance with the trade agreement is likely a bigger issue. Within a power spot market structure, a classical contract law regime is applied. The standardisation of the contract terms and conditions exist for both day-ahead and intraday trade, and provide investors with clarity of how the trade occurs, regardless of who the counterparty is.

3.3.3.3 The hybrid structure: power purchase agreement

The most-applied governance structure to manage the offtake of electricity produced by an OWF is through a power purchase agreement (PPA). The PPA is a bilateral contract that secures a long-term stream of revenue by negotiating price and volume. According to empirical results, such long-term contracts are the preferred response to the conditions set out by the legal limitations (Crocker & Masten, 1988; Jongste, 2015; Joskow, 1987). The motivation of this preference is apparent from an investor's perspective, as this section will illustrate. Moreover, a PPA is often a key requirement for obtaining non-recourse finance from a commercial bank (Pulles, 2015). The PPA may specify prices at a steady level, to increase with inflation or negotiated in any other way as long as both parties agree to the terms. The offtake of electricity governed under a PPA may be the grid operator, a retail company, or a large end-user, depending on the country's arrangement of the electricity market. Because the prices are negotiated beforehand, there is often little adaptive power to price signals from the market. From an investor's perspective, the limited adaptive power to price signals is likely not an issue as it reduces cash flow volatility. It is important to note that even when power offtake from an OWF is governed in the bilateral market, the physical operations will always be determined by the merit order and in accordance with the TSO. Physical flows of electricity are therefore not aligned with the flows of money. In comparison with a market structure, a PPA offers more adaptive power of coordination. The long-term agreement with offtakers allows OWF investors to coordinate responses to differences in production levels due to the intermittent nature of wind energy. Hybrid governance structures like the PPA would generally offer less incentive intensity than a market structure. Investors may negatively value the lost potential of upsides from temporal favourable market conditions. The administrative control in a PPA is easier exercised as both parties are more committed to their long-term agreement. From an investor's perspective, this creates more certainty of the counterparty's future behaviour. A neoclassical contract law regime often results in long-term agreements with more flexibility. In PPAs that govern electricity sale by OWFs, the assumed flexibility may be lower, but the long-term relation is often valued because of the highly specific investments needed.

3.3.3.4 Comparing electricity offtake governance structures

Table 4 provides an overview of both electricity offtake governance structures and how these perform with respect to the governance attributes from an investor's perspective. From the analysis of these governance forms, it becomes clear why the PPA is the preferred mode of governance. A PPA better secures future cash flows by reducing volatility as a result of market risks. A closer and long-term cooperation with the offtaker increases the ability for OWF investors to adapt to changes and secure the specific investments needed.

Governance Structure

Governance Attributes	**Power spot market**	**Power Purchase Agreement**	**Integrated Utility Firm**
Adaptive power to price signals	Market volatility in future cash flows	Reduced volatility in future cash flows	*Impossible in the absence of an involved utility*
Adaptive power of coordination	Little room to coordinate with offtaker(s), unless dealt with through the market system	More coordination with offtakers to respond to intermittency of wind speed	
Incentive Intensity	Small potential for employing capacity in times of high demand and prices	No potential to employ (extra) capacity to benefit from high prices	
Administrative control	Some uncertainty in counterparty compliance	Less uncertainty in counterparty compliance	
Contract law regime	Great detail in terms and conditions should provide clarity	Long-term relation secures the specific investments	

Table 4: Governance structures and attributes of OWF electricity offtake

3.3.4 EPC and OEM Contracting

The third element of the project governance is the contracting with EPC and OEM companies. Non-utility investors seldom have the expertise in-house to engineer, construct, and install the various elements that are needed to realise the OWF. Construction and installation of foundations, turbines, the internal cable arrays, and grid connection to the on shore grid have to be governed in transactions with specialised OEM and EPC companies. Moreover, service and maintenance during the operational phase is often governed in a contract with either the OEM or EPC company. There are two considerations to be made by OWF investors in the governance of these services. These are the number of (sub)contracts managed and the inclusion of equity investments by EPC or OEM companies.

The number of contracts to be managed by the project sponsor determines the complexity of the project's governance. Each interaction with a contractor creates a risk of behavioural uncertainty from the counterparty, called interface risk. Simplicity in the contracting structure (e.g. a low number of main contractors) is mentioned by industry professionals as a solution to this issue (Freshfields, 2014; Jongste, 2015; Pulles, 2015).

The second option in the governance of contracted services is to create commitment by EPC and OEM companies through equity investments. The interests of the project's investors and contracting parties are aligned when the latter are also project owners. This governance solution creates an incentive for the timely and cost-efficient provision of services for contracting parties.

3.4 Findings

OWF projects and the transactions within them are characterised by high asset specificity. Highly specific assets in the form of a permitted site with favourable site-specific conditions, very large physical and sometimes even specifically dedicated investments are required. Additionally, human expertise in the management of the project, contracts, regulation, and risks is needed. Site specificity and physical asset specificity are primarily challenging during the early phases of a project. Moreover, the different transactions in OWF projects are characterised by a high degree of uncertainty. Uncertainty may stem from the behaviour of a counterparty in a transaction, uncertainty from the market, technological uncertainty, financing uncertainty, and regulatory uncertainty. The presence of these forms of uncertainty differs throughout the phases of a project.

OWF investments are most often governed through hybrid equity alliances -like (un)incorporated joint ventures, and special purpose vehicles- due to balance sheet constraints of utility investors and the (expected) preferences of new (non-utility) investors. However, there are several variations possible in terms of division of roles and responsibilities within these hybrid structures. Moreover, in the absence of a utility investor the OWF cannot be vertically integrated for the offtake of electricity. Therefore, the offtake of electricity is governed through markets or PPAs, while the historically integrated national or regional utility firms can be assumed to have been the result of efficient alignment of transaction attributes and governance structures (Joskow, 1987; Niesten, 2009). Therefore, it may be argued that the governance of electricity offtake offers limited room for alignment due to the absence of a utility company that can manage the offtake with its retail division. The governance of contracts with EPC and OEM companies offers some room for alignment by wrapping multiple (sub) contracts into one and shared ownership to create commitment. A high degree of mutual trust is required as the investments, electricity offtake agreement, and the contracted services from EPC and OEM companies require a complex combination of coordination between several parties.

Although the characteristics of OWF projects (project attributes) may in many cases be similar, different governance structures are observed. Following only TCE –assuming the governance structure to be a reflection of just the project's attributes- does not explain this difference. Therefore, as will be argued in the next chapters, the joint effect of policy instruments and investor characteristics may offer a more satisfying explanation. This would not be to disprove the relation between transaction attributes and governance structures, but rather expand this view with other elements.

4. Policy Instruments and Offshore Wind Farms

As policy makers in Europe recognize the need for more investments in OWFs, different policy instruments to support and promote investments are applied. The first section of this chapter presents the two issues that form the motive for policy makers to adopt these policy instruments. Next, the policy instruments that are applied are discussed in this chapter. The third section highlights important limitations of these policy instruments. Finally, the fourth section analyses the effects of these policy instruments on project attributes as described in the previous chapter. This chapter thereby aims to answer the following question:

> How may policy instruments affect offshore wind farms and investors?

4.1 Motives for Policy Intervention

4.1.1 Poor Performance in a Market without Intervention

As mentioned in the previous chapter, no longer being part of an integrated monopolistic firm, generation firms in Europe are required to compete also with other sources of electricity. Moreover, non-utility investors may have a broad range of original fields of work and thus different investment options available to them. In order for OWF investments to be an attractive investment option, the technology must be competitive with other energy sources.

The levelised cost of electricity (LEC) is a measure determined by calculating the net present value (NPV) of all costs made over the lifetime, divided by the identically discounted electricity generation over those years. By definition, the LEC is therefore a measure of the electricity price required by the investor to earn back the total expenses of the project within the expected lifecycle. For renewables, in the absence of fuel costs, the formula for LEC holds:

$$LEC = \frac{\sum_{t=1}^{n} \frac{I_t + O_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{E_t}{(1+r)^t}}$$

$I_t = Investment\ costs$
$O_t = Operation\ \&\ maintenance\ costs$
$E_t = Electricity\ generated$

Offshore wind energy can be produced at a LEC between 0,12 – 0,19 EUR/KWh (Fraunhofer Institut, 2013). As the LEC of other (conventional) energy sources is lower, energy from offshore wind requires policy intervention in order to be competitive in a market where a broader mix of energy is offered. Figure 17 provides an overview of LEC for different sources.

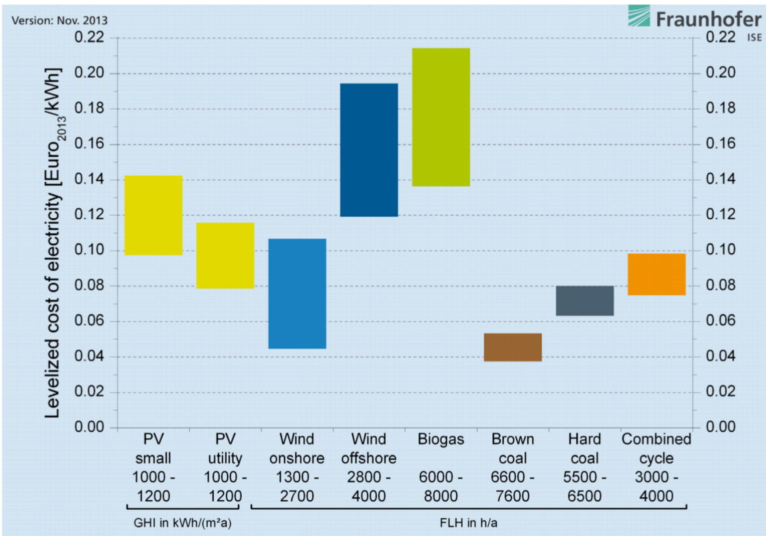

Figure 17: LEC per source of electricity (Source: Fraunhofer Institut, 2013)

Moreover, electricity is offered at its marginal costs due to the merit order effect. This means that as long as the market price received by OWFs is lower than the LEC, the investment is unattractive in the absence of some intervention from policy instruments. To illustrate, 2013 day ahead prices on the Dutch APX market floated around 0,05 EUR/KWh on average (see figure 18) (APX, 2015). If an OWF were to offer its electricity in this market, the investors would not be able to make a sufficient return on their investment. It can be concluded that offshore wind would perform poorly from an investor's perspective in a market without policy instruments.

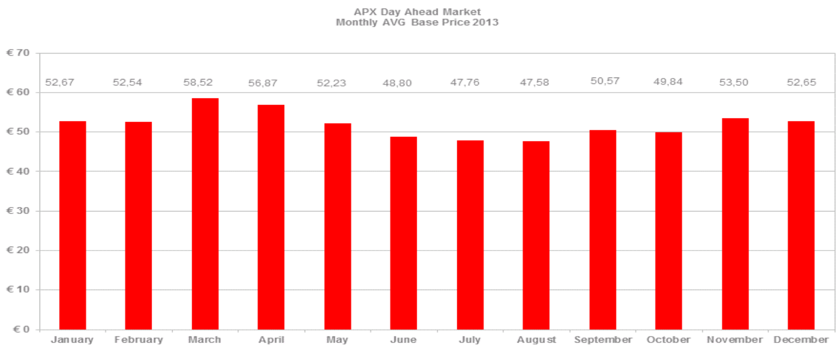

Figure 18: APX day ahead market 2013 (Source: APX, 2015)

A form of market failure arises from the conflicting renewable integration goals of policy makers in Europe and the introduction of competition in the generation of electricity. The need to make offshore wind energy competitively priced forms the first answer as to why policy instruments may be applied. The existence of this unwanted effect justifies government intervention according to neoclassical economics (Correlje & Groenewegen, 2009).

4.1.2 The Need for Spatial Planning at Sea

Beyond the need for financial support there is another important reason why OWF development cannot take place without intervention from governments and that is to restrict certain OWF projects and deal with the high degree of site specificity.

OWF development takes place at sea and therefore competes with the available space for shipping routes, oil & gas fields, fisheries, recreational areas, and marine life. Maritime spatial planning governs when and where human activities may take place at sea. The European Parliament and the Council adopted legislation to create a common framework for this planning in Europe (European

Commission, 2014). Countries may choose their own adoption of maritime spatial planning based on the EU framework.

For OWF projects, investors must therefore comply with the regulatory regime set out by policy makers. Policy intervention is needed to ensure that unwanted projects are not developed, flora and fauna is protected and only those areas where OWFs compete with the least possible other purposes get a permit. In particular, the impact on the marine environment should be assessed and minimized. The need to prevent any negative externalities forms the second motivation for policy instruments to intervene in OWF development.

4.2 Direct-Effect Policy Instruments

Abdmouleh et al. (2015) reviewed policy instruments aimed at stimulating investments in RES and the policy factors that affect the integration of RES. These factors are public funding, fiscal benefits and legislative aspects including power purchase legislation and grid access legislation (Abdmouleh, Alammari, & Gastli, 2015). As shown in the previous chapter, in the specific case of OWF policy, spatial planning is a third legislative aspect that is important. The policy instruments that thus directly affect OWF investments are (Jongste, 2015):

- Permitting consent procedures
- Up-front subsidies
- Grid connection policies
- Exploitation subsidies

4.2.1 Permitting Consent Procedures

The permitting consent procedure a country applies to ensure that only suitable sites for OWF development are granted permission may be designed in different ways. These options are multiple stage permits, a single-stop permit, and designated development zones.

4.2.1.1 Multiple Stage Permits

The permission to develop an OWF at a certain location will have to be granted by the policy maker. Consent procedures and obtaining planning permissions is considered an important issue in offshore wind development across Europe (Butler & Neuhoff, 2008). Permissions must be granted for several steps in the OWF project lifecycle including the lease of the site; the approval of the environmental impact; and the permission of construction of the foundations, cabling and turbines. Multiple steps of permits, means that multiple appeals may be made that could hinder the development of an OWF.

4.2.1.2 Single-stop Permit

Integration of the consent procedure by providing a single license to the OWF developer that covers all permits can give developers a lot of certainty in their planning of costs and schedule. A relatively easy consenting process with a single window clearance, in which the government plans to provide all permits through the issue of a single license, may be an attractive option (Mani & Dhingra, 2013).

4.2.1.3 Designated Development Zones

If policy makers decide to designate certain zones for the exclusive development of OWFs, the environmental impact assessment, wind measurements and studies on other site conditions for these zones may be executed by the policy maker, thereby substantially increasing the prospects for the developers of the sites in such zones. This policy instrument choice takes away the burden of permitting procedures for OWF investors. The award of a site could be managed in a tendering procedure.

4.2.2 Up-front Subsidies

Up-front subsidies provide awards, fiscal benefits, or exemptions for the initial investments of OWFs, regardless of how much electricity is generated.

4.2.2.1 Tax Benefits

Tax benefits may be awarded to investments made in renewable energy or OWFs in particular. By offering tax benefits in the form of accelerated depreciation of up-front investments, policy makers may stimulate investments in OWFs (Jongste, 2015).

4.2.2.2 State Bank Financing

Another option for governments to provide OWF developers with the financial means to make investments in OWFs (without granting a direct investment subsidy) is through the provision of financing against attractive loan terms through state banks. Green investment banks in particular may have a mandate to promote development of green initiatives in their domestic market (Jongste, 2015). Similarly, the European Investment Bank (EIB) can also support projects throughout the EU. In the passed years, commercial lenders have started to provide debt finance during the construction phase of a project. In Europe, there has been an important role for Export Credit Agencies (ECA) and state banks that supplied guarantees, thereby derisking the commercial lenders' stake (Phillips, 2012).

4.2.3 Grid Connection Policy

Grid connection policy for OWFs can differ in both the attribution of costs as well as in the responsibility of who has to actually make the connection.

4.2.3.1 Grid Connection Cost Attribution

Grid connection to the onshore grid forms a major component of total investment costs in offshore wind projects. The actual transmission system alone can be up to 11% of total costs, not considering substation costs (Dicorato, Forte, Pisani, & Trovato, 2011). The total share of grid connection costs for offshore wind was as high as 18% on average in the Netherlands and Germany, based on 2004 figures (Swider et al., 2008). Attribution of these costs can be through either super-shallow, shallow or deep system integration. Super-shallow system integration is a form of cost attribution where the power generator only invests in the actual power plant (or wind farm). With shallow system integration, developers also bear the costs of grid connection, while in a regime with deep system integration, developers also pay for the grid reinforcements needed to integrate the new plant. From a consumers' perspective, super-shallow system integration is considered the most cost-effective as it leads to the least transfer of costs to consumers (Weißensteiner, Haas, & Auer, 2011).

4.2.3.2 Grid Connection Responsibility

As bearing grid connection costs can also form a significant barrier to invest in RES generation from developers' perspective, Swider et al. (2008) argue that grid operators should cover for these costs if large-scale deployment of RES is a policy goal. A possible concern in letting a monopoly (transmission network) developer cover grid connection is that such monopolist would be under less pressure than competing wind farms to keep costs of the connection grid down. This effect can, however, be offset by running tenders to appoint an offshore transmission owner as applied in the UK (Green & Vasilakos, 2011).

4.2.4 Exploitation Subsidies

Earning back the high up-front investments is made possible primarily by affecting the returns from electricity sold. To promote investments in OWFs by affecting the difference between the LEC and the price received by OWF developers, two general types of financial support mechanisms may be applied. These are price-based feed-in tariffs (FiT) or contracts for difference (CfD) and quantity-based tradable certificates (Finon & Perez, 2007). Exploitation subsidies provide an award that is proportional to the actual energy generation.

4.2.4.1 Feed-in Tariffs and Contracts for Difference

FiTs and CfDs can be differentiated on whether their financial support to offshore wind producers is either market-dependent or market- independent from current electricity market prices (Couture & Gagnon, 2010). The former type is also known as a feed-in premium and offers either a fixed bonus or an additional percentage of the electricity price on top of the actual current electricity price. An important property of this FiT system is that it does not fully mitigate market risk due to its market-dependent remuneration level. Market-independent FiT systems, however, offer a fixed price independent of market price fluctuations. This is the most widespread applied form of financial support mechanisms within Europe (Abolhosseini & Heshmati, 2014; Green & Vasilakos, 2011). Within this category, Couture and Gagnon describe some variations of this fully fixed model, namely an inflation-adjusted model, the spot market gap model, known as contracts for difference and a front-end loaded variant (Couture & Gagnon, 2010). Figure 19 below illustrates these systems respectively from left to right and top to bottom. The retail price of electricity in these figures is assumed to increase over time. This is not necessarily the case in real life as fluctuations in prices can occur in either direction. What is clear, however, is the fact that the required price level should be accurately determined. The general idea behind the FiT systems is that the electricity generated by RES is sold through long-term contracts at a fixed price, thereby mitigating all price risk for the project developers. A successful FiT, aimed at a cost-efficient deployment of RES, is set at a level equal to the actual LEC for that specific technology to avoid windfall profits (Couture & Gagnon, 2010). Determining the appropriate level can be a difficult endeavor, but the use of a tender bidding procedure could lead to cost-efficient solutions (Green & Vasilakos, 2011). In case of a tender system and FiT combination, the level of remuneration is set according a project specific tender. Couture and Gagnon (2010) conclude that an essential provision for the success of a FiT system is this stable and long-term purchase contract.

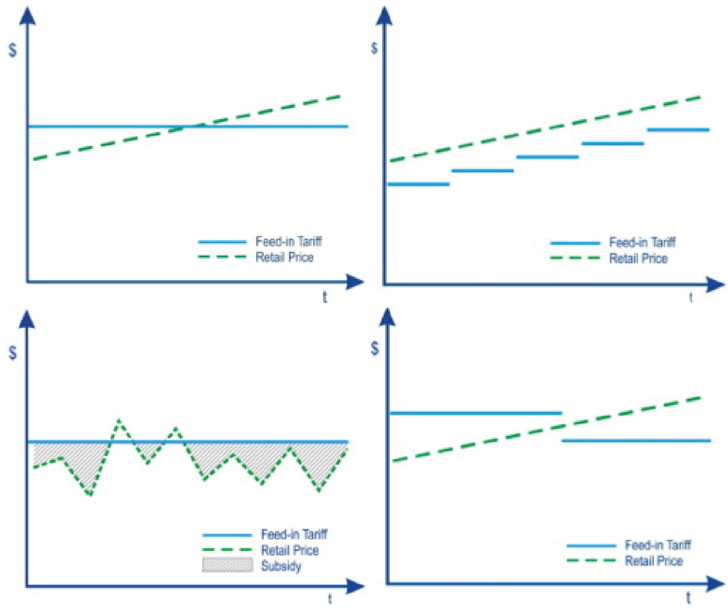

Figure 19: 4 variants of FiT systems - left to right, top to bottom: fully fixed FiT, inflation adjusted FiT; Contract for Difference; front-end loaded FiT (Source: Couture & Gagnon, 2010)

4.2.4.2 Renewable Portfolio Standards and Tradable Certificates

The second most-applied exploitation subsidy is the use of renewable portfolio standards and tradable certificates. Under this regime, energy supplier companies are obliged to supply a certain share of their electricity through RES. Every KWh produced by a generator is rewarded with (one or more) tradable certificates. Thereby, a market for tradable certificates emerges. An important advantage of tradable certificates is the price competition between different RES, thus stimulating the development of the most cost-efficient technologies (Abolhosseini & Heshmati, 2014). A distinct difference with feed-in tariffs to stimulate OWFs is that the investor is faced with price risk in both the electricity market as well as in the tradable certificates market.

4.3 Limitations in Policy Instrument Design

Analysing the different policy instruments, limitations in how policy makers throughout Europe design these instruments were found. These are related to the focus on removing externalities, the importance of policy stability, and the threat of governmental and third party opportunism.

4.3.1 The Focus on Removing Externalities

A neoclassical economic (NCE) approach seems to be the foundation for the chosen policy instruments. Policy Instruments affecting the investment costs or revenues of OWFs –like grid connection policies, up-front and exploitation subsidies- are aimed at fixing the market failure of difference in LEC between OWFs and conventional energy. Likewise, permitting consent procedures are aimed primarily at preventing conflicts of interest in use of the seabed. In line with neoclassical rationale any problems are corrected in order to re-establish properly functioning competition, whether it is in the electricity market or in the use of the seabed. In NCE reasoning, market failures like externalities justify governmental intervention (Correlje & Groenewegen, 2009). This trust in the functioning of the competitive market assumes that the economic outcomes reflect the values of the investors.

However, taking a new institutional economic (NIE) approach, the right institutions should be present before investors are able to reveal their subjective values (Correljé, Groenewegen, Künneke, & Scholten, 2014). The correction of externalities to return to a well-functioning competitive market does not give a satisfying explanation as to why investors might remain hesitant to invest. In the presence of sufficiently generous subsidy levels throughout Europe's largest offshore wind countries (Denmark, Germany United Kingdom, Belgium, Netherlands and Sweden), how else can one explain the reluctance of non-utility investors to invest in OWFs? Investor's bounded rationality may explain this. Creating a level playing field between proven and new technologies –in terms of expected returns- will often not be enough to stimulate investments in renewable energy by new entrants. Policy makers should thus consider the path dependence and experience of investors (Wüstenhagen & Menichetti, 2012) This illustrates an important interaction between policy instruments and investor characteristics.

4.3.2 The Importance of Policy Stability

In the context of bounded rationality and imperfect information the perception of a possible threat of opportunism is even more important than the actual potential of such behaviour. Changes in policy instruments are mentioned as an important barrier to invest for non-utility investors in OWFs (EWEA, 2013; Freshfields, 2014; Jongste, 2015; Pulles, 2015). Clear-sighted and stable policy is important to calm investors' concerns about the long-term energy goals and support, but governments are under pressure from consumer concerns about high subsidies (Bischoff, 2014).

4.3.3 Threat of Governmental and Third Party Opportunism

In the previous chapter, specificity in sites and physical assets and uncertainty from technology, markets, and financing were identified as challenging attributes in the transactions that make up OWF projects. Policy instruments may however raise another barrier to invest: the threat of governmental and third party opportunism.

In Williamson's traditional framework, strategic behaviour is acknowledged only in the form of counterparty risk and uncertainty in regulatory regimes are covered as a characteristic inherent in the transaction and described as a result of a lack of information. With TCR, Spiller extended the recognition of uncertainty and strategic behaviour with governmental and third party opportunism after studying the investor-government relation in utilities sectors. Levitt & Henisz (2009) have shown that infrastructure projects in general are "inherently highly politically salient, [because] of their centrality to a nation's security and well-being" (Levitt et al., 2009). In the unbundled and liberalised electricity markets of Europe, the threat of opportunism for OWF investors may exist in both forms: as an external effect on the transaction's uncertainty which may block developments and as a threat in the transactions of subsidies with the government. Figure 20 provides an overview.

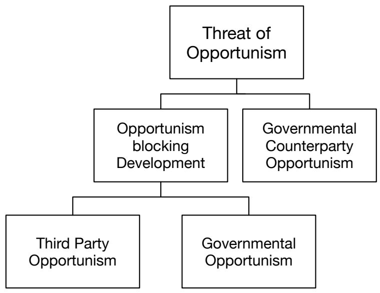

Figure 20: Threat of Opportunism in OWF investments

4.3.3.1 Opportunism blocking development

The grant of all necessary permits required to initiate the development of an OWF is a decision made by a country's policy makers. To allow the investors of an OWF to develop their OWF, these policy makers should be able to consider the possible barriers to develop at that certain site. Third party opportunism could potentially block development of a farm. One issue is the conflicting shipping routes and helicopter access to the OWFs. Other possible conflicting uses of the seabed are fisheries and oil and gas platforms. Additionally, the ecological impact should also be assessed before a permit may be granted (De Jong, 2012). Moreover, OWFs may be faced with siting issues as a consequence of opposition from local residents or interest groups. This problem has proven to be particularly relevant for near shore wind farms that are visible from land (Wolsink, 2010). The duration and complexity of the permitting consent procedure may vary greatly between countries or projects (Mani & Dhingra, 2013). Contestability of wind farm development is thus not an issue only present for onshore development. In fact, third party opposition from local interest groups or environmental organisations may also hinder offshore development. Especially developments near shore could be blocked as these fall within the visible range from shore and thus may be faced with opposition from local residents (Sullivan, Kirchler, Cothren, & Winters, 2013). Similarly, developments in close proximity of nature reserves could face resistance from environmental organisations as these OWFs may conflict with the significant natural, historical, or cultural value of a site (Wolsink, 2010). Opposition from both type of interest groups can lead to blocking or withdrawal of permits to develop a site.

Withdrawal of a permit by the government could thus be the result of third party opposition, but it may also stem from changes in a government's regulatory regime. The withdrawal of 9 permits for development of OWF sites in the Netherlands was the result of a change in supportive policy regime (Energiebusiness, 2014). European governments have the intention to promote new investments in OWFs so the decision to block development of certain (planned) sites seems in contrast with their goals. However, the threat of governmental opportunism that may block development of a certain OWF (an investor has already committed equity to) should not be ignored. A problem arises when governments implement a certain policy (e.g. permitting consent procedure) and later change the requirements or retroactively withdraw permits. This issue is referred to as time inconsistency of policy makers. Investors that are aware of this threat will not find government commitment credible (Helm, 2009).

4.3.3.2 Governmental opportunism in exploitation subsidy

Governmental opportunism may have particularly large consequences for OWF investors during the operational phase of a project if the government changes the remuneration received from the exploitation subsidy. As the direct counterparty in the provision of exploitation subsidies parallel to the sale of electricity, a country's government may thereby act opportunistically. Investors should evaluate the investment proposals of projects on the likelihood that governments will stick with their promises. Once built, an OWF operator will decide on the operation of the farm only by looking at the operational costs. If these do not exceed the market price, he/she will continue to operate the OWF, not earning back on his investment, as sunk costs are not regarded in this decision. As the merit order effect (chapter 3) and the formula for LEC of OWFs (this chapter) have illustrated, OWFs have considerably lower marginal operating costs than current market prices, thus creating room for governmental opportunism. As Spiller (1997, 2010) has shown, there are potentially conflicting interests between governments and investors in utilities. For renewable energy in Europe, there has been empirical evidence of the threat of such governmental opportunism in Spain's solar PV exploitation subsidy scheme: In 2007 and 2008, Spain realised a very large deployment of solar PV, due in large part to a very generous exploitation subsidy (a FiT). The investments stopped completely after the government decided to retroactively reduce promised subsidy as a consequence of the unsustainable costs of the system (del Río González & Mir-Artigues, 2014). Moreover, incumbent investors are then faced with sunk costs or even stranded assets. This threat of opportunism will be an important consideration for new investors when reviewing a country's offshore wind policy.

4.4 Effects of Policy Instruments on Project Attributes

Following the concepts of TCE, the role of policy may be seen as an effort to reverse the discriminating alignment hypothesis to see if the project's attributes (high asset specificity and uncertainty) can be better aligned with the preferred governance structures. Only briefly discussed by Williamson (2003) and applied in a recent study by Bekker (2014), reversing the hypothesis is an approach rarely used in TCE-analysis. But, as the institutional environment limits the room for alignment to economize on the transaction costs, this seems like a useful application in the case of OWF investments.

Appendix D shows the analysis of these effects of policy instrument design choices on uncertainty, asset specificity, and threats of opportunism. The analysis concludes that policy instruments affect the asset specificity and uncertainty associated with the transactions in OWF projects. Moreover, the threat of opportunism from governments and third parties differs among choices in policy instruments applied by countries.

4.4.1 Positive Effects of Policy Instruments

Asset specificity is most directly affected by grid connection policies. Removing the challenging aspect of the large grid connection investment can reduce the physical asset specificity.

Reduced uncertainty in terms of risks and returns seems to be the primary goal of both up-front and exploitation subsidies. Up-front subsidies generally reduce the financing uncertainty in OWF projects. Feed-in tariffs remove the uncertainty in prices of electricity, whereas tradable certificates do not. Moreover, flexibility in permits, integration of permits into a single step, or designated development zones could all reduce regulatory uncertainty in the early phase of OWF development.

The threat of third party and governmental opportunism differs among choices in policy instruments. Permitting procedures that reduce uncertainty in the development also reduce the threat of third party opportunism. Exploitation subsidies may have varying effects on the threat of opportunism. Feed-in tariffs paid by tax payers increase the threat of third party opportunism, whereas less contestable cost attribution to rate payers removes this particular threat. Tradable certificates seem less prone to this threat of third party opportunism.

4.4.2 Conflicting Effects of Policy Instruments

Observed conflicting effects of grid connection policy and permitting consent procedures suggest that investor preferences and experience (their characteristics) will determine their preferred policies. The previous section described how policy instruments generally have a downward effect on asset specificity, uncertainty, and the threat of opportunism and thereby have a positive effect on the alignment of transaction attributes with the governance of OWF projects. Based on this view, more facilitating policy instruments would be preferred by all non-utility investors in OWFs. However, possible conflicting trade-offs are observed.

4.4.2.1 Trade-off in permitting consent procedures

- Designated development zones reduce regulatory uncertainty from permitting, but lead to higher site specificity by making developers dependent on specific sites. This could form a barrier for investors that want to develop their OWF project at another location.

4.4.2.2 Trade-off in grid connection policy

- Super-shallow grid connection responsibility attribution reduces physical asset specificity but may increase regulatory uncertainty in the timely connection to the grid if responsibility for the connection is shifted to the TSO. This suggests that investors that are capable of dealing with this aspect would prefer to manage the grid connection themselves.

4.5 Findings

Policy makers in Europe apply permitting consent procedures, grid connection policies, up-front and exploitation subsidies to promote OWF investments, but there may be several limitations in how these are designed. Simply creating attractive returns and stimulating certain areas for OWF development (removing the externalities) may not be enough to attract new investors. However, the policy instruments in Europe seem to be designed from this NCE rationale. In fact, a threat of third party and governmental opportunism should be acknowledged as a possible barrier to invest. Retroactive changes in permitting consent procedures and subsidy regimes are the primary causes of these threats. Therefore, stability of a regime should be a very important design consideration.

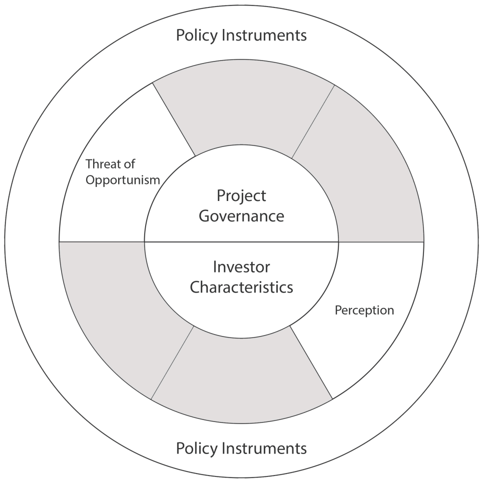

Figure 21: Interaction 1

The threat of third party and governmental opportunism should be acknowledged as a barrier to invest for non-utility investors. Policies that create a level playing field with cost of conventional energy investments might not be enough to attract inexperienced investors because of their bounded rationality. The existence of these threats of opportunism indicates that there may in fact be an important interaction between policy instruments and investors' perception (figure 21).

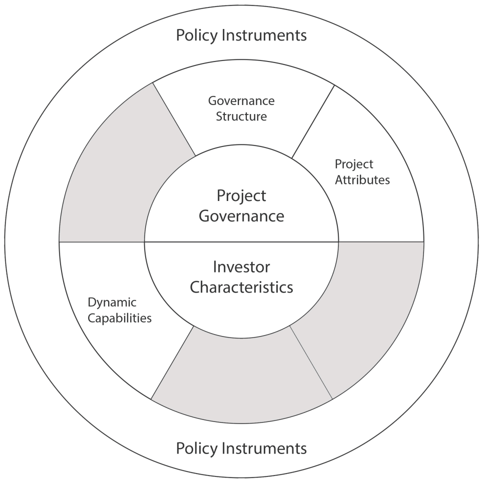

Figure 22: Interaction 2

Moreover, the attractiveness of policy instruments may differ among different investors as these could value the trade-offs between effect on asset specificity and uncertainty of policy instruments differently. The ability (dynamic capabilities) to deal with certain asset specificities or uncertainties (project attributes) would determine investors' preferences for certain policy instruments with conflicting results. This effect was primarily identified in the responsibility of grid connection and in designated development zones. Therefore, policy makers may consider implementing flexibility of policy instruments to address the specific expertise or needs of investors in a certain project. The existence of this relation indicates that there may in fact be an important interaction between policy instruments' effects on project attributes and investors' dynamic capabilities (figure 22).

5. Investor Characteristics in Offshore Wind Farms

This chapter analyses the differences between investors in OWFs, based on the concepts of behavioural finance and dynamic capabilities. First, the possible investor types are analysed. Second, the investor characteristics that determine their heterogeneity are explored. For each characteristic, it's reviewed how it may be related to project governance and policy instruments. Thereby, an answer is given to the following question:

> Which investor characteristics determine the (successful) involvement in offshore wind farms?

5.1 Offshore Wind Investors

To study investments in OWFs throughout Europe, an analysis of Europe's 59 OWFs and 155 investments of various investors has been conducted. The results of this analysis can be found in appendix A. Conclusions in this section are partially based on this analysis.

5.1.1 Traditional Investors in Offshore Wind Farms

As mentioned before, utilities have historically financed many OWFs from their balance sheet. This prominent role for classic power producers can still be seen when looking at current cumulative investments throughout Europe. Utilities own over 65% of installed capacity in Europe (Figure 23). Utilities traditionally kept a majority stake in the OWF throughout all project phases. If utilities required extra liquidity, they would generally use corporate financing. Attracting project finance was considered a risk, as too much control and influence would be granted to lenders. Additionally, commercial lenders did not feel comfortable lending to such innovative energy projects through project finance (Van Pelt, 2015).

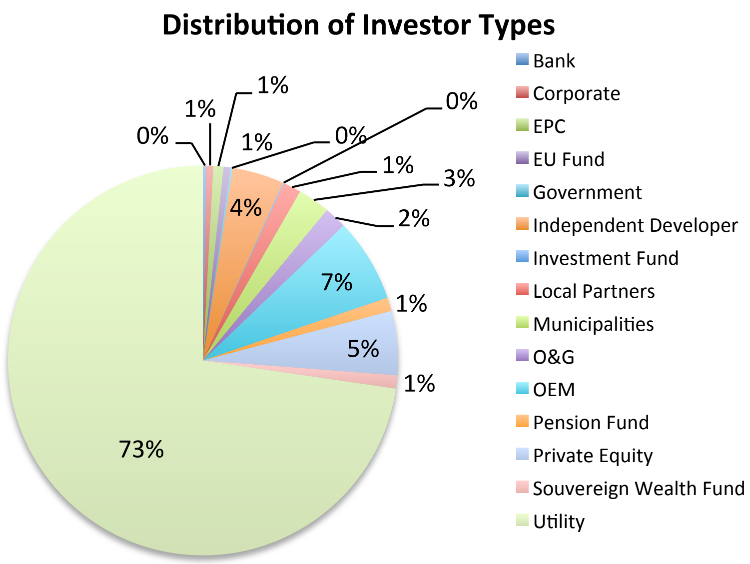

Figure 23: Distribution capacity (shares) per investor type (Source: Appendix A)

If utilities did take a loan on an OWF project, it would typically be post-construction once the OWF became operational. Refinancing at this phase by means of project finance allowed for utilities to take a relatively cheap loan (as all development and construction risks had been overcome). These divestments were driven by the balance-sheet constraints that utilities were faced with (Phillips, 2012; Pulles, 2015). Refinancing a stake in the OWF frees up capital to recycle in new investments and raises the farm's return on equity. An early example of such introduction of post-construction debt is the North Hoyle OWF in the UK, where a 50% stake was refinanced with debt in 2004 (Phillips, 2012).

5.1.2 Non-utility Investors in Offshore Wind Farms

Figure 24 indicates the distribution of OWF capacity among currently active non-utility investors. A large role for independent developers, local partners, municipalities, O&G companies, OEMs, and private equities can be observed. Other non-utility investors that seem (increasingly) active as investors are institutional investors (pension and investment funds) and EPC companies (Appendix A).

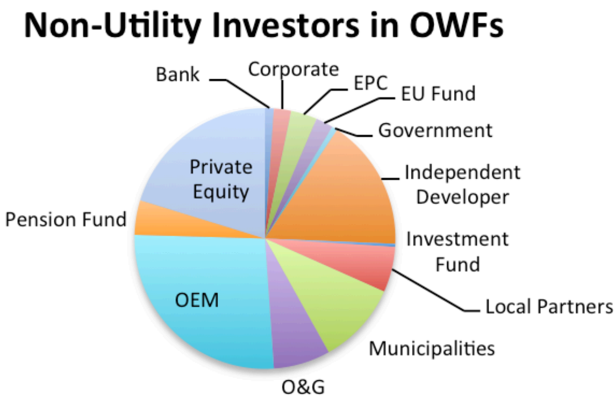

Figure 24: Distribution of capacity (shares) among non-utility investors (Appendix A)

In the remainder of this chapter, the identified investor types active in current cumulative capacity throughout Europe will be analysed based on the concepts of the conceptual framework: dynamic capabilities, financial requirements, and perception. These non-utility investor types are:

- Independent Developers
- Private Equity
- Corporates
- Local Partners
- Municipalities
- O&G Companies
- OEM Companies
- EPC Companies
- Institutional Investors

5.2 Dynamic Capabilities

As described in chapter 2, dynamic capabilities of investors may originate from learning effects shaped by experience, resource endowment, and opportunities shaped by motives.

5.2.1 Experience

Learning is an important part of dynamic capabilities and is shaped by the processes of an investor and can therefore originate from an OWF investor's experience. Experience in earlier OWFs or renewable investments may play a significant positive role in investment decisions of non-utility investors in OWFs. The presence of high human asset specificity as found from the analysis in chapter

3 required to successfully make OWF investments, could be developed by having experience in earlier investments. In line with NIE, first-time investments in OWFs are associated with high transaction costs that could form a potential barrier to invest. Results from current investments in Belgium show a recurrence of the same non-utility investors in Belgium's OWF projects (figure 25). Which illustrates the possible advantages of having prior experience in RES or even OWF projects.

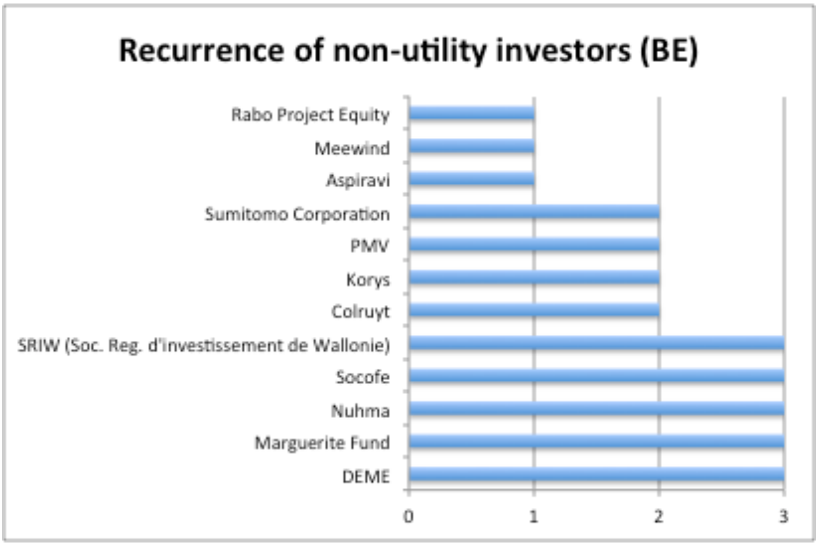

Figure 25: Recurrence of non-utility investors (Appendix A)

Experience from earlier OWF projects or related activities can also come from managerial or technological experiences gained in positions at other organisations. Typhoon Offshore, a Dutch independent developer of the Gemini wind farm (600 MW) exemplifies this kind of experience: Founded in 2010, the team had beforehand already gained experience in financing, contracting, and structuring OWF projects in earlier organisations (Typhoon Offshore, n.d.). Technological experience is typically more present with firms specialised in the technical features of OWFs.

For each non-utility investor the level of experience may be different, but based on the different investor types their experience can be justified. Table 5 provides an overview of the typical experience each investor type may have. These findings are based on the conducted expert interviews, the data analysis of appendix A, and a variety of other sources.

Non-utility Investor Type	Type of Experience	Justification
Independent Developer	Technology, Managerial	Independent developers may have managerial and technology experience from on shore wind or prior positions at (large) utilities (EWEA, 2013; Typhoon Offshore, n.d.; Wpd, 2014). It should be noted that there have also been many examples of unsuccessful independent developers that were unable to deal with the complex combination of regulatory, technical, managerial aspects (Pulles, 2015).
Private Equity	-	Private equities have generally little experience in OWF projects. Only five private equity firms have invested in the current cumulative capacity (Appendix A).
Corporates	-	As a sector unrelated to their main business, the OWF sector is a relatively new field for most corporates (Appendix A).
Local Partners	-	Local partners seldom have prior experience before investing in a regional project.
Municipalities	-	Municipalities seldom have prior experience before investing in a regional project.
O&G Companies	Technology, Managerial	O&G companies have technology and managerial experience from related engineering tasks and large-scale project management (Pembina Institute, 2013).
OEM Companies	Technology, Managerial	OEM and EPC companies have evident technology and managerial experience from the turbines, foundation structures or cabling and large-scale project management.
EPC Companies		
Institutional Investors	-	Institutional investors have generally little experience in OWF projects (Appendix A)

Table 5: Experience per investor type

Prior experience in managing contracts with EPC and OEM companies could mean that the behavioural uncertainty of a counterparty in the connection to the onshore grid can be actively managed. This could affect the response to policy makers' choice to integrate and manage the connection to the grid by another party, such as the TSO. A study by Hertie School of Governance (2015) reviewed cost overruns and delays in German OWF projects and concluded that a key issue is the governance problem created by the separation between the private OWF developers and the regulated TSO, which leads to liability issues in case of delays. Moreover, they conclude that the impact of such time delays is underexplored (Kostka & Anzinger, 2015). Experience in the technology or management of grid connections may therefore be very useful. This illustrates that more experienced OWF investors could prefer to manage the grid connection and the related risks themselves, rather than being dependent on (semi-) public bodies (Jongste, 2015). In contrast, completely new investors might appreciate such policy instruments.

5.2.2 Resource Endowment

Applying the resource-based view, Dunne et al. (2009) has shown that useful resources in dynamic and technically advanced sectors can be technical, financial, or relational. Resource endowment of technology and intellectual property can come from an investor's background or original line of business (Dunne, Gopalakrishnan, & Scillitoe, 2009). Technology assets are available only to those investors that have an overlapping field of business with OWF projects such as OEM, EPC, and O&G companies. Financial assets are generally more widespread available to mature investors with successful experience in other fields. The third form of resource endowment comes from a company's reputation or its relation with regulators, suppliers or customers in the OWF supply chain. Relations with regulatory bodies or other (semi-)public parties (e.g. TSOs) that take place in essential interactions with OWF investors may also be a valuable resource. Figure 26 provides an overview.

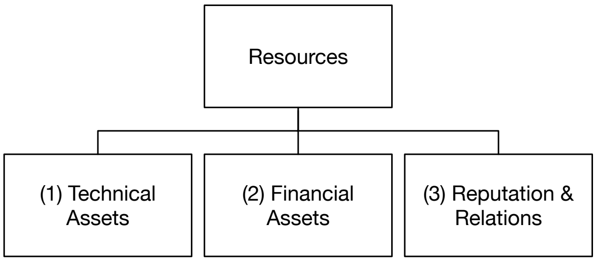

Figure 26: OWF investors' resources

For each non-utility investor the level of resource endowment may be different, but based on the different investor types their resource endowment may be assumed. Table 6 provides an overview of the typical resource endowment each investor type may have. These findings are based on the conducted expert interviews, the data analysis of appendix A, and a variety of other sources.

Non-utility Investor Type	Source of resource endowment	Justification
Independent Developer	Relations	Independent developers are typically small asset-light companies, but their experience may provide useful relations (Pulles, 2015)
Private Equity	Financial assets	While private equity may differ greatly in size, their availability of financial assets can be assumed
Corporates	Financial assets	While corporates may differ greatly in size, their availability of financial assets can be assumed
Local Partners	-	As local partners are often residents or small to medium sized companies in other lines of business, their resource endowment is generally low
Municipalities	Relations	Municipalities potentially have relations with policy makers at a national level
O&G Companies	Financial assets, technology assets, relations	O&G companies have access to financial and technical means as well as useful relations. Investments in OWFs play to the strengths of O&G companies — low cost of capital, skilled at resource characterization, and stakeholder engagement through their network (Pembina Institute, 2013).
OEM Companies	Financial assets, technology assets, relations	Originate from the company's core business (offshore engineering, dredging, construction, (onshore) wind turbine production, etc.) which has several similarities with OWF investments
EPC Companies		
Institutional Investors	Financial assets	Institutional investors have access to financial assets from their cash reserves. Globally, investment funds, insurance funds and pension funds make up for USD 69,6 trillion of the USD 71,1 trillion assets held by all institutional investors (Kaminker & Stewart, 2012).

Table 6: Resource endowment per investor type

Technological assets may give OWF investors the means to deal with higher physical asset specificity. Moreover, financial assets, relations and strong reputations may give OWF investors the advantage to be resilient to financing uncertainty. Relations with offtakers can also be useful to deal with uncertainty from behavioural opportunism of the counterparty in the offtake of electricity.

In general, it can be argued that investors with a low resource endowment are less able to deal with the issues of high asset specificity and uncertainty inherent in OWF projects. Therefore more facilitating policy instruments (with significant reducing effects on the investment attributes, as shown in chapter 4) may be suggested if policy makers wish to attract non-utility investors with a limited resource endowment.

5.2.3 Motives

The opportunity that is created by making an investment in an OWF determines the motive for non-utility investors to be active in OWFs. In reality investors usually have several motives to invest, but often there is one driving force. Moreover, making a healthy profit on any investment is obviously a requirement for any investor. Mignon & Bergek (2011) have identified possible investor motives in RES investments (Mignon & Bergek, 2011). An adaption of these motives based on the nature of OWFs in particular and the argument that profit is a basic driver -if not an ever-present premise to invest- leads to the following possible motives: strategy, diversification, solution, and sustainability (figure 27).

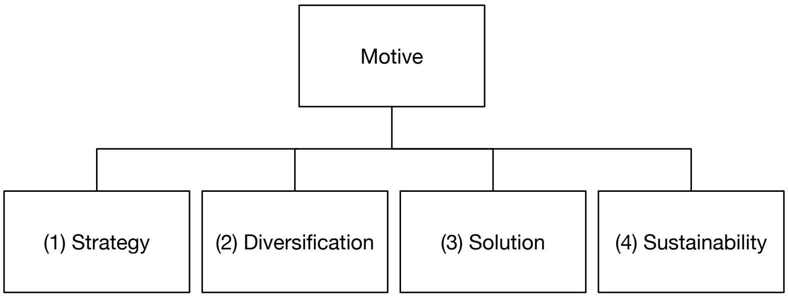

Figure 27: OWF investors' motives

The main motive to invest may be the simple fact that it is in an investor's strategic interest to invest in OWFs. This could be as a part of their core business, similar to the traditional utility investors. For other investor types, the strategic interest may be that the investment could support their interest or core business. Another motive to invest could be to diversify the current (energy) portfolio. Diversification of a portfolio is often sought-after to increase or secure a certain profit level. A third possible motive to invest may be to provide a solution to a specific issue or need (e.g. a dedicated OWF to provide the independent supply of energy to local industry or community). Sustainability goals may form the final driver for OWF investments.

For each non-utility investor the opportunity may be different, but based on the different investor types their motive can be assumed. Table 7 provides an overview of the typical motives each investor type may have. These findings are based on the conducted expert interviews, the data analysis of appendix A, and a variety of other sources.

Non-utility Investor Type	Motive(s)	Justification
Independent Developers	Strategy	Independent developers can make a very large return during a relatively short part of the OWFs life cycle, after which it seeks to divest its stake (EWEA, 2013).
Private Equity	Diversification	OWFs could offer interesting diversification options for private equity. Examplified by Blackstone Group as the majority investor (80%) in Meerwind OWF (GE) (Appendix A).
Corporates	Sustainability	Driven by the requirements to own green power, large corporates may invest in OWFs. Sustainability targets are successfully incorporated in the remuneration of executives of large corporates to achieve sustainable goals (Rosendaal, 2011).
Local Partners	Solution, Sustainability	Local industries could benefit from the supply of energy. This could either be driven by a wish to have an independent source of electricity (solution-driven) or to achieve green power requirements (sustainability-driven).
Municipalities	Solution, Sustainability	Municipalities could take an interest in developing an OWF to promote or develop their region. Depending on the local needs, this could be either driven by sustainability or to find a solution for energy demand or independence.
O&G Companies	Diversification, Strategy	OWFs offer O&G companies the means to diversify energy inputs, products and services in the face of volatile energy input costs and peaking or declining oil demand in key markets, thereby securing future profits. Moreover, O&G companies can position themselves for a potential transition in energy markets, signalled by the rapid pace of cost reduction for many RES technologies (Pembina Institute, 2013).
OEM Companies	Strategy	OEM and EPC companies may decide to invest as a sign of commitment to completion of contracts without cost overruns or delays. Taking an ownership stake in a project can be an important differentiator in being awarded a contract (EWEA, 2013).
EPC Companies		
Institutional Investors	Diversification	OWFs could offer interesting diversification options for institutional investors. Since the crisis, there is a limited availability of long term, low risk yields (traditionally bonds) (EWEA, 2013).

Table 7: Opportunity per investor type

An investor's main driver may determine its most important barriers to invest in OWFs. Consequently, the critical policy instrument that will determine their response may vary between investors. Mignon & Bergek (2011) argue that different policy instruments influence different investors. Their motives to invest in a renewable energy -categorised as profit-driven, technology-driven, solution-driven or efficiency-driven- determine their response to (changes in) policy instruments (Mignon & Bergek, 2011). Solution- and strategy-driven investors will require making the OWF investment as a vital part of their business. Therefore, it may be argued, that permitting consent procedure is the most important determinant for their investment. Solution- and strategy-driven investors will be less reactive to subsidies affecting the expected pay-off of their investment. On the contrary, profit-driven investors who make their decision purely on the basis of an expected return or a reduced portfolio risk will evaluate the suitability of a policy regime primarily on its subsidies directly affecting the expected cashflow. Purely sustainability-driven investors will be far less responsive to policy.

5.3 Financial Requirements

Risk and return are the traditional notions by which an investment may be described. It's therefore logical that an investor's risk and return requirements should match their part within a project. Risk and return may differ per project as a result of differences in asset specificity and uncertainty through the used technologies, site-specific conditions, contract arrangements and regulatory framework. The choice in policy instruments plays a major role in the resulting risk and return of an OWF. Therefore, different OWF projects –among others as a result of different policy instruments- may attract different investors. The types of risks investors are comfortable with and the level of returns they require differ significantly between investor types. Each investor type evaluates a different set of metrics in investment decisions (Climate Policy Initiative, 2011). To analyse the different attitudes of investors, their preferred involvement per project phase is used as a proxy for their specific risk or return requirements. The actual risk or return requirements are often confidential and may differ per investor. The reason each investor type prefers involvement in a different phase may be their desire to make a return within a certain investment horizon or because they are uncomfortable with the risks in other phases. Table 8 provides an overview.

Non-utility Investor Type	**Preferred phases**	**Reason**	**Justification**
Independent Developers	Development	Return	Independent developers aim to make their return during a relatively short part of the OWFs life cycle, after which it seeks to divest its stake (EWEA, 2013).
Private Equity	Operational	Risk	Private equities are likely still averse towards development and construction risks as a result of their limited experience (Appendix A).
Corporates	Operational	Risk	Corporates are likely still averse towards development and construction risks as a result of their limited experience (Jongste, 2015).
Local Partners	All	-	Likely driven by the desire to realise a regional OWF, local partners and municipalities acknowledge the need to take an active ownership in each phase.
Municipalities			
O&G Companies	All	Return	O&G companies are more accustomed to the development and construction risks, as these are similar to offshore O&G projects (Dirks, 2015).
OEM Companies	Development, Construction	Return	The invested capital through the equity participation can be deployed more efficiently in equipment to support the core business (Dirks, 2015).
EPC Companies			
Institutional Investors	Operational	Risk	Institutional investors are generally more risk averse than other investors because they manage other people's assets. Development and construction risks are considered a possible barrier to invest (Freshfields, 2014).

Table 8: Risk and return requirements per investor type

As shown in chapter 3, the different phases of an OWF project carry different risks and may therefore attract different investors based on their risk/return profile. This may create a scarcity of available capital in the high-risk development and construction phases. Especially during construction -when large investments are required- the availability of funding is considered an issue (Pulles, 2015). In conclusion, there is a need to mitigate construction risks if project sponsors want to attract risk averse investors (e.g. institutional investors) in the construction phase (Freshfields, 2014).

5.3.1.1 Project governance solutions to risk/return mismatch

Solutions to the differences and mismatches in risk/return requirements between different investors and project phases may be found in both the governance of OWF projects as well as in the design of policy instruments.

The contracting of the electricity offtake through a PPA can mitigate market risks otherwise present in the offtake through spot market governance (see chapter 3). A PPA may be a premise for attracting certain risk averse non-utility investors like institutional investors (Pulles, 2015).

By using a simple contracting structure to reduce counterparty risks, project sponsors may seek to attract investments from non-utility investors in development and construction phase of a project. Based on Freshfields' (2014) market-survey the expected preferred structure for future OWFs is a simple SPV that allows for minimized construction risk (less interface risk) and facilitates changes in ownership throughout project phases (Freshfields, 2014). The simplicity of this structure creates benefits of clarity of income flows, ownership and responsibilities, and contracts with counterparties.

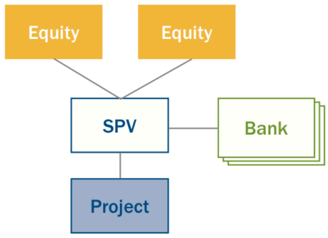

Figure 28: Project Structure - Special Purpose Vehicle

Within a project's governance structure, other innovative solutions can be created to realise alignment between the risks inherent in the investment opportunity and the risk/return profile of possible investors. DONG energy has proven to be very successful in doing so by offering so-called EPC wraps in four divestments since 2010. In these contractual agreements, DONG retained the liability for all construction risks and committed to complete construction in time, at a fixed price. This means other investors would have to carry no construction risk (Freshfields, 2014). In 2011, DONG energy divested a 50% stake to two pension funds during the development phase of its Anholdt project using this solution to the issue of risk/return mismatch (Phillips, 2012).

5.3.1.2 Policy instrument implications for risk/return mismatch

Not all project sponsors are able to facilitate such solutions themselves, as they require a strong balance sheet to mitigate any contingencies. Policy instruments that affect the availability of financing means could therefore be a solution to fund the development and construction phases. The provision of financing through up-front subsidies by state-owned investment banks are suggested as a way to cover the scarcity of funds for these phases (Pulles, 2015). Moreover, the backing of a project by a government could create trust with other investors and commercial lenders alike.

A second implication of differences in risk and return requirements of non-utility investors is their possible different preference in exploitation subsidies. Systems of FiTs generally provide more steady returns, whereas a system with tradable certificates has the potential for up-sides. However, the difference between OWFs' LEC and market prices throughout Europe have shown that systems with a fixed remuneration are the preferred exploitation subsidy, regardless of such requirements (Couture & Gagnon, 2010).

5.4 Perception

An important implication of bounded rationality is the existence of path dependency. In the context of this research, path dependency may exist when investors have made prior investments in either renewable or conventional energy or have shunned energy investments from their portfolio altogether. Policy makers trying to stimulate investments in offshore wind must thus be sensitive for history. Incumbents will have vested interests and perceptions will be based on past experiences. Creating a level playing field –in terms of expected returns- will often not enough to stimulate investments in new technologies because of this existence of path dependency (Wüstenhagen & Menichetti, 2012).

A clear perception of a country's policy instruments regime could allow non-utility investors in OWFs to better estimate the potential of threats of opportunism by third parties and the government itself.

Assuming that governments apply the right policy instruments, this suggests that better-informed investors will likely make more investments. Changes in regulatory regimes, could thus result in a very slow entrance of new, inexperienced investors, as these would not be able to assess the possibilities of changing conditions. To stimulate the entrance of new investors, policy makers should thus seek to commit to stable policies. Moreover, foreign investors will be more hesitant to enter markets in which they have little or no experience with the stability of policy.

In contrast, changing policy regimes that may be interpreted as governmental opportunism (see chapter 4) that can destroy trust and may affect the perception of investors for many years. The situation in Spain's solar PV sector serves as an excellent example where ex post reductions in exploitation subsidies after the start of operational life of solar PV projects have significantly damaged investors' trust in the Spanish renewable energy policy (del Río González & Mir-Artigues, 2014; Jongste, 2015). Moreover, the recent withdrawal of permits by the Dutch government may have also damaged the perception of investors with a vested interest in those projects (Energiebusiness, 2014). These examples of governmental opportunism (both described in chapter 4) suggest that the perception of policy regimes by investors could be affected by changes in the policy instruments.

5.5 Findings

This chapter described the differences between investors, based on the concepts of behavioural finance and dynamic capabilities. Non-utility investors can be independent developers, private equities, corporates, local partners, municipalities, O&G companies, OEM and EPC companies, and institutional investors. Each investor type may have technical and/or managerial experience; technical, financial or relational resource endowment; and different motives to invest in OWFs. These dynamic capabilities define investors' ability to be successful in OWF investments, but none of the investor types shows all of these characteristics. Moreover, investors have different financial requirements in terms of risk and return. This could affect their willingness to participate in certain (parts of) a project and determine their moment of investment or divestment within a project. Finally, perception of a policy regime is an important implication of acknowledging the bounded rationality of investors.

The investor characteristics have been related to project governance and the effects of different policy instruments to analyse the assumed interactions between these elements of the framework.

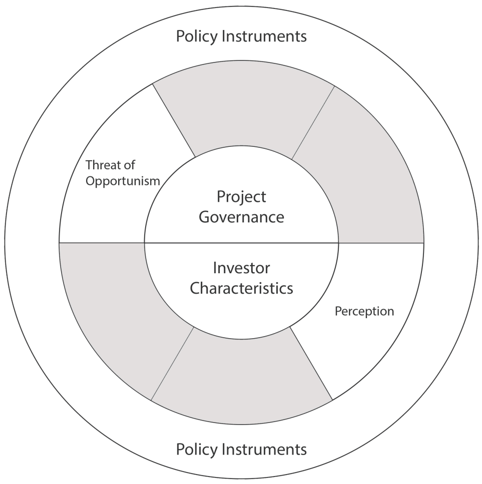

Figure 29: Interaction 1

As already extensively discussed in chapter 4, an interaction between policy instruments, threat of opportunism, and investors' perception seems to exist (figure 29). A clear perception of a country's policy instruments regime is key in estimating the threat of opportunism. This suggests that better-informed investors will likely make more investments (assuming policy instruments are suitably applied by governments). Consequently, changes in policy instrument regimes may be a threat for attracting new investors. Stability of a policy regime seems key in attracting non-utility investors.

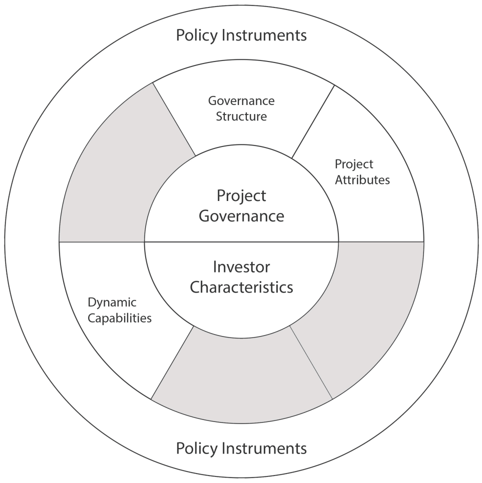

Figure 30: Interaction 2

The interaction between investors' dynamic capabilities, a project's attributes and governance structure, and policy instruments was further explored (figure 30). The combination of several investors in a project seems logical as their individual experience is generally low and resource endowment and motive will likely substantially differ per investor. These dynamic capabilities of investors will likely affect which aspects of a project (poject attributes) they are comfortable with. This interaction is in fact in line with studies on resource dependency in strategic alliances (Das & Teng, 2000; Ferrier, 2013) and the underlying assumptions of the new institutional school of economics. Managerial or technological experience is expected to play an important role in non-utility investors' activity in the offshore wind sector. Based on the analysis in this chapter, most non-utility investors in OWFs generally seem to have limited experience in OWF investments. The response to policy instruments that regulate the grid connection could be affected by an investor's experience. It is expected that more experienced investors would prefer to manage the grid connection, because of liability issues with the regulated TSOs. Based on the analysis, it is expected that resource endowment in technological, financial, or relational assets provide non-utility investors the means to deal with the sector's high asset specificity and uncertainty and therefore, those investors will be responsible for these aspects of a project which is reflected in the governance structure.

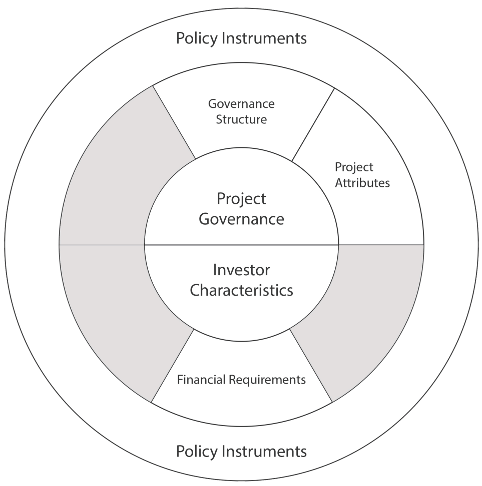

Figure 31: Interaction 3

A new interaction was observed between investors' financial requirements (risk and/or return), a project's attributes and governance structure, and the policy instruments applied (figure 31). Risk and return requirements differ between possible investors. The governance structure of a project can provide solutions of alignment between the project's risk/return profile and an investor's requirements. Examples include PPAs, EPC-wraps, and governance structures that allow changes in ownership (e.g. SPVs). Therefore, policy makers must consider this interaction, because their policy instruments (in particular subsidies and cost attributions) can affect a project's risk/return profile throughout its different phases.

PART IV: CASE STUDY ANALYSIS

6. Applying the Conceptual Framework in Case Studies

This chapter applies the framework to study the interactions between project governance, investor characteristics, and policy instruments in three rich case descriptions. The case studies will contribute as a way of validation of the framework. Validation in this study concerns whether the identified interactions of the framework represent the reality as observed in the real-life examples. This chapter thereby aims to answer the question:

> How have non-utility investors been involved in existing offshore wind farms?

6.1 Selection of Case Studies

The nature of the case study analysis is *comparative.* Reviewing multiple cases would result in similar results if the framework -and our expectations of the real-life existence of these interactions- had been based on a single theory suggesting one best approach to realizing OWF investments. As suggested in the previous chapters, however, we expect that the interaction of OWF project governance, affected by different policy instruments, and governed by different investor types will present itself in different ways between the selected cases. Different cases will show different policy instruments, governance forms and investor combinations, but each is expected to show the beforementioned interactions in some way. Therefore, the selection of cases is based on the following criteria, warranting a broad range of presence of the different concepts from the framework:

- *Different institutional contexts*: All cases are selected within the scope of this research (Europe). However, by exploring cases from different countries, different policy instrument regimes are reviewed. This will contribute to identifying different threats of opportunism as a result of different policy instruments;
- *Involvement of non-utility investors*: A (large) role for one or more non-utility investor(s) is essential to answer the research question. Moreover, these investors must be different between projects to reflect on the effects of different investor characteristics;
- *Similarly challenging projects*: The cases should be challenging in terms of scope (capacity, distance to shore, investment requirements, etc.) to warrant the presence of high asset specificity and uncertainty (project attributes) in order to reflect on the earlier statement that not only project attributes determine the governance structure but investor characteristics are critical as well;
- *(Nearly) operational:* In order to make observations throughout all the project phases and see whether different phases attracted different investors;
- *Availability of information*: Sufficient data should be available on all cases. Data will be obtained through publicly available documentation, discussions with ING Bank employees, and two interviews per case with project investors.

6.2 Structure of Case Studies

Each case study starts with a short summary of the project, discussing its history, location, and investors. In the subsequent section of each case the three interactions that have been identified in the operationalisation of the framework (Chapters 3, 4, and 5) are used as a guiding structure to reflect on the observations in each case. These interactions relate policy instruments with project governance and investor characteristics through (Figure 32):

- Threat of opportunism and perception
- Dynamic capabilities, project attributes and governance structure
- Financial requirements, project attributes and governance structure

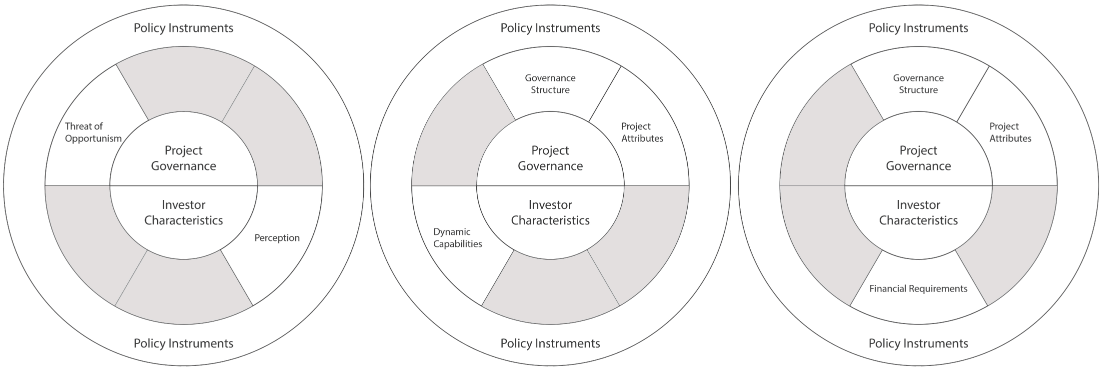

Figure 32: Framework interactions

Additionally, any other interesting observations in the cases are discussed.

6.3 Case A: Belwind Offshore Wind Farm

6.3.1 Case Summary

Project Name	Belwind Offshore Wind Farm
Capacity	165 MW
Location	Bligh Bank, North Sea, 46 km of Zeebrugge (BE)
Involved Investors	Parkwind, Rabo Project Equity, Sumitomo, Meewind
Start Development	June 2006
Start Construction	August 2009
Operational	December 2010

Table 9: Belwind project details

Figure 33: Belwind location

Belwind is a 165 MW OWF located on the Bligh Bank 46 km of the coast of Belgium near Zeebrugge. Development of the project started in June 2006 by Econcern. After the company went bankrupt in 2009, the project was up for sale. Parkwind acquired the project and later Rabo Private Equity, Sumitomo and Meewind became involved. Parkwind is an independent OWF developer and operator of OWFs in Belgium founded by Colruyt. Parkwind was founded because Colruyt wanted to retain focus on its core business and not become an OWF developer. Belwind was the first project developed by Parkwind, but afterwards continued as an independent developer in several other

Belgium OWFs (Bauer, 2015). Parkwind's shareholders are Colruyt, Korys, and PMV. Colruyt is a family-owned, Belgium company that originated as a supermarket chain that distinguishes itself by low prices and sober stores. The Colruyt Group now exists of several retail divisions with a shared focus on sustainability (Bauer, 2015). Korys is the Colruyt Group's investment structure which aims to create sustainable value. The Investment Company Flander (Dutch: Participatie Maatschappij Vlaanderen) (PMV) is an investment company that invests in sustainable projects in the Flanders region with private investors through funds. Rabo Project Equity was a captive renewable energy investment fund of the Rabobank. Rabobank joined the Belwind project through this equity investment in support of their participation as a debt provider. Sumitomo Corporation is a large Japanese integrated trade corporation with over 800 different businesses and subsidiaries worldwide. The company has a strong history and a very diverse set of activities in among others metal products, transportation & construction, infrastructure, and mineral resources & energy (Sumitomo Corporation, 2015). Meewind is a Dutch investment fund that attracts funds from private investors, companies, and low-level governments to invest in renewable energy projects. Meewind consists of two funds, of which its Zeewind fund focuses solely on OWFs. The Belwind OWF is structured as an SPV. The project is an excellent example of the transition from the classic balance sheet financed project as part of the historically integrated utility firms as it was the first of its kind in Belgium (Belwind Offshore Energy, 2009).

6.3.2 Threat of opportunism and perception

The award of the permit for the development of Belwind was granted to the previous owner of the project; therefore no important threats of opportunism were ever a barrier during the development phase of the current project setup. Overall, investors' perception was generally positive.

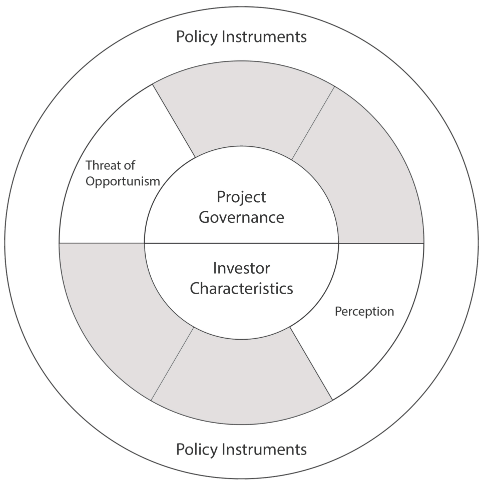

Figure 34: Interaction 1

By Royal Decree on 17 May 2004, the Belgium federal government has appointed 'Windzones' to be developed by private investors. These windzones were divided into concessions (FOD Economie, 2012). The appointment of suitable windzones had been done in accordance with possible future developers (at the time mainly utilities) (Bauer, 2015). In order to win the concession, the original developer of the project (Econcern) had to make a case and execution of the necessary environmental impact assessments were conducted by a specialised scientific body, the MUMM (Bauer, 2015). The cooperation between the competent ministry and the MUMM carrying out the study on the environmental impact, has led to quick and precise identification of potential environmental impacts (FOWIND, 2014). The area concession was granted in June 2007 and the permit based on the subsequent environmental impact assessment was granted in February 2008.

When the investors entered into the project (after the bankruptcy of Econcern) these early steps in the permitting were already passed. Threats of opportunism (e.g. from third parties blocking development) typically associated with early phase OWF development was also lower as a consequence hereof. Whether this had been the result of the Belgium policy regime or because of the timing of the opportunity which presented itself is questioned by the investors (Bauer, 2015). Overall, the permitting consent procedure through the system of concessions presented a clear outlook from the start of the project, which positively affected the investors' perception.

6.3.3 Dynamic capabilities, project attributes and governance structure

The investors of the consortium dealt with the asset specificity and uncertainty of the project by addressing the challenges of different project aspects with their complementary dynamic capabilities.

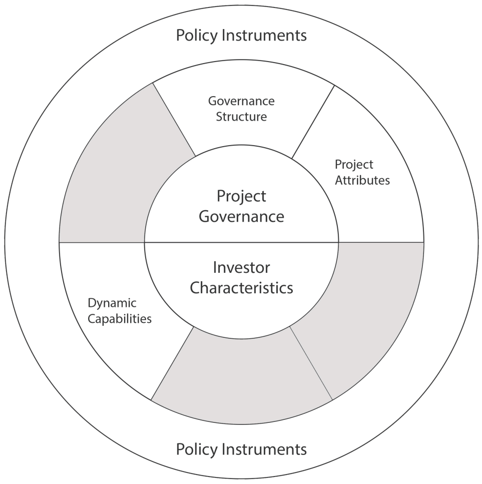

Figure 35: Interaction 2

6.3.3.1 Grid connection remained a challenging aspect given the policy regime

Belgian OWF investors bear two thirds of the grid connection cost – with a cap at €25 million – and the remaining costs are incurred by the country's TSO: Elia. (MAKE Consulting, 2015). OWF investors are, however, responsible for the construction and installation of the grid connection. Because these costs are (partially) incurred by Elia, the OWF investor is obliged to issue the award of the contract through a tendering procedure (Bauer, 2015). Physical asset specificity of the grid connection components thus remained a challenge in the Belwind project. However, the cost coverage of the grid connection by Elia reduced the financial requirements, reducing the financing uncertainty. Technological uncertainty and asset specificity, thus remained a challenge as the grid connection had to be managed by the investors.

6.3.3.2 Governance of EPC contracting provided a solution

The governance structure of EPC contracts provided a solution for the investors' limited experience (dynamic capability) in developing earlier OWFs. Parkwind was the primary responsible investor for the successful development of Belwind and today, operations of the OWF are still managed from Parkwind's office in Leuven (Bauer, 2015). Van Oord was responsible for the foundations, infield-cabling, export cable, onshore grid works and all offshore marine works. All of the EPC services were thus governed in a single contract with Van Oord, including the grid connection not covered by Belgium policy. Van Oord carried all responsibility in governing the many subcontracts, isolating the investors from this difficult task. The subcontracts governed through the contract with Van Oord were (Belwind Offshore Energy, 2009):

- Ballast Nedam Offshore: *Supplied and staffed the pile driving ship, Svanen*
- Bladt Aalborg: *Produced the steel transition pieces including J-tubes, boat landings, ladders and platforms*

- CEI de Meyer: *Responsible for dredging and backfilling of the export cable through the ship canal*
- Det Norske Veritas: *Responsible for design and certification of the foundations*
- Jack-up Barge (NL): *Supplied and staffed he self-elevating platform*
- Nexans: *Supplied the 150kV export cables*
- Parker Scanrope: *Supplied and mounted the 33kV infield cables*
- Seawind: *Consortium of Pauwels, Fabricom-GTI and DEME International. Was responsible for engineering, production and installation of the offshore transmission station and all onshore electrical infrastructure connecting to the national grid*
- Visser & Smit Marine Contractors: *Transported and installed the 150kV export cable*

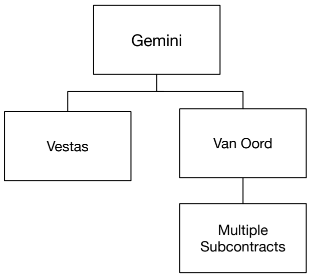

Figure 36: OEM and EPC Contracting Structure Belwind

The list of subcontractors illustrates the benefits of the reduced number of interactions with contracting companies. The complexity of governing the contracting with EPC and OEM companies was significantly reduced for Parkwind by applying this structure.

6.3.3.3 Complementary dynamic capabilities created a strong consortium

Parkwind had no prior experience in OWF investments but was able to apply some of the experience Colruyt had gained in developing smaller solar PV and onshore wind projects (Bauer, 2015). As illustrated in section 5.2.1, their experience grew significantly in the projects that followed from Belwind: Northwind and Nobelwind. The moment of investment by Parkwind was after the project had already been designed and developed by Econcern. Parkwind's trust in the technical design of Belwind allowed them to take over the project without having the extensive experience (Van Hemert, 2015). Parkwind's resource endowment is mainly financial and comes from its shareholders' strong financial position. However, without technological assets or strong relations within the sector at the time, Parkwind may be considered an investor with a rather low resource endowment. Sumitomo had extensive experience in the operation of onshore wind farms in Japan, China, and the US. Sumitomo has a total power generating capacity of 6,129 MW, of which 524 MW are wind assets (Sumitomo Corporation, 2015). The Belwind OWF, however, was its first offshore project. In the operational phase, Sumitomo joined the project adding years of experience in operating renewable energy projects, including many onshore projects. Sumitomo has a large resource endowment in technical assets and financial assets that originate from its worldwide presence in a variety of technical sectors closely related to the offshore wind sector. Moreover, Sumitomo's involvement was important for the other investors because of their strong relational bargaining power with suppliers (Smelik, 2015). The role of financial investors Rabo Private Equity and Meewind was based more on their financial assets allowing the main developer Parkwind to overcome financing uncertainty. All in all, the dynamic capabilities of the investors seem complementary and together allowed the consortium to deal with the project attributes.

6.3.4 Financial requirements, project attributes and governance structure

The choice in governance structure of ownership and electricity offtake are considered crucial determinants of the alignment of the project's risk and return with the investors' financial requirements (Bauer, 2015; Smelik, 2015).

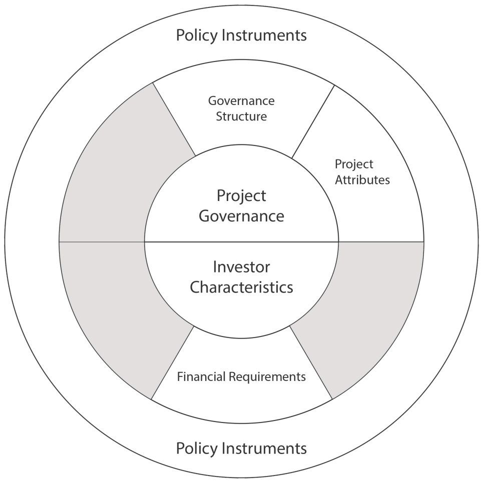

Figure 37: Interaction 3

6.3.4.1 Subsidies affected project risks and returns

The policy instruments applied in the Belwind case contributed to a favourable outlook on risks and return through up-front and exploitation subsidies.

The EIB provided a loan of €300 million, covering 49% of the project's total investment costs. This had been the first time that the EIB took on such project finance risk (Belwind Offshore Energy, 2009). Half of he EIB loan had been guaranteed by Eksport Kredit Fonden (EKF), Denmark's ECA (PFI, 2011). The involvement of these forms of state bank financing can be considered an important determinant in the successful financial close of the project given the caution of commercial lenders to provide project finance back then (Van Pelt, 2015). Moreover, In Belgium, renewable energy projects receive a tax deduction of 13% on all investments (Bauer, 2015).

Until December 2013, Belgium OWF projects received renewable obligation certificates. At the federal level and the levels of the three Belgian regions (Brussels-Capital Region, Flanders and Wallonia) schemes required TSOs to purchase renewable obligation certificates at a guaranteed minimum price (MAKE Consulting, 2015). Elia, as the TSO, performs these public service obligations and therefore is obliged to purchase these (Elia, 2012). Belwind may sell the certificates to Elia for 20 years under prevailing regulated conditions for a minimum of €107/MWh (PFI, 2011). Because of the minimum certificate price, the system effectively works like a feed-in premium as Belwind's investors receive a fixed premium on the 'grey' price of the produced electricity. The 20-year guaranteed minimum price received for the renewable obligation certificates secured a steady income from the exploitation subsidy during the operational phase of the project.

6.3.4.2 Governance structure aligned with exploitation subsidy

The governance of electricity offtake was aligned with the exploitation subsidy as granted by the Belgium government by securing a long-term agreement. The liberalised wholesale electricity market in Belgium allowed the investors to sell the electricity to any access responsible party on the national grid. The electricity offtake is governed in a 15-year PPA with Electrabel (Bauer, 2015). Electrabel is an electricity retail company active in the Benelux electricity market and part of French utility Engie (previously GDF Suez). The choice of a PPA to manage the offtake seems in line with the expectations of TCE theory, as the most suitable form of governing this transaction in the absence of a utility company as one of the project investors.

6.3.4.3 Changes in ownership aligned with risk and return requirements of investors

The governance structure was also aligned with the financial requirements of investors and their comfort with certain project attributes. Ownership changes between parent companies of the consortium occured in the operational phase of the project when Parkwind and Rabo Project Equity divested stakes. Sumitomo and Meewind joined the project at this point. Figure 38 illustrates the shares throughout the project phases. The project's governance structure, as a legally independent SPV, allowed for these changes of ownership throughout the different project phases. After the successful completion of the construction phase, Parkwind wanted to divest part of its stake in the project to free up capital for new OWF developments (Bauer, 2015). This allowed them to make an attractive, quick, return on part of their early project phase investment. Moreover, Sumitomo and Meewind were able to join the project at a point when the risks better suited their preference. These ownership changes stipulate the relationship between investor characteristics in terms of and risk or return requirements and governance structures.

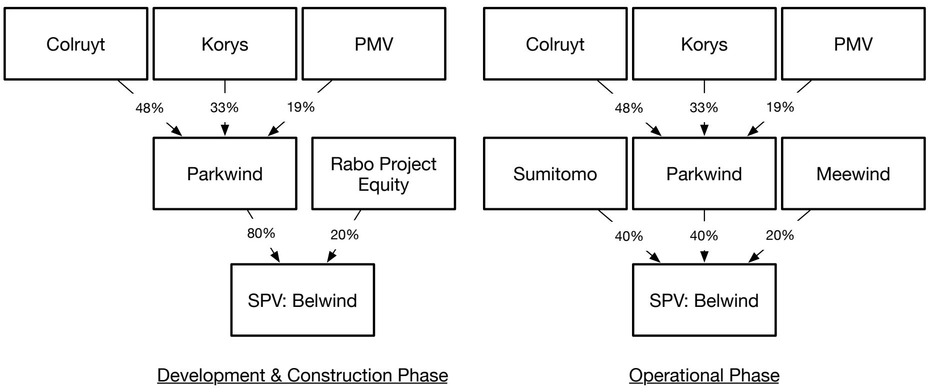

Figure 38: Investment structure Belwind

6.3.5 Additional Observation: Serendipity of Investment Decisions

The Belwind case showed that the motive to invest and serendipity play an important role in whether non-utility investors are interested in OWFs.

Belwind offered an interesting opportunity for Parkwind/Colruyt as it fits the parent company's sustainability goals and an option to gain a strong position in Belgium's offshore wind market. Moreover, the opportunity presented itself at the right time (Bauer, 2015). The bankruptcy of Econcern allowed Colruyt to set up the Parkwind and take over the development of Belwind. This opportunity to start a new OWF development company seems to be an important driver for the investment decision. The motive for Parkwind to invest and the opportunity it created allowed this relatively inexperienced, new, non-utility investor to deal with the asset specificity and uncertainty – inherent in the immature offshore wind sector- that remained a key issue despite Belgium's favourable policy regime.

Although initially focused on the Dutch OWF sector, Meewind was more or less forced to expand their scope. Meewind was founded from a motivation to catalyse a large number of OWF investments primarily in the Netherlands. After their beginning in 2006, they had promised their investors that the first OWF would be under construction within five years. When the developments in the Dutch North Sea turned out to be stalled by the discontinued Dutch policy, they expanded their focus to Belgium. The possibility to purchase the project from Econcern thus came at the right time (Smelik, 2015).

6.4 Case B: Gemini Offshore Wind Farm

6.4.1 Case Summary

Project Name	Gemini Offshore Wind Farm
Capacity	600 MW
Location	Buitengaats & Zee-energie, North Sea, 84 km of Eemshaven (NL)
Involved Investors	Typhoon Offshore, HVC Group, Northland Power, Siemens, Van Oord
Start Development	January 2009
Start Construction	May 2014
Operational	(Planned) 2017

Table 10: Gemini project details

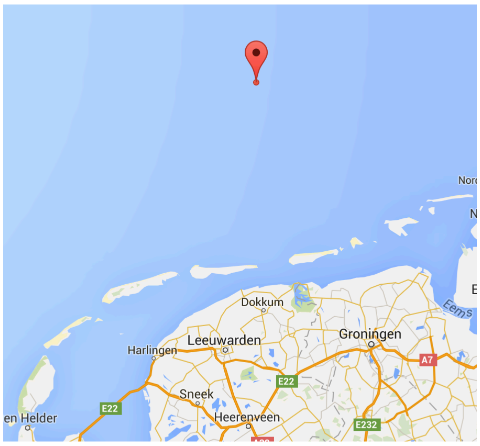

Figure 39: Gemini location

Gemini is the largest-ever built OWF in the Netherlands. Because of its very large distance to shore (84 km) and very large capacity (600 MW) the investment requirements were tremendous. The total project costs amounted to €2,8 billion, of which €2,2 billion had to be supplied through non-recourse debt provisions. This makes the share of equity to be supplied by the investors relatively small, but created a challenging task in structuring, financing, and managing the project for the sponsor (Green Giraffe, 2015).

The involved investors in the Gemini project are Typhoon Offshore, HVC Group, Northland Power, Siemens and Van Oord. Typhoon Offshore, the project's initial developer, is a young independent developer active in the offshore wind sector. HVC Group is a collaboration between municipalities and water boards in the Netherlands. By waste processing and energy production, HVC aims to contribute to the goals of the 52 municipalities and 5 water boards that own HVC (Energyvalley, 2011). HVC Group was the first equity investor to join the Gemini project after Typhoon acquired it. Northland Power became the project sponsor during the construction and operational phases. Northland Power is a Canadian independent power producer founded in 1987. Northland Power had experience in four earlier (onshore) wind energy projects. Siemens is a large German conglomerate with a wind energy division specialised in development, production and maintenance of wind turbines. Siemens Financial Services is a division that provides business-to-business financial solutions to clients within their markets (Siemens Financial Services, 2015). Van Oord is a Dutch EPC company specialised in dredging, offshore oil & gas projects, and offshore wind projects. These last two companies are both investor and contractor in the project.

6.4.2 Threat of opportunism and perception

Permitting consent procedures were not in line with the award of exploitation subsidy, which resulted in many granted permits that would later be withdrawn and other projects never receiving the necessary subsidy.

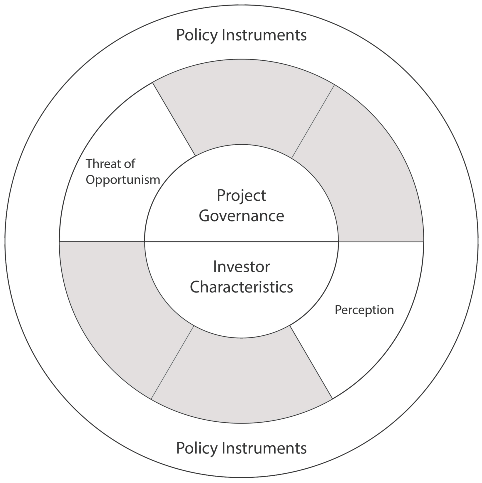

Figure 40: Interaction 1

6.4.2.1 Permitting consent procedure and exploitation subsidy

The Ministry of Infrastructure and Environment is responsible for spatial planning in the Netherlands and the Dutch part of the North Sea. In the National Water Plan constraints to OWFs had been identified. These included all areas that were to be exclusively put to uses other than the development of OWFs, such as shipping routes, fisheries, etc. The Dutch government provided developers the opportunity to make a case for sites beyond these constraints. Once the site had been chosen the developer had to perform an EIA that included an assessment of impact on other sea users, and submit plans for construction, operation, decommissioning and safety, together with the request for consent. To help developers, the government operates a 'one-desk' service, coordinating consultation processes for areas such as fishing and shipping, and permitting requirements from subsidiary and supporting activities such as landing of ships during installation and maintenance and onshore planning. If successful, the developer may start construction, but is required to commence within 3 years of the approval (FOWIND, 2014).

This meant that once the permit was acquired, the timely award of an exploitation subsidy determine whether the project could be further developed. Complexity of the Dutch exploitation subsidy regime could have caused an issue, but a good cooperation with the regulatory bodies –in particular the ministry of Economic Affairs- was mentioned as an important factor for the success of Gemini (Dirks, 2015; Green Giraffe, 2015). The Gemini project had a favourable collaboration with the Dutch government, and in particular with the ministry of Economic Affairs responsible for the award of the exploitation subsidy. The government acknowledged the importance of Gemini for realising their 2020 goals, which resulted in openness to resolving possible difficulties (Dirks, 2015).

6.4.2.2 Withdrawal of permits formed a threat of opportunism

The first-come-first-serve approach resulted into over 20 permits that were granted. It was clear that these projects were never all going to receive the required exploitation subsidy (Van Hemert, 2015). Therefore, the permitting consent procedure applied by the Dutch government was considered as a possible threat of opportunism from the outset of the project. Additionally, room for appeals because of the permitting consent procedure created a threat of third party opportunism that materialised in many other (proposed) Dutch OWFs that received their permit in the same round as Gemini.

6.4.2.3 Overall investor perception

Once contracts for exploitation subsidies are signed, the investors trust the Dutch government in their grant of subsidies. The investors in Gemini praise the Dutch system for the early clarity of the award of the exploitation subsidy. Moreover, as the exploitation subsidy was awarded to the project, rather than to the original owner (BARD), the awarded subsidy was transferred to Typhoon Offshore (Dirks, 2015; Van Hemert, 2015).however, the continuity in policies affecting the earlier stages of an OWF development is mentioned as a possible issue. Adapting to regulatory changes and recalculating the project prospects may be a barrier to new investors. The investors confirm that continuity of a policy is essential in attracting more investors to these early phases (Van Hemert, 2015).

6.4.3 Dynamic capabilities, project attributes and governance structure

The investors of the Gemini consortium dealt with the asset specificity and uncertainty (project attributes) of the project by addressing the challenges of different project aspects with their complementary dynamic capabilities. This resulted in a division of roles and responsibilities (governance structure) that all investors agreed with.

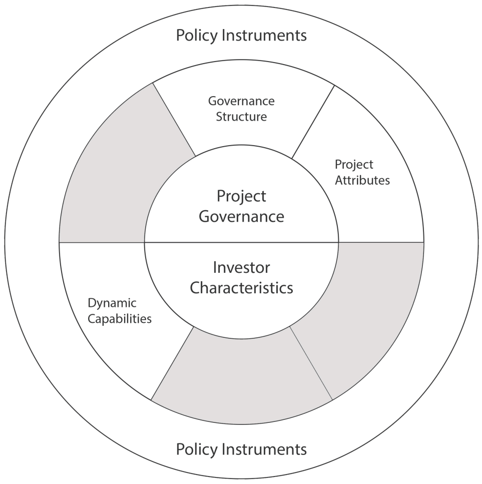

Figure 41: Interaction 2

6.4.3.1 Challenging project attributes were dealt with by investors' dynamic capabilities

The division of tasks dealing with the different aspects of the project was based on the investors' dynamic capabilities. As will be described below, the expertise of Typhoon Offshore and Northland Power were neither based on the management of interactions between contracting parties. The expertise of Van Oord in dealing with subcontractors helped with the behavioural uncertainty in governing the many subcontracts. Van Oord had the assets to execute the technical aspects. Moreover, because of their stronger balance sheet they were able to hold the responsibility for execution of those tasks (Van Hemert, 2015). Transferring the management of EPC contracts to Van Oord is considered the only way for asset-light developers to attract banks and investors (financial uncertainty) (Van Hemert, 2015).The scope of the division of responsibility was clearly divided between Siemens and Van Oord (figure 42).

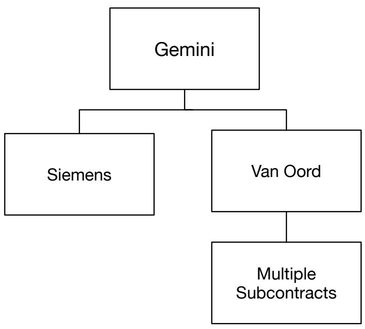

Figure 42: Contracting Structure Gemini

6.4.3.2 Grid connection remained a challenging aspect given the policy regime

The grid connection policy in the Gemini project accounted for the large asset specific investment needs by remunerating these costs through the exploitation subsidy. The offshore grid connection had to be applied for by Gemini's OWF developer to the Dutch TSO, TenneT. The costs and responsibility of connection to the grid were borne by Gemini. Tennet is responsible for any grid reinforcement needs as a consequence of the connection; these costs are transferred to the final consumers (FOWIND, 2014). The Dutch government thus applied shallow system integration for the grid connection of Gemini. However, the exploitation subsidy applied does take into consideration the costs of grid connection so the costs are covered in the total remuneration received through subsidies. The characteristics of the Gemini project (large distance to shore and large capacity) and the grid connection policy applied by the Dutch government increased the investment requirements (asset specificity).

6.4.3.3 Complementary dynamic capabilities created comfort among investors

The Gemini project company has been staffed with many of the experienced personnel of Typhoon Offshore (Van Hemert, 2015). Typhoon Offshore's team was founded by former Econcern employees. Notebly, the experience gained in the early development phase of the previous case example from Belgium (Belwind) and another Dutch OWF (Prinses Amalia) gave Typhoon Offshore's team the experience in developing OWFs. This means that although the company was founded not long ago, their experience was similar to traditional utility investors already active in the offshore wind sector (Van Hemert, 2015). Typhoon considers their large network of relations with advisors, banks, and other investors an important resource in their success. These relations had been founded by their earlier experiences (Van Hemert, 2015). Typhoon Offshore had very limited financial resources so had to attract a lot of other investors and a large share of debt to be able to deal with the high asset specificity and the financing uncertainty. Without a larger equity investor, the commercial banks would not have been willing to finance the project.

Therefore, Northland Power joined the project because of their complementary qualities with Typhoon Offshore. Northland Power had the intention of exploiting Gemini once operational to expand their presence in Europe (Van Hemert, 2015). Northland Power did not have the required managerial experience to run the development of the project. Staffing of the Gemini SPV and the project director was lead by Northland Power, but many people in the project team were transferred from Typhoon Offshore as these people had the expertise in project management (Dirks, 2015).

Moreover, as Northland Power had no prior experience with Van Oord or Siemens as contracting parties, it required their commitment through equity investments. Siemens and Van Oord were, at that time already in the picture as the intended contracting parties (Dirks, 2015). As an EPC contractor, Van Oord had experience in earlier OWF projects Prinses Amalia (NL) and Belwind (BE). However, the Gemini project was the first project that Van Oord also invested in (Dirks, 2015). Siemens had been the market leader in wind turbine production for several years and, through Siemens Financial Services, had secured this position by investing equity in earlier projects. Siemens had successfully invested in three large OWF projects prior to Gemini (table 11).

Country	**Farm**	**Capacity**	**Share Siemens Financial Services**	**Year of Completion**
United Kingdom	Lincs	270 MW	25%	2013
United Kingdom	Gwynt y Mor	576 MW	10%	2015
Germany	Butendiek	288 MW	23%	2015
Netherlands	Gemini	600 MW	20%	2017

Table 11: Investment experience Siemens (Source: Appendix A)

6.4.4 Financial requirements, project attributes, and governance structure

Upfront and exploitation subsidies granted by the Dutch government affect the risks and return of the project. Moreover, governance solutions were used to align investors' financial requirements with the expected risks and return of their participation in the project.

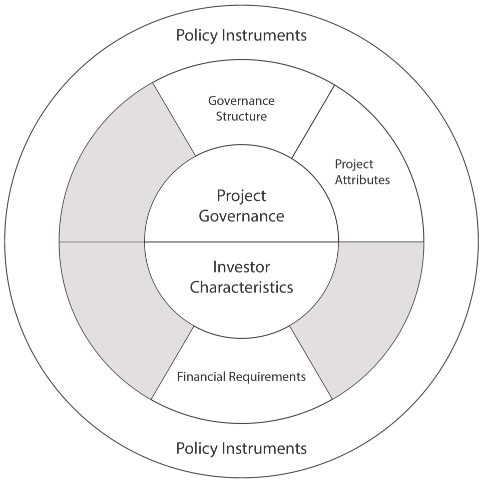

Figure 43: Interaction 3

6.4.4.1 Subsidies affected the expected return of the project

Gemini will receive a steady return on its investment through the exploitation subsidy received. In the Netherlands the Sustainable Energy Production Incentive (In Dutch: Stimulering Duurzame Energieproductie (SDE)) support OWFs. The SDE works like a sliding premium tariff set by competitive auction, with a ceiling price set by the government. The available budget for all possible OWFs in the Netherlands to be divided through the SDE is set annually. For OWF developers, the subsidy was auctioned in rounds between developers that had already received the permit for their respective OWFs. Gemini participated for the budget of round 2. Gemini placed a bid in 2010 for the price they could produce the electricity at. When assessing these bids the government corrects the price using a formula on the basis of water depths and distance to shore. This correction was an important factor for Gemini to be eligible for the subsidy as it was the project with the largest distance to shore (85 km). The auction results in a ranking of projects and those that come within budget get the subsidy. Through this system, Gemini received the price they bid of 168,9 €/MWh (Green Giraffe, 2015). This price will be paid for 15 years once Gemini is operational. The subsidy to be received by the scheme is based on top ups upon the wholesale price that are capped at the difference between the generation costs and a threshold at 2/3 of the long-term power price (FOWIND, 2014). This effectively means that if the wholesale price is to drop below this threshold, the project will not receive more compensation than the difference between the bid and the threshold. Gemini is not expected to repay subsidies when the wholesale price of electricity is greater than the cost of generation so there is a clear difference with a contract for difference scheme as described in chapter 4.

For Dutch OWFs that acquired their exploitation subsidy under the SDE 2013 or earlier budgets (see below), the government offers an energy investment deduction tax benefit. The energy investment deduction allowed Gemini's investors to deduct 41,5% of the investment costs from the fiscal profit (RVO, 2015). Additionally, the European Investment Bank provided three loan facilities as part of the very large debt side funding of the Gemini project. The total EIB loan amounted to €587 million. The risks of part of these loan facilities and part of the loans from commercial banks were removed by guarantees from the ECAs Delcredere-Ducroire and EKF (Green Giraffe, 2015; PFI, 2014). These two forms of up-front subsidy further affected the profitability of the project.

6.4.4.2 Electricity offtake was aligned exploitation subsidy and financial requirements

The governance of the electricity offtake was aligned with the horizon of the awarded exploitation subsidy, as well as with the financial requirements of the largest investor, Northland Power. The electricity offtake in the Gemini project is governed in a 15-year PPA with Delta. 15% of the electricity is supplied by Delta to HVC Groep. The length of this contract is in accordance with the length of the provided subsidy through the Dutch exploitation subsidy scheme. For Northland Power, a PPA is as essential requirement to invest as it secures a steady return (Northland Power, 2015). The exploitation subsidy that was awarded supported this security. Moreover, the Dutch exploitation subsidy and project structure were in line with Northland Power's corporate policy of regular dividend distributions to its shareholders (Green Giraffe, 2015). As the primary owner, Northland Power had likely the largest say in the return requirements of the project (Dirks, 2015).

6.4.4.3 Changes in ownership to align with risk or return requirements

The Gemini OWF is structured as an SPV to allow ownership changes (figure 44). As mentioned, Gemini was the largest non-recourse financed OWF project ever. The chosen governance structure best suits the requirements of such financing (Jongste, 2015). From the initial phases of the project, Typhoon Offshore had the intention to exit the project once the development phase was completed, because Typhoon Offshore is specialised in financing, structuring, and contracting of projects necessary to bring a consented project to the financial close, at which point the construction may start. Upon the financial close and begin of the construction phase Typhoon Offshore divested their stake in order to make a large return on their investment. As the project was governed as an SPV, this change in ownership was made possible. Typhoon Offshore likely secured an attractive profit on their investments by divesting their stake once the construction of Gemini started. This allowed them to retain their focus on development of other projects.

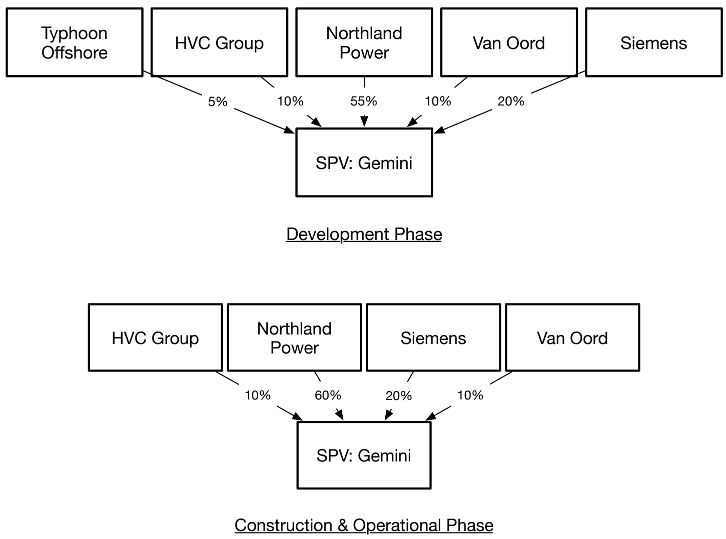

Figure 44: Investment structure Gemini

Van Oord intends to exit the project once the operational phase is successfully reached in order to free up its capital for other projects since owning assets is not part of their strategy. The motive for Van Oord to invest in the Gemini project was strategic. Van Oord joined to show commitment in their successful completion of EPC activities. This secured their contract with a total value of €1,3 billion, the largest contract ever to be awarded to Van Oord. Moreover, Van Oord has the strategic goal to expand its role as EPC contractor worldwide and a strong position within the Dutch home market was considered a premise of this. Van Oord did not have another motive other than to support their EPC contract. Van Oord acknowledges the importance of showing commitment through equity investments, but does not consider owning energy generating assets as a potential for an addition to their business model. To become an active player in this market has never been a motivation for the investment in Gemini. Investments in hardware in support of their main business (e.g. ships) would always be preferred over joining a project as an equity player (Dirks, 2015). As Van Oord's commitment to the project was supportive to their role as EPC contractor, it had no specific return requirement that were leading in the decision. The higher risks during the development and construction phase of the project were considered a minor issue for Van Oord as these were managed by their own people through the contracting structure applied. Because of the alignment of interests all the involved project managers, Van Oord is confident of their ability to deal with the many interfaces with subcontractors (Dirks, 2015). So although further details are confidential, agreements on the planned moment of divestment by Van Oord have likely been made from the outset of the consortium's collaboration in Gemini (Dirks, 2015). Such agreements seem vital for the successful contribution of investment by non-utility investors that have a shorter investment horizon.

6.5 Case C: Butendiek Offshore Wind Farm

6.5.1 Case Summary

Project Name	Butendiek Offshore Wind Farm
Capacity	288 MW
Location	Near island of Sylt, North Sea, 53km west of coast
Involved Investors	Wpd, Marguerite Fund, Industriens Pension, PKA, Siemens, CDC Infrastructure
Start Development	September 2000
Start Construction	March 2014
Operational	(Planned) 2015

Table 12: Butendiek project details

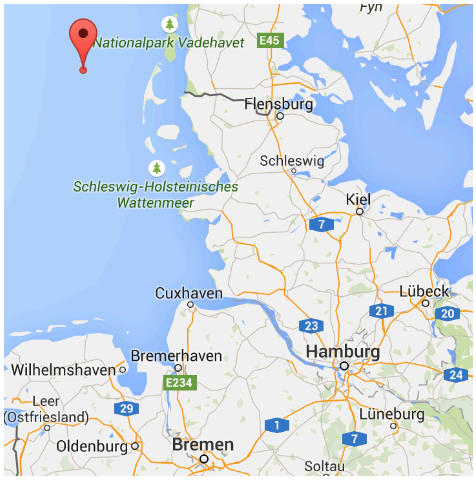

Figure 45: Butendiek location

Butendiek Offshore Wind Farm is a 288 MW project west of the coast of Germany's most Northern part. The project was characterised by a very long development phase as planning started already in early 2000. The project was initially set up as a community investment to involve local citizens. However, in 2007 Airtricity acquired the project only to be acquired by SSE Energy a year later. SSE Energy sold the project to the independent developer Wpd in 2010. Wpd is an independent developer of OWFs, with prior experience in onshore wind. The involvement of other investors, contracting and eventually the construction of the OWF took of from then (Butendiek, 2015). The initial group of equity investors that joined Wpd comprised of a very large group of state-owned Swiss, Austrian, and German utilities and some institutional investors (Butendiek, 2011). In 2012 only Wpd and the Marguerite Fund were still committed to the project as most of the initial investors dropped out (De Roos, 2015). The Marguerite fund is an independent fund aimed at making investments in infrastructure in energy, renewables, and transportation in Europe. The fund's core sponsors are six large (semi-)public European financial institutions: Caisse des dépôts et consignations, Cassa Depositi e Prestiti, European Investment Bank, Instituto de Crédito Oficial, KfW, and PKO Bank Polski SA (Marguerite, 2015). Industriens Pension, PKA, Siemens, and later CDC Infrastructure decided to invest. Industriens Pension is a pension fund from Denmark managing the pensions of industrial employers. Industriens Pension is owned by the confederation of Danish industries and different labour unions and was founded in 1992. Industriens Pension has a global portfolio of investments in infrastructure and energy. PKA is one of the largest pension groups for labour markets in Denmark. Construction eventually started in March 2014, fourteen years after the first steps in development were made.

6.5.2 Threat of Opportunism and Perception

The award of the permit for the development of Butendiek was granted to the previous owners of the project, therefore no important threats of opportunism were ever a barrier during the development phase of the project and investors' perception was generally positive.

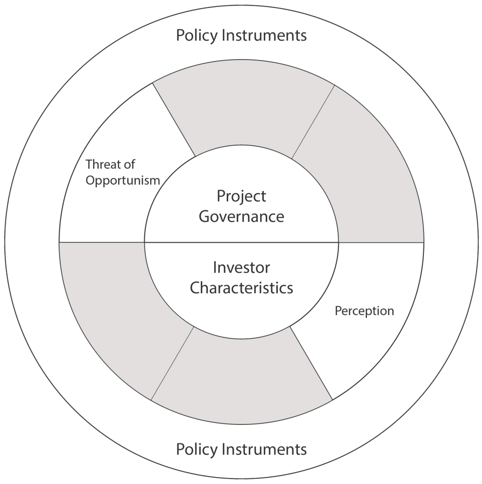

Figure 46: Interaction 1

6.5.2.1 All policy challenges were overcome by previous project owners

In Germany, a marine spatial plan was developed that identified potential zones for offshore wind development, after taking into account constraints such as nature reserves and shipping routes. Developers were invited to make a case for permission to build an OWF within these zones (FOWIND, 2014). The permission for the development of the Butendiek project had already been granted to the community investment initiative. Once the initial project owners had secured the location, multiple permits were bundled in a single-spot permitting consent procedure by the Federal Maritime and Hydrographic Agency (BSH). This included land tenure rights, environmental impact assessment and generation license. The permit was transferred as the ownership of the project changed twice, because the addressee of this permit is the OWF itself, rather than the project owner (Norton Rose, 2011). The granted permit gave the developer a lease to the seabed for 25 years, guaranteed grid connection access, and a fixed output tariff (FOWIND, 2014). This meant that the permitting consent procedure integrated grid connection costs to the TSO and secured the exploitation subsidy.

6.5.2.2 Perception of current investors is generally positive

The investors have no negative experience with regard to the permitting consent procedure or grant of the subsidy. Notably, all of those challenges had been overcome before the (current) investors acquired the project (Lynsgaard, 2015).

6.5.3 Dynamic Capabilities, Project Attributes and Governance Structure

The grid connection policy applied by the German government created a threat of behavioural uncertainty that the investors. Given their own capabilities, the investors would have preferred to manage this aspect of the project themselves. The investors of the consortium dealt with other challenges of different project aspects with their complementary dynamic capabilities.

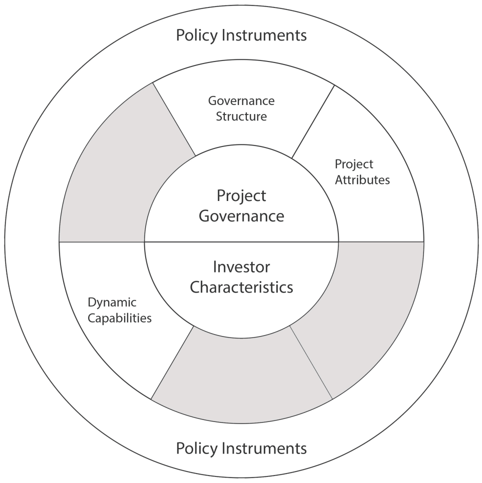

Figure 47: Interaction 3

6.5.3.1 Grid connection policy created unwanted behavioural uncertainty

TenneT constructed the Butendiek grid connection in line with Germany's grid connection policy. Delays in grid connection, due to technical challenges and a lack of capital have meant that a number of German projects have been built, but were not connected to the grid in time (FOWIND, 2014). The connection of Butendiek was not delayed but this could have created behavioural uncertainty from the TSO. Although the grid connection was a challenging element from the government's policy in other German OWFs, the investors in the Butendiek project never feared for the timely connection, because of the shared connection with a neighbour OWF.

In future projects, the investors acknowledged to prefer this to be managed by the developer, granted that they have better experience and resources (dynamic capabilities) than the TSOs (Lynsgaard, 2015). Wpd had the right knowledge for managing the project as they had earlier experience in the management of onshore wind projects. The other investors reviewed their capabilities as project manager before commiting to the project. PKA AIG concluded after a series of interviews that the people responsible at Wpd were capable (Lynsgaard, 2015).

6.5.4 Financial Requirements, Project Attributes and Governance Structure

Upfront and exploitation subsidies affected the risks and return of the project. Moreover, governance solutions were used to align investors' financial requirements with the expected risks and return of their participation in the project.

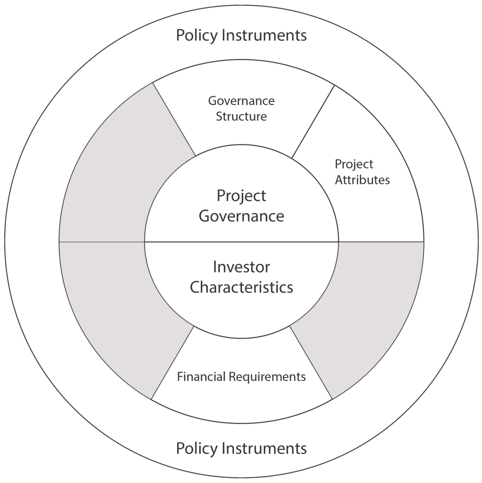

Figure 48: Interaction 3

6.5.4.1 *Subsidies affected risk and returns*

The German FiT was introduced in the Renewable Energy Act (Erneuerbare-Energien-Gesetz, EEG 1991) (FOWIND, 2014). In the standard scheme of the FiT, a starting tariff of 150 €/MWh for the first 12 years holds, however, as individual turbines are located outside the 12 nautical mile zone and in water depth below 20 metres the period of remuneration may be longer. Beyond the starting tariff, any turbine operational before 2018 can opt for a tariff of 190 €/MWh for a period of 8 years (Norton Rose, 2011). The guaranteed base level remuneration and the additional option of accelerated remuneration provided the Butendiek investors the possibility to change the cashflows of the project to meet the investors' preferences (a shorter payback time). The investors in the Butendiek project decided to use this compressed FiT scheme.

The investment requirements were aided by the EIB providing a €450 million loan. Moreover, KfW contributed €200 million. Together, these public bank loans accounted for half of the project's total costs of €1,3 billion. EKF guaranteed €300 million of the EIB loan. Additionally, the German TSOs are required to fund OWF grid connections.

6.5.4.2 *Alignment electricity offtake governance*

For Butendiek, the electricity produced is sold to the market at a level in line with the current market price of grey electricity. The TSO, TenneT, is obliged to take or pay the offtake of the Butendiek project under the 'direct market model' applied in Germany (ICIS, 2013). From an investor's perspective, this removes the need to engage in a long-term PPA with a private offtaker (e.g. a utility's retail company) and thereby better facilitates projects that lack the involvement of a utility company. This steady return independent of market fluctuations was a requirement for the Marguerite Fund to get involved in the project, because they target long-term and stable risk-adjusted returns.

6.5.4.3 *Ownership changes to align risk and return requirements*

The Butendiek project was structured as an SPV. The project company entity was held through a shared ownership. Figure 49 illustrates the shares throughout the project phases.

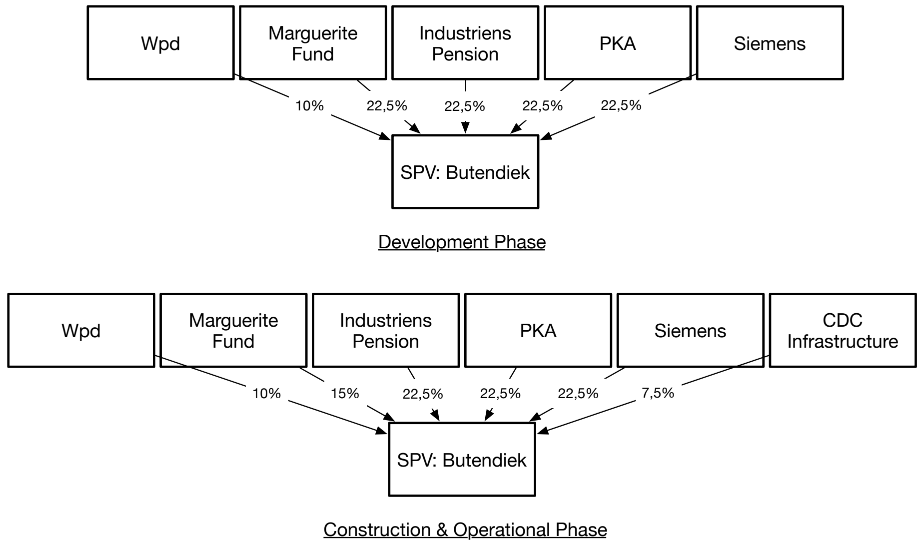

Figure 49: Investment structure Butendiek

Wpd has been the main responsible party for the successful development, construction and operation of Butendiek OWF. Whereas some independent developers have a short investment horizon to make a large return, Wpd has retained its share in the Butendiek project once operational. This seems illustrative for Wpd's approach to investments.

Siemens provides the maintenance and service of the wind turbines as a part of their contract as OEM company. Siemens Financial Services, unlike Van Oord in the Gemini project, is not bound to a short-term investment horizon. As part of the larger Siemens Group, Siemens Financial Services can hold on to investments for a longer time because of their dedicated team that are solely involved in equity or debt provision in Siemens-equiped projects (Azevedo, 2015). This is an important difference with other contracting parties that may require divesting their stake to free up capital after the successful completion of their contracted activities (as Van Oord in the Gemini case).

The other investors (Marguerite Fund, Industriens Pension, and PKA) are only financial investors, therefore not actively involved in the project management. These financial investors in the project did have strict financial requirements. Illustratively, for PKA, minimum return requirements are assessed on a case-by-case approach. More details on risk or return requirements are confidential.

6.5.4.4 Multicontracting structure affected risks and returns

The Butendiek OWF has been procured through a 'multicontracting' structure. This meant that the project management had to deal with the interfaces of several contracts with different companies responsible for the turbine supply and maintenance, the foundations, the inter-array cables, and the offshore substation. Figure 50 illustrates the structure.

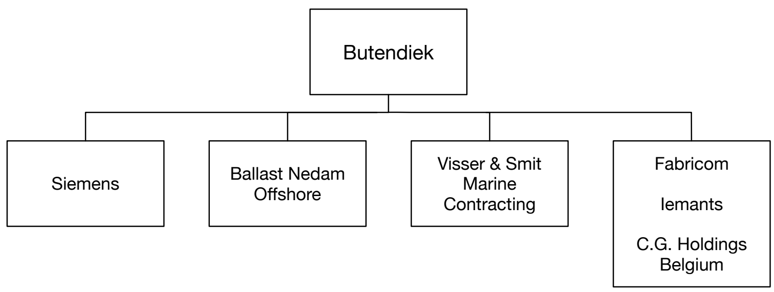

Figure 50: Contracting Structure Butendiek

An advantage of this contracting structure is that the developer has more control over the execution of works and the allocation of risks. If the developer is successful, this can result in substantial cost reductions, better contractual conditions and guarantees (Green Giraffe, 2014).

Within the contracting structure, Siemens is responsible for the supply and service & maintenance of the wind turbines in the Butendiek OWF. The supply and the service and maintenance are essentially two different contracts but because Siemens is responsible for the entire scope of this work the project manager does not have interactions with two counterparties. Ballast Nedam Offshore was responsible for the installation of the turbine foundations. Visser & Smit Marine Contracting had the responsibility for the inter-array cabling. The fourth contract was with three companies (Fabricom, Iemants, and C.G. Holdings Belgium) for the offshore substation.

After execution of extensive due diligence of the construction risks, the other investors trusted Wpd with the management of these contracts and the associated contracts. For PKA the construction risk was an important consideration. In their due diligence, PKA extensively looked into the management of the different interfaces between contracts by Wpd (Lynsgaard, 2015). Notably, such 'multicontracting' structures are seen often in Germany as no EPC company active in the German market seems to offer the EPC wrap solutions like DONG does in the United Kingdom and Van Oord does in the Netherlands and Belgium (De Roos, 2015). Within the setup of these contracts, the other investors were also able to get involved in discussing rewards and liability agreements to ensure that they were comfortable with this contracting structure (Lynsgaard, 2015).

6.5.5 Additional Observation: Motive for future OWF projects

Siemens and the institutional investors involved in the project both had a strategic interest in investing in the project in order to participate in other projects that followed after Butendiek.

For the institutional investors: Pension Denmark and PKA, investment during the development phase of the project created an interesting opportunity. To illustrate, before Butendiek PKA had gradually increased its infrastructure investments in the years before and since 2012 PKA has a specialised subsidiary investment firm focussing on RES projects. The specialised subsidiary, PKA AIP (Alternative Investment Partners) fits in the company's strategy of increased focus on such investments. The team initially consisted of 6 people with a specialised focus on private equity, infrastructure (including OWFs), woodland and agriculture. The dedicated team had a target to invest €1,6 billion over three years (Fixsen, 2012). Butendiek was the first OWF investment lead by PKA AIG, so there was limited experience from an organisational perspective. The team of PKA AIG, however, had experience in specific direct energy and infrastructure investments from previous positions. This allowed PKA to tap into that knowledge (Lynsgaard, 2015). Many developers and utilities in the market noticed their commitment during this higher-risk phase of the project. Being able to successfully close that transaction was considered a proof of their ability to commit to OWF investments. The pro-active approach through PKA AIG increased their exposure in the market (Lynsgaard, 2015). This has proven to be successful as since Butendiek, PKA AIG has been involved in two more OWF projects (Appendix A).

The involvement as an investor creates new contracting opportunities for Siemens. This effect is especially present in OWF investments, which is a relatively new asset class for most (non-utility) investors (Azevedo, 2015). Similar to the Gemini project, a strategic investor role for Siemens as the OEM contracting party is observed. Siemens Financial Services only invests in projects that involve the use of Siemens equipment.

6.6 Findings

Interactions in accordance with the framework are observed in all three case studies. Additionally, two interesting observations were made.

The existence of a threat of opportunism as a result of policy instruments damaging investors' perception was a minor issue in the three successfully developed projects. The investors from each case study are generally positive about the role of the government within their respectful projects. Notably, all projects have had previous owners that were able to overcome some of the policy challenges. However, in the Gemini project there were some concerns about the large number of awarded permits and the much lower number of to-be-awarded exploitation subsidies. The inevitable withdrawal of permits formed a possible threat of governmental opportunism in this case.

To deal with the asset specificity and uncertainty of the projects, the challenges of different project aspects were overcome by investors' dynamic capabilities that were often complementary within the cases. In Belwind and Gemini, the government did not manage grid connections. In both projects, most investors did not have the capabilities to deal with the connection (or the other EPC contracts) so these were all integrated into a single contract with Van Oord. In Butendiek, grid connection was managed by the TSO, which is considered a downside of the policy regime by the investors. Notably, these investors –having trust in their own capabilities of dealing with the grid connection- would have preferred to connect the OWF themselves to avoid uncertainty in the performance of the TSO.

The combination of investors' dynamic capabilities that are complementary created strong consortia and created trust among investors. In Belwind, the relatively asset-light and inexperienced Parkwind attracted Sumitomo to provide financial means and strong relations with suppliers. Although Northland Power is the primary owner of Gemini, the project company was staffed with the experienced staff of Typhoon Offshore that had expertise in development of OWFs. As neither Typhoon Offshore nor Northland Power had the dynamic capabilities of managing the construction phase, Siemens and Van Oord joined the Gemini consortium, which created the trust of a possible successful completion with the other investors.

Project risks and returns for the involved investors were aligned with investors' financial requirements by choices in the governance structures. Ownership of all three projects is governed through an SPV structure allowing the investors to enter and/or exit the project to suit their preferences in terms of risks or returns. Wrapping multiple subcontracts into a single EPC contract shields investors from several risks associated with the complexity of contract interfaces in both the Belwind and Gemini project. Interviewees confirm that this has been important in attracting some of the financial investors reluctant to face construction risks. To illustrate, Van Oord will likely divest their stake in Gemini as soon as the construction has been proven successful, allowing them to free up capital and make a large return. Other governance solutions were also used to align investor's financial requirements. In Gemini, the use of a PPA to govern the electricity offtake was an essential governance solution to meet Northland Power's risk requirements. The effects of policy instruments on financial requirements and governance structure was also noted in the case studies. Primarily, subsidies awarded in each project were essential in being able to meet investors' requirements. Moreover, in Butendiek, the policy regime requires the TSO to buy the electricity produced, creating a steady return for the investors without having the need to make a long-term contract with another offtaker.

Besides the three interactions described above, two interesting observations were made in the Belwind van Butendiek case respectfully. The involvement of the investors Parkwind van Meewind in Belwind was largely a result of a happy coincidence. The bankruptcy of Econcern allowed Parkwind to acquire the project and Meewind was 'forced' to expand their focus to this Belgian project in order to realise their fund prospectus. In Butendiek, the involved investors joined the project from a very strategic vision to expand their involvement in the OWF sector through future investments. Both Siemens and the institutional investors saw the Butendiek project as a platform for future OWF projects and to increase their exposure in the sector.

PART V: SYNTHESIS

7. Synthesis

This chapter compares and integrates the conclusions of all the analyses. Thereto, expectations of the framework interactions are compared with both findings from the operationalisation and the case study analysis. This comparison is an important step towards answering the main research question and in validation of the framework and the explored interactions. Moreover, the framework is evaluated by looking into its scientific added value and its limitations.

7.1 Framework Operationalisation vs. Empirical Findings

We've explored interactions between the central elements of this research: project governance, investor characteristics and policy instruments. It was expected that suitable policy instruments should bring together project governance and investor characteristics in the OWF sector (as illustrated by the circular shape of the framework). The exact relations within these interactions have been identified and studied in the operationalisation of the framework and the case study analysis respectfully. The section compares the findings from the operationalisation and the case studies for each of the three interactions (figure 51). These interactions describe how project governance, investor characteristics, and policy instruments relate through:

- Threat of opportunism and perception
- Dynamic capabilities, project attributes and governance structure
- Financial requirements, project attributes and governance structure

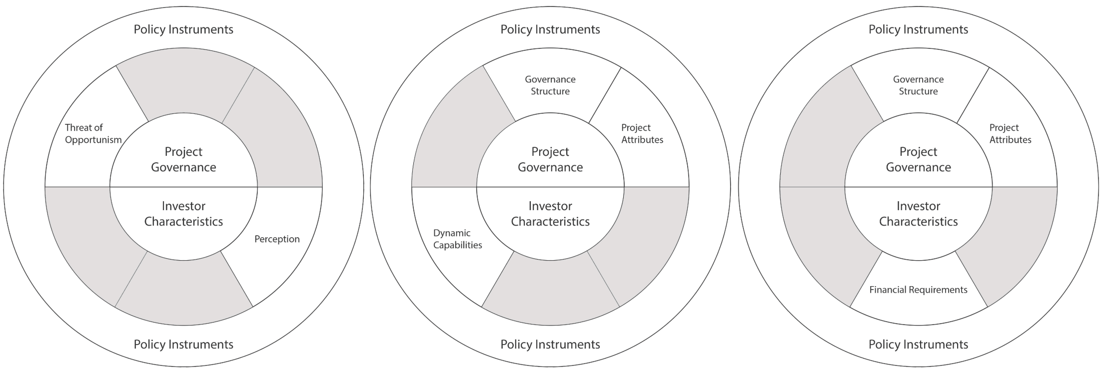

Figure 51: Framework Interactions

7.1.1 Threat of Opportunism and Perception

7.1.1.1 Findings from the operationalisation

Policy instruments relate to investor's perception through a possible threat of opportunism. The operationalisation showed the limitations in policy designs that focus solely on addressing market failures in electricity prices and conflicting usage of the seabed, but seem to ignore the potential threat of opportunism and the importance of policy stability. A threat of governmental opportunism could hinder a project if policy makers change subsidies or permits. Likewise, third party opportunism from interest groups opposing an OWF project could block developments. Therefore, threats of opportunism are particularly affected by the permitting consent procedure. Moreover, the threat of governmental opportunism may also occur in the provision of an exploitation subsidy. These threats not only affect perception of active investors, but may also be a barrier for new investors. A clear perception of a country's policy regime could allow investors to better estimate such the threats.

While contrary, an unclear perception or damaged trust in policy may be a barrier for non-utility investors, as they could over-estimate potential threats of future changes in policy.

7.1.1.2 Findings from the case studies

The perception of the interviewed investors with regard to the government policy is generally quite positive as no threats of opportunism materialised in the case studies. As mentioned before, several policy challenges had already been overcome when the investors acquired the projects. The most obvious example of this interaction has been observed in the Gemini case, in which there were concerns about the large number of awarded permits and the much lower number of to-be-awarded exploitation subsidies. The inevitable withdrawal of permits formed a threat of governmental opportunism. In conclusion, based on the performed case study analysis, it is difficult to verify this interaction with absolute confidence, as investors in successful projects tend to be positively biased.

7.1.2 Dynamic Capabilities, Project Attributes and Governance Structure

7.1.2.1 Findings from the operationalisation

The ability (dynamic capabilities) to deal with certain asset specificities or uncertainties (project attributes) would determine investors' preferences for certain policy instruments with conflicting results. This effect was primarily identified in the responsibility of grid connection and in designated development zones. Therefore, policy makers may consider implementing flexibility of policy instruments to address the specific expertise or needs of investors in a certain project.

The combination of several investors in a project seems logical as their individual experience is generally low and resource endowment and motive will likely substantially differ per investor. Based on the operationalisation of the framework, it is expected that experience and resource endowment in technological, financial, or relational assets provide non-utility investors the means to deal with the sector's high asset specificity and uncertainty and therefore, those investors will be responsible for these aspects of a project which is reflected in the governance structure.

7.1.2.2 Findings from the case studies

To deal with the asset specificity and uncertainty of the projects, the challenges of different project aspects were overcome by investors' dynamic capabilities that were often complementary within the cases. The combination of complementary dynamic capabilities created strong consortia with trust among investors. Experienced but asset-light developers seek strong financial investors to strengthen their consortium (Typhoon Offshore and Northland Power, Parkwind and Sumitomo, Wpd and the Danish Pension Funds). Moreover, driven by the motive to radiate confidence in their expertise, OEM and/or EPC companies invest and contribute with their capabilities during the construction of the projects. Although Northland Power is the primary owner of Gemini, the project company was staffed with the experienced staff of Typhoon Offshore that had expertise in development of OWFs. As neither Typhoon Offshore nor Northland Power had the dynamic capabilities of managing the construction phase, Siemens and Van Oord joined the Gemini consortium. This created the trust of a possible successful completion with the other investors.

Policy instrument choices that may have been intended to support OWF investors could be valued differently. In Butendiek, grid connection was managed by the TSO, which is considered a downside of the policy regime by the investors. Notably, these investors –having trust in their own capabilities of dealing with the grid connection- would have preferred to connect the OWF themselves to avoid uncertainty in the behaviour of the TSO.

7.1.3 Financial Requirements, Project Attributes and Governance Structure

7.1.3.1 Findings from the operationalisation

Policy makers must consider the differences in financial requirements of investors, because policy instruments (in particular subsidies and cost attributions) can affect a project's risk/return profile throughout its different phases. However, governance structure of a project can also provide solutions of alignment between a project's risk or return and an investor's requirements. Examples include PPAs, EPC-wraps, and governance structures that allow changes in ownership (e.g. SPVs).

7.1.3.2 Findings from the case studies

Affected by different policy instruments, the project risks and returns for the investors were aligned with investors' financial requirements by choices in the governance structures.

Ownership of all three projects is governed through an SPV structure allowing the investors to enter and/or exit the project to suit their preferences in terms of risks or returns. Wrapping multiple subcontracts into a single EPC contract shields investors from several risks associated with the complexity of contract interfaces in both the Belwind and Gemini project. Interviewees confirm that this has been important in attracting some of the financial investors reluctant to face construction risks. To illustrate, Van Oord will likely divest their stake in Gemini as soon as the construction has been proven successful, allowing them to free up capital and make a large return. Other governance solutions were also used to align investor's financial requirements. In Gemini, the use of a PPA to govern the electricity offtake was an essential governance solution to meet Northland Power's risk requirements.

The effects of policy instruments on financial requirements and governance structure were noted in the case studies. Primarily, subsidies awarded in each project were essential in being able to meet investors' requirements. Moreover, in Butendiek, the policy regime requires the TSO to buy the electricity produced, creating a steady return for the investors without having the need to make a long-term contract with another offtaker.

7.2 Framework Evaluation

7.2.1 Scientific Added Value

This research has contributed to existing literature with an integrated perspective of the elements that determine the involvement of non-utility investors in OWFs and by making a strong case for the added value of combining theories (*theoretical pluralism*). The combination of several theories to analyse project governance, investor characteristics, and policy instruments resulted in a more complete view of these elements. Moreover, the interactions *between* these elements were only found once we detached from single theories' assumptions and look into combinations of concepts that transcend a single theory.

TCR acknowledges the threat of opportunism inherent in policy instruments as a result of bounded rationality and imperfect information with governments, but leaves out the differences in cognitive factors of investors. Combining TCR with behavioural finance teaches us that it is not the actual threat of this opportunism that determines the involvement of investors. Rather, the *perception of a threat of opportunism is more important than the actual threat*. This means that different investors could value a policy differently. Whether a threat of opportunism from policy instruments is a barrier to invest will depend on these investors' earlier experiences with a policy regime (*path dependency*).

Following the discriminating alignment hypothesis from TCE, a governance structure is a consequence of the transaction attributes, while *governance is also a reflection of investor characteristics*. To illustrate, although faced with similar attributes, different investors choose different modes of governance. Wpd applied a 'multicontracting' structure to govern all the EPC works in Butendiek. Contrary, both Parkwind and Typhoon Offshore chose a subcontracting structure wherein Van Oord managed the many subcontracts. These differences are better explained by looking into investor characteristics, in particular their dynamic capabilities stemming from experience in managing contract interfaces and the resources to do so. Moreover, governance structures also reflect the financial requirements of investors. Changes in ownership of projects facilitated by the choice of equity alliances allows investors to meet their specific requirements that are often not the same as the expected risks or returns of participation in a project across all of its phases.

Similarly, theory on dynamic capabilities ignores *interdependency in strategic alliances* between investors, assuming that only the competitive advantages of a single firm determine its success in the OWF sector. However, the characteristics of OWF projects in terms of size, complexity, and costs require a combination of dynamic capabilities that none of the individual investor types display. *Consortia based on complementary dynamic capabilities* are of vital importance for success. Combining TCE and dynamic capabilities thus seems logical from this view as well.

7.2.2 Framework Limitations

The simplification of using project attributes in the framework rather than *transaction attributes* has its limitations in understanding a specific transactions. To characterise OWF projects, projects are analysed as a bundle of transactions. This simplification is justified by the fact that the overall *project* governance structure is of more interest than the governance of individual transactions within the project. This approach was useful for the *identification* of project governance challenges. However, to further *analyse* the governance of a specific transaction (e.g. the grid connection), as a result of a policy instruments and investor characteristics, the exact attributes of that transaction should be further explored. By doing so, looking into a single transaction more closely could contribute to a better understanding of its governance.

Policy instruments are the control variables of policy makers within the framework, but these are in fact *limited by constraints* and bound to *dynamics with policy objectives and targets*. Possibilities of policy makers implementing or changing policy instruments on a national level are in reality often constrained by objectives and targets at an international level. Moreover, the framework ignores the dynamics between policy objectives, policy targets, and policy instruments. Stability of policy instruments is not always within the reach of control of policy makers, as changes in objectives must inevitably be translated into policy instruments. Likewise, policy instruments must be updated based on (possibly disappointing) earlier results if policy makers want to meet earlier stated targets.

7.3 Findings

The interactions from the framework have been compared with case study findings. Moreover, the framework has been reflected upon by evaluating the scientific added value and its limitations.

The interaction through threat of opportunism and the perception of investors is most likely better observed in unsuccessful cases. Moreover, the perception of investors is somewhat difficult to 'measure' through an interview. Therefore, the methodology of comparing (successful) OWF projects might have been unsuitable to describe this interaction. Suggestions for further research on this topic will be addressed in chapter 8.

The interaction though investors' dynamic capabilities, project attributes and governance structures was confirmed and better understood through the case study analysis. From the operationalisation combining several investors in a project seems logical as their individual experience is generally low and resource endowment and motive will likely substantially differ per investor. The interviewed investors confirmed this by mentioned that consortia were formed based on complementary qualities. A trade-off in policy instrument effects was also confirmed in the Butendiek case. Although meant as a supportive measure, the investors had confidence in their own dynamic capabilities and preferred to connect the OWF to the grid to avoid behavioural uncertainty of the TSO.

The third interaction through investors' financial requirement, project attributes and governance structure was observed in the cases. However, risk or return requirements often seem directly related to governance structures instead of through a project's attributes. This may be explained by pointed out that risk (as a financial requirement) and uncertainty (as a transaction attribute) are very closely related. Therefore, it may seem from the case studies that sometimes risk or return requirements relate directly to governance structure, without considering the project attributes, while actually this relationship is more implicit.

Evaluation of the framework has shown that combining multiple theories gives a better insight in what determines the involvement of non-utility investors in OWFs than a single theory could have done. The findings that transcend the individual theories are that *perception of a threat of opportunism is more important than the actual threat, governance is also a reflection of investor characteristics*, and there is *interdependency in strategic alliances* between investors with *complementary dynamic capabilities.*

Two limitations of the framework have been found. The first limitation of the framework is the simplification of projects as a bundle of transactions, characterised by project attributes, rather than transactions characterised by transaction attributes. Moreover, the control over policy instruments by (national) policy makers is more limited than the framework suggests.

8. Conclusions and Recommendations

This chapter presents the conclusions of this research by answering the main research question and discussing the scientific added value of the framework. Moreover, additional recommendations for (non-utility) investors and future research are given. The central research question addressed in this chapter is:

> How can policy makers enhance the role of non-utility investors in offshore wind farms by improving the interactions between project governance, investor characteristics, and policy instruments?

8.1 Conclusions

Having analysed the project governance, policy instruments, and investor characteristics and the interactions between these elements, an answer to the main research question can now be formulated. First, the individual elements are presented. Next, the interactions that policy makers should consider to enhance the role of non-utility investors are presented. Moreover, the scientific added value of the research discussed.

8.1.1 Project Governance

In line with the theory of TCE, the characteristics of the transactions in OWF projects (project attributes) and the governance structures of those transactions should be aligned. In practical terms, this means that suitable structures to govern the shared investments, electricity offtake, and contracting of EPC and OEM companies are needed. As OWF projects are characterized by several uncertainties (from counterparties in transactions and environmental uncertainties that stem from markets, technologies, financing, and regulation) and require very specific assets (large physical investments and specific sites) theory of TCE would prescribe hierarchical governance structures. In reality, investments in OWFs involving non-utility investors may best be managed through equity alliances with other investors, because balance sheet investments are too risky and too large given typical project characteristics (size and costs). Notably, there are several variations possible in terms of division of roles and responsibilities within these alliances. Moreover, in the absence of a utility investor the OWF cannot be vertically integrated for the offtake of electricity. Therefore, the offtake of electricity is often governed through either spot markets or PPAs. The governance of contracts with EPC and OEM companies offers some variations with the possibility of wrapping multiple (sub) contracts into one and shared ownership to create commitment. A high degree of mutual trust is required as the investments, electricity offtake agreement, and the contracted services from EPC and OEM companies require coordination between several parties. Although the characteristics of OWF projects (project attributes) may in many cases be similar, different governance structures are observed. Following only TCE –assuming the governance structure to be a reflection of just the project's attributes- does not explain this difference. Therefore the joint effect of policy instruments and investor characteristics may offer a more satisfying explanation. This would not be to disprove the relation between transaction attributes and governance structures, but rather expand this view with other elements.

8.1.2 Policy Instruments

Policy makers in Europe apply permitting consent procedures, grid connection policies, up-front and exploitation subsidies to promote OWF investments, but there may be several limitations in how these are designed. Simply creating attractive returns and stimulating certain areas for OWF development (removing the externalities) may not be enough to attract new investors. In fact, a threat of third party and governmental opportunism should be acknowledged as a possible barrier to invest. Retroactive changes in permitting consent procedures and subsidy regimes are the primary causes of these threats. Therefore, stability of a regime should be a very important design consideration. Moreover, it was found that different policy instruments have trade-off effects on the project's asset specificity and uncertainties (project attributes) of OWFs. This effect was primarily identified in the responsibility of grid connection and in the permitting consent procedure. This suggests that different investors may prefer different policy regimes, which could be explained by their characteristics.

8.1.3 Investor Characteristics

Non-utility investors can be independent developers, private equities, corporates, local partners, municipalities, O&G companies, OEM and EPC companies, and institutional investors. Each investor may have technical and/or managerial experience; technical, financial or relational resource endowment; and different motives to invest in OWFs. The dynamic capabilities that stem from these characteristics define investors' ability to be successful in OWF investments, but none of the investor types shows all of these characteristics. This suggests that partnerships in project governance would be required to complement their capabilities. Moreover, investors have different financial requirements in terms of risk and return. This could affect their willingness to participate in certain (parts of) a project and determine their moment of investment or divestment within a project. Finally, perception of a policy regime is an important implication of acknowledging the bounded rationality of investors.

8.1.4 Interactions to Enhance the Role of Non-Utility Investors

This research aims to give policy makers an insight in how to enhance the role of non-utility investors in OWFs. To do so, policy makers should consider three interactions that relate policy instruments with project governance and investor characteristics through:

- Threat of opportunism and perception
- Dynamic capabilities, project attributes and governance structure
- Financial requirements, project attributes and governance structure

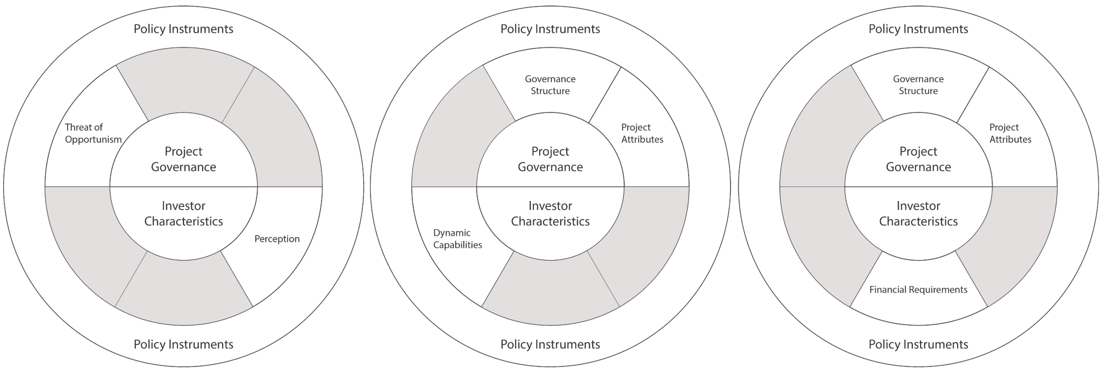

Figure 52: Framework interactions

Policy instruments should pose a minimal threat of governmental and/or third party opportunism. As mentioned, retroactive changes in permitting consent procedures and subsidy regimes are the primary causes of these threats. This means that stability of policy instruments is preferred to radiate credible commitment to policy goals. Contrary, policy instability could form a barrier to investors. Notably, it is not the actual threat of this opportunism that determines the involvement of investors, but rather their perception of such threats. The three cases displayed no major threats of opportunism or damaged perceptions, which contributed to their success. However, illustrated in the Gemini case, an inevitable withdrawal of several Dutch OWF permits somewhat damaged the investors' perception of the policy regime, but the investors remained confident of the government's support of their project. The perception of investors therefore also strongly depends on their earlier experiences with a policy regime.

Policy makers should consider that investors will structure projects in accordance with their combined dynamic capabilities; policy instruments can then be designed to account for this. The combination of several investors in a project seems logical as their individual experience is generally low and resource endowment and motive will likely substantially differ per investor. The governance structures can be optimized to fit investors' complementary experience, resources, and motives. Expertise in dealing with certain aspects of a project (like the construction) can be exploited by involving the right investors in the right part of a project. In other words, the dynamic capabilities of investors should match the role these investors take within the governance structure (e.g. developer, contractor, strategic or financial investor). In all case studies, this reflection of dynamic capabilities was observed in the division of roles and responsibilities within the governance structure. Moreover, experienced, but asset-light developers formed partnerships with investors that had either complementary financial or relational resources. The ability to deal with certain asset specificities or uncertainties (project attributes) would determine investors' preferences for certain policy instruments with trade-off effect on those project attributes. To illustrate, investors capable of managing the grid connection preferred to be independent of a (semi-)public party to manage the grid connection. Therefore, to avoid the unintended negative effects of policy support, policy makers could either design policy instruments to target the needs of specific investors (e.g. consider their expertise) or consider flexible policy instruments wherein investors can choose the level of governmental involvement (tailored for specific project needs).

Policy makers must consider the differences in financial requirements of investors, because policy instruments (in particular subsidies) are essential in ensuring that OWF projects receive the necessary return to be competitive with other energy investments. However, as observed in all cases, investors that are uncomfortable with specific risks (associated with uncertainties in project phases) can be safeguarded from these by project governance solutions (e.g. EPC wraps that shield them from construction risks) and equity alliance structures that allow changes in ownership. That way, investors that have certain risk or return goals or investors that are bound to an investment horizon (to free up capital) can enter or exit a project to match these requirements. This indicates that the investors can find many solutions to meet their financial requirements on their own through mutual agreements. Policy instruments are then not required to align risks and returns of each project phase with investors' financial requirements, but only have to ensure that OWF projects are competitive over their entire lifecycle.

What's clear from the last two interactions is that the alignment of project governance and investor characteristics is critical to successfully involve (more) non-utility investors in OWFs. Unfortunately, the *effects of policy instruments on this alignment are limited*. However, as concluded from the case studies, investors are capable of forming governance structures to match their characteristics, provided that policy makers create the right regulatory framework posing a minimal threat of opportunism and ensuring OWFs to be competitive with other energy investments. Therefore, as mentioned, policy makers are recommended to *strife for overall stability of policy regime, consider to target the needs of specific investors or apply flexibility in certain instruments,* and *provide attractive remuneration for projects over their entire lifecycle*.

8.1.5 Scientific Added Value

This research has contributed to existing literature with an integrated perspective of the elements that determine the involvement of non-utility investors in OWFs and by making a strong case for the added value of combining theories (*theoretical pluralism*). The combination of several theories to analyse project governance, investor characteristics, and policy instruments resulted in a more complete view of these elements. Moreover, the interactions *between* these elements were only found once we detached from single theories' assumptions and look into combinations of concepts that transcend a single theory. Combining TCR with behavioural finance teaches us that it is not the actual threat of this opportunism that determines the involvement of investors. Rather, the *perception of a threat of opportunism is more important than the actual threat*. Following the discriminating alignment hypothesis from TCE, a governance structure is a consequence of the transaction attributes, while *governance is also a reflection of investor characteristics*. Similarly, theory on dynamic capabilities assumes that only the competitive advantages of a single firm determine its success, while in fact there is *interdependency in strategic alliances* between investors with *complementary capabilities.* Beyond the practical implications of this research, it has therefore been shown that theoretical pluralism is a valuable application in similar issues.

8.2 Recommendations

8.2.1 Recommendations for (Non-Utility) Investors

Investors and lenders in OWFs can use the framework to evaluate investment propositions *ex ante.* The concepts of the framework are likely covered implicitly during a due diligence process, but it may provide a useful framework to explicitly see if there are any potential issues in the interactions between project governance, investor characteristics, and policy instruments and what could be solutions for these issues in the specific case of their investment proposition.

Successful projects are built upon strong consortia; therefore investors should actively seek suitable partners. Given the size and complexity of OWF projects, non-utility investors will require partnerships as observed in the existence of equity alliances in most recent OWF projects. In order to have non-utility investors successfully participate in OWF projects, their dynamic capabilities must be complementary.

Moreover, simple equity alliance structures like SPVs can allow changes in ownership throughout project phases to allow for alignment of risk preferences. For example, investors that have certain return goals (like most independent developers) or investors that are bound to an investment horizon (to free up capital) can enter or exit a project to match these requirements. In the offtake of electricity, some investors may require PPAs to be comfortable with risks of a project. Investors are therefore recommended to consider the financial requirements of themselves and others within a consortium when arranging the project's governance structure.

8.2.2 Recommendations for Future Research

The framework provides interesting options for future research as its interactions may all be analysed in further detail. Two options for future research in particular may give interesting findings for OWF investments. Additionally, the applicability of the framework may be tested in the context of other sectors.

From the analysis of the effects of policy instruments it was suggested that different investors could prefer different policy instruments due to the effects of those policy instruments on asset specificity and uncertainties and the characteristics of investors. Therefore flexibility of policy instruments was suggested as a viable option. Flexibility of grid connection policies or permitting consent procedures could be explored as policy options. Experienced investors could for example choose to manage the grid connection themselves (less behavioural uncertainty from TSO) and be remunerated for the extra costs through the exploitation subsidy, while other (less experienced) investors could have the grid connection built by the TSO or another (public) party. Flexibility in permitting consent procedures could for example be incorporated by allowing changes in ownership of permits (to prevent delays in development as observed in the Butendiek case) or give way for flexibility in the technical specifications of an OWF (e.g. number and type of turbines). Methods for exploring the possibilities of such flexible measures could be based on the meta design model by Stikkelman and Herder (2004).

Objectives and constraints of a flexible policy regime could be identified through a literature review and stakeholder interviews. A broader set of stakeholders should be involved in creating the objectives and constraints of such flexible policy design to ensure that all interests are represented. Options for flexible policy could thereafter be designed and tested.

The interaction between policy instruments, their inherent threat of opportunism by governments or third parties, and the perception of investors may be subject of further research. Based on the conceptual framework, suggestions from expert interviews and earlier studies, this interaction is expected to play an important role in attracting or keeping non-utility investors from entering the sector. However, unfortunately it has been difficult to validate this interaction from empirical findings based on successfully completed projects. This interaction is most likely better observed in unsuccessful cases. Moreover, the perception of investors is somewhat difficult to 'measure' through an interview. Other qualitative methods to identify barriers to invest are suggested.

The final suggestion for further research is on the applicability of the framework in other contexts. Primarily, other large-scale (renewable) energy projects like concentrated solar power (CSP) and onshore wind may be reviewed based on the same concepts. In terms of scope, the applicability of the framework could also be reviewed in less-developed OWF markets (outside Europe). In general, project-based industries with a large role for government intervention could show similar interactions to those suggested in the framework. The setup of such research could be similar to this research, but with a larger focus on the operationalisation and empirical analysis as the research will thus be based on the conceptual framework suggested in this report.

9. Reflection

In this chapter, the research is reflected upon. To do so, possible limitations in the methodology, the availability of (objective) information, and the choice in research scope are discussed.

9.1 Reflection on the Methodology

The problem inherent in the combination of developing a conceptual framework based on theories and comparative case studies to empirically analyse the relations from the framework are illustrated by Ragin and Becker (1992). With respect to the limitations of this methodological approach, they state that: 'The paradox of theory is that at the same time it tells us where to look, it can keep us from seeing' (Ragin & Becker, 1992). A risk of trying to 'force-fit' the data into a theoretical construct exists.

By taking a pluralistic view, incorporating multiple theoretical constructs, I've tried to remain open to several angles and views. Moreover, the selection of theories and the choice of concepts from these theories and figuring out how these may relate to each other were made very carefully. Although the presentation of the conceptual framework at the end of chapter 2 may seem early on in the research, in fact, large parts of the different analyses were conducted prior to formulating the final framework in order to ensure that I remained open to other insights. I honestly think that, although challenging and enduring, this method resulted in a thorough overview of the role of non-utility investors in the European OWF sector and a very interesting framework for describing and analysing this.

9.2 Reflection on the Information

When interviewing people an inherent risk of information devaluation exists. The reality is expressed by the interviewee, but unavoidably devaluated by their biases, limited knowledge, and possible reluctance to share certain information. The interpretation by the interviewer is another step in this devaluation. Once reported findings may have been lost or wrongfully interpreted (figure 53).

Figure 53: Information Devaluation Chain

Involved investors from case studies are unavoidably biased and may gloze over certain issues to protect their interests. Moreover, their views are expressed after most of the project's challenges have been overcome, so their views could have changed. Finally, the investors may be reluctant to share certain information. This was particularly experienced with regard to any information on the agreements about (future) moments of divestments, division of tasks, and risk or return requirements. As, mentioned, measuring the perception of interviewees was difficult through such qualitative interviews (see section 8.2.2 for suggestions on further research into this subject). The issues of biased information or the reluctance to share certain information was aimed to be overcome by interviewing two different investors for each case study, comparing their answered, and cross-checking this with other available sources.

9.3 Reflection on the Scope

The scope of the research has been focused on the European offshore wind sector. In particular, conclusions are drawn from Europe's largest offshore wind countries: The United Kingdom, Germany, Denmark, The Netherlands, Belgium, and Sweden. Moreover, the selection of case studies was based on this scope with cases from Belgium (Belwind), The Netherlands (Gemini), and Germany (Butendiek).

The findings of this research might have been significantly different had the focus been outside the European OWF market. As the practical goal of this research (to give policy makers within Europe an insight in the adequacy of policy instruments to support OWF investments) focuses on the European OWF market, this choice in scope is no issue. However, the applicability of the framework in other geographical or sectorial contexts may be different and was therefore mentioned as an option for further research (section 8.2.2).

A bigger risk in the validity of the findings would be if the choice in comparative case studies would be either unsuitable for comparison or not representative of the overall OWF market. This has been safeguarded by applying the selection criteria mentioned in section 6.1 and discussing the choice with several people from the ING Bank SFUPR team. The fact that these case studies confirm the interactions suggested by the operationalisation of the framework suggests that this choice in scope has been suitable.

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APPENDICES

A. Dataset of European Offshore Wind Farms

PROJECT DETAILS			TECHNICAL DETAILS				TIMELINE DETAILS			DEVELOPER DETAILS		
Country	Farm	Size (MW)	Distance to shore (km)	Max Depth (m)	Turbine Type	Foundation	Development	Construction	Operational (planned)	Developer	Category	Note
Netherlands	Egmond aan Zee	108	10	21	V90-3.0 MW Offshore (Vestas)	Monopile	2001	2006	2007	Noordzeewind	Developer	SPV of investors
Netherlands	Prinses Amaliawindpark	120	23	24	V80-2.0 MW (Vestas)	Monopile	1999	2006	2008	Eneco	Utility	-
Netherlands	Eneco Luchterduinen	129	23	24	V112-3.0 MW Offshore (Vestas)	Monopile	2008	2014	2016	Eneco	Utility	-
Netherlands	Westermeerwind	144	0,5	5	SWT-3.0 - 108 (Siemens)	Monopile	2009	2014	2016	Ventolines	Developer	Not owner
Netherlands	Gemini	600	85	36	SWT-4.0 - 130 (Siemens)	Monopile	2009	2014	2017	Typhoon	Developer	Independent
Belgium	Belwind	165	46	24	V90-3.0 MW Offshore (Vestas)	Monopile	2006	2009	2010	Parkwind	Developer	SPV of investors
Belgium	Northwind	216	37	29	V112-3.0 NW Offshore (Vestas)	Monopile	2006	2013	2014	Parkwind	Developer	SPV of investors
Belgium	Thornton Bank I	30	27	28	5M (Senvion)	Gravity-Base	2003	2008	2012	C-Power nv	Developer	SPV of investors
Belgium	Thornton Bank II	184,5	27	24	6.2M 126 (Senvion)	Jacket	2003	2011	2012	C-Power nv	Developer	SPV of investors
Belgium	Thornton Bank III	110,7	26	26	6.2M 126 (Senvion)	Jacket	2003	2011	2013	C-Power nv	Developer	SPV of investors
Germany	Alpha Ventus	60	56	30	M5000-116 (Areva Wind)	Various	1999	2008	2010	DOTI	Developer	SPV of investors
Germany	BARD Offshore I	400	101	40	Bard 5.0 (Bard)	Tripile	2004	2010	2014	BARD Group	Developer	Independent
Germany	EnBW Baltic 1	48,3	16	19	SWT-2.3 - 93 (Siemens)	Monopile	2001	2010	2011	EnWB Energie Baden-Württenberg	Utility	-
Germany	Meerwind	288	53	26	SWT-3.6 - 120 (Siemens)	Monopile	2001	2011	2014	WindMW	Developer	SPV of investors
Germany	Nordsee Ost	295,2	57	26	6.2M 126 (Senvion)	Jacket	2000	2012	2014	RWE Innogy	Utility	-
Germany	Riffgat	113,4	12	23	SWT-3.6 - 120 (Siemens)	Monopile	2000	2012	2014	OW Riffgat	Developer	SPV of investors
Germany	Butendiek	288	32	22	SWT-3.6 - 120 (Siemens)	Monopile	2000	2014	2015	WPD	Developer	Independent
Germany	DanTysk	288	70	31	SWT-3.6 - 120 (Siemens)	Monopile	2005	2012	2015	DanTysk	Developer	SPV of investors
Germany	Global Tech I	400	115	41	M5000-116 (Areva Wind)	Tripod	2005	2012	2015	Global Tech I	Developer	Not owner
Germany	Trianel Windpark Borkum Phase 1	200	45	33	M5000-116 (Areva Wind)	Tripod	2006	2013	2015	Trianel	Utility	-
Germany	Amrumbank West	288	35	25	SWT-3.6 - 120 (Siemens)	Monopile	2000	2013	2015	E.ON	Utility	-
Germany	Borkum Riffgrunt I	312	54	29	SWT-4.0 - 120 (Siemens)	Monopile	2000	2013	2016	PNE Riff I	Developer	SPV of investors
Germany	EnBW Baltic 2	288	32	42	SWT-3.6 - 120 (Siemens)	Various	2000	2013	2015	EnWB Energie Baden-Württemberg	Utility	-
United Kingdom	Barrow	90	7,5	20	V90-3.0 MW Offshore (Vestas)	Monopile	2002	2005	2006	Barrow Offshore Wind Limited	Utility	SPV of investors
United Kingdom	Burbo Bank	90	6,4	8	SWT-3.6 - 107 (Siemens)	Monopile	2002	2006	2007	DONG Energy Burbo	Utility	-
United Kingdom	Greater Gabbard	504	36	32	SWT-3.6 - 107 (Siemens)	Monopile	2005	2009	2012	Greater Gabbard Offshore Winds Ltd	Developer	SPV of investors
United Kingdom	Gunfleet Sands I + II	172,8	7	15	SWT-3.6 - 107 (Siemens)	Monopile	2002	2008	2010	Gunfleet Sands Ltd	Developer	SPV of investors
United Kingdom	Inner Dowsing	97,2	5	14	SWT-3.6 - 107 (Siemens)	Monopile	2002	2007	2009	GLID Wind Farms Topco Ltd	Developer	SPV of investors
United Kingdom	Kentish Flats	90	8,5	5	V90-3.0 MW Offshore (Vestas)	Monopile	2002	2004	2005	GREP UK Marine Ltd	Developer	Subsidiary of Vestas
United Kingdom	Lincs	270	8	15	SWT-3.6 - 120 (Siemens)	Monopile	2007	2011	2013	Lincs Wind Farm Limited	Developer	Subsidiary of Centrica
United Kingdom	London Array Phase 1	630	20	25	SWT-3.6 - 120 (Siemens)	Monopile	2005	2011	2013	London Array Limited	Developer	SPV of investors
United Kingdom	Lynn	97,2	5	18	SWT-3.6 - 107 (Siemens)	Monopile	2002	2007	2009	GLID Wind Farms Topco Ltd	Developer	SPV of investors
United Kingdom	North Hoyle	60	7,2	11	V80-2.0 MW (Vestas)	Monopile	2002	2003	2004	NWP Offshore Ltd	Developer	Subsidiary of RWE
United Kingdom	Ormonde	150	9,5	22	5M (Senvion)	Jacket	2006	2010	2012	Ormonde Energy Limited	Developer	Subsidiary of Vattenfall
United Kingdom	Rhyl Flats	90	8	12	SWT-3.6 - 107 (Siemens)	Monopile	2002	2008	2009	RWE Innogy	Utility	-
United Kingdom	Robin Rigg	180	11	13	V90-3.0 MW Offshore (Vestas)	Monopile	2005	2007	2010	E.ON Climate & Renewables UK Robin Rigg East Ltd	Developer	Subsidiary of E.ON
United Kingdom	Scroby Sands	60	2,3	10	V80-2.0 MW (Vestas)	Monopile	2001	2003	2004	E.ON	Utility	-
United Kingdom	Sheringham Shoal	316,8	23	22	SWT-3.6 - 107 (Siemens)	Monopile	2007	2010	2012	Scira Offshore Energy Ltd	Developer	SPV of investors
United Kingdom	Teesside	62,1	1,5	15	SWT-2.3 - 93 (Siemens)	Monopile	2003	2012	2013	EDF Energy	Developer	Subsidiary of EDF
United Kingdom	Thanet	300	12	25	V90-3.0 MW Offshore (Vestas)	Monopile	2004	2009	2010	Thanet Offshore Wind Ltd	Developer	Subsidiary of Vattenfall
United Kingdom	Walney Phase 1	183,6	14	28	SWT-3.6 - 107 (Siemens)	Monopile	2006	2010	2011	Walney Offshore Windfarms Ltd	Developer	Subsidiary of DONG
United Kingdom	Walney Phase 2	183,6	14	30	SWT-3.6 - 120 (Siemens)	Monopile	2006	2011	2012	Walney Offshore Windfarms Ltd	Developer	Subsidiary of DONG
United Kingdom	West of Duddon Sands	389	15	24	SWT-3.6 - 120 (Siemens)	Monopile	2006	2013	2014	West of Duddon Sands	Developer	SPV of investors
United Kingdom	Gwynt y Mor	576	16	28	SWT-3.6 - 107 (Siemens)	Monopile	2005	2012	2015	Gwynt y Mor Offshore Wind Farm limited	Developer	SPV of investors
United Kingdom	Humber Gateway	219	10	18	V112-3.0 MW Offshore (Vestas)	Monopile	2008	2013	2015	Humber Wind Limites	Developer	Subsidiary of E.ON
United Kingdom	Westermost Rough	210	8	25	SWT-6.0 - 154 (Siemens)	Monopile	2009	2013	2015	Westermost Rough Ltd.	Developer	SPV of investors
Denmark	Anholt	399,6	15	19	SWT-3.6 - 120 (Siemens)	Monopile	2008	2011	2013	DONG Energy - Anholt Offshore	Developer	Subsidiary of DONG
Denmark	Horns Rev 1	160	17,9	14	V80-2.0 MW (Vestas)	Monopile	1999	2002	2002	-	-	-
Denmark	Horns Rev 2	209,3	31,7	17	SWT-2.3 - 93 (Siemens)	Monopile	2005	2008	2010	DONG Energy Horns Rev 2	Developer	Subsidiary of DONG
Denmark	Middelgrunden	40	4,7	6	B76/2000 (Bonus)	Gravity-Base	1996	2000	2001	DONG Energy	Utility	-
Denmark	Nysted	165,6	10,8	10	B82/2300 (Bonus)	Gravity-Base	2001	2002	2003	Energi E2	Developer	Subsidiary of DONG
Denmark	Rodsand 2	207	8,8	10	SWT-2.3 - 93 (Siemens)	Gravity-Base	2007	2009	2010	E.ON Vind Sverige AB	Developer	Subsidiary of E.ON
Denmark	Samso	23	4	13	B82/2300 (Bonus)	Monopile	1999	2002	2003	Samsoe Havvind	Developer	SPV of investors
Denmark	Sprogo	21	10,6	16	V90-3.0 MW Offshore (Vestas)	Gravity-Base	2008	2009	2009	Sund & Baelt Holding	Developer	Subsidiary of government
Sweden	Karehamn	48	3,8	20	V112-3.0 MW Offshore (Vestas)	Gravity-Base	2010	2012	2013	E.ON Vind Sverige AB	Developer	Subsidiary of E.ON
Sweden	Lillgrund	110,4	11,3	8	SWT-2.3 - 93 (Siemens)	Gravity-Base	2003	2006	2007	Vatttenfall Europe Windkraft GmnH	Developer	Subsidiary of Vattenfall
Sweden	Vindpark Vanern	30	3,5	13	WWD-3-100 (WinWinD)	Rock-Anchored	2006	2009	2010	Vindpark Vanern	Developer	SPV of investors

no test facilities, min 20MW and a planned operating date

Table 13: Dataset OWFs Europe

INVESTOR DETAILS					OWNERSHIP SHARE / PHASE							DIVESTMENTS		
Country	Farm	Owner	Category	Alternative?	Development Share (%)	Development Capacity (MW)	Construction Share (%)	Construction Capacity (MW)	Operational Share (%)	Operational Capacity (MW)	Phase Investment	Phase (partial) Divestment	Change (%)	Change (MW)
Belgium	Belwind	Colruyt	Private Equity	Alternative	38%	63,36	38%	63,36	19%	31,68	Development	Operational	19%	31,68
Belgium	Belwind	Korys	Private Equity	Alternative	26%	43,56	26%	43,56	13%	21,78	Development	Operational	13%	21,78
Belgium	Belwind	PMV	Municipalities	Alternative	15%	25,08	15%	25,08	8%	12,54	Development	Operational	8%	12,54
Belgium	Belwind	Sumitomo Corporation	Corporate	Alternative	0%	0,00	0%	0,00	40%	66,00	Operational	-		
Belgium	Belwind	Rabo Project Equity	Bank	Alternative	20%	33,00	20%	33,00	0%	0,00	Development	Operational	20%	33
Belgium	Belwind	Meewind	Infrastructure Fund	Alternative	0%	0,00	0%	0,00	20%	33,00	Operational	-		
Belgium	Northwind	Colruyt	Private Equity	Alternative	32%	69,47	32%	69,47	14%	31,10	Development	Operational	18%	38,3616
Belgium	Northwind	Korys	Private Equity	Alternative	22%	47,76	22%	47,76	10%	21,38	Development	Operational	12%	26,3736
Belgium	Northwind	PMV	Municipalities	Alternative	13%	27,50	13%	27,50	6%	12,31	Development	Operational	7%	15,1848
Belgium	Northwind	Sumitomo Corporation	Corporate	Alternative	0%	0,00	0%	0,00	30%	64,80	Operational	-		
Belgium	Northwind	Aspiravi	Municipalities	Alternative	33%	71,93	33%	71,93	40%	86,40	Development	-		
Belgium	Thornton Bank I	Socofe	Municipalities	Alternative	11,26%	3,38	11,26%	3,38	11,26%	3,38	Development	-		
Belgium	Thornton Bank I	DEME	EPC	Alternative	11,67%	3,50	11,67%	3,50	11,67%	3,50	Development	-		
Belgium	Thornton Bank I	Nuhma	Municipalities	Alternative	20%	6,00	20%	6,00	20%	6,00	Development	-		
Belgium	Thornton Bank I	EDF SA	Utility	Utility	18,28%	5,48	9,15%	2,75	9,15%	2,75	Development	Construction	9%	2,739
Belgium	Thornton Bank I	RWE AG	Utility	Utility	26,73%	8,02	26,73%	8,02	26,73%	8,02	Development	-		
Belgium	Thornton Bank I	SRIW (Soc. Reg. d'investissement de Wallonie)	Municipalities	Alternative	11,26%	3,38	11,26%	3,38	11,26%	3,38	Development	-		
Belgium	Thornton Bank I	Marguerite Fund	EU Fund	Alternative	0,00%	0,00	9,13%	2,74	9,13%	2,74	Construction	-		
Belgium	Thornton Bank II	Socofe	Municipalities	Alternative	11,26%	20,77	11,26%	20,77	11,26%	20,77	Development	-		
Belgium	Thornton Bank II	DEME	EPC	Alternative	11,67%	21,53	11,67%	21,53	11,67%	21,53	Development	-		
Belgium	Thornton Bank II	Nuhma	Municipalities	Alternative	20%	36,90	20%	36,90	20%	36,90	Development	-		
Belgium	Thornton Bank II	EDF SA	Utility	Utility	18,28%	33,73	9,15%	16,88	9,15%	16,88	Development	Construction	9%	16,84485
Belgium	Thornton Bank II	RWE AG	Utility	Utility	26,73%	49,32	26,73%	49,32	26,73%	49,32	Development	-		
Belgium	Thornton Bank II	SRIW (Soc. Reg. d'investissement de Wallonie)	Municipalities	Alternative	11,26%	20,77	11,26%	20,77	11,26%	20,77	Development	-		
Belgium	Thornton Bank II	Marguerite Fund	EU Fund	Alternative	0,00%	0,00	9,13%	16,84	9,13%	16,84	Construction	-		
Belgium	Thornton Bank III	Socofe	Municipalities	Alternative	11,26%	12,46	11,26%	12,46	11,26%	12,46	Development	-		
Belgium	Thornton Bank III	DEME	EPC	Alternative	11,67%	12,92	11,67%	12,92	11,67%	12,92	Development	-		
Belgium	Thornton Bank III	Nuhma	Municipalities	Alternative	20%	22,14	20%	22,14	20%	22,14	Development	-		
Belgium	Thornton Bank III	EDF SA	Utility	Utility	18,28%	20,24	9,15%	10,13	9,15%	10,13	Development	Construction	9%	10,10691
Belgium	Thornton Bank III	RWE AG	Utility	Utility	26,73%	29,59	26,73%	29,59	26,73%	29,59	Development	-		
Belgium	Thornton Bank III	SRIW (Soc. Reg. d'investissement de Wallonie)	Municipalities	Alternative	11,26%	12,46	11,26%	12,46	11,26%	12,46	Development	-		
Belgium	Thornton Bank III	Marguerite Fund	EU Fund	Alternative	0,00%	0,00	9,13%	10,11	9,13%	10,11	Construction	-		
Denmark	Anholt	DONG Energy	Utility	Utility	100%	399,60	50,00%	199,80	50%	199,80	Development	Construction	50%	199,8
Denmark	Anholt	PKA	Pension Fund	Alternative	0%	0,00	20,00%	79,92	20%	79,92	Construction	-		
Denmark	Anholt	Pension Danmark	Pension Fund	Alternative	0%	0,00	30,00%	119,88	30%	119,88	Construction	-		
Denmark	Horns Rev 1	DONG Energy	Utility	Utility	40%	64,00	40,00%	64,00	40%	64,00	Development	-		
Denmark	Horns Rev 1	Vattenfall	Utility	Utility	60%	96,00	60,00%	96,00	60%	96,00	Development	-		
Denmark	Horns Rev 2	DONG Energy	Utility	Utility	100%	209,30	100,00%	209,30	100%	209,30	Development	-		
Denmark	Middelgrunden	DONG Energy	Utility	Utility	50%	20,00	50,00%	20,00	50%	20,00	Development			
Denmark	Middelgrunden	Middelgrundens Windmollelaug	Local Partners	Alternative	50%	20,00	50,00%	20,00	50%	20,00	Development	-		
Denmark	Nysted	DONG Energy	Utility	Utility	80%	132,48	80,00%	132,48	43%	70,38	Development	Operational	38%	62,1
Denmark	Nysted	E.ON	Utility	Utility	20%	33,12	20,00%	33,12	0%	0,00	Development	Operational	20%	33,12
Denmark	Nysted	Pension Danmark	Pension Fund	Alternative	0%	0,00	0,00%	0,00	50%	82,80	Operational	-		
Denmark	Nysted	Stadtwerke Lubeck	Utility	Utility	0%	0,00	0,00%	0,00	8%	12,42	Operational	-		
Denmark	Rodsand 2	E.ON	Utility	Utility	100%	207,00	100,00%	207,00	20%	41,40	Development	Operational	80%	165,6
Denmark	Rodsand 2	SEAS-NVE	Utility	Utility	0%	0,00	0,00%	0,00	80%	165,60	Operational	-		
Denmark	Samso	Samso Municipality	Municipalities	Alternative	50%	11,50	50,00%	11,50	50%	11,50	Development	-		
Denmark	Samso	Difko	Investment Fund	Alternative	50%	11,50	50,00%	11,50	50%	11,50	Development	-		
Denmark	Sprogo	Sund & Baelt	Government	Alternative	100%	21,00	100,00%	21,00	100%	21,00	Development	-		
Germany	Alpha Ventus	E.ON	Utility	Utility	26,25%	15,75	26,25%	15,75	26,25%	15,75	Development	-		
Germany	Alpha Ventus	EWE	Utility	Utility	47,50%	28,50	47,50%	28,50	47,50%	28,50	Development	-		
Germany	Alpha Ventus	Vattenfall	Utility	Utility	26,25%	15,75	26,25%	15,75	26,25%	15,75	Development	-		
Germany	BARD Offshore I	BARD Group	OEM	Alternative	100,00%	400,00	100,00%	400,00	0,00%	0,00	Development	Operational	100%	400
Germany	BARD Offshore I	Ocean Breeze Energy	IPP	Alternative	0,00%	0,00	0,00%	0,00	100%	400,00	Operational	-		
Germany	EnBW Baltic 1	EnWB Energie Baden-Württemberg	Utility	Utility	50,31%	24,30	50,31%	24,30	50,31%	24,30	Development	-		
Germany	EnBW Baltic 1	Group of 19 Municipalities	Municipalities	Alternative	49,69%	24,00	49,69%	24,00	49,69%	24,00	Development	-		
Germany	Meerwind	The Blackstone Group	Private Equity	Alternative	80%	230,40	80%	230,40	80%	230,40	Development	-		
Germany	Meerwind	Windland Energieenzeugungs	Independent Developer	Alternative	20%	57,60	20%	57,60	20%	57,60	Development	-		
Germany	Nordsee Ost	RWE Innogy	Utility	Utility	100%	295,20	100%	295,20	100%	295,20	Development	-		
Germany	Riffgat	ENOVA Energieanlagen	Independent Developer	Alternative	10%	11,34	10%	11,34	10%	11,34	Development	-		
Germany	Riffgat	EWE	Utility	Utility	90%	102,06	90%	102,06	90%	102,06	Development	-		
Germany	Butendiek	WPD	Independent Developer	Alternative	10%	28,80	10%	28,80	10%	28,80	Development	-		
Germany	Butendiek	Marguerite Fund	EU Fund	Alternative	22,50%	64,80	15,08%	43,42	15,08%	43,42	Development	Construction	7%	21,384
Germany	Butendiek	Industriens Pension	Pension Fund	Alternative	22,50%	64,80	22,50%	64,80	22,50%	64,80	Development	-		
Germany	Butendiek	PKA	Pension Fund	Alternative	22,50%	64,80	22,50%	64,80	22,50%	64,80	Development	-		
Germany	Butendiek	Siemens Financial Services	OEM	Alternative	22,50%	64,80	22,50%	64,80	22,50%	64,80	Development	-		
Germany	Butendiek	CDC Infrastructure	Infrastructure Fund	Alternative	0,00%	0,00	7,43%	21,38	7,43%	21,38	Construction	-		
Germany	DanTysk	Vattenfall	Utility	Utility	51%	146,88	51%	146,88	51%	146,88	Development	-		
Germany	DanTysk	Stadtwerke München	Utility	Utility	49%	141,12	49%	141,12	49%	141,12	Development	-		
Germany	Global Tech I	Stadtwerke München	Utility	Utility	24,90%	99,60	24,90%	99,60	24,90%	99,60	Development	-		
Germany	Global Tech I	HEAG Südhessische Energy	Utility	Utility	24,90%	99,60	24,90%	99,60	24,90%	99,60	Development	-		
Germany	Global Tech I	Axpo International	Utility	Utility	24,10%	96,40	24,10%	96,40	24,10%	96,40	Development	-		
Germany	Global Tech I	Esportes Offshore Beteiligungs	Utility	Utility	10%	40,00	10%	40,00	10%	40,00	Development	-		
Germany	Global Tech I	Several Development firms	Independent Developer	Alternative	16,10%	64,40	16,10%	64,40	16,10%	64,40	Development	-		
Germany	Trianel Windpark Borkum Phase 1	Trianel	Utility	Utility	100%	200,00	100%	200,00	100%	200,00	Development	-		
Germany	Amrumbank West	E.ON	Utility	Utility	100%	288,00	100%	288,00	100%	288,00	Development	-		
Germany	Borkum Riffgrunt I	DONG Energy	Utility	Utility	50%	156,00	50%	156,00	50%	156,00	Development	-		
Germany	Borkum Riffgrunt I	Kirkbi	Private Equity	Alternative	32%	99,84	32%	99,84	32%	99,84	Development	-		
Germany	Borkum Riffgrunt I	The Oticon Foundation	Private Equity	Alternative	18%	56,16	18%	56,16	18%	56,16	Development	-		
Germany	EnBW Baltic 2	EnWB Energie Baden-Württemberg	Utility	Utility	100,00%	288,00	50,11%	144,32	50,11%	144,32	Development	Construction	50%	143,6832
Germany	EnBW Baltic 2	Macquarie Capital	Investment Fund	Alternative	0,00%	0,00	49,89%	143,68	49,89%	143,68	Construction	-		
Netherlands	Egmond aan Zee	Nuon	Utility	Utility	50%	54,00	50%	54,00	50%	54,00	Development	-		108
Netherlands	Egmond aan Zee	Shell	O&G	Alternative	50%	54,00	50%	54,00	50%	54,00	Development	-		
Netherlands	Prinses Amaliawindpark	Eneco	Utility	Utility	100%	120,00	100%	120,00	100%	120,00	Development	-		
Netherlands	Eneco Luchterduinen	Eneco	Utility	Utility	50%	64,50	50%	64,50	50%	64,50	Development	-		
Netherlands	Eneco Luchterduinen	Mitsubishi	Corporate	Alternative	50%	64,50	50%	64,50	50%	64,50	Development	-		
Netherlands	Westermeerwind	Westermeerwind BV	Local Partners	Alternative	100%	144,00	100%	144,00	100%	144,00	Development	-		
Netherlands	Gemini	HVC Groep	Utility	Utility	10%	60,00	10%	60,00	10%	60,00	Development	-		
Netherlands	Gemini	Typhoon Offshore	Independent Developer	Alternative	5%	30,00	0,00%	0,00	0%	0,00	Development	Construction	5%	30
Netherlands	Gemini	Northland Power	Utility	Utility	55%	330,00	60%	360,00	60%	360,00	Development	-		
Netherlands	Gemini	Siemens Financial Services	OEM	Alternative	20%	120,00	20%	120,00	20%	120,00	Development	-		
Netherlands	Gemini	Van Oord	EPC	Alternative	10%	60,00	10%	60,00	10%	60,00	Development	-		
Sweden	Karehamn	E.ON	Utility	Utility	100%	48,00	100,00%	48,00	100%	48,00	Development	-		
Sweden	Lillgrund	Vattenfall	Utility	Utility	100%	110,40	100,00%	110,40	100%	110,40	Development	-		
Sweden	Vindpark Vanern	Karlstads Energi AB	Utility	Utility	10%	3,00	10,00%	3,00	10%	3,00	Development	-		
Sweden	Vindpark Vanern	Hammero Energi AB	Utility	Utility	10%	3,00	10,00%	3,00	10%	3,00	Development	-		
Sweden	Vindpark Vanern	Karlstads Bostads AB	Municipalities	Alternative	10%	3,00	10,00%	3,00	10%	3,00	Development	-		
Sweden	Vindpark Vanern	AB Hammarobostader	Municipalities	Alternative	10%	3,00	10,00%	3,00	10%	3,00	Development	-		
Sweden	Vindpark Vanern	Gasungarna AB	Municipalities	Alternative	10%	3,00	10,00%	3,00	10%	3,00	Development	-		
Sweden	Vindpark Vanern	Kyrkvinden Ekonomisk forening	Local Partners	Alternative	10%	3,00	10,00%	3,00	10%	3,00	Development	-		
Sweden	Vindpark Vanern	Vindkraft Gasslingen Ekonomisk forening	Local Partners	Alternative	10%	3,00	10,00%	3,00	10%	3,00	Development	-		
United Kingdom	Barrow	DONG Energy	Utility	Utility	100%	90,00	100%	90,00	100%	90,00	Development	-		
United Kingdom	Burbo Bank	DONG Energy	Utility	Utility	100%	90,00	100%	90,00	100%	90,00	Development	-		
United Kingdom	Greater Gabbard	SSE Renewables	Utility	Utility	50%	252,00	50%	252,00	50%	252,00	Development	-		
United Kingdom	Greater Gabbard	RWE Innogy UK	Utility	Utility	50%	252,00	50%	252,00	50%	252,00	Development	-		
United Kingdom	Gunfleet Sands I + II	DONG Energy	Utility	Utility	100,00%	172,80	100,00%	172,80	50,10%	86,57	Development	Operational	50%	86,2272
United Kingdom	Gunfleet Sands I + II	Marubeni	Corporate	Alternative	0,00%	0,00	0,00%	0,00	24,95%	43,11	Operational	-		
United Kingdom	Gunfleet Sands I + II	Development Bank of Japan	State Bank	Alternative	0,00%	0,00	0,00%	0,00	24,95%	43,11	Operational	-		
United Kingdom	Inner Dowsing	Centrica Energy	Utility	Utility	100%	97,20	100,00%	97,20	50,00%	48,60	Development	Operational	50%	48,6
United Kingdom	Inner Dowsing	EIG Partners	Energy Fund	Alternative	0%	0,00	0,00%	0,00	50,00%	48,60	Operational	-		
United Kingdom	Kentish Flats	Vestas	OEM	Alternative	100%	90,00	100,00%	90,00	0,00%	0,00	Development	Operational	100%	90
United Kingdom	Kentish Flats	Vattenfall	Utility	Utility	0%	0,00	0,00%	0,00	100,00%	90,00	Operational	-		
United Kingdom	Lincs	Centrica Energy	Utility	Utility	50%	135,00	50%	135,00	50%	135,00	Development	-		
United Kingdom	Lincs	DONG Energy	Utility	Utility	25%	67,50	25,00%	67,50	25,00%	67,50	Development	-		
United Kingdom	Lincs	Siemens Financial Services	OEM	Alternative	25%	67,50	25,00%	67,50	25,00%	67,50	Development	-		
United Kingdom	London Array Phase 1	DONG Energy	Utility	Utility	50%	315,00	50,00%	315,00	25,00%	157,50	Development	Operational	25%	157,5
United Kingdom	London Array Phase 1	E.ON	Utility	Utility	30%	189,00	30%	189,00	30%	189,00	Development	-		
United Kingdom	London Array Phase 1	Masdar	Souvereign Wealth Fund	Alternative	20%	126,00	20,00%	126,00	20,00%	126,00	Development	-		
United Kingdom	London Array Phase 1	Caisse de depot et placement du Quebec	Infrastructure Fund	Alternative	0%	0,00	0,00%	0,00	25,00%	157,50	Operational	-		
United Kingdom	Lynn	Centrica Energy	Utility	Utility	100%	97,20	100%	97,20	50,00%	48,60	Development	Operational	50%	48,6
United Kingdom	Lynn	EIG Partners	Energy Fund	Alternative	0%	0,00	0,00%	0,00	50,00%	48,60	Operational	-		
United Kingdom	North Hoyle	RWE Innogy UK	Utility	Utility	100%	60,00	100%	60,00	0,00%	0,00	Development	Operational	100%	60
United Kingdom	North Hoyle	Zephyr Investment Fund	Private Equity	Alternative	0%	0,00	0,00%	0,00	100,00%	60,00	Operational	-		
United Kingdom	Ormonde	Vattenfall	Utility	Utility	100%	150,00	100%	150,00	100,00%	150,00	Development	-		
United Kingdom	Rhyl Flats	RWE Innogy UK	Utility	Utility	100%	90,00	100,00%	90,00	50,10%	45,09	Development	Operational	50%	44,91
United Kingdom	Rhyl Flats	Greencoat UK Wind PLC	Energy Fund	Alternative	0%	0,00	0%	0,00	24,95%	22,46	Operational	-		
United Kingdom	Rhyl Flats	Green Investment bank	State Bank	Alternative	0%	0,00	0,00%	0,00	24,95%	22,46	Operational	-		
United Kingdom	Robin Rigg	E.ON	Utility	Utility	100%	180,00	100%	180,00	100,00%	180,00	Development	-		
United Kingdom	Scroby Sands	E.ON	Utility	Utility	100%	60,00	100,00%	60,00	100,00%	60,00	Development	-		
United Kingdom	Sheringham Shoal	Statoil	O&G	Alternative	50%	158,40	50%	158,40	40,00%	126,72	Development	Operational	10%	31,68
United Kingdom	Sheringham Shoal	Statkraft	Utility	Utility	50%	158,40	50,00%	158,40	40,00%	126,72	Development	Operational	10%	31,68
United Kingdom	Sheringham Shoal	Green Investment bank	State Bank	Alternative	0%	0,00	0%	0,00	20,00%	63,36	Operational	-		
United Kingdom	Teesside	EDF SA	Utility	Utility	100%	62,10	100,00%	62,10	100,00%	62,10	Development	-		
United Kingdom	Thanet	CRC	Independent Developer	Alternative	100%	300,00	0%	0,00	0,00%	0,00	Development	Construction	100%	300
United Kingdom	Thanet	Vattenfall	Utility	Utility	0%	0,00	100,00%	300,00	100,00%	300,00	Construction	-		
United Kingdom	Walney Phase 1	DONG Energy	Utility	Utility	74,90%	137,52	50,10%	91,98	50,10%	91,98	Development	Construction	25%	45,5328
United Kingdom	Walney Phase 1	SSE Renewables	Utility	Utility	25%	46,08	25%	46,08	25%	46,08	Development	-		
United Kingdom	Walney Phase 1	PGGM	Pension Fund	Alternative	0%	0,00	12,40%	22,77	12,40%	22,77	Construction	Refinanced with debt		
United Kingdom	Walney Phase 1	Ampere Equity Fund	Energy Fund	Alternative	0%	0,00	12,40%	22,77	12,40%	22,77	Construction	Refinanced with debt		
United Kingdom	Walney Phase 2	DONG Energy	Utility	Utility	74,90%	137,52	50,10%	91,98	50,10%	91,98	Development	Construction	25%	45,5328
United Kingdom	Walney Phase 2	SSE Renewables	Utility	Utility	25%	46,08	25%	46,08	25%	46,08	Development	-		
United Kingdom	Walney Phase 2	PGGM	Pension Fund	Alternative	0%	0,00	12,40%	22,77	12,40%	22,77	Construction	Refinanced with debt		
United Kingdom	Walney Phase 2	Ampere Equity Fund	Energy Fund	Alternative	0%	0,00	12,40%	22,77	12,40%	22,77	Construction	Refinanced with debt		
United Kingdom	West of Duddon Sands	ScottischPower Renewables	Utility	Utility	50%	194,50	50,00%	194,50	50%	194,50	Development	-		
United Kingdom	West of Duddon Sands	DONG Energy	Utility	Utility	50%	194,50	50,00%	194,50	50%	194,50	Development	-		
United Kingdom	Gwynt y Mor	RWE Innogy UK	Utility	Utility	60%	345,60	60,00%	345,60	50%	288,00	Development	Operational	10%	57,6
United Kingdom	Gwynt y Mor	Siemens Financial Services	OEM	Alternative	10%	57,60	10,00%	57,60	10%	57,60	Development	-		
United Kingdom	Gwynt y Mor	Stadtwerke München	Utility	Utility	30%	172,80	30,00%	172,80	30%	172,80	Development	-		
United Kingdom	Gwynt y Mor	Green Investment bank	State Bank	Alternative	0%	0,00	0,00%	0,00	10%	57,60	Operational	-		
United Kingdom	Humber Gateway	E.ON	Utility	Utility	100%	219,00	100,00%	219,00	100%	219,00	Development	-		
United Kingdom	Westermost Rough	DONG Energy	Utility	Utility	100%	210,00	50,00%	105,00	50%	105,00	Development	Construction	50%	105
United Kingdom	Westermost Rough	Marubeni	Corporate	Alternative	0%	0,00	25,00%	52,50	25%	52,50	Construction	-		
United Kingdom	Westermost Rough	Green Investment bank	State Bank	Alternative	0%	0,00	25,00%	52,50	25%	52,50	Construction	-		

Table 14: Dataset investors Europe

B. Expert Interview: Leon Pulles

Topic	European offshore wind market
Date	06/03/2015
Interviewee	Leon Pulles
Function	Senior Investment Manager
Interviewer	Coen Makker

C: Hoe ziet u de verdeling in rollen van investeerders?

L: Europese utilities hebben het niet makkelijker op het moment. Van UK utilities heb ik geen goed beeld. Centrica is wel ver en actief in offshore wind. Utilities die het minste last hebben gehad van overheidsbemoeienis staan er het beste voor (zoals GDF Suez), ook financieel

C: zoals door unbundling?

L: unbundling en liberalisering van de waardeketen. Het begon bij de UK, maar ook NL bijvoorbeeld kwam daar snel achteraan. De Franse regering heft daar langer mee gewacht. In Zuid Europa hebben de utilities ook direct meer ingespeeld op renewables.

Op het gebied van offshore wind konden de utilities met name 10 jaar geleden dit soort projecten goed initialiseren.

Nu moeten parken steeds meer obv bankfinanciering (dus project finance) en nieuwe equity partijen worden gerealiseerd.

C: En wat is de rol van onafhankelijke ontwikkelaars? Korte investeringshorizon, development fase, doel om daarna te verkopen voor hoge return?

L: dat zou kunnen maar en zijn wel veel voorbeelden van hoe dat niet zo goed is gegaan. Bijvoorbeeld Windrai (Duitse ontwikkelaar). Dat zag je veel in duitsland, partijen die succesvol waren op het land en dit wilden uitbereiden naar offshore. Op zee heb je echt wel te maken met andere condities. Op land is het een stuk minder moeilijk. Op zee komen de offshore wereld en de elektrische wereld samen. Een high voltage station op zee is een goed voorbeeld van twee complexe werelden de samen komen. Een onervaren ontwikkelaar die dat moet coördineren heeft het daar moeilijk mee.

Bovendien is de ontwikkelfase al gauw zo'n 5-10% van de CAPEX, wat in een OWF een groot bedrag is.

C: development fase kent natuurlijk veel onzekerheid. Maar een partij met meer bereidheid voor die risico's en een korte investeringshorizon vindt dat misschien toch een interessante business case om een grote return te maken in een korte tijd?

L: Je ziet het ook wel hier en daar, bijvoorbeeld Mainstream of Typhoon in Gemini (hoewel zij veel ervaring en financiering natuurlijk al meenamen uit Econcern). Maar ik vraag me af of er zo veel van dit soort partijen zullen zijn.

C: Onafhankelijke ontwikkelaars?

L: ja, die het zo goed kunnen en die ervaring hebben

C: WPD in Duitsland?

L: die bijvoorbeeld wel idd, maar in Duitsland zie je ook Stadtwerken die dit doen. Dat soort spelers zouden wel samen met andere investeerders een rol kunnen spleen

C: Die samenwerking is sowieso een centraal thema zo lijkt het in welke investeerders nodig gaan zijn, zo heb ik gelezen. Het zal een combinatie van partijen moeten zijn. Vanwege A. de grootte van projecten en B. de verschillen in fases risicoprofielen en voorkeuren van investeerders. Daarin wordt vaak verwezen naar een grote (verwachte) rol voor institutionele investeerders

L: Ontwikkelfase zal qua risico en bedragen echt heel moeilijk zijn om investeerders aan te trekken! Dan zullen het toch de utilities moeten zijn die het toch al doen.

Of bijvoorbeeld een partij die al samen met een utility in een operationeel park zit, zols Eneco en Mitsubishi, zullen misschien in het vervolg ook samen de ontwikkeling willen ingaan. Maar ook dat lijkt mij best lastig.

C: Dus voor een alternatieve investeerder is ervaring belangrijk

L: ja en het is veel geld en een groot risico. Pensioenfondsen zie je niet in de ontwikkelfase. Pas wanneer het operationeel is.

In Duitsland en Engeland heb je wel investment banks die in eerdere fases deelnemen.

Zo zie je ook wel grote Japanse conglomeraten deelnemen, veel zijn ook bekend uit de solar. Dat vormt bijvoorbeeld een goede combinatie voor in de constructiefase met een utility met ervaring.

C: waarom zijn zei dit wel bereid te doen en institutionele beleggers niet? Heeft dit alleen te maken met het risicoprofiel?

L: pensioenfondsen willen bepaalde rendementen en lage risico's inderdaad. Die anderen willen een hoger rendement en dan moet je naar voren in de fases van een park.

Maar ook veel private equity partijen vinden het risk/return van OWF toch niet goed genoeg. Die willen meer rendement voor dat risico

C: vanwege de status van de techniek of om het beleidssysteem?

L: ja beide, veranderingen in een support regime (vb solar in Spanje) het retro-actieve veranderingen zijn een te groot risico. Een te gul support regime kan nog weleens op worden teruggekomen.

C: met name wanneer het uit een overheidsbudget moet komen?

L: ja dan moet er door partijen worden ingeschat of de overheid dat ook gaat/kan betalen. Als het mis gaat gaat het ook goed mis dan

Met wat er nu wordt gerealiseerd in UK en GE worden risicos wel beter begrepen en komen er betere contractvormen. Maar die trial en errors zorgen ook voor een prijsopdrijvend effect. Risico's van cost/schedule overruns zijn heel groot.

C: Is er dan een belangrijke rol voor beleid om investeringen nog aantrekkelijker te maken voor een breder scala aan investeerders? Dus ook alternatieve investeerders in de ontwikkel/constructie fase?

L: Pensioenfondsen in de constructiefase zou eventueel kunnen. Maar dat moet dan wellicht wel in combinatie met een investeringsbank. Dat zou een combinatie kunnen zijn om pensioenfondsen in de constructiefase actief te krijgen

C: Als ik zo kijk naar UK, GE vs, NL dan krijg ik de indruk dat ik in UK en GE meer institutionele partijen actief zijn? Zou er iets zijn in het beleid wat bepalend is?

L: aansluiting zoals het Net op Zee is denk ik gewoon een goeie keuze en belangrijk.

C: minder risico in de ontwikkelfase?

L: Q-meetings Siemens en Ballast Nedam hebben dit beschreven. De risico's van de ontwikkeling en constructive

C: Operationeel dus wel meer interesse van een breder scala investeerders maar ze zijn juist nodig in de eerdere fases?

L: ja dat denk ik ook

C: en er zijn aannemelijke twijfels of de partijen die nu al wel actief zijn in ontwikkeling en constructie wel voldoende kapitaal hebben om 2020 doelstellingen te realiseren?

L: ja ik denk dat dat inderdaad wel een interessant probleem is. In Belgie heb je bijvoorbeeld wel ook private fondsen (rijke families bv) die mee doen in de tenderfase

C: Het is dus een veel breder spectrum aan investeerder die nodig zijn. Maar voorlopig zijn het voornamelijk de utilities?

L: Ik had toen ik rondliep bij die SER - Borssele Tender bijeenkomst dat het inderdaad utilities waren die op zoek zijn naar bank financiering en een extra equity partij om mee samen te werken.

C: dat is denk ik de belangrijkste conclusie. Zij zullen het niet alleen kunnen doen.

C. Expert Interview: Niels Jongste

Topic	European offshore wind market
Date	10/04/2015
Interviewee	Niels Jongste (Green Giraffe)
Function	Director
Interviewer	Coen Makker

C: Ik ben benieuwd naar de verschillen in hoe landen hun beleidsinstrumenten om OWF investeringen te stimuleren hebben ingericht en het type investeerders dat actief is per land

N: Het korte antwoord is ja, die zijn er. Of in ieder geval die waren er en dat worden er steeds minder.

3 elementen:

-up-front subsidie – EIA ook in Nederland, investeringssubsidie

- Exploitatie subsidie (ROC, FIT, verschillende smaken)

- Verkapte staatssteun achtige zaken (investeringsklimaat, aantrekken van industrie, deze is moeilijk te kwantificeren… buiten beschouwing laten)

Dan heb je dus up-front en exploitatie. Exploitatie heeft ieder land (in de EU) en up-front hadden sommigen.

Bijvoorbeeld Q7, daar zat veel EIA op. Dan zie je dat de realisatie werd geaccelereerd door bedrijven met veel belastingscapaciteit die de EIA kunnen benutten.

EIA werking: stel investering van 100, normaliter afschrijving van 100 over een aantal jaren. Maar EIA zegt: investering in een duurzame energie, dan mag je 144 afschrijven en ook nog eens in 1 keer. Dus je krijgt (in geval van 35% belasting) zo'n 45 terug als belastingvoordeel. Dus je investering gaat van 100 naar 55 (100-45). Onafhankelijk van of de OWF het ook doet.

C: Dus dat is misschien een beetje een gevaarlijke prikkel.

N: Ja bv in China zie je dat er veel meer is gebouwd dan er daadwerkelijk is aangesloten op het grid en produceert.

C: Tot wanneer bestond dit in NL/EU?

N: In NL tot 2 jaar geleden.

En voor exploitatie subsidies heb je eigenlijk twee smaken. FIT en ROC.

Deze trekken verschillende soorten investeerders aan:

-Type 1: geeft geen upside (prijsupside). (SDE, wat we in belgie krijgen en het Duitse FIT) Dit is heel erg aantrekkelijk voor lange termijn investeerders, risicomijdende investeerders aan zoals Pensioenfondsen en yieldco's.

- ROC (of andere varianten met prijs upside, NL MER/MEP) trekt meer investeerders aan die daarin geïnteresseerd zijn.

Beide trekken dus zowel andere soort investeerders als andere project structuren aan.

Tweede aspect is de lengte van de periode, en daar wordt ook op gestructureerd. Als de lengte van de subsidieperiode 15 jaar is, dan gaan mensen ook de deals structureren voor 15 jaar. Dus onderhoudscontracten van 15 jaar. Is een systeem langer dan 15 jaar, dan zie je dat investeerders daar weinig (extra) waarde aan toekennen omdat veel partijen de technische levensduur van die installaties maar op 15 jaar inschatten. Daarna moeten die turbines vervangen worden of moeten er grote onderdelen worden vervangen.

C: Is dat dan ook terug te zien in de investeringshorizon van de partijen die onder de verschillende systemen investeren?

N: Nou als je aan het verkopen bent probeer je het vaak zo te zeggen: de concessieperiode is 30-35 jaar. Dan pleit je dat het park er inderdaad zo lang kan staan en dat de prijs van elektriciteit na die periode van 10-15 subsidie omhoog gaat. De zwaarste onderhandelingen zitten dan ook op dit stuk (na de subsidieduur), dat eerste deel gelooft iedereen wel (FIT staat vast, onderhoudskosten staan vast, alleen een beetje variabiliteit van wind maar dat is goed te berekenen). Maar het deel daarna kan nog een zeer aanzienlijk effect hebben op je rendement.

C: Een langer lopend systeem, maakt een park dus makkelijker te verkopen?

N: Ja, maar na 15 jaar wordt er dus niet veel waarde aan toegekend. Alleen Belgie geeft nog 20 jaar.

C: Technische levensduur is dus ongeveer 30 jaar.

N: Ja, zo wordt er ook op begroot. Alleen de kabels en fundaties kunnen veel langer mee. Kabels wel 60-70 jaar. Maar de economische levensduur is maar de vraag hoe lang dat is. Met name de vraag is wat er met die turbines gebeurt na die periode omdat er nog geen turbines al zo lang staan offshore.

C: Tijdens het kijken naar parken en hun investeerders valt het me eigenlijk tegen in hoeverre er buiten utilities nou een significant aandeel van de equity investering op zich nemen. Ook in de landen waar het regime bv "stabiel" en aantrekkelijk is.

N: Ik denk dat dat meevalt. Blackstone in DE, fonds-achtige beleggers (marguerite, CIP, Highland group) Dus ik denk dat het traditioneel wel idd utilities waren (tot 2-3 jaar terug), maar dat er nu toch wel bijna de helft van niet-utilities komt. Ook in de UK: Marubeni. BE, heb je Colruyt.

C: Denk je dat die partijen die voor stabiliteit gaan (verwijzing naar FIT systeem en aantrekking lange termijn, low risk partijen zoals pensioenfondsen) het belangrijkst zijn om aan te trekken? Dat landen daarom meer en meer lijken te veranderen naar een systeem zonder prijs upside.

N: Met name die FIT is gewoon budgetair heel makkelijk voor overheden. Je weet wat je kwijt gaat zijn en inflatie werkt in je voordeel. Welke richting electriciteitsprijzen ook bewegen, er zit iig een inflatiecomponent in. (hoewel inflatie nu minder vanzelfsprekend is, maar dat daargelaten.) Het betekent dat je elk jaar minder hoeft aan te vullen.

C: Zijn er andere beleidsinstrumenten van overheden die een wezenlijk effect hebben op de type investeerders die een land aantrekt? Bv de designated development zones met metingen, permitting en subsidie in 1 tender

N: Ik denk dat het met name overal kostprijs drukkend zal zijn. Een hoop van die consessies waren van utilities of ontwikkelaars. En die ontwikkelaars zitten er in voor een kort termijn en een hoog rendement, want die hebben toch niet de paar 100 mln om dat hele park te bouwen en te runnen. Dus die moeten het verkopen en komen dan bij dezelfde poel aan investeerders terecht die nu aan bod komen. Wat de overheid doet is eigenlijk –als je iedereen laat bieden op de Noordzee dan moet iedereen die eigen kosten maken (C: metingen, permits) en die berekenen ze door in de prijs. Als jij dat als overheid zelf wegneemt, dan kan je wel een grotere poel investeerders tegelijk benaderen, want er zijn veel meer partijen die met dat gecalculeerde risico willen instappen, dan voordat je weet hoe de zeebodem eruit ziet en of dat je wel of geen subsidie geeft. Dus je verbreedt het wel.

C: en de doorlooptijd van de development wordt korter?

N: ja

C: Is het dan zo dat het moeilijk is voor ontwikkelaars om aan de equity kant partijen erbij te kregen? Wat zijn de verschillen daarin tussen de fases v.h. project?

N: ja vanaf de start van de bouw is het redelijk goed te doen, ik zou niet zeggen dat partijen daar in de rij staan, maar er is wel voldoende liquiditeit. Daar zijn voldoende partijen voor. Daarvoor is het nagenoeg onmogelijk om partijen te vinden die 10 mln + willen investeren in iets dat nog geen financial close heeft bereikt.

C: Is dan die financial close bepalend of die consent vanuit de overheid?

N: Het is een beetje een staffel in de risico. Als je geen vergunning hebt dan kun je het gewoon vergeten om een externe investeerder op project niveau bij te halen, misschien op je eigen corporate niveau (maar dat is een ander verhaal). Die vergunningen zijn heel belangrijk, of je een subsidie hebt ja of nee, of je moet tenderen ja of nee, in de UK zie je dat veel partijen wel consent hebben maar nog moeten tenderen voor de CfD. En de laatste stap is of jij in staat bent om die contracten ook echt uit te onderhandelen en wat voor een 'view' je daarop neemt. Ontwikkelaars hebben vaak een voor tunnelvisie en die geloven vaak wel dat ze dan die contracten kunnen onderhandelen met nog wel eens 5% korting.. ja dat werkt niet altijd zo als je met grote partijen als Siemens aan tafel zit, want die hebben er weinig mee te maken dat jij die 5% nodig hebt om het project te laten vliegen.

C: En zo'n ontwikkelaar, zijn dat dan voornamelijk nog wel utilities?

N: 50/50 je hebt ook een hoop kleinere IPPs of kleinere ontwikkelaars. Bijvoorbeeld in Belgie Colruyt, daar (BE) zijn veel consessies in handen van niet-utilities. In Duitsland zie je veel kleinere ontwikkelaars (Energiekantor en WPD). In de UK is het wel min of meer gedomineerd door utilities. En utilities die hebben niet zo'n hele sterke balans meer maar die kunnen wel de ontwikkeling dragen. Dus daar zie je ook een wat ander model: die ontwikkelen het zelf en die gaan daarna in minority stakes verkopen om dat park in waarde te maximaliseren.

C: En ook zelf hun kapitaal te recyclen voor nieuwe projecten?

N: ja inderdaad, recycling van het kapitaal

C: Even recap: UK start met een utility die daarna zijn stake verkleint. BE zijn er een paar alternatieve investeerders. In DE zijn die ontwikkelaars toch oorspronkelijk vanaf onshore wind gekomen?

N: ja dat klopt.

C: Houdt zo'n partij als Wpd dan wel langer zijn stake aan?

N: Dat proberen ze wel ja, je ziet in Butendiek dat Wpd nog 10% heeft. Dat moeten ze ook van die andere investeerders, die zeggen: jij moet ook wel een beetje risico houden om wat jij zegt dat je het op tijd en binnen budget kunt bouwen ook te laten zien. Dus die proberen dat wel te houden en dan nog misschien een keer mee te profiteren van afbouw en dan nog eens verkopen tegen een nog lager rendement, of die leerervaring op te doen en mee te nemen voor een volgend project of gewoon om stabiele kasstromen te realiseren om hun operations te dekken (C: complementeert goed in combinatie met de meer onzekere cashflows uit nieuwe projecten)

C: Is een land als DK, waarover we het nu nog niet hebben gehad en wat toch echt vroeg begon, nu nog erg actief? Gebeurt daar nog veel?

N: Daar is nu ook wel weer een tenderronde bezig. Ze hebben pas Horns Rev 3 ook getenderd. Daar is het NL model nu ook een beetje van afgekeken. Om volledig permitted te tenderen op degene die het laagste bod brengt. Dus die zijn nog wel redelijk actief, maar ze zijn al bijna vol. Bij redelijk goede wind zijn ze bij wijze van spreken al voor 80% energievoorzienend uit wind.

C: Dat is dan ook voor een groot deel vanuit hun onshore wind parken?

N: Ja ook wel, maar er staan offshore ook wel redelijk wat.

C: Is het dan zo dat landen qua beleid wel steeds meer op elkaar gaan lijken? Als je zegt dat NL op DK lijkt. UK gaat van ROCs naar CFD, wat eigenlijk een FIT is zoals NL, BE en DE is. Permitting procedures worden ingekort..

N: Qua financiele support beginnen ze inderdaad wel allemaal op elkaar te lijken. In de UK heb je nog wel veel meer die scheiding tussen grid en generating assets. In Duitsland had je dat al en in BE krijg je dat nu ook.

C: Want die grid connectie in de UK wordt getenderd?

N: 2 mogelijkheden, je mag hem zelf bouwen (als ontwikkelaar) en daarna ben je verplicht om hem te verkopen. Of je kunt zeggen, bouw hem maar voor mij en dan gaat de UK overheid deze tenderen.

C: En in NL is daar eigenlijk een soort consessie voor alle connecties aan tennet gegeven? Is tennet daarin dan ook het efficients?

N: Dat vraag ik me af. Waarom zou tennet het efficienter kunnen? Volgens mij is het tennet geweest die het qua connectie van offshore grids het slechts heeft gedaan in DE.

C: Dus voor offshore aansluiting zou jij pleiten voor een tendersysteem?

N: Ik zou pleiten om de ontwikkelaar het zelf te laten doen en dan al dan niet verplicht te laten verkopen. Dan heb je namelijk zelf het risico in de hand. Als je nu voor 2 mld gaat bouwen offshore en je bent afhankelijk van semi overheid die dat grid moet aanleggen..Wat je niet kunt hebben is dat je assets daar een half jaar moeten wachten op een connectie. Als jij je auto een jaar stil zet, wordt ie niet beter. Dat geldt voor een turbine nog veel meer. Als je dan je auto op een paal in de noordzee een half jaar stil laat staan, wordt ie er al helemaal niet beter van.

C: Kan je een overzicht schetsen van wat er in landen nou allemaal aan beleidsinstrumenten is en hoe die in elkaar steken? Dit van de keuze tussen tender en zelf bouwen/verkopen van grid connectie in de UK wist ik niet bv. Heb jij hierover meer info?

N: EWEA site, daar staat redelijk veel op. Verder zou ik even moeten denken en het eea opzoeken. Ik zou je natuurlijk een hele lijst met links kunnen sturen van sites van de DECC e.d. Maar om een volledig beeld te krijgen, wordt een beetje complex. Die up-front en exploitatiesubsidies zijn redelijk duidelijk en die grid ook wel. DE tennet doet het en je kan dingen claimen als ze te laat zijn, NL gaat tennet het doen maar nog onduidelijk wat je kan claimen, in Belgie Elia gaat het doen, claim onduidelijk. UK is wel heel duidelijk. Maar daar heb je bijvoorbeeld ook nog de GIB, wat ook een vorm van overheidssteun is.

C: dat is eigenlijk een soort up-front subsidie?

N: Ja het is eigenlijk een liquiditeitsverschaffing die zeker helpt en dat hoeft niet eens met korting te zijn om al gunstig te zijn.

C: Het feit dat de GIB achter een project staat betekent al veel?

N: het helpt inderdaad als commerciële bank ook enorm als je tegen je kredietcommissie kan zeggen dat de GIB er achter staat. En geen enkele projectontwikkelaar of bouwer gaat natuurlijk de UK overheid lastig vallen want daar heb je enkel in ene volgend project weer last van. Het heeft een soort impliciet comfort.

En dan heb je nog alle ECAs die hun deel van de supply chain pushen.

C: Ja, maar dat is natuurlijk een support mechanisme die bijdraagt aan ontwikkeling in een ander land.

N: Ja, maar het is wel een beetje afhankelijk van hoe je het 'land' definieert, want sommige partijen vinden dat het land ophoudt bij de 12-miles zone en anderen bij de EEZ. Bijvoorbeeld bij Belgische projecten die buiten de 12-miles zone liggen maar binnen de EEZ van België, heeft Delcredere –de belgische ECA gewoon de dekking gegeven. Dus de definitie van 'land' ligt dan wat vager.

C: Over België gesproken, ik zag dat daar ook veel municipalities investeren?

N: Niet direct, maar inderdaad via PMV (Vlaanderen) en SOCOFE (Wallonië).

C: En moet ik dat zien als een type investeerder die participeert of een vorm van overheidsbeleid dat stimulerend werkt aan meer investeringen van derden?

N: Ik zou dat wel echt als een type investeerder zien. Die hebben minder belang bij de centrale overheidsdoelstelling. Maar wellicht meer bij lokale werkgelegenheid en dat soort zaken. Als je bijvoorbeeld kijkt naar de participatie van HVC in Gemini. HVC is in handen van een aantal gemeentes. Die gemeentes hebben namelijk voor zichzelf als doel gesteld dat zij die 2020 doelstelling ook willen halen. En dat vullen ze dan nu in door een participatie te nemen in Gemini. En de vraag is of dat formeel juist is, er is geen enkele wetgeving die zegt: dit is de overheidsdoelstelling en die wordt daarna idd wel neergelegd bij de provincies, maar niks zegt dat HVC die verplichting kan overnemen en of dat nou meetelt. Het is dus niet een vorm van overheidsbeleid, maar een motivatie vanuit HVC zelf.

C: Dat Gemini is in NL wel echt een uniek project nietwaar? Zonder grote utility als developer

N: Ja het is begonnen als kleine ontwikkelaar

C: Wanneer project development redelijk lang duurde in de cases die ik heb gezien, daar was vaak het geval dat een kleine partij begon met een site development in de zin van metingen en permitting en met het idee om dat te verkopen in een vroeg stadium. Dat is wel echt een ander soort 'developer' dan een typhoon of Wpd die ook daadwerkelijk de bouw en operatie realiseren.

N: Ja, in Engeland zijn er bijvoorbeeld een hoop parken ontwikkeld door een partij die het project door heeft verkocht na de permitting. En mainstream heeft ook veel na permitting verkocht. PNW heeft ook Godewind verkocht na permitting. Voor die utilities is het gewoon een make or buy decision. Je kan wel weer 7 jaar gaan pielen of ik sla voor een relatief laag bedrag die eerste 7 jaar over.

C: Ik vraag me ook nog wel af of overheden dergelijke ontwikkelaars willen stimuleren als die nooit de intentie hebben om de ontwikkeling door te voeren

N: Ja, maarja zo waren de regels. Als de overheid niet zelf die kosten wilde maken dan gaan er partijen komen die dat uit handen nemen. Als iemand het wel doet en dan daaruit rendement maakt is logisch.

C: Uit dat perspectief is het dan misschien ook logisch dat nederland nu de zone development heeft overgenomen?

N: Ja die keuze is wel logisch, het is nu meer zoals een PPP structuur door de tendering. Of al die bestaande permits dan geschrapt hadden moeten worden? Er is iets voor te zeggen dat er een level playing field is, maar om dan het kind met het badwater weg te gooien…

C: Hoe ver waren die projecten al? En om hoe veel ging dat? Waren jullie ergens bij betrokken?

N: Ja er waren wel een paar met wie we in gesprek waren. Ik denk dat het om een stuk of 7 ging en de meesten gingen ook voor de ronde die Gemini heeft gewonnen dus ze waren ook zeker al enigszins gevorderd met procurement e.d. Die hadden relatief snel kunnen bieden. Maar de NL overheid wilde misschien wel meer verscheidenheid qua partijen want die 7 waren eigenlijk de gebruikelijke 3. Dong, Eneco en RWE

N: Incentive systemen moeten passen bij het type investeerders dat een overheid wil aantrekken. Bij Gemini was er bijvoorbeeld veel oppositie toen een Duitse partij het won en er dus NL subsidie naartoe zou gaan. Dan moet je je afvragen wat de doelstelling is. Als je wil dat de goedkoopste bieder wint dan is dat prima. Als je zoals FR wil dat er ook werkgelegenheid en economische bedrijvigheid van komt, dan had je als NL overheid ook een supply chain moeten opzetten 10 jaar geleden, want al die fabrieken staan in DE en DK. In Frankrijk hoor je niemand klagen.

C: Maakt het feit dat een FIT vanuit overheidsbudget wordt betaald en dan ook extra ‘controversieel’?

N: nouja misschien wel, maar die SDE+ wordt gewoon doorgevoerd op je energierekening als consument. Het kan wel zo zijn dat er daardoor meer oppositie is. Maar mensen vergeten wel dat de elektriciteitsprijzen ook dalen door meer offshore wind.

N: Als de subsidietermijnen eindigen, dit zie je in on shore wind, dan zetten parkeigenaren die zaag erin en dan gaat er een nieuwe turbine op die weer nieuwe subsidie kan ontvangen. Dus de keuze voor het subsidietermijn bepaalt die levensduur van een project. Als je nu voorbij 2020 wil kijken, zou je dus misschien een aflopend subsidiesysteem moeten kiezen dat qua duur loopt totdat groen en conventioneel concurrerend is.

<Bespreken een aantal vormen en variaties van subsidiesystemen>

C: in Spanje is er door het stopzetten van het subsidiesysteem, eigenlijk een sunk cost effect gecreëerd?

N: In Spanje is het eigenlijk zo dat het nadeel van subsidie of support duidelijk is geworden. Je loopt namelijk altijd achter de feiten aan. Iedere ondernemer is altijd sneller dan de overheid. In een markt waarin de prijzen van zonnepanelen snel omlaag gingen kregen partijen exploitatie subsidie gebaseerd op 10 mln investeringskosten voor de ontwikkeling van een park die later 8 mln bleken te zijn. De eerste 2 mln winst is dan al gepakt. Toen realiseerde de Spaanse overheid dat dit was gebeurd dus werden de exploitatiesubsidies aangepast obv 8 mln. Maar die ontwikkelaars hadden die parken al doorverkocht aan investeerders die uitgingen van die 10 mln. Die pensioenfondsen zagen dus hun return omlaag gaan van 6% naar 0%. Die markt is naar mijn weten sindsdien echt op slot geraakt. Als je geld verliest hebben investeerders wel echt een lange termijn geheugen. Dit is een belangrijke les geweest. Daarom werkt tenderen dus wel beter, want als je als ontwikkelaar denkt het voor 8 te kunnen maar 10 te vragen, dan weet je dat een concurrent van je gaat winnen door wel voor 8 te bieden.

Het is een mooie puzzel al met al, mooi genoeg om op af te studeren!

C: De verschillen in smaken met land zijn dus wel degelijk van belang. Ik denk dat we in sneltreinvaart de meeste elementen al hebben gedekt!

D. Effects of Policy Instruments on Project Attributes

This appendix explores how different policy instruments could affect project attributes.

Effects of Permitting Consent Procedures

Permitting consent procedures have little effect on asset specificity. However, designation of special development zones may have a negative effect on site specificity as it reduces the possibilities for site allocation during development. A policy regime of designated development zones is especially troubling for OWF investors that wish to develop a farm as a dedicated asset for the production of energy at a certain location. However, a consent procedure wherein the government has already conducted an EIA would reduce the need for specific knowledge required, a form of human asset specificity. Table 15 provides an overview of these effects of permitting consent procedures on asset specificity.

Permitting consent procedure	Effects on asset specificity
Designated development zone	Increases site specificity by committing limited sites to be designated for OWF development
	Reduces human asset specificity of investors by taking on all zoning development tasks by the policy maker

Table 15: Effects of permitting consent procedures on asset specificity

A single-stop permitting procedure may greatly reduce regulatory uncertainty during the development phase of an OWF as the permitting procedure is simplified. Designated development zones seem like the most facilitating form of permitting procedures as it reduced the regulatory uncertainty from acquiring all necessary permits. Table 14 shows the effects of policy instruments on uncertainties in OWF investments.

Permitting consent procedure	Effects on uncertainty
Single-stop permit	Reduces regulatory uncertainty by simplifying the permitting procedure (Mani & Dhingra, 2013)
Designated development zone	Reduces (development phase) regulatory uncertainty by removing all steps from permitting procedure

Table 16: Effects of permitting consent procedures on uncertainty

Permitting consent procedures could be subject to appeals from third parties that want to block the development of an OWF. Multiple stage permits are subject to a higher threat of such appeals. Single-stop permitting procedures or designated development zones could alleviate this threat. However, the award of a permit without the confirmation of a direct effort to continue the development and construction may increase the threat of displaced agency by early phase 'developers'. Moreover, flexibility in the permit details could also provide non-utility investors with more room for design choices during development the OWF without much threat of third party opportunism.

Permitting consent procedure	Effects on threat of opportunism
Single-stop permits	Reduces threat of third party opportunism as a single-stop permitting procedure also reduces the possible number of appeals from third parties
	Potentially increased the threat of displaced agency as the award of permits is simplified if it is without a need for direct continuation of development and construction
Designated development zones	Reduces threat of third party opportunism if policy makers have a priori overcome potential disputes
	Removes threat of displaced agency
Flexibility of permits	Reduces threat of third party opportunism as permits are made less rigid
	Potentially increased the threat of displaced agency as the award of permits is simplified if it is without a need for direct continuation of development and construction

Table 17: Effects of permitting consent procedures on threat of opportunism

Effects of Up-Front Subsidies

Up-front subsidies may affect financing uncertainty. Financing uncertainty may be reduced by state bank financing. Moreover, the support of state banks, EIAs, or multilaterals could provide investors with trust in successful completion of a project (Jongste, 2015). Table 18 provides an overview.

Up-front subsidy	Effects on uncertainty
State bank financing and ECAs	Reduces financing uncertainty by providing liquidity and guarantees. Thereby, creating trust with investors and lenders (Jongste, 2015)
Tax benefits	Reduces financing uncertainty by reducing investment costs

Table 18: Effects of up-front subsidies on uncertainty

Up-front subsidies or the choice in how these are applied by governments do not seem to have an effect on asset specificity or the threat of opportunistic behaviour of governments or third parties.

Effects of Grid Connection Policy

The physical asset specificity can be affected by the grid connection policy. Attribution of (super-)shallow grid connection responsibility reduces the need for investing in physically specific grid assets.

Grid connection policy	Effects on asset specificity
Grid connection responsibility: TSO	Reduces physical asset specificity
Grid connection responsibility: OWF investors	None

Table 19: Effects of grid connection policy on asset specificity

Super-shallow system integration whereby grid connection costs and responsibility are attributed to the government or the TSO could reduce the technological uncertainty that comes with the installation to connection to the on shore grid. However, behavioural uncertainty from the counterparty in the agreement to connect the OWF to the grid increases for the non-utility OWF investor, because grid connection becomes a transaction that is governed by the government or the TSO (Dirks, 2015). The OWF investor no longer controls the timely completion of the grid connection.

Grid connection policy	Effects on uncertainty
Grid connection responsibility: TSO	Reduces technological uncertainty by taking on grid connection by policy maker or TSO
	Experiences in Germany illustrate increases in behavioural uncertainty if the investor no longer controls the contract of connecting the OWF to the grid. Liability issues for delays and cost overruns may be the result (Kostka & Anzinger, 2015) .

Table 20: Effects of grid connection policy on uncertainty

Effects of Exploitation Subsidies

Exploitation subsidies could have an effect on uncertainty in market price fluctuations of electricity if a system of feed-in tariffs is used. The fixed income from a feed-in tariff removes these fluctuations in returns and creates a steady price received per KWh sold. If feed-in tariffs have to be won in a tendering procedure, regulatory uncertainty is increased because the award remains uncertain until a later stage in the development phase. Tradable certificates do not remove price fluctuations and in fact may even increase volatility as the price of tradable certificates could also be subject to market price fluctuations. However, as most offtake of electricity is governed under PPAs, a system of tradable certificates will likely not be subject to price fluctuations in the electricity market if the OWF investors decide to govern their offtake at a fixed price. For both exploitation subsidy systems, the choice for granting the subsidy in an early phase of the OWF project may facilitate the needed financial support of other (financial) investors and debt providers. Table 21 provides an overview of these effects of exploitation subsidy choices on uncertainties in OWF investments.

Exploitation subsidy	Effects on uncertainty
Feed-in tariffs: all variations	Reduced market uncertainty from fluctuations in prices
Feed-in tariffs: tender for subsidy	Increased regulatory uncertainty as OWF investors have to compete in tender rounds before being awarded the exploitation subsidy
Tradable certificates	No reduced market uncertainty, as electricity price received remains volatile and price fluctuations may occur in the certificates market as well
Both systems: early timing of the grant	Reduces financing uncertainty as it is often a prerequisite for attracting debt

Table 21: Effects of exploitation subsidies on uncertainty

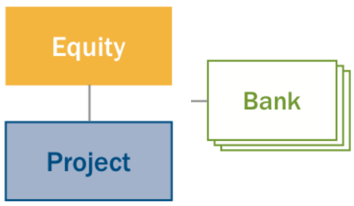
Exploitation subsidies and the possible variations between those have different effects on the threat of opportunism. The attribution of costs that are associated with the exploitation subsidy to the rate payers of the electricity used creates less threat of changes in the subsidy agreement with the government as it is less contestable than a budgetary system wherein the costs are covered by tax payers. This difference is important among variations of feed-in tariffs. Likewise, a fixed remuneration awarded to all OWF projects is more likely to encounter opposition from public opinion. Whereas a tendered award creates a more cost-efficient solution thereby better aligning public and private goals.

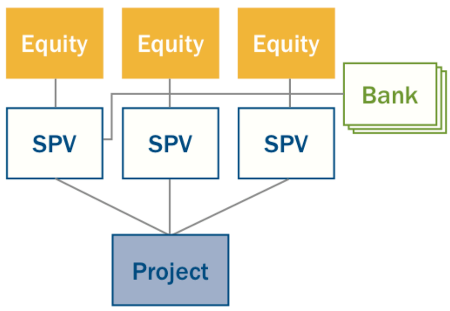
Exploitation subsidy	**Effects on threat of opportunism**
Feed-in tariffs: costs attributed to rate payers	Reduces threat of governmental opportunism as counterparty in the subsidy transaction as a rate payer cost attribution is less contestable
Feed-in tariffs: costs attributed to tax payers	Increases threat of governmental opportunism as counterparty in the subsidy transaction as tax paid budgetary systems are more contestable
Feed-in tariffs: fixed remuneration	Increases threat of governmental opportunism as counterparty in the subsidy transaction when fixed remuneration is too generous
Feed-in tariffs: tender for subsidy	Reduces threat of governmental opportunism as subsidies are awarded to most cost-efficient OWF projects

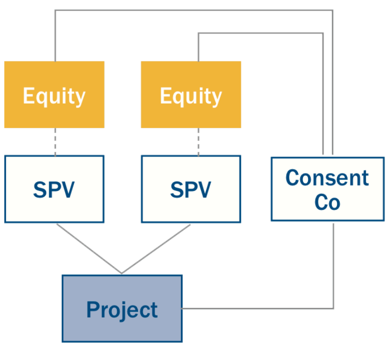
Table 22: Effects of exploitation subsidies on threat of opportunism

E. Project Structures in Offshore Wind Farms

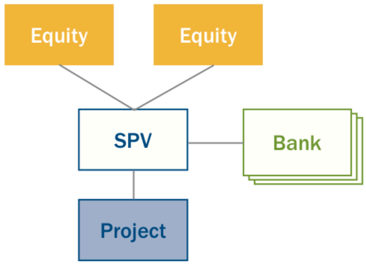
Different structures exist for organizing an OWF. These structures vary in complexity and in the number of parties involved. The project structures that are used in OWF projects can be categorized in the archetypes described below (EWEA, 2013). In reality, hybrid structures exist and stakeholder roles may change as the project matures through the project life cycle.

Sponsor Equity / Balance-sheet Financed Project	Roles of Equity and Debt	Notes
	In a (single) sponsor equity structure, the project is said to be on the balance sheet of the equity sponsor. As the sole owner of the project, the equity sponsor has full control and responsibility. Debt can either be provided through corporate finance as a loan to the equity sponsor or through project finance in which case the bank cannot claim assets from the sponsor in case of default (non-recourse)	As larger projects require larger investments, this type of project structuring will be increasingly difficult to realize for a single sponsor.

Incorporated Joint Venture (with debt)	Roles of Equity and Debt
	Special Purpose Vehicles (SPVs) allow for equity sponsors to be faced with limited risks associated with the project itself. Using different SPVs allows for equity sponsors to take on debt for their stake in the project, without the need for central consensus of all sponsors. Moreover, different risks or liabilities can be allocated to the various SPVs.

Unincorporated Joint Venture	Roles of Equity and Debt
	Unincorporated Joint Ventures achieve the same principles as an incorporated JV. However, the interests in the project are described in agreements that outline the percentage of sponsors' stakes and the governance of the project.

SPV (with debt finance)	Roles of Equity and Debt	Notes

	Like (un)incorporated JVs, this structure effectively delinks the risks of the project from the balance sheets of the equity sponsors. The simplicity of this structure, has the following benefits (EWEA, 2013): • Clarity of income flows • Clarity of ownership and responsibilities • Clarity of contracts with counterparties (e.g. construction companies or OEMs)	The simplicity of this project structures makes this a preferred structure for debt providers. 78% of all debt-financed projects have been financed under an SPV structure (EWEA, 2013).

F. Information Interviews Case Studies

Introduction to my research

In my research I aim to answer the following question:

How can policy makers enhance the role of non-utility investors in offshore wind farms by improving the interactions between project governance, investor characteristics, and policy instruments?

My research consists of three parts, wherein I explore (1) governance challenges in offshore wind farm projects, (2) the effects of different policy instruments applied in Europe and (3) what the important differences between non-utility investors are.

These different parts are supported by case studies. As a part of this, I would like to learn about the role and experience of <COMPANY NAME> in the <PROJECT NAME> offshore wind farm through a semi-structured interview.

Suggested topics

Main questions	**Additional questions**	**Clarifying questions**
<u>Investor Characteristics</u>		
Did your organisation have any prior experience in OWF investments?	Was this an important requirement to invest?	
Do you consider experience as an essential premise for successful participation?		
Did your company play an active role in the project in any of the phases?	What are the most important assets/qualities that your company brought to the group of investors?	Are these mainly technical, financial or relational assets?
Beyond the financial motive: What was the most important motive to invest?		Did the investment create new opportunities for your company?
What were the return requirements for your investment?	Did this affect your decision for the moment of investment or (possible) divestment?	
What was your stance towards the risks?		
<u>Collaboration between Investors</u>		
How were tasks between investors divided?	How important was the collaboration and division of tasks for the success of the project?	Was there a single investor responsible for the project?
Did the other investors have qualities complementary to	How did the investors find each	

your own?	other?	
Policy Instruments		
How was the permitting consent procedure governed?	Were there any issues in this process?	
How was the exploitation subsidy granted?	Were there any issues in this process?	
Were there any up-front subsidies granted? (E.g. tax benefits, state bank financing)	Was this decisive for the success of the project?	
How was the connection to the grid governed?		How were costs and responsibilities divided between the project company and the TSO/government?
What is your general opinion of the policy regime?	Were there any issues in this process?	
	Is stability a possible issue of the policy regime?	How does your opinion on the policy regime relate to other countries?

Table 23: Case study interview questions

G. Case Study Interview: Belwind – Parkwind

Topic	Belwind – Parkwind
Date	04/05/2015
Interviewee	Ralf Bauer
Function	Development Manager Finance
Interviewer	Coen Makker

Investor Characteristics

C: Kunt u Parkwind als ontwikkelaar beschrijven?

R: Parkwind is een zelfstandig ontwikkelaar en exploitant van OWFs, Opgericht door de investeerder Colruyt. Na failliessement Econcern heeft Colruyt besloten om Belwind over te nemen. Daarvoor had Colruyt als missie al om sustainability en impact op de society, carbon footprint en het besparen van energie. Zie de website voor meer uitleg hierover. Dus uit de insteek van die filosofie had Colruyt al enkele investeringen gedaan in Solar PV en kleinere onshore wind projecten. Toen Belwind als mogelijkheid zich voordeed is Colruyt daarom erin gestapt. Parkwind is later ontstaan. Colruyt zag in dat zij geen OWF developer wilde zijn, blijven bij de core business van retail, dus Parkwind is toen als losse entiteit ontstaan.

C: De ontwikkeling van Belwind door Colruyt heeft zich dus voorgedaan toen die mogelijkheid zich voordeed. Was dat toen dan echt een bewuste strategie?

R: Het paste dus bij het streven naar sustainability. Het voordoen van die mogelijkheid/opportuniteit kwam wel op het goede moment.

C: Dus eigenlijk vanuit die motivatie van sustainability en niet te veel gehaaid zijn op snelle winsten, kan parkwind die strategie succesvol uitvoeren?

R: Ja, en het is voor ons ook belangrijk om niet te veel risico's te nemen.

C: Wilde Colruyt dan ook diversificeren?

R: Colruyt is sterk in retail dus het is niet zo dat we daaruit moesten diversificeren.

C: Zal parkwind dan nu ook doorgaan als losse ontwikkelaar?

R: Ja, nu zijn we bezig met Belwind, Parkwind en Nobelwind. De parken zijn overigens de SPVs omdat Parkwind dus een los bedrijf is.

Project Governance

C: Het is goed dat u het zegt want het is tot dusver soms behoorlijk moeilijk om te herleiden hoe de rollen en verantwoordelijkheid in een park verdeeld is. In het geval van belwind is Parkwind dus volledig zelfstandig ontwikkelaar en operator is.

R: Ja, maar een deel van de aandelen is dus wel verkocht aan SUMITOMO om op die manier kapitaal vrij te maken voor nieuwe projecten. Parkwind rapporteert natuurlijk wel aan haar aandeelhouders: Colruyt, 2, 3..

C: Naast de interne structuur, was ik ook benieuwd naar de offtake van energie. Hoe is dat geregeld in de afwezigheid van een utility als investeerder?

R: Door de vrije markt in Belgie zijn we in staat om dit te verkopen aan elke ISP (programmaverantwoordelijke) die actief is op de Belgische markt. De grootste speler in Belgie in Electrabel. Voor het geval van belwind hebben we een PPA met Electrabel.

Policy Instruments

C: hoe zou u de rol van overheidsbeleid in de ontwikkeling van belwind als geheel omschrijven? Permit, exploitatie subsidie en up-front subsidie?

R: De vergunningsuitgave in Belgie is redelijk goed georganiseerd. Omdat het zeegebied van belgie erg beperkt is, is de ruimtelijke inrichting van de belgische zee strikt gereguleerd. Bovendien moet de environmental impact worden bekeken.

C: En worden die metingen en onderzoek naar de impact door de ontwikkelaar zelf uitgevoerd?

R: Nee dat wordt door de overheid gedaan. Door de MUMM (?) Het milieu effecten rapport en de monitoring wordt door hun uitgevoerd. De ontwikkelaar betaalt daar wel voor.

C: Is het dan zo dat de overheid die onderzoeken al eerder heeft uitgevoerd of komt er vanuit de ontwikkelaar (Econcern destijds) een keuze voor een locatie?

R: Nee die locatie lag al vast. Bovendien is die windzone in samenspraak met ontwikkelaar al vastgelegd. Die zijn vervolgens ingedeeld in mogelijke concessies. Ontwikkelaars konden daarvoor een case maken en die zijn vervolgens daarna toegekend.

C: En hoe is voor Belwind de exploitatiesubsidie?

R: In belgie voor offshore wind was het oude systeem: t/m 216 MW park krijg je 107 EUR/MWh voor de eerste 20 jaar. En de stroom kan verkocht worden aan de markt.

C: De overheid heeft dus zelf die inschatting gemaakt van de hoogte van de subsidie en heeft niet gediversificeerd tussen parken?

C: In er daarnaast in de up-front subsidie een tegemoedkoming van overheid geweest?

R: De aansluiting van de onshore cable wordt tot 25 miljoen vergoed.

C: En wordt de aansluiting dan ook uit handen genomen? Bv door de TSO?

R: De parken zelf moeten de kabel installeren. Daarbij moeten ze wel bepaalde procurement regels volgen. Zodat de aanbesteding objectief is.

C: Hoe groot acht u de effecten van verschillen in dit soort overheidbeleid? Denkt u dat sommige hiervan essentieel zijn? Zijn er vormen van steun waarvan Belwind liever zelf het touw in handen had gehad?

R: Ik denk dat het systeem er goed uitziet. Het belangrijkste is natuurlijk zo dat de ontwikkeling 3-4 jaar duurt en daarna nog 2 jaar bouwen, dus het financiele plaatje moet vroeg kloppen. Omdat er zo veel variabelen zijn. Subsidie is altijd een moeilijk gegeven maar ik denk dat het in belgie er goed uit ziet.

C: Is die onzekere beginperiode door het belgische beleid aantrekkelijker? Zoals up-front subsidies die de investering makkelijker maken?

R: Ja, maar let erop dat zulke subsidies en green bank steun pas komt als een park operationeel is. De ontwikkeling is echt wel afhankelijk van het kapitaal van de ontwikkelaar. In belgie heb je overigens wel een belastingsvoordeel. Je hebt een investeringsaftrek van 3% waarmee je je belastbaar inkomen kan verminderen. Voor hernieuwbare energie investeringen is dit tot 13%.

C: Richt Parkwind zich alleen op de belgische markt? Wat vinden jullie van andere landen t.o.v. Belgie?

R: Wij kijken natuurlijk ook naar andere landen. Het is natuurlijk belangrijk dat er winst uit projecten moet komen, maar wat parkwind echt onderscheidt is dat die winst niet enorm hoog of snel gerealiseerd hoeft te worden. Parkwind heeft niet als doel om heel snel te groeien. We willen 1 park per keer ontwikkelen, zodat we elke keer daarop goed kunnen focussen. We hebben gekeken naar FR, NL en DK en nu kijken we ook naar de UK. Maar we zullen pas echt actief worden in het buitenland als we ons besluiten te richten op 1 bepaald park.

C: Zijn er elementen uit de rol van de belgische overheid die u wel heel bepalend vindt? Waar we nog niet over hebben gesproken?

R: Wat wel heel belangrijk is is het exploitatiesysteem. Het nieuwe systeem is in samenspraak met de sector tot stand gekomen. Ook de bankiers en andere financiers moeten vertrouwen hebben in de continuiteit van een beleid. In Belgie is die effectitiviteit en consistentie erg goed. In het nieuwe systeem is dat iets minder aantrekkelijk omdat er voor parken die na tussen nu en 3 jaar tot financial close komen wel 20 jaar toezegging is, maar er daarna onzekerheid is voor parken die nog niet zo ver zijn of door onvoorziene gebeurtenissen over zo;n deadline komen. Zo'n deadline instellen geeft ontwikkelaars wel echt veel zenuwen. Dit zie je ook wel in andere landen. Maar ook de grid connectie en dat deze op tijd tot stand komt. Het is overigens wel een complex verhaal. We kunnen wel van de overheid verlangen consistent te zijn, maar er bestaat geen uniforme overheid. Als de netbeheerder bijvoorbeeld het grid voor verzwaren dan is het ook een kwestie van allerlei gemeenten die daartegen bezwaar kunnen maken. Vertragingen in de aansluiting zijn dus wel een moeilijke kwestie. Er zijn zo veel belanghebbenden.

C: Denkt u dat een flexibel overheidsbeleid per project een goed idee zou kunnen zijn? Of is een unaniem en duidelijk beleid beter?

R: Ik denk dat het niet mogelijk is om dat te doen. Dat zou ook tot subjectiviteit leiden. Ook omdat we in een rechtstaat leven. Het is wel belangrijk dat de overheid in zijn beslissingen de materialiteit laat gelden boven bepaalde richtlijnen die eigenlijk geen waarde hebben. Als een wiek van een turbine misschien een halve meter buiten het originele plan uitsteekt kan de overheid misschien minder zwaar zijn. Mar het blijft moeilijk om zowel een lijn te trekken en om flexibel te zijn.

H. Case Study Interview: Belwind – Meewind

Topic	Belwind – Meewind
Date	03/07/2015
Interviewee	Willem Smelik
Function	Director
Interviewer	Coen Makker

Note: Part of the audio recording of this interview was unfortunately lost. Answers to some of the main questions have been reconstructed in accordance with the interviewee via email afterwards.

Investor Characteristics

C: Kunt u een introductie geven van Meewind, het ontstaan ervan en de focus op (offshore) wind energie?

W: Op het moment dat wij startte met Meewind was de filosofie: je moet investeren in je eigen toekomst. Dit was in 2006. In onze ogen was dit het niet in stand houden van weinig democratische regimes, dus het investeren in de eigen industrie. Een van de meest kansrijke industrieen was offshore wind. De plannen van de EU zouden uitkomen op zo'n 150 miljard tezamen voor de komende 10 jaar. Als nederland zit je in dat centrum van de Noordzee, toen zei ik dus daar moeten we op inzetten. Dat is goed voor je havens, goed voor de werkvoorziening, goed voor het klimaat en goed voor energie-onafhankelijkheid. Met dit verhaal ging ik naar allerlei mensen en uiteindelijk besloten het zelf aan te pakken. Zo is het windfonds opgericht. Onze insteek was als volgt: Wat je nodig hebt om die transitie te realiseren zijn 3 dingen: maatschappelijk draagvlak, eigen vermogen, en een effectief lobbykanaal. Het eigen vermogen was nodig omdat de nieuwe bedrijfstak (onafhankelijke ontwikkelaars) weinig vermogen hebben. Die moeten een eigen vermogen krijgen om de plannen te realiseren. Van 80 plannen, hebben er 12 een vergunning gekregen en daarvan slechts 3 die een subsidie hebben gekregen. Vervolgens is er nu een nieuw systeem gebracht. De Nederlandse overheid heeft hierin denk ik niet goed gehandeld. Een effectief lobbykanaal is van belang omdat de bestaande utilities in een spanningsveld zitten tussen het leveren van goedkope stroom en duurzaam worden. In die spanning is het leveren van goedkope stroom vaak belangrijker. Nieuwe investeerders hebben het meer in hun genen zitten om duurzame energie te doen. Eneco heeft duurzaamheid als marketing-entiteit opgenomen.

C: verwacht u dat utilities als Eneco dan ook geen grote rol meer zullen spelen in de duurzame projecten van de toekomst?

W: Ik denk dat hun rol in ieder geval beperkter wordt omdat ze minder geld hebben. Dit is een probleem bij alle utilities. Sommigen zitten bijvoorbeeld ook een beetje in de knel met hun houding tegenover duurzaamheid. Het traject met het lobbykanaal is nodig omdat utilities de discussie blokkeren. Als je kijkt naar het maatschappelijk draagvlak is dat nodig om de politiek erbij te houden. Wij hadden in onze prospectus opgenomen dat we in de NL noordzee een tsunami aan OWFs teweeg wilden brengen. We hebben destijds uitgerekend dat er 15 mln nodig zou zijn, dus als elke Nederlander het minimale inlegbedrag van onze participaties van 1000 euro zou inleggen dan zouden we er al zijn zonder subsidie.

C: Was die focus initieel dus echt op Nederland? Want met het Belwind project is daar toen vanaf gestapt?

W: Wij zijn begonnen in het hele traject in Nederland met het krijgen een vergunning om een beleggingsfonds te hebben, daarna hadden we een prospectus nodig. Toen we die hadden gemaakt, dachten we klaar te zijn om te gaan werven.

Audio ontbreekt

C: Wat was het belangrijkste motief om te investeren in Belwind?

W: In onze prospectus hadden we opgenomen dat we binnen 5 jaar zouden gaan bouwen. Op dat moment lag de ontwikkeling in Nederland stil ten gevolge van het beleid. Toen zijn we verder gaan kijken. Econcern dat op dat moment failliet was had op dat moment het Belwind project en was blij deze aan ons en de andere investeerders te verkopen.

C: Heeft die investering in Belwind het gewenste effect gehad m.b.t. dit motief?

W: Het betekende dat we onze prospectus konden nakomen. Verder bood het een interessante optie om na Belwind verder te investeren in verdere parken (Nobelwind).

C: Waren er bepaalde rendementseisen bij het project?

W: We zeggen onze investeerders dat we verwachten 7-10% rendement te maken. Dit is op basis van de investeringen minus de fondskosten. Dit rendement is overigens o.b.v. de twee fondsstructuren die we hebben 'bestaande parken' en 'nieuwe parken'.

C: Hoe stond u tegenover die risico's?

W: Deze waren voor ons ondergeschikt aan de duurzaamheidsdoelstelling.

C: (Hoe) heeft dit effect gehad op het moment van investeren/de-investeren?

W: Wij waren in de development fase al betrokken vanaf het moment dat Econcern eruit stapte. De beleggers kennen onze filosofie en geloven ook in het duurzaamheidsideaal.

Project Governance

C: Hoe zag de rolverdeling met andere investeerders eruit?

W: Parkwind was de ontwikkelaar, maar als aandeelhouder waren we nauw betrokken.

C: Hoe belangrijk was de samenwerking voor het succes van Belwind?

W: Er waren op voorhand hele duidelijke afspraken gemaakt over de investeringshorizon en de verdeling van verantwoordelijkheden. Dit was erg belangrijk om de samenwerking met Sumitomo goed vast te leggen. Sumitomo is als Japans conglomeraat erg strikt op het vooraf duidelijk vaststellen van de voorwaarden.

C: Waarom is er gekozen voor Sumitomo? Waren er bepaalde kwaliteiten die Sumitomo toevoegde aan het consortium?

W: Sumitomo bracht een hele belangrijke kracht door hun relationele bargaining power in de industrie. Zij opereren in zo veel markten op wereldniveau. De markt van toeleveranciers van bijvoorbeeld onderdelen of materialen is heel klein. De macht die Sumitomo in de onderhandelingspositie kan toevoegen is daarin van essentieel belang.

*** Audio hervat ***

W: Ik zag in de OWF sector een mooie parallel met het vastgoed. In vastgoedontwikkeling wordt de kantorenmarkt aangestuurd door de vraag het operationele projecten. Het probleem in die markt is dat elk pensioenfonds het liefst een plaatje van een mooi nieuw kantoorgebouw op hun brochure. Die vraag naar operationele (gebouwde) assets trekt in die markt de ontwikkeling. Leegstand in kantoren was daardoor een groot probleem. Waarom pensioenfondsen hierin wel willen investeren en niet in OWFs heb ik niet begrepen omdat ze hiermee feitelijk al geld weggooide.

C: Zouden dat soort partijen nog niet gewend/comfortabel zijn met de techniek?

W: Nee, en op het moment dat er voldoende vraag is naar gebouwde assets gaan die projectontwikkelaars hard lopen. In het vastgoed is die structuur dus volstrekt duidelijk en kan zo die markt verzadigd worden. Als we dat met duurzame energie zouden kunnen is het probleem opgelost. In het ergste geval wordt er teveel gebouwd, maar voorlopig zijn we nog niet boven de 5% uit.

C: Die parallel met vastgoed heb ik ook al eerder over nagedacht omdat het inderdaad een samenkomen is van vergelijkbare partijen.

W: Mensen waren ook verbaasd en vroegen mij, moet je daarvoor geen ervaring of kennis hebben? Het is hetzelfde exploitatiemodel als in vastgoed.

C: De afhankelijkheid van de subsidie maakt het wel moeilijker?

W: De overheid is er zelf ook debet aan. Het probleem is dat er ongeveer zo’n 15% van de exploitatiekosten aan financieringskosten zijn. Dus financieren met een overheidsgarantie zou een reductie in de subsidiekosten tot gevolg kunnen hebben.

I. Case Study Interview: Gemini – Typhoon Offshore

Topic	Gemini – Typhoon Offshore
Date	29/06/2015
Interviewee	Bernard van Hemert
Function	Technical Manager
Interviewer	Coen Makker

Investor Characteristics

C: Waar kwam de ervaring in offshore wind van Typhoon uit voort?

B: Als organisatie was Typhoon een nieuwe speler, maar meerdere werknemers hadden al eerdere ervaring uit andere projecten, bijvoorbeeld Belwind en Amalia.

C: Acht u die ervaring als een belangrijke vereiste voor het succes van Gemini/Typhoon?

B: Ja absoluut, ik denk dat de offshore wind markt een moeilijke markt is voor onervaren spelers. Er zijn twee moeilijkheden: 1. Je moet snel risico's kunnen inschatten. Wat is haalbaar en wat niet. 2. Je hebt een groot netwerk nodig. Bijvoorbeeld op het gebied van adviseurs, banken, investeerders. Als deze partijen een keer eerder een project met jou hebben gedaan, dan weten ze wat ze aan je hebben. (er is dan meer vertrouwen om te investeren). Als er tegelijk 4-5 andere projecten in ontwikkeling zijn, en zij kunnen niet overal hun energie en tijd in steken, dan zullen zij voor een andere ontwikkelaar kiezen als jij niet al eerder hebt laten zien om die twee moeilijkheden te overkomen. Het voortraject van een project is gewoon erg lang en intensief. Alle partijen moeten het gevoel hebben dat het een goeie kans van slagen heeft.

C: Waren er voor Typhoon bepaalde rendementseisen? Had dat invloed op het moment van divestment?

B: In het algemeen geldt dat je als ontwikkelaar een hoog rendement wil halen en daarbij een hoger risico accepteert. Dat is inherent aan projectontwikkeling. Dus je maakt de afweging: hoe diep zijn mijn zakken en waar is de curve van het wegnemen van onzekerheden het grootst. Door die stappen op je te nemen verdien je dan het meeste geld. Die factoren leg je naast elkaar. Daarnaast moeten er ten derde dan ook nog investeerders op je pad komen waarmee je op een bepaald moment een overeenkomst kan bereiken.

C: In een OWF zijn die stappen in de development fase?

B: Een voorbeeld is de onzekerheid in de bodem. Om echt veilig te kunnen bouwen en een goed ontwerp te maken moet je eigenlijk op elke plek waar een turbine komt een meting doen. Voor Gemini betekent dat 150 boringen! Dat kost een paar miljoen, maar daarna heb je wel een gecertificeerd ontwerp. Het project wordt dan direct vele malen meer op. De return op deze ontwerpstappen zijn veel waard. Andere aspecten zijn de vergunningen, windmetingen en de hele netinpassing. Je ziet dat projecten in alle fases tot financial close verkocht kunnen worden. Het kan natuurlijk ook gebeuren omdat het geld op is.

Project Governance

C: Is het een kleine markt? Waarop ontwikkelaar, investeerders e.d. elkaar vinden?

B: Ja heel klein, het verschilt overigens per categorie/rol binnen projecten. De groep van mogelijke investeerders groeit wel, banken zijn ook inmiddels wel erg bereid en hebben vertrouwen in OWFs. Aan de andere kant heb je ook wel steeds meer banken nodig per project vanwege de groei in projecten. Adviseurs of aannemers met een goede track record zijn op 1 hand te tellen.

C: En adviseurs zijn partijen als Green Giraffe?

B: Ja ook, maar ook technische adviseurs die technische DD doen voor de banken. Hiervan zijn er ook maar een paar die het vertrouwen genieten van banken.

C: en in de rol waarin Typhoon opereert, als ontwikkelaar zelf?

B: Hierin is wel een redelijk groepje, maar je ziet wel dat veel projecten spaak lopen door netwerk aansluiting, financiering, etc. Het begin is vrij makkelijk, maar er komt steeds meer bij kijken in die ontwikkelfase. In het Q7 project, geleid door Econnection zag je dat er zeer technische bekwame mensen mee bezig waren, maar dat er uiteindelijk problemen kwamen bij de financiering. Je moet dus zowel verstand hebben van de techniek als van de financiele kant.

C: Van Oord was in Gemini zowel investeerder als contractor. Hadden zij een grote rol in die technische kant en het nemen van beslissingen daarin? Was Typhoon ook betrokken bij het technische verhaal?

B: Typhoon heeft natuurlijk niet voor niets besloten om al in een vroeg stadium met Van Oord in zee te gaan. De uitvoering van de techniek lag uiteraard bij Van Oord, maar ook de verantwoordelijkheid. Als kleine club kunnen wij wel allerlei dingen opschrijven en bedenken, maar uiteindelijk moet een groot bedrijf met een sterke balance sheet die verantwoordelijkheid op zich nemen.

C: Was dat voor andere investeerders belangrijk?

B: Ja absoluut, Northland Power bijvoorbeeld. Maar ook de banken. Als je het risico van het ontwerp bij jezelf houdt, zien andere partijen (financiele investeerders en banken) dat als een groot risico, een kleine kans maar met grote gevolgen.

C: Dat soort oplossingen (simple contracting structure/EPC wrap) zijn misschien wel essentieel voor het succesvol opzetten van dergelijke structuren?

B: Nouja, of je moet het zo doen of je moet een grote investeerder zijn die dat kan risico kan dragen.

C: Waren er voor de financial close al afspraken met Northland Power dat Typhoon uit het project zou stappen?

B: Ik laat even in het midden wat voor een afspraken er zijn gemaakt. Maar je hebt goed gezien dat Typhoon er op financial close uitstapte.

C: Waren er partijen in het project die risico's uit vroege fases niet aandurfde? Was er bijvoorbeeld al eerder contact met Northland Power voordat deze erin stapte?

B: In het algemeen kan ik zeggen dat er allerlei verschillen kunnen zijn tussen partijen, maar ik kan er niet verder op in gaan voor Gemini.

C: Wat gebeurt er eigenlijk met de mensen die nu bij Gemini gestafft zijn vanuit Typhoon zodra Gemini operationeel is? Gaat Typhoon verder met andere projecten met deze mensen?

B: Het verschilt. Er zijn een aantal mensen in dienst gekomen bij Gemini en omdat Gemini een duidelijk opzet heeft met als doel het bouwen en beheren, kunnen deze mensen daar blijven werken. Die kijken gewoon 25 jaar vooruit. Anderen zijn ZZP'ers zoals ik. Wij kunnen kiezen of we misschien een nieuw project willen doen. Ik zou zelf misschien zelfs wel overwegen om op een punt in mn carriere de overheid te helpen.

C: En vanuit Northland Power, die toch de majority owner is, hoe zijn die hier in het dagelijkse management van het park betrokken?

B: Hier kan ik niets over zeggen

C: U zei al dat het een kleine markt is. Hoe vinden partijen elkaar?

B: Dit gaat vooral via het netwerk en is ook soms een kwestie van toeval. In het Belwind project was een hoop gedoe omdat Econcern de ontwikkelaar bankroet ging. De overname door Colruyt was in een korte tijd rond. Het was een kwestie van twee partijen die elkaar op het goede moment vonden. Het was in dat geval een samenloop van omstandigheden. Het is gewoon een kleine wereld. Er zijn wel brokers e.d. maar ik heb nooit gezien dat die formeel partijen bij elkaar brengen.

C: Colruyt heeft later ook pas Parkwind opgericht. Zijn er mensen toen dan overgegaan om die ervaring en expertise mee te nemen?

B: Zij hadden het gevoel dat de technische dingen op financial close allemaal in goede handen waren. Qua techniek was alles al goed geregeld en waren risico's afgedekt. Daarom hadden ze niet die ervaring per se nodig. Als winkelketen wil je niet veel kennis investeren in offshore wind. Over de oprichting van Parkwind weet ik niets.

Policy Instruments

C: Even om terug te komen op Gemini. Was er ooit angst dat er vergunningen zouden gaan worden ingetrokken? Er zijn recent namelijk een aantal andere ingetrokken door de overheid

B: Ja die angst was er wel. Die benadering met 'first come first serve' resulteerde in korte tijd in 20 + vergunningen; dat was een duidelijke dwaalweg. Dit is dan overigens een persoonlijke mening: op zich werken als beleidselementen wel, maar de ellende is dat het elke paar jaar verandert. Dat is gewoon heel onhandig voor een industrie. Zowel op het gebied van de SDE als de permits. Het oorspronkelijke idee van wie als eerst komt, wie als eerst maalt zou misschien wel kunnen werken als het was doorgetrokken. Het idee nu van de overheid om eerst allerlei ontwikkeling zelf te doen dat werkt ook. Het probleem is gewoon die stabiliteit.

C: Variaties tussen beleid zijn dus misschien minder essentieel, maar de stabiliteit van een regime op de lange termijn is veel bepalender?

B: Ja daar zou best wat in kunnen zitten.

C: Een partij als Typhoon heeft misschien nog wel die kennis over het beleid om dat risico in te schatten, maar een pensioenfonds o.i.d. schikt dan van het idee van investeren in NL?

B: Pensioenfondsen stappen misschien meestal wat later in, maar voor partijen die aan het begin van het traject erbij zijn is het gewoon inderdaad onzeker. Je moet snel aanpassen en anticiperen op de nieuwe regeling zodra deze wordt aangekondigd. Wat zijn de nieuwe spelregels? Hoe kan ik mijn rendement halen en risico's beperken?

C: Hoe staat u tegenover het overheidsbeleid?

B: Er is op zich wel vertrouwen in de NL overheid zodra er een contract gesloten is, maar om vaart te maken en die doelstellingen te halen en de poel van partijen die het snappen en het begintraject aan durven te gaan groter te maken is gewoon continuïteit van essentieel belang.

C: Was de SDE toekenning gunstig? Deze was al toegekend aan het BARD project nietwaar?

B: Ja dat klopt, die toekenning was overdraagbaar. Ik weet niet of dat gangbaar is in de rest van Europa.

C: Waren er moeilijkheden in het overheidsbeleid? Hoe stond u tegenover dit beleid?

B: Ik denk eerlijk gezegd dat de aansluiting aan het grid door onszelf een voordeel gaf. Je ziet dat er in Duitsland toch veel problemen zijn geweest met de spotcontacten op zee. Het was goed dat die grid connectie inberekend zat in onze SDE en de verantwoordelijkheid zo in onze handen was. Wat wel grappig was, overigens, en daar kan je kritiek op hebben, maar die factorberekening voor de afstand heeft het BARD project enorm geholpen. Dus je kunt je afvragen of die verhouding correct was. Het is in ieder geval zeker een factor geweest die andere partijen vermoed ik over het hoofd hebben gezien.

C: Zou je kunnen zeggen dat je liever een overheid hebt die financieel wat meer ontwikkelaars tegemoet komt, maar inhoudelijk wat meer afstand houdt?

B: Ik persoonlijk ben wel voor een sterke overheid. Er gaat veel publiek geld naar dit soort zaken dus ik denk dat het best belangrijk is dat je centraal de goede regie erin houdt. Tegelijkertijd zie je dat het heel vaak mis gaat in dat soort projecten, fyra etc. Ik ben zelf van mening dat we moeten streven naar een overheid die dan ook technisch die kennis in huis heeft.

C: Zijn er andere landen die u als voorbeeld ziet?

B: Ja Denemarken doet dit met tendering dus al sinds het eerste begin. Vanaf 2002. Ik denk dat die benadering goed werkt.

J. Case Study Interview: Gemini – Van Oord

Topic	Gemini – Van Oord
Date	19/06/2015
Interviewee	Wouter Dirks
Function	Project Manager Offshore Wind
Interviewer	Coen Makker

Investor Characteristics

C: Had uw organisatie eerdere ervaring in investeringen in offshore wind?

W: Nee, we waren wel al actief geweest als (main) contractor in andere projecten, maar Gemini was onze eerste equity investment.

C: Was dit (die ervaring) voor uw organisatie een belangrijke vereiste om te investeren?

W: We hebben een groot vertrouwen in onze eigen kwaliteit. Dus de eerdere ervaring was geen reden voor ons om wel of niet equity te investeren. Het business model van een contractor is dat het kapitaal gebruikt wordt om de kernactiviteiten te financieren. Dus wij hebben liever dat we 10 mln euro in staal (een nieuw schip bv.) steken dan dat we dat vastzetten in een ontwikkeling (OWF project). Een investering in hardware levert ons meer op dan een investering in een project. Dat heeft te maken met het feit dat we gewoon beter weten hoe dat werkt. Wij zijn geen ontwikkelaar van energie-producerende installaties. Geld daar in steken ligt minder voor de hand. Het is voor ons wel zo dat het een enorme opportunity is om zo'n EPC contract binnen te halen. Door vroeger in die ontwikkeling deel te nemen, hadden we een stem in het bepalen van wie het ging bouwen.

C: Maar de voorkeur gaat over het algemeen uit naar alleen als contractor meedoen en niet meedoen aan de equity kant?

W: Daarover zijn de meningen misschien wel een beetje verdeeld. Ik denk wel dat er mensen zijn die erkennen dat we –voor een goedgevulde contracting portefeuille- ook equity partner moeten worden in sommige projecten.

C: Was er ook een ander motief? Bijvoorbeeld voor een meer constant inkomen?

W: Dat is in principe niet ons verdienmodel. Wat je bij steeds meer projecten ziet is dat de bouwers vaker een stake nemen in het project en het op een gegeven moment verkopen. Bijvoorbeeld zodra er na 5 jaar is laten zien dat het project na realisatie in de operationele fase goed loopt. Wij zien het in ieder geval niet als ons business model om geld te verdienen uit de verkoop van stroom.

C: Hoe wordt dat moment van de-investering bepaald?

W: In Gemini weet ik niet precies wat er is afgesproken. Meestal is vastgelegd in afspraken tussen de aandeelhouders van een project hoelang ze minimaal er in moeten blijven en onder welke voorwaarden ze mogen verkopen. Van Oord zou bijvoorbeeld het liefst zo kort mogelijk erin zitten. NPI heeft wel een business model dat is gericht op het genereren van die 20 jaar cashflow, dus die hebben eisen gesteld aan de andere equity partijen mbt het minimaal aantal jaren aandeelhouderschap. De invulling van deze afspraken kan ik je niet vertellen, maar hierover zijn afspraken gemaakt gedurende de development fase. Bij consortia tussen dit soort niet-utility investors zijn dit soort afspraken enorm belangrijk.

C: Was het voor de beslissing te investeren belangrijk welke andere partijen in het consortium zaten/zouden stappen? Was onderling vertrouwen in complementaire kwaliteiten bv van belang?

W: Ja dat speelde een grote rol. Zoals je weet was de concessie in handen van Typhoon Offshore, maar Typhoon was te klein om de equity alleen te doen. Op een zeker moment kwam daar NPI bij. Ik vermoedt dat NPI toen als vereiste heeft gesteld dat de andere equity partijen ook verantwoordelijk waren voor –of expertise hebben in- de realisatie.

C: Siemens en Van Oord waren toen al in de picture als OEM en EPC?

W: ja de overeenkomst met Van Oord was eigenlijk al veel eerder gemaakt met BARD en Typhoon. Dat is een kwaliteit die wij kunnen leveren. Dat we tegen ontwikkelaars zeggen dat alle kosten van werkvoorbereiding (engineering etc.) nemen wij op ons voor de komende 2 jaar, maar dan willen we ook de toekenning dat wij het daarna mogen bouwen. Er zijn ontwikkelaars die ons daarin vertrouwen. Typhoon deed de financiering en wij namen de techniek op ons. Samen proberen we het dan tot een succes te maken. Het is wel erg lang zo geweest dat we liever geen equity in die SPV wilden zetten. Die project voorbereiding kosten zouden we wel pas terug krijgen bij de start/toekenning van de constructie. De contractvorm is eigenlijk niet veranderd, maar we zijn ernaast equity partner geworden. We zijn nu dus ook een beetje klant geworden, maar daar merk je weinig van.

C: Wat waren de rendementseisen van uw organisatie in dit project?

W: Dat weet ik niet precies. De rendementseis werd waarschijnlijk gedomineerd door wat NPI eruit wilde halen. Typhoon was al erg ver met het opzetten van het financial model. De EIB was destijds al binnen gehaald. Alleen de commerciële banken waren toen nog niet aan boord. Daarvoor was NPI nodig.

C: Is die EIB of de Green Investment Bank dan soepeler qua eisen dan commerciële banken?

W: Ja die eisen zijn minder streng op het vlak van technische risico's. Banken hebben een veel strengere due diligence. De EIB kijkt meer naar wat de garanties zijn die de NL staat geeft.

C: Hoe stond u tegenover de risico's? Ik kan me voorstellen dat er geen fases in het project waren waarmee jullie niet comfortabel waren?

W: Wij zien het als een voordeel dat wij al tijdens die constructiefase in de SPV zitten. In die rol als eigenaar waren we ook bij machte om te zorgen dat er een team verantwoordelijk is dat capabel is om met risico's om te gaan. Voor utilities werken is vaak veel moeilijker. We zien vaak dat ze met enorm veel ingehuurde staf een project managen. Dat kan enorme consequenties hebben voor het beheersen van de totale project risico's Je ziet ook op projecten die door utilities worden gemanaged, vaak beslissingen worden genomen die duiden op een gebrek aan kennis om complexe projecten adekwaat te manegen.

C: Vanwege de aanwezigheid van interfaces tussen die contracten?

W: Ja, en verschillende package managers die dan niks met elkaar te maken willen hebben, resulterend in een slecht interface management. Voorbereiding en uitwerken duren dan veel te lang. Bij Gemini gaat dat gewoon niet gebeuren. Zodra er een probleem is wordt er oplossingsgericht gewerkt. Ons eigendom in het project geeft ons daarin controle.

C: Ging dat om veel subcontracten?

W: Dat is inderdaad een gigantisch web aan leveranciers en subcontractors met een bijbehorende hoeveelheid aan interfaces. Dat kunnen wij goed managen. Dat hebben we ook bij Luchterduinen laten zien. Bij andere projecten waarin dat wordt opgeknipt door de klant hebben we echt slechte ervaringen. Dong is één van de weinige utilities (naar mijn weten) die daarin goed is, het managen van die contracting.

C: Wat was de rol/verantwoordelijkheid van NPI toen die erin stapte? Werd NPI ook de developer meteen?

W: NPI werd de meerderheidsaandeelhouden in het project. NPI is niet een bedrijf wat zelf projecten in de uitvoering managet. De aandeelhouders hebben een staf aangesteld, waarbij NPI een grote invloed had. Er is toen een nieuwe project director benoemd. Enkele maanden waren er bij Gemini op het kantoor een paar mensen van NPI. Van Typhoon zijn veel mensen overgegaan naar Gemini.

C: Hoe hebben u en de andere investeerders elkaar gevonden?

W: Typhoon en Van Oord kenden elkaar al uit het netwerk. Typhoon heeft veel slimme en commerciele mensen die de energiewereld goed kennen. Op die manier denk ik ook dat NPI erbij is gekomen. NPI was misschien tegelijk ook zelf op zoek naar opportunities in Europa. Die wereld is natuurlijk ook niet zo heel groot. Als je als investeerder interesse hebt in OWFs in Europa dan denk ik dat je snel in contact bent met de mensen die aan de ontwikkelkant nog partners zoeken.

C: Hoe zag de vergunningsuitgifte procedure eruit?

W: De EIA en alle vooronderzoeken moest Typhoon al zelf doen. De subsidie voor het OWF is op basis van een openbare tender verkregen door BARD met hulp van Typhoon.

C: Wat waren hierin belangrijke problemen of moeilijkheden?

W: Gemini had vanaf het begin wel een goede relatie met de overheid. Vanuit EZ was ook altijd wel 'druk' op ons om te zorgen dat wij het niet lieten stilvallen. EZ was ook altijd bereid om in discussie te gaan over zaken uit het voortraject waarin wij problemen zagen. De invloedsfeer van EZ was wel beperkt bij zaken die echt onder andere overheidsinstanties vielen zoals de toekenning van de de waterwetvergunning door Rijkswaterstaat. Gemini was voor de NL overheid heel belangrijk voor het behalen van de duurzame energie doelstellingen.

W: De vergunning uitgifte is overigens niet flexibel. Bij aanpassingen aan de technische configuratie (turbine type, aantal, etc.) moest er een nieuwe vergunning worden aangevraagd. De eerste was voor de BARD turbines dus de vergunning moest later hierop worden aangepast. (inclusief de EIA e.d.)

C: Hoe zag de toekenning van de exploitatie subsidie eruit? Dit was een competitieve bieding met correctie voor de afstand tot de kust?

W: Ik weet niet wie er toen geboden hebben, alleen dat het naar BARD ging. De subsidie was volgens mij al toegekend aan BARD voordat Van oord bij het project betrokken raakte..

C: Wat waren hierin belangrijke problemen of moeilijkheden?

W: De flexibiliteit en het feit dat de subsidie kon worden overgedragen (van BARD naar Typhoon) was wel een voordeel. BARD moest vanwege financiële problemen de vergunning verkopen. De samenwerking met Typhoon voorzag in deze situatie.

C: Hoe staat u tegenover het overheidsbeleid? Tegenover andere landen?

W: Het lijkt volgens mij behoorlijk op elkaar. Het goede van het Nederlandse systeem is dat er wel vroeg duidelijkheid is over de vraag of er geld beschikbaar zal zijn. In de UK bijvoorbeeld zijn er heel veel locaties waar wind mag worden ontwikkeld, maar die parken weten allemaal nog niet of ze ook subsidie gaan ontvangen. Het grote nadeel van Nederland is wel de constante dreiging van wijziging in de regelgeving gedurende de looptijd van de subsidie.

C: Is de stabiliteit van het regime een mogelijk probleem? Was dat voor Van Oord nog een overweging in de rol als equity investeerder?

W: Voor Gemini niet. Toen wij daarin stapte was alles al zover gevorderd dat dat regulatory risk wel beheersbaar werd gevonden na een aantal gesprekken met het ministerie van Economische Zaken. De enige die er op dat moment de stekker nog uit had kunnen trekken waren de equity partijen zelf.

C: Hoe denk je dat OWFs in de toekomst gefinancierd gaan worden?

W: Ik denk dat veel utilities het niet (alleen) meer zullen kunnen. De financiering zal dus meer en meer gaan op basis project financiering, bij voorkeur non-recourse. Kijk DONG heeft er gewoon een business model van gemaakt. Maar je ziet veel varianten. Eneco heeft Japans geld in hun projecten zitten, maar houden wel zelf de controle. Ik denk dat ernaast ook nog andere misschien onverwachte partijen interesse zullen gaan krijgen, zoals bijv. Google. Al met al denk ik dat het diverser zal worden en dus per park heel verschillend zal zijn. Grote bouwers zoals Van Oord zullen ook wel een stukje equity blijven pakken als dat nodig is om een EPC contract te verkrijgen.

C: Wat vindt u van het nieuwe Nederlandse beleid?

W: Wat ik zo hoor van mensen die daarmee bezig zijn is dat de concessies en de eisen daarbij misschien wel een beetje te laag zijn. Dus de hele wereld kan daar op dit moment op inschrijven. een pre-kwalificatie ronde vooraf wordt genoemd als mogelijk verbeterpunt.

K. Case Study Interview: Butendiek – Siemens

Topic	Butendiek – Siemens Financial Services
Date	30/06/2015
Interviewee	Pedro Azevedo
Function	Investment Manager
Interviewer	Coen Makker

*****The answers in this interview were made confidential on request of the interviewee*****

Investor Characteristics

C: Prior experience as an equity investor in Siemens came from two projects before the Butendiek and Gemini projects, is that correct?

P: [redacted]

C: What's interesting to me is the motive to invest. For Siemens I can imagine the incentive to win an OEM supply contract. Is it always in a combination, can you elaborate?

P: [redacted]

C: Because it is a separate part of the company, do you think that the control between Siemens FS as financial investor and Siemens wind energy more direct in a project? Does it provide an advantage, this direct link, in managing the project?

P: [redacted]

C: And Wpd was responsible for the day to day management?

P: [redacted]

C: Do you think that the existence of Siemens FS offers more opportunities, or more offers for Siemens Wind turbine company?

P: [redacted]

C: Does this also result in gaining new contracts? Is it part of a strategy in that sense?

P: [redacted]

C: Especially in the early phases of a project, correct?

P: [redacted]

C: Yes, I've actually spoken with Van Oord and they also invest. They say that on the longer term, once the project is operational and the technology is proven to work. They would preferably divest their stake. Siemens FS is a specialised investment body, does this mean that you have a longer investment horizon?

P: [redacted]

C: So there are no arrangements made yet in Gemini or Butendiek as to what will be your moment of divestment?

P: [redacted]

Project Governance

C: Perhaps you could reflect on the division of tasks and roles was in the Butendiek case? Were there qualities with other investors that were complementary to those of Siemens?

P: [redacted]

C: In general, do you get approached within Siemens with first an opportunity to be a contractor and then as an investor? Or is it ever vice versa? Does Siemens FS actively look for new projects?

P: [redacted]

Policy Instruments

C: With regard to the German policy in the Butendiek case, I've heard that the grid connection in Germany in general had been a bit of an issue. But Butendiek had a shared connection. Was there at any point a fear that the TSO would not be able to finish the connection in time?

P: [redacted]

C: In considering future projects, do you think that investors or Siemens in particular would prefer to manage grid connections themselves?

P: [redacted]

C: And there is enough trust in the German government to give compensation if they cannot connect it in time as promised?

P: [redacted]

C: My final question on the Butendiek case in particular: I saw that the ownership of the project including the lease of the seabed was transferred I think 2 times, do you think it is beneficial that permits are transferable? Or may there be a larger risk of delays?

P: [redacted]

C: My last question: Do you think that stability of policy regimes in general or potentially is an issue in Europe?

P: [redacted]

L. Case Study Interview: Butendiek – PKA

Topic	Butendiek – PKA (AIG)
Date	29/06/2015
Interviewee	Jacob Lynsgaard
Function	Senior Investment Manager
Interviewer	Coen Makker

Investor Characteristics

C: Could you elaborate on PKA (AIG) and the experience in OWF investments?

J: PKA AIG is the advisory body of PKA concerning all alternative investments. This includes among others infrastructure investments. We were established three years ago when PKA wanted to extend its focus on alternative investments. So we are a fairly small group of about 10 people, who administer a rather large mandate for PKA for direct investments of around a billion euro. PKA has currently 4 offshore investments of which we've completed 3. One investment was thus done before we were established. Butendiek was the first OWF investment of PKA AIG and I was leading that transaction.

C: I did not realise that PKA AIG was established before the Butendiek project. The prior experience of PKA was from 1 project?

J: Yes PKA had been involved in one OWF in Denmark. So that is the experience from an organisational perspective. The people from PKA AIG that had done Butendiek had also, however, experience in infrastructure projects from our previous postions. So, we were able to tap into our knowledge from that experience. The people driving the investment had more experience.

C: Do you think that experience was essential? I can imagine that a developer and a purely financial investor would require less involvement or knowledge in that sense.

J: Sure, but I think that experience is important in two perspectives. First of all, being able to drive a large investment process requires you to cover all the aspects of the due diligence. That is a general skill you need to have in investments, not particularly in OWFs. Secondly, OWF specific knowledge is required but we partner up with a lot of different advisors, technical, financial, etc.

C: Would you say that the collaboration in Butendiek with complementary qualities between the investors was key?

J: I wouldn't say it is essential but it is certainly a step in the right direction. Sometimes, you see people go into investments without any previous experience but it is still a success. But obviously, experience helps.

C: Does PKA have a certain goal to have a percentage of its money invested in alternative or OWF assets?

P: Yeah, there are some soft goals around that. PKA has roughly 35 billion dollars under management and the target is to have somewhere between 8-12% of those in alternative investments. This thus also include infrastructure funds and private equity funds.

C: Do you think that the Butendiek project created new opportunities of focus areas for PKA? I guess if the PKA AIG was founded to start a new focus on such investments?

J: Yes, when a pension fund does an investment like Butendiek, when you take construction risk and debt financing. Many people (in the market) notice that. After such an investment we are approached by many people with new opportunities. Many of those are perhaps not relevant to us, but we do get access to interesting opportunities. It then certainly helps that we are able to demonstrate that we have completed such transactions. Since Butendiek we've completed 2 more of these transactions. This certainly created support for the market. People are aware of who we are. We are now seeing a lot of transactions that we were not seeing before our existence (PKA AIG). The pro-active approach we've taken towards investment opportunities have helped us achieve this.

C: You might not be able to answer this, but when assessing a project like this. Is there a minimum return requirement for PKA or for pension funds in general?

J: Yes there is, basically we do a case by case assessment of the minimum return requirement. That all depends on the characteristics of the given investment. Butendiek had construction risk, so we needed to take that in account in our return. In general, the risk factors determine the appropriate risk-adjusted return.

Project Governance

C: Was the construction risk ever a difficult thing or a barrier for PKA to invest? I've read that institutional investors are sometimes hesitant to join into project where there is construction risk.

J: That is certainly a factor. We've spend a significant amount of time in our DD getting comfortable with the construction risk and each of the contracts. The management of the interfaces between the contracts was extensively looked into. Basically, having Wpd as the overall project manager we assessed their capabilities to handle the multicontract setup. We had technical advisors who also involved in setting up the details of the contract and the interfaces. We basically tried to approach the project and construction risk from different angles in order to make sure that we got comfortable with it. Within a construction contract, we were able to build in certain elements to make sure everything went well.

C: Are those agreements of how they get rewarded and how liability is arranged?

J: exactly

C: AS the main managing investor, Wpd, had to be trusted on their capabilities in handling the project. How did you assess them initially? They had experience in onshore wind?

J: Again, this was part of our DD process. First of all, we look into their capabilities and experience. They had a good experience in onshore wind. We have interviewed all the people that were going to manage the project to make sure that those people in particular had the right experience. Once again, you can put economic incentives in place to ensure that the managing party is fully and even more incentivised to make sure that the project is executed accurately. That is another way that we got comfortable. The plan Wpd had proposed was also accurate.

C: I have a final question on how such consortia get together. Did Wpd approach PKA to invest? Of was there let's say a formal event where interested parties were invited?

J: Well, in general Wpd was looking to get together a consortium. We have multiple ways to source our potential transactions. WPD came through one of those sources. We get roughly 10-20 opportunities per month so we are fairly exposed.

Policy Instruments

C: I read that the concession for the lease of the seabed, grant of the subsidy, etc. were all awarded to the initial group of investors. Were there any issues in the process once the current consortium took over?

J: All those things were done before we acquired the project. From a legal and environmental perspective there were no issues. Everything went quite smoothly. (atleast not at the time when we entered into the transaction).

C: Was the grid connection already completed at that time?

J: The grid connection was not yet completely completed but we were comfortable that it would be available once we needed it. This was a key driver that made us comfortable with the grid connection. There have been some challenges in other German windfarms.

C: In assessing a new project, would you consider that an important risk?

J: Absolutely, there are different mechanisms when the grid is delayed, but getting the grid is a key concern and a key focus area everywhere where we do investments.

C: Controlling such a risk yourself, or through a party like Wpd, is more assuring than being subject to a government that has experienced some issues before?

J: Yes, you need the right people to execute the different parts pf the project.

C: It has been mentioned by other people that the availability of up-front subsidies or financing provisioned by state banks or ECAs may also be an important part of policy for the successful financial close of a project. Would you agree with that, or does this not give a big advantage?

J: In general, there are 2 ways to do a project. All equity or mixed debt/equity. PKA has done all equity transactions before so this was no prerequisite. In BUtendiek we did decide to have debt as well, this obviously drives up return and you are able to close the transaction without having everything agreed with the banks. But that is quite common for any transaction involving debt.

C: Given the size of the projects, bank financing remains important. Is this difficult to realise with commercial banks?

J: I think the interest is there and it depends on the project but when it is a common project with experienced parties it is not difficult to achieve, but just a very heavy process. As banks require a separate DD track. It requires extensive negotiations.

C: Does the EIB or for example the Green investment Bank (UK) have less restrictive DD or requirements?

J: I'm not familiar with the Green investment bank's process, but with EIB that is just as thorough and detailed as with commercial banks. The terms the EIB can offer are more favourable but the process is at least as heavy. In general, having EIB or semi-public institutions involved in the debt of a transaction requires a more heavy process.

C: What is your general view on the policy affecting OWFs in Germany?

J: I think every government supports the development, but that comes at a high price. The subsidies required are very pricy for governments and the end-users. They need to be able to justify the premium paid. I think it is becoming more and more public knowledge that the government support is quite expensive. They are obviously trying to drive down those costs. I think it is yet to be seen if they are able to do that or that the market will shut down. On the other hand, you need to show that you are developing your country into a renewable direction.

C: Is stability of policy regimes important or potentially an issue?

J: That is also a key area of our DD. We spend a fair bit of time on analysing the various regimes.