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What are the chances for public-private partnerships in the offshore wind sector?

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I. Abstract

On the 23rd of April in 2009 the European Parliament issued the directive 2009/28/EC. In this agreement the Netherlands are obliged to have a share of 14% of energy from renewable sources in the gross final consumption of energy in 2020 (The European Parliament, 2009). According to a recent study of PBL Netherlands (Environmental Assessment Agency), the Netherlands will not reach this target. With the present renewable energy policy and stimulation programs, the share of renewable energy in the Netherlands is estimated to rise from the current 4% to 7-10% in 2020 (Planbureau voor de leefomgeving, 2010). Several persons and institutions addressed the possibility of public-private partnerships (PPP's) as an alternative or addition to the current SDE+ policy program, which solely grants feed-in premiums to the most (alleged) cost-effective solutions. This is especially the case for the offshore wind sector. In practice, offshore wind projects cannot receive subsides within this policy scheme at the moment. PPP's have contributed to better and/or cheaper projects in publicly managed sectors (e.g. governmental buildings, infrastructure) in the Netherlands (Jager, 2011)(P3BI, 2001). However, at the moment no clear examples exist within the Netherlands and there are no elaborate views on how such a renewable energy PPP could or should be designed.

This gap in knowledge forms the main research area of this thesis. The main research question is:

''What are possible strengths and weaknesses of public private partnerships for offshore wind projects when used as alternatives for the current methods of stimulation in the Netherlands?''

For the answering of this question, several sub questions are answered as well. These sub questions focus on; PPP's in the traditional Dutch public sectors, the current Dutch renewable energy policy and on experiences of other EU countries offshore wind policy schemes (i.e. Denmark, France & United Kingdom) and a different sector (i.e. oil & gas) The results of these sub questions will form the building blocks used for answering the main research question. This will be done by discussing two designed PPP models, constructed of the outcomes of the different sub questions, which are presented in chapter 2. Literature on PPP's gives multiple forms and categories. These variants range from public outsourcing to franchising and joint-ventures. Dutch literature focused on this topic is more precise and narrowed this range of project PPP models down to two central forms; the concession model and the joint-venture model (Everdijk, 2009).

The concession model is a PPP model where the traditional character of principal-contractor remains. The government defines a project (e.g. highway, railroad) and chooses a private partner or consortium via a tendering process for the realization of the project. The most used form within the Netherlands is DBFMO, this stands for Design, Build, Finance, Maintain and Operation, meaning that for a certain period (e.g. 20 years) all these responsibilities are solely managed by the selected private party. This approach will be used as the main example for the offshore wind concession model. In this model, a specific project is tendered by the government. The main selection criterion will be the level of needed subsidy (i.e. feed-in tariff/premium), which is paid from a budget, specifically allocated to the tender. During the development phase, several tasks and responsibilities are executed by the issuing government. This will lower uncertainties for the developing private parties. This will expectantly improve the attractiveness and competitiveness of the project within the tender phase.

The joint-venture model is a model in which public and private parties develop, realize, exploit and manage services with a mutual acceptation of risks and divisions of costs and benefits. The tasks & responsibilities are not divided but are transferred to a specially founded shared project organization in which both public and private parties will participate. The joint-venture model approach is less defined than the concession model approach. In general, the main criterion is that a public party participates (financially) within a project. For the offshore wind joint-venture, two variants will be elaborated on in this thesis, focusing on governmental participation during the entire project cycle (approach II), or only after the project development phase (approach I). The latter approach can be seen as an adapted or extended concession model. The main difference is the condition that the government (indirectly) financially participates, after the moment that the tender and needed subsidies are awarded.

Figure I.1 shows both the designed offshore wind PPP's, including the public, private and shared responsibilities. The figure includes a simplified overview of the current situation in the offshore wind

sector as well. These PPP models were discussed in expert interviews, expectantly providing insights in the chances, threats and practicability of both models. In total, five experts with backgrounds from the public and private spectrum were interviewed.

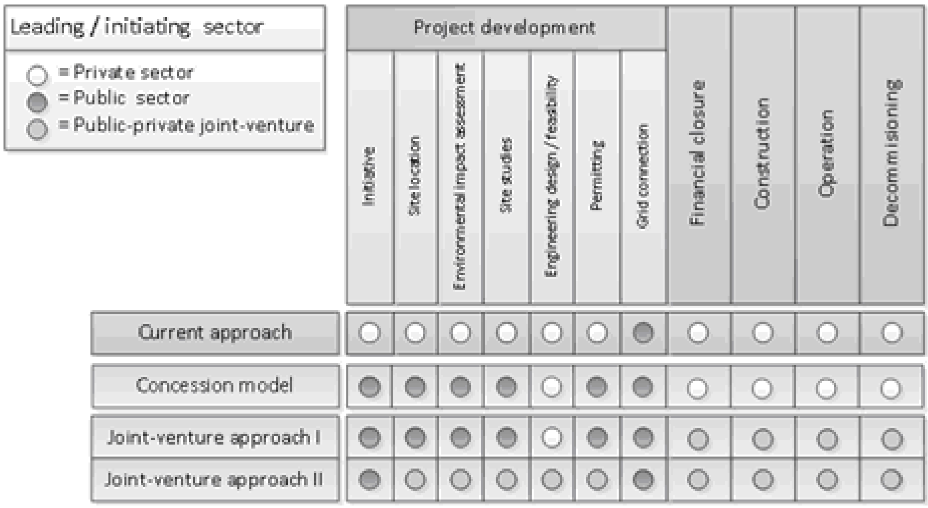

Figure I. 1 A schematic overview of the divided responsibilities in the PPP models

Combined with the results from the descriptive chapters regarding used PPP models in the traditional Dutch sectors, the current Dutch renewable energy policy schemes and the learning of other EU countries and the oil & gas sector, the expert interviews have resulted in the following conclusions.

The concession model shows potential when used to stimulate specific technologies (e.g. offshore wind) that are (not yet) cost –effective enough to apply for a subsidy within the regular SDE+ scheme. However, this does require a specific and guaranteed budget for each project that is tendered. In the concession model, the public partner will have more responsibilities during the project development phase. The responsibilities that are regarded appropriate for the government are:

- Site location
- Environmental impact assessments
- Site studies (e.g. geological, wind conditions)
- Permitting
- Grid connection

The main fear of the interviewed experts is that the conditions set by the government within the tender will negatively influence the ability for the private parties to design the best solutions. At the moment, this can indeed be caused by required permits. These permits require specific descriptions (e.g. type of foundation, turbine) of the desired projects. This problem could be alleviated by introducing flexible permits, which offer more room for different designs.

The joint-venture approach (II), in which a state-owned entity selects a private partner for the development, realization and operation of an offshore wind project is perceived to be unpractical within or alongside the current SDE+ policy scheme. Apart from the governmental financial participation, a subsidy will still have to be granted by the same issuing government. The approach could create unwanted forms of mixed-interests. The method could work within a policy scheme in which subsidies are awarded based on standards and are guaranteed (e.g. the British obligation system). However it is not likely that such a paradigm will be introduced within the Netherlands. The approach (I) were a stated-owned company financially participates after that the needed subsidy is awarded is considered to be potentially favourable. The main advantage would be the increase in the financing ability of such a desired project.

Additional (quantitative) research will have to be performed to determine the cost-effectiveness of the (leading) governmental roles within the tasks of the site studies, grid connection and the participation in the financing of an offshore wind project. Furthermore, a critical success factor of the concession model will be the feasibility of the required flexible permits.

II. Acknowledgements

The thesis that lays here before you is the result of a seven month long period of researching the possibilities of public-private partnerships for large scale renewable energy projects, in particular for offshore wind. The research was executed as a part of the second year of my MSc study, Energy Science. The writing of this thesis has provided me with great learning experiences, for instance it enabled me to become more skilled in systematically describing and analyzing renewable energy policies.

A special word of gratitude goes to both my supervisors, Sophie Schut and Robert Harmsen, who both have greatly helped me during the entire research process. Their extensive feedback has helped me a lot, especially when I encountered difficulties when I was determining the correct research approach. I would like to thank the five experts who have given me the opportunity to interview them. Their shared knowledge has significantly improved the depth and quality of this thesis.

Furthermore, I would like to thank the colleagues at my host organization Strukton Integrale Projecten, for enabling me to write my thesis in a comfortable and professional work environment. I would also want to take this opportunity to show my thankfulness for the support of my parents during my entire student career.

Ruud Bouwhuis,

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Table of Contents

List of tables

List of figures

List of abbreviations

ADEME	Environment and Energy Management Agency
BAFO	Best and final offer
CAPEX	Capital expenditures
DB	Design & build
DBM	Design, build & maintain
DBFMO	Design, build, finance, maintain and operate
DECC	Department of energy and climate change
EBN	Energie beheer Nederland (Energy management Netherlands)
EIB	European investment bank
EIA	Energie investerings aftrek (Energy investment deduction)
EIA	Environmental impact assessment
EOI	Expression of interest
EPC	Engineering, procurement & construction
FIT	Feed-in tariff
IOR	Inter-organizational relationships
MEDDE	Ministry of Ecology, Sustainable Development and Energy
MEP	Ministeriele regeling milieukwalitieit elektriciteitsproductie
MER	Milieueffectrapportage
O&M	Operation & maintenance
OFGEM	Office of electricity and gas markets
OPEX	Operating expense
PPP	Public-private partnership
RE	Renewable energy
ROC	Renewable obligation certificate
SEA	Strategic environmental assessment
SER	Sociaal economische raad
SDE+	Stimulering duurzame energie (Stimulation renewable energy)
SPC	Special purpose company

Chapter 1. Introduction

This chapter will give an introduction in the research area of this thesis. Afterwards, the structure and outline of the thesis will be presented as well.

1.1.1 Background

On the 23rd of April in 2009 the European Parliament issued the directive 2009/28/EC. In this directive the European Parliament reaffirmed that in 2020 the community-wide energy consumption should be supplied with at least a 20% share of energy from renewable sources. In this agreement the Netherlands are obliged to have a share of 14% of energy from renewable sources in the gross final consumption of energy in 2020 (The European Parliament, 2009). According to a recent study of the PBL Netherlands Environmental Assessment Agency the Netherlands will not reach this target. With the present renewable energy policy and stimulation programs, which primary consists of the SDE+ subsidy scheme, the share of renewable energy in the Netherlands is only set to rise from the current 4% to 7-10% in 2020 (Planbureau voor de leefomgeving, 2010).

Rabobank International presented an outlook report with even more negative figures. According to their estimations only around 50% of the renewable energy projects that are granted support in the SDE+ program will actually be realized. Their explanation is that this is mainly caused by the fear of project developers that they will miss out on subsidies. Within the SDE+ scheme, subsidies are awarded in a cost-effective approach, meaning that projects who require the least subsidy will receive it first. Because the SDE+ scheme has a limited budget, initiators of renewable energy projects are believed to apply for a lower support tariff than that they actually need to increase the chance of actually receiving one. Afterwards these projects are canceled when it becomes clear that these projects are not economically viable, because the awarded SDE+ support is insufficient (Rabobank International, 2012). The government states that the reserved budget of these granted subsidies will become available again in the SDE+ program of years to come (Verhagen, 2012). However, this does not directly imply that in these rounds this problem will not occur again. This could possibly cause the problem that a significant part of the SDE+ budget will not (effectively) be used. Additionally, due to the cost-effective approach, currently expensive technologies (e.g. offshore wind, tidal energy) are unable to receive any subsidy, although that these technologies could provide significant contributions to the achievement of the EU2020 targets.

These are examples of non-technical barriers that can hold back the deployment of renewable energy in the Netherlands. Several persons and institutions addressed the possibility of Public-private partnerships (PPP's) as an alternative or addition to the current SDE+ policy program. PPP's could help to speed up the renewable energy transition within the Netherlands (Reintjes, 2011) (Kuijpers, Leerdam, & Willems, 2009)(PPS Netwerk, 2008)(Norton Rose, 2012)(Van der Hem, 2010). PPP's could enable the Dutch Government in becoming more proactive and initiating in renewable energy deployment and thereby having a more direct influence in reaching the targets set for 2020 and beyond. These statements are made for renewable energy in general, but also especially for offshore wind. However, apart from mentioning the term PPP, these parties do not give elaborate views on how these PPP's should be modeled or designed. This gap in knowledge provides the main motivation for this research and thesis.

1.1.2 What are public-private partnerships?

The term public-private partnership is widely used in all sorts of (public) sectors. The Dutch Government uses the following broad definition for PPP:

''A public private partnership is a long term partnership where the government and the private sector, within their own identities and responsibilities, realize a project with a clear and optimal division of risks and tasks. The goal of this partnership is to realize an end product with a higher value for the same amount of money, or with the same value for less money.''
(Dutch Government, 2012)

The term originated as a form of public contracting in construction projects. In this sector PPP's are used for the development of public infrastructure, which can be roughly divided into two different sectors, specifically the economic (e.g. transportation, water, sewage, electricity grids, waste) and social infrastructure (e.g. schools, hospitals, libraries, prisons) (Yescombe, 2007).

There is a whole variety in different forms of PPP's, defined by the purpose and the allocated division of risks, tasks and ownership between the public and private parties. The spectrum ranges from entities that are almost entirely controlled by the private sector, at one end, to those almost completely controlled by the public sector, at the other (Everdijk & Korsten, 2009). In common PPP sectors (e.g. public infrastructure) in the Netherlands, project PPP's have realized projects with lower costs, up to 10-15% compared to traditionally executed projects (Jager, 2011).

In 2001, the P3BI institute of University Twente conducted a research on the performance of 24 different, mainly infrastructural, PPP projects in the Netherlands. In many of these projects they found a combination of value added in content, value added in process and financially added value compared to traditionally executed projects.

These forms of added value expressed themselves in the following benefits:
- Saving of time
- Higher quality
- Share of knowledge and skills
- Integrated approach
- Shared risks
- Cost reduction
- Without the PPP structure the project would not be realized

(P3BI, 2001)

1.1.3 Renewable energy public-private partnerships

PPP's models are used in (a few) energy sectors as well. For instance in the Netherlands, a state owned company (i.e. EBN) participates in the exploration, development and production of oil and natural gas by providing 40% to 50% of the needed equity (Ecofys, 2011). Combining PPP's with the deployment of renewable energy is a new concept in the Netherlands however. In several (scientific) reports that focus on the topic of non-technical barriers and risks of renewable energy, PPP's and governmental participation in general are mentioned as options to stimulate the deployment of renewable energy projects. Especially for large-scale projects, requiring investments of up to 50M€ or more, with significant technological, regulatory or market risks, government participation may help to establish a financial close at lower cost of capital (Ecofys, 2011) (Kleßmann, 2012). Additionally by doing so, a clear signal is given to other investors and lenders that the government is committed to the deployment of renewable energy and that regulatory risk will be addressed and reduced (Jager & Rathman, 2008).

In other countries PPP's have already helped improve the diffusion of renewable energy resources, especially in developing countries and western countries where energy supply is still a core responsibility of the (national) government (Sovacool, 2012). Renewable energy PPP's have been used in European countries like Spain and Portugal as well. In Portugal, the national government issued one project according to the principles of an infrastructural PPP tender for the deployment of an 800 MW wind farm in 2005. The investments were being used by the government as symbols of the country's ability to innovate and deal with future challenges of energy provision (Martins, Marques, & Cruz, 2011). In Spain the local government(s) actively invested and participated in wind energy projects during the '90's to create trust and security for potential investors. These PPP's have highly contributed to the development of their onshore wind energy sector (Dinica, 2008). At the time (i.e. around 2000) that the Spanish onshore wind market had matured, the private market took the intiative and the number of PPP's declined.

1.2 Outline of the thesis

In this paragraph the outline of the rest of the thesis will be elaborated on. In chapter two, the researched topic or problem will be presented, including the societal and scientific relevance of the research topic, the main research question and the corrensponding sub research questions. In the following chapter, a preliminary research on the theoretical background will described, which will be used to indentify the dependant variables and indicators for succesful (renewable energy) PPP's. The dependant variables and indicators form the basis of the executed research phases and the research methods used in the rest of the thesis. The research methods are described indepth in the fourth chapter, Methodology.

The rest of the chapters will elaborate on the different research phases, which will provide the awsners for the sub research questions presented in chapter 2. The fifth chapter will provide insights in which practical forms of PPP models are currently used in tradtional PPP sectors. Chapter 6 will focus the project-cycle of large scale energy projects and the current renewable stimulation programs in the Netherlands. These two chapters will provide an exploratory image of the (current) Dutch situtation.

In the seventh chapter, an overview including offshore wind policy programs of other EU countries (i.e. Denmark, France, United Kingdom) and a different sector (i.e oil & gas, EBN) will be given. The outcomes of this overview will be used as examples for two offshore wind public-private parnerships which will be designed and shown in chapter 8. In chapter 9, the two designed renewable energy PPP's are veryfied by the use of consultation rounds with public and private experts. Chapter 10 and 11 will recapitulate and assess the thesis by presesenting the overall conclusions and evaluating the used research methods.

Chapter 2. Problem definition

This chapter will elaborate the problem definition of the intended research, its relevance to society & science and the research questions that will have to be answered.

2.1 Problem definition

PPP's have contributed to better and/or cheaper projects in publicly managed sectors in the Netherlands (Jager, 2011) (P3BI, 2001). As mentioned in Chapter 1 there are several parties that point out the possibility of public private partnerships as a way to increase the deployment of renewable energy in the Netherlands. Until this moment, no clear examples exist within the Netherlands and none of these parties give elaborate views on how such a PPP could or should be designed. Scientific studies on renewable energy PPP's in other (European) countries only use broad definitions and descriptions as well.

Ideally within a PPP, the tasks and responsibilities are executed and managed by the party that is most suited (Bult-Spiering, Blanken, & Dewulf, 2005). If the Dutch Government decides to actively participate in renewable energy (RE) projects, would a PPP framework be a suitable approach? How should such a PPP's model look like? Furthermore it is unclear if the benefits of regular PPP's will also apply for RE projects, in particular for offshore wind. Will presently existing barriers be affected or even alleviated? How can these tasks and responsibilities be divided within a renewable energy PPP? Insights are needed in the role(s) and tasks that are suited for the government in the RE sector, which normally is apart from the granted subsidy a private operated market. Finally, if renewable energy PPP's have advantages, will they be more favorable compared to the current methods of renewable energy stimulation in the Netherlands?

2.2 Project aim

The aim of this MSc thesis is to investigate what the potential of PPP models would be if these were to be used as an approach to initiate and deploy offshore wind projects in the Netherlands. Accordingly, it will have to become clear what the strengths and weaknesses are of renewable energy PPP's. This will include a comparison with the current methods of renewable energy stimulation in the Netherlands. To increase the scope of the research, the focus will be on the sector offshore wind.

2.3 Relevance

2.3.1 Societal relevance

There are several reasons why this research topic is relevant for society. The deployment of renewable energy in the Netherlands is behind schedule compared to the targets that the Dutch Government and the European Union have set out. Furthermore, according to critics mentioned in Chapter 1, the current Dutch renewable energy policy will be insufficient. In addition, due to its cost-effective nature, the current SDE+ scheme is not suitable, including the budget, for currently expensive technologies which do show much potential, such as offshore wind (Energeia, 2013).

Researching renewable energy PPP's could provide valuable insights on how RE projects can be implemented more successfully and effectively. Furthermore, if renewable energy PPP's prove to be useful methods of implementing renewable energy it could also be used for the stimulation and steering of certain RE business sectors. For instance, in the Government Accord, the coalition mentions setting up projects that will lower the costs of offshore wind energy (Coalition Partners, 2012). These types of PPP's could turn out to be well suited top-down instruments for achieving this goal.

For (construction) companies that are currently active in the PPP sector and that are affected by to the economic crisis, like Strukton for instance, renewable energy PPP's could provide an additional and valuable business area.

2.3.2 Scientific relevance

This research topic has scientific relevance because at the moment there are only a few scientific articles available that combine public private partnerships and renewable energy deployment. In these articles, PPP is mainly used in a broad and unspecified sense. There is a gap in academic literature regarding international experiences and PPP models adopted (Martins, Marques, & Cruz, 2011). Scientific articles and reports focusing on lowering barriers and risks for renewable energy deployment mention higher government participation and PPP's as possible solutions (Jager & Rathman, 2008) (Kleßmann, 2012) (Ecofys, 2011) but fail to elaborate on how this should or could be designed. This thesis could provide a beginning of a solution to both these scientific knowledge gaps by giving an orientating view on if, which and how forms of PPP models could be used in for renewable energy projects and in particular in the offshore wind sector.

This research topic relates to the study Energy Science; Systems Analysis and to the Copernicus Institute because it requires me to thoroughly identify, evaluate and possibly find solutions that alleviate risks and other non-technical barriers for renewable energy deployment. Furthermore I will be required to critically assess the current Dutch renewable energy policy, and (partially) those of other European countries.

2.4 Research questions

The main research question of this MSc thesis is:

''What are possible strengths and weaknesses of public private partnerships for offshore wind projects when used as alternatives for the current methods of stimulation in the Netherlands?''

To make the answering of this research question possible, several sub questions will have to be investigated. These sub questions are:

1. *What are public private partnerships and which types are used in the Netherlands?*

   This question will give more elaborate insights on which types of PPP's are currently used in the Netherlands.

2. *In what way are renewable energy projects currently initiated and stimulated in the Netherlands and what can be said about the effectiveness of these stimulation methods?*

   With the answering of this question the business as usual situation of governmental renewable energy stimulation in the Netherlands will be identified. To achieve this current general renewable energy stimulation policy and the policy specific to offshore wind will be assessed, as well as how renewable energy projects are executed at the moment.

3. *Can there be lessons learned from offshore wind policy of other EU countries, different sectors and from case studies?*

   For this question it will be investigated if there are policy programs of other EU countries, sectors and or individual projects that (partially) use forms of the PPP models found. The experiences of the objects studied will be used to design two PPP models.

4. *How can the risks and tasks of an offshore wind project be divided within a PPP framework and what are the corresponding strengths and weaknesses?*

   This question will combine the found answers of sub questions 1-3. Based on the information found in the preceding questions, two offshore wind PPP models will be presented and elaborated on.

Chapter 3. Theoretical background on public-private partnerships

This chapter will aim to provide valuable paradigms from existing literature that will contribute to understanding the concept of PPP's. What are the characteristics of a PPP and which (theoretical) literature can be used to examine these PPP's? At the end of this chapter the dependent variables of the thesis research will be presented and justified. Consequently the found sources in this chapter will be used to elaborate the research methods of this MSc thesis, which can be found in Chapter 4.

3.1 Characteristics of public private partnerships

To optimally asses a renewable energy PPP, the characteristics of PPP's will have to be identified. This paragraph will focus on this topic from a more theoretical perspective, practical examples of used structures PPP's for instance will be described in the analysis section of this thesis. In general, the term public-private partnership is used to describe the structure as well as the process of the intended partnership. The structure of a partnership is the legal, financial and/or organizational form that is designed to formalize the partnership agreements. The process of a PPP is the interaction within the partnership, which can be seen as activities or actions (Bult-Spiering, 2005).

The following definitions specify the structure of a public-private partnership:

PPP is the result of:
- *An agreement between public and private parties and/or;*
- *The jointly founding of an organization between public and private parties.*

(Van der Meij, 1992)

PPP's are focused on the planning, construction, maintenance, management and exploitation of utilities, from a mutual risks acceptation of the upcoming costs and benefits.
(Knoester, 1987)

Two definitions that focus on the interaction or process within such a partnership are:

A partnership is considered a PPP when:
- *There is interaction between businesses and government(s);*
- *Which is focused on synergy when trying to achieve convergent goals;*
- *Which has societal as well as commercial characteristics;*
- *With the condition that both parties keep their respective identities and responsibilities.*

(Kouwenhoven, 1991)

Within a PPP-cooperation:
- *Governments and businesses work together on a basis of clear and contractual agreements;*
- *Where the responsibilities, costs and risks of each partner are contractually acknowledged;*
- *With the intent to realize societal as well as commercial goals;*
- *Where both parties expect that the partnership and the presence of each other's specific competencies will realize a better result for the same costs or the same result for lower costs;*
- *With the conservation of each parties identity and responsibilities.*

(Kenniscentrum PPS, 1999)

From these definitions it can be concluded that the essential parts that define PPP's can be divided into two groups, *elements* of PPP's and *conditions* for PPP's. *Elements* of PPP's characterize the difference of PPP's with other forms of partnerships. A PPP can be defined as such when it consists of at least the following elements:

- *One or more public and one or more private actors;*
- *Work together on the realization of a mutually agreed goal;*
- *In an organizational context;*

- *With the input of resources acceptance of risks and division of profits.*

(Bult-Spiering, 2005)

The *conditions* of PPP's are the circumstances which makes PPP's a favourable form of partnership. These can be seen as conditions that must be fulfilled to justify the use of the PPP model. Based on several different definitions there are an amount of conditions that must be met, PPP's should:

- *Focus on achieving synergy and/or added value;*
- *Serve societal and commercial interests;*
- *Keep the own identities of the actors and their identifications with their own goals and responsibilities intact;*
- *Result in a division of benefits in agreement with the contribution of resources and agreement of risks by each of the participating actors.*

(Bult-Spiering, 2005)

Many types of projects, institutions (e.g. Gastro), networks and agreements can be labelled as PPP's. This thesis focuses on project specific PPP's. Literature on project PPP's is primarily focussed on the development of spatial or infrastructural projects. Within this area private, public and civilian parties are active. These three sectors can't be seen as separate economic identities with their own characteristics anymore. There is an increase in the overlap between these three sectors in their operations and efforts of achieving their goals (de Bruin & ten Heuvelhof, 1999)(Kickert et al, 1999). If these sectors are seen as clusters of organizations and organizations as clusters of actors, it will signify that public and private actors are increasingly dependent on each other in achieving their individual goals. Therefore it is possible that these inter-organizational dependencies can be seen as one collective public-private network (Bult-Spiering, 2005).

3.2 PPP's from a network perspective

Using the Network Perspective for the analysis of PPP's is a commonly used approach within this field of research (Bult-Spiering, 2005). The book *Netwerken van Organisaties* by H. Oosterwijk gives the following general characteristics of networks, based on an extensive literature review:

- *A network consists of a number of individual actors, each with its own interests and responsibilities.*
- *Actors within a network have a certain dependency to each other.*
- *All actors are (actively or passively) involved with a certain problem or goal.*
- *Actors don't have a hierarchal relationship with each other.*
- *A network forms a specific and distinguishable object.*

(Oosterwijk, 1995)

These characteristics are similar and overlapping with the conditions of PPP's described in paragraph 3.1. When evaluating PPP's from a network perspective, it does not imply that all interaction patterns and relationships between actors within the entire public-private network will have to be assessed (individually). Only the parts of the network that are activated need to be viewed. A part of a network is activated when a problem of at least one actor within the network arises, which can potentially be solved by other actors within the activated network. The activated parts of a network are called *Field-related organizational populations* (Trist, 1983). Organizational populations are field-related within a network when they are committed to a common ''problem'' that requests a shared commitment. The activated part of the network could then be organized in different ways which can form solutions for the identified ''problem''. Figure 3.1 shows the position of such a (PPP) project within a public-private network.

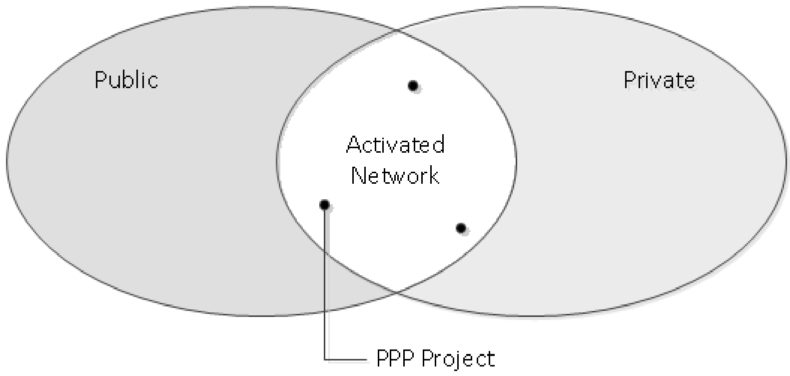

Figure 3. 1 The Public-private network (Bult-Spiering, 2005)

If the project is realized and/or the project goal is achieved, this will neutralize the activated part within in the public-private network. This could however cause other problems to arise, which possibly will activate different parts of the network. When the interaction of different actors results in a specific partnership, the partnership will take the form of an inter-organizational relationship and can be assessed as such (Bult-Spiering, 2005).

3.3 Assessing PPP's as Inter-organizational Relationships

A definition of inter-organizational relationships is mentioned below:

- *A committed relationship between two or more organizations, focused on a specific goal, who agree on mutual responsibilities, with the expectance to achieve results that would not be achieved when pursued individually.*

(Luscuere, 1978)

These relationships can have temporally or permanent character. If the goal of the inter-organizational relationship is to realize a construction project, e.g. an offshore wind farm, then the relationship will have a temporally character. The cooperation process within a temporally inter-organizational relationship can be divided into two phases, the exploration phase and the actual co-operation phase. The first phase focuses on the realization of the partnership, the second phase on the performance of a realized partnership (Bult-Spiering, 2005).

Literature on assessing inter-organizational relationships (IOR's) state both economic aspects and sociologic aspects are relevant for the success of such an IOR. The economic aspects are critical when explaining the functioning of the IOR from a rational perspective, but the sociologic aspects are important as well (Madhok, 1995)(Foss & Koch, 1996). Co-operation can be attractive from a rational point of view, however when willingness and consciousness are missing it will be difficult to establish a PPP (Peters, 1997). In the book *Handboek Publiek-Private Samenwerking* by M. Bult-Spiering et al. an extensive (IOR) literature survey is performed on aspects and motives that are relevant when assessing the realization and the functioning of a PPP (Bult-Spiering, 2005). The economic motives that determine if a PPP should be realized are based on the assumption that the IOR will provide forms of added value compared to traditionally executed projects. This surplus value can be divided in the following four different forms:

- ***Added value in content:*** e.g. the integral approach in solving the problem provides a higher (physical) quality to the solution and/or realized project.
- ***Financial added value:*** e.g. due to a better division of risks, income and costs a higher price-quality division can be made.
- ***Value added in process***: e.g. due to complementary knowledge and skills of both partners a process advantages can be achieved.
- ***External added value***: e.g. the PPP can influence other (private) project initiatives. For instance, other parties can be persuaded by the governmental participation to execute similar projects or spin-offs.

(Bult-Spiering, 2005).

As mentioned above there are sociological motives as well that affect the realization of PPP's. The most important aspects that influence the feasibility of a PPP are:

- ***Willingness****: e.g. both parties want to cooperate.*
- ***Mutual consciousness of interdependencies****: e.g. both parties need to be conscious of the fact that they need each other to come up with better solutions.*
- ***Consistent ideology:*** *e.g. the internal policy of an organization will determine if they are likely to look for external parties to execute projects or if they will try to achieve this on their own.*
- ***Perception of alleged partner:*** *e.g. it is favorable if partners have a positive view on their counterpart. They need to trust their partner and need to think that they can provide quality.*
- ***Consensus in operating philosophy:*** *e.g. to optimize the alleged partnership it is favorable if both parties have similar values and a mutual view on how projects need to be executed.*
- ***Domain consensus:*** *e.g. domain consensus occurs when actors acknowledge each other's right to be active in a certain domain/sector.*

(Andriessen, 1989)

3.4 Adapting found criteria to the research

The preceding paragraphs of this chapter presented different variables, perspectives and indicators that enable researchers to determine what could make a PPP project successful. This closing paragraph will narrow down the found conditions and adapt them to the specific research topic. According the read literature the following four conditions determine if a PPP is would be favourable or not:

1. *<u>PPP's should focus on achieving synergy/added value.</u>*
2. *<u>PPP's should keep the own identities of the actors and their identifications with their own goals and responsibilities intact.</u>*
3. *PPP's should serve societal and commercial interests*
4. *PPP's should result in a division of benefits in an agreement with the contribution of resources and agreement of risks of each of the participating actors.*

The first two conditions are most important and relevant for this research and will form the depending variables for the research phases that will be elaborated in chapter 4. Two reasons why the latter two are less suitable are the following; in the case that there is no form of added value or synergy, it will be hard to find a way in which a PPP can serve both societal and commercial interests. Because two existing PPP models will be used during the research phase (see research phase I), this criterion is less relevant as well. These models already include the required divisions and agreements.

For these reasons and to improve the scope of the research, the research will focus on the first two variables defining successful PPP's. The following part of this paragraph will discuss the perspectives that will be used when assessing these depending variables.

1. PPP's should focus on synergy/added value.

The possible forms of added value, also mentioned as the (rational) economic motives for IOR's are:
- *<u>Value added in process</u>*
- *<u>Financial added value</u>*
- *Value added in content*
- *External added value*

The first two forms are most relevant for this research. The value added in content is less relevant because of the character of projects. In traditional PPP sectors (e.g. infrastructure, governmental buildings) the partnerships can cause completely different designs compared to traditional contracting projects. The design of a wind turbine or its layout will probably not be (significantly) altered. Furthermore, renewable energy PPP projects do not exist in the Netherlands at the moment. Therefore it will be hard to determine if the (physical) quality of a project will improve. External added value, although relevant, will be hard to determine as well. Of course, general remarks could be made about improving and stimulating certain renewable energy sectors. But giving elaborate possibilities for this type of added value will be time-consuming and could be research topic on its own. For this reasons the scope of research will primarily lay on finding examples of value added in process and financially added value.

2. PPP's should keep the own identities of the actors and their identifications with their own goals and responsibilities intact.

This second dependent variable can be assed using the sociologic motives for IOR's. As discussed in paragraph 3.3 these motives are:

- *<u>Willingness</u>*
- *<u>Mutual consciousness of interdependencies</u>*
- *<u>Domain consensus</u>*
- *Consistent ideology*
- *Perception of alleged partner*
- *Consensus in operating philosophy*

It will be difficult to assess (all) these criteria. But, as mentioned in the previous chapter, there need to be sociological motives present to make PPP's happen. Because renewable energy PPP's do not actually exist in the Netherlands at the moment, it can be expected that it will hard for potential stakeholders to imagine and form a thorough opinion on all different sociological motives. Because of this reason and to improve the scope of the research the motives mentioned are narrowed down to the three motives that are underlined. From these three (interrelated) motives I think willingness is the most important, and forms the general motive. The other two variables provide more in-depth reasons why the actors are or aren't willing to participate in a PPP project.

The table that is listed below gives the overview of the two dependent variables, with the corresponding indicators.

Table 3. 1 Overview of dependent variables and indicators for PPP success

Dependent Variables	
1. PPP's should focus on achieving synergy/added value	**Indicators** • *Value added in process* • *Financial added value* • *Value added in content* • *External added value*
2. PPP's should keep the identities of the actors and their identifications with their own goals and responsibilities intact	**Indicators** • *Willingness* • *Mutual consciousness of interdependencies* • *Domain consensus*

Chapter 4. Methodology

This chapter will describe the research steps that will need to be taken for the answering of the research questions presented in chapter 2. These steps are divided in different research phases and will be individually and elaborately discussed in their respective paragraphs. The conceptual model of this research, shown in figure 4.1, illustrates the different research phases, how these phases interact with each other and which type of sources will be used.

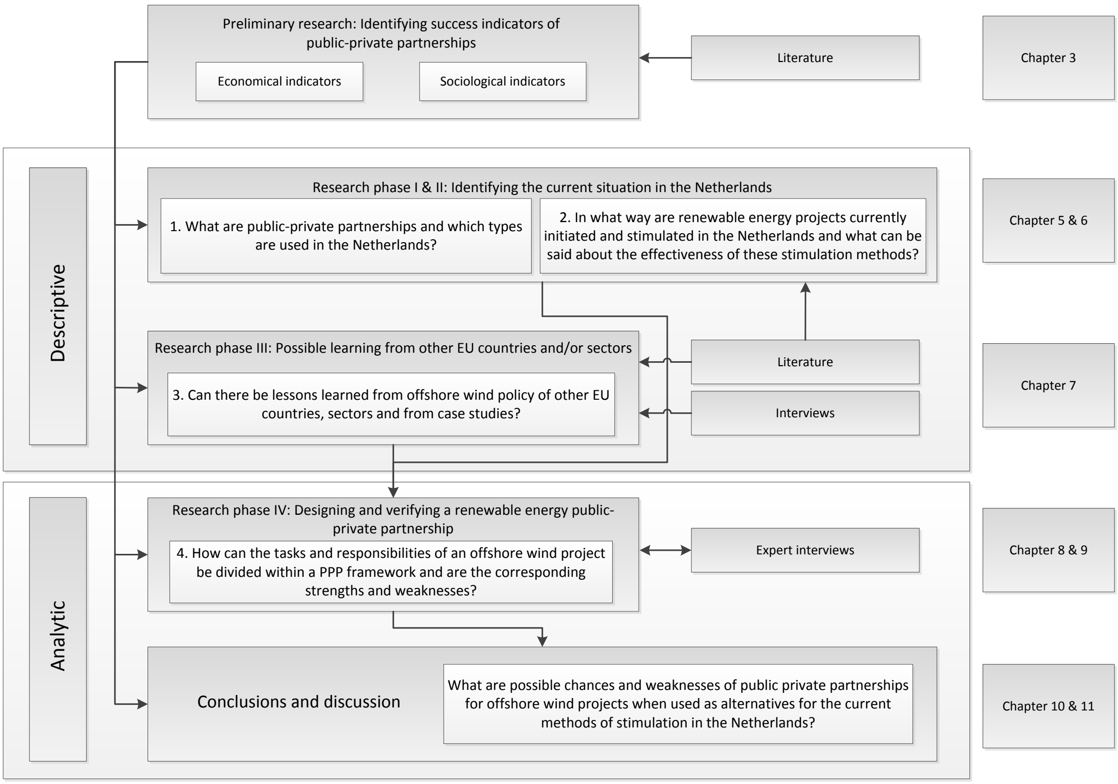

Figure 4. 1 Conceptual model of this thesis

4.1 Research phase I: Public-private partnerships in the Netherlands

In the first research phase, which has a descriptive character, the current situation in the Netherlands concerning commonly used PPP models will be identified. This will be based on existing literature and if necessary interviews with in-house specialists of my host organization Strukton Integrale Projecten. In chapter 3, PPP's are already discussed from a more generic and theoretical perspective. This research phase will provide additional information from a practical point of view by describing the most used models of PPP in the Netherlands. The described PPP models will be the concession model and the joint-venture model. The choice for these two models is based on Dutch PPP literature that state these two models are the most occurring forms within the Netherlands (Bult-Spiering, 2005)(Sanders & Heldeweg, 2012)(Everdijk & Korsten, 2009). These two PPP models will be used as research objects for the next research phases. I have chosen these models because of the availability of existing literature, the in-house knowledge of Strukton Integrale Projecten and the familiarity for the potential stakeholders (i.e. the public and private actors).

The aspects of these PPP models that will be elaborated in this research step are:

- *The (current) applications of the model*
- *The used procedures*
- *The used organizational and financial structures*

4.2 Research phase II: Renewable energy deployment and stimulation in the Netherlands

The second research phase will provide insights in how big-scale renewable energy projects (i.e. 50€ million or higher) in general and offshore wind in specific are initiated and stimulated in the Netherlands at the moment. The leading thread of this research phase will based on the general life-cycle description of big scale renewable energy projects, including their inherent risks and tasks, as described by David de Jager and Max Rathman (Jager & Rathman, 2008). This research phase is essential because it will provide (general and qualitative) insights in which general/universal risks and tasks exist, which can provide justifications for a renewable energy PPP. This life-cycle description will incorporate the different Dutch renewable energy stimulation programs that (could) influence a renewable energy project. Expectantly the programs that will be examined are:

- *Stimulering Duurzame Energie (SDE+)*
- *Energie Investerings Aftrek (EIA)*
- *Green Deals*

Existing literature will be used to describe these programs. If possible the effectiveness, based on existing literature, of the relevant programs will be discussed as well. The life-cycle including the policy schemes description will be used during the analysis phase as the business as usual situation to give an indication if and where strengths and weaknesses exist for the two described PPP models.

4.3 Research phase III: Possible Learning from other EU countries and sectors

The third research phase of this thesis will provide, mostly qualitative information, on the practicality of the described PPP models in research phase I. This will be based on experiences of other countries and sectors. This will primarily be done from the economic (added value) perspective, meaning it will mostly provide insights/indications if renewable energy PPP's can provide added value in process or financial added value. These programs will not be described from the sociological perspective because this is expected to be a time consuming task and it will only give limited answers. Furthermore, it will be difficult to transpose sociological motives found in other countries to the Netherlands.

Based on the preliminary (literature) research, there are two countries (e.g. Denmark and France) that have interesting offshore policy schemes for analyzing the potential of the concession model. Both countries have tendering programs for offshore wind projects that have similarities with the concession model. Possibly there will be more EU countries that have similar programs, but these two countries are interesting because they have private-initiative stimulation programs (e.g. similar to the current SDE+ program) for the same type of technology as well (PWC, 2011)(RETD, 2012).

This makes these countries especially interesting because how often both types of programs are used can indicate the usefulness and acceptance of the tendering programs in those countries. Therefore these two countries are selected for the indication of the usefulness and applicability of the concession model. Additionally a case study of the Anholt offshore wind project will elaborate if the Danish program functions like intended.

For the joint-venture model, there are two (policy) programs that are interesting. The preliminary research has shown that the United Kingdom has a state-owned company, The Crown Estate, which actively participates during the development phase of offshore wind projects (PWC, 2011). In a different energy sector, the gas & oil sector, EBN Nederland performs a similar role. EBN Nederland, which is a state-owned company as well, financially participates in natural gas and oil exploration and extraction projects within the Netherlands. Analyzing both companies/programs will give indications if the joint-venture model is practical and applicable.

For all four mentioned programs the following aspects (if possible) will be described:

- *The type of stimulated projects/ technologies*

- *The used procedures (Process)*
- *The type of used organizational structures (Process)*
- *The type of financial stimulation (Financial)*

This research phase will primarily provide the answers for research sub question 3. Existing literature and if needed interviews will be used as sources of information. The earlier mentioned onshore wind PPP programs of Spain and Portugal will not be used. In the case of Spain, PPP models were primarily used in the 90's, when the wind sector was still an undeveloped market. The described Portuguese renewable energy PPP of 2005, according to preliminary research, did not have any follow up projects. Furthermore, additional sources concerning this policy program appeared hard to obtain.

4.4 Research phase IV: Designing and verifying a renewable energy PPP

The first three research phases together with chapter 3 will provide the building blocks for the first analytic research phase of this thesis. Converging the current Dutch initiating and stimulation methods with the (foreign) PPP programs will provide insights in if the two renewable PPP's could have added value in process compared to the conventional situation. This will be done on a qualitative basis because it is expected that it will be too complex to quantify and objectively compare different programs of countries with their inherent scales and scopes amongst each other. Two renewable energy PPP models will be designed based on the information found in the previous research steps.

A quantitative method could be used to see if one or both PPP model(s) can provide financial added value. The method of financing can possibly greatly affect the cost of electricity production. The financial stimulation methods found in the other sectors/countries will be compared to the current Dutch methods (e.g. SDE+ & EIA). This can be done with the ECN SDE+ model (ECN, 2012). The ECN model is used to determine what the needed price of electricity (in €/kWh) is to make a certain technology (e.g. offshore wind) financially feasible.

Probaly, these first two analyses will only provide a partial anwser to the main research question, But the described models will provide two suitable discussion objects for potential stakeholders and experts. As mentioned earlier, I expect that it will be dificult to immediately discuss a concept that does not exist at the moment. The two renewable energy PPP models will be discussed with experts from the sector(s). The aim of these expert interviews is to find/exclude additional forms of added value that have been overlooked/out of scope and especially to see if there are sociological motives for renewable energy PPP's.

The expert interviews that have been performed will be used to provide additional insights in the practicability of the two defined renewable PPP models compared to the descriptions of the other EU policy schemes and the EBN model. To achieve this, the expert interviews need to focus on the dependent variables and their respective indicators as presented and discussed in chapter 3 & 4. In order to provide insights from multiple perspectives and disciplines, it was intended to find expert from both the public and private spectrum with different backgrounds. In total, five experts were interviewed. Table 4.1 gives an anonymized overview of the backgrounds of the interviewed experts.

Table 4. 1 Anonymized overview of interviewed experts

Sector	Type of organization	Function
Public	1. Ministry of Economic Affairs	Policy Advisor Offshore Wind
	2. Ministry of Economic Affairs	Policy Advisor Energy & Sustainability
Private	3. Construction company active in the PPP sector	Director Business Development (and) Director Sustainable Energy
	4. Construction company active in the PPP sector	Director PPP Assets (formerly) Financing Manager (Inc. Renewables)
	5. Utility company	Director Business Development (Offshore) Wind

The interviewed experts all receive a document prior to the interviews which introduces the thesis topic and presents the both defined PPP models. This will expectantly improve the quality and the effectiveness of the interviews. Already found strengths and weaknesses of both PPP models will not be mentioned, this to avoid the opinion of the experts from being biased. This document can found in appendix II. The interviews are structured as standardized open-ended interviews. In these interviews, participants are always asked identical questions, but the questions are formulated in a way that the responses are open-ended. This open-endedness allows the participants to contribute as much detailed information as they desire (Turner, 2010). These open-ended questions are directly based on the dependant variables and their indicators.

4.5. Conclusions & discussion

Based on the outcomes of the previous research steps, this final part of the thesis will discuss the outcomes of the research, and will expectantly answer the main research question. This will be structured in a section which presents the strengths and weaknesses of the two designed PPP models according to the set dependent variables. Additionally, the outcomes, the effectiveness and suitability of the used approach and methods will be discussed and indications for further research will be made.

Chapter 5. Public-private partnerships in the Netherlands

This chapter will give an introduction of the most frequently used project specific PPP models in the Netherlands. Literature on PPP's presents multiple different forms and categories. This ranges from public outsourcing to franchising and joint-ventures. Dutch literature is more precise and narrowed this range of project PPP models down to two central forms; the concession model and the joint-venture model (Everdijk, 2009). Based on this division there will be two paragraphs, each describing one of these models and giving practical examples. A final third paragraph will give an overview of the models described, showing how they differ and indicating which party is responsible for which tasks.

5.1 The concession model

5.1.1 Introduction

The concession model, which is also known as the PPP integrated contract model, is a PPP model in which the traditional character of principal-contractor remains (PPS bij het Rijk, 2008). The government defines a project (e.g. highway, railroad) and chooses a private partner or consortium via a tendering process that will realize this project. Although this looks similar to conventional public contracting of infrastructure and buildings there are three big differences (Ball, 2000)

1. The private sector organization involved not only constructs the capital asset but is also responsible for its operation and maintenance. In other words, the private client has responsibility over the life-cycle of the asset. A concession contract integrates design, construction and maintenance.
2. An output specification is used in which the public sector client defines the services required.
3. Risks are transferred from the public client to the private sector. In concession contracts a 'genuine transfer of risk' to the private sector contractor takes place to secure value for money in the use of public resources.

There are several different forms of concessional PPP's in the Netherlands such as Design & Build (DB), Design, Build & Maintain (DBM) or Design, Build, Finance, Maintain and Operate (DBFMO). These forms are all comparable to each other; the way they differ is the extent of life-cycle integration. Figure 5.1 illustrates the spectrum of public-private responsibility and how these concession models can be placed within this spectrum.

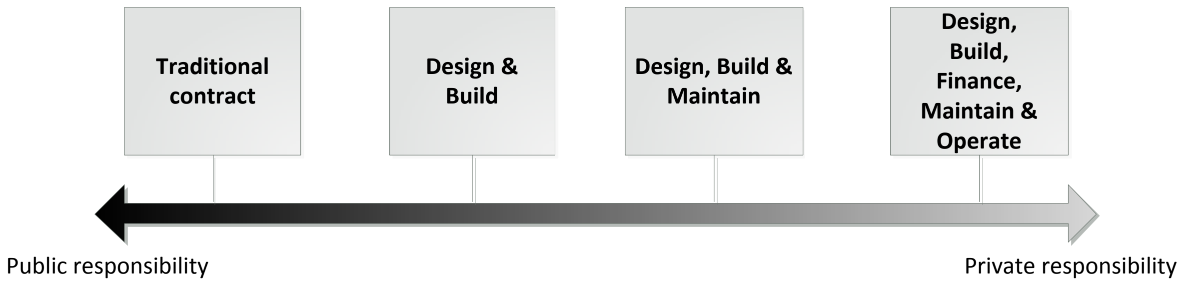

Figure 5. 1 Forms of concessional PPP's (adaptation of FHWA, 2013)

The most used (and elaborate) form in the Netherlands is the DBFM(O) approach. As said this stands for Design, Build, Finance, Maintain and Operation, meaning that for a certain period (e.g. 20 years) all tasks of a project are solely managed by a private party or consortium. An often mentioned reason for this fully integrated approach compared to traditional public contracting is the improved efficiency and quality of a project. This can result for instance in lower costs and/or a faster delivery. According to the Dutch government this can go up to 10-20% of the total costs (Ministerie van Financiën, 2012)(Canoy, 2011).

5.1.2 Current applications

In the Netherlands the DBFMO model is almost solely used in by the national government in the public sectors infrastructure (e.g. roads, railways & sluices) and governmental buildings (e.g. offices, barracks & prisons). If an infrastructural project has a contract value that exceeds €65 million, the Dutch government can choose to use DBFMO as the form of contracting. In the case of governmental buildings projects this threshold is €25 million. These thresholds are chosen by the government because in general, projects with a lower contract value will not have a high enough efficiency gain to offset the higher transaction costs (Ministerie van Financiën, 2012).

At the moment there are 24 projects in the infrastructural sector being tendered, constructed or are already in the operational phase (Ministerie van Financiën, 2012). Two characteristic DBFM(O) projects in the infrastructural sector are the A15 Maasvlakte-Vaanplein highway (with a contract value of €1.2 billion) and the second Coen Tunnel with adjoining Westrandweg (contract value of €595 million) (PPS Netwerk, 2013). In the governmental buildings sector there are currently 16 DBFMO projects being tendered, realized or are in the operational phase. Two big DMBFO housing projects that were granted are the Kromhout Barracks in Utrecht (with a contract value of €300 million) and the renovation of the Ministry of Finance (contract value of €175 million) (PPS Netwerk, 2013)(Ministerie van Financiën, 2012).

5.1.3 Used procedures

In detail the procedures of DBFM(O) projects between different sectors can differ significantly because of the differences in the desired products. However in general the tendering guidelines and the phases after awarding the tender are comparable in all sectors. This is because the Dutch government standardized the tendering guidelines for all sectors in which they are actively promoting DBFM(O) projects (Ministerie van Financiën, 2012). This general (and simplified) guideline for DBFM(O) project is shown in figure 5.2 and will be described further below. This description is based on the report 'Guidelines DMBFO-contracts'' which was co-written by construction companies Strukton and Ballast Nedam (Strukton & Ballast Nedam, 2008).

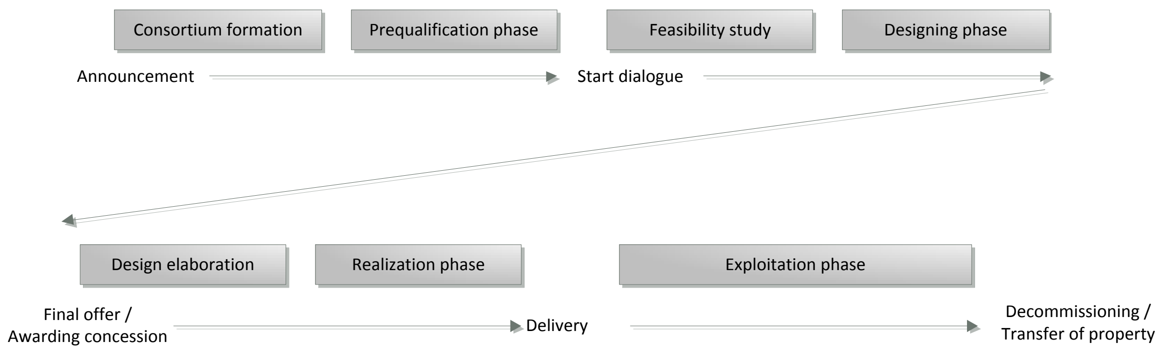

Figure 5. 2 Simplified DBFM(O) project life-cycle

The first phase of a DBFM(O) project starts with the announcement of the participating government that they will issue a tender for a specific construction project. After this phase the prequalification phase begins. The first step within this phase is the consortium formation; different firms who are interested in competing for the tender will try to form the most suitable consortium for the desired project. This is necessary, because after the prequalification phase, the issuing government will select the consortia that may compete for the tender, primarily based on the references of the participants in the consortium (i.e. what kind of experience do they already have?). It is possible that one single market party has all the required knowledge, competencies and experience to compete for the tender on its own. In such a case it isn't necessary to form a consortium. However in practice, this is hardly ever takes place (Rijksgebouwendienst, 2009).

After this prequalification phase the competitive dialogue phase will begin. The consortia that are granted access to this round will receive additional desired specifications by the issuing government (e.g. what type of design, the selection criteria & the output specification). Based on these specifications the still participating consortia will perform a feasibility study in which they determine if they are able and if it is favorable to win the tender. At this point a consortium will also for instance look at; who will focus on which aspect, the planning and the tender budget. The consortia that are convinced that they are able to win the tender continue to the designing phase. Within this phase the consortia elaborate their plans and designs. During this phase there are several feedback moments with the issuing government, hence the name ''dialogue phase''. At a certain point, the competing consortia will have to hand in their best and final offers (BAFO). Based on the selection criteria (e.g. lowest costs, highest quality) given at the start of the dialogue phase the issuing government will select a winning consortium. In most DMBF(O) projects, the tendering phase will take one to two years.

The consortium will now have time to elaborate and to finalize their winning plans. When this is done and the consortium and the issuing government agree on the defined project, the partners of the consortium and subcontractors that they have hired will realize the project. This phase, including the realization of the property generally takes up to two to five years. After the realization the project will be delivered and will be in use for a certain contracted period (e.g. 15 to 20 years). During this period the consortium is still responsible for the maintenance and if applicable for required facilities (i.e. cleaning, catering). After this period the project is decommissioned or the ownership of the property is transferred, in the case that the life time of the project exceeds this period, to the issuing government for a contractually agreed price.

5.1.4 Used organizational and financial structures

In a typical DMBF(O) structure the winning consortium will found a special purpose company (SPC). This SPC will form the contract party for the issuing government. The ''special purpose'' of this SPC is the execution of the awarded concession. This SPC is a new entity, often a private limited company and will become responsible for the development, realization and the financing of the awarded concession. The shareholders in the SPC, often the members of the consortium and possibly private equity investors, will provide equity that will be used for financing the realization of the DBFM(O) project. In general PPP projects, this is 10-20% of the total sum that is needed to finance a PPP project. The additionally needed 80-90% will be financed by financial institutions (Rijksgebouwendienst, 2009). In figure 5.3 a schematic SPC is shown, including its most important stakeholders, during the realization phase. The arrows indicate the monetary flows during this phase.

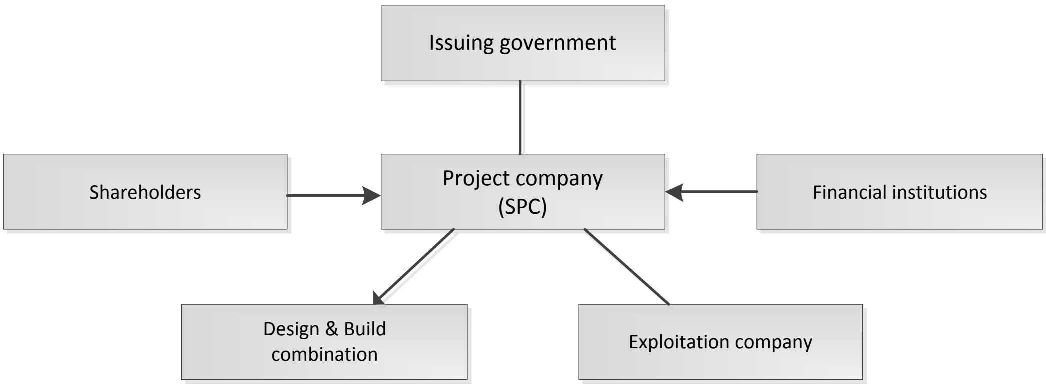

Figure 5. 3 Organizational structure DBFM(O) during realization phase

The realization of the project is generally executed by a building consortium, during this realization this consortium is responsible for both the (additional elaboration of the) design and the construction. This is done to optimize the quality of the project. At the moment some parties within this sector include the responsibility of the exploitation company in such a consortium as well. This forces the constructers to choose for options that are most favorable from a total life-cycle point of view, instead of which is most economical to construct.

During the development and realization phase, the issuing government will not give a financial contribution to the SPC. This will start from the point that the project is ready to be taken into use. From this point the government will pay a periodic ''beschikbaarheidsvergoeding'' or availability fee. This fee will be used by the SPC to pay for the services that they provide during the exploitation phase (e.g. cleaning, catering, maintenance), to pay off loans from the financial institutions and ideally to pay the shareholders of the SPC a rewarding dividend.

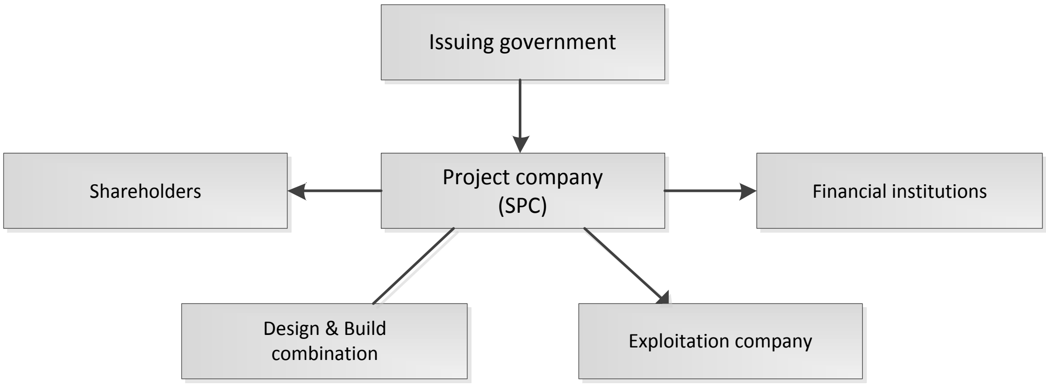

Figure 5. 4 Organizational structure DBFM(O) during exploitation phase

The extent of this availability fee is determined by the quality that the SPC provides to the customer. Ideally the availability fee is sufficient for the SPC to pay all outstanding debts and to pay the shareholders an attractive dividend. In the case that the SPC fails to comply with contractually set quality standards, it is possible that they will receive availability fee that is insufficient to pay off all their debts. This is a risk that solely lays at the SPC and its shareholders, and forms a guarantee for the issuing government that the SPC will try to comply with the agreed quality standards.

5.2 The joint-venture model

5.2.1 Introduction

The joint-venture model, also known as the alliance model, is a model in which public and private parties develop, realize and exploit and manage services with a mutual acceptation of risks and divisions of costs and benefits. To be precise; the tasks, responsibilities, control and risks are not divided but are transferred to a specially founded shared project organization or joint-venture in which both public and private parties will participate (Deloitte, 2010).

Compared to the concession model there isn't one or a few different forms, but a whole ranges of types. This is because in a joint-venture PPP the needed scope of the project (i.e. who performs which task, what is the distribution of funding) is adapted to the specific situation.

5.2.2 Current applications

Although that the joint-venture model is favored to the concession model by experts in Dutch governance literature, there are hardly any infrastructural or governmental buildings joint-venture projects in the Netherlands (Eversdijk, 2009). In the infrastructural sector, there is one well-known project, the Waardse alliance. The Waardse alliance was a project within the Betuwelijn railroad and formed a pilot for alliance or joint-venture schemes in the infrastructural sector (Prorail, 2005). Studies commissioned by the Dutch government have concluded that the joint-venture model could have advantages compared to the concession model in the governmental buildings sector, however the Dutch government still hasn't issued a joint-venture PPP in this sector yet (Rijksgebouwendienst, 2008).

In the Netherlands the joint-venture PPP is almost singly used for urban and area development projects. There are other sectors where the government participates in joint-ventures, in these sectors they participate with stated owned companies (e.g. EBN) (Ministry of Finance, 2012). Because there isn't a minimum contract value and because all kind of governments within the Netherlands (can) participate in joint-venture PPP's, there isn't a clear picture on the amount of area development joint-venture PPP's in the Netherlands. A known example is located in Groningen, called Meerstad. In this joint-venture several different governmental and private parties (tried to) develop a new district in the city of Groningen during the period of 25 years (with an excepted contract value of €1 billion) (PPS Netwerk. 2013).

5.2.3 Used procedures

Compared to the concession model, there are several possible routes that can be taken for the establishment of a joint-venture PPP. These routes were described in the feasibility study on the applicability of joint-venture PPP's in the governmental buildings sector. Based on the size of the anticipated joint-venture, one of these routes is favorable and/or mandatory (i.e. due to European procurement legislation). In the case of a type of project where a concession PPP would be used otherwise, it is expected that the procurement procedure (i.e. competitive dialogue) as described in paragraph 5.1.3 will need to be used (Rijksgebouwendienst, 2008).

In the case of the Waardse alliance, the project was procured within a competitive dialogue framework of a DB concession. After the tender was awarded to the winning the consortium, the concession was reformed to a joint-venture project in which the issuing government participated (Rijksgebouwendienst, 2008).

5.2.4 Used organization and financial structures

Depending on the use of the PPP model, different legal forms are favorable or required. In the earlier mentioned study on the potential of joint-ventures PPP's in the governmental buildings sector, it is stated that in the case of area development plans a private limited company is favorable. For infrastructural and governmental housing projects a general partnership form should be used (Rijksgebouwendienst, 2008). Apart from some legislative differences, required to prevent the structure of being labeled as state aid, in both cases the organizational structure will be similar to the SPC form mentioned in paragraph 5.1.4. A main difference to the concession model approach is that the issuing government(s) becomes(s) shareholders in the entity, instead of principal.

In the two mentioned joint-venture schemes there is no specific ''availability fee'' of the issuing government. In the case of area development joint-ventures, the income of the entity is (generally) earned by selling products or services (e.g. real estate) to the market. In traditional PPP sectors such as infrastructure and governmental housing it can be expected that the actual payments will still need to be made by the issuing government. In the case of the Waardse alliance, these payments were made from the budget that was already assigned by the government for the DB concession. In general, if the budget would turn out to be insufficient, the partners of this joint-venture agreed to increase the budget on a 50/50 basis. In the case that there would be a surplus, this surplus would be divided on a 50/50 basis as well (Korf, 2003).

5.3 Overview of discussed PPP models

This paragraph will give a summarizing outline of the two PPP models discussed in this chapter. The concession model can be seen collective term of several variants of public contracting, in which the private contractor has more responsibilities and tasks compared to traditional public construction contracts. Although that these variants are seen as public-private *partnerships,* the traditional public-private paradigm of principal-contractor remains intact. Within the range of variants within the concession model, the DBFMO can be seen as the most elaborate form (i.e. the private partner has the most responsibilities).

Within a DBFMO concession, the government issues a tender for a certain construction project and is mostly used in the public sectors of infrastructure and governmental housing. Through an EU procurement route, a private consortium is selected, based on specific criteria, from a certain amount of interested consortia. This selected consortium becomes responsible for the (final) design, construction, financing, maintenance and operation of the project for an agreed period (e.g. 20 years). The issuing government pays a periodic availability fee for the use of the project. If (quality) standards are not met, the government may lower the availability fee with a contractually agreed amount. Ideally, the received availability fees are sufficient for the consortium to pay of the debts and to make an interesting profit over the entire project-lifetime.

The joint-venture model can be regarded as a more vague catch all word. In general, the main criterion is that a public party participates (financially) within a project. Although that several parties indicate a joint-venture approach as favorable, this approach is hardly ever used in public construction sectors. Within the construction sector, public-private joint-ventures are almost solely used in urban development projects. Income for the public and private partners within this joint-venture is gained by selling products (e.g. real estate) to a private market.

Figure 5.5 illustrates the two PPP models described in the previous paragraphs, including several variants of the concession model. In this figure, the responsibilities and the associated tasks for both the public and the private parties are shown.

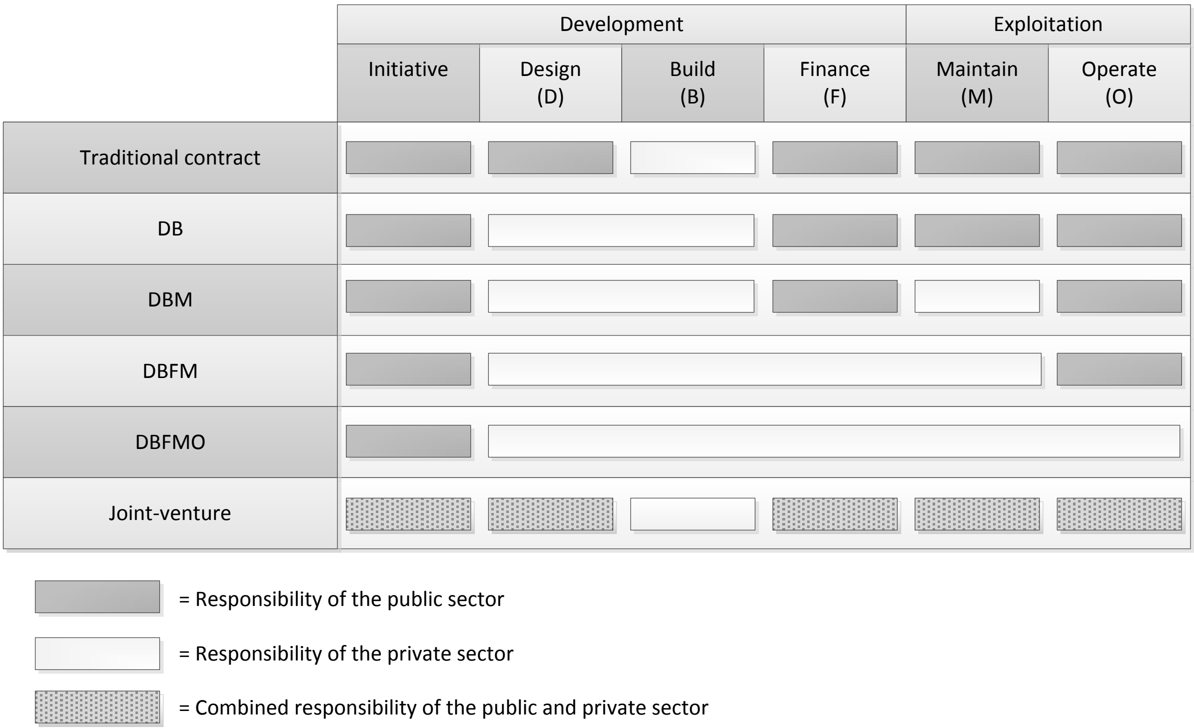

Figure 5. 5 Overview of frequently used PPP models in the Netherlands (Adaptation of Rijkgebouwendienst, 2008).

Chapter 6. Renewable energy deployment and stimulation in the Netherlands

In this chapter, the general characteristics of a large-scale renewable energy project (e.g. offshore wind) will be described by passing through its project-cycle. During the description of these different phases the corresponding risks and barriers and the relevant Dutch support schemes will be presented as well. The description of this project-cycle and the inherent risks and barriers are based on the report *''Policy instrument design to reduce financing costs in renewable energy technology projects''* by David de Jager and Max Rathman (de Jager & Rathman, 2011). The presented risks and barriers will give an outline on what can be generally expected within a large scale renewable energy project. Evidently more risks and barriers exist for specific projects.

The project-cycle is shown in figure 6.1. The five phases in this project-cycle will form different paragraphs in this chapter. For the second phase: *Financial closure*, the article *''Financing investments in renewable energy: the impacts of policy design''* by Ryan Wiser and Steven Pickle is used as well. After the description of the five phases, an additional paragraph will discuss the (parts of) Dutch renewable support schemes that are not directly linked to one of the different project-cycle phases. Furthermore, the effectiveness of the mentioned Dutch policy schemes will be discussed, if possible.

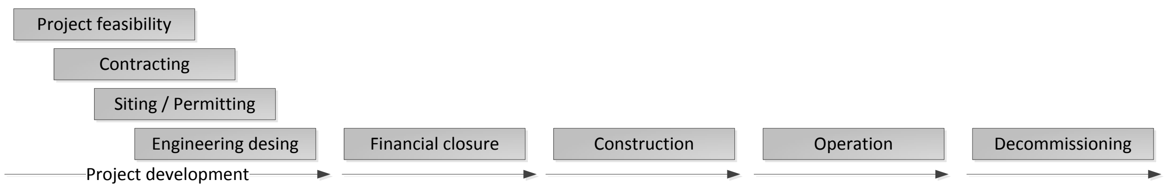

Figure 6. 1 Renewable energy project-cycle (de Jager & Rathman, 2011)

6.1 Phase I: Project development

During the first phase of the project-cycle of a renewable energy project, several different tasks need to be executed. It includes the assessment of the technical and institutional feasibility, preparation of contracts with suppliers of equipment & services and with purchasers of the produced energy, acquisition of land and various permits and (pre-) engineering of the project. These tasks are interdependent and can/should be executed simultaneously. This phase could already require significant amounts of investments, in the order of several percentages of the total project investments (if fully executed) (de Jager & Rathman, 2011).

In the Netherlands, developers of renewable energy projects can apply for the SDE+ (Stimulering Duurzame Energieproductie or Stimulation Renewable Energy Production) subsidy during this phase. Most project developers need to have certainty that they will receive this subsidy before they can continue to the financial closure of the intended project. This operational subsidy, which can be characterized as a feed-in premium, is used to account for the difference between the price of conventional energy (i.e. coal, gas & oil) and the price that is needed to make the project economically viable. The different forms of energy that can receive subsidy within the SDE+ are renewable electricity, heat & gas. At the moment there is one shared budget (i.e. three billion euros in 2013) for all different categories, which will become available in different phases. In the first phase, projects with relatively low-cost techniques can apply for the subsidy (i.e. €7ct per kWh or lower). In the case of a feed-in premium, a subsidy of €7ct per kWh implies that if the market price of electricity would be €5ct per kWh, the government will subsidize the remaining and needed €2ct per kWh.

After a certain period, the first phase is closed and the second phase starts. During this phase it is possible to apply for a higher premium (i.e. €8ct per kWh). After each phase, the level of the subsidy that can be applied for increases, until phase six which has a maximum premium of €15ct per kWh. The subsidy program is active until the total and fixed budget is assigned. It is possible that the budget is already allocated after the first phase, which happened for instance in 2012 (Energeia, 2012). With this approach the most inexpensive or cost-effective projects have the most certainty of receiving a subsidy. In the case that the renewable energy project is subject to specific permits, then these permits need to be acquired before it is possible to apply for a SDE+ subsidy (Agentschap NL, 2013). In the case of offshore wind, it is possible to apply for a feed-in premium within the conventional programme. However, due to the high costs of this technology, in practice this will be nearly impossible. In 2009/2010, a subsidy tender specifically allocated to offshore wind was issued to stimulate projects in this sector. This specific program will be shortly discussed in paragraph 6.6.

Additional to the potential revenues of the SDE+ subsidy scheme, it is possible to deduct maximally 41, 5% of the initial investment costs of the fiscal profit from a renewable energy project. This tax exemption is called EIA, which stands for Energie Investerings Aftrek or Energy Investment Deduction. In practice this stimulation method will imply that 10% of the total investment costs can be deducted from the corporation tax paid over the profits of the project (Agentschap NL, 2012).

The following general risks and barriers are associated with the first project-cycle phase, assuming that the project is considered feasible:

- Acquisition of permits is not successful due to:
    - A successful appeal by local protest groups
- Connection to the electricity grid is impossible or too expensive
- Energy purchase agreement is not reached
- Delay in project development due to legal or institutional procedures, resulting in the project not being viable due to:
    - Higher costs of equipment and services
    - Unfavourable changes to or elimination of policy support schemes

(de Jager & Rathman, 2011)

6.2 Phase II: Financial closure

If all the tasks are executed successfully during the preceding phase, the project developers will search for ways to finance their project. Typically project developers need to obtain capital for the up-front costs of building the project through a combination of debt (i.e. a loan) and equity investment (i.e. ownership). There are multiple ways to structure loan agreements, and debt can be obtained through public markets (i.e. bonds) or private placements (i.e. bank loans, institutional debt). Equity can be procured from internal sources or from external investors (Wiser, 1998).

Equity investors and lenders view and analyse the risks of renewable energy projects differently compared to each other. Equity investors are less risk adverse because they can benefit from any upswings in the returns of a project. Lenders only receive the payments of debt and interest. Up to the limit of unacceptable risk, lenders adjust debt interest rates and terms for default risk (i.e. higher interest rates on riskier loans), default meaning a failure to pay. If a project is likely to default or come close to default in a single year, it will be unlikely that lenders supply a loan. Therefore, unlike equity investors, lenders typically analyse a project from a worst-case perspective (Wiser, 1998).

There are two primary ways to financing a renewable energy project: project financing and corporate financing. These two financing structures differ in how debt is structured. Non-utility generators have generally relied on project financing. In these arrangements, lenders look primarily to the cash flow (i.e. income from power purchase agreements) and assets of the specific project for repayment rather than to the assets or credit of the initiator of the project. When chosen for project finance, the project will be structured in the form of a SPC, described in chapter 4. With the corporate finance method, corporations borrow money on conditions based on the entire corporate balance sheet. Project financing has several advantages over corporate financing. Project finance loans are generally non-recursive to the parent company and therefore do not have a substantial impact on the company's balance sheet or creditworthiness. Small- and medium-sized developers are free to initiate several projects simultaneously without huge companywide impacts. Downsides of project finance compared to corporate finance are the necessity of large power purchase agreements and higher legal, transaction & debt costs (Wiser, 1998).

The following general risks and barriers are associated with this phase:

- The energy purchase agreement does not meet the conditions posed by the lenders
- In the case of corporate finance; the corporation is valued too poor for the required loans

(de Jager & Rathman, 2011) (Wiser, 1998)

6.3 Phase III: Construction

When the project developers reach financial closure with lenders, and possibly external investors, the actual construction of the project can begin. This is usually done by several subcontractors, either contracted individually or as a consortium. Similar to other construction sectors (including DBFMO projects), it is common to have one contracting party in the form of an EPC that executes all the physical work (directly or indirectly with their own subcontractors). EPC stands for Engineering, Procurement & Construction. This phase has several risks with potentially high impacts, but which are not generally specific to renewable energy projects. However, for newer technologies that not yet have institutional track-records, new barriers might occur during construction (de Jager, 2011).

During the construction phase, the following general risks are identified:

- Construction risk:
    - Time and/or cost overrun
    - Technical specifications are not met
    - Assumptions prove to be not realistic
- Counterparty risk
    - Construction contractor does not perform according to contract

(de Jager & Rathman, 2011)

6.4 Phase IV: Operation

During the operation phase, especially when chosen for a project finance construction, the project will have to generate a net positive cash flow. This case flow should provide the wanted return of investment for the investors after the periodic payments of debt, interest, services and taxes have been made. In renewable energy projects, evidently the main income is generated by the electricity sales and the electricity production subsidies (e.g. in the Netherlands the mentioned SDE+). Any disturbance in the production of energy will result in lower income and potentially in the default of the project.

As seen in the listing below, several risks types exist during the operation phase:

- Performance risk
    - Underperformance of installation
    - Underperformance of operation & maintenance (O&M)
    - Theft / damage
- Resource risk (incl. fuel supply)
    - Variable availability of resource (e.g. wind speed profile or solar irradiation)
    - Disturbance in logistics (e.g. biomass supply)
- Market risk
    - Demand risk (e.g. uncompetitive pricing policy of renewable energy projects)
    - Price risk (changes in market prices of energy carriers)
- Regulatory risk
    - Design of policy support scheme
    - General support scheme is modified, affecting the cash flow of the project
- Credit risk
- Counterparty risk (e.g. of subcontractor responsible for operation and maintenance)

(de Jager & Rathman, 2011)

6.5 Phase V: Decommissioning

After a certain period of operation, the end of the technological lifetime of the project will be reached. At this the point the installations of the project will have to be decommissioned and the site has to be cleaned up. The risks of this phase are considered to be low, because in many cases the scrap value of the installations is higher than the decommissioning costs. Risk associated with the decommissioning phase:

- No budget available for decommissioning

(de Jager & Rathman, 2011)

6.6 (other) Renewable energy programs in the Netherlands

This paragraph will give an overview of the renewable energy programs of the Netherlands that are not yet discussed, including the SDE+ scheme for offshore wind used in 2009 and Green Deals. Furthermore it will attempt to discuss the performance of these schemes and the regular SDE+ & EIA scheme.

6.6.1 SDE+ offshore wind

As mentioned in paragraph 6.1, the SDE+ program has been developed as mechanism to support renewable energy. Its most important feature is that it only selects the most cost-effective solutions to provide renewable energy (3E, 2013). Due to the high amounts of needed subsidy for offshore wind, caused by high investments costs and scale, it is perceived to be very hard to successfully apply for a subsidy within the normal SDE+ scheme. During the year of 2009, it was possible for developers to apply for construction permits for offshore wind farms. To receive a construction permit it was necessary that an Environmental Impact Assessment (EIA) or in Dutch a MER has been performed successfully (3E, 2013). In this year, 77 different plans were presented to the Dutch government. Of these 77 projects eventually 12 projects were granted a development permit.

In the following year of 2010, a budget of maximally €5.4 billion, which was estimated to be enough for a total installed capacity of 950 MW, became available to these permit holders via a tendering scheme (Energeia, 2009). During this tender the permit holders presented their plans, with the required amount of feed-in premium, for the locations that they had received. The plans with the lowest costs (i.e. lowest feed-in premium) would receive the needed subsidies. The German developer and wind turbine manufacturer Bard won the tender and received the subsidy for two offshore wind parks, each with a capacity of 300 MW (EnergieKeuze, 2011). The bid price of Bard for these wind parks was €17ct per kWh (3E, 2013).

The budget that remained after this allocation was insufficient for awarding subsidy to the presented projects of other competing private parties. This budget was finally awarded to Eneco in 2011, for a smaller offshore wind park with an expected capacity of 129 MW (Energeia, 2011). The bid price was estimated to be about €20ct per kWh. Dutch grid operator Tennet, which is a state-owned company, is responsible and obligated to connect these wind parks to the Dutch electricity grid, however the costs are paid by the project developers (3E, 2013). At the moment, none of these three wind parks are under construction or are already realized, what can be seen in table 6.3. They are still in the planning phase or are searching for the necessary financing (Energeia, 2012). Initially the permits that were issued in 2009 were only valid if the projects were realized in the following years, however due to the lack of subsidizing possibilities they are expected to be prolonged until 2020 (3E, 2013).

The used method for the allocation of subsidy was criticized by market parties. Eneco and Nuon have protested against the allocation of the subsidies and even threatened that they would take the Ministry of Economic Affairs to court. They stated that Bard would not be financially capable of realizing the two wind parks (Energeia, 2010). When Eneco received the spare budget, Nuon and Eneco withdrew their claims (Energeia, 2011). An often heard remark is the lack of a level playing field, because all the parties that have a development permit are bound to specific (and different) locations. In the past, it was expected that the subsidies would be allocated on a first come, first serve basis. This would make distant sites still feasible for development, however as mentioned above the allocation was made on an economic comparison. This could cause the problem that remote locations will never be developed due to the higher realization costs (Energeia, 2008).

In 2010, the government expected offshore wind energy to provide a considerable share of the growth in renewable energy in 2020. Its target was to achieve 6000 MW of offshore wind in the Netherlands by 2020. The Dutch energy policy however is inconsistent and changes with each cabinet. The current cabinet has a different focus and its now generally expected that only 1 GW will be installed by 2020. This is sort or less equal to the amount of offshore wind projects that already have been granted subsidy today (3E, 2013).

6.6.2 Performance SDE+

As mentioned in the paragraph 6.1 the main renewable energy stimulation instrument in the Netherlands is the feed-in premium scheme SDE+. Its predecessors were the SDE and the MEP. The MEP program was active from 2003 until 2006 and the SDE program from 2008 to 2011. The MEP program was the first feed-in program for renewable energy in the Netherlands. Different to both the SDE programs, the MEP program didn't have a fixed budget limit. If a project complied to all set standards it would always receive the fixed feed-in premium (Energeia, 2005). The program was abolished abruptly in 2006, after the Minister of Economic Affairs active at that time judged that the EU target of 9% renewable power in 2010 would be met if all projects that were granted a premium would be realised (de Jager & Rathman, 2011). As mentioned in chapter 1, the current share of renewable power is around 4%.

This abolishment was received with a lot of criticism (Financieële Dagblad, 2007). Another mentioned reason was that the due to the successfulness of the program, it would exceed the EU renewable energy targets and that it would become too expensive to support (Energeia, 2005). After the abolishment, investments in new renewable energy installations had fallen down to practically zero, until the new SDE program was introduced almost two years later (EREC, 2009). Critics claim that potential investors and developers moved away to alternative foreign projects/markets during this period (Energie.nl, 2013)

The main difference with the SDE is that the current SDE+ program is focussing on the short them implementation of renewable energy (up to 2020). The old scheme focussed on longer term options and innovation as well. For technologies that are currently expensive but may become important on the-midterm, other policy instruments such as innovation subsidies will have to be used (Ragwitz, 2011).

Reports on the performance or cost-effectiveness of these programs are scarce. In chapter 1 of this thesis the scepticism of the Rabobank on the SDE and SDE+ programs was already briefly discussed. Based on the current SDE+ program, the Rabobank doesn't think that the 2020 targets will be met and they predict that the Dutch government will recast their renewable energy policies in 2014 due to increasing pressure by the EU. The main two reasons for these statements are that the subsidies have been too low and the competition in the price tenders pushes out feasible projects. In general, subsidies levels have been too low to attract uptake or financing required to meet an investment trajectory that will allow the 2020 target to be met. This could be seen as a positive fact for government finances in the short-term, but could create a greater strain on public finance in years to come. The current structure of the SDE with a price-tendered auction is aimed at generating renewable energy capacity at the lowest cost. While this helps governments ensure that windfall profits seen in other policy systems are avoided or at least lowered, in reality, the share of granted applications that are actually been realized is low. Especially biomass projects, which is the most subsidized technology in the scheme. This technology's competiveness is to a large extent influenced by variable feedstock prices. This variable costs make the economic lifetime less predictable compared to solar or wind energy for instance. Part of the budget is thus consumed by projects that are not going to be able to attract financing, which pushes out other projects and technologies. It is difficult to assess how many projects that were granted a subsidy will be realized. This because projects have a three to five year time limit before they need to be realized to ensure the feed-in premium. In total Rabobank estimates that only around half of all projects that have been granted a subsidy today will actually be realized at some point in the future (Rabobank, 2012).

It is difficult to verify the conclusions of Rabobank, because the amount of projects that forfeit their granted subsidy is not published by the Dutch Government. Every year, the Dutch Government does publish the amount of capacity that has been realized in the report of the SDE+ scheme (Agentschap NL, 2012). The following tables show the granted capacity, the realized capacity and the realization percentage of the SDE program from the different years. For the MEP scheme only a total overview can be given.

Table 6. 1 Overview of subsidy approval and realization for renewable gas projects

Renewable Gas	Granted Capacity (Nm3/h)	Realized Capacity (Nm3/h)	Realization Percentage
SDE 2008	40	40	100%
SDE 2009	6783	1590	23%
SDE 2010	4778	502	11%
SDE 2011	22612	0	0%
Total	34213	2132	6%

Table 6. 2 Overview of subsidy approval and realization for biomass projects

Biomass Electricity	Granted Capacity (MW)	Realized Capacity (MW)	Realization Percentage
MEP	442	390	88%
SDE 2008	83	82	99%
SDE 2009	96	75	78%
SDE 2010	113	86	76%
SDE 2011	26	-	0%
Total	760	633	83%

Table 6. 3 Overview of subsidy approval and realization for wind projects

Wind Electricity	Type	Granted Capacity (MW)	Realized Capacity (MW)	Realization Percentage
MEP	*Onshore*	1615	1615	100%
	Offshore	**228**	**228**	**100%**
SDE 2008	*Onshore*	46	37	80%
SDE 2009	*Onshore*	446	36	8%
	Offshore	**719**	**0**	**0%**
SDE 2010	*Onshore*	488	79	16%
SDE 2011	*Onshore*	119	-	0%
Total		3661	1995	54%

Table 6. 4 Overview of subsidy approval and realization for PV projects

PV Electricity	Granted Capacity (MW)	Realized Capacity (MW)	Realization Percentage
MEP	11	11	100%
SDE 2008	15	8	53%
SDE 2009	23	18	78%
SDE 2010	23	11	48%
SDE 2011	50	1	2%
Total	122	49	40%

This data for this overview was published in March 2012, it is likely that realization percentages will have increased since this period (Agentschap NL, 2012). Based on this data it is difficult to conclude that many of the granted capacity will not be realized. However, the tables do at least show the immense delay between a granted subsidy and the actual realization (i.e. many projects granted in 2009 are still not realized).

In response to the allegations of the Rabobank, several politicians requested insights in the amount of projects that will not be realized. Minister of Economic Affairs H.G.J. Kamp did confirm that for the period of 2013 until 2031 a budgeted amount of €433 million will not be used for renewable energy production and will be utilized for alleviating budget cuts elsewhere within the Ministry. This €433 million comes from a total forfeited budget of 936 million euros, allocated in rounds until 2011. The rest of this budget will be used in later SDE+ rounds (Kamp, H., 2013). This could (partially) explain the increase in the SDE+ budget, which rapidly grew from 1.7 billion in 2012 to 3 billion euros in 2013 (Rijksoverheid, 2013).

6.6.3 Green Deals & EIA

The Green Deal program was issued in 2011, as a broad approach to stimulate sustainable projects. In these Green Deals, the Dutch government tries to become a facilitator and to alleviate barriers that market parties hinder in the realization of their sustainable projects. These projects can be divided within five themes; Energy, Resources, Biodiversity, Water and Mobility. The green deal program is not intended as an instrument that (partially) finances initiatives.

Most performed tasks by the government in the first 131 deals were:

- The alleviation of bottlenecks in law and legislation.
- (Non-financial) Support to the market:
    - E.g. introducing labelling, certification or quality systems.
- The strengthening of networks.

(Agentschap NL, 2012)

For both the Green Deal & the EIA schemes, there is not much literature available that discusses the effectiveness. Compared to the SDE+ program they are relatively small. Therefore it will be difficult to say something about the effectiveness of these programs. Compared to the annual SDE + budget of 2012 (i.e. 1, 7 billion), the IEA budget was only €151 million (Agentschap NL, 2012). What can be said is that, compared to the MEP/SDE+ schemes; it has a much more stable existence. The EIA program exist since 1996 and has principally not be been altered since. This does give a rough indication that the program is functioning well.

Chapter 7. Possible Learning from other countries and sectors

This chapter will focus on offshore policy schemes from other EU countries and on a PPP approach in a different Dutch sector (i.e. Oil & Gas). As mentioned in chapter 4, Denmark and France have offshore wind tendering programs that (partly) resemble the concession model. Both these programs will be elaborated first. Afterwards, two state-owned companies, i.e. the Crown Estate (United Kingdom) and EBN (the Netherlands), will be discussed. These entities have similarities with the joint-venture model.

7.1 Offshore wind in Denmark

The renewable energy policy schemes in Denmark are the responsibility of the Minister for Climate, Energy and Buildings and the Danish Energy Agency (3E, 2013). In 2007 the Danish Energy Agency (DEA) ordered/performed a strategic research (i.e. Report ''Future offshore wind turbine locations – 2025'') on locations which can be assigned for the development of future offshore and near shore wind parks. Based on this research, seven locations for offshore wind parks were assigned with a potential total capacity of 4.600 MW (DEA, 2007). These seven locations, which can be divided in several sub-locations, will (eventually) made available to private parties for development via a tendering system. This procedure is named: *''Government call for tenders''* (DEA, 2013). The first of the seven locations that was made available for the tendering system was the Anholt offshore wind farm, with a planned capacity of 400 MW. This wind farm will be elaborated in a case study, presented further on in this paragraph.

As an alternative to the tendering system, it is possible for private parties to come with own initiatives as well. This method is called: *''Open-door procedure''*. Both procedures will be discussed in the upcoming sections.

7.1.1 Government call for tenders

The tendering process starts when the DEA announces a tender for an offshore or near shore wind park, with a specific capacity (e.g. 200 MW) and on a specific predetermined location. The location will be the most favorable site from the seven predefined locations mentioned above. The call for tenders procedure is issued similarly to the procurement route of the concession model as described in Chapter 5.

First, during a prequalification phase, interested parties or consortia are evaluated on their technical, financial and legal expertise (PWC, 2011). The parties or bidders that are positively evaluated may proceed to the competitive dialogue phase. During this phase the DEA, in combination with grid operator Energinet.dk, will have performed an Environment Impact Assessment (EIA) of the designated offshore area, the required substation and power cables. Preliminary reports on the conditions (e.g. wind, ground type) of the site will be supplied to the participating parties as well (DEA, 2013). Based on these reports and their own knowledge, the competing bidders will develop their plans for the wind park. At a certain moment, the bidders that are still interested will have to submit a final quotation for the price at which the bidders are willing to establish the wind park. This needs to be presented in the form of a fixed feed-in tariff, which is binding, for a certain amount of produced electricity. The DEA will then award the concession to the party that requests the lowest feed-in tariff. The winning price will differ from project to project because the result of a tender depends on the project location, the wind conditions at the site, the competitive situation in the market at that time, etc. (DEA, 2013).

At the moment that the concession is awarded to the winning bidder, the DEA will already have arranged all required permits. The earlier mentioned grid operator energinet.dk will be responsible and pay for the grid connection of the wind park. This includes the offshore transformer station (3E, 2013).

7.1.2 Open-door procedure

In the open-door procedure, the project developer takes the initiative to establish an offshore wind farm of a chosen size in a specific area. This is done by submitting an unsolicited application for a licence to carry out preliminary investigations in the desired area. In an open-door project it cannot be expected that approval will be given for the areas that are already designated for offshore wind farms, which are presented in the strategic report of the DEA. The application must, as a minimum, include a description of the project, the anticipated scope of the preliminary investigations, the size and number of turbines and the limits of the project's geographical location. In an open-door project, the developer pays for or leases the grid connection (DEA, 2013).

Before the Danish Energy Agency actually begins processing an application, it initiates a hearing of other government bodies to clarify whether there are other major public interests that could be opposed to the development of the project. On this basis, the Danish Energy Agency decides whether the area in the application can be developed and in the event of a positive decision, it issues an approval for the applicant to carry out preliminary investigations, including an EIA (DEA, 2013).

If the results of the preliminary investigations show that the suggested project can be economically viable and the EIA is executed successfully, the project developer can obtain a licence for construction of the project. When the construction goes according to the planning, then the DEA will provide the permit for the exploitation phase (PWC, 2011). During this exploitation phase, the developer will receive a fixed feed-in premium of approximately €3.7ct per kWh. At this moment, the DEA has approved three different offshore wind projects within this open-door procedure scheme. Two of these projects are turbine demonstration projects (i.e. with a capacity of 7.2MW and 7.6 MW). The other is a small near-shore wind park (i.e. with a capacity of 21 MW) (3E, 2013).

7.1.3 Case Study: Anholt Wind Park

As mentioned earlier, the Anholt offshore wind park is the first of seven locations assigned for offshore wind development. It was also the first offshore wind park that was procured in the way described as ''government call for tenders''. The tender was announced on 30 April 2009. DONG Energy, as the only party that submitted a binding bid, won the concession on 22 June 2010. The establishment should be completed before the end of 2013. In actual terms, DONG Energy has, approximately 3.5 years to complete the establishment of the wind farm. This is considered to be a very short establishment phase (Deloitte, 2011). On the 20th of June 2013, the last of a total of 111 turbines came into operation. However, final commissioning work is expected to continue during the summer.

The wind farm is expected to produce 4.5% of Denmark's electrical power (i.e. 400 MW or the consumption of approximately 400.000 households). During the exploitation phase of the farm, DONG will receive a feed-in tariff of €14.1ct per kWh for the first 20 TWh produced (DEA, 2013). In the case that DONG Energy fails to fully install the wind farm before the end of 2013, this will have consequences to the price per kWh paid by the Danish government (Deloitte, 2011).

Although this was the first tender performed with these specific procedures, Denmark did already have experience with (less elaborate) forms of offshore wind tenders. There were two previous tenders; for the Horns Rev II (209 MW) and Rødsand II (207 MW) offshore wind farms. The Anholt tender differed from these two tenders in several ways. Firstly, the Anholt call for tender has been performed pursuant to the provisions of Danish public call for tenders in traditional sectors (e.g. transport, governmental housing), and secondly, especially the penalty requirements for non-compliance were significantly tightened in relation to the two previous tenders. Furthermore, the EIA and parts of the geo-technical and physical research were supplied by the DEA in the Anholt tender, this wasn't the case in the previous two tenders (Deloitte, 2011).

Because there was only one party that submitted a bid for the Anholt tender, consultancy firm Deloitte was assigned to perform a critical analysis; ''on the furthering of competition in relation to the establishment of large offshore wind farms in Denmark''. In the ''Future Offshore Wind Power Sites – 2025 report'', it was expected that the Anholt Wind Park would only need a feed-in premium (i.e. subsidy additional to market price) of around €6.5ct per kWh. The market price of electricity in northern Europe ranges from 4-6 €ct per kWh. Nevertheless, DONG Energy requested a tariff of €14.09ct per kWh (i.e. subsidy and market price combined) instead. This is however still similar or even lower compared to current offshore projects in other European countries (Deloitte, 2011).

The following motivations for the lack of interest were given by interviewed market parties:

General market motivations:

- Alternative Markets: investors saw more potential in alternative markets, especially the British market.
- Scarcity of capital: at the time of the tendering phase there was a lack of financial options due to the financial crisis.
- Insufficient plans and synergy potential: due to absence of long-term plans.
- Difficulties to enter the Danish market: foreign investors perceive the Danish market as difficult to enter. Primary reasons are:
  - DONG Energy's strong position/competiveness.
  - Awarding history: the three offshore wind concessions have only been awarded to DONG Energy and E.ON.
  - Insufficient flexibility in contract conditions.
  - Insufficient marketing by the authorities.

Contract specific motivations:

Several of the contract conditions have also caused investors not to submit a bid for the Anhot tender, including:

- Timeframe: the timeframe in which the Anholt park should be established was considered to be very short. This resulted in many of the investors not being able to mobilize the necessary resources and agreements for the potential construction phase.
- Inflexible tender process: several investors considered it to be a problem that the conditions in the Anholt tender were very fixed and that there was no possibility of negotiating the requirements.
- Comprehensive penalty provisions: the keep-open penalty (i.e. the party that would present the second best bid, could still be asked to establish the project if the winning party would not comply) and the delay penalty have only added risk to the project for potential investors. This made the project less attractive.

Some of the following contract conditions were found to have a positive influence of the project for the potential investors:

- Settlement form: investors considered it a great benefit that the settlement form is based on a fixed high price of electricity, delivered over many years.
- Guaranteed grid connection: the fact the grid connection is performed, paid and guaranteed by the state helps reducing the risks for the investors.
- One-stop-shop: the DEA works as a one-stop-shop for licenses for offshore wind turbines and coordinates with other relevant authorities about conflicting area interests and requirements of, for instance, natural protection. According to the investors, the process is effective and non-bureaucratic.

7.2 Offshore wind in France

In France, the renewable energy policy is the responsibility of the Ministry of Ecology, Sustainable Development and Energy (MEDDE) and ADEME, the French Environment and Energy Management Agency. Similar to Denmark, France uses a tendering system for the deployment of offshore wind projects. France has ambitious goals, with a desired capacity of 6.000 MW of offshore wind in 2020. However, until this moment no offshore wind farms have been installed yet. To initiate the deployment of offshore wind energy, the French government issued a first call for tender's scheme in 2011. This scheme will be elaborated on later in this paragraph. Again, similar to Denmark, France has an open (fixed) feed-in tariff option for offshore wind as well, however until this moment this option has not been used. If a party should be considered to have a proper offshore wind park plan by the ADEME, then they could apply for a fixed feed-in tariff of €13ct per kWh (3E, 2013).

7.2.1 Call for tender procedure

As mentioned earlier, in 2011 the first call for tender was issued by the French government for offshore wind farms. In this tender round, five locations were selected for offshore wind farms. These sites have ranging expected capacities of 450 to 500 MW. In the tender, which is executed following similar procedures as in Denmark, the outlines of the desired projects are defined (e.g. location, capacity), in consultation with stakeholders (3E, 2013). However compared to Danish tender, the involved authorities will not perform/order any preliminary environmental or site studies for the development of such projects. Interested consortia will have to meet minimum eligibility criteria to prequalify for the tendering phase. These criteria are based on the financial (e.g. sufficient equity rate) and technical abilities (e.g. strong technical experience) of interested parties (ADEME, 2012). After this pre-qualification phase, the different competing consortia will elaborate their plans. After a certain period (i.e. a half to one year) the competing consortia will have to hand in their bids.

In this tender scheme, the bids will be evaluated on the following three criteria:

- Proposed electricity price or Feed-in tariff for a period of 20 years (40%).
- Industrial aspects: technical experience, business model and finance plan, action plan for security of supply and construction feasibility, impact on domestic economy (40%).
- Impacts on the environment (20%).

(ADEME, 2012)

The winning consortia for the earlier mentioned five locations were announced in April 2012. The to be awarded feed-in tariffs are different for all projects depending on the conditions of each site and range between €17.5ct per kWh (Fécamp) to €20ct per kWh (Saint-Brieuc). Three sites were won by the consortium of EDF, DONG Energy and Alstrom. One site was one by Iberdrola, Eole Res and Areva. The other site, Le Tréport, was rejected by the ADEME because the bid was valued too costly (3E, 2013) (Renewable Energy Focus, 2012).

When the French government has selected a winning consortium, then the private parties will have a period in which they can elaborate their plans, including detailed feasibility and EIA studies. After this period, the winning consortium will confirm their bid. In the case that the results of the studies are not satisfactory, the applicant may decide to abandon the project (Greenunivers, 2011). For the tenders issued in 2011, it is expect that this elaboration round will take two years and will finish in April 2014.

The following round will require the consortium to apply for the necessary permits (issued by the ADEME), which are in the case of the mentioned tenders expected to be derived in April 2015. When the consortium receives the necessary permits, construction may commence. Expected delivery of the awarded locations is in 2017 or 2018. This implies a lead-time from the announcement of the tender until the realization of six to seven years (ADEME ,2012).

Unfortunately, until now there is no research literature available which critically assesses this procedure. This can be explained by the fact that this was the first French tender and the winning consortia are still in the phase in which they can elaborate their plans and asses its feasibility.

In publications of the tender issuing party ADEME, the following advantages of this procedure are mentioned:

- It gives security and visibility to investors: the feed-in tariff is contracted and guaranteed for 20 years;
- Reduces risks of non-construction due to the selection process for tendered zones;
- Ensures access to the grid, which lowers grid connectivity costs (grid connection is paid by consortium);
- Allows for optimized projects costs;
- ADEME can form a one-stop shop for administrative procedures and can facilitate work of relevant authorities.

(ADEME, 2012)

In an article of Alexandre Simonnet made for GreenUnivers, a French website publishing economical and financial articles about ''green business'', two jurists were interviewed on their opinions about the tender procedure. In this interview the following remarks about the French call for tender procedure were made:

- Because the French government does not supply preliminary studies, each candidate must make its own studies to support their bid. This creates the problem that several identical studies will be conducted in the same area.
- More elaborate studies (e.g. geotechnical, geophysical) will only be executed when the candidate already has been awarded the concession, due to the high costs. This creates the risk that the concession holder abandons the project when the outcomes of these studies are not as good as expected.
- Because the concession holders are free to abandon the project and there are no strict deadlines, it is still uncertain if this approach will be adequate for reaching the desired 6 GW capacity in 2020.

(GreenUnivers, 2011)

7.3 Offshore wind joint-ventures in the United Kingdom

This paragraph will discuss the British stated-owned company, the Crown Estate, which participates in the development phase of offshore wind projects. Unlike the earlier discussed countries of the Netherlands, Denmark and France, which have a feed-in tariff or premium approach, the United Kingdom uses an obligations system, called Renewables Obligations Certificates or ROC. This policy scheme will be introduced first to make a fair comparison possible.

7.3.1 Introduction of British renewable energy policy

In the United Kingdom the Department for Energy and Climate Change (DECC) is responsible for the renewable energy policy. As mentioned, in the United Kingdom, the government stimulates renewable energy deployment through an obligation system. In this scheme energy suppliers must comply with a fixed renewable energy quota, which should rise to 20.6% of their annual produced electricity portfolio in 2014 (Ofgem, 2013).

An energy supplier is forced to pay the buy-out price (i.e. a fine) in the case that they fail to reach the set quota. For the year 2013-2014 this buy-out price was €49.09 per ROC (Ofgem, 2013). In the case that the electricity produced with renewable sources exceeds the set quota, the energy supplier can receive a bonus. The level of the bonus is determined by the paid buy-out fines by other parties and the amount of ROC's that have been awarded (Ofgem, 2013). The ROC's can be traded on an open market between energy generators and/or suppliers as well. The nominal value of a ROC is made up of the buyout payment that is avoided plus the portion of the buyout fund that is redistributed to the suppliers with a surplus of ROC's. These additional payments are estimated to be 10% of the buyout price. The current price of one ROC is about €47.5. The initial end date of the ROC scheme was set on 2027, but was extended to 2037 in April 2010 (3E, 2013).

Dependent on the carbon footprint of the used renewable technology, one or two ROC´s are awarded to one MWh (PWC, 2011). For offshore wind for instance, at the moment two ROC's per produced MWh are awarded. These figures give a current additional stimulation level for offshore of around €10.5ct per kWh, besides the income gained from selling the produced electricity to the market.

The amount of ROC´s awarded per MWh is reviewed periodically to ensure that subsidy levels are set as cost-effectively as possible. Over the following years, the level of support for offshore wind will decrease to 1.8 ROC's in 2016/17. The banding levels (i.e. amount of ROC's per MWh) are reviewed every four years. For existing projects the grandfathering principle is used, meaning that these wind parks will remain subject to the old banding level. This will ensure a fixed level of support (3E, 2013).

Since the ROC's introduction in 2002, it has succeeded in supporting the increase of the total renewable capacity from 3.1 GW in 2002 to 13 GW in the first quarter of 2012. This is equal to a relative increase of the level of renewable electricity in the UK from 1.8% in 2002 to 9.4% in 2011. It is currently worth around £2.4 billion a year in support to the renewable electricity industry. Within this scheme, the higher costs of renewable energy are eventually paid through higher prices of electricity. Next the DECC, the state-owned company Crown Estate is also active within the field of renewable energy. The next paragraph will discuss this corporation.

7.3.2 The Crown Estate

The Crown Estate, formed in 1961, is a state-owned company that manages the property portfolio of the United Kingdom. This property portfolio covers urban and rural areas, around half of the foreshore and almost the entire seabed around the UK. The Crown estate has a commercial mandate to optimize returns on their assets. Under the Crown Estate act, it is not allowed for the Crown Estate to borrow money. Consequently, the Crown Estate operates via a business model that effectively recycles its existing capital. The net profits of the will go to the treasury for the benefit of the UK (Crown Estate, 2013).

The Crown Estate acts as a steward for most of the seabed in the UK. For this reason, they have a natural interest and are responsible for the coordination and the permitting of near and offshore wind, tidal and wave energy (PWC, 2011). In the case of tidal and wave energy, which still is a relatively immature technology, the Crown Estate has presented its interests in investing up to £20 million in one or two first array (e.g. commercial demonstration) wave and/or tidal projects. Until the 15th February 2013, private parties could submit their expression of interest (EOI). After that these EOI's were evaluated on their eligibility by the Crown Estate, negotiations with the remaining parties began. Expectedly, before March 2014, the projects in which the Crown Estate wishes to invest will be announced (Crown Estate, 2012).

The Crown Estate has more experience within the field of offshore wind energy. For over a decade the Crown Estate is active in conducting a series of leasing rounds, intending to create the world's largest offshore wind development program (Crown Estate, 2013). In 2009, the DECC performed a Strategic Environmental Assessment (SEA). In this SEA the areas were published were there was no overriding environmental considerations to prevent the achievement of deployment of offshore wind. Based on these areas, the Crown Estate selects zones which will be made available for offshore wind developers. The Crown Estate will issue a request for companies or consortia to present plans for these selected zones. Based on the presented plans, the Crown Estate will directly select one private partner per zone. This will be done with a so-called beauty contest, meaning that the plans will be evaluated on qualitative criteria (e.g. the size of wind park, technical experience) (PWC, 2011). Compared to the Danish and French system, which have two tiers in their selection process, the winning party will only be chosen based on one very early selection phase.

During this development phase, the Crown Estate will support the selected private parties. This includes support during the permitting phase, with the site (location) studies (e.g. wind, waves, geological) and with communication with other maritime parties. During this phase, the Crown Estate will pay up to 50% of the made expenses (Crown Estate, 2011) (PWC, 2011). In the development phase it is still possible that the party that is granted the right to develop chooses not to build the wind park if the conditions show to be unfavorable.

When this phase is completed successfully, the Crown Estate will withdraw from this partnership and will only act as a steward of the location. During the period that the wind park is in operation, the private party will be obliged to pay a ground lease fee. The expenditures of the Crown Estate during the development phase will be paid with the income gained from the ground lease (Crown Estate, 2011). As mentioned earlier, the private party that operates the wind farm will not receive a feed-in tariff from the British government. All the income will have to be gained from selling the produced electricity and the awarded ROC's.

The last time that the Crown Estate announced that they have selected zones that would become available for leasing was in 2008. In this announcement, which was the third in a series of competitive leasing rounds, nine zones of development were put forward. Each of these zones potentially containing multiple projects. The scale of some of these zones is much larger than anything seen before, with several zones potentially yielding 10 GW of projects. In total the size of leasing round three is anticipated to be at least 25 GW. On January 2010, the Crown Estate announced the successful bidders for the development rights of the nine different zones. Each zone was awarded to a different consortium, with only two firms being active in multiple consortia (RenewableEnergyfocus, 2010). It is expected that the Crown Estate will contribute up to £100 million during the development phases of these projects (Crown Estate, 2013).

At the moment all the consortia are still active in this phase. Initially, the construction of the wind parks is scheduled to commence in 2014. However, according to a skeptic article of three lawyers of law firm Reed Smith; it is questioned if there would be any substantial degree of offshore wind generation by 2018, as originally anticipated by the Crown Estate (Ceeney R, et al. 2012).

In this article the following reasons are given why they think that delay or even non-compliance could occur:

- Due to scale of the projects, in combination with the current economic climate, it is expected to be difficult to obtain external funding. Due to the high capital expenditure required at the outset of offshore projects, funding needs to be in place prior to committing to a project.
- The planning process for offshore development takes too long, costs too much and does not always give the desired outcomes. Due to inefficient permitting procedures, it is expected that the round 3 projects will be delayed with at least six months.
- The participating utility companies are mostly foreign-owned. There are concerns that events abroad could negatively affect the willingness of these firms to actively participate in the round 3 projects.
- It is unclear if the required cabling will be installed on time. The grid connection is tendered by the Office of electricity and gas markets (Ofgem), and remunerated by the users of the national electricity grid.
- The gradual reduction of awarded ROC's per MWh, including not knowing the reduction after 2017, will lead to greater uncertainty for potential investors.

(Ceeney, R. et al. 2012)

7.4 Joint-ventures in the Dutch oil & gas sector

As mentioned earlier, in a different energy sector (i.e. the oil & gas sector), the Dutch government already participates in a joint-venture structure. The state-owned company EBN or Energie Beheer Nederland, which roughly stands for *Energy Management of the Netherlands,* is active in the exploration, production, storage and trading of natural gas and oil within the territories of the kingdom of the Netherlands. Together with national and international oil and gas companies EBN will participate in oil and gas exploration and production projects. In these projects EBN will primarily have a capital supplying role. The level of the investments range between 40% and 50% of the equity required. Next to the made investments, EBN does also facilitate (e.g. stakeholder consultation) and if needed shares existing knowledge with its private partners. The actual physical work will be solely performed by the private partner (EBN, 2013).

The initiative of these partnerships will have to be taken by the private partner. When a private party has received an operating permit from the national government, for instance for an production drilling, they are required by law to allow EBN to (financially) participate in the project. Within the oil & gas sector, EBN is exempted to (European) procurement legislation, which means that EBN is free to choose its partner(s) (EBN, 2013). In the case of a production site the connection with the gas grid is facilitated and constructed by Gasunie Transport Services, which is a stated-owned company as well. Generally the connection is paid by the shareholders of the project (i.e. EBN and its private partner) (GTS, 2013).

At the moment EBN participates in 128 exploration projects and 48 production sites. EBN does also have shares in four transportation pipes, two gas treatment facilities and four underground gas storage sites. Next to these facilities, EBN is a 40% shareholder in GasTerra B.V. and participates in several other smaller companies. Due to their experience in the sector, EBN also plays an advisory role to the Dutch

Ministry of Economic Affairs concerning energy policy. The profits that are earned with their activities are fully redirected to the sole shareholder of EBN, the Dutch Government. During the last years, this resulted in direct annual payments of around €5.7 billion (EBN, 2013).

At the moment, several persons and parties have suggested that the Dutch Government should use EBN to stimulate and finance large renewable energy projects at low costs of capital (Groene Courant, 2013)(SER, 2013). Due to its high financial rating (i.e. triple A), EBN can invest capital in fossil energy projects at low costs. This could be seen as an unleveled playfield compared to renewable energy projects, in which most private parties can only receive loans at higher costs of capital.

At the moment it is not possible for EBN to participate in renewable energy projects, because EBN only has a mandate from the Dutch Government to be active in the oil & gas sector. The main goal of EBN is to generate income for the Dutch Government. It is questionable if renewable energy projects can provide the same amounts of revenue for EBN. Furthermore it is unclear if EBN would still have an exemption from the EU procurement legislation when active in the renewable energy sector (EBN, 2013).

7.5. Overview

This paragraph will give an overview of how the different countries and associated policies discussed in this chapter compare. Additionally, the main findings will be given as well. At the moment the three EU countries discussed do only use these, PPP-like, methods for the realization of offshore wind, although the United Kingdom (i.e. Crown Estate) is planning to become active within the sector of tidal & wave energy as well. Figure 7.1 shows the responsibilities/phases during the development of a (renewable) energy project and which of the parties performs a leading role.

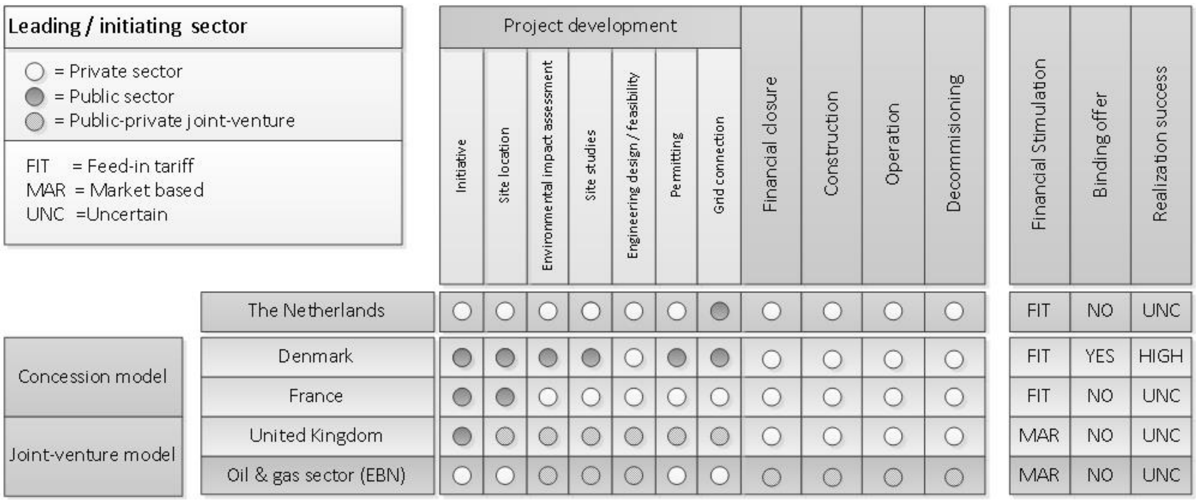

Figure 7. 1 Overview of the discussed policy programs

It is interesting to see that in all the different renewable policy programs of the EU countries examined, the differences are found during the project development phase and the forms of stimulation. The different phases: financial closure, construction, operation and decommissioning are still always fully executed by the private party. In case of projects in which EBN participates, the joint-venture executes all these phases as well, but in practice EBN only supplies risk baring capital. All the ''tasks'' are still executed by their private partner. The participation of EBN can be explained by the fact of the huge profits (i.e. €5.7 billion in 2012) that are produced during the operation phase.

In the two countries (e.g. Denmark and France) that also offer a fixed stimulation fee for offshore wind developers that want to develop projects on their own initiative, it can be said that these are currently less favored by the market compared to the tenders issued by the government. This is based on the fact that there are only a few projects realized within these procedures. However this can also be explained by the lower amount of received subsidy. For instance, in the case of France, a developer's initiative will maximally receive €13ct per kWh, significantly lower than the €17.5ct per kWh received in the Fécamp tender.

Based on the Anholt case, it could be said that strict tender/contract conditions have caused less competition and a higher price per kWh, therefore increasing the costs to the issuing government. However, the Danish government does have a much higher certainty that the project will actually be realized, compared to the other countries where this will probably remain uncertain until the construction of the wind park starts or even until these projects are realized. Furthermore, the awarded price per kWh can still be seen as competitive compared to other EU offshore wind projects.

In case of subsidy tenders that are site specific it could be expected that if the government has provided elaborate site studies and permitting in advance, the certainty of actual realization will increase. This increases the costs for the issuing government, however it prevents that interested private parties executed the same studies simultaneously. This could lower the development costs for these parties, what can improve the competiveness within the tender as well.

Compared to the current Dutch approach it will probably be easier to transparently select private partners within the joint-venture approaches of the Crown Estate & EBN, because within these partnerships the concerning governments are not responsible for awarding the needed financial stimulation which makes the projects economically viable as well. The needed income for these projects is generated by selling commodities on a private market.

Based on the findings and examples of this chapter and the results of chapter 4, two renewable energy PPP models for the tendering of offshore wind will be designed in the upcoming chapter.

Chapter 8. Designing an offshore wind public-private partnership

This chapter will introduce two renewable public-private partnerships models which can be used for the deployment of offshore wind projects. Both these two models are based on the information discussed in the previous chapters. The models, respectively the concession model and the joint-venture model, will be verified in the upcoming chapter 9. The models will be assessed, based on the criteria presented in chapter 3, by discussing them in interviews with experts and by performing a small quantitative financial analysis. These assessments will then be used to make recommendations on the PPP models described.

8.1 The concession model

In chapter 5, the concession model used in traditional sectors (e.g. infrastructure, governmental housing) was introduced. In particular the most elaborate form, a DBFMO, was described. In chapter 7, the offshore policy programs of Denmark and France were discussed as forms of inspiration for the concession model from an offshore wind perspective. In general these policy schemes, especially the Danish scheme, have many similarities with a DBFMO approach. Similarities such as:

- A defined project scope by the issuing government (e.g. location, output(s), route).
- Project phases such as: engineering design, financial closure, construction, operation and decommissioning are ideally executed (solely) by the winning consortium of the tender.
- Periodic financial stimulation, in the form of an availability fee or a fixed feed-in tariff.

A big difference between a project in traditional public sectors and the renewable energy sector is the role of the government. A DBFMO within a traditional public sector could be seen as a form where tasks (e.g. financing, maintenance) and responsibilities of the issuing government are outsourced to private parties. In renewable energy projects, especially in the Netherlands, it can be seen as a transposed direction. Almost all tasks and responsibilities are already executed by private parties, apart from a granting role in the permitting phase and of course the awarding of the required subsidies. If a government would want to issue a renewable energy project according a concession model or DBFMO approach, it would imply that several tasks and responsibilities (e.g. project initiative, site location) of which the private parties have currently a leading or initiating role, will have to or could be performed by the issuing government. In a concession model such as a DBFMO, the design, build, financing, maintenance and operation are still performed by private parties. This means that possible roles and tasks for an issuing government in a renewable energy concession model will occur within the project development phase.

The Danish model used to tender the Anholt offshore wind project, as described in the previous chapter 8, will be used for the temporary renewable energy concession model. I have chosen this approach, because the Danish model resembles a DBFMO approach the most, compared to the French model which for instance doesn't have a binding bid or penalty system. In the concession model the government takes initiative and/or has a leading role in the following tasks and responsibilities:

- Site location & global scope definition
- Environmental impact assessments
- Site studies (e.g. geological, wind conditions)
- Permitting
- Grid connection

The issuing government will define a project (e.g. an offshore wind farm), in which the required capacity and the location are given. Interested private parties or consortia will be supplied with site studies, which they can use to elaborate their bid. The winning party or consortium is selected by a procurement round (as described in chapter 5), in which the main criteria will be the lowest required feed-in tariff. The budget for this feed-in tariff or premium should be reserved and guaranteed. This bid will have a binding character. This implies that penalties have to be paid when a private party does not achieve the set conditions. The awarded feed-in tariff can be lowered in the case that the winning party performs badly, similar to the availability fee of a traditional DBFMO, described in chapter 5. The schematic overview of this temporary concession model, including the different project phases is shown in figure 8.1. This figure does also include a simplified overview of the current (Dutch) approach for offshore wind.

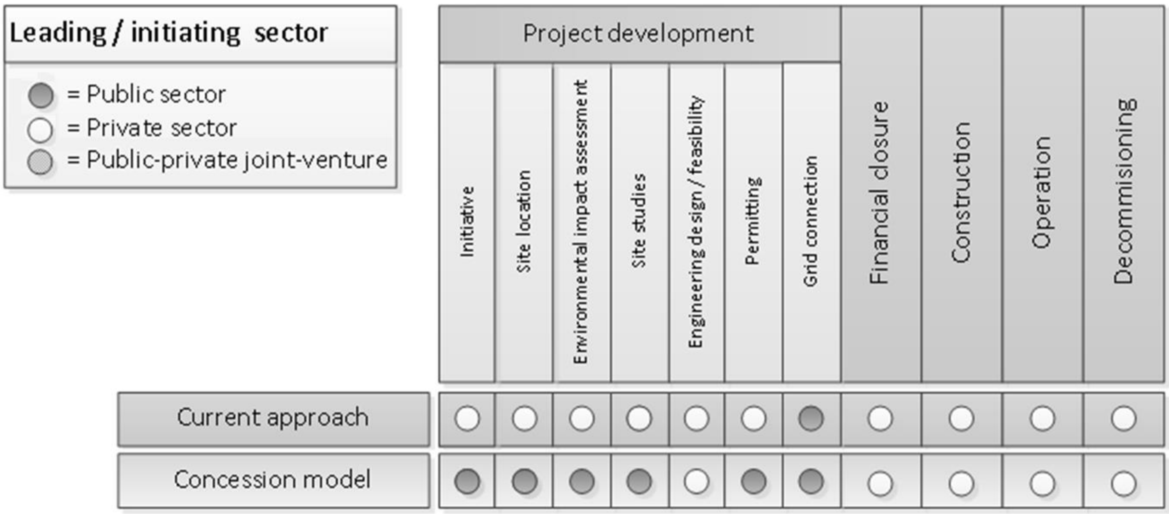

Figure 8. 1 Schematic overview of project phases within the concession model.

The temporary concession model will be used as a discussing object for the expert interviews. The expert interviews, which will be elaborated on in the next chapter, will provide insights in which aspects of the temporary model, such as the binding bid or providing site studies, could be considered favourable.

8.2 The joint-venture model

Compared to the concession model it is more difficult to look for a specific analogy of a joint-venture PPP from a traditional public sector. This is caused by the wide variety of joint-ventures in urban development projects and the low amount (i.e. one, the Waardse alliance) of examples in infrastructural projects. Furthermore, public-private joint-ventures in urban development projects and the gas & oil sector (i.e. EBN) (ideally) become economically viable due to the produced commodities (e.g. real estate, gas, oil) that are sold to a (private) market. In general, this isn't the case for joint-ventures in traditional public sectors or renewable energy projects. These types of projects will still have to rely on an additional form of financial stimulation (e.g. feed-in tariff) from the government to become economically viable.

It will be highly likely that a specific renewable energy project, due to EU legislation, will have to be procured to legitimately offer financial stimulation. Another difference with the concession model is the tasks performed by the government or the stated-owned entity the enables the government to participate in a renewable energy project. In the EBN approach, this stated-owned entity only brings risk baring equity to the table. In general, EBN does not perform specific tasks. This raises the question, in which project phases will it be (the most) beneficial for a stated-owned entity to participate?

To optimally address these issues during the expert interviews, I have chosen to define two approaches within the joint-venture model. The schematic overviews of both these approaches are shown in figure 8.2

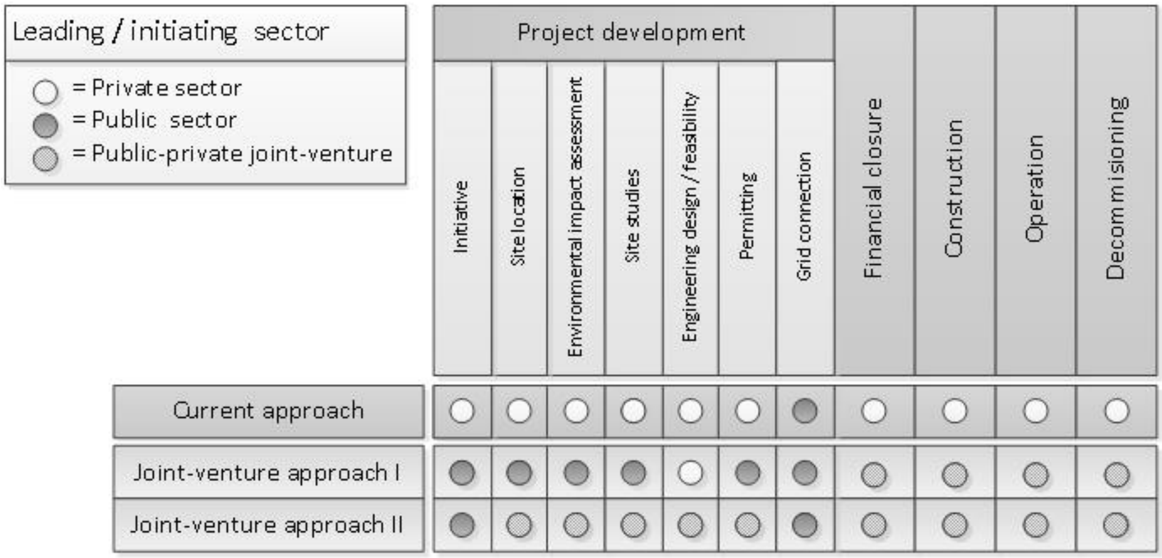

Figure 8. 2 Schematic overview of project phases within the joint-venture model.

In the first approach is roughly based on the Waardse alliance described in chapter 5. In this approach a project is tendered according to the concession model presented in the previous paragraph, implying a similar approach during the project development phase. After awarding the project to a winning party or consortium, which includes allocation a specific subsidy to the project, a stated-owned entity could financially participate during the realisation, operation and decommissioning phase.

The second approach will be a partial analogy towards the EBN and Crown Estate model. In this approach, a state-owned entity chooses a private partner, by means of an earlier mentioned beauty contest, in a very early stage. This partner will elaborate the project, but is financially assisted by the stated-owned entity. If an interesting business case arises after the project development phase, the public and private party may choose to realize this project together. The biggest problem that comes to mind in this approach is the awarding of the needed financial stimulation during the exploration phase (e.g. a feed-in tariff). It will be difficult to do this within the conventional competitive SDE+ framework, with possibly other competing projects and parties, without losing transparency as a government or risk losing invested capital of the stated-owned entity.

Confidently, the expert interviews will more provide insights on how and if governmental participation via a stated-owned company could and should work.

Chapter 9. Verifying the offshore wind private partnerships

This chapter will present the results of the last part of this thesis, the verifying of the designed PPP models. This was done by performing a series of interviews with experts from both the public and private spectrum. The backgrounds of the experts interviewed and the chosen approach can be found in chapter 4. The results of these expert interviews will be presented individually for the concession model and the joint-venture model. The specific quotes of the different experts can be found in appendix I. Afterwards the outcomes of the quantitative financial analysis using the ECN SDE+ model will be elaborated on, these outcomes however will not be PPP model specific.

9.1 Verifying the concession model

This paragraph will present the outcomes of the expert interviews concerning the concession model, as defined in the previous chapter. The first part of this section will focus on the economical chances and threats, providing answers for the first dependent variable of this research. The latter part will focus on the sociological chances and threats, providing input for the second dependant variable discussed in chapter 4.

9.1.1 The economic chances/threats of the concession model

This section will show the potential benefits and disadvantages of the concession model as derived from the executed expert interviews, structured according to the four different forms of added value.

Added value in process:

In general, all of the interviewed experts see potentially added value in process when using the concession model. Especially a facilitating role of the government by supplying site studies is favoured, although that the mentioned advantages mainly focus on financial aspects (see financially added value).

A concession, in which the government has selected the location, could be considered favourable. An advantage of the site selection would be the potential synergy with other projects issued by the government. For instance, this could be a combined grid connection for several nearby offshore wind parks. Another form of synergy can emerge between (governmental) stakeholders (e.g. Ministry of Economic Affairs, Rijkswaterstaat, Environmental organizations) during location mitigations decisions. However, a private expert mentions that until now this has not been the case. In previous site locations debates, the Dutch government had to assess and acknowledge the interest of too many different stakeholders, which caused high increases in lead times (i.e. up to three years). Other heard remarks concerning the site selection by the government are that the site selection should not interfere with viability of a project. The site should be suitable for the desired technology and it should have a relatively easy grid access.

An offshore wind tender, where the outlines (e.g. location, output) are defined by the government, can take away uncertainties potentially caused by the fact that the government doesn't know what its role during the development phase should be. However, experts from the private sector do fear that these projects would be defined to such an extent that this will interfere with their ability to come up with the most optimal designing solutions. The leading role of the government during the EIA and permitting phase is considered favourable by the private sector experts, because this these steps impose a limiting factor during the development phase. Furthermore, guaranteed permits create certainty to the private parties that they can actually execute the project when it would be awarded to them.

However, this does create the current problem that when the government facilitates the needed permits and environmental impact assessments; they have to do this for specific technologies (e.g. a specific turbine, specific rotor size, type of foundation). This will hugely affect the designing and engineering possibilities for the interested private parties. The public experts are aware of this problem. Currently, the Ministry of Economic Affairs is researching the possibilities of a so-called flexible permit in the offshore wind sector, which currently does not exist. This type of permit could provide the certainty that the winning party will receive the required permits, without greatly affecting their designing and engineering options and abilities.

Supplying wind studies to the interested private parties will have added value in process, because it will prevent different parties from executing the same tasks. A leading role of the government concerning the grid connection is considered favourable as well by the private experts. This could be seen as a sign of commitment of the government towards the market and it would alleviate planning and lead time risks for the constructing party as well.

The experts believe that in general, a concession model including binding bid scheme could have process advantages (e.g. a higher certainty of realization) however they fear that this scheme will have significant financial impact (see financially added value) and that it will have negative influence on the competitiveness (i.e. a lower amount of contestants) within the tender.

Financially added value:

The public experts interviewed state that in their opinion tendering solutions such as the concession model will primarily be interesting for projects with significant scale size and costs, e.g. offshore wind. Renewable energy technologies with low cost of electricity or low project cost are not interesting, because the potential benefits gained when improving certain processes are too low to justify the additional work.

As mentioned in the section added value in process, the interviewed experts fear that a binding bid in a tender will have significant financial impact. Based on the remaining uncertainties and risks of a certain project during the tendering phase, the cost will decrease/increase. The higher the uncertainties, the higher cost will be due to allocated risk premiums. The primary risks that influence the needed price for electricity production are the uncertainties of successful permitting & EIA's, construction & installation, grid connection and the insurance of a certain project. *Denote that within the concession model only can influence the uncertainties of successful permitting & EIA´s and the grid connection. These tasks are transferred to the public actor, compared to the conventional approach.*

All interviewed experts see financial benefits in an active and facilitating role for the government in relation to the permitting and & EIA phase, the site studies and the grid connection. Evidently it could lower the costs for the private project developing parties, because less tasks will need to be executed by these parties. However, this active and facilitating role should not lead to large designing restrictions (e.g. a permit for a specific type of foundation). This could then lead to sub-optimal solutions, which would increase the costs of a project.

In the case of the site studies (e.g. geological, weather), it can also have financial benefits for the issuing government. At the moment these studies are performed after the allocation of the (SDE+) subsidy, due to the relatively high costs (i.e. in the order of one to several millions) for the developing party. The uncertainties over the site conditions can cause significant risk premiums, reaching up from one to several percentage points of the alleged investment costs (CAPEX). In the case of offshore wind projects, with a potential CAPEX going up to one billion, this can cause significant lower costs for the government. At the moment, the Ministry of Economic Affairs is researching the impact of supplying site studies in offshore wind tenders and they are optimistic that this can provide financially added value.

Financial benefits directly allocated to governmental responsibility regarding the grid connection were given as well by the private experts. If this would be executed and paid by a (semi)-governmental party, this could increase the financing ability of a project. The grid connection has a significant impact on the CAPEX (i.e. needed investments costs). If this would be excluded from a project, it would become easier for financial institutions to assess the creditability of the project. This would especially be the case for offshore wind.

The private and PPP expert states that due to the character of a renewable energy project, especially for offshore wind, it will be difficult to finance such a project similar to a regular DBFMO. The perceived risks (e.g. by financial institutions) of a DBFMO are more known compared to those of an offshore wind farm, and can be better managed and insured. For instance, the issuing government will not be the only end-user. It will be likely that a third party buys the produced electricity. *Denote that this risk presently exists in the same form within the current approach. It can also be seen as a perceived risk, because the third party* *will only have to purchase the produced electricity for market-based prices. The needed additional and fluctuating premiums are paid and guaranteed by the government.*

As mentioned earlier, the interviewed experts see financial limitations in a concession model including a binding bid. The bid will include risk premiums, determined by the private party on what the extent of the uncertainties would be. The higher the (perceived) uncertainties, the higher the bid (i.e. needed feed-in tariff) will be.

One private expert wonders if it is smart to award a concession, solely based on the needed subsidy. It could be favourable if the tendering criteria include financing ability and quality standards. In his opinion, the developing company (i.e. Bard) which was awarded the Dutch offshore concession in 2009 was known to be unfit to receive enough financing to realize this concession.

Value added in content:

Within this form of added value, there are less examples mentioned compared to the previous two forms. Compared to regular DBFMO's there is less potential for smarter and qualitative better solutions. The projects are less complex to design or have less room to diversify, from an engineering point of view. However, between different technologies (e.g. turbine, foundation) possibilities for different solutions do still exist.

In general, several experts see potential for value added in content, invoked for instance by designing criteria which favour solutions that include forms of innovation or that have a lower environmental impact. However, in the opinion of the public experts, the amount of needed subsidy should remain as the most depending criterion for the awarding of a tender. Another private expert expresses that the quality of an own initiative will be higher. In this approach the developing party has the most designing freedom, and can execute a project in the way they desire.

Externally added value:

Tendering renewable energy projects in a concession model approach can improve activity in that industry, for instance offshore wind. However, in the opinion of public experts, this should not be the reason why such a project should be tendered. A private expert questions if it would not already be too late to stimulate a certain industry. Project developers and/or their former staff have moved away, especially to Germany and Belgium, during the period in which there was a lack clear renewable energy policy within the Netherlands. Specific manufacturers (e.g. turbines) are not likely to start up in the Netherlands, because there are probably enough foreign competitors with high experience. In his opinion, Dutch construction companies could probably favour the most from offshore wind projects tendered within a concession model approach.

9.1.2 The sociologic chances/threats of the concession model

This paragraph will focus on the sociological chances and threats of the concession model perceived by the interviewed experts. These chances and threats are structured according to three indicators; willingness, mutual consciousness of interdependencies and domain consensus.

Willingness:

In general, all the private experts are positive towards a more initiating government. Two private experts, specifically mention the desire of the market (i.e. offshore wind) of a government that shows commitment. At the moment, private parties have a distrusting stance towards the Dutch government's policy towards offshore wind. This is caused by both the current SDE+ scheme and the changing stance towards the sector by the varying cabinets. The SDE+ scheme creates distrust because this system does not choose for specific technologies, but only for projects that are the most economically viable. If another technology becomes more interesting, the subsidy for newly developed projects within a previously favourable sector could become very uncertain. All three private experts state that regarding this uncertainty in receiving a needed subsidy, they favour the British and German policy schemes. In these schemes you will receive a guaranteed amount of feed-in tariff or ROC's when you achieve certain predefined standards.

In general, it can also be said that the public experts have a positive stance towards the concession model. This is primarily based on the fact that the Ministry of Economic Affairs is researching the (cost) effectiveness of certain aspects of the concession model, including an initiating role during the permitting & EIA phase and having a facilitating role in supplying site studies of a (to be) tendered location.

Mutual consciousness of interdependencies:

As a reminder, this indicator expectantly shows the perceptions of both the private and public sector of the ability of (one of) the actors to perform certain tasks within a PPP. Because a renewable energy project is normally for the major part executed by private parties, this indicator will show which tasks of the concession model are suitable for the public partner (i.e. the issuing government).

The interviewed private experts, in general, agree that some tasks or phases within an offshore wind project life-cycle could be suitable for a leading or initiating public party. These phases are: the site location, the permitting & EIA phase, supplying site studies and the facilitating the grid connection. However, one expert questions the capability of the government to make definitive decisions, which are needed for instance when selecting a site location. In his opinion, until this moment, the Dutch government has been inadequate in developing an integral policy instrument that can be used for brining projects such as offshore wind farms to the market, due to an to extensive form of consensus decision-making policy (i.e. polder model) in the Netherlands. The Dutch government should create an instrument, which is allowed to make definitive decisions and which is able to rightfully assess the interests of the different stakeholders.

A different remark is made concerning the facilitating role in the site studies. According to one expert, the best approach would be if the government would only supply unprocessed measurement data, measured according to the standards of the sector. He believes that Dutch government lacks the needed knowledge to rightfully assess the measured data and that this analysis should be done by the private parties interested in the tender.

The public experts mention the following areas as potential locations in which the government can make an effective contribution: site location, permitting & EIA, site studies, infrastructure (not only grid connections, but also harbours for instance).The main reason why the government should have a more active role in this areas is to realize costs reductions. Concerning the site studies, the public experts indicate that this should be done by a third specialized party. This would improve the credibility of the outcomes perceived by the private parties.

Domain consensus:

The third sociological indicator focuses on domain consensus meaning the extent of private or public parties accepting the other sectors party performing tasks within their working domain. As mentioned, the concession model requires a more initiating government, in a domain large operated by private parties.

One private expert states that the concession model could be used for renewable energy projects in which the government has a specific or natural interest. He gives the example the Brouwersdam, where they are planning to include a tidal energy plant. The government has a specific interest in this project because it is the owner of the dam, but also because the tidal energy plant can be used to pump water from the river to the sea in case of a (impending) flood. Projects in which the government doesn't have to be directly involved should not need a leading or initiating government, only a good facilitating government for permits, site studies etc. These type of projects should be initiated for instance by utility companies.

As mentioned earlier, a perceived fear of the private experts is that the additional tasks performed by the government within the concession model, compared to the current approach. will interfere with the ability of the private parties to design and engineer the best solutions. This negative influence of the government should be avoided at all costs.

9.2 Verifying the joint-venture model

This paragraph will elaborate on the outcomes of expert interviews concerning the joint-venture model, as presented in chapter 8. Similar to the pervious paragraph, this will be structured according to the economical & sociological motives for PPP's.

9.2.1 The economic chances/threats of the joint-venture model

Added value in process:

The main advantage of a joint-venture PPP according to the public experts is that financing an offshore wind project will probably become easier. In markets (e.g. offshore wind) where funding is scare, PPP joint-ventures could be make a crucial difference. For instance, in the offshore wind project of Typhoon (formerly a Bard project) the loan of the EIB seems to have kick-started the realization of the project.

In the eyes of the public experts and a private expert a direct Dutch adaptation (i.e. a state-owned company which takes the initiative for a project) of the Crown Estate model will be difficult to not possible to achieve. This is primarily caused by the different policy scheme (i.e. obligation certificates) in the United Kingdom. This scheme entails a fixed and guaranteed subsidy (i.e. the market value of the certificates). In the current Dutch system the Ministry of Economic Affairs will still have to grant individual subsidies, on a competitive basis.

One private expert is sceptical towards the joint-venture model in general. In his opinion this will create all sorts of difficulties. The approach will need backing of the parliament and would probably be a sensitive subject at the moment, due to other criticized infrastructural projects. Furthermore it will prevent the government from being open and transparent in these types of projects. He also mentions that financial participation will always imply a say in the matter. Due to the fact that the government has varied interests, this will lead to suboptimal (designing) solutions.

Financially added value:

Most interviewed experts don't believe one of the joint-venture approaches will (significantly) lower the financial costs. It is prohibited for a government to supply loans for lower tariffs than that commercial institutions do. A state-owned entity such as an EBN, must always borrow money at commercial tariffs. The primary advantage concerning governmental financial participating would be the earlier mentioned financing ability of a certain project. The general idea is that a project which is supported by the government is less likely to default, which shows governmental commitment and makes them more interesting for potential investors.

An advantage mentioned by the public experts is the (partial) prevention of windfall profits. If a stated-owned company would participate in a project that has a lot of uncertainties, which would be allocated for in risks premiums when apply for a subsidy, the company could benefit when these uncertainties do not come into effect. Additionally, after the successful realization of a project, which is perceived to be risky, the stated-owned company could sell its shares to more risk-divers parties such as retirement funds.

A negative financial aspect of the joint-venture model according to one private expert is the earlier mentioned governmental influence due to the financial participation. If the participating stated-owned company has to acknowledge interests of third (governmental) parties, the resulting suboptimal solutions could lead to an increase of costs. Furthermore, it is likely that this increase in costs will directed to the public partner.

9.2.2 The sociological chances/threats of the joint-venture model

This section of the joint-venture assessment paragraph will focus on the sociological motives for a joint-venture PPP approach for the stimulation of renewable energy. There were no outcomes that directly addressed the indicator domain consensus. Therefore this indicator will not be elaborated on in this section.

Willingness:

The public experts in general have a positive stance towards the joint-venture model, however they question if it would be applicable. The Ministry of Economic Affairs is currently researching the possibilities of financial participation by the government in renewable energy projects. The way this should organizationally and legally be arranged will be determining for the success or failure of this approach.

Two private experts state that private parties will probably be interested in financial participation by a government or state-owned company. However, one of these experts questions if this would desirable for the government. In his opinion it should not be done if this implies that the government will receive additional costs.

Mutual consciousness of interdependencies:

According to the public experts there are several obstacles that come to mind, when thinking about governmental financial participation in renewable energy projects. This should always be structured in the form of a state-owned company such as EBN. It is unlikely that the government (i.e. the Ministry of Finance) will personally loan/supply the needed financing. This would have a too big impact on the financial credibility of the government, and could possibly be seen as a form of state aid. The state-owned entity should loan its needed equity from private institutions.

In their opinion, if such an entity were to exist, it should operate as a private company that happens to be owned by the state. The company should only participate in projects of which they think they can earn an interesting profit with. The ownership should not be placed within the legislating or subsidy granting government of the sector (i.e. Ministry of Economic Affairs). This would avoid mixed interests within the Ministry.

One private expert envisions a complete opposite approach. In this approach, a state-owned company participates in projects based on standards. This implies that every private party that is offering a project that achieves certain norms can apply and will receive assistance in financing. This will however evidently prevent the company from acting as a commercial entity. *Denote that this could be seen as a request for a German or British assured policy system.*

9.3 Additional comments

This paragraph will discuss some additional comments, made during the interviews, which were not specifically stated when discussing one of the two models or which cannot be specifically addressed to one.

The financing ability of specific projects can be improved by tendering or awarding smaller projects. For instance the European Investment Bank (EIB) will only grant investment loans of up to €500 million. If the government would award an offshore project with for instance a capacity of 1000 MW, this project would probably have a price tag of three to four billion euros. In these types of projects it is clear that additional funding next to that of the EIB will be required. Furthermore, splitting concessions in smaller sections/projects will spread the risk of non-compliance by the winning parties for the government. Another advantage would be that the different parties will be pushed and motivated by the achievements of their competitors.

As mentioned earlier, the primary risks mentioned that influence the needed price for electricity production are the uncertainties of successful permitting & EIA's, construction & installation, grid connection and the insurance of a certain project. These risks especially count for offshore wind projects. Transferring the risks of construction & installation and insurance to the government, especially in the case of construction & installation, could cause a so-called ''government will pay attitude''. Meaning, risks will not be handled with care, because the executing party does not feel the (financial) consequences. This could lead to unnecessary budget increases.

9.4 Financial analysis using the ECN model

As mentioned in chapter 4, aside from finding forms of financially added value with the (literature) research from other EU countries, sectors and the expert interviews, a small quantitative analysis would be performed as well. This analysis would be based on the ECN SDE+ model, which is used to determine reference electricity prices needed to make a certain renewable energy project, with a specific technology, economically viable. Within this model, several variables (e.g. capacity, investment costs, inflation, interest rate) can be adjusted. The adjustments of these variables will influence the output of the model, indicated as a needed amount of eurocents per kWh. All the different changeable variables are shown in appendix III, indicated in red cells.

The technology focussed on in this thesis is offshore wind. Therefore the analysis will be performed within the model for offshore wind. Ideally better managed risks (e.g. transferring the permitting risk to the government) will provide better financial conditions, in the form of for instance lower loan rates or a lower internal rate of return (i.e. desired return on invested equity). For instance, the mentioned site studies can influence the risk premiums, which can be translated in the ECN model as a lower accepted internal rate of return.

This analysis will provide insights in the extent changed conditions influence the cost of electricity. However, the importance and relevance of this analysis must be discussed. This analysis will provide relative visions in the extent in which alternate financial conditions caused by better or lowered risks can influence the needed price per kWh, but will not be PPP model specific. The outcomes cannot be used directly for statements on the financial added value of for one of the two models, because the preceding chapters have not provided statements with a (quantitative) preciseness which can be based to support specific numbers for the variables. In addition, large differences emerge when comparing the default financial conditions for offshore within the ECN SDE+ model with those from literature on financing offshore wind farms within the Netherlands by PWC (PWC, 2011). For instance, the equity share within the ECN model is 20%, compared to the 40% from the PWC analysis. The loan rate within the ECN model is set on 5% compared to 7,5% in the PWC analysis. These differences do not generate certainty that is this model can be used for absolute arguments. However as said, it will provide a relative insight in the potential of the extent that improved or altered financial conditions (i.e. due to lower risks) can influence the cost of electricity per kWh. It will also show how the altered variables are related to one other.

I decided to vary the three variables loan rate, internal rate of return and the equity share with a certain amount, which are shown in table 9.3. The default values of the ECN model are denoted with a *. These variables do also include the earlier assumptions of the PWC analysis, to give an indication of the different outcomes caused by the varying assumptions.

Table 9. 1 Input variables for the ECN SDE+ model

Loan Rate	4%	*5%	7,5%
Internal rate of return	5%	10%	*15%
Equity share	10%	*20%	40%

When varying a specific variable (e.g. loan rate), the other two variables remain at the default level. The following tables 9.1 – 9.4 show the influences of the altered variables.

Table 9. 2 Change in cost of electricity when varying the loan rate

Loan Rate	4%	5%	7,5%
Cost of electricity (in €ct per kWh)	15,16	15,62	16,88
Relative difference compared to default variable	-3%	0%	8%

Table 9. 3 Change in cost of electricity when varying the internal rate of return

Internal rate of return	5%	10%	15%
Cost of electricity (in €ct per kWh)	13,89	14,69	15,62
Relative difference compared to default variable	-11%	-6%	0%

Table 9. 4 Change in cost of electricity when varying the equity share

Equity share	10%	20%	40%
Cost of electricity (in €ct per kWh)	14,5	15,62	17,87
Relative difference compared to default variable	-7%	0%	14%

Table 9.2 shows that lowering the loan rate with for instance one percentage point, which can already be seen as a big difference from a financial institutions point of view, does somewhat have an impact. However it only makes a small difference, especially compared to the other variables. On the other hand, these variables have a wider (absolute) span in which the variables can vary.

The difference in cost of electricity caused by a lower internal rate of return does show potential gains for making this type of technology more competitive, however it can be questioned to what extent this is realistic. Internal rate of returns of for instance 8 -10% are common for investments made by retirement funds. The investments made by these parties however are generally perceived as less risky compared to offshore wind. It does show a potential mechanism for lowering the costs of a project within the joint-venture model, if a state-owned entity would agree to make investments for a relative low internal rate of return.

The impact of changing the equity share is directly linked to the loan rate and the internal rate of return. I.e. if the equity share would be 40% this implies that the investors want an internal rate of return (e.g. 15%) over 40% of the total investment, while paying a loan rate (e.g. 5%) over the remaining 60% of the investment costs. Meaning, the higher the equity share, the bigger the impact will be of a change in the internal rate of return, same applies for the linkage between the percentage borrowed and the corresponding loan rate. The level of the equity share is generally set by the lending financial institutions, as a method to increase the certainty of loan. The riskier they perceive the project to be, the higher the equity share must be. However, it is assumable that investors in return will want to receive a higher reward (i.e. a higher internal rate of return) if they are required to bring in a higher equity share, as a compensation for the additional risks that are taken.

In practice, the financing conditions will vary according to the perceived change in risk and the desired returns to accept these risks, by the lending financial institutions as well as the investing private parties. These assessments of the existing risks will never be truly objective and are based on opinions of what extent of risks is acceptable. This is also directly linked to the experience and existing track records with such investments of the investing/lending parties. It is assumable that if one party perceives the risks (e.g. creditworthiness increases due governmental participation) to be lower, this will positively influence the conditions set/required by the other parties, due to the interrelated financing conditions. In fact lowered (perceived) risks due to better management in one of the PPP models can have a snowball effect. If one variable is lowered (e.g. equity share), the impact and height of other variables (e.g. internal rate of return can be lower) as well.

9.5 Conclusions

This paragraph will give the conclusions based on the verifying of both designed PPP models. First model specific conclusions will be made, afterwards the conclusions based on the ECN SDE+ model will be given and finally some general remarks. Additionally, two tables are shown which will give an overview indicating the main outcomes of each PPP model.

The section of the expert interviews concerning the concession model can be seen as successful. In relatively small sessions, the experts gave valuable input to practically all the described motives and corresponding indicators. According to the public experts, the concession model is especially interesting for promising technologies which cannot be supported with the current SDE+ scheme due to costs and/or scale, such as offshore wind or potentially tidal energy. One private expert states that this approach has especially benefits for projects in which the government has a natural interest, such as the mentioned Brouwersdam tidal energy project. In general, both the private and public experts applaud the idea of a more initiating and facilitating government, as presented in the concession model. Especially facilitating roles such as the permitting and EIA phase, the supplying of site studies and taking responsibility for the grid connection are considered valuable. The site studies in particular. In the case of a site-specific tender these studies would otherwise have to be performed by multiple parties (almost) simultaneously. In the worst case, these site studies would only be performed after that the tender is awarded. These options can save time and money, for both parties. These tasks and responsibilities are also seen as responsibilities of which both the private and public experts agree that they can suit the government.

As a contrast to these positive views, there is hesitation of the private experts towards the image of a government directly influencing the designing and engineering possibilities of the private parties. In their opinion strict boundaries set by the government will lead to suboptimal solutions, with possibly higher cost. At the moment, this can indeed be caused by inflexible permits, which require elaborate specifications (e.g. type of foundation, height, rotor blades) of the proposed projects if they were to be accepted. The public experts see this as a problem as well and address the fact that they are researching the possibilities for flexible permits. These permits leave more room for different designs and technologies. A concession model which includes a binding bid is perceived as difficult to achieve. Although it could improve the certainty of construction, it is likely that it will negatively influence the competitiveness (i.e. less bidding parties) of the tender. Furthermore it could increase the costs caused by higher risks premiums. The higher the uncertainty of the risks, the higher the risks premiums will be. This problem can be alleviated by the government by creating as much certainty as possible during the project development phase. This can be done by supplying assured permits, elaborate site studies, etc. Furthermore a binding bid will ensure realization of the project for the government, this is something what current Dutch policy schemes lack.

In general, there is a positive stance towards the concession model, from both the public and private parties. However one expert does question if the Dutch government is capable of making such a policy scheme happen, due to their consensus-decision making nature. Furthermore, a specific budget (apart from the SDE+ scheme) will be necessary to guarantee the needed financial stimulation. Table 9.5 shows an overview of the general outcomes of this chapter concerning the concession model.

Table 9. 5 Overview of the general outcomes of the concession model

Dependent Variables	
	Indicators
1. PPP's should focus on achieving synergy/added value	+ Facilitating roles (e.g. permits, site studies) are favorable and can save time and money for both sides. +/- A binding bid negatively influences the competiveness and the costs. (This could be alleviated by creating as much certainty as possible). However, it does ensure realization for the issuing government. +/- A specific budget apart from the main policy scheme is needed to guarantee the financial stimulation for the winning private partner.

	+/- The model should not interfere with the designing options of the private parties. - This is currently inevitable due to inflexible permits.
	Indicators
2. PPP's should keep the identities of the actors and their identifications with their own goals and responsibilities intact	+ In general, both the public and private experts see this model as favorable. + Suitable for large scale projects, in which the government has a natural interest. +/- The facilitating roles mentioned are suitable for the government; however the performing of these responsibilities should not influence the designing options of the private parties. - One expert doesn't think that the government is capable to realize such a policy scheme, due to its consensus-decision making policy/nature.

The section that focussed on the joint-venture model generated less input compared to the concession model, but this could be explained by the fact that within this model, the only crucial element is governmental financing. Specific tasks will be executed by private parties (approach II), or will be performed in exactly the same way compared to the concession model. The only difference being governmental financial participation after the awarding of the concession (approach I). Therefore, almost all statements only focus on if and how the government could (indirectly) participate financially.

Almost all interviewed experts state that governmental participation will positively influence the financing ability of offshore wind projects. Especially at the moment, in which there is much scarcity in financing and financial institutions are requesting more certainties (e.g. higher equity shares). The public experts state that this can only be done within an EBN type of organization. It should be a state-owned entity, which operates as a private company. This would avoid conflicting interests with for instance the Ministry of Economic affairs, which will still need to grant subsidies to the projects in which the entity participates.

A joint-venture model in which the state-owned entity takes the initiative and selects private parties to develop certain areas, which basically will be a Dutch variant of the Crown Estate will not work within or next to the current SDE+ policy scheme. In the current Dutch policy scheme, the Ministry of Economic Affairs will still only grant subsidies on a competitive basis. This creates the undesirable possibility that projects in which the state-owned entity has invested will miss out on the needed subsidy. This joint-venture approach will probably function best in a policy scheme that ensures that the received subsidy is fixed and guaranteed, for instance in the form of ROC's. Table 9.6 shows the main outcomes of the joint-venture model.

Table 9. 6 Overview of the general outcomes of the joint-venture model

Dependent Variables	
	Indicators
1. PPP's should focus on achieving synergy/added value	+ Governmental participation can increase the financing ability of offshore wind projects. - The current SDE + policy scheme is not suitable for governmental participation during the development phase (approach II).
	Indicators
2. PPP's should keep the identities of the actors and their identifications with their own goals and responsibilities intact	+/- The entity should fully function as a private company, to avoid conflicting interests within the government(s).

The financial analysis with the ECN SDE+ model shows that improved financial conditions, such as a lower loan rates, can improve the competitiveness of this technology. Other financial conditions such as a lower internal rate of return (e.g. from 15% to 10%), can cause a significant effect. These rates of returns are common for more assured investments made by for instance retirement funds. Investing in an offshore wind project, especially before the realization, will expectantly be considered too risky to justify these internal rates of return.

Because of the interrelatedness of the evaluated variables in the ECN model, better (perceived) risk divisions and reductions (e.g. offering site studies) in the defined PPP models can create a momentum in which both the financial institutions and investors settle with lower loan rates, equity shares and/or internal rates of return. The potential reduction in costs of electricity produced, which could reach up to 10-30% (de Jager, 2013), will probably not be enough to make offshore wind competitive with other comparable technologies such as onshore wind, which has an estimated cost of electricity of €9ct per kWh (ECN, 2013).

A general remark that should be made is that in the answers of the interviewed private experts, the call for certainty and commitment of the government can be heard. There is a lot of distrust towards the government, which is partially caused by the current main policy scheme. In the SDE+ approach, developers can develop flawless projects, but in the end run out on the needed subsidy because the costs are too high compared to other types of technologies. In other countries, such as Germany or Great Britain, it is already known on forehand (i.e. before the development phase) what the level of subsidy will be for the developer if the project applies to certain standards.

10. Conclusions

This ending chapter of this thesis will present the final conclusions of the performed research. First the major conclusions per individual model will be given; afterwards the chapter will focus on overall and model comparing conclusions.

10.1 Conclusions concession model

The concession model is based on the DBFMO approach, used by the government to tender construction projects in traditional public sectors (i.e. infrastructure, governmental buildings). Within these sectors, a DBFMO is seen as an approach to bring more responsibilities (e.g. design, financing, maintenance) for the public to the private spectrum. The concession model for offshore wind can be seen as a transposed approach compared to the traditional DBFMO's because offshore wind projects are currently fully executed within a private domain, apart from a governmental facilitating role in the permitting phase, grid connection and the granting of subsidies. In the concession model, the public partner will have more responsibilities and tasks. Ideally within a PPP, the tasks and responsibilities are executed and managed by the party that is most suited for these tasks. According to the interviewed experts tasks that can be suitable for the government in the development phase are:

- Site location
- Environmental impact assessments
- Site studies (e.g. geological, wind conditions)
- Permitting
- Grid connection

Apart from process advantages, especially the supplying of site studies is expected to create financial benefits for both the public & private partner, due to expected lower risk premiums allocated in the needed feed-in tariff or premium. The private experts interviewed fear however that the public party will influence their ability to design the best solution. In principle, this is not part of a DBFMO approach, in which the Design is a responsibility of the private partner. However, the current permits issued, in the offshore wind sector, require specific descriptions (e.g. type of foundation used) of the intended plans. If the government should have an initiating role, within the permitting phase, this currently implies defining the project in detail. The Ministry of Economic Affairs acknowledges this problem and is currently researching the possibilities of a flexible permit, which leaves as much designing freedom open as possible.

When looking at the general risks & barriers mentioned for large-scale renewable energy projects in chapter 6, it can be said that the following barriers could be alleviated by the concession model. The acquisition of permits is guaranteed, because these will be acquired by the tendering government. The grid connection will not be a barrier. This because the costs and connectivity will be assured by the government and because the tender is awarded based on a guaranteed feed-in premium; this will lower the risks of not reaching an energy purchase agreement. Delay in project development due to legal or institutional procedures will be less likely, because the projects will be tendered on a project to project basis. Unfavorable effects for the tendering government in a project will have less impact compared to faults in an entire (SDE+) policy scheme. Therefore it will be less hard for the government to endure individual projects with certain negative aspects.

The concession model shows potential when used to stimulate specific technologies (e.g. offshore wind) that are (not yet) cost-effective enough to apply for a subsidy within the regular SDE+ scheme. However, this does require a guaranteed and specific budget to be allocated for each issued project.

10.2 Conclusions joint-venture model

The concession model and the joint-venture model should not be compared on the same level or as (strictly) competitive approaches. Compared to the concession model, the joint-venture model is less elaborate and more divers. Instead of shifting specific tasks and responsibilities to the public spectrum, it shares the corresponding risks with the private partner. In practice, this model will only focus on one aspect of an offshore wind project, namely the financing part including the financial burdens (or benefits) of risks. The actual different tasks will still be executed by the private partner.

Therefore this model can be seen as a tool for the government to lower their subsidy expenditures and therefore should only be favourable if it shows to be cost-effective. Compared to this approach, the concession model is a more elaborate and integral policy scheme. The joint-venture approach could also be used within the concession model, as an additional responsibility of the government. In this approach a state-owned entity would only participate financially in projects that already have been awarded to private party or consortium. The main advantages would be a higher financing ability of the project. Additionally lowering unneeded subsidy costs for the public partner by benefiting from wind-fall profits.

A joint-venture model in which the state-owned entity takes the initiative and selects private parties to develop certain areas, which basically will be a Dutch variant of the Crown Estate will not work within the current SDE+ policy scheme. In the current Dutch policy scheme, the Ministry of Economic Affairs will still only grant subsidies on a competitive basis. This creates the possibility that projects in which the state-owned entity has invested will miss out on the needed subsidy. If the government would guarantee subsidies to projects in which the stated-owned company has invested, this could possibly be seen as state aid. This joint-venture approach will probably function best in a greater policy scheme in which to be received subsidies are fixed and guaranteed, for instance in the form of ROC's.

10.3 Conclusions overall

As mentioned above, the concession model and the joint-venture model should not be compared on the same level or as (strictly) competitive approaches. What they do have in common is that they don't fit within the current SDE+ scheme. Both models needed a specific guaranteed budget, which is not possible in the SDE+ approach that only favours the most cost-effective solution. The concession model is best suited to co-exist next to the SDE+ scheme and should be used to initiate specific big-scale projects with technologies (e.g. offshore wind) that are not (yet) as cost-effective as other technologies, but which could be favourable for other perspectives. Possibilities do arise for this approach, since the Minister of Economic Affairs recently indicated that he intends to allocate a specific part of the total SDE+ budget to offshore wind (Energeia, 2013).

The joint-venture approach in which a state owned company participates after the project development phase could be incorporated into the concession model, to improve the financing ability of the tendered projects. The other approach within the joint-venture model, in which a state-owned entity selects a private partner from the beginning of the life-cycle of a project, requests a policy scheme other than the SDE+ paradigm. It requires a guaranteed overall policy scheme such as can be found in Germany or the United Kingdom. In these schemes, a certain level of subsidy is guaranteed if certain norms (e.g. required permits) are achieved. Although that the market is favouring and hoping for such a system, which was confirmed in the expert interviews, it is not likely that for instance an obligations system will be introduced within the Netherlands according to the Minister of Economic Affairs (Energeia, 2013).

In my opinion it would not be wise to change the total policy scheme (again). Although that the policy schemes of Germany and the United Kingdom show a (highly) committed government, it will probably set the trajectory towards the 2020 targets back with a certain amount of years, because a major policy scheme change will need additional time for implementation. With regard to these 2020 targets, the current policies should be optimized. An improved SDE+ scheme should be used to stimulate small and cost-effective technologies. In this improved scheme there should be a penalty system which prevents private parties from abandoning project and to improve realization rates. Based on the results of this thesis, the concession model would be suitable for offshore wind or other specific technologies that the governments want to stimulate, but which cannot receive subsidies within the general scheme. For instance tidal energy will be suitable as well because of its similarities (e.g. high investment costs, scale, public interest in the site location) with offshore wind. Financial governmental participation via a state-owned entity can be included within this approach. This should only be done if this is proved to be more cost-effective. The joint-venture approach in which the entity selects a private partner to develop projects in a very early stage is in my opinion not favourable for the Netherlands, because it will create too many difficulties (e.g. allocation subsidy, transparency) within the current policy paradigm.

11. Discussion

Due to the novelty of the researched subject and its multidisciplinary character, this thesis has a broad and explorational character. Although that the outcomes of this thesis have shown a positive stance, towards the concession model in particular, there is still a lot of additional research needed to specifically determine the practicability of the described models. Additional quantitative research will have to be performed to determine the cost-effectiveness of the (leading) governmental roles within the tasks of: site studies, grid connection and financial participation. Furthermore, a critical success factor of the concession model will be the feasibility of the required flexible permits.

There is a lack of scientific literature focussing on specific renewable energy policy programs, especially those concerning the Dutch renewable policy schemes and the offshore wind programs discussed in chapter 7. This resulted in using unscientific sources, namely literature and websites from governmental institutions that are responsible for the described policy schemes. These sources are therefore never truly unbiased, because these parties will not negatively describe their own programs. To avoid presenting an unbalanced or a too positive view on these programs, I have decided to look for articles that give a critical view on this program as well. This has expectantly created a more balanced image of the programs. For most programs I was able to find suitable sources, except for the description of EBN.

The expert interviews were very helpful, elaborating and informative, however it has to be stated that in my opinion for some of the interviewed experts it was hard to fully let go of the current situation and the corresponding mental models. This may have caused a predetermined stance towards for instance the second joint-venture approach, which ideally is more suitable within a German or British renewable energy policy paradigm. This could partially be caused by the relatively broad introduction section that was send in advance of the interviews. However, this was done intentionally. This was done to avoid the interviewed experts from being biased, with for instance earlier found results from the policy programs of the other described countries.

Both the public and private experts consider a concession model favourable for the tendering of offshore wind projects. Although that the private parties are interested, the ball is now in the court of the public domain. The government should start by initiating such projects. The upcoming energy accord of the SER (i.e. Sociaal-economische raad or Social economic board) includes new plans for an additional 4.400 MW of offshore wind capacity. In my opinion, the concession model would be a perfect approach for tendering these projects.

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