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San Giorgio Group Case Study: Walney Offshore Windfarms

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San Giorgio Group Case Study Overview

This paper is one of a series – prepared by Climate Policy Initiative for the San Giorgio Group – examining the use of public money to catalyze and incentivize private investment into low carbon technologies and drawing lessons for scaling up green, low-emissions funding. The San Giorgio Group case studies seek to provide real-world examples of what works and what does not in using public money to spur low-carbon growth. Through these case studies CPI describes and analyzes the types of mechanisms employed by the public sector to deal with the risks and barriers that impede investment, establish supporting policy and institutional development, and address capacity constraints.

Contents

Executive summary

Unlike their onshore cousins, offshore windfarms are a relatively new use of wind technology and still face challenges attracting project developers and/or sufficient levels of private investment. Robust and generous government policy frameworks are essential to encourage and attract developers in the first instance. In addition, reaching the scale of investment required for such large-scale projects means engaging nontraditional investors for whom the risk and return profiles of such investments act as strong barriers.

At the beginning of 2012, the Walney Offshore Windfarms project was the largest installed offshore windfarm in the world. However, at the time of its approval in 2007, its developer, DONG Energy, faced serious challenges attracting sufficient investment to move the project forward. Despite strong market penetration of wind technology, the offshore location added numerous risks to the project profile. These included significant revenue, construction, operation, and maintenance risks. At the same time, the usual providers of project finance, (European) banks, were reluctant to back such a large renewable energy project, especially within the context of the escalating European debt crisis.

The Walney project used a combination of policy and financial tools and incentives to successfully address critical barriers to renewable energy investment at this scale:

1. First, the context of a clearly articulated long-term emissions reduction target and generous government policy framework provided sufficient incentives and benefits to attract DONG Energy – as an example of a large scale utility – to the UK market; and
2. Buoyed by the long-term policy framework and associated future revenue stream, DONG Energy employed extensive financial engineering to carefully reallocate project risks and share benefits in a way that attracted nontraditional investors.

The following table summarizes how the various stakeholders involved in the Walney Offshore Windfarms project addressed specific investment issues and potential investors' concerns.

Have Walney Offshore Windfarms arrangements been effective?

The CPI approach to effectiveness analysis relies on a framework which aims to illustrate that there is a causal relationship between inputs and returns/benefits. In order to apply this approach across different cases, we have adopted a common set of appropriate criteria and indicators that can be applied to systematically measure the performance of the investment in question.

Our objective in these case studies is to draw lessons for scaling up and replicating best practices to other sectors, technologies, and geographies. In the case of Walney Offshore Windfarms, we evaluate the program's success by reviewing the impact of the policy framework and the environmental and economic benefits generated. These include the amount of private investment attracted to the project, the amount of GHGs avoided, the returns to each stakeholder group and our assessment of whether the project can be easily replicated.

In addition to the GBP 1.3-1.5 billion of private money redirected by the UK government to pay for policy and financial incentives, Walney attracted GPB 1.3 billion in private investment. Over its lifetime, the windfarm is projected to deliver significant direct and indirect benefits across the range of stakeholders. In particular:

- The 367.2 MW windfarm produces 1,383 GWh of clean energy per annum. This translates into 8.3 MtCO2 and 193,000 tons of SO2 avoided over the project's lifetime, which supports the UK Government's emissions reduction targets.
- The UK Government will collect GBP 400 million in taxes related to Walney. In terms of green growth, the project created about 60 operations and maintenance jobs, and we expect that Walney will further contribute to green growth objectives and help drive generation costs down.
- The project-level internal rate of return is between 8% and 10%. Returns are adjusted at the individual shareholder level based on the outcome of several arrangements surrounding the special purpose vehicle (profits or losses on the power purchase agreements, margins on sale of equity stakes, etc).

Who	Issue	Walney Responses and Effects
Policy Makers	There was a limited pool of project developers with the know-how and financial strength to pursue the deployment of immature, but promising, renewable energy projects with high initial capital costs.	The Walney project was made viable by a clear and long-term policy framework in the UK that established incentives - in the form of green tradable certificates - to road test and scale up renewable technologies by essentially placing a dollar value on such projects. As more offshore windfarms are deployed, economies of scale can be expected to reduce reliance on policies or external sources of capital.
	It was unclear how the benefit of green tradable certificates would be delivered or how they would be financed.	Walney was awarded two green tradable certificates for each MW hour of clean energy produced. Both the power and the associated benefits may be sold to buyers or used by regional energy companies to meet their renewable obligation. The UK Government financed the significant cost of the green tradable certificate mechanism by shifting the burden to regional energy companies. Investors then managed the ensuing price risk, that is, the fluctuations of green tradable certificates price expected over time, through three 15-year fixed price power purchase agreements.
Offshore Project Developers	Utilities' balance sheets were constrained and banks were unwilling to provide project financing for offshore wind farms.	Off-balance sheet financing allowed DONG Energy to leverage public money. Through extensive financial engineering, DONG shared future benefit streams and offset project risks, and structured projects in a way that offered satisfactory income positions and attracted nontraditional equity investors.
External Financial Investors	External investors were uncertain about project returns.	Off-balance sheet financing allowed DONG Energy to leverage public money. Through extensive financial engineering, DONG shared future benefit streams and offset project risks, and structured projects in a way that offered satisfactory income positions and attracted nontraditional equity investors.
	Non-utility investors were not equipped to take on specific project-level risks.	The risks affecting all the major cash flows that nontraditional investors (such as pension funds) could not manage were trans-ferred to more able parties (natural owners of such risk, such as project developers) via financial engineering. This included operations and maintenance and construction risks.
	It was unclear how direct stakes in offshore windfarms fit into financial investors' portfolios.	In the longer run, the "de-risked" equity stake exhibited features common to fixed income securities. These included a clearly identified large initial outflow repaid with relative certainty over time and little or no ability to benefit from any upside. Taking direct stakes in the renewable energy project also provided several benefits to nontraditional investors: diversification relative to the traditional asset classes, lower fees than infrastructure funds, and socially responsible investing.
	It was difficult to secure debt to cover the external financial investors' stake.	In the absence of project debt, DONG provided the external financial investors with bridge debt. As of early 2012, however, the Dutch financial investors still have not refinanced the temporary debt package.

Key issues and recommendations for future large-scale green investments

Our analysis of the Walney Offshore Windfarms highlights some key issues in structuring a large-scale renewable energy project and suggests a number of early lessons for rendering effective investments:

- **Attractive government policy incentives, and the smart use of these by the project developer are essential to make the project viable for all stakeholders.** Until levelized generation costs are driven down, strong policy mechanisms are needed to cover the gap between renewable energy and grid electricity prices and to provide sufficient returns for banks or external equity contributors to supply project finance. The redirection of government revenues (including via green tradable certificates) contributes toward future income. Although significant risk still attaches to future prices, sharing this and associated benefits among minority investors is crucial to alter investment return profiles and bring new investors on board.
- **The careful allocation of risk can effectively manage potential investors' concerns about construction, operations, and maintenance cost risks.** The major project stakeholders are themselves best placed to decide which risks they can assume.
- **Effectively minimizing future revenue uncertainty can significantly extend the pool of potential investors to the multi-trillion dollar pension fund market.** Simplification of the financial engineering required to structure the Walney Offshore Windfarms might also minimize associated transaction costs and allow smaller players to come on board.
- **Taking into account the (re)financing aspects of projects within policy frameworks facilitates a more conducive investment environment.** Major sources of policy uncertainty for developers and investors include deadlines, level of support, length of support, and sustainability of support. Failure to address these issues complicates the extensive financial engineering and reduces likelihood of obtaining debt or passive equity financing.
- **Confidentiality impedes our ability to fully understand the risk allocations between individual stakeholders and the extent to which they have been effective.** Sharing understanding about how individual investors have dealt with due diligence requirements would be a valuable learning tool for extending the model to other nontraditional investors or technology types.

1. Introduction

In October 2011, Climate Policy Initiative (CPI) and the World Bank Group, in collaboration with China Light & Power (CLP) and the Organization for Economic Cooperation and Development (OECD), hosted the inaugural meeting of the San Giorgio Group, a new working group of key financial intermediaries and institutions actively engaged in providing green, low-emissions finance.[1]

The San Giorgio Group recognizes that a major barrier to scaling up climate investment flows is the limited availability of clear, 'on the ground' examples of financial practices, environmental policies, and political signals that make green investment effective. The goal of the San Giorgio Group is to fill this gap by drawing on the experience of its members to track and analyze the life cycle of existing projects, programs, and portfolios. In so doing we aim to distill lessons about evolving financing practice and provide insights on how to scale up climate finance and spend resources more wisely.

Our enquiries are framed by four overarching questions:

- What is the role of public money?
- How can public money be best delivered (instruments and institutional channels)?
- How to ensure alignment of international and national public investment flows with each other and with private investment?
- How can continued learning be ensured?

San Giorgio Group case studies share a systematic analytical framework. They explore in depth the role of project stakeholders, the sources of return for the various stakeholders, the risks involved and arrangements to deal with them, case-specific developments, and lessons on how to replicate and scale up best practice.

The Walney Offshore Windfarms (WOW) in the United Kingdom (UK) illustrate how an incentive-based climate-action policy framework, together with innovative financial structuring, was able to overcome a dearth of available capital to finance a promising yet risky renewable technology. More than GBP 2.6 billion was mobilized to cover both the project itself, and the cost of financial incentives over the project's lifetime, drawing on three sources: (1) public money (via incentives), (2) bank debt, and (3) external equity contributions.

WOW is a 367.2 MW offshore wind park in the UK and, at the time of commissioning in 2012, was the largest offshore wind park in the world. The windfarms were developed by Danish offshore wind leader, DONG Energy, which was initially attracted by generous UK incentives. Even so, DONG estimated total costs at GBP 1-1.2 billion and was forced to look beyond its own corporate structure to finance the project. In **section 2** of this study we present an overview of the WOW project, the policy context in which the project developed, and the main stakeholders and investors.

In **section 3** we explore the project's investment returns and benefits. We find that part of the financing needed (around 25.1% of the total) was achieved through the sale of minority stakes to a UK utility. More interestingly, DONG altered the risk return profile of this investment, which allowed it to engage European institutional investors on a "de-risked" basis (**section 4**) to cover the remaining 24.8%.

In **section 5** of the report, we explore the three-pillared financial engineering system that DONG employed to alter the risk-return profile of this investment and attract institutional contributors. First, DONG Energy "de-risked" the investment by deploying Power Purchase Agreements (PPAs), Construction Management agreements, and Operations and Maintenance (O&M) agreements. These contracts allowed DONG to manage much of the cost and price uncertainty associated with these elements of the project's cash flow. Second, the amount that financial investors had to pay DONG Energy for the purchase of their stake in the project was made partially dependent on the fulfillment of specific conditions (construction cost and time). Third, DONG Energy lent money to the financial investors to help them acquire a minority stake in the windfarms (vendor financing).

In **section 6** we consider the possibility of replicating and scaling up the Walney financing model. In the end, the combination of policies and financial engineering in the "Walney model" transformed the financial investors' equity stake into a quasi-fixed income position that could be attractive to other nontraditional (non-utility) external investors. We find it may be possible to replicate this model in other policy environments and geographies, with other renewable technologies, and possibly other groups of investors. We do note, however, that in the "Walney model," some risks remain

1 See the CPI web site for additional information: http://climatepolicyinitiative.org/event/inaugural-meeting-of-the-san-giorgio-group/.

allocated to external investors who may ultimately prefer simpler investment alternatives.

We hope that the lessons learnt in this case study will provide policymakers, project developers, financial investors, and lending institutions with a better understanding of the interactions between policies and private arrangements that enable private investors to support promising but risky renewable technologies.

- Well-developed public policy frameworks with strong financial incentives and/or generous benefits are essential to attract project developers to develop costly, large-scale renewable technology projects.
- The presence of such a policy framework allowed DONG Energy to bring on board nontraditional investors, through financial engineering that reallocated cost and price risks and share associated revenues and benefits with minority investors.

2. Walney Offshore Windfarms – Project Overview

Project overview

The Walney Offshore Windfarms project highlights the interaction between government policy regulations and incentives, and the deployment of innovative financial engineering by the project developer, to secure sufficient financing to achieve the commissioning of the world's largest offshore wind farm.

- **Offshore windfarms are relatively expensive investments when compared with carbon-based technologies or other more widely deployed renewables**, including onshore wind. Despite improvements over the last decade the technology remains subject to medium risk. For example it is difficult to access turbines for repair or maintenance during adverse weather conditions, and construction is subject to both weather conditions and some supply chain considerations (in particular, securing material and dedicated vessels to erect the foundations).
- **The scale of the Walney project added cost and price risks creating further obstacles for potential developers and/or investors.** With its 367.2 MW capacity, Walney significantly scaled up previous examples of offshore power generation (between 2 and 3 MW of nameplate capacity), was further away from shore and deeper in the seabed.
- **The UK government's policy framework, and particularly its green tradable certificate system, specifically rewards the generation of cost-effective renewable electricity.** Strong incentives targeting the deployment of offshore wind – reward generators with two Renewable Obligation Certificates (ROCs)[2] per MWh generated by offshore wind farms that began generating on or after 1 April 2010.
- **The scale of the project and aggregation of risks compounded the already poor lending**

2 Renewables Obligations can be traded and are designed to encourage generation of electricity from eligible renewable sources in the United Kingdom. They place an obligation on licensed electricity suppliers to source an increasing proportion of electricity from renewable sources. Electricity supply companies are obliged to purchase Renewables Obligation Certificates (ROCs) from the producers up to the specified quota of their electricity sales. The quota is set by the government.

Walney Offshore Windfarms

The Walney Offshore Windfarms (WOW) in the United Kingdom (UK) comprise two wind farms built in two overlapping phases (Walney 1 and Walney 2), each with a nameplate capacity of 183.6 MW (51 Siemens SWT 3.6-120 - 3.6MW). This makes **WOW the world's largest installed offshore windfarms at the beginning of 2012.** The wind farms are located in the Irish Sea, 15 km off the English coast. The developer, Danish state-owned utility 'DONG Energy', aims to generate 663 GWh per annum at each farm (corresponding to a capacity factor of 43%).The project commenced in 2003 with feasibility studies on the Walney Island sites.

appetite of banks and forced DONG to turn to external investors, including nontraditional investors. This was a departure from more common practice by utility project developers of using the value of their own balance sheets to attract project debt from banks.

- **DONG deployed innovative financial instruments to 'de-risk' the investment for institutional investors and share incentives offered by the UK government, enabling it to sell direct minority equity stakes in Walney.** DONG Energy signed a 15-year Power Purchase Agreement (PPA) on the power generated and the "associated benefits" (ROCs, Climate Change Levy Exemption Certificates – LECs – and Renewable Energy Guarantees of Origin – REGOs). The agreement guaranteed construction costs and schedules, as well as the operational performance of the plant, and set the terms for lending the necessary finance to the consortium to purchase shares.

Project timeline

Figure 1 disaggregates the project into development phases and project milestones and highlights the role of individual stakeholders. The short construction time (one year for Walney 1 and six months for Walney 2) and parallel installation activity for the two stages of the windfarms deviate from prevailing industry practice.

Project stakeholders

Based on publicly available information[3] we have categorized and mapped the linkages between the stakeholders involved in the WOW project. These are illustrated in the "tube map" (Figure 2). Six groups of stakeholders were involved in the "Walney Offshore Windfarms" special purpose vehicles[4] (SPV): **utilities investors in the SPV** (green); **financial investors in the SPV** (pink); **investors in the transmission lines** (purple); **UK policymakers and governmental bodies** (orange), **technology and services providers** (grey); and **offtakers/beneficiaries of power and associated benefits** (salmon). Each of these had a particular role in making the SPV viable.

(1) Utility investors

Two parties were involved in the financing of the SPV on the utilities side and together own 75.2% of the project.

The initial project sponsor, the DONG Energy group, is a Danish vertically-integrated energy group present on gas, oil, and power markets in Europe. The Kingdom of Denmark holds a majority stake (76%).[5] The energy group is the result of the merger, between 2005 and 2006, of several utilities.[6]

The DONG Energy group established itself as a pioneer and leader in offshore wind in Europe and owns 50.1% of the SPV via its UK subsidiary, DONG Energy Power (UK) Ltd (DEPUK). DONG Energy's trading arm (DONG Naturgas A/S) was party to the PPAs with the UK holding company and with the Dutch financial investors. The DONG Energy group also provided financing to the Dutch consortium, enabling it to purchase a minority stake in the SPV.

DONG Energy traditionally financed energy projects on a balance sheet basis. That is, the holding company (DONG Energy A/S) borrowed at the corporate level by issuing medium-term notes (MTNs) and perpetuities (long-term bonds) utilizing cash flows from operations, and supplemented these, on a needs basis, with cash from revolving credit lines. The rationale behind this financing strategy – according to the company's website – was to "*concentrate group borrowings at the group parent level to simplify* [DONG Energy's] *liability profile while avoiding any structural subordination issues.*"

SSE (Scottish Southern Energy) is an FTSE-100 company that covers electricity and gas value chains from production to supply. As of 2012, SSE is the leading developer of energy from renewables in the UK with a total capacity of approximately 2.5 GW, including 350 MW of offshore wind farm capacity (already in operation or under construction). SSE owns 25.1% of the SPV via its renewables subsidiary, Scottish Southern Energy Renewables (SSER).

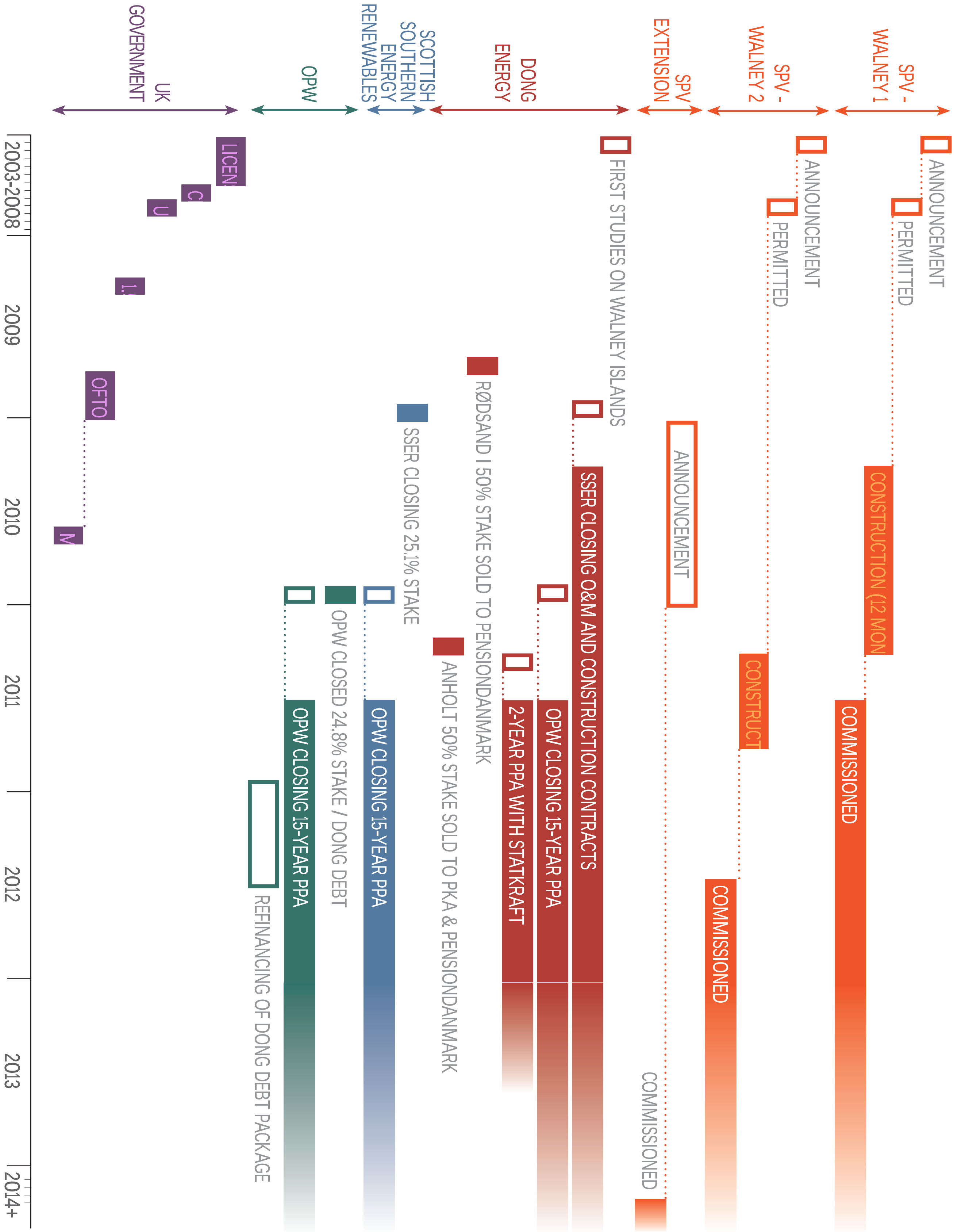
3 Press releases, corporate filings (Companies House), annual reports, corporate and investor communications, administrative filings, reports by third-party information providers (Bloomberg New Energy Finance notably), and companies' websites.

4 A legal entity created for the sole purpose of constructing and operating the windfarm – this is common practice in the energy sector.

5 The second biggest shareholder, SEAS-NVE (11%), is Denmark's largest consumer-owned energy company.

6 DONG (Dansk Olie & Naturgas A/S), Energi E2, Elsam, and Nesa.

Figure 1 – Timeline for Walney Offshore Windfarms highlighting major stakeholders involved



Source: CPI based on all the sources mentioned in this report

(2) Non-utility financial investors

In 2010, **the OPW joint venture** (OPW HoldCo UK Ltd. or HOLD), a dedicated special purpose vehicle jointly held by the Dutch pension fund PGGM and the Dutch private equity fund **Ampère Equity Fund** acquired a 24.8% share in WOW from DONG Energy.[7] To purchase the minority stake, OPW secured financing from DONG Energy and is seeking to refinance this position (with the help of offshore wind-focused boutique Green Giraffe Energy Bankers). Under a 15-year PPA, OPW sells its pro-rata share of power and associated benefits to DONG Energy's trading arm, providing OPW with a guaranteed future revenue stream.

Managed by Triodos Bank, the EUR 320 million **Ampère Equity Fund** is a vehicle that specializes in European clean energy projects. It aggregates the contributions and/or commitments of several Dutch institutional investors (including PGGM) and invests amounts ranging from EUR 10 to 50 million before leverage. Ampère Equity Fund investors include pension funds such as PGGM (in addition to its direct stake in OPW), ABP, and APG and banks including Rabobank and Delta Lloyd.

The remaining shareholder, **PGGM**, is a major Dutch pension fund[8] administrator (care and welfare sectors). In early 2012, assets under PGGM management totaled EUR 105 billion.

(3) Investors in the transmission line

During the course of the project development lifetime, the UK government requested that tenders for the sale of related transmission assets (cables and substations) for offshore wind farms occur through a competitive bidding process (Offshore Transmission Owner [OFTO][9] sales). Using the OFTO process, the WOW transmission assets were sold to **Blue Transmission Walney I**, a consortium composed of **Barclays Integrated Infrastructure Fund** and **Macquarie Capital Group**. The consortium benefited from low-rate debt funding by the **European Investment Bank (EIB),** which covered half of the acquisition costs. At the end of 2011, **Mitsubishi Corp.** acquired Macquarie's 50% share in the consortium.

(4) UK policymakers and governmental bodies

The UK is endowed with excellent sites for offshore wind, several established ports and experience in offshore oilfield development. Building on this, the UK Government has singled out offshore wind as a cornerstone of its low carbon future, implementing policies specifically designed to incentivize large-scale offshore projects.

The **Crown Estate** awarded seabed leases to offshore wind developers through several bidding rounds. The UK Department of Energy and Climate Change (**DECC**) and the Office of Gas and Electricity Markets (**Ofgem**) have responsibility for: 1) granting permits for the construction of windfarms, 2) managing the OFTO process, and 3) issuing ROCs (green tradable certificates) to eligible renewable energy producers (Ofgem). Finally, Her Majesty's Treasury is responsible for carbon taxes (Carbon Price Support), which benefits all low-carbon generation, and Her Majesty's Revenue & Customs (**UK HMRC**) collects taxes from the SPV.

The policy framework is delivering. In 2010, more than half of the offshore wind installed in Europe[10] was installed in the UK. To date, the UK has awarded sites for future developments totaling 47 GW - more than half of the current electricity generating capacity in the UK. DECC and Ofgem awarded Walney two ROCs for each MWh produced.

(5) Technology and services providers

As the construction manager for the WOW project, **DONG Energy** provided other shareholders with guarantees in case of delays. DONG Energy favored its existing network of contractors, including **Siemens**, which was retained as the turbine equipment provider due to the excellent track record of its turbines and its prior turbine supply agreement with DONG.

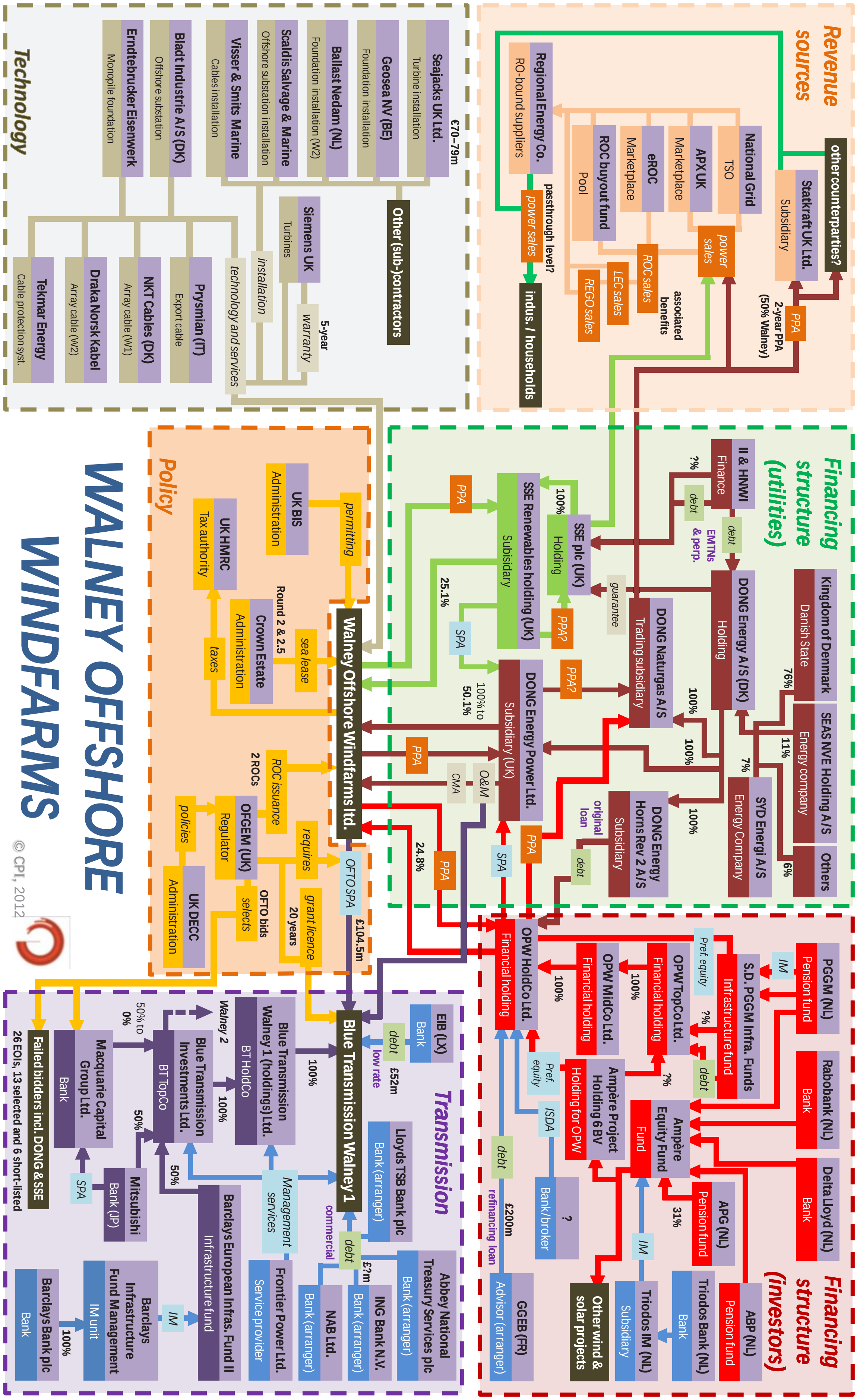
7 The structure is more complex than a single-level joint venture - more details are to be found in the focus section of the report.

8 According to the PGGM head of infrastructure investment, "This direct investment in clean energy is aligned with the ESG criteria in the investment policy for our clients. It highlights our Infrastructure change in strategy to shift our focus from fund investments to entering into partnerships with strategic players for direct investments. Our infrastructure investments are made through the PGGM Infrastructure Fund 2010-2011 containing commitments for EUR 1.25 billion and with current investments in social infrastructure transportation, communication, and energy." Joint press release for the transfer of the stake from DONG to OPW.

9 More details are available on the UK DECC website: http://www.decc.gov.uk/en/content/cms/meeting_energy/network/offshore_dev/offshore_dev.aspx.

10 As of the end of 2011, more than 4 GW of offshore wind capacity was installed globally - almost all of it in Europe.

Figure 2 – Stakeholder mapping (as of Feb. 2012)



Source: CPI based on all the sources mentioned in this report

(6) Offtakers/beneficiaries of power and associated environmental benefits

The two utilities (DONG Energy and SSE) trade power and associated benefits (such as ROCs) with various counterparties. They may elect to engage in PPAs (e.g. when DONG Energy sold 50.1% of Walney production to Statkraft for the two years after the plants become operational). Additionally, they may access market-places, over-the-counter brokers, and regional energy companies to sell energy and environmental commodities. Finally, as UK-operating entities, they may choose to use the associated benefits to fulfill their own renewable obligations.

Walney attracted approximately one dollar of private money for each dollar redirected by the UK Government to pay for future revenue. Ultimately, this revenue stream made the project viable and profitable for investors and helped consolidate UK emissions, green growth, and green jobs objectives.

3. Walney Offshore Windfarms – Investment, Return, and Profitability

To assess the returns associated with the Walney project, we consider overall project costs and how these are distributed across phases and equity contributors. Then we estimate the overall project return as well as individual returns to each project contributor (from the project but also from arrangements around the project).

Project costs

The projected **investment cost** for both phases of Walney were between GBP 1.0 and 1.2 billion. Cumulative equity contributions to the SPV by its three shareholders confirm this amount (GBP 1,235 million as of the end of 2011).[11] Breaking down overall investment costs by investment stages gives a better sense of the project cash flow profile and highlight that a significant share of costs are borne by DONG Energy or one of its affiliates.

- Development costs[12] incurred at the SPV level totaled GBP 5.8 million and included the acquisition of the licence to carry out preliminary investigations, survey costs, and the environmental impact assessment.
- Construction costs made up almost the entire overall investment cost and included turbines, offshore substations, monopole foundations, array cables, construction, and installation. DONG Energy Power (UK) Ltd. acted as the project's construction manager. We hypothesize that the construction management contract and deferred consideration payments in the two share purchase agreements (see focus section) shielded the SPV, and ultimately its shareholders, from cost overruns.
- For the operating phase, no specific amount was disclosed for operating expenses but would be expected to cover Operations and Maintenance (O&M) costs, grid access, annual rental payment for seabed and cables,[13] etc. Based on IEA/OECD/NEA (2010), we estimate O&M costs of GBP 23.8/MWh[14] and hypothesize that the 20-year O&M contract minimizes SPV cost deviation.
- As the project was financed on balance sheet rather than through-project finance, there are no financing costs at the project level.
- The cost of decommissioning the windfarms 20 years from now will be GBP 23.7 million.[15]

Ultimately, equity contributions by the three shareholders (and shareholders' loans subsequently capitalized)

11 Detailed figures are in the annex. Note that equity contributions could also cover future OPEX and decommission costs should expected revenues from the fixed price PPAs be insufficient.

12 Proxied by the cumulative pre-construction (before 2009) administrative expenses. Note that some administrative costs might have been incurred at the DONG group level and by the initial project developer Warwick Energy for the very first year(s).

13 At a minimum GBP 0.9 million p.a. for the seabed lease with the Crown Estate and at a minimum GBP 0.1 million p.a. for the cables (WOW 2010 annual report).

14 DONG's experiences in the wind offshore sector suggest that "OPEX figures are somewhat closed in the industry but 20-35 % of average revenue stream is general expectation in the industry today on Round 1 +2 Sites. Turbine cost in O&M: 70-85 % of OPEX depending on Grid Split" (http://www.windpower.org/download/345/091006_Reliability_Seminar_DONG_Presentation.pdf).

15 WOW 2010 annual report. This is financed by a provision whose value is the "NPV of the estimated cost of decommissioning the wind farm at the end of its 20-year useful life, based on expected price levels and technology at the balance sheet date."

covered total investment costs. Cumulative contributions from DEPUK reached GBP 758 million (for 61.3% of the entire equity contributions); GBP 299 million for SSER (24.2%); and GBP 179 million for HOLD (14.5%). The difference between these equity contributions shares and ownership percentages (DEPUK for 50.1%, SSER for 25.1%, and HOLD for 24.8%) reflects the impact of the risk arrangements[16] in the two share purchase agreements, and possibly in the power purchase agreement between HOLD and DONG Naturgas A/S.

Expected generation and Levelized Cost of Electricity[17] calculations

Each windfarm boasts 51 turbines of 3.6 MW. Factoring in the stated capacity factor (43%), the expected annual production is 1,383 GWh in a typical year. We calculate LCOE using the discounted cash flow model developed in a previous CPI report (Varadarajan et al., 2011)[18] and estimate LCOE of USD 148/MWh before accounting for the financial structure (using a 5% discount rate).[19] This is in line with the European benchmark of LCOE from USD 100 to 200 per MWh identified in the same report. CAPEX accounts for 77% of that amount and the remaining 23% corresponds to the discounted operating expenses. No public money was contributed up front in this project.

Sources of return from the project

The windfarms generate electric power and are eligible for the associated benefits derived from clean energy generation (ROC, LEC, and REGO). Power and the associated benefits are typically sold to buyers (via PPAs, over-the-counter (OTC), and market transactions) or used by regional energy companies to meet their own renewables obligation. Power and associated benefits prices have been and are expected to fluctuate over time. The existence of three 15-year fixed-price PPAs (for both power and associated benefits) between the SPV and its three shareholders shields the SPV from any price risk during the first 15 years.

The terms of these fixed-price PPAs are confidential, but **we estimate total annual revenues between GBP 178-203 million:**[20]

- Annual revenues from power generation sales are estimated around GBP 69 million.
- Annual revenues from ROC sales are estimated between GBP 104 and 127 million.
- Revenues from other associated benefits (LECs and REGOs) are estimated to add an extra GBP 5-7 million per year.

The SPV revenues are actually paid for by its three shareholders (offtakers). At the end of these 15-year PPAs, new PPAs will be renegotiated for an extra five years or the SPV will become exposed to market price variations (in which case, counterparties would pay for the revenues of the SPV).

Overall project return

Using the discounted cash flow model developed in Varadarajan et al. (2011),[21] we calculate that the project-level Internal Rate of Return (IRR) is 7.7-10.0% (depending on associated benefits price assumptions).[22] This is in line with the benchmark IRR range (4-13%).[23] To get a better sense of the flows involved, we illustrate the cash flow profile of the SPV in Figure 3. The contribution of associated benefits to overall revenues is highlighted (no positive IRR without them).

16 More detail on these in the risk and focus sections of the report.

17 "Levelized cost or revenue" means the (present value of) total project costs or revenues for each kWh of energy generated by the windfarms. This provides a single, aggregated measure of costs or revenues associated with energy production that can be compared across technologies (Varadarajan et al., 2011). The LCOE method calculates the levelized cost of electricity to the final user by actualizing all cash flows related to a specific energy source. The calculation has been based on the average weighted cost of capital computed from existing market structure and system-specific productivity.

18 http://climatepolicyinitiative.org/publication/the-impacts-of-policy-on-the-financing-of-renewable-projects-a-case-study-analysis/

19 To be consistent with the literature (IEA/OECD/NEA, 2010).

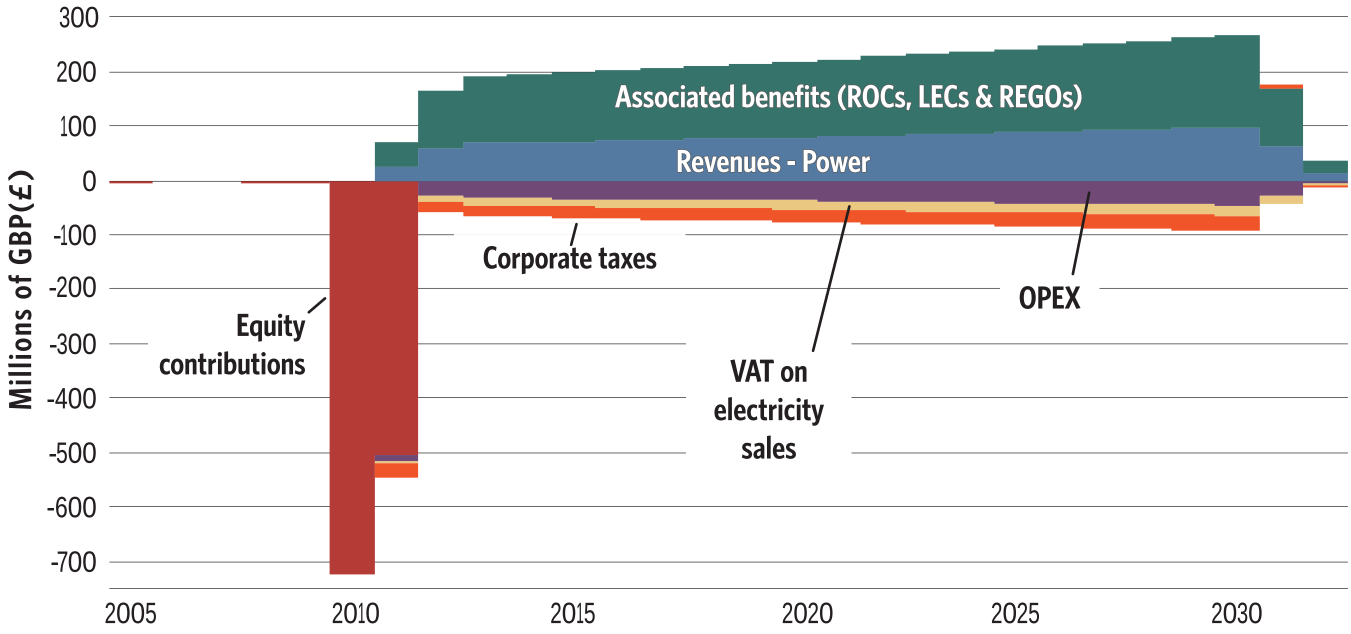
20 Assuming a power purchase price corresponding to wholesale UK grid prices of GBP 50/MWh, ROCs sold for GBP 75-92/MWh each (on the basis of 2 ROCs issued per MWh electricity generated and depending on price projections) and LECs sold for GBP 4-5 each. Note that historical ROC prices have been lower.

21 http://climatepolicyinitiative.org/publication/the-impacts-of-policy-on-the-financing-of-renewable-projects-a-case-study-analysis/

22 Ibid.

23 Assuming a renewal of the PPA for the last 5 years at the same (assumed) conditions and inflation-indexed contracts on the basis of 2% p.a.

Figure 3 – Expected cash flows from the Walney Offshore Windfarms SPV



Individual return to project contributors

In addition to financial return from renewable energy projects, the expansion of projects such as WOW has other multiple benefits including: generation of clean energy; displacement of fossil-fuel generating capacity; greenhouse gases emissions savings; and some quantifiable socio-economic and industrial benefits.

Assessing revenues from the SPV is a good starting point for estimating individual return to project contributors. However, the existing arrangements between project stakeholders, SPV off-balance sheet items, and co-impacts need to be evaluated to complete the picture. The table below (Table 1) categorizes the sources of revenue for the four main stakeholders involved: 1) the entire DONG Energy group, 2) the SSE group, 3) OPW, and 4) the UK Government.

(1) DONG Energy

Since 2004, DONG Energy has contributed GBP 758 million to the SPV (development costs and equity contributions). Some group-wide costs would also have been incurred during the early stages. As per the SPV shareholders' agreement, DONG is entitled to 50.1% of the distributable income from the SPV. Assuming a project-specific Weighted Average Cost of Capital (WACC) of 7%, **the attributable net present value[24] for DONG is between GBP 34 and 159 million depending on the fixed price for the ROCs**. The DONG Energy group has designed most of the financial engineering around the SPV and is set to receive a (1) margin on the services provided and / or (2) the profit or the loss on specific transactions:[25]

- Profits and losses (P&L) on the sale of assets and shares: GBP 5 million profit on the considerations paid by OPW and SSER share purchase agreements[26] and an extra profit on the OFTO sale[27] to the winning bidder;
- P&L on power and associated benefits arrangement: Any locked-in margin between the fixed price PPA (between WOW and OPW) and the investor PPA (between OPW and the DONG trading affiliate), as well as any P&L on DONG trading affiliate (DONG Naturgas A/S) activity for the DONG and OPW share (74.9%);
- Interest charge from vendor financing: GBP 9

24 Ignoring development costs considered sunk costs at this stage.

25 It is a possibility that the consideration paid not only reflects foregone revenues but also price such arrangements.

26 GBP 21 million profit on disposal to SSER (DEPUK 2009 annual report) and GBP 16 million loss on disposal to OPW (DEPUK 2010 annual report).

27 The transmission line for Walney 1 was sold to Blue Transmission Walney 1 Ltd. in October 2011 for GBP 104.5 million. Carrying value of the Heysham substation and rights was valued at GBP 90 (annual reports). Note that the transmission lines were already carved-out from share purchase agreements with SSER and OPW.

Table 1 – Sources of return/ benefits for the major project stakeholders

		DONG	SSE	OPW	UK GOVERNMENT
Financial return / benefits	Income from the SPV	✓	✓	✓	
	P&L, margin, fees on services & goods	✓	✓	✓	✓
	Taxes				✓
Non-financial return / benefits	Climate / environmental	✓	✓		✓
	Strategy / learning	✓	✓	✓	✓
	Green growth				✓
	Green jobs				✓

million[28] in interest charges collected by DONG Energy for extending lending facilities to OPW;

- Margin / P&L on construction and operation: Any margin on the construction management (and possibly for all DONG-owned services provided during the construction phase) and O&M contracts;

Overall, these arrangements have potentially increased return by more than 30% compared to the attributable net present value. It is harder to value the contribution of this project / transaction to DONG's overall strategy to (1) meet its voluntary renewables target, (2) scale up deployment of offshore wind parks, and (3) drive down LCOE.

(2) SSE

The SSE group joined as a shareholder in 2009. It paid a GBP 23 million consideration to DONG for a 25.1% stake in the SPV and then contributed GBP 299 million worth of equity to the SPV. **We estimate the attributable net present value from the SPV for SSE at around GBP 17-80 million.** On top of this, **SSE is entitled to the P&L on any trading activity on its 25.1% stake on power and associated benefits**. Finally, as with DONG Energy, the project contributes to the group's overarching strategic goals which are difficult to value.

(3) OPW

The OPW structure became a 24.8% shareholder in 2010 on condition that major risks were allocated elsewhere (financing, price, construction, and operation risks). **In this respect, the OPW investment is quasi-fixed income.** As such, they paid a premium to DONG (the exact amount is not entirely clear – see focus section) compared to SSE. Overall, OPW contributed GBP 179 million worth of equity to the SPV. **We estimate the attributable net present value from the SPV for OPW at around GBP 17- 79 million. OPW may also capture a margin between the fixed price PPA and the investor PPA** (the terms of these PPAs are confidential). OPW's investment serves its ultimate shareholders (PGGM and Ampère Equity Fund) investment requirements[29] implements Corporate Social Responsibility considerations, and manages investment constraints.

(4) UK Government

While the UK Government did not contribute directly to the SPV or its shareholders, it indirectly contributed financing by redirecting GBP 1.3-1.5 billion worth in discounted associated revenues paid for by regional energy suppliers. The value of this contribution roughly equaled equity contributions (GBP 1.3 billion) – meaning that overall, **approximately one public Pound used to pay for future revenue attracted one Pound of private investment.** Tangible assets for the UK government directly created by this project include discounted taxes (Value Added Tax and corporate taxes) worth around GBP 400 million and lease payments for the use of seabed (via the Crown Estate).

The UK Government will also benefit from direct intangible co-impacts, including projected savings of 8.3 MtCO_2-equivalent and 193,000 tonnes of SO_2 over 20 years.[30] This implies a cost of GBP 169 per tonne of emissions avoided (alongside other climate benefits created by the investment – most notably, economies of scale and learning in offshore wind that should drive down the cost of future wind farms). In terms of securing energy supply, the windfarms are expected to supply approximately 360,000 homes with renewable energy at near zero marginal costs. Creating sustainable green jobs and spurring green growth are also an objective of the UK Government.[31] While most

28 6.5% on the GBP 144 million bridge facility possibly extendable for two more years (interest charge increasing to GBP 28 million).

29 The terms of the repartition of return between the two OPW shareholders are discussed in the focus section.

30 Based on 4Coffshore estimates

31 DECC website (09/12/2011): "Forecasts suggest as many as 70,000 people could be employed in the UK offshore wind industry by the start of the next

of the jobs during the construction phase have been fulfilled by existing contractors,[32] **the windfarms are expected to create 60 jobs during the O&M phase** (according to DONG Energy press release relayed by UK Government), half of which will be allocated to Siemens for the first five years before local service providers take over.

Have Walney Offshore Windfarms arrangements been effective?

A key objective of the San Giorgio Group's framing questions is to facilitate an overall assessment of whether money is being spent wisely. As a first step toward answering this question, we track progress from initial financial inputs (international and domestic public resources and private investment) and consider what that investment actually pays for (that is, the direct outcomes it enables). Next, we consider interim benefits that flow from (and are contingent on) direct outcomes, through to the final outcomes that go toward meeting the program's overarching environmental and economic objectives.

Our approach builds on CPI's effectiveness framework and aims to illustrate that there is a relationship between inputs and returns/benefits (see Table 2). In order to apply this approach across different cases, we have adopted a common set of appropriate criteria and indicators that can be applied to systematically measure the performance of the investment in question.

In the case of Walney, we highlight the main features introduced by the project in terms of project return, return to individual stakeholders, technology development, environmental benefits, and economic results. The aim is to clarify the relationship between investments and returns and benefits, which could be relevant to other sectors, countries, or portfolios.

decade.".

32 Often non-UK but who might have been sub-contracting to regional services providers.

Table 2 - CPI effectiveness approach applied to Walney Offshore Windfarms

INPUT	DIRECT OUTCOME	INTERIM BENEFITS	FINAL OUTCOME
• Private investment valued at **GBP 1.3 billion** • UK Government revenue incentives valued at **GBP 1.3-1.5 billion**	• Additional offshore capacity: **367.2 MW** • 60 O&M jobs created • 7.7-10.0% IRR • GBP 400 million in tax collected • Additional return on extra-SPV arrangements	• 1,383 GWh clean energy p.a. • Energy savings • Technology-level jobs	• 8.3 MtCO2 avoided over lifetime • 193,000 tons of SO2 avoided over lifetime • Help learn / drive LCOE down • Contribution to meeting emissions reduction targets

Innovative financial engineering shielded external investors from major risks related to offshore wind incentives, construction costs, and windfarm performance. Risks were allocated to the stakeholders best placed to manage them.

4. An innovative approach to risk allocation

To assess the risk profile of the Walney Offshore Windfarms project, we apply a typical risk management framework.[33] We (1) identify and assess individual risks, (2) analyze and present the risk response for the three most important risks, and finally, (3) outline the risk allocation implications for the major project stakeholders and the UK Government.

Risk identification and assessment

To ensure we captured all the significant[34] sources of risk, we categorized three major groups of risk [35]:

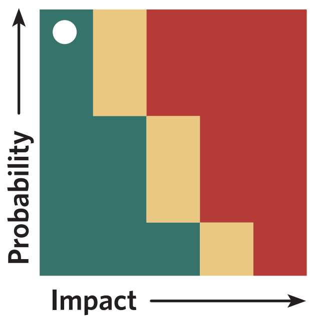
- **"Development" risks** cover project development *per se*, that is all the risks incurred before the project begins to operate: procurement (equipment / technology), construction, and financing.
- **"Operations" risks** cover all the risks related to project output (production and availability risk), operating costs (notably O&M risk), and revenues (power generation sale price but also all the regulatory and price risks relative to the associated benefits).
- **"Outcome" risks** cover the risks more specific to overarching public policy objectives and strategic private objectives: the risk of not meeting renewable energy deployment and emissions reduction targets, the risk of overpaying for incentives, and the risk that green growth and green jobs co-impacts are not met.

We collected an exhaustive list of categorized risks that could affect the project before systematically assessing those risks according to two criteria: their probability of occurrence / frequency (from very low to very high) and their impact on the project's financial and non-financial objectives (again from very low to very high). At the end of this process, we rank risks the following way (US Dept. of Transport, 2006):

33 A project developer or participant would rather consider this a continuous process with feedback loops than something static. We are only discussing the most up-to-date risk profile for Walney Offshore Windfarms, carried out to the best of our knowledge.

34 Non-material and low probability risks are excluded from the scope.

35 This is very similar to the typical risk breakdown for project finance along development stages except that we have added a third dimension dedicated to overarching outcomes from the project – mostly public policy objectives. We acknowledge that the exercise requires some degree of subjectivity and that some risks are interrelated and span more than one dimension. San Giorgio Group case studies strive to capture these three dimensions systematically.



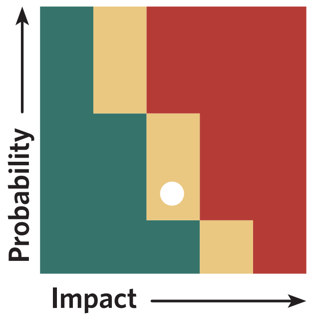
LOW-RISK EVENTS

Risk events with low impact whatever their probability of occurrence or medium impact risks with a very low probability of occurrence

Example(s): negative LEC price change / higher-than-expected insurance costs

How low-risk events are dealt with:

- Most often accepted by offshore windfarms SPV
- Either not specifically addressed or addressed only with accounting provisions



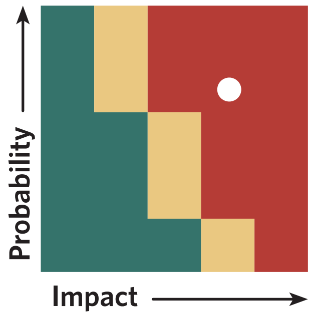
MODERATE-RISK EVENTS

Risk events between low-risk and high-risk events

Example(s): currency risk (3 currencies involved) / risk of policy change

How medium-risk events are dealt with:

- Risk management for highly probable but low-impact events (derivatives for currency or interest rate risk)
- Monitoring of low probability but high/very-high impact events



HIGH-RISK EVENTS

Risk events with very high impact whatever their probability of occurrence or medium-impact events with a high probability of occurrence

Example(s): extreme ROC price variation / plant failure

How high-risk events are dealt with:

- High-risk events warrant a special treatment with policies or risk arrangements (PPAs, construction contracts, O&M contract, etc.)

Risk analysis and response strategies[36]

To analyze the major risks to the Walney Offshore Windfarms, we focused on the high-risk events identified in the previous sub-section: price, construction, and operating performance risks.

Power and associated benefit price risk[37]

Revenues are the most important drivers of return for the SPV and would normally be expected to fluctuate according to prevailing market prices for power and the three associated benefits (ROCs, LECs, and REGOs). Given ROC prices account for more than 60% of the calculated levelized revenues, price fluctuations put future revenue at significant risk. The following table (Table 3) highlights changes in project IRR when we change our assumptions for the electricity price and for the ROC price. The base case (highlighted) reflects our initial assumptions.

Assuming a cost of capital of 7%, maintaining ROC prices above GBP 35 each becomes critical to ensuring the project's viability. Factoring in price volatility for power and ROCs makes the base case assumptions even less certain.

Walney employed **two types of responses to address price risks.** First, when DONG Energy was the sole project participant and when only SSER came on board as a minority shareholder, no formal PPAs were signed as utilities typically hedge price risks (power and associated benefits) two to three years ahead using a mix of **forward transactions**, **derivatives contracts,** and **PPAs with third-party offtakers.[38]**

Second, when the Dutch financial investors took a minority stake in the SPV for WOW (in December 2011), they demanded adequate protection from power and associated benefits price variations. To address these risks, **two sets of PPAs** were signed (see Figure 4). The first set of PPAs (labeled 'fixed price PPAs') obligated shareholders to purchase in cash (at a fixed price) their pro-rata share of power generation and associated benefits.[39] The second PPA (an 'investor PPA') between OPW HoldCo Ltd. and DONG Naturgas A/S, aimed to

36 Consistent with US Dept. of Transport (2006), we consider four typical risk responses: (1) risk avoidance (eliminate risk or protect the project from it) by changing project scope or adding resources to it (money / time / headcount), (2) risk transfer (transfer of the financial impact) by contracting out part of the work to a more able party, (3) risk mitigation (reduce probability or impact to an acceptable level), and (4) risk acceptance (address the risk should it occur).

37 A related but moderate-risk event (as it is less likely) is any retroactive change in UK incentives (change in ROC multiplier to something other than 2 ROCs per MWh, shift to feed-in tariffs, contracts-for-differences, etc.) that would affect Walney's revenues. This is typically addressed by having parties to the contract monitor policy developments (and lobby against adverse changes) and by having clauses dedicated to "change of law" in the PPAs.

38 A 2-year PPA was signed between DONG Naturgas A/S and Statkraft that included the 50.1% production from Walney.

39 This translates to an equity ownership percentage.

Table 3 - Impacts of different electricity and ROC prices on revenues

	-100%	-50%	-30%	-20%	-10%	Base case	10%	20%	30%
Power price	-	25	35	40	45	50	55	60	65
RESULTING IRR	2.5%	5.9%	7.2%	7.7%	8.3%	8.9%	9.4%	10.0%	10.5%
ROC price	-	21	29	33	38	42	46	50	54
RESULTING IRR		2.2%	5.1%	6.5%	7.7%	8.9%	10.0%	11.1%	12.2%

make the Dutch financial investors comfortable,[40] as DONG Naturgas A/S has the expertise and ability to market those commodities.[41] The PPAs became active once Walney 1 became operational; the duration of the initial PPAs is 15 years.

Construction (cost overrun and delay) risk

Construction costs are the second biggest driver of returns for the SPV – the higher they are, the less profitable the investment. Construction cost overrun is a major risk since offshore wind farms are capital-intensive investments with relatively low costs during the operating phases.[42] A related construction risk is construction delay, which could undermine the entire project, jeopardize financing milestones and policy incentives deadlines, reduce overall return, and increase working capital requirements. Table 6 in the annex highlights changes in project IRR when we change the assumptions for construction cost. This test demonstrates that a further 10 % increase above the assumed base case of 7% cost of capital would extinguish project profitability.

The following arrangements addressed the construction risks associated with Walney:

- **A construction management agreement (CMA);**[43] concurrent with the sale of the minority stake to SSER, the SPV signed this agreement with its original parent company, DONG Energy Power (UK) Ltd. (as 'construction manager');
- **Deferred consideration payments** as part of the SSER and OPW **share purchase agreements (SPA);**[44] payment of the final installments for the equity purchase to DONG Energy (the seller of the stake but also the construction manager) was made conditional on the commissioning of the two phases for the windfarm on schedule.

Operating performance risk

The windfarms' output – the electricity generated – is possibly as critical to project's profitability as the power prices. Electricity generated is typically measured in terms of an availability factor for the plant (our base case was a hypothetical 100%).[45] Potential negative events that could impair availability include technological failures (notably gearboxes) and adverse weather (affecting turbines' ability to operate and preventing maintenance staff from intervening). Table 7 in the annex captures changes in project IRR when we reduce the availability factor. With a required cost of capital of 7% for the project, an average availability factor below 87.5% would jeopardize the project profitability. The following arrangements were put in place to address operating performance risks:

- **O&M contract:** also concurrent with the sale of the minority stake to SSER, the SPV signed this agreement with its original parent company,

40 The terms of those contracts are confidential – and we cannot analyze the risk response further. In particular, we do not know whether or to what extent the Dutch financial investors (1) remain exposed to specific risks (negative margin, counterparty risk, change of law, etc.) and (2)whether they are capturing a spread between the two PPAs. That fact that the PPAs last 15 years while expected asset lifetime is 20 years is another unknown. Likewise, we don't know whether the inflation adjustment is captured in those arrangements.

41 We hypothesize that there is a PPA between DONG Energy Power (UK) Ltd. and DONG Naturgas A/S.

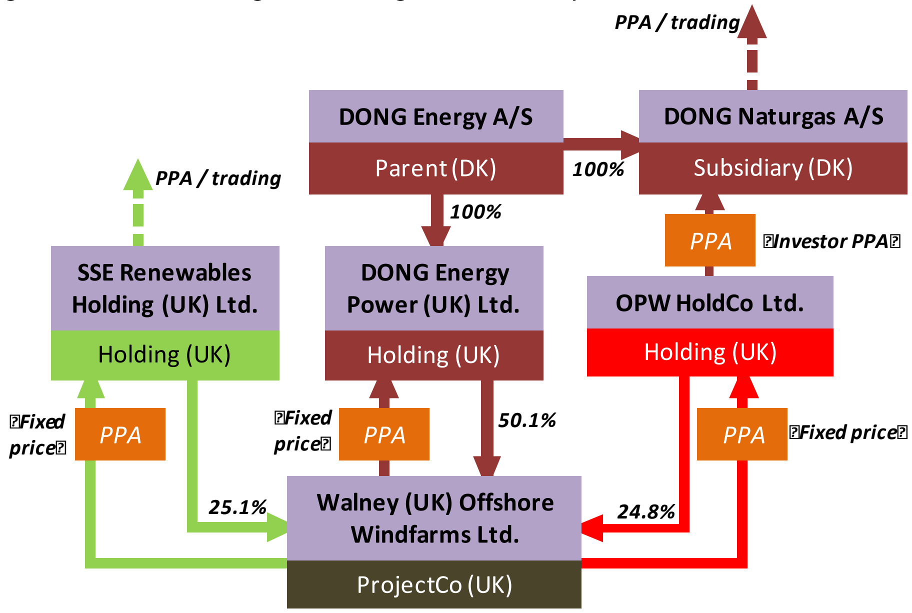
42 In a similar fashion to nuclear power plants and at the opposite of natural gas-fired plants for instance.

43 "Walney Offshore Windfarms have been constructed according to the multi-contract principle which means that all project-controlling and construction settlement are managed by the project organisation. With some 348 direct supplier contracts, the project organisation has been in full control of all elements in the installation processes, and the multi-contract principle enables instant mitigation should any delay or faulty deliveries occur. The close cooperation with the contractors and suppliers makes it possible to conduct a risk hedging based on the project's interests and make a total priority of the resources" (DONG Energy website).

44 We suspect that the new shareholders' agreements precisely defined the terms according to which shareholders would have to pay in case of cost overrun or delays.

45 As we did not have specific information / assumptions from the developer.

Figure 4 - Power Purchase Agreement arrangements for Walney Offshore Windfarms



Source: CPI analysis based on DONG and OPW corporate filings retrieved on the Companies House.

DONG Energy Power (UK) Ltd. (as "O&M service provider"). During the first five years, half of the O&M team is staffed by Siemens as part of its five-year warranty on the wind turbines; and

- Siemens' proven technology with an excellent **track record** (specifically in this model of wind turbine) and reputable developers and contractors.

Risk allocation

Beyond the overall project-level risk, financial engineering and policies altered the share of the risk allocated to various parties (along the three groups considered earlier). We represent these effects in the dynamic risk allocation matrix below (Figure 5).[46] This illustrates the risk allocated to each major project stakeholder on the one hand, and the evolution of the overall risk profile for the project on the other.

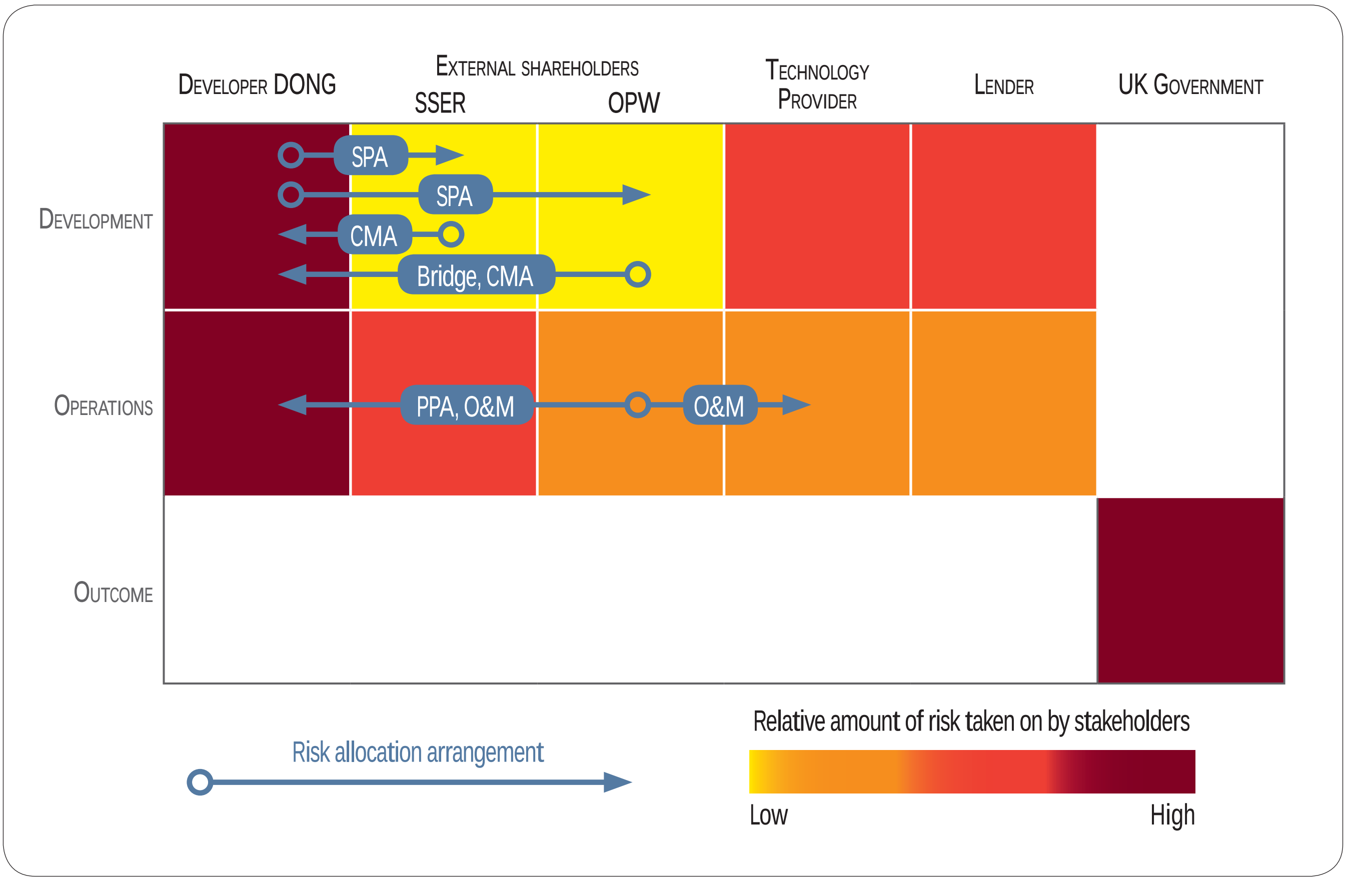
The **DONG Energy** group played multiple roles in this project and concentrated a large share of the risks as the developer, majority shareholder, construction manager, O&M service provider, bridge lender, offtaker, etc. DONG Energy shouldered the risks that it was best equipped to manage, i.e. technical expertise (construction and O&M) and energy commodity trading. Risks for which DONG Energy had less clear cut expertise were shared with or transferred to more experienced parties. A short-term lending facility meant to be refinanced was "re-allocated" to a mandated lead arranger and turbine management was allocated to Siemens for the first five years. As a minority shareholder and offtaker, the **SSE** group utility was exposed to risk pertaining to shareholders and market prices for power and associated benefits. **OPW** also had a minority stake in the project but was not exposed to price risk given the 15-year PPA. As a borrower not backed by a large utilities group, OPW might be under more pressure from any adverse change in cash flows (so this financing / interest rate risk ultimately depends on the terms of the refinancing facility with the help of offshore wind-focused boutique Green Giraffe Energy Bankers).

The **UK Government** is exposed to three main risks. First, the risk of not having enough offshore wind MWh deployed exposes it to EU emissions reduction target penalties. Second, the risk of paying too much for offshore wind MWh places a potential extra burden on the UK budget and puts the sustainability of incentives in question.[47] Third, the risk that co-benefits (employment, industrial development, etc.) objectives are not met introduces the risk that non-climate considerations could prevail over emissions reductions objectives.

46 A more detailed risk allocation matrix is in the annex. Risk is categorized according to some measure of the "magnitude of risk" times the "likelihood of risk" (given the lack of contract-level data available on this project, this weighting system is subjective): "very high" in dark red, "high" in orange, "moderate" in light orange, and "low" in yellow.

47 The UK Government is able to shift that risk to other stakeholders in the Walney project, which puts the project at risk and possibly affects the attractiveness of the UK incentive package. This ultimately puts deployment and dispatch targets at risk.

Figure 5 - Dynamic risk allocation matrix for Walney



DONG's financial engineering relied on three pillars.

- First, DONG Energy "de-risked" the investment by deploying PPAs, construction management, and O&M agreements. These significantly reduced uncertainties relative to the three largest cash flow components.
- Second, the amount that the financial investors had to pay DONG Energy for the purchase of their stakes depended partially on the fulfillment of specific conditions (construction cost & time)
- Third, DONG Energy lent money to the financial investors to help them acquire a minority stake in the windfarms, addressing risks faced by financial investors through the share purchase agreement, while providing DONG Energy with security assurances.

5 Financial engineering to target financial (non-utility) investors

As discussed in the previous section of this report, investors in offshore wind farms are typically exposed to several risks. One way to encourage their investment is to limit their exposure to major risks that they cannot bear (or that would be too costly). The risk management process for the Walney project was handled using a series of contracts that addressed specific risks by transferring them to the most able party. In the end, the financial engineering protected the Dutch financial investors from price, early-stage financing, construction, and operating performance risks. Those risks were borne instead by other parties (mostly DONG Energy).

De-risking the investment in the SPV

Two groups of risk were removed from investors through the WOW project's financial engineering: 1) construction & technology risk; and 2) price risk.

Offshore windfarms are not yet mainstream generation technologies and their deployment continues to entail major **construction and technology risks**. In the Walney project, construction and technology risks that accrued to the financial investors were mitigated by: (1) allowing equity stakes to be paid for in several deferred installments (thereby creating a deferred contingency), one of which was conditional on the 'timeliness' of commissioning for both phases of the wind parks; and (2) an O&M contract (including Siemens' warranty on the wind turbines for the first 5 years) and construction management agreement. These arrangements also removed part of the **price risk**. Because the Dutch financial investors were not natural holders of power generation or its associated benefits, it was a priority for them to shift those classes of risks to a party better suited to manage them. Their failure to do so would probably have doomed their involvement.

The OPW investment structure: supporting repayment and differentiated returns

In November 2010, the ultimate shareholders in the Dutch financial investors' joint holding (infrastructure arm of pension – PGGM – and private equity fund – Ampère Equity Fund) created the overarching consortium holding structure, OPW.[48] The structure consists of three levels:

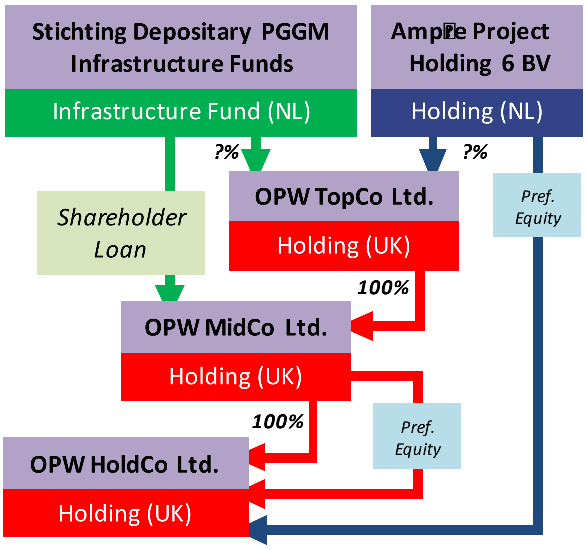
- OPW TopCo Ltd. – TOP – owns 100% of an intermediate company, OPW MidCo Ltd. – MID
- MID, in turn, owns 100% of the investment holding company, OPW HoldCo Ltd. – HOLD
- HOLD is the actual purchaser of the ownership stake in WOW.

This three-level ownership helped the lenders (i.e. DONG Energy provision of a temporary debt package and any subsequent senior or junior lenders)[49] to ensure

48 First, OPW TopCo Ltd., formerly known as Millerway Ltd., was activated with the transfer of 100% of its capital to Stichting Depositary PGGM Infrastructure Funds and Ampère Project Holding 6 BV. Second, OPW MidCo Ltd., formerly known as Leopardcourt Ltd., was activated with the transfer of 100% of its capital to OPW TopCo Ltd. Third, OPW HoldCo Ltd., formerly known as Hailgrove Ltd. was activated with the transfer of 100% of its capital to OPW MidCo Ltd. The three entities were previously dormant companies incorporated and owned by law firm Clifford Chance in 2009 and 2010. These three entities might be "general purpose" entities / vehicles routinely incorporated and remaining dormant until the purpose (and name) of the company is modified (source: articles of association, annual reports and related resolutions for the three companies retrieved from the Companies House).

49 This relates to the priority on claims: senior lenders are repaid in priority

Figure 6 – Detailed financing structure for the Dutch financial investors (Dec. 2010)



Source: CPI analysis based on DONG and OPW corporate filings retrieved on the Companies House.

structural subordination, maximizing their chances of being repaid (in addition to, or in lieu of, what is contained in an inter-creditor agreement governing the seniority of debt and signed by all junior and senior lenders). The OPW structure is governed by a shareholder agreement between the three entities and its two ultimate shareholders.

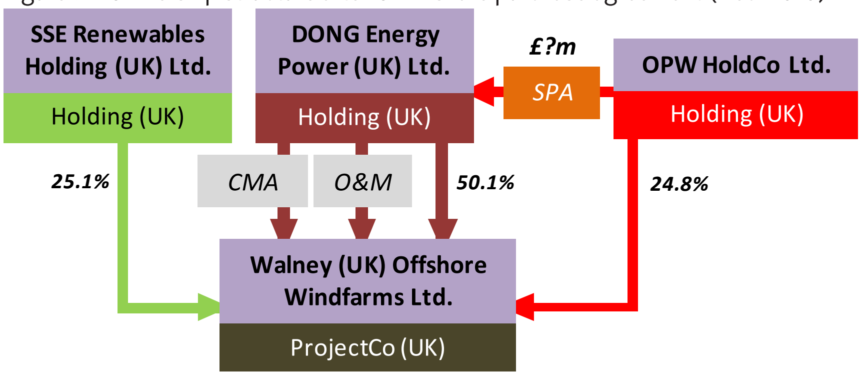
In order for the structure to allow for a differentiated return to each of its ultimate shareholders, a shareholder loan agreement (see Figure 6) was signed between MID (as the borrower) and Stichting Depositary PGGM Infrastructure Funds (one of the ultimate shareholders acting as a lender) on the OPW closing date (December 2010). The loan agreement enabled MID to fund the subscriptions for preference shares issued by HOLD. These "Fixed Cumulative Redeemable Preference Shares" provide a preference dividend of 12% of the issue price per annum (paid quarterly). HOLD retains the option to redeem shares that have priority on liquidation but bear no voting rights (into HOLD itself).[50]

Selling the stake to the non-utility investors

A share purchase agreement (SPA) transferred all or part of the ownership of a company from the seller to the buyer. On the OPW closing date,[51] a SPA was also signed between HOLD, the "buyer," and DONG Energy Power (UK) Ltd. (DEPUK), the "seller." Under the SPA, HOLD paid consideration of at least GBP 16 million[52] to acquire 24.8% of WOW share capital and outstanding shareholder loans. HOLD also took on a pro rata share of the construction costs (see Figure 7).

For HOLD, the payment of consideration under the SPA essentially granted it access to a share of the return on investment. **To limit the specific risks allocated to OPW (that is, the risk of paying too much for the WOW shares, etc.), the SPA made some of the consideration 'deferred contingent'.** From a cash flow perspective, this also reduced OPW's financing requirement at the date of the closing.[53] It is likely that indemnification provisions of the SPA also reduced the risk of overpayment for OPW.[54] As the provider of essential services and know-how, DEPUK remained onboard as

Figure 7 – Ownership structure after OPW share purchase agreement (Dec. 2010)



Source: CPI analysis based on DONG and OPW corporate filings retrieved on the Companies House.

compared to junior lenders.

50 According to MID 2010 annual report and HOLD amended articles of association.

51 We are not explicitly covering SSER closing, as the focus of this report is financial investors' contribution to renewable energy projects. SSE routinely invests directly in renewables projects thus this is relatively less relevant to this report.

52 According to a DONG Energy press release: "to acquire the stake in Walney, the consortium will pay to DONG Energy a consideration of approximately GBP 16 million (approximately DKK 140 million) as well as its pro rata share of the construction costs. The purchase price excludes payment for the transmission assets, which are in the future to be owned by a separate transmission operator to be decided by the UK regulator." Based on the DEPUK 2010 annual report, figures are significantly different (GBP 172 million) – we do not know what is included though.

53 We could even envisage that the share of WOW revenues accruing to OPW could be used to pay for the deferred contingent consideration.

54 Any limit on that indemnification amount at the same time puts a cap on the related risk for DEPUK.

Table 4 – Lending facilities extended by DONG Energy

FACILITIES	AMOUNT	ANNUAL INTEREST RATE	MATURITY	ROLES
"deferred consideration" mezzanine[1]	**GBP 93m**	No interest rate	28/11/2011	Related to the **SPA contingent consideration** payment schedule[2]
Other mezzanine	**GBP 39m** (GBP 15m of which deferred)	Unknown	27/12/2022	**Unknown** (O&M fees? Construction management fees? Upfront payment in relation to PPA?)
Bridge	**GBP 144m** (GBP 54m of which deferred)	**6.5%**[3]	31/12/2011 extendable to 20/12/2013[4]	**For GBP 79m equity contribution to the SPV** (Dec. 2010) and **unknown use for the rest of the funds** (deferred portion - contingencies?)
ROC working capital facility	Unknown	Unknown	Unknown	**Working capital requirement** (linked to ROC flow cycle?)

[1] The amount for the "deferred consideration facilities" is guaranteed by OPW's ultimate shareholders (Ampère and PGGM) and was funded by the issue of ordinary and preferred shares of HOLD (HOLD 2010 annual report).
[2] TOP security assignment (17/02/2011).
[3] The long-term debt facilities carry a 6.5% interest rate per annum. There is some degree of ambiguity here, however, as the HOLD 2010 annual report does not identify precisely what is included in those long-term facilities.
[4] The repayment date was initially scheduled for two months after the completion dates of Walney 1 and Walney 2, whichever occurs later. Should the repayment date need to be extended (because of "several accepted reasons"), it will in any case end on 20/12/2013 (HOLD 2010 annual report).
Source: CPI analysis based on DONG and OPW corporate filings retrieved on the Companies House.

the majority stakeholder, ensuring that all the Parties' interests in getting WOW off the ground were aligned.

Also on the date of the OPW closing, a separate shareholder agreement was signed between the three WOW shareholders (DEPUK, SSER, and HOLD). Under this agreement, each Party agreed to fund its pro rata share of the operating expenses in WOW if those could not be paid out of the cash flow of the project company. At the same time, a call option agreement was concluded between DONG Energy and OPW (see Figure 8). Should that be exercised anytime in the next 20 years, the 3-level OPW structure would transfer to DEPUK.[55] This would provide DONG Energy with certainty about who its investment partner will be at the end of the investment lifetime.

Vendor finance

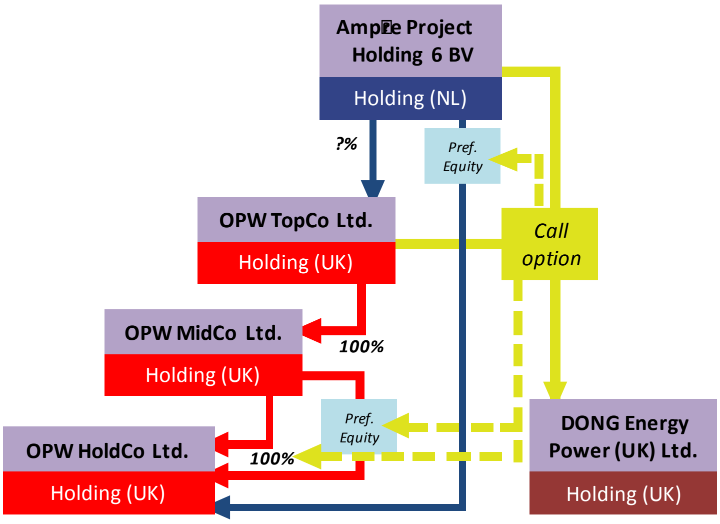
Concurrently with the SPA, the DONG Energy group provided HOLD with lending facilities to finance the purchase of the minority shares and HOLD's pro rata share of construction costs. This was a temporary debt package meant to be refinanced with senior bank debt within one or two years (i.e. by the end of 2011 or early 2012).[56] DONG Energy Horns Rev 2 A/S, a 100% DONG Energy A/S-owned affiliate, acted as the lending party and extended EUR-denominated debt at a fixed interest rate. Accordingly, the EUR/GBP currency risk remains with HOLD.

The **lending facilities** comprised a GBP 144 million bridge facility, a GBP 93million 'deferred consideration' mezzanine facility, another mezzanine facility for GBP 39million and a working capital facility relative to the ROCs (see Table 4 for more details on terms and use of the funds).

55 The contract is actually between TOP and Ampère Project Holding 6 BV writing (i.e. selling) the option on the one side and DEPUK purchasing the call option on the other side. The call option can be exercised 20 years from now (in the period 3 months before / 6 months after the 20th anniversary of completion of Walney I), at an "Actual Adjusted Option Price that translates at market value of investment." The call option has three underlying assets: (1) the entire issued share capital of MID (initially 100% held by TOP), (2) the preference shares in the capital of HOLD held by MID, and (3) the preference shares in the capital of HOLD held by Ampère Project Holding 6 BV. This captures the entire financial investors' ownership structure. This was confirmed by the DEPUK 2010 annual report: "the company has an option, at the end of the initial 20 year period of operation, to re-acquire the 24.8% interest." The original wording is the 20th anniversary of the earlier of a) completion of Walney I and b) completion of Walney II. MID 2010 Annual Report.

56 "There is no refinancing agreement over this debt in place yet. It is the intention of the company that revenues from its investments will be utilised to repay the debt and if necessary to refinance the debt to more closely match that revenue" (HOLD 2010 annual report). As of March 2012, a refinancing agreement was still outstanding.

Figure 8 – Call option sold to DONG Energy Power (UK) (Dec. 2010)



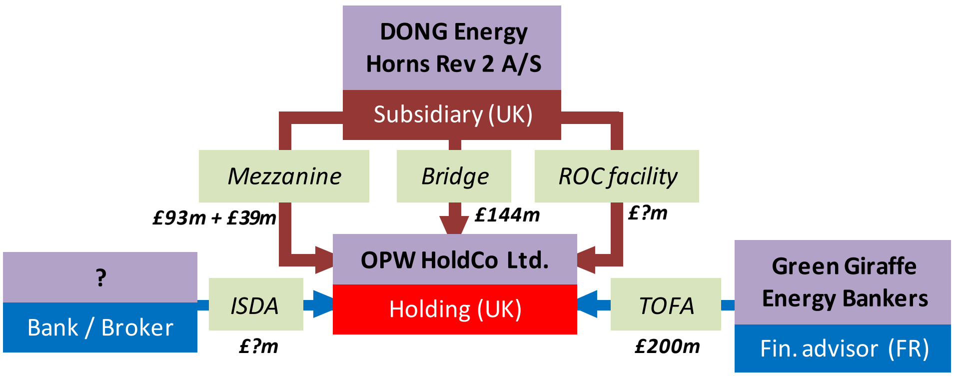
Source: CPI analysis based on DONG and OPW corporate filings retrieved on the Companies House.

In order to make itself (and ultimately the take-out finance lender) comfortable with extending cash facilities to HOLD, DONG Energy requested several protections from the entire OPW structure. In particular, **extensive securitization of all OPW liabilities (senior debt, ROC facility, share purchase agreement, call option, offtaker liability, etc.)[57] ensured that the senior lenders (DONG Energy) could claim priority in the case of default**.

The debt package provided by DONG Energy was not intended to be a long-term facility. OPW companies' annual reports highlight the temporary character of those facilities, and lending documents envisage the introduction of a take-out finance agreement (TOFA), i.e. a refinancing agreement (see Figure 9) to be concluded before mid-2012. In April 2011, a renewables boutique, Green Giraffe Energy Bankers, was appointed to act as advisor for this refinancing transaction. **Until the take-out finance agreement is concluded, the Dutch financial investors are exposed to a refinancing risk.** As of February 2012 they were reportedly struggling to refinance the package, and DONG extended the original loan through May 2012.[58] Banks reportedly have concerns about DONG's retention of absolute control over the windfarms' operations. Options that might facilitate the refinancing include modification of the WOW shareholders' agreement or the provision of a corporate guarantee by DONG.

Between the bridge financing and the take-out finance agreement, we also believe that HOLD contracted with a hedging bank to **hedge its interest rate** exposure during any interim period (ISDA - International Swaps and Derivatives Association - contract).

Figure 9 – Refinancing of the DONG lending facilities (still on-going as of March 2012)



Source: CPI analysis based on DONG and OPW corporate filings retrieved on the Companies House.

57 There are four main types of securitization arrangements (from OPW to DONG Energy group should OPW default) that the parties resorted to: (1) Share charges -TOP ordinary shares in MID but also MID and Ampère Project Holding 6 BV preferred equity (if any) in HOLD; (2) Debentures – HOLD 24.8% stake in WOW and also all the proceeds and mezzanine accounts, debt, etc.; (3) Account charges – MID preferred dividend account; and (4) Assignments – Rights in MID share charge.

58 Infrastructure Journal, 06/02/2012

The combination of policies and financial engineering in the 'Walney model' transformed the financial investors' equity stake into a quasi-fixed income position.

- This might be attractive to other nontraditional external investors.
- We believe it is possible to replicate this model in other policy environments and geographies, with other renewable technologies, and, possibly, with other groups of investors (wealthy individuals and other institutional investors).
- We note that in the Walney model, some risks remain allocated to external investors who may prefer simpler investment alternatives.

6. Scaling up and replicating the Walney financial engineering

To assess the ability of the WOW model to unlock new non traditional investors and help the low-carbon infrastructures financing gap we consider: (1) the expected cash flow profile for the Dutch financial investors compared to a utility investor; (2) other offshore windfarms financing models in the UK; and (3) what it might take for other classes of investors and/or projects to apply the WOW model.

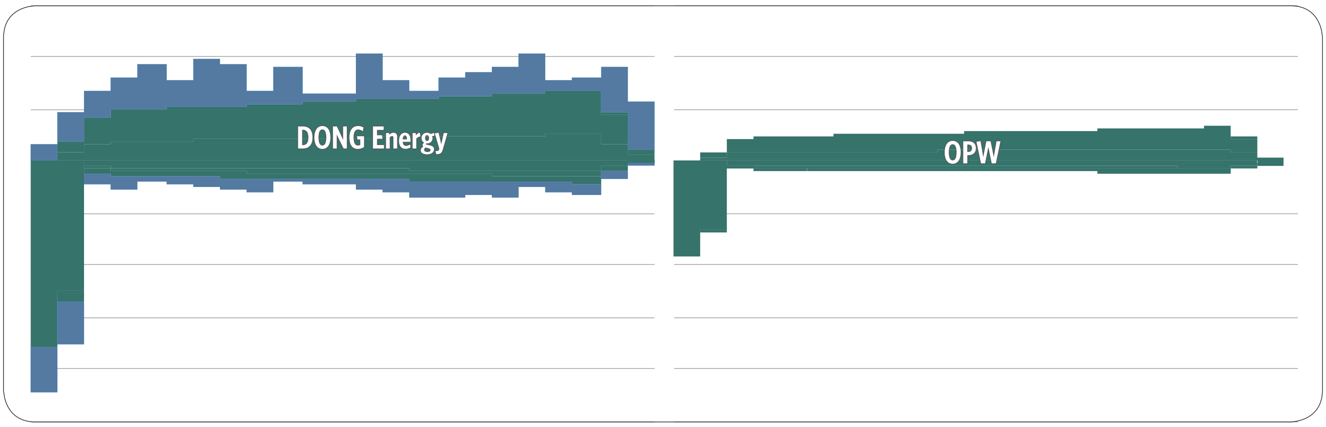
How did the cash flow profile attract non-utility investors?

The overall effect of policies and the financial engineering on investors' expected cash flows, highlights a cash flow profile closer to that of a fixed-income security. This becomes obvious when you compare a possible cash flow profile for DONG Energy's investment in Walney with the likely cash flow profile for OPW (Figure 10).

Apart from the different ownership levels that affect the scale of the two profiles (50.1% vs. 24.8% respectively), we remark that:

- The **construction management contract shields financial investors from potential cash flow 'downsides'** such as cost overrun or delay-related costs. Should extra costs be incurred, it is probably that DONG Energy, as the construction manager, would pay for them (dotted area in the lower-left part of the left graph). Similarly, based on typical O&M contracts, it is likely that the Dutch financial investors are shielded from additional O&M costs (on top of the O&M fee), with DONG Energy (plus Siemens during the first five years) liable for any extra costs as the O&M service provider.
- Similarly, the contract probably **limits potential revenue that might otherwise flow to financial investors**. Should construction and O&M costs actually be lower than planned, DONG Energy would be the sole beneficiary. Likewise, should DONG Energy ultimately sell OPW's share of Walney power generation and associated

Figure 10 – DONG Energy vs. OPW stylized expected cash flow profile



benefits for more than the amount stated in the PPA, all of the 'upside' would accrue to DONG Energy (dotted area in the upper part of the left graphic). On the other hand, should DONG Energy sell OPW share of Walney output for less than the PPA, DONG would be the only party to suffer a loss as OPW is protected from price variations.

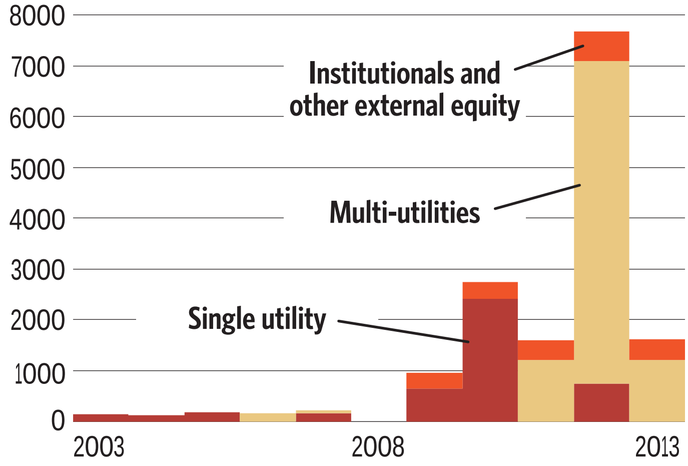
The end result is a quasi-fixed income security (probably closer to a synthetic corporate bond[59] than a government bond). So when considering 'de-risked' direct equity stakes in offshore windfarms, a more realistic asset class benchmark might be corporate bonds rather than the alternative or private equity asset classes. There are, however, some limits to this synthetic issue, as the financial engineering cannot perfectly emulate a fixed-income security. Risks that continue to rest with the equity investors are:

- **Counterparty risk,** which becomes a key issue with the multiplication of contracts around OPW participation in the Walney Offshore Windfarms. Should one party not respect its obligations under a contract, there is a risk that other contracts might be affected.
- **Refinancing risk.** This turned out to be a genuine source of concern for the Dutch financial investors, as the outcome determines the level of recurring financing charge that will ultimately impact the return for the financial investors.
- **Liquidity risk** of the investment which prevents any quick exit. This would usually command a premium over some liquid benchmark.
- Although **change of policy** is typically addressed in PPAs, the default treatment and to what extent actual change of policy might match the definition in a PPA is unclear.
- Finally, some financial investors may prefer "plain vanilla" alternatives that are at least as profitable but may be riskier, for the sake of simplicity.[60]

59 i.e. security replicating the cash flow profile of a debt security issued by a private firm.

60 The term 'plain vanilla' describes a standardized financial instrument, usually options, bonds, futures and swaps. 'Plain vanilla' finance is the opposite of more exotic instruments that alter the components of a traditional financial instrument, resulting in a more complex security.

Figure 11 - 10 years of commissioned and financed offshore windfarms in the UK - in USD million



Source: CPI analysis based on BNEF and 4COffshore data

How have offshore wind projects been financed in the UK? What has been the participation of financial investors in such projects?

We now consider how offshore wind projects have been financed in the UK over the last ten years in order to highlight the investment trend, the evolution of the sources of financing, and where Walney fits into this. Based on Bloomberg New Energy Finance (BNEF)[61] and 4COffshore data,[62] we reconstituted the pipeline of commissioned and financed offshore windfarms in the UK (3.6 GW) over the last ten years by the overall investment amount in USD million (Figure 11). We categorized windfarms by year of commissioning (or expected year) and individual shareholders' contributions to overall investments (based on ownership percentages, distinguishing between single-utility sponsorship, multiple-utilities sponsorship, and resort to external non-utility equity contributions - institutional investors notably). **The total value of the investments for 3.6 GW of capacity from 2003-2013 is in excess of USD 15 billion.**

We identified four main methods of financing offshore windfarms in the UK:

1) Balance sheet financing – single equity contributor

Until 2009 the preferred method of financing offshore windfarms was for a single utility to invest and finance its stake on a balance sheet basis (using a mix of equity injections from the group holding to the subsidiary

61 Bloomberg New Energy Finance: www.newenergyfinance.com

62 4C Offshore: www.4coffshore.com

Table 5 – UK-commissioned and -financed offshore windfarms with non-utility investors

WINDFARM (CAPACITY)	COMMISSIONING YEAR (EXPECTED)	NON-UTILITY EXTERNAL INVESTOR (%)	UTILITY INVESTORS (%)
Inner Dowsing (97.2 MW)	2009	TCW Asset Management (50%)	Centrica (50%)
Lynn (97.2 MW)	2009	TCW Asset Management (50%)	Centrica (50%)
Gunfleet Sands I & II (172 MW)	2010	Marubeni Corporation (50%)	DONG (50%)
Walney I & II (367.2 MW)	2011+2012	PGGM + Ampère Equity Fund (24.8%)	DONG (50.1%) and SSE (25.1%)
London Array I (630 MW)	2012 (E)	Masdar (20%)	DONG (50%) and E.ON (30%)
Lincs (270 MW)	2013 (E)	Siemens (25%)	Centrica (50%) and DONG (25%)

Source: CPI analysis based on BNEF and 4COffshore data

on the one hand and intra-group loans on the other). More than 1 GW of offshore wind was financed like this method. The rationale for this was the early stage risk nature of such technologies and, ultimately, the lack of appetite on the part of banks to lend on a project basis.

2) Balance sheet financing – multiple equity contributors

As projects have become larger, riskier, and costlier, utilities have courted equity partners among other utilities. By sharing equity ownership, they spread project-specific risks among several shareholders and alleviate the burden on the capital expenditures. More than half of offshore windfarm projects commissioned and financed in the UK over the last 10 years involved at least two utilities / energy companies. The major contributors were DONG Energy, Centrica, SSE, RWE, E.ON, Statkraft, Statoil, and Vattenfall.

3) Off-balance sheet financing – non-utility external equity contributions

It was only in 2009 that non-utility equity contributions were added to the picture (see Table 5). Since then, several UK offshore windfarms added nontraditional investors (i.e. not utilities) to the equity base of their investments to make up for the lack of bank financing and to allow utilities to pursue their capital expenditures / diversification objectives.

Over the last 10 years, non-utility investors have contributed around 13% shareholders contributions in offshore wind projects. These investors were (1) fund managers (TCW Asset Management and Ampère Equity Fund), sovereign wealth funds (Masdar), and institutional investors (PGGM), (2) offshore technology providers (Siemens), and (3) Japanese trading companies (Marubeni). Apart, perhaps, from Siemens, none of these investors is a natural owner of offshore windfarms. It is therefore no surprise that most of these projects involved long-term PPAs and similar arrangements to the Walney financial engineering (with the exception of vendor financing and deferred contingent consideration payment). Moreover, the UK OFTO process helped relieve utilities' balance sheets from the cost of transmission assets. These assets were, for the most part, transferred to consortia of infrastructure and private equity funds (Mitsubishi – Barclays in the case of Walney).

4) Project financing

Thanks to growing industry practice, the credibility of policies, and the strength of investors' balance sheets, banks are becoming more comfortable with lending on a project basis and standardized lending terms are starting to emerge.[63] The 270 MW Lincs offshore windfarm is the first project that will be project financed in the UK.[64]

Later stage (re)financing

It is worth noting this financing picture is by no means static. Ownership can still change hands and windfarms that are initially financed 100% on balance sheet are potential candidates for both refinancing on a project finance basis and the sale of equity stakes to external investors (both utilities and institutional money):

63 Report from the Financing Sub-group to the Offshore Wind Developers Forum, 2011.

64 Initial financing rather refinancing of existing contributions - see afterwards in the text.

- Some **individual stakes are already being refinanced on a project finance basis.** Both the European Investment Bank (EIB) and commercial banks have been providing debt to help refinance. For instance, the EIB made credit lines available to Vattenfall for its share in the 300 MW Thanet offshore windfarm, and several commercial banks lent Masdar Abu Dhabi Future Energy money to refinance its 20% stake in the 630 MW London Array I offshore windfarm.
- In other instances, **multiples stakes are refinanced together as a portfolio of projects rather than a single one** – sometimes with onshore windfarms, on a project finance basis or sold to other entities that finance those acquisitions on a project finance basis. For instance, a group of 10 banks helped Centrica refinance a portfolio consisting of one onshore windfarm (26 MW Glens of Foundland) and two offshore windfarms (97.2 MW Inner Dowsing and 97.2 MW Lynn) when 50% of this portfolio was sold to asset manager TCW Asset Management.
- In other geographies, institutional investors have required a **positive track record of several years** before committing to acquire stakes. For instance, 7 years of offshore windfarm operating life was required by Danish institutional investors before they purchased a minority stake in the 165.6 MW Nysted offshore windfarm in Denmark (initial sponsor was DONG Energy).

5) What would it take to replicate and scale up WOW financial engineering?

Given the financing challenge for low-carbon energy infrastructures, we now explore whether the WOW model could be replicated by other groups of investors in respect of other projects, technology, geographies, or policies. While the lack of detailed, publicly available information on the Walney financial arrangements prevents us from discussing precise levels of expected return, we can lay out a framework that might allow for the replication or scaling up of the WOW model.

Non-utility external equity contributors

To date, DONG Energy has managed to attract investment to its projects from Dutch (PGGM) and Danish pension funds (PKA and PensionDanmark), private equity funds (Ampère), industrial conglomerates / trading firms (Marubeni), and foundations / endowments (the Lego Foundation[65]) to support its portfolio. Other utility sponsors have also managed to attract sovereign wealth funds (Abu Dhabi via ownership of Masdar) and technology providers (Siemens). One of the main reasons that institutional investors are attracted by direct stakes in windfarms, and this goes for all infrastructure investments, is their preference to avoid the layers of fees present in infrastructure funds.

In terms of scaling up this financing model (assuming the same external investors but additional investments; or the same categories of investors but new participants), we identify the following major hurdles:

- **complexity** of the security (especially with a larger universe of proven asset classes) and required due diligence (cost and dedicated staff);
- **sustainability / credibility of the policy environment;** and
- the **specific risks** (counterparty, refinancing, and liquidity) identified previously.

Looking at other potential external investors[66] we find that **insurance companies** have the financial capacity to invest and match the profile of investors in offshore windfarms (return requirement, risk tolerance, and specific constraints). However, increased financial regulation in Europe (Solvency II)[67] prevents them from doing so. **Banks** and **mutual funds** (and, we could argue,

65 The Lego Foundation acquired 32% of the 277 MW Borkum Riffgund in Germany.

66 A more systematic and exhaustive approach would be to relate global financing needs for offshore wind with financing capacity over a given horizon. The latter would require a thorough analysis of (1) developers' balance sheets and capital expenditures (for instance, major European utilities: DONG Energy, RWE, E.ON, EDF, etc.), (2) passive external investors' share of assets under management potentially reinvested in such direct stakes (institutional investors and high-net worth individuals), (3) government money supporting such deployment (quantification of public money dedicated or channeled via various types of incentive packages), and (4) financial institutions money lending to project shareholders.

67 Solvency II is an EU Directive to reform and harmonize European insurance regulation that relies on three pillars: minimum capital requirements (quantitative requirements), supervisory review processes (qualitative, i.e. governance and risk management), and market discipline (disclosure and transparency requirements). The indirect effect of this major change in regulation will be to increase return expectation from direct stakes by insurance companies or constrain insurance companies' investment ("Insurers will have to assess the risks associated with their capital allocations and hold higher levels of liquid assets to match these risks...For example, Solvency II may have a negative impact on insurance companies' capacity to hold the long-term maturities of green bonds.") European Climate Foundation, EU Roadmap 2050, 2011).

hedge funds) do not typically take direct equity stakes in specific projects as it goes beyond their comfort zone. Notably, they require liquidity (and offshore windfarms would not be part of the 'acceptable' asset classes for banks). **That leaves us with the high net worth individuals** (that is, individuals whose net worth is typically above USD 1 million) **and institutional investor categories**. They match the profile but would require additional structuring efforts (either on the family office / advisor side or on the utility sponsor side) to cover tax, legal, and liquidity requirements (in case of hardship).

Other policy configurations

In **terms of incentive types, the WOW model of selling minority stakes to non-utility investors is flexible enough to accommodate green tradable certificates (e.g a long-term PPA, as in the UK with ROCs), feed-in tariffs (Germany), and reverse auction-set feed-in premia (Denmark for the Anholt windfarm) as long as return requirements are met and the policy environment is deemed stable and sustainable.** However, we emphasize that achieving a stable and sustainable policy environment is itself a major capacity challenge that currently remains beyond the reach of some developed and developing countries, but especially developing ones. The framework that informs the Walney transactions is complex, sophisticated, and has taken years to develop. It was made possible by high levels of political stability, institutional capacity, and technical capability. While the desire to implement this kind of model could trigger a reform process within a country, poor institutional and/or political capacity in some developing countries would be a significant barrier to the scale up of this model.

Other geographies

Demand for the deployment of offshore windfarms has been reported both in the US (states along the East Coast) and in Asia. While it would be possible to replicate the WOW model in those geographies, successful projects would rely heavily on well defined incentive policies (to make up for the cost differential with grid prices) and supply chain considerations. While there are turbine manufacturers in most regions, most installation vessels and offshore cable manufacturers are located in Northern Europe where the bulk of offshore windfarms have been deployed. This could imply a significant additional burden on investment costs until local manufacturers and suppliers build up indigenous, low-cost alternatives, or scale is sufficient to drive costs down.

Other technologies

In terms of applying the WOW model to other investments in renewables technologies, we must keep in mind that this model was a reaction to an inability to secure bank debt. It has since been reported that the European banking sector is becoming more comfortable with offshore wind as an investment class.[68] In terms of the critical size of individual investments – it must be 'worth it' for a nontraditional investor to undergo the familiarization and due diligence required to become comfortable with these kinds of projects. Individual onshore windfarms or moderate size solar PV plants would not meet that criterion, but portfolios might. Less mature renewables such as Concentrated Solar Power (CSP) would be an interesting match if the policy and legal environments (for the enforcement of contracts) were deemed good. Whether the model could be applied to even less mature renewables is not clear due to their lack of track record and / or low deployment levels (tidal, geothermal, etc.).

68 Report from the Financing Sub-group to the Offshore Wind Developers Forum, 2011.

Conclusions

The innovative character of the Walney financing model highlights an approach that succeeded in providing sufficient incentives to make nontraditional investors like pension funds and private equity funds comfortable with taking passive and de-risked equity stakes in non-mature renewables. **The combination of UK incentives and project-specific financial engineering allowed external passive investors to achieve a quasi-fixed income position.**

The UK Government's ambitious deployment targets for both offshore wind renewables and green growth benefits play an essential role in attracting project developers in the first place, and creating sufficiently attractive revenue streams to allow developers to bring on board minority shareholders. The policy framework was able to support the financing model because it covers the entire value chain of the offshore industry and all investment stages. In the Walney transaction, **the most critical role for public finance was the provision of green tradable certificates over a 20-year horizon, which provides around 60% of the expected project revenues**. We estimate that the value of those ROCs may, in fact, contribute approximately as much to the Walney Offshore Windfarms as private capital from the utilities and financial investors.

Public investment flows are well aligned with private investment objectives. In fact private and public contributions are intertwined to an extent that both private and public stakeholders are able to extract benefits: private returns and direct & indirect co-benefits respectively. The DONG Energy group's presence in all financial engineering arrangements (as developer, majority shareholder, construction manager, O&M service provider, offtaker, and lender) allowed it to concentrate and shoulder some risks instead of the external equity contributors.

DONG Energy and other offshore wind developers and financial investors have already made incremental adjustments to the 'Walney model', itself a version of previous models, as they **learn from experience**. The first version of this financing model occurred in 2009 when Danish pension funds contributed to a Danish offshore windfarm with a 7-year operating track record. Walney went one step further by selling those stakes in a planned offshore windfarm to foreign financial investors. Recent developments highlight the replication of this financing model to other types of investors (foundations and Japanese trading firms) and other policy environments (Germany).

Index of acronyms

AUC	Assets Under Construction
BNEF	Bloomberg New Energy Finance
CAPEX	Capital Expenditure
CLP	China Light & Power
CMA	Construction Management Agreement
CSP	Concentrated Solar Power
DEPUK	DONG Energy Power UK
DONG	Dansk Olie & Naturgas A/S
EIB	European Investment Bank
GBP	Great Britain Pound
HOLD	OPW HoldCo Ltd
IRR	Internal Rate of Return
ISDA	International Swaps and Derivatives Association
LCOE	Levelized Cost of Energy
LEC	Climate Change Levy Exemption Certificate
MID	OPW MidCo Ltd
MTN	Medium-Term Notes
NPV	Net Present Value
OECD	Organization for Economic Cooperation and Development
O&M	Operations and Maintenance
OFGEM	Office of Gas and Electricity Markets
OFTO	Offshore Transmission Owner
OPEX	Operating Expenses
OTC	Over-The-Counter
P&L	Profit and Loss
PPA	Power Purchase Agreements
REGO	Renewable Energy Guarantee of Origin
ROC	Renewable Obligation Certificate
SPA	Share Purchase Agreement
SPV	Special Purpose Vehicle
SRI	Socially Responsible Investment
SSE	Scottish Southern Energy
SSER	Scottish Southern Energy Renewables
TOFA	Take-Out Finance Agreement
UK	United Kingdom
UK DECC	UK Department of Energy and Climate Change
UK HMRC	UK Her Majesty's Revenue & Customs
VAT	Value Added Tax
WOW	Walney Offshore Windfarms

Annexes

Financial statements for Walney Offshore Windfarms

P&L ACCOUNT (IN GBP '000)	Q42004 + FY2005	2006	2007	2008	2009	2010
Turnover	-	-	-	-	-	-
Cost of sales	-	-	-	-	-	-453
Administratives expenses	-2,993	-1,787	-952	-63	-171	-3,210
Auditors' fee	-5	-4	-6	-9	-17	-17
Other operating income	-	-	-	-	-	43
Gross profit	-2,993	-1,787	-952	-63	-171	-3,620
EBIT	-2,993	-1,787	-952	-63	-171	-3,620
Interest receivables and similar income	19	78	17	355	5,619	5,091
Exchange gains	-	-	7	276	5,448	-
Amount receivable from group companies	-	52	2	-	-	-
Bank interest receivable	19	2	8	9	149	5,091
Capital gains and other financial income	-	24	-	70	22	-
Amounts written off investments	-	-	-	-90	-	
Interest payables and similar charges	-88	-37	-159	-1,106	-24,905	-17,381
Exchange losses	-	-	-52	-762	-8,468	-4,062
Amounts payable to group companies	-88	-	-	-160	-658	-10,772
Other interest payable	-	-	-4	-	-	-3
Interest on bank overdraft	-	-37	-103	-184	-560	-2,309
Loss on termination of derivative financial instrument	-	-	-	-	-15,219	-
Unwinding of discount on decommissioning provision	-	-	-	-	-	-235
Profit on ordinary activities before taxation	-3,062	-1,746	-1,094	-904	-19,457	-15,910
Tax on profit on ordinary activities	-	-	8	0	7,231	4,038
Loss on ordinary activities before taxation multiplied by standard rate of UK corporate tax	?	?	-328	-258	-5,448	-4,455
Accelarated capital allowances	?	?	?	?	-	8
Short term timing differences	?	?	?	?	-	65
Expenses not deductible for tax purposes	?	?	-	26	-	-
Pre trading losses carried forward	?	?	328	232	5,448	4,382
Group relief receivable	?	?	8	-	-	-
Total current tax	?	?	?	?	0	0
Retained profit / (loss) on the period	-3,062	-1,746	-1,086	-904	-12,226	-11,872
Dividends	-	-	-	-	-	-
Retained profit / (loss) on the period	-3,062	-1,746	-1,086	-904	-12,226	-11,872

BALANCE SHEET (IN GBP '000)	2005	2006	2007	2008	2009	2010
Fixed assets						
Intangible assets - Heysham rights	-	-	-	-	90	90
Cost at beginning of the year	-	-	-	-	-	90
Reclassified from tangible fixed assets	-	-	-	-	90	-
Cost at the end of the year	-	-	-	-	90	90
Net book value end of the year	-	-	-	-	90	90
Tangible (fixed) assets	-	-	-	13,568	89,926	506,686
Cost at beginning of the year	-	-	-	-	13,568	89,926
Additions	-	-	-	13,568	76,448	416,760
Assets Under Construction (AUC)	-	-	-	-	-	393,057
Decommissioning	-	-	-	-	-	23,703
Reclassified to tangible fixed assets	-	-	-	-	-90	-
Cost at the end of the year	-	-	-	13,568	89,926	506,686
Depreciation	-	-	-	-	-	-
Net book value end of the year	-	-	-	13,568	89,926	506,686
(Fixed asset) Investments	90	90	90	90	-	-
Subsidiaries	90	90	90	90	-	-
Disposals	-	-	-	-	-90	-
Net book value end of the year	90	90	90	90	-	-
Fixed assets	90	90	90	13,658	90,016	506,776
Current assets						
Debtors - amounts falling due within one year	4,975	398	2,890	1,164	8,167	21,878
Trade debtors	-	-	-	-	-	118
Amount receivables from group companies (parent and fellow subsidiary undertakings)	4,975	392	68	990	126	2,669
DONG Energy A/S	?	?	?	?	126	
Deposits paid (aka prepayments and accrued income)	-	-	2,350	-	-	-
VAT recoverable	-	-	472	-	-	-
Deferred tax asset	?	?	?	-	7,231	11,269
Other timing differences	?	?	?	-	-8	58
Tax losses available	?	?	?	-	7,239	11,211
Other debtors	-	6	-	174	810	7,822
Related to the cost of disposing of the company's offshore transmission assets	-	?	-	?	?	1,775
Debtors - amounts falling due after more than one year	-	-	-	-	37,000	173,877
Loan notes receivables	-	-	-	-	37,000	173,877
SSE Renewables Holdings (UK) Ltd. in accordance with loan instrument (23/12/2009)	-	-	-	-	37,000	173,877
Cash at bank and in hand	40	223	-	1,127	92,495	258,111
Current assets	5,015	621	2,890	2,291	137,662	453,866

Current liabilities						
Creditors - amounts falling due within one year	-3,167	-519	-3,874	-14,042	-20,497	-235,344
Trade creditors	-	-	-190	-2,458	-4,546	-20,854
Amounts payable to group companies	-2,801	-	-2,623	-4,637	-1,848	-193,954
DONG Energy Power A/S	?	?	?	?	?	?
DONG WIND (UK) Ltd.	?	?	?	?	?	?
Bank overdraft	-	-388	-1,039	-6,844	-	-
Other creditors and accruals	-366	-131	-22	-103	-14,103	-20,536
Creditors - amounts falling due after more than one year	-	-	-	-	-217,705	-
Amounts owed to group undertakings	-	-	-	-	-180,705	-
DONG Energy A/S	-	-	-	-	-180,705	-
Amounts owed to associated undertakings	-	-	-	-	-37,000	-
SSE Renewables Holdings (UK) Ltd.	-	-	-	-	-37,000	-
Current liabilities	-3,167	-519	-3,874	-14,042	-238,202	-235,344
Net current assets	1,848	102	-984	-11,751	-100,540	218,522
Total assets less current liabilities	1,938	192	-894	1,907	-10,524	725,298
Creditors - amounts falling due after more than one year	-	-	-	-	-217,705	-
Provisions for liabilities - decommissioning	-	-	-	-	-	-23,938
Charged to the P&L account	-	-	-	-	-	-235
Adjustment to provision	-	-	-	-	-	-23,703
Net assets	1,938	192	-894	1,907	-228,229	701,360
Capital and reserves						
Called-up share capital	1	1	1	1	2	4
Share premium	4,999	4,999	4,999	8,499	8,498	732,252
Hedging reserve (FRS 26) - renamed other reserves in 2009	-	-	-	115	-	-
Profit and loss account	-3,062	-4,808	-5,894	-6,798	-19,024	-30,896
Equity shareholders funds	1,938	192	-894	1,817	-10,524	701,360

STATEMENT OF TOTAL RECOGNISED GAINS AND LOSSES (IN GBP '000)	2005	2006	2007	2008	2009	2010
Loss for the financial year	?	?	-1,086	-904	-12,226	-11,872
Value adjustment for hedging transactions	?	?	-	115	-115	-
Total recognized gains and losses relating to the year	?	?	-1,086	-789	-12,341	-11,872
Proceeds from the issue of shares	-	-	-	3,500	-	723,756
Net (depletion in)/addition to shareholders' funds/(deficit)	-	-	-1,086	2,711	-12,341	711,884
Opening shareholders' funds/(deficit)	-	-	-	-894	1,817	-10,524
Closing shareholders' funds/(deficit)	-	-	-1,086	1,817	-10,524	701,360

Shareholders' Equity Contributions in Walney Offshore Windfarms

Shareholder	Number of shares	Total amount paid up (Nominal value + any share premium)	Amount paid up on each share (Nominal value + any share premium)	Aggregate nominal value (GBP)	Implied share premium	Details on transaction	Transaction date	Reference
DONG Energy Power (UK) Ltd. (DONG Wind (UK) Ltd. until 2009)	**3.006**	**757.797.604**				**50,1%**		
	100	**100**	1	100	-	Ordinary shares acquired (from whom?)	30/09/2004	WOW SH01 2010
	1.000	**5.000.000**	5.000	1.000	4.999.000	Ordinary shares acquired (from whom?)	11/11/2005	WOW AR01 2010
	1	**3.500.000**	3.500.000	1	3.499.999	Share allotment - Increase in nominal capital	18/12/2008	WOW AR01 2010
	899	**899**	1	899	-	Share allotment - Capitalisation of outstanding debt - "GBP 899 out of the total sum standing to the credit of the Company's share premium account be capitalised (...) paying up in full at par 899 ordinary shares of GBP 1 each"	22/12/2009	WOW SH01 2010 WOW written resolution circulated on 22/12/2009
	- 502		-	502		Transferred to SSER - "The **net consideration receivable** in respect of this disposal was **GBP 23,231,000** and the attributable cost of investment was GBP 2,134,000 resulting in a profit on disposal of GBP 21,097,000, As of 31 December 2009, **GBP 1,090,000 of the net consideration receivable was contingent upon certain future conditions being fulfilled** and the total figurate of GBP 23,231,000 represents the directors' best estimate, at the date of these accounts, of the likely, final net consideration receivable, having regard to the likely outcome of the contigencies specified."	23/12/2009	WOW AR01 2010 DEPUK annual report 2009
	749	**311.427.540**	415.791	749	311.426.791	Share allotment - Capitalisation of shareholder loans - "An amount of GBP 311,427,540 payable to DONG Energy A/S has been converted to 749 ordinary shares of GBP 1 each at a premium in WOW"	30/06/2010	WOW AR01 2010 WOW annual report 2009
	501	**159.284.539**	317.933	501	159.284.038	Share allotment - Capitalisation of shareholder loans - "A further amount of GBP 159,284,540 was capitalised by issuing a further 501 ordinary shares of GBP 1 at a premium"	22/12/2010	WOW SH01(01) 2011 WOW annual report 2010
	- 744		-	744		Transferred to OPW - "The company sold 501 GBP 1 ordinary shares in" WOW "to OPW HoldCo Ltd. for a **consideration of GBP 171.7m**. The attributable cost of investment (including shareholder loans) and associated costs of sale were GBP 188.5m resulting in a GBP 16.3m loss on disposal". "The sale price applicable to **both** transactions contains elements where the amount payable is uncertain and is contingent upon a future event".	22/12/2010	WOW AR01 2011 DEPUK annual report 2010
	501	**134.328.125**	268.120	501	134.327.624	Share allotment - Cash	24/06/2011	WOW SH01(07) 2011
	501	**144.256.401**	287.937	501	144.255.900	Share allotment - Cash	15/12/2011	WOW SH01(12) 2011
SSE Renewables Holdings (UK) Ltd.	**1.506**	**298.940.883**				**25,1%**		
	502			502		Transferred from DONG	23/12/2009	WOW AR01 2010
	251	**94.403.000**	376.108	251	94.402.749	Share allotment - Capitalisation of shareholder loans - "An amount of GBP 94,403,000 payable to SSE Renewables Holdings (UK) Ltd. has been converted to 251 ordinary shares of GBP 1 each at a premium in WOW"	30/06/2010	WOW AR01 2010 WOW annual report 2009
	251	**79.793.212**	317.901	251	79.792.961	Share allotment - Capitalisation of shareholder loans - "A further amount of GBP 79,793,212 was capitalised by issuing a further 251 ordinary shares of GBP 1 at a premium"	22/12/2010	WOW SH01(01) 2011 WOW annual report 2010
	251	**64.676.331**	257.675	251	64.676.080	Share allotment - Cash	24/06/2011	WOW SH01(07) 2011
	251	**60.068.340**	239.316	251	60.068.089	Share allotment - Cash	15/12/2011	WOW SH01(12) 2011
OPW HoldCo (UK) Ltd.	**1.488**	**178.874.020**				**24,8%**		
	744			744		Transferred from DONG: acquisition of 24.8% of the company's share capital and outstanding shareholder loans	22/12/2010	WOW AR01 2011
	248	**78.847.437**	317.933	248	78.847.189	Share allotment - Capitalisation of shareholder loans - "An amount of GBP 78,847,437, representing the value of shareholder loans acquired, was capitalised by issuing a further 248 ordinary shares of GBP 1 at a premium"	22/12/2010	WOW SH01(01) 2011 WOW annual report 2010
	248	**62.313.440**	251.264	248	62.313.192	Share allotment - Cash	24/06/2011	WOW SH01(07) 2011
	248	**37.713.144**	152.069	248	37.712.896	Share allotment - Cash	15/12/2011	WOW SH01(12) 2011
Total for 2011	**6.000**	**1.235.612.507**				**100,0%**		

Detailed risk allocation matrix

	Risk allocation	DONG Energy	SSER	OPW	Green Giraffe	Siemens	UK Government	Treatment / Mitigation Measures for the party where the residual risk is allocated
DEVELOPMENT	**Project development risk** Risk of a faulty design causing delays or questions regarding the viability of the project	Bear all the development risks						Track record / leading expertise of DONG in offshore wind / multiple application process
	Procurement / Equipment Turbine failure / defect	After expiration of the 5-year warranty				5-year warranty		Ability to sign up for extended Siemens warranty / track record of the turbines used
	Construction costs Cost overrun / delays	Construction manager / Guarantee	Costs not covered by DONG financial guarantee: force majeure, liquidated damages cap, etc.					Careful planning / Financial guarantee provided by DONG Energy to other shareholder
	Financing costs OPW debt package late or non-repayment	As the bridge / mezzanine lender - 1-2 year			As the refinancing package lender - longer-term risk			Several securities (share & account charges, assignments and debentures) for DONG, structural subordination & facilitate the terms of a refinancing
OPERATIONS	**Regulatory risk** Hypothetical move away from ROC incentives / change of ROC multiplier	The UK Government pledged not retroactively reduce support under the Renewables Obligation						Lobbying by consortium / legal challenge to any retroactive or prospective change / Attempt to hedge or transfer risk
	Production / availability risk Extreme wind / lower-than-expected wind regime	Ope. performance guaranteed in shareholder agreement	Costs not covered by DONG operating performance guarantee		Affect cash flow stability and might cause negative covenants to be breached	5-year warranty		Track record / leading expertise of DONG in operating offshore wind farms
	O&M cost risk Cost overrun / delays for maintenance	O&M manager / Guarantee	Costs not covered by DONG contract: force majeure, liquidated damages cap, etc.					Careful planning / Maintenance schedules minimizing downtime
	Power price risk Lower-than expected / volatile power price	Own price exposure plus OPW's one	Own price exposure	15-year PPA with DONG but after the 15 years? Renegotiation?				Hedge residual positions using a mix of PPAs (DONG 2-year PPA with Statkraft), forward / futures and option contracts
	Associated benefits price risk Lower-than expected / volatile ROC, LEC and REGO prices							
OUTCOME	**UK deployment targets and emissions reduction** Risk of having not enough offshore wind MWh deployed						Penalties regarding EU renewables targets	Monitoring production & dispatch / displaced carbon-emitting generation / Ensure policy attractiveness, proper design and review process
	UK renewable deployment cost Risk of paying too much for offshore wind technologies	Hypthetical risk - should the UK government decide to reduce the attractiveness of the offshore wind incentive in order to alleviate pressure on budget					Sustainability of incentive at risk: extra costs	Monitoring award of incentives in relation to earmarked budget & generation cost assessment / Assurance that ROC system will prevail for X years vs. Flexibility
	Co-impacts Risk that employment / industrial development goals not met						Relevance of support should non climate considerations prevail	Monitoring of employment, related industrial activities (offshore wind industry and ports) and learning from the project

DONG Energy is "DONG Energy A/S", "DONG Naturgas A/S", "DONG Energy Horns Rev 2 A/S" and "DONG Energy Power (UK) Ltd."
SSER is "SSE Renewables Holdings (UK) Ltd."
OPW is "OPW HoldCo Ltd.", "OPW MidCo Ltd." and "OPW TopCo Ltd."
and the ultimate shareholders thereof (PGGM Infrastructure Fund and Ampère Project Holding 6 BV)

Low | Mid | High

Additional sensitivity tests

Table 6 - Sensitivity tests to construction costs

	-30%	-20%	-10%	Base case	10%	20%	30%
Construction cost (£ bn.)	0.9	1.0	1.1	**1.2**	1.4	1.5	1.6
RESULTING IRR	13,7%	11,8%	10,2%	**8,9%**	7,7%	6,7%	5,9%

Table 7 - Sensitivity tests to availability factor

	85%	90%	95%	Base case
Availabilty factor (%)	85	90	95	**100**
RESULTING IRR	6,6%	7,4%	8,1%	**8,9%**