Business Plan for an Offshore Wind Farm on the Kish & Bray Banks

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The Project

The Dublin Array is an offshore wind farm project to be located on the Kish and Bray Banks in the Irish Sea approximately 10 km to the east of the coasts of Dublin and Wicklow. The wind farm will consist of 145 turbines arranged in rows four to five deep that run north-south along the banks. The wind farm has a potential installed capacity of up to 520 MW, depending on the capacity of the wind turbines to be installed. The wind farm will be connected to the onshore electrical grid by cables that will run from the wind farm to a grid landfall point in south Dublin. The Dublin Array has access to 364 MW connection capacity from Eirgrid under Gate 3 of the group processing scheme as administered by the Commission for Energy Regulation. This would allow 364 MW of power to be exported to the national grid from the project.

In 2012 the Irish and UK Governments began to actively explore the possibilities for export of Irish renewable energy to the UK. Such renewable energy could include both onshore and offshore wind energy projects. This process has now reached the stage where the Irish and UK Governments signed a Memorandum of Understanding on Energy Trading on January 24th 2013. It is clear that the Governments intend to facilitate large scale wind energy projects that will contribute to the achievement of Irish and UK 2020 EU targets. This is a clear signal to wind energy developers. Dublin Array therefore has two potential routes to market. Government may, depending on the prospects for achieving current and future mandatory EU targets, proceed with a scheme to construct offshore wind energy for domestic consumption in Irish waters. Alternatively, the measures to be proposed in the forthcoming Intergovernmental Agreement in relation to green energy export may allow offshore wind energy projects in the Irish Sea to export renewable energy to the UK. Further details of these two potential routes to market for Dublin Array are provided in this business plan.
The Project Promoters

Company Description
The Dublin Array project was initiated in 1997 by Saorgus Energy, a wholly Irish owned company that specialises in the development of large-scale wind energy projects. Saorgus Energy has developed approximately 100 MW of wind power onshore in Ireland to date, and it has a further 525 MW of onshore projects at various stages in its development portfolio. Two companies, Kish Offshore Wind Ltd and Bray Offshore Wind Ltd, have been set up for the purposes of financing and constructing the Dublin Array project. These companies contain the same directors and shareholders as Saorgus Energy Ltd. Development management services are provided to the project by Saorgus Energy.

Company Experience
Saorgus Energy has over 15 years experience of all aspects of wind energy development, financing and management. It has developed over 100 MW of onshore wind farms and has secured planning permission for 13 projects. Saorgus Energy also provided planning consultancy services to ESB and Bord na Mona in the past. Saorgus Energy was joint development partner with Powergen, a UK utility, in one of its first developments. It subsequently purchased Powergen’s Irish assets when Powergen withdrew from the Irish electricity market. Powergen has since been acquired by E.on UK. Saorgus Energy has financed its onshore wind farms to date using a range of financial arrangements, including non-recourse bank debt finance, private funds investment and tax / BES schemes. It has closed financial deals with most of the major Irish banks and a number of major international banks. As well as developing Dublin Array, Saorgus Energy has over 500 MW of onshore wind farms at various stages of development at present.

Corporate Details
Kish Offshore Wind Ltd, Bray Offshore Wind Ltd and Saorgus Energy Ltd are companies incorporated in Ireland with registered numbers 385489, 385488 and 111330 respectively. All companies have their registered offices at Enterprise House, Kerry Technology Park, Listowel Road, Tralee, Co. Kerry.

The companies are close companies within the meaning of Part 13, Taxes Consolidation Act, 1997. The financial statements of the companies are audited by an independent auditor in accordance with International Standards on Auditing (UK and Ireland) issued by the Auditing Practices Board.
Development Team

The development team for the Dublin Array will be led by personnel from Saorgus Energy, together with personnel from the project development partners for the project. The development team will consist of:

Michael Barry – Director, Business Development & Financing
Michael Barry will lead the financing of the Dublin Array.

Michael is a successful businessman and director of Saorgus Energy. He has 20 years experience of wind energy development and finance. His financial experience includes equity / debt project financing and private funds investment. He has led the project financing / refinancing of eight wind farm transactions and has also funded the purchase by Saorgus Energy of a number of wind farm projects. He also has property, horticultural, communications and forestry interests. Prior to working in wind energy, he ran a number of successful businesses in the catering and hospitality industry. Mike has worked on the Dublin Array project since its inception in 1997.

Dr. Aidan Forde - Director, Business Development & Policy / Regulation
Dr. Aidan Forde will lead the consenting, approvals and regulation of the Dublin Array.

Aidan is a geologist and director of Saorgus Energy. Aidan holds a PhD in geology from James Cook University, Queensland, Australia. He has 20 years experience of wind energy development & regulation and has led the development of over 100 MW of onshore wind development by Saorgus Energy. He is an expert in Irish and international wind energy policy and regulation, and has held positions on the Irish Wind Energy Association and Trading and Settlement Code Modification Panel. Prior to working in wind energy, he spent several years researching and lecturing at universities in Ireland and Australia. Aidan has worked on the Dublin Array project since its inception in 1997.

Dr. John Bourke – Director, Investment & Finance
Dr. John Bourke will lead the discussions between the European Investment Bank and the Dublin Array.

John is a Dublin business consultant and director of Saorgus Energy. He holds a PhD in chemical engineering. John has held directorship positions with AIB Group in corporate finance, fund management, and other banking areas and continues to reside on the board of a number of international banks and companies. He has worked in wind energy since 1999.

Damien Courtney – Manager, Project Development & Finance
Damien Courtney will manage the development and financing of the Dublin Array.

Damien has worked in wind energy for 10 years. He holds an MSc in Physics from the National University of Ireland, Cork. Damien has worked on all aspects of wind farm
development, including the financing of six wind farms, the construction of two wind farms and the planning and development of several other projects. Prior to working in wind energy, he worked for seven years with PwC Consulting, two of which were spent working with Eirgrid on the design and implementation of the electricity market rules. Damien has worked on the Dublin Array project since 2004.

*Gene McGillycuddy – Manager, Project Development & Engineering*

Gene McGillycuddy will manage the grid connection and construction of the Dublin Array.

Gene is an award winning marine engineer with more than thirty years of project management experience in all aspects of the project cycle from concept through to design, planning, construction and process operations. As director of engineering, he has delivered a large number of industrial manufacturing projects with combined values of over €200m. He also provided engineering consultancy services to industry, which included connection of wind farms to the national grid.

*Christine Henderson – Manager, Finance & Electricity Market Specialist*

Christine Henderson will act as financial control lead for the Dublin Array.

Christine has worked in wind energy for 6 years. She is responsible for the financial management of three operational wind farms, including all aspects of Single Electricity Market operations. Christine is also responsible for financial modelling for projects in development and for potential acquisitions. She is a member of the IATI. Prior to working in wind energy, Christine spent eleven years working as a management accountant with Royal Bank of Canada in Jersey.

*Denis Tangney – Manager, Operations*

Denis Tangney will lead the operations management for the Dublin Array.

Denis studied mechanical engineering at the Institute of Technology, Tralee. In his role as operations manager with Saorgus Energy, he is responsible for the operation and maintenance of three wind farms. This responsibility includes management of all aspects of wind turbine / electrical operation and maintenance and ensuring that best practice is applied in health & safety and environmental management systems. Denis works closely with wind turbine manufacturers, electrical maintenance companies and international turbine specialists. He is trained by the Danish Wind Academy to turbine technician & inspection standard. He is also certified to work at height.
Financing

Operating Revenue
In February 2008 the Minister for Communications, Energy & Natural Resources announced that the REFIT (renewable energy feed-in-tariff) scheme would include offshore wind energy projects at a value of €14 per MWh. In September 2009 the offshore REFIT support measures were published by the Department. However, in 2012, Government announced that offshore REFIT would not be progressed for the time being, due to the global economic downturn. However, at the same time, Government began to actively explore the possibilities for export of Irish renewable energy to the UK. Such renewable energy could include both onshore and offshore wind energy projects and there are several such projects actively seeking to connect to the UK and supply electricity in the medium term.

This process has now reached the stage where the Irish and UK Governments signed a Memorandum of Understanding on Energy Trading on January 24th 2013. At the signing of this agreement, Minister Rabbitte said:

“Ireland has the potential to generate far more wind energy than we could consume domestically. The opportunity to export this green power presents an opportunity for employment growth and export earnings which we must seize if we can. Today the two Governments are committing themselves to a programme of work.

“We will work closely with the UK government so we are in a position to move towards a formal agreement on energy trading. We will tease out the very complex engineering and market issues so that, subject to their successful resolution and a decision by UK and Irish Ministers to proceed, in a year’s time, we will be in a position to make an intergovernmental agreement providing a formal basis for energy trading.”

It is therefore clear that the Governments intend to facilitate large scale wind energy projects that will contribute to the achievement of Irish and UK 2020 EU targets. This is a clear signal to wind energy developers. Dublin Array therefore has two potential routes to market. Government may, depending on the prospects for achieving current and future mandatory EU targets, proceed with a scheme to construct offshore wind energy for domestic consumption in Irish waters. If so, Dublin Array will be in a position to assist in the achievement of targets in this way. The revenue of the project in this case will come from sales of electricity onto the Irish market together with a market-based investment support initiated by Government.

Alternatively, the measures to be proposed in the forthcoming Intergovernmental Agreement in relation to green energy export may allow offshore wind energy projects in the Irish Sea to export renewable energy to the UK, either by way of “statistical transfer” as mandated by the EU Renewables Directive or by way of new interconnector cables across the Irish Sea. The revenue of the project in this case will
come from sales of electricity onto the UK market together with a market-based investment support initiated by the UK Government. The exact nature of such a scheme is dependent on measures yet to be introduced by both Governments. However, it is clear as of the time of writing in February 2013 that both Governments wish to encourage Irish export projects such as Dublin Array. In this sense, it is important that projects such as Dublin Array are ready to proceed to construction once the relevant enabling framework is put in place by the authorities. Dublin Array is completing the necessary consenting programme in parallel with these government initiatives.

Capital Spend to Date
To date the development of Dublin Array has involved the expenditure of 4-5 million euros, the vast bulk of which has been spent in Ireland on professional engineering and environmental services. The largest tranche of expenditure was in the preparation of the Environmental Impact Assessment. This involved many personnel, most of whom are independent contractors, such as ornithologists, civil and marine engineers, fisheries experts, marine biologists, shipping consultants and ecologists specialising in Natura 2000.

All of this expenditure serves to add value to the project but this value is only realised if the project can eventually proceed to construction and operation. It is a reality of such development work that all of this expenditure may be lost if the project cannot proceed for some reason. As such, the Irish promoters of Dublin Array stand to lose heavily if an unforeseen difficulty arises that prevents progress.

It is normal in such resource development projects for relatively small players (as compared to large utilities) to take this risk because large utilities tend to be risk-averse. When the main risks are eliminated by the development company, it may then approach a large utility to form a partnership to bring the project to completion. The development company can then use the value that it added to the project to enable it to maintain a significant stake in the project. In this way, indigenous companies can partner with large international companies in these flagship projects.

It is useful to note that, if the indigenous companies did not risk their local capital, such projects would be developed exclusively either by international development companies or by the large utilities themselves. In this case, none of the value added would remain locally.

Development Partners & Sources of Capital
The build cost for Dublin Array (based on 520 MW installed capacity) is in the region of €1.7 – 1.8 billion.

The project promoters have been in discussions with a number of the largest companies who are actively developing offshore wind portfolios (mostly drawn from
utilities, oil and gas companies and industry specialists) to make arrangements for the project to move forward as a joint venture. Under this arrangement, the project promoters would proceed with the sale of part of the project, the proceeds of which would be re-invested to part finance their share of the capital cost of the project. The balance of their financing would be funded by project finance (non recourse loan) from a commercial bank / club of banks. This bank debt would be secured on the project.

The following diagram outlines a typical financing structure that would be used by the project promoters to develop the project:

![Diagram of financing structure](image)

**Fig. 1 The proposed financing structure for the Dublin Array**

**Equity / Private Investors**
As in previous onshore projects developed and constructed by Saorgus Energy, equity / private investors have taken a place in the provision of capital either through share issue or loan notes. Should this be required, an independent investment company would be contracted to source investors.

**Equity Financing**
The equity financing is expected to contribute up to 20% of the overall capital requirement of the project. Financial and utility investors would expect shares issued for this type of financing to yield an annual return in the region of 10%. The structure of the shares would be decided by the joint venture.

**Bank Financing**
The remaining 80% of the capital cost will be financed by bank debt. The bank financing will be sourced from a number of commercial banks. Debt finance will also be sourced from the European Investment Bank (EIB). According to the EIB “the promotion of renewable energy, energy efficiency, R-D-I in energy and security of supply has become a priority objective to which the EIB devoted €2.2 billion in 2008 for the development of renewable energy projects” (source [www.eib.org](http://www.eib.org)).
It has recently participated in the funding of:

- Eirgrid East-West Interconnector (€300 million)
- ESB Renewables Project (€175 million)
- Belwind Offshore Wind Farm, Belgium (€300 million)
- Bord Gáid Éireann (€150 million)

The EIB granted €300 million to finance the Belwind offshore wind farm, which reached financial close on 24 July 2009. This is the first time the EIB assumed project finance risk for an offshore wind farm. Construction of the first phase of this wind farm has since been completed.

The EIB also participated in the financing of the London Array Offshore Wind Farm (£1 billion).

The EIB finances a maximum of 50% of the total cost of any project.

It is not possible to provide a meaningful financial model for the project at this point in time, prior to the establishment by the Irish and UK governments of the enabling arrangements for the Intergovernmental Agreement in relation to green energy export. It is expected that these arrangements will provide a sufficient return on investment to attract the very large capital inflows required. When the necessary arrangements are put in place by the authorities, this Business Plan will be updated.
Construction

Construction Project Plan
The successful development of offshore wind farms requires planning consent, agreements to connect to the electricity grid and, at present, market support mechanisms that guarantee a price to be paid for the power produced by the wind farm. Each of these is considered a pre-requisite in the construction project plan, as the final investment decision is dependent on all of these components being achieved.

The following tasks form part of the construction project plan:

- Wind resource assessment
- Geotechnical investigations
- Project partner joint venture selection
- Financial modelling
- Debt financing arrangements
- Equity financing arrangements
- Technical due diligence
- Legal due diligence
- Construction project management contract
- Turbine supply contract
- Balance of plant contract
- Procurement of long lead materials
- Insurance provisions
- Health & safety planning
- Environmental management planning
- Transport planning
- Turbine procurement
- Electrical procurement
- Civil marine procurement
- Marine civils construction
- Turbine installation
- Electrical installation
- Turbine testing
- Electrical pre-commissioning
- Commissioning

The timescale for the project plan for the Dublin Array cannot be presented in a meaningful way at present as it will depend on the support and enabling arrangements to be put in place by the Irish and UK Governments. However, once the necessary arrangements are put in place by the authorities, this Business Plan will be updated.
**Construction Contractual Arrangements**

The Dublin Array will be built under either a Turnkey or a Balance of Plant contract, with a Balance of Plant contract being the preferred contract structure. Under this arrangement one primary contractor will construct the balance of plant (foundations and electrical infrastructure) for the project. The wind turbines will be supplied by the turbine manufacturer. Owner’s engineering services will be provided under a separate project management contract.

This is the arrangement that is being used by Scottish and Southern Energy in the construction of the 500 MW Greater Gabbard project in the North Sea off the coast of Suffolk, UK. In this project, Fluor, as primary contractor, is constructing the balance of plant including the installation of wind turbines. The wind turbines are being manufactured by Siemens. In the next section – Construction Supply Chain – details are provided for the contractors that will be used on the Dublin Array.

**Construction Supply Chain**

In the last few years the offshore wind energy sector has emerged as a distinct sector of the wind industry. With 5 GW of offshore wind installed today, the industry has now entered a phase of strong industrial growth. The industry is now moving to standardise the installation process and to develop dedicated offshore turbines from a dedicated supply chain, just as was the case with onshore wind around 20 years ago.

**Wind Turbine Suppliers**

There are several turbine manufacturers supplying the offshore market today. It is very likely, given the scale of offshore wind development anticipated and necessary to achieve existing and future EU targets, that there will be new entrants to this market. The turbine supplier for the Dublin Array will be chosen after a competitive tender.

**Electrical Infrastructure Suppliers**

The electrical infrastructure consists of the cabling between turbines, offshore substation and associated equipment. Among the leading providers of offshore electrical infrastructure are ABB and Siemens, both of whom are capable of delivering long cable runs to shore using HVDC (High Voltage Direct Current) technologies. The electrical infrastructure for the Dublin Array will be installed under the Balance of Plant contract, which will be awarded after a competitive tender.

**Substructure Suppliers**

The main civil marine engineering firms that are involved in the offshore wind industry today include MT Hojgaard, Per Aarsleff, Bilfinger and Berger, Hochtief, Zublin, Dredging Intervational, Van Oord and Ballast Nedam. An international marine civil engineering contractor such as one of the above will be contracted under the Balance of Plant contract to carry out the substructure engineering works for the Dublin Array.
Grid Connection Construction

Connection Programme
The project promoters have provided for connection to either Ireland or the UK for this project, as noted above. The actual connection will depend on the nature of the intergovernmental agreement that is currently in progress, as noted above. When this aspect of the project becomes clearer, this business plan will be updated accordingly.

Possible Irish Connection Route
The 364 MW connection of the Dublin Array to the national grid has been confirmed by Eirgrid and the connection route has been surveyed (see Fig 3 below). From the cable landfall, the project can connect to the existing 220 kV substation at Carrickmines, Co. Dublin by means of high voltage underground cable.
Fig. 3  Irish connection route for the Dublin Array - offshore (above) and onshore (note the offshore cable route shows two landfall options; the northern landfall was chosen for the project after the grid connection point was confirmed).
Fig. 4 Thanet 300 MW offshore wind farm grid connection - Richborough substation, Kent
Construction Project Management

A project management company with offshore construction experience in the international market will be appointed to act as project manager for the Dublin Array. The project manager will supervise the design and monitor the progress of the procurement, manufacture, construction, erection and commissioning of the project to ensure the project is procured and built to the envisaged programme under the project contracts and to the specified quality.

The project manager will ensure that all major events/activities associated with the electrical and wind turbine works at the site of the project, including turbine erection...
operations, and all electrical infrastructure/grid commissioning operations are supervised. The project manager will also be responsible to ensure that the highest standards of health and safety and environmental management are maintained by all contractors in accordance with applicable laws.

**Health & Safety**
The construction project manager will have responsibility for health & safety during the design stage (acting as Project Supervisor Design Stage) while the balance of plant contractor will have responsibility for health & safety during the construction stage (acting as Project Supervisor Construction Stage).

The project manager will monitor the performance of the Project Supervisor for the Construction Stage as defined in the Safety, Health and Welfare at Work (Construction) Regulations, 2006.

**Environmental Management System**
The construction project manager will have responsibility for the project’s environmental management system and will ensure that the project complies with all of the obligations under the relevant legislation.

**Warranty & Insurance**
A lead broker with experience of sourcing construction insurance for offshore wind in the international market will be appointed to define the insurance requirements for the Dublin Array. As for onshore wind, these requirements will be customised for the project depending on the warranty provisions of the balance of plant and turbine supply contracts, and will cover the risks specific to offshore construction. The construction insurance contract will be awarded after a competitive tender.

All construction contracts will contain warranty provisions from the original equipment manufacturer / contractor.

**Installation Vessels**
A variety of offshore vessel types will be used for the construction of the Dublin Array. These include survey ships, turbine installation vessels, construction support vessels, work boats and crew transfer vessels.

**Survey ships**
These are required to survey the sea floor in preparation for the installation of the offshore wind farm. There is sufficient supply of survey ships in the offshore wind market to meet demand today.

**Turbine Installation Vessels**
These are custom built self propelled installation vessels that can carry multiple turbines at a time. Twelve such vessels are needed to meet the construction of 40 GW of offshore wind by 2020 (the target set by the European Wind Energy Association).
**Construction Support Vessels**
These are used to assist in the construction of offshore wind farms. They include motorised and non-motorised jack-up barges, barges, pontoons and platforms. There is sufficient supply of these vessels in the offshore wind market.

**Work Boats**
These vessels support the work of other vessels by providing supplies of tools and consumables to other boats. There is also sufficient supply of these boats.

**Crew Transfer Vessels**
There is sufficient supply of crew transfer vessels.

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Fig. 6 A “Jumping Jack” vessel installing a turbine at Burbo Bank offshore wind farm, Liverpool Bay (*picture courtesy Siemens*)
Port facilities are very important for supplying the offshore market. The port facilities that are required for the construction of the Dublin Array include deep water access, reinforced quaysides to take the large weight of turbines (if not delivered directly to site) and large storage areas. While it is possible for turbine components to be delivered to the offshore site and assembled directly there, one of the key conclusions from the Beatrice offshore wind farm in the UK and from the DOWNVInD project (http://www.downvind.com) is that pre-assembly activities should be carried out onshore, rather than offshore. It is expected that most of the pre-assembly work will be carried out onshore at a port facility. In order to facilitate this, the port to service the Dublin Array needs to be able to meet the following requirements:
- an area of storage of 6 to 25 ha (60,000 to 250,000 m²);
- quay length: approximately 150 m to 250 m;
- quay bearing capacity: 3 to 6 tons/ m²;
- a seabed with sufficient bearing capacity near the pier;
- draught of minimum 6 m;
- warehouse facilities of 1,000 to 1,500 m²;
- access for smaller vessels (pontoon bridge, barge etc);
- access for heavy / oversize trucks;
- being available for the project installation.
Fig. 8  An aerial photograph of Mostyn Quay during the construction of Burbo Banks offshore wind farm

Fig. 9  Loading a 182 tonne nacelle for a Siemens 3.6 MW offshore wind turbine
For operation and maintenance, the required port facilities include full time access for service vessels and service helicopters, safe access for technicians and loading / unloading facilities.

The ports that are able to meet all of the above requirements in Ireland are Dublin Port and Belfast (Harland & Wolff). Arklow, Wicklow and Drogheda would be able to meet some of the requirements for construction and all of the requirements for operation. It is planned to use Dublin Port for the construction of the wind farm. In the event that Dublin Port or Belfast are not available, there are a number of ports on the west coast of the UK that can be used (Hunterston, Barrow-in-Furness, Mostyn, Milford Haven). One or more of Dublin, Arklow, Wicklow and Drogheda will be used for operation and maintenance of the wind farm.
Operation

Warranty & Maintenance

Wind Turbine Warranty & Maintenance

Wind turbine warranty and maintenance will be provided by the turbine supplier under the wind turbine supply agreement for a period of at least five years. Scheduled maintenance will consist of one minor and one major service per wind turbine per year. The wind turbine manufacturer will also have responsibility for all unscheduled maintenance tasks. Access to turbines for operations tasks will be the responsibility of the turbine supplier. Under the wind turbine supply / warranty agreement, the cost of replacement of all defective turbine components is covered by the turbine manufacturer during the warranty period. This removes the risk of defective materials / design in the turbines. An availability guarantee is also provided by the wind turbine supplier under the warranty agreement. In the event that the guaranteed availability (typically set to 95% +) is not reached, penalties are imposed on the supplier. This provides an incentive to the turbine supplier to ensure that downtime resulting from faults is minimised, and removes the risk of financial exposure to the project resulting from downtime.

Electrical / Civils Warranty & Maintenance

The electrical infrastructure warranty and maintenance will be provided under the balance of plant contract for a period of at least five years. Scheduled maintenance consists of annual inspection and maintenance of all electrical equipment including transformers, switchgear and protection. The warranty will cover the cost of replacement of any electrical components during the warranty period. The balance of plant contract will also contain a warranty for the foundation substructure / marine civils. Maintenance of scour on turbine foundations and cable routes will be provided by the balance of plant contractor.
Operations

The day-to-day operations management of the wind farm will be contracted to a dedicated operations company, with experience of offshore wind farm operations. The contract will be awarded after a competitive tender. The contract term will commence during the construction phase of the project on turbine pre-commissioning and last for a period of five years from the commercial operation date of the project, with an option to extend the contract before the end of the five year term. The operations contractor will have responsibility for all aspects of the day-to-day running of the wind farm including:-

- Remote monitoring of the wind turbine and electrical infrastructure through SCADA (Supervisory Control and Data Acquisition System) system interface;
- Carrying out remote turbine resets;
- Liaising with the turbine and electrical maintenance teams in the event of faults;
- Acting in the ‘Responsible Operator’ role in interfacing with the system operators;
- Monitoring grid power quality and coordinating electrical resets in the event of grid trips;
- Inspecting wind turbine and electrical infrastructure on a monthly basis;
- Coordinating turbine and electrical maintenance; and
- Performance monitoring and reporting.
Management
The overall management of the Dublin Array will be contracted to a management company, with experience of all aspects of offshore wind farm development and operations. The management contract will consist of two phases – one covering the construction phase of the project to the commercial operation date, and the other covering the operation phase of the project for a period of five years from the commercial operation date. Saorgus Energy has provided management services to three wind farms under construction and operation, as well as to a large number of wind farms in development.

Fig. 11 Lillegrund offshore wind farm, Denmark