

North Seas Energy Clusters

Scoping paper

INTRODUCTION

The Political Declaration on energy cooperation between North Seas Countries, signed on 6 June 2016, set up a three-year work programme, based on voluntary cooperation, to facilitate the further cost-effective deployment of offshore renewables, in particular wind, and interconnection in the North Seas countries.

It was agreed that the work programme would be developed and implemented by four Support Groups focusing on the following work streams:

- Maritime spatial planning
- Development and regulation of offshore grids and other offshore infrastructure
- Support framework and finance for offshore wind
- Standards, technical rules and regulations in the offshore wind sector

The aim of this paper is to outline the scope for cost savings and identify some of the challenges which may arise from the development of concrete coordinated/combined/hybrid projects in four regions in the North Seas area (detailed in Annex 1) where a coordinated approach appears to have the highest potential.

The proposed cluster approach will take as a starting point the offshore development plans of Signatory States' which already have them and consider how cooperation between developers in different States might lead to improved efficiency and timely implementation, with the ultimate aim to reduce the costs of the energy transition for the participating states.

Within the North Seas region there are certain areas where regional coordination in the development of offshore energy generation and transmission infrastructure appears to have significant added value, compared to isolated national developments. The High Level Group of the North Seas Energy Cooperation agreed in May 2017 that it would be useful to take a results-oriented "cluster" approach in order to identify this potential added value. It was agreed that Support Group 2 should lead the work on energy clusters, involving other Support Groups when issues arise which are relevant to their areas of work.

Areas which have the potential to be "energy clusters" are geographical areas in the Exclusive Economic Zones of any Signatory State to the June 2016 Political Declaration on North Seas Energy Cooperation

1. that border on areas in one or more other Signatory States,
2. where there is a firm intention to invest in offshore infrastructure for the purposes of transporting or generating energy, and
3. where, in the bordering state(s), further linked investment could either reduce costs or provide access to the bordering national market(s) or both.

The objectives of cost reduction and/or access to a bordering market could, in particular, be achieved by combining offshore generation and interconnection to form “hybrid projects”. Such projects typically have a long lead time, so are unlikely to be built in the near future. Nevertheless, action needs to be taken in the short term to facilitate and enable their development in the medium or longer term. This action includes analysing the potential costs and benefits of regional coordination of the energy clusters identified and possibly proposals for modifying the legal and regulatory framework applicable to these hybrid projects.

The above objectives could also be met by joint or coordinated auctioning/tendering procedures and financing schemes. In this paper, such forms of collaboration are referred to as “coordinated/combined projects”.

Moreover, it should be noted that the European Commission issued a call for tender on 30 June for a 12 month study on the challenges and benefits of a cluster-based approach. Its aim is to demonstrate the potential value of a cluster approach; assess the plans for investment in renewables and the offshore grid, and the potential for cost reduction; identify measures to address any differences in the relevant regulatory frameworks for investment in renewables and grid infrastructure; and establish action plans for each cluster. The purpose of the study is very much in line with the work of Support Group 2 and the outcomes of this study will inform the work of the Support Groups in the North Seas Energy Cooperation. It will be important to ensure that the relevant work of the Support Groups and the consultants is closely coordinated and procedures will need to be set up to achieve this, for example sharing of draft papers, regular meetings between the relevant Support Groups and the consultants to present progress reports, discuss issues arising etc. An early meeting with the consultants will be arranged as soon as they have been appointed.

AREAS

Four geographical areas appear to have particular potential to become a cluster, due to the fact that a coordinated approach to the development of the offshore infrastructure being planned there is, at first sight, likely to lead to efficiencies and cost savings. These are:

1. German Bight
2. Mid-North Sea (area close to the Dogger Bank)
3. BE-NL-UK
4. Ireland-UK

Information on these four areas is included in the Annex. These areas were chosen because of their geographical spread which means that as many signatory States as possible can be involved in the work. This is important because any lessons learned and solutions identified as a result of the cluster work are likely to be relevant to other projects which may be facing similar challenges. It should be noted that the identified clusters have different time perspectives for their realisation and accordingly different levels of complexity. However, one of the first objectives of the work will be to consider whether there may be other potential clusters (and one of the aims of the Commission study on the cluster approach is to identify possible further clusters). As resources are limited, it will not be possible to do the same in-depth work on all four of these clusters. It has therefore been agreed to focus on the BE-NL-UK cluster in the first instance. As a first step, Support Group 2 will hold meetings at the end of September with the relevant stakeholders in clusters 1, 2 and 3 (TSOs,

regulators, developers) to discuss how the work might be taken forward in their clusters and inform them of the decision to prioritise work on cluster 3 in the first instance. The other Support Groups may wish to join these meetings and at a later stage become more actively involved in the work on cluster 3. (Noting that cluster 4 is the least mature of the four areas and that any lessons learned and solutions identified as a result of cluster work are relevant to other projects, it has been decided not to progress cluster 4 at this stage).

POTENTIAL FOR COST SAVING

The development of coordinated/combined/hybrid projects is not an objective in itself. Such projects should only be facilitated where they have the potential to reduce costs, increase efficiencies and where the Signatory States concerned have an interest in pursuing them.

Savings and efficiencies could, for instance, accrue from

- the shared use of infrastructure, for example by combining generation, transmission, and interconnection or infrastructure that facilitates their construction
- Coordinated lay-out to facilitate other uses in the neighbourhood of projects (ferry routes, recreational shipping)
- joint or coordinated tenders/auctions and support schemes in different countries
- storage/reuse of oil and gas infrastructure
- common technical and environmental standards and applied assessment methods
- optimised/special regulatory framework for the operation of offshore grid infrastructure

These objectives are in line with the work of the other Support Groups in the North Seas Energy Cooperation. It is therefore important that the other Support Groups also pursue a results-oriented approach and that there is an effective feedback mechanism between Support Group 2 and the other Support Groups. As offshore wind development takes place further and further offshore, the additional benefits of coordinated or combined approaches could outweigh the additional costs arising from factors such as increased cable lengths, installation in deeper waters etc.

CHALLENGES

The offshore wind potential in the North Seas has so far been developed on a national basis. Each country has traditionally developed its own sea area based on national sovereignty, and often without taking a larger sea-basin perspective or coordinating directly with neighbouring countries. Each country has its own regulatory regime, renewable energy development plan and support scheme, timing and process for tendering and auctioning of offshore wind capacity, maritime spatial

planning procedures¹, grid development strategies and technical and environmental standards and assessment methods.

As a result of this legal and regulatory patchwork, developers of infrastructure have little incentive to pursue even the most evident synergies that could derive from cross-border cooperation. For individual project developers it is most often easier and less risky to develop their projects independently rather than consider linking them up with other relevant infrastructure developments, even though this may ultimately result in a sub-optimal lay-out of the offshore grid infrastructure.

Project developers and TSOs cannot solve these challenges by themselves. Work by the Support Groups and the relevant regulators is therefore needed to ensure that the lay-out of offshore infrastructure is optimised, efficiencies maximised and costs minimised. This is a major part of the rationale behind the Political Declaration.

SCOPE FOR ACTION

The challenge is therefore to identify a possible legal and regulatory framework for coordinated/combined/hybrid projects that overcomes any existing barriers and effectively incentivises the coordinated development of infrastructure, where this appears efficient, and is at the same time feasible in terms of grid expansion, from the planning phase onward. This is a difficult task which is likely only to be possible by testing various possible approaches on concrete (virtual) projects. Moreover, as coordinated/combined/hybrid projects are intrinsically more risky than individual projects, there will be a need for strong political support, and possibly some financial support, to reduce the risks.

While coordinated/combined/hybrid projects will clearly be developed and promoted by private parties and TSOs, governments and regulators will have an important role, for example by addressing potential barriers in the regulatory and legal framework.

Examples of action that Governments and regulators in the relevant subgroups might take, in cooperation with potential developers and investors, to create a favourable environment for coordinated/ combined/ hybrid projects, are set out below (but this list is not definitive):

1. Identifying the potential for synergies between various existing and planned projects, and the potential to integrate them where this makes economic and commercial sense, where it is technically viable and does not lead to difficulties in terms of grid expansion (onshore and offshore) or congestion management.
2. Addressing regulatory and legal hurdles to the development of coordinated/combined/hybrid projects
3. Supporting the development of coordinated/combined/hybrid projects, for instance by:

¹ However, according to the recent Maritime Spatial Planning Directive member states are required to look beyond their own borders when it comes to maritime spatial planning.

- Speeding up assessment, planning and permitting processes etc.
- Combining the Strategic Environmental Impact assessment
- Developing joint or coordinated auctioning/tendering procedures and financing schemes
- Coordinated implementation (in time and space) and possible sharing of facilities
- Possibly providing additional financial resources for innovative projects
- Optimising the operation of the offshore assets, and their interfaces with the relevant onshore grid
- Providing financial and/or regulatory incentives to trigger action and overcome first mover risks

4. Create a stable and predictable policy and regulatory framework by:

- Agreeing the rationale and objectives for the development of coordinated offshore transmission and generation infrastructure, and the regulatory framework governing its operation
- Proposing a framework for the allocation of costs and benefits between the parties concerned, in order to ensure that no party suffers a loss as a result of taking part in cooperative projects
- Proposing financing/cost recovery mechanisms that enable transmission owners to participate in the development of cooperative projects regardless of whether they are located in their area.

The activities of the relevant Support Groups will be coordinated to ensure choreographed activities through the following actions:

- Support Group 2 will have regular meetings to agree on common objectives, to consider synergies between projects, to identify the specific challenges and find practical solutions to overcome them, and to exchange best practices. (The regional action plans that will be developed under the above mentioned Commission study on the cluster approach will suggest concrete steps to facilitate promising projects. These action plans will identify where common infrastructure might be used, how maritime spatial planning might be coordinated, how investments could be coordinated to maximise economies of scale, identify specific areas where harmonised standards may bring cost reduction, consider environmental aspects and provide an initial financial screening.)
- Where appropriate, political guidance and approval will be sought in order to ensure a stable and predictable policy environment that encourages innovative solutions.
- SG1 will develop the clusters further from the perspective of spatial planning and strategic environmental assessment with a focus on accumulation of environmental impacts and impacts on other uses. Case studies foreseen include German Bight, UK-NL-BE and Dogger Bank. An EU project proposal on this was submitted in April 2017. Funding has been awarded and is expected to start by the end of 2017 and be for two years.
- Any solutions and approaches that may be developed for energy clusters can also be applied to other projects facing similar challenges. In this context it is important to note that the

energy cluster work will be carried out in parallel with the work in the other SGs and that all areas of work will have equal priority.

Annex 1

POTENTIAL CLUSTERS

This is an illustrative list of possible clusters and does not preclude work being carried out on other projects. Due to limited resources, it will not be possible to do the same in-depth work on all four of the clusters. It has therefore been agreed to give the BE-NL-UK cluster the first priority, followed by the German Bight and Mid-North Sea clusters. The Ireland-UK cluster will not be taken forward for the time being.

Hybrid projects and clustering options will require more detailed analysis on a case-by-case basis, as the dimensioning of assets is decisive for the business case of each project. The four clusters presented in this Annex represent a first step towards identifying potential areas where it might be beneficial to remove barriers to facilitate hybrid projects, but there may well be others,

In light of the results of the NSCOGI grid integration study and other studies, it must be borne in mind that the potential of clusters depends not only on the development of offshore wind but also on how the European energy system is likely to develop in the future, ie how the electricity production portfolio of Signatory States develops and the related potential for market integration.

1. German Bight

State of play

Interconnection

The COBRA cable (PCI 1.5), a 700 MW subsea HVDC cable, will connect Denmark to the Netherlands and is being developed by TenneT and Energinet.dk. Construction of the onshore part has started, and in the Netherlands the construction of the offshore part started in January 2017. The project, which mostly runs through German waters, will be technically ready to integrate wind farms. However, it should be noted that, as the capacity of the cable is limited to 700 MW, this presents a challenge to it being used both as an interconnector and to transmit electricity from offshore wind farms to shore.

Offshore wind

TenneT already owns and operates platforms and grid connections using DC technology in the German Bight area such as SylWin 1 - connecting the wind farms DanTysk, Sandbank and Butendiek in the Eastern North Sea region to Germany. TenneT is planning additional platforms and connections in the area. In the Netherlands there are currently no wind farms planned in the area. In Denmark Horns Rev 1 and 2 are in operation, Horns Rev 3 is under construction.

Prospects

The route of the COBRA cable passes through areas where significant further wind farm development may be expected and the cable is designed to enable connection of a wind farm.

Doubling up offshore connectors as interconnectors might present significant efficiency gains, which will need to be analysed on a case-by-case basis. Usage of offshore assets both as connection to shore (ie renewables integration) and interconnection between countries (ie market integration) adds significant technical complexity to the projects, which need to pay off. In addition there might

be fewer connections to the shore, requiring fewer permitting procedures and leaving more space to other users of the sea. Regulatory and legal issues need to be developed for hybrid solutions.

Key challenges

There are so far no plans for connecting any adjacent wind farms to the COBRA cable, even though it is technically ready.

The choice of the connection point to an offshore wind farm is strongly influenced by the regulatory regimes of the different Member States; these considerations generally outweigh the costs of physical connection. Furthermore, the costs of grid connection are often borne by the grid operator and not by the developer (as is the case in Germany, Denmark and the Netherlands). This means there is little incentive for developers to maximise connection efficiencies (for example by using an existing interconnector). The added complexity of bringing the generation from an offshore wind farm located in Germany in the Dutch and Danish support system is a likely deterrent..

Connection of an offshore wind development via an interconnector presents the additional challenge of creating a regulatory regime across borders which clearly defines, for instance, how and when the interconnector can be used and who gets priority when both interconnected and wind generated capacity are available.

Key stakeholders active in the region

- TenneT TSO B.V. and Energinet.dk – COBRA developers
- Windfarm developers in the German Bight
- TenneT GmbH Germany.

2. Dogger Bank

Current activities

The Dogger Bank sits across the border between the economic zones of the UK, Denmark, Germany, the Netherlands, and Norway. The region has excellent potential for offshore wind development due to the high wind speeds, shallow waters and type of seabed. Several plans exist for its development, which are in various stages of development:

- In the UK part of the Dogger Bank, there are four offshore wind projects with development consent (permission to build):

Project	Size (MW)	Ownership
Dogger Bank Creyke Beck A	1,200	Statoil (50%), SSE (50%)
Dogger Bank Creyke Beck B	1,200	Statoil (50%), SSE (50%)
Dogger Bank Teesside A	1,200	Statoil (50%), SSE (50%)
Dogger Bank Teesside B	1,200	Innogy (100%)

- The projects incorporate two separate connections to the UK: 'Redcar' for the two Teesside projects and 'Fraisthorpe' for the two Creyke Beck projects.
- **Viking Link** (PCI 1.1.4) is a joint project of National Grid Interconnection Holding Ltd and Energinet.dk, connecting UK and Denmark and scheduled for completion in 2022. There is a major offshore windfarm planned on the route of Viking Link – Hornsea Project One/Two/Three/Four (DONG Energy). This zone will need a platform to prevent losses to transmission. Viking Link could provide a connection to land for this offshore wind farm if designed appropriately.
- In the long term (beyond 2040) the **North Sea Wind Power Hub project**, for which TenneT and Energinet.dk signed a cooperation agreement in March 2017, envisages one or more artificial island hubs, surrounded by wind farms. The electricity generated would be delivered from the turbines to the island using AC connections, and the island connected to the shore by a DC line. This would allow for significant cost savings (compared to each wind farm connected individually to shore by a DC line). The island DC line could extend to several countries and would act as an interconnector, ensuring maximum leverage of the investment. The Dogger Bank would meet many of the conditions for the location of the project.

Prospects

There is much potential in the area and many interested parties. Especially in an area this far offshore there is a very significant potential for efficiencies deriving from combined interconnection and generation in the long term. However, due to the large distance from the shore and the multiple countries and stakeholders involved, a potential project in the Dogger Bank will involve a high degree of complexity. It might be useful to develop and implement such a huge project as the North Sea Wind Power Hub project step-by-step.

Key challenges

The implementation of the North Sea Wind Power Hub project needs a detailed cost-benefit analysis in order to examine if and where it would be useful to develop such an artificial island hub. Since the

Dogger Bank is on the territory of several Member States legal, regulatory and financial questions would need to be analysed in more detail. Cooperating across borders to find optimal solutions or to approach projects jointly so that they exploit these efficiencies is a significant challenge, in particular given the very high level of investments required. Plans for development of the different parts of Dogger Bank are also at very different stages in the countries concerned. This adds to the coordination challenge (e.g. the four offshore wind projects already have development consent, whereas the North Sea Wind Power Hub project has a long term perspective). Finally, for a project bringing this much electricity to the markets in the region (the aggregated capacity may end up between 70 and 100 GW) there are market risks and grid expansion questions to be considered.

Environmental aspects need to be further scrutinised as the Dogger Bank is partly a NATURA 2000 area.

The regulatory aspects, including priority use of the interconnector between wind farms and interconnected capacity (as described for the German Bight), also play a role in the various plans in this area.

Key stakeholders active in the region

- TenneT
- Energinet
- National Grid
- Forewind consortium
- DONG Energy
- Other wind farm developers/operators

3. UK – Netherlands – Belgium cluster

Current activities

Interconnectors

- The **BritNed** is an existing 1000 MV DC cable between the UK (Isle of Grain in Kent) and the Netherlands (Maasvlakte near Rotterdam).
- The **Nemo** project, is a 1000 MW DC link planned between UK (Richborough) and Belgium (Zeebrugge area) which is due to be commissioned by January 2019. The project partners are National Grid and Elia.
- The **TYNDP 2016 project No. 260** promoted by National Grid and TenneT considers the possibility of a second 1 GW HVDC connection between UK and the Netherlands. Possible synergies with the development of offshore wind capacity are the subject of further studies.
- The Modular Offshore Grid, a meshed infrastructure due to be commissioned at the end of 2019, will connect four future offshore windfarms to the Belgian coast, representing 1300 MW in total.
- Second interconnector between Belgium and GB (see TYNDP project 121)
- Next phase of offshore development in Belgium: TYNDP project 120 – “Offshore-Onshore Corridor”)

Generation

- In the UK four offshore wind farms have been developed in the **Thames Estuary** (Kentish Flats, Gunfleet Sands, London Array, Thanet).
- **Galloper Offshore Wind Farm**, being developed in a joint partnership by Innogy, is an extension of the existing and fully operational Greater Gabbard wind farm off the coast of Suffolk. Greater Gabbard has an installed capacity of 504 MW; Galloper will have a capacity of up to 336 MW with a commissioning date in 2018.
- Vattenfall's **Norfolk project** located north-east of the Norfolk Coast comprises two wind farm development areas. The first 1.8 GW of the project, Norfolk Vanguard, is already in the scoping phase; it comprises two distinct areas, Norfolk Vanguard East (NV East) and Norfolk Vanguard West (NV West) and will be connected to the shore by offshore export cables with landfall planned around Walcott and Happisburgh. The remaining 1.8 GW area, Norfolk Boreas, will be developed at a later stage with a separate planning application.
- **East Anglia ONE** is a 714 MW Scottish Power Renewables wind farm currently under construction east of Southwold and south of Norfolk. East Anglia Three (1200 MW) was granted development consent in August 2017. There are another two windfarm areas under development – East Anglia TWO and ONE North. These three zones together have a planned capacity of 2.3 GW.
- The Dutch government is commissioning **five 700MW** offshore wind parks in three offshore wind zones (Borssele, Hollandse Kust Zuid, Hollandse Kust Noord) in the North Sea until 2023. These wind parks have already been planned in detail and the permits are irrevocable, funding has also been provided. Project developers and TenneT have already made investment decisions and will make their final investment decisions in 2017 or beginning of 2018 at the latest. This implies that there is not much space to coordinate for these wind parks. The option was considered for the **Borssele Offshore Wind Zone** which is a cluster of Dutch wind farms along the Belgian-Dutch zone border. Each of the projects has been allocated to project bidders. Although the wind farms on both sides of the border are located right next to each other, it has been decided that there will be separate cables to bring the power to shore.

- On the Belgian side, four wind farms will be connected to shore via a Modular Offshore Grid (MOG) planned to be fully operational by 2020. A potential expansion (1-2 GW as an indicative figure) of additional offshore wind generation is being discussed. The MOG has an intrinsic optionality to be coupled to other offshore platforms which could arise in the context of further offshore grid development.
- Between 2023 and 2030, **another 7 GW** is foreseen for offshore wind farms in the Netherlands. The designated areas are already publicly known, the order and details of the roll-out of the wind farms will be decided later in 2017. These areas do not include the Dogger Bank. The wind area of **IJmuiden Ver** (approximately 6 GW right next to the UK border) is one of the areas under consideration. There are possibilities for hybrid solutions combining wind connections with interconnection to the UK (wind area or mainland) which could be investigated.

Prospects

While no coordination of national developments has taken place so far, there is a potential for such coordination for those projects which are in early stages of development. As in the German Bight case, there may be significant efficiencies in combining the use of connections to wind farms and interconnections. Another option would be the development of joint links to the shore for generation projects at adjacent locations belonging to neighbouring countries.

The possible new link NL-UK (TYNDP 2016 project No. 260) has the potential to become a first mover for a hybrid solution, for example in combination with the Dutch wind area IJmuiden Ver (as mentioned earlier).

Key challenges

In both the generation and the interconnection projects for which investment decisions have been made, there has been limited consideration of possible synergies between them. This is likely to be due to differences in planning procedures and regulatory frameworks, as well as perceived additional risks. The challenges appear to be similar to the case of the German Bight. An additional complexity may be the different approach to the regulatory situation of interconnections in the UK and on the continent (cap-and-floor model vs regulated asset-base).

Key Stakeholders active in the region

- TenneT
- National Grid
- Elia
- Many offshore wind farm developers
 - Innogy
 - ScottishPower Renewables
 - Shell
 - SSE (Scottish and Southern Energy)
 - Vattenfall
 - Dong

4. Irish Sea – geographical energy area

Current activities

[The TYNDP 2016](#) identifies a bottleneck between Great Britain and the island of Ireland (Figure 1). The area offers numerous opportunities for RES generation, mainly wind and tidal (Figure 2 shows the possible wind farm locations).

Two 500 MW HVDC interconnectors already operate between the two jurisdictions; the Moyle interconnector in the northern zone between Scotland and Northern Ireland and; the East West interconnector in the southern zone of the Irish Sea, connecting Ireland and UK. The two zones form corridors in the TYNDP which remain congested. Potential projects within these corridors that would alleviate the bottlenecks form a cluster known as the ISLES projects, which are included in the TYNDP 2016.

Neither of the corridors fully addresses integration of the Isle of Man.

- **ISLES Project:** The Irish-Scottish Links on Energy Study (ISLES) is an initiative designed to enable the development of interconnected grid networks to enhance the integration of marine renewable energy between Scotland, Northern Ireland and Ireland. The first phase of the project (ISLES 1) concluded that an interconnected offshore electricity grid network is technically possible and would have significant economic benefits. The initial ISLES concepts, Northern ISLES and Southern ISLES, could connect 2.8 GW and 3.4 GW of generation by circa 2030. The Indicative Southern ISLES Network Architecture concept plan is visualised below. It also incorporates two projects:
 - Northern zone – an optimal grid connection of offshore marine renewable energy resources (wind, wave and tidal) totalling 500 - 1000MW in the Irish Sea between Ireland and UK. This project is no longer a PCI project
 - Southern zone connecting Ireland and UK and effectively involving generation from RES (under consideration).
- **Isle of Man – Irish Sea energy hub:** A single electricity generator and operator company operates on the Isle of Man; the **Manx Electricity Authority** (MEA). The only electrical interconnector to the UK is owned by the Manx Cable Company, a wholly owned subsidiary of MEA.

The Isle of Man is **not a part of the EU** (nor the EEA), which creates regulatory challenges.

The local government is willing to **support RES generation** on its territory for export to the UK and the possibility of creating an interconnector hub on the island was suggested in the Council of Ministers' report on the Strategy for Offshore Energy Production of 2014. However the Minister for Economic Development has said that the costs must be borne by the developer, not the Isle of Man government.

The best areas for offshore wind development are located to the **north and east of the Island** (taking into consideration water depth, tidal current and sea bed type). Currently, there are **two projects** under development. Power generated by these projects would be **exported to the UK**.

- Tidal sites – **Manx Tidal Energy Ltd** and **Tocado Tidal Energy Ltd** will develop three proposed sites at the Point of Ayre, Calf of Man and Castletown (Fig. 3 left).
- **DONG Energy** wind farm project east off the island could generate up to 700 megawatts (MW) (Fig. 3 right).

Key Challenges

The key for the ISLES project will be moving from the conceptual to the physical. It will be a challenge to determine the regulatory regime that could support the development of renewables and offshore transmission projects with multiple uses, and between jurisdictions. Studies have addressed the requirements for such developments and possibilities to create a business case. The next step will be to demonstrate the political will to explore the options and move forward.

Key stakeholders active in the region

- Manx electricity authority/Manx tidal energy
- DONG energy
- ISLES project consortium (Scottish Government, Department of Communications, Climate Action & Environment (DCCA) in Ireland and the Department for the Economy (DfE) in Northern Ireland).

September 2017