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IRISH-SCOTTISH LINKS ON ENERGY STUDY (ISLES)

There is a significant opportunity to take a coordinated approach to delivery of electricity generation and transmission in the Irish Sea, the straits of Moyle and around the western coastal waters of Scotland – the ISLES zone.

The ISLES zone is an area benefiting from strong wind, wave and tidal resource and water depths suitable for the deployment of offshore renewable energy technologies. The zone also offers the potential to increase interconnection between the Great Britain (GB) electricity market and the single electricity market (SEM) for the island of Ireland.

The Irish-Scottish Links on Energy Study (ISLES) is an initiative between the governments of Scotland, the Republic of Ireland and Northern Ireland that promotes a more strategic approach to harnessing the renewables resources of the ISLES zone to enable efficient coordinated development and enhanced connections between the two electricity markets.

ISLES demonstrates that coordinated development can benefit consumers in both markets by reducing the capital costs of deploying renewable generation, by increasing capacity for cross-border trade in electricity and by improving the capability and resilience of linked onshore and offshore electricity networks.

The ISLES project highlights for the three partner governments the benefits of coordinated network development and the barriers that have to be tackled to make progress at scale.

This overview document draws together the key threads of the work undertaken in ISLES II – several streams of research designed to take forward towards implementation of the ISLES vision for coordinated network development offshore.
WHAT IS A COORDINATED NETWORK?

As Europe’s offshore wind industry matures the traditional model of connecting individual generation projects to one market via single-use ‘radial’ links is evolving: in some circumstances coordinated development between two or more projects that share transmission facilities and, potentially, connections to more than one market is the most efficient solution.

Taken to its fullest extent, coordination leads to a ‘meshed’ network where offshore and onshore design is fully coordinated between generation and transmission and between different electricity markets. The ISLES I vision and North Sea ‘supergrid’ concepts are examples of designs for a meshed offshore network.

Figure 1: Levels of network coordination, from radial and point-to-point links (top left), to fully meshed networks (bottom right)
A wide range of different network configurations is possible to suit different degrees of coordination between individual generation projects and different levels of interconnection to facilitate trading in electricity between markets. For example:

**Local clusters:** where generation projects share connections to one shore. This kind of coordination is seen in some European offshore wind markets such as Germany.

**Multi-jurisdictional coordination:** where individual or small clusters of generation projects are interconnected between markets. Proposals to connect potential offshore wind projects on the east coast of the United States might follow such a design.
BENEFITS OF COORDINATED NETWORKS

Coordinating development of generation and transmission in the ISLES zone could yield a range of significant commercial opportunities. These would be expected to benefit:

• **Governments and consumers** from reduced costs of pursuing decarbonisation policies, and from increasing interconnection to neighbouring markets that reduces the overall level and volatility of wholesale market prices. ISLES could also offer an export opportunity for surplus renewable resources in Great Britain and Ireland, to be exported to other markets in Europe and Scandinavia.

• **Project developers** from cutting their transmission costs, thereby reducing their project’s levelised cost of energy, which could improve their chances of winning renewable support under competitive allocation. ISLES could also offer developers new markets in which to sell their renewable energy, and improve site selection.

• **System operators** from greater connectivity between markets and improved network routing options that reduce the costs of balancing national transmission systems and avoid onshore reinforcements.

• **Supply chain** companies from arrangements to support anticipatory investment to demonstrate the commercial viability, and potential to deploy at scale, new generation technologies and High Voltage Direct Current (HVDC) enabling transmission technologies.
WHAT IS STOPPING COORDINATED DEVELOPMENT?

Despite the many advantages of coordinated network development there are no operational, cross-jurisdictional examples of coordinated offshore renewable energy generation/transmission projects.

Some of the barriers to coordinated development are specific to the ISLES zone while others are common across a range of initiatives within Europe. These range from:

- **Policy barriers** relating to the visibility of future renewables deployment targets and the availability of support.

- **Regulatory barriers** relating to uncertainty around how coordinated investment decisions will take place, how they will be regulated, and how they will interact with competitive allocation of renewable support that will be rolled out across all Member States.

- **Commercial and technology barriers** including the impact of inter-project dependencies on overall levels of risk, the current low levels of project development in the ISLES zone, new technology risks and the potential for asset incompatibility.
ACHIEVING EUROPEAN OBJECTIVES

The ISLES vision exemplifies many key themes underpinning EU energy policy and is fully consistent with European objectives for renewable energy, climate change, energy security and market integration.

The *Energy Union* Package announced by EU leaders in early 2015 reflects the drive for increased energy coordination and cross-border trade in energy. It follows the launch of the *2030 Framework for Climate and Energy Policies* in October 2014 when EU leaders agreed an EU-wide 27% renewable energy target by 2030.

Low levels of interconnection have been highlighted as a major obstacle to achieving Energy Union, and the need for major cross-jurisdictional energy infrastructure projects, driven by the private sector, is a clear EU priority.

The current EU minimum interconnection target has been set for electricity at 10% of the installed electricity production capacity of the Member States by 2020. In 2016, the European Commission will report on the necessary measures to reach a 15% target by 2030.

The ISLES initiative therefore addresses important European objectives for sustainable energy security at the regional and European level, and supports the drive towards increasing interconnection between Member States towards the 2030 target.

ISLES was awarded Project of Common Interest (PCI) status by the European Commission in October 2013. This status allows for streamlined planning and access to EU funding.
ISLES I: A VISION FOR DELIVERY

The first phase of this project, ISLES I, was completed between 2010 and 2012. It produced a feasibility study that was an important first step in establishing a vision for coordinated network development in the ISLES zone.

The ISLES I studies were comprehensive, covering technology and infrastructure options, environment and planning issues, construction and deployment, costs and benefits and regulation. The deliverables included a range of detailed reports and expert technical analyses across a range of relevant topics.

The ISLES I research demonstrated that an offshore interconnected transmission network offers huge potential for the partner administrations to capitalise fully on their abundant offshore renewable energy potential. The studies concluded that:

• An interconnected offshore electricity 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 respectively by circa 2020.

• A number of important challenges remain to be resolved, including operation of energy markets and the promotion of innovation and investment, to facilitate major coordinated development.

• A second project phase was needed to achieve further progress towards implementation.
WHAT HAS CHANGED SINCE ISLES I?

Since completion of ISLES I in 2012, the policy and development landscape has changed in ways that could affect how the ISLES vision is realised.

For example, Electricity Market Reform (EMR) in the GB market has changed the way in which financial support is provided to renewable energy projects. Renewables support is now allocated competitively to projects in auctions and this method alters early-stage risks and changes incentives to coordinate with neighbouring projects.

Although competitive allocation of support is set to be adopted more widely in the EU, the GB example is a first for the offshore renewable energy industry and affects developer appetite for early stage projects.

Competitive allocation, in addition to other changes, has changed the development landscape. This is a stark contrast to expectations at the time of ISLES I of a surge of projects in the ISLES zone, resulting in many developments having stalled or fallen away. This changes both the nature of the opportunity and the barriers to development: it is clear that taking forward the ISLES vision ‘Towards Implementation’ will rely on spurring on existing and new development in generation.

There have also been political developments during the course of ISLES II. For example, the prospect of a UK General Election was important up to May 2015 in framing ISLES II. Its timing limited the outgoing UK Government’s ability to give clear signals on its appetite for new renewable energy generation beyond 2020.
ISLES II – TOWARDS IMPLEMENTATION

ISLES II has developed the work undertaken through ISLES I, reflecting subsequent changes to the policy, regulatory and political context and also the generation development pipeline.

ISLES II comprises three research streams, reflecting the priorities identified in the first phase of work:

• **SPATIAL PLAN AND SUSTAINABILITY APPRAISAL:** to establish a Spatial Plan and Locational Guidance for an interconnected offshore electricity transmission network, and to assess the environmental, social and economic effects of the Plan.

• **NETWORK REGULATION AND MARKET ALIGNMENT STUDY:** to consider the impact of regulatory and market barriers, jurisdictional boundaries and the absence of mechanisms to ensure development decisions appropriately account for costs and benefits external to an individual project.

• **BUSINESS PLAN:** to draw together the results of the ISLES II research streams and develop a viable plan of action for key stakeholders.

Figure 3 shows how these different work streams, to take the ISLES vision towards implementation, integrate together.
A Spatial Plan for an integrated offshore electricity transmission network that facilitates the sustainable development of renewable energy generation in the ISLES zone has been created.

The Plan articulates principles for spatial planning that can help to facilitate further generation and transmission developments. It provides developers with locational guidance on suitable areas for development and it identifies measures to avoid, minimise or otherwise mitigate adverse effects.

By identifying key strategic environmental, economic and social considerations that should be accounted for in consents and licensing applications, the Plan will assist developers in reducing consenting risks. The Plan is therefore a head start for developers in planning for an interconnected transmission network and related generation.

The Sustainability Appraisal element of ISLES II is a process for considering the potential social, economic and environmental effects of the Spatial Plan. It identifies measures to avoid, reduce or offset adverse effects and enhance beneficial effects. It allows environmental, social and economic concerns to be addressed as the Plan develops.
Figure 2: Isles II Spatial plan

KEY

- **Potential generation**
- **Potential transmission landfall**
- **Isles II study area**
ISLES II: NETWORK REGULATION AND MARKET ALIGNMENT STUDY

The Network Regulation and Market Alignment Study makes recommendations to address two main barriers to efficient coordination of offshore generation and transmission networks:

• The first barrier stems from the fact that investment decisions for particular offshore transmission assets do not account fully for the wider benefits those assets could provide. At present, incentives to coordinate with other developers to share network assets are insufficient to justify the expected higher risk and complexity of sharing.

• The second barrier relates to inconsistencies in support and regulatory arrangements between jurisdictions. For example, there is at present no mechanism for the ISLES zone that allows one country to pay renewable support to generation located in another country.

Three main recommendations address these barriers. These can help the ISLES jurisdictions to overcome regulatory barriers to co-ordinated development and have wider relevance at EU level.

Recommendation 1: Regulatory arrangements should include mechanisms to mitigate the risks for individual projects of being connected to ‘multiple use’ assets at any point during the lifetime of the project.

When a generation or interconnection project is under development, the main coordination risk is that other developers fail to complete their projects. This leaves any remaining project(s) to deliver the shared network assets on its own. Hence, agreeing to participate in coordinated development exposes
projects to the risk of paying more for its network assets than it would have done by developing its own dedicated assets alone.

Once a generation or interconnection project is operational, allowing any other user(s) to connect to its offshore network assets could curtail the original projects access to capacity on the network to transport its electricity when needed.

Risk mitigation mechanisms to address capacity sharing are set out in considerable detail in the main reports of the Network Regulation and Market Alignment Study.

**Recommendation 2: The needs of generation rather than transmission should be at the forefront of the regulatory framework.**

Renewable energy projects face a range of challenges in the ISLES zone and a co-ordinated network will not happen without generation projects coming forward in the first instance. So it is important that practical actions arising from ISLES help, and do not hinder, individual projects or initiatives.

Successful development of generation projects and transmission requires the underlying generation projects to be competitive in their own right. Coordinated transmission benefits will provide incremental benefits to developers rather than being the main driver of the business case for coordinated development.

In practice, centralised bodies would not impose a coordinated solution that materially lengthens project timetables for generation projects or makes their development more risky.

**Recommendation 3: Policy-makers should adopt a pragmatic and timely approach to delivering workable regulatory arrangements.**

A common set of regulatory and legal arrangements that address all
permutations of possible development in the ISLES zone would take a long
time to develop and implement.

Therefore, a pragmatic approach will be needed from governments and
regulators in each jurisdiction and at a European level. In the near-term, ad
hoc arrangements will be developed in relation to specific cases of generation
and network coordination. Over time, these arrangements may be codified into
a more formal, wide-ranging set of rules.

One of the key principles for the ad hoc arrangements should be that regulatory
rules applying to generation or network assets should be the same for all
assets that provide the same function in that jurisdiction (e.g. a direct link
from an Irish offshore generator to the GB electricity system will have the same
rights and responsibilities as a link from a British offshore generator.)
ISLES II: BUSINESS PLAN

The Business Plan outlines the commercial case for coordinated development of electricity generation and transmission assets within the ISLES zone.

It builds on the recommendations of Network Regulation and Market Alignment Study and proposes an institutional framework and associated decision-making framework to unlock coordination benefits as individual projects develop in the ISLES zone.

The recommendation is made that the partner governments introduce a new central entity — an ISLES Coordination Panel (ICP) – involving regulators, TSOs and policymakers from relevant surrounding jurisdictions.

The Panel would consider coordination opportunities between projects based upon their individual merits, including the case for consumer underwriting.

Importantly, the delivery of generation and connecting transmission links in the ISLES zone remains developer-led under these proposals.

This approach provides the central consideration and decision-making capacity needed for regional coordination in the ISLES zone. It would not remove the discretion of national policy-makers or contravene recent national moves to improve network coordination (e.g. proposals to alter the GB’s system operator’s role in planning under Ofgem’s ITPR project).

Further, the approach is designed to provide clarity to project developers over network design specification and regulatory treatment needed for shared network infrastructure.

Some developing projects in the ISLES zone have the potential to be considered as pilots for establishing the proposed institutional framework, and to be assessed for initial network coordination opportunities. These have been termed “anchor projects”.

NEXT STEPS TOWARDS IMPLEMENTATION

Clear political commitment and the support of TSOs, regulators, developers and the supply chain will be required to secure the ISLES vision of coordinated development of offshore electricity generation and transmission assets between Great Britain and Ireland.

Recommended initial actions are:

1. Confirming the regulatory arrangements required to underpin coordinated network investment in each jurisdiction, in accordance with the outputs of the Network Regulation and Market Alignment Study.

2. Exploring options for export of renewable energy to other Member States, using either bilateral or co-funding options to support marine renewables.

3. Introducing an ISLES Coordination Panel to consider coordination opportunities and make recommendations to regulators, with terms of reference agreed with each relevant jurisdiction.

4. Approaching developers of early stage anchor projects to consider initial network coordination opportunities.
Figure 3: Integration of the ISLES II Work Streams
COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT

There has been a comprehensive stakeholder engagement process during ISLES II, involving one-to-one meetings with developers, government bodies and regulators and a series of organised workshops and statutory stakeholder events.

A formal consultation process was undertaken in relation to the Spatial Plan and Sustainability Appraisal so that stakeholders had an opportunity to inform the content of both documents.

Two stakeholder events were held for the Network Regulation and Market Alignment Study: one with a technical focus on the current state of arrangements and regulatory options; and a second involving discussion with a more general audience to compare and contrast developer-led versus more centrally-planned approaches to coordination.

The Business Plan stakeholder events involved attendees from across industry, government, supply chain and the advisory community. Feedback related to perceptions about the benefits and challenges of the ISLES ambition, the potential barriers to implementation and messaging for government.

The main themes of stakeholder responses received included the potential for a coordinated grid to promote specific goals such as greater offshore renewable energy generation. The feedback emphasised the importance of ongoing government commitment to driving the ISLES initiative forward towards implementation.

Particular challenges were acknowledged, primarily relating to the challenges associated with investing in shared infrastructure at this scale and the lack of generation projects currently under development.
ISLES II CONSULTANTS

Spatial plan and sustainability appraisal

AECOM
www.aecom.com

ABP Mer
www.abpm.co.uk

Network regulation and market alignment study

Pöyry
www.poyry.com

Energy Link
www.energy-link.co.uk

Business plan

Baringa
www.baringa.com

Bellenden
www.bellenden.co.uk

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