SIMCelt

Supporting
Implementation of
Maritime Spatial
Planning in the
Celtic Seas

Component 1.2.1

Spatial Demands and Scenarios for Maritime Sectors and Marine Conservation

Deliverable 2

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Cables and Pipelines

Maritime Sector Briefing Note

This briefing note examines the current status of submarine cables and pipelines in the Celtic Seas project area. It considers the future development of cables and pipelines as critical infrastructure for the energy and telecommunications sectors and analyses the implications of their growth in relation to Maritime Spatial Planning.

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About SIMCelt: SIMCelt is a cross-border project involving partners from the UK Ireland and France. It aims to support cooperation between Member States on the implementation of the Maritime Spatial Planning Directive in the Celtic Seas. The SIMCelt project is aimed specifically at the OSPAR Region III Celtic Seas area in accordance with a proposed extension of this region.

http://www.simcelt.eu/about/celtic-seas-area/

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KEY POINTS

Submarine cables and pipelines are essential infrastructure for the transport of energy (gas, oil and electricity) and telecommunications. Maritime Spatial Planning (MSP) can provide guidance to developers and other stakeholders on how and where cables and pipelines may be located to ensure coordination with other activities and to minimise negative impacts that may be caused by routing cables and pipelines in sensitive areas.

- Within the Celtic Seas a large number of telecommunications and energy cables already cross the sea floor. Telecommunications cables starting in Ireland, on the west coast of the UK and in north west France run east-west across the Atlantic to north America and north-south to the rest of Europe (via the Gibraltar Strait) and Africa.
- Submarine energy cables were originally developed to transport electricity to different places within the same country and to neighbouring countries through interconnectors. Currently, development of submarine energy cabling is being driven by offshore wind energy and the growing ocean energy sector.
- Existing pipeline infrastructure for gas exists in small areas associated with gas fields off the southern and west Irish coast and the eastern Irish Sea and two interconnectors linking Ireland with Britain.
- Cables and pipelines have a minimal spatial footprint on the sea bed, however some environmental impacts may occur on a temporal basis during installation or if sediment surrounding the pipelines is moved by currents.
- Pipeline infrastructure in the Celtic Seas is unlikely to change in the short term as there have been no new discoveries of commercially exploitable oil and gas.
- The potential for exporting renewable energy has also led to a number of new energy interconnectors between the Celtic Seas administrations to be proposed for development. Some of these proposals, such as the Celtic Interconnector (Ireland-France) are supported by the European Commission as 'Projects of Common Interest' to developing a single energy market.
- Different consenting regimes for cables and pipelines that cross multiple jurisdictions and separate processes for where cables and pipelines make landfall can be time consuming for developers.

DISTRIBUTION OF ACTIVITY

Electricity

In terms of cross-border energy infrastructure, the main electricity interconnectors are shown in Figure 1 below. In the Irish Sea these include the Moyle interconnector, linking Northern Ireland to Scotland, the east-west interconnector, linking Ireland to Wales and the Western HVDC link, which is currently under construction and will link Scotland to England and Wales. In Ireland, EirGrid, the State-owned transmission system operator (TSO), has identified an interconnector with France as economically feasible. The potential route of the 'Celtic Interconnector' would be approximately 600 km long, of which the offshore element would comprise approximately 500 km (Eirgrid, 2018).

In addition to electricity interconnectors, there are a number of submarine electricity cables within national jurisdictions. Some of these bring electricity generated by offshore installations to shore, whilst others distribute electricity around national networks. For example, there are numerous connections between the islands on the west coast of Scotland and the mainland. As well as these cables, the Western HVDC link will start at Hunterston in Scotland and pass through International, Scottish, Northern Irish, Isle of Man and English and Welsh territorial waters to make landfall at Leasowe, Wirral.

Figure 1: Routes of Proposed Energy Interconnectors

Source: European Subsea Cables Association
http://www.escaeu.org/articles/submarine-power-cables/

Oil and Gas

Submarine pipelines in the Celtic Seas are shown in Figure 2 below. In terms of cross-border connections, there are three major gas pipelines - the Scotland - N. Ireland pipeline (SNIP) and the UK-Ireland interconnectors. Due to no oil production in the Celtic Seas there are no cross-border oil pipelines.

There are some significant pipeline areas in the Irish Sea, connected to oil and gas platforms. In Liverpool Bay, gas platforms are connected by pipeline to Point of Ayr in North Wales. An oil pipeline from the Douglas oil field connects to an offshore platform where the oil is transferred to ship for transport. In Morecambe Bay, the North and South Morecambe and surrounding smaller gas fields are connected by pipeline to Rampside terminal in Cumbria.

In addition to these pipelines, offshore gas fields in Ireland at Corrib (west Mayo) and Kinsale, Ballycotton and Seven Heads (off Co. Cork, in the south west of Ireland) are connected to the mainland by submarine pipelines.

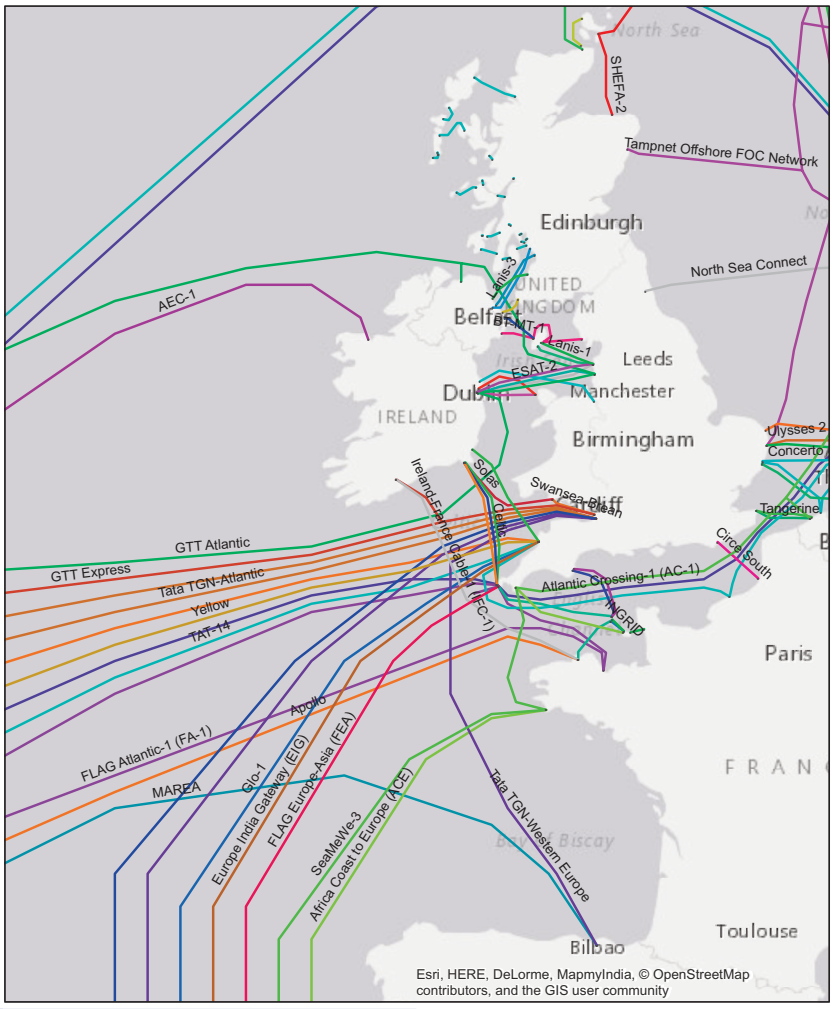
Figure 2: Gas Transmission Network (Pipelines) in the Celtic Seas

Source: ENTSO-G (2017)

Telecommunications

Telecommunications cables in the Celtic Seas are shown in Figure 3 below. Alongside connections between the UK, Ireland and France, there are a high number of connections mainly from the south west of England extending to North America and south around the Atlantic coast through the Straits of Gibraltar into the Mediterranean. There are four trans-Atlantic cables connecting Ireland to North America.

Figure 3: Submarine Telecommunications Cables



Source: Telegeography (2017)

Trans-European Energy Networks (TEN-E)

The EU has identified that nearly €200 billion of investment is needed to improve Europe's energy infrastructure for oil and gas pipelines and transmission grids[1]. To support the development of energy infrastructure, the EU has identified a number of energy corridors known as Trans-European Energy Networks (TEN-E). Under the TEN-E Strategy of 2014, development of electricity transmission grids to support the development of offshore wind farms was identified as a priority corridor. This work is being taken forward through the North Sea Countries Offshore Grid Initiative (NSCOGI). With regards to gas, a north-south corridor in western Europe to remove internal bottlenecks has also been identified as a priority corridor.

Based on these priority corridors, a list of Projects of Common Interest (PCI) has been drawn up. These critical infrastructure investments can benefit from accelerated consent processes and financial support from the Connecting Europe Facility and other incentives. To become a PCI, a project must have a significant impact on the energy markets and market integration of at least two EU countries. PCIs currently listed for the Celtic Seas region are detailed in Table 1 below and include the Icelink project to bring electricity to the UK which may be routed through the Celtic Seas before making landfall in northern Scotland. In addition to the PCIs that will directly connect Celtic Seas countries by submarine cable, Electricity Highways, identified by the eHighway 2050 project (funded by the 7th Framework Programme), are planned connections in the Pan-European Transmission Network that are required to meet energy needs between 2020 and 2050.

Table 1: TEN-E Projects of Common Interest in the Celtic Seas

No.	Countries	Description
1.6*	FR-IE	Celtic Interconnector interconnection between La Martyre (FR) and Great Island or Knockraha (IE)
1.7.1*	FR-UK (England)	FAB project interconnection between Cotentin (FR), Alderney in the Channel Islands and the vicinity of Exeter (UK)
1.9.1	IE-UK (Wales)	Greenlink interconnection between Wexford (IE) and Pembroke, Wales (UK)
1.9.2	IE-UK (Scotland)	ISLES interconnection between Coolkeeragh — Coleraine hubs (IE) and Hunterston station, Islay, Argyll and Location C Offshore Wind Farms (UK)
1.13*	IS-UK (Scotland)	Icelink (Atlantic Superconnection) Interconnection between Iceland and United Kingdom
10.1	IE-UK (N. Ireland)	North Atlantic Green Zone Project aims at lowering wind curtailment by implementing communication infrastructure, enhanced grid control and interconnection and establishing (cross-border) protocols for Demand Side Management*

**Also labelled as Electricity Highways. Source: European Commission (2015)*

[1] See https://ec.europa.eu/energy/en/topics/infrastructure

European Network of Transmission System Operators for Electricity (ENTSO-E)

Supporting the liberalisation of gas and electricity markets in the EU, the European Network of Transmission System Operators for Electricity (ENTSO-E) was established in 2009 and is made up of grid operators across EU Member States, including EirGrid (IE), Réseau de Transport d'Electricité (FR), National Grid Plc (UK), System Operator for Northern Ireland (NI), Scottish Hydro and Scottish Power (Scotland) from the Celtic Seas countries. ENTSO-E members 'share the objective of setting up the internal energy market and ensuring its optimal functioning' through regional and technical cooperation between transmission system operators, developing strategic network plans and formulating policy positions. In doing so, this contributes to security of energy supply, integrating new renewable energy sources into energy networks, responding to the climate agenda and providing benefits not just to the energy sector, but across Europe as a whole.

North Sea Countries Offshore Grid Initiative

Recognising the potential for offshore renewable energy in the Northern Seas of Europe, the North Sea Countries Offshore Grid Initiative was established in 2009 to facilitate the development of an offshore energy grid that will maximise the efficient and economic use of renewable energy resources. In 2010 a Memorandum of Understanding was signed between the ten Northern Sea countries (Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Norway, Sweden and the United Kingdom), ENTSO-E and the Agency for the Cooperation of Energy Regulators (ACER). The Memorandum of Understanding committed signatories to undertake joint work on areas of grid integration and configuration, market and regulatory issues and planning and authorisation procedures.

In 2016 a Political Declaration reaffirmed signatories' commitment to cooperation, which is now being taken forward through four specific work areas. These are:

- Maritime Spatial Planning;
- Development and regulation of offshore grids and other offshore infrastructure;
- Support framework and finance for offshore wind projects;
- Standards, technical rules and regulations in the offshore wind sector.

Work areas 1 and 2 will have the most relevance for the siting of any new offshore networks. Under the MSP work area, countries will consider the coordinated planning of offshore wind and grid projects beyond national borders, including area mapping (i.e. mapping areas where new wind farms may be sited) and developing a common environmental assessment framework. Under Work area 2, optimisation of the grid, reducing the risk of stranded or redundant assets and identifying potential synergies with the oil and gas industry (for example repurposing existing oil and gas infrastructure) will be critical to ensuring the most efficient infrastructure is developed.

The Irish-Scottish Links on Energy Study (ISLES Project)

Within the Celtic Seas, some joint work has already been undertaken to support the development of shared offshore grid networks. The ISLES Project was established in 2010 by the governments of Scotland, Northern Ireland and the Republic of Ireland to investigate the feasibility of creating an offshore interconnected electricity grid based on renewable sources (ISLES, 2012:1). The study concluded that a grid network consisting of 'Northern' and 'Southern' ISLES concepts connecting offshore wind and proposed tidal energy

developments of up to 2.8 GW and 3.4 GW respectively by HVDC could be put into place by 2020 if certain challenges are overcome. These include operation of energy markets, promotion of innovation and investment, navigating planning and licensing regimes across jurisdictions and constantly changing regulatory frameworks.

The ISLES II Project, which began in June 2013 and ran to September 2015, sought to develop the original ISLES concept further by exploring three particular aspects or work streams related to:

- An ISLES Spatial Plan and Sustainability Appraisal, providing locational guidance to potential developers;
- A network regulation and market alignment study, in order to provide recommendations on a model of market operation for the ISLES jurisdictions, and;
- An ISLES business plan proposing an overarching governance framework and promoting future commercial development of a sub-sea network on the ISLES Zone.

Following on from the two ISLES projects, a Northern Seas offshore grid electricity interconnection linking Scotland, the Republic of Ireland and Northern Ireland has been proposed as a Project of Common Interest. This would connect existing onshore power generating facilities with a potential offshore wind farm development in Scottish Waters. A feasibility study for this project is currently under way.

Security of Gas Supply Regulations

Following the disruption of gas supplies to the European Union in 2006 and 2009, the EU introduced its first regulation on the security of gas supplies in 2010 (Regulation 994/2010). In 2017 this was revised and replaced by new Regulation (EU) No. 2017/1938, *concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No. 994/2010*. The revised regulation requires:

- The European Network for Transmission system Operators for Gas (ENTSO-G) to perform an EU-wide gas supply and infrastructure simulation to provide an overview of major supply risks;
- Regional cooperation to assess common supply risks and develop preventive and emergency measures (the UK, Ireland and France are covered by the North West Regional Coordination (ReCo) team;
- Energy solidarity, whereby EU countries must help their neighbours in times of supply crisis in order to minimise disruption to households;
- Decisions on whether pipelines should have permanent bi-directional capacity take into consideration the views of all EU countries that could potentially benefit.

European Network of Transmission System Operators for Gas (ENTSO-G)

ENTSO-G exists to facilitate and enhance cooperation between national gas transmission system operators across Europe to ensure the development of a pan-European transmission system in line with European energy goals. The activities of ENTSO-G include developing rules for gas market integration, system operation and development, network planning and providing outlooks for gas supply and demand. In relation to security of energy supply, ENTSO-G is tasked with carrying out EU-wide simulation of gas supply and is responsible for preparing infrastructure disruption scenarios.

Gas Infrastructure Europe

Gas Infrastructure Europe (GIE) is a representative organisation made up of companies whose activities cover transmission pipelines, gas storage and LNG terminals. GIE has links to major European bodies including the European Commission, Council and Parliament and the regulatory bodies including the Agency for the Cooperation of Energy Regulators (ACER) and the Council of European Energy Regulators (CEER). GIE advocates investment in energy infrastructure as a necessary part of delivering a single gas market for Europe. As part of their objectives, GIE supports the interoperability of transmission systems and the enhancement of cross-border transmission.

TELECOMMUNICATIONS CABLES

Submarine telecommunications cables are vital to global communications and the functioning of the international economy as more trade is conducted via the internet. These telecoms cables, which carry telephone calls and data, are generally owned by consortia of communications companies, or more recently, global brands such as Google and Microsoft (Paterson, 2015).

The importance of international submarine cables is recognised in the 1884 International Convention for the Protection of Submarine Cables, the 1958 Geneva Conventions on the Continental Shelf and High Seas and the UN Convention on the Law of the Sea 1982 (UNCLOS). These Conventions make provision for:

- Freedom to lay, maintain and repair cables outside of a nation's 12 nautical mile territorial sea;
- National obligations to impose criminal and civil penalties for intentional or negligent injury to cables;
- Special status for ships laying and repairing cables (ISCPC.org, 2011).

The International Cable Protection Committee (ICPC) was established in 1958 to act as the international submarine cable authority, providing leadership and guidance on issues related to submarine cable security and reliability. Members are drawn from major telecommunications organisations such as British Telecom and Orange and infrastructure operators such as Hibernian Atlantic. At a regional level, the European Subsea Cables Association (ESCA) is a forum of national and international companies which own, operate or service submarine cables in European and surrounding waters and works to promote marine safety and the protection of subsea cables from natural and man-made hazards.

NATIONAL ACTIVITIES

UK

For the UK, licensing, exploration and regulation of the oil and gas industry is the responsibility of the Department of Business, Energy and Industrial Strategy (DBEIS). Within this, the Oil and Gas Authority (part of DBEIS) oversee the construction, maintenance and decommissioning of oil and gas pipelines. Under the Petroleum Act 1998 and the Pipeline Safety Regulations 1996, a Pipeline Works Authorisation must be in place before construction or modification of pipelines can begin. The Offshore Petroleum Production and Pipelines (Assessment of Environmental Effects) Regulations 1999 may also require an environmental statement to be produced before works can begin.

Where cables and pipelines pass through Territorial Seas managed by The Crown Estate or The Crown Estate Scotland, permission is needed for the rights to lay, maintain and operate cables or pipelines on the sea bed. Rents and other lease terms are payable on an annual basis for oil and gas pipelines, depending on their size (pipe diameter). For cables, whether they are domestic (starting and ending in the UK) or international (making landfall in the UK or leaving Territorial Seas for another destination), a licence fee must be paid.

ENGLAND

Cables in English Territorial Seas requires a licence from the Marine Management Organisation. Where cables/pipelines extend beyond 12 nautical miles this section of the cable does not require a licence.

WALES

Cables require a licence from Natural Resources Wales.

SCOTLAND

Submarine cables in Scottish waters require a licence from the Marine Scotland Licensing Operations Team (MS-LOT).

NORTHERN IRELAND

For submarine cabling in Northern Ireland's waters a licence is required from DAERA's Marine and Fisheries Division.

Ireland

The Department of Communications, Climate Action and Environment is responsible for licensing and regulating oil and gas exploration and production, both onshore and offshore.

Under the terms of the Gas (Interim) (Regulation) Act, 2002 the construction of offshore gas pipelines in the Irish Territorial Sea or other designated waters (such as the EEZ) requires consent from the Department of Communications. Climate Action and Environment for upstream (exploring and extraction) pipelines and the Commission for Energy Regulation for downstream (processing and distribution) pipelines. The operation of gas pipelines, which is primarily undertaken by Gas Networks Ireland, Ireland's Transmission System Operator and Distribution System Operator, requires a separate licence.

Cables and pipelines that pass through the foreshore also require a Foreshore Licence from the Department of Housing, Planning, Community and Local Government.

France

In France the Préfets Maritimes are the competent authorities for authorising the laying of submarine cables and pipelines within Territorial Seas, Ecological Protection Zones, the EEZ and Continental Shelf. There are three Préfets – Atlantic, Channel and North Sea, and the Mediterranean. The deployment of offshore renewable energy technologies (e.g. wind turbines) is subject to two legal authorisations – a *concession* to occupy the public maritime domain and an authorisation related to water resources protection – with the consenting process for cables laid down in a Decree (law). This law states that the owner or operator of cables or pipelines must inform the relevant Préfet six months before work is due to commence. The Préfet may then consult with other authorities (Prefectures or Districts) before making an Approval Order for the work to be undertaken (Le Lièvre and O'Hagan, 2015). In France two main companies are involved in the installation of cables and pipelines – *Réseau de Transport d'Électricité (RTE)*, which is responsible for electricity networks, and Orange Navy, responsible for telecommunications.

INTERACTIONS WITH OTHER SECTORS AND THE ENVIRONMENT

Whilst submarine cables and pipelines are relatively small features on the seabed, they can still have a range of impacts at a local scale. Such impacts mostly occur during the installation phase and include:

- Disturbance to seabeds when cables and pipelines are placed or moved. However, where the seabed is disturbed benthic species may re-colonise the affected area within a year or two (OSPAR 2009:28);
- Chemicals may leach from protective coatings of pipelines and anodes of pipelines;
- Carter et al (2009) note that where cables are laid on the seabed inside a protective structure rather than being buried, such structures may encourage the settling of species that attach themselves to hard surfaces and are not normally found in the surrounding soft substrate (e.g. anemones);
- Electromagnetic fields from power cables may cause disturbance to species that use electric or magnetic fields for orientation (OSPAR 2010:10);
- Heat from power cables may affect benthic species and biogeochemical processes (Ibid.);
- Wave motion and currents may cause movement of sediment, exposing buried cables to potential damage.

In terms of interactions with other sectors, these are quite limited as cables and pipelines in situ on the sea bed do not generally interact with other activities. There may be competition for space where cables and pipelines make landfall, however it is more the case that other activities can have an effect on the operation of cables and pipelines, for example:

- Bottom trawl fishing methods generally do not harm submarine cables due to cables being buried or cable armouring. Where cables are exposed on rocky sea beds there is a small chance of hooking or snagging, however this is relatively rare (100-150 cases per year worldwide) (Carter et al, 2009);

- Use of grapnels to retrieve static fishing gear in deeper waters may also damage cables;
- Shipping lanes that traverse cable and pipeline routes, or anchoring of ships, have the potential to damage cables and pipelines (Carter et al, 2009);
- There may be competition for space where cables and pipelines make landfall, e.g. built up coastal areas, conservation sites.

POTENTIAL DRIVERS OF CHANGE

The development of cables and pipelines is largely dependent upon developments in other fields such as marine energy. Therefore:

- The development of additional offshore wind farms by countries for export of renewable energy (e.g. Ireland, Isle of Man) will necessitate development of new grid connections;
- Future oil and gas discoveries in the Celtic Seas may present opportunities for exploitation and thus require new pipeline infrastructure;
- The development of smart grids may provide additional opportunities for cable networks, however uneven roll-out of 'intelligent' electricity networks may prevent the technology being used to its full potential (Bompard et al, 2014);
- Development of gas storage or carbon capture and storage facilities in former offshore fields may require the construction of new pipelines or a change of use in existing pipelines (The Crown Estate, 2017).

KEY MSP AND CROSS-BORDER CONSIDERATIONS

The following issues have been identified as important in the future development of submarine cables and pipelines from a cross-border perspective:

- Delays to the development of a single European market for energy may have an impact upon the financing of infrastructure projects such as offshore grids;
- Installation of new HVDC cables may require an increase in transmission capacity where the cable makes landfall in both countries;
- Cables that cross jurisdictional boundaries require individual licensing/consenting procedures for each jurisdiction, which is a time consuming process;
- Repurposing of pipelines (e.g. for carbon capture and storage) may require new impact assessment/consenting processes to be put in place.

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