Subsea cables

Scottish Government
Riaghaltas na h-Alba
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Key message

The length of subsea power cables doubled between 2015 and 2019 due to the increase in the number of offshore marine renewable energy schemes. The length of active subsea telecommunications cables increased by 3% between 2015 and 2019. This increase is due to the installation of new high speed broadband cables to the islands.

Global Symphony cable laying in Shetland.
© Global Marine Group.

What, why and where?

Submarine cables are critical infrastructure, delivering communications, internet, and power inwards to Scotland and outwards to international partners via an extensive network totalling 6,120 km (Figure 1) (6,006 km active; 114 km under construction). Cables are generally owned and operated by private or corporate entities. There are also military cables on the seabed, which are not covered here.

Telecommunication cables are responsible for approx. 99% of global communications and carry telephone calls, internet connections and data.

There are numerous international submarine cables connecting Scotland and the rest of the UK to the global digital economy. There are also domestic fibre optic inter-island cables delivering broadband to remote communities.

Telecommunications cables are predominantly fibre optic, and have different requirements for installation, maintenance and general handling than subsea power cables which vary significantly in size and weight.

There have been about 400 km of new fibre optic cables laid since 2011 including the Highlands and Islands project connecting numerous Scottish Islands with high capacity fibre optic broadband connections (Figure 2).

Power cables

There are three main types of power cable installed:

- Distribution cables - link the Scottish mainland to the islands, except Shetland and Fair isle, and interconnections between islands.

For further information on this topic go to: https://marine.gov.scot/sma/assessment/subsea-cables

- Transmission cables - provide bulk transport of power between areas of power generation and centres of demand.
- Export cables - provide a connection between offshore generation sites such as wind, wave or tidal energy farms.

Power cables completed since 2011 include the Kintyre to Hunterston cable (220kV high voltage alternating current (HVAC)) and the Caithness to Moray cable (320kV high voltage direct current (HVDC)).

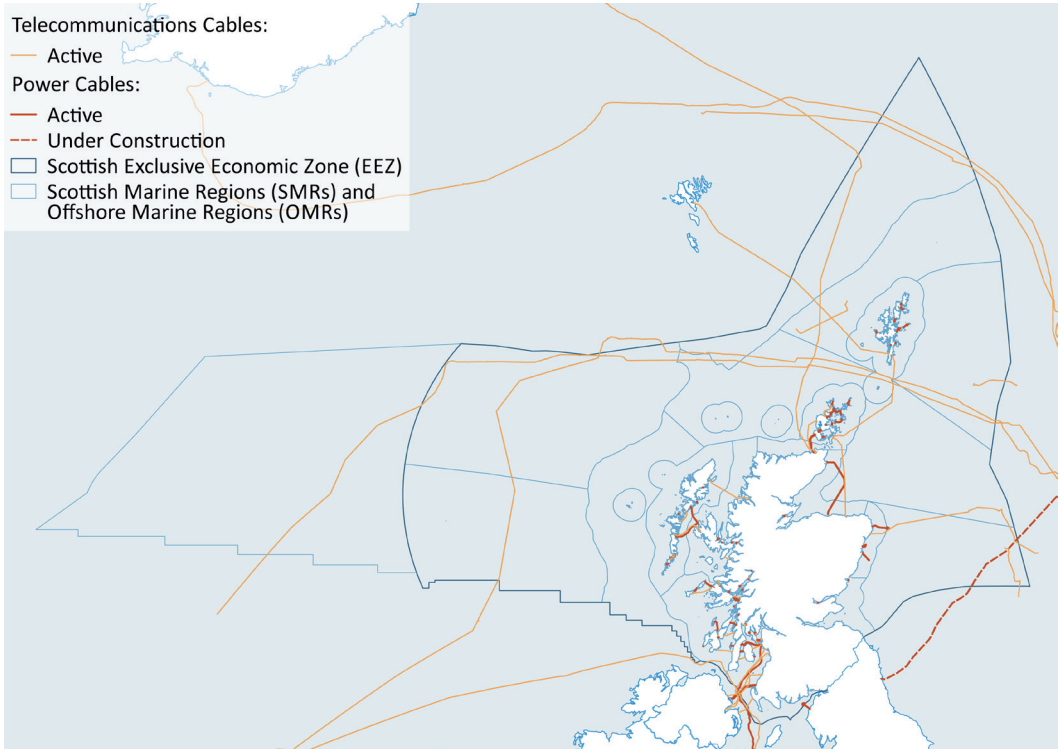


Figure 1: Active and under construction telecommunications and power cables in Scottish seas (July 2019). Source: KIS-ORCA / MS Maps NMPi.

Figure 2: Global Symphony cable laying in Shetland. © Global Marine Group.

Contribution to the economy

Subsea cables facilitate other benefits through the deployment of telecoms infrastructure. It is therefore difficult to isolate the direct use value of the cables from the industries they support. In 2019 (Yardley *et al.*, 2019) published an independent report on benefits likely to be realised as a result of the Digital Scotland Superfast Broadband programme (DSSB) deployment, showing every public pound invested in fibre broadband in Scotland is delivering almost £12 (£11.60) of benefits to the Scottish economy.

An Economic and Social Evaluation of the UK Subsea Cables Industry (Elliot *et al*., 2016), compiled by the University of Huddersfield, states "a preliminary estimate of the economic value of the UK telecommunications subsea cables industry to the digital economy values it at £62.8 billion per annum. The impact of the UK electricity subsea cables industry is smaller but still significant at £2.8 billion per annum."

More generally, the economic and social benefits of the internet underpin the Scottish Government's Digital Strategy. Employment in the Scottish digital sector was 64,100 in 2015 and produced exports in Scotland of £4.24 billion (Scottish Government, 2017), though again it is difficult to determine how much of this can be directly attributed to submarine cables.

It is not possible to quantify the economic contribution of subsea cables directly, as no separate information on GVA or employment are available. GVA (Gross Value Added) is the value of goods and services produced minus the cost of raw materials and other inputs used to produce them. However, the length of active telecommunications cables increased by 3% and the length of active power cables increase by 103% between 2015 and 2019. This may indicate an increasing contribution to the Scottish economy but this has not been quantified. The large increase in the length of active power cables is due to the growing network of cables bringing offshore marine renewable energy (wind, wave and tidal energy) production to landfall in Scotland.

Examples of socio-economic effects

- Internet provision.
- Business and social communication (domestic and international).
- Employment and research.
- Possible restrictions other seabed uses.

Pressures on the environment

An OSPAR agreed list of marine pressures is used to help assessments of human activities in the marine environment. The marine pressure list has been adapted for use in Scotland via work on the Feature Activity Sensitivity Tool (FeAST). Subsea cable activities can be associated with 19 marine pressures – please read the pressure descriptions and benchmarks for further detail.

Forward look

In today's digital world the importance of the communications sector and its contribution to the economy is widely recognised. European Subsea Cables Association (ESCA) data estimate that >99% of international trans-ocean internet and communications traffic is carried by cable. Submarine cables will be vital for the foreseeable future. The extent to which any new cables will be laid in Scottish waters is not known. The number of additional submarine cables will depend on a variety of factors such as the destination countries and the most suitable starting point for such a cable.

The installation of new power cables depends on a number of factors including: the role of possible interconnectors between countries to share power and the need to bring ashore electricity generated by new offshore wind, wave or tidal farms. Overall need will be influenced by the intention to improve security and stability in electricity supply as well as possible increasing demand to meet decarbonisation targets.

Possible power transmission improvements include:

- Western Isles to mainland Scotland HVDC Link
- Shetland to Caithness HVDC link
- Orkney to Caithness HVAC link
- Eastern HVDC link
- new 1,400 MW interconnector between Norway and Peterhead (NorthConnect), due to be completed 2023.

Economic trend assessment

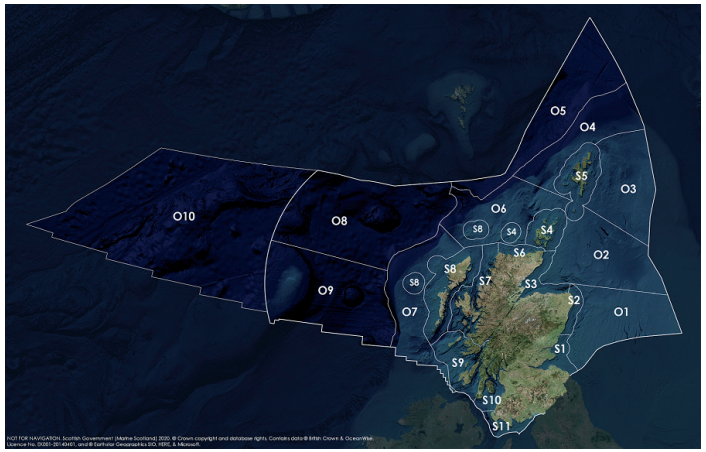
There are no trend data on the contribution of subsea cables to the Scottish economy. The increase in the length of subsea cables between 2015 and 2019 may indicate an increasing contribution to the Scottish economy but this has not been quantified.

Status and trend assessment legend

Status assessment (for Clean and safe, Healthy and biologically diverse assessments)		Trend assessment (for Clean and safe, Healthy and biologically diverse and Productive assessments)	
	Many concerns		No / little change
	Some concerns		Increasing
	Few or no concerns		Decreasing
	Few or no concerns, but some local concerns		No trend discernible
	Few or no concerns, but many local concerns		All trends
	Some concerns, but many local concerns	**Confidence assessment**	
	Lack of evidence / robust assessment criteria	**Symbol**	**Confidence rating**
	Lack of regional evidence / robust assessment criteria, but no or few concerns for some local areas		Low
	Lack of regional evidence / robust assessment criteria, but some concerns for some local areas		Medium
	Lack of regional evidence / robust assessment criteria, but many concerns for some local areas		High

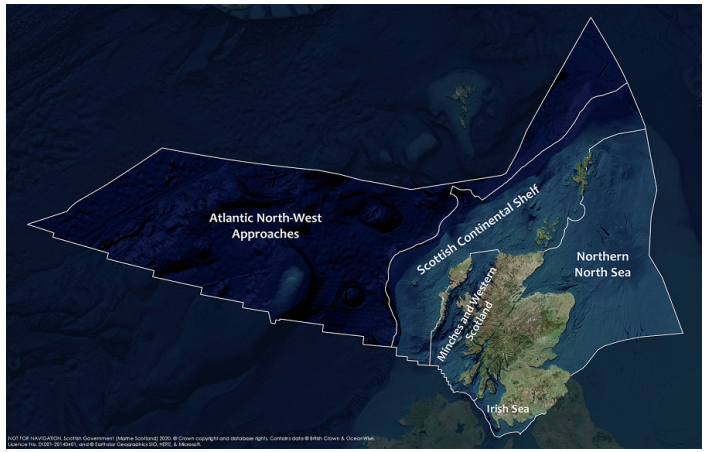
Overal confidence

Assessment regions

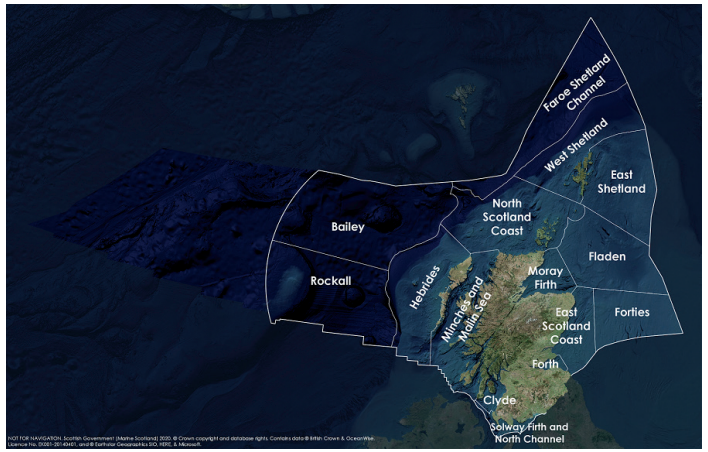


The Scottish Marine Regions (SMRs; S1 – S11) and the Scottish Offshore Marine Regions (OMRs, O1 – O10)

Key: S1, Forth and Tay; S2, North East; S3, Moray Firth; S4 Orkney Islands, S5, Shetland Isles; S6, North Coast; S7, West Highlands; S8, Outer Hebrides; S9, Argyll; S10, Clyde; S11, Solway; O1, Long Forties, O2, Fladen and Moray Firth Offshore; O3, East Shetland Shelf; O4, North and West Shetland Shelf; O5, Faroe-Shetland Channel; O6, North Scotland Shelf; O7, Hebrides Shelf; O8, Bailey; O9, Rockall; O10, Hatton.



Biogeographic, Charting Progress 2 (CP2) Regions. These have been used as the assessment areas for hazardous substances.



Scottish Sea Areas as used in Scotland's Marine Atlas 2011. These are sub divisions of the biogeographic, or Charting Progress 2 (CP2), Regions.

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