



POSITION STATEMENT: RESPONSE TO SCOTTISH GOVERNMENT NATIONAL PLANNING FRAMEWORK 52

Europacable is the association of European cable manufacturers and has spent 30 years investing in innovative technology that overcomes the limitations of overhead lines (“OHLs”) in certain circumstances.

Europacable is submitting this Paper in response to the National Planning Framework 2 published on 8th January 2008. Our comments relate to the sections of the Framework that discuss the electricity transmission infrastructure. In making the comments below, we recognise the current investment plans that have been approved by Ofgem and the further reinforcement including sub sea links from the Outer Hebrides, Orkney and the Shetland Islands and the upgrades to existing transmission lines such as Beaulieu-Dounreay, Beaulieu-Keith and the East Coast transmission line.

We also note the Scottish Government is working with other governments (e.g. Republic of Ireland, Northern Ireland and Norway) and the European Commission on proposals to develop sub-sea cable routes to harness marine energy resources and a North Sea super-grid.

Land-based upgrades

Europacable gave evidence at the Strategic Session of the Public Local Inquiry into the proposed Beaulieu-Denny overhead line. In summary, Europacable recognises that underground cables are more expensive than overhead lines and believes that it can only responsibly promote the use of underground cables on land if it publicly recognises that Extra High Voltage underground cables are rarely appropriate for an entire new Alternating Current (AC) power transmission project. The proposed Beaulieu to Denny overhead line though crosses land with outstanding natural or environmental heritage and Europacable believes underground cables are an appropriate solution for sections of the line.

Although more expensive, the installation of cables along the proposed route will provide several benefits apart from creating less visual and environmental impact. Notably underground cables have lower transmission losses, can absorb emergency power loads, have lower maintenance costs, emit no electric field and can be engineered to emit a lower magnetic field than an overhead line and require a narrower right-of-way. They are also less susceptible to the impacts of severe weather.

With respect to undergrounding, we believe the principal issue facing the Scottish Government boils down to a decision on whether the incremental cost of cables is a price that electricity customers should pay to preserve and protect the landscape, wildlife, amenity, cultural and historical sites, tourism and health in the Scottish Highlands. In consideration of this, it should be recognised that transmission costs represent only around 3% of electricity bills and any incremental costs would be recovered from 28 million electricity consumers across Great Britain over the estimated economic life of the asset, probably 40 years.

For future upgrades, the merits of undergrounding would need to be examined on a case-by-case basis after an independent study of life costs and environmental impacts have been carried out.



Sub-sea cables

For over 30 years, Europacable members have been supplying different types submarine power cables up to voltages of 500kV for AC and DC networks, with the technology and materials depending on voltage and power requirements. Sub sea cables are used to link islands, offshore oil and gas platforms and offshore wind farms and the cable design is project specific determined by a variety of requirements and environmental conditions – with conformance to national and international standards an important consideration.

Submarine cables have a variety of potential applications, including:

- a) Supplying electricity from generation sources on the mainland to islands or other land masses isolated by water.
- b) Interconnecting high voltage networks of different regions to transfer electrical power in both directions. This interconnection can improve the reliability of both networks and allows the previously disconnected or transmission-constrained regions to optimise their collective generation resources to achieve the lowest cost or meet pollution and/or emission commitments. The interconnection also allows greater flexibility in siting new generation and onshore network development.
- c) Transferring cheap power generated on islands (making use of local energy resources) to the mainland, which can stimulate growth on isolated islands.
- d) Interconnecting offshore oil & gas production units from a centralised generation unit or to supply power to offshore oil & gas production units from the mainland.
- e) Taking power from offshore renewable energy developments such as offshore wind, tidal, and wave energy.

Whilst it is difficult to be precise about the break points between the choice of AC or DC, it is generally accepted that for distances up to a few tens of kilometres, and power levels of some hundred megawatts, AC cable connections will be preferable. Above these levels, DC connections become more competitive. To determine the most appropriate offshore to shore transmission system, it is recommended that lifetime cost analysis is performed for both HVAC and HVDC when the transmission distance exceeds 60km and the power transfer requirements are greater than 300MW. The table below highlights the key differences between undersea AC and DC transmission cables.

AC transmission	DC transmission
Higher cable costs: more cables needed	Lower cable costs: fewer cables needed
Lower power transfer capabilities (per cable)	Higher power transfer capabilities (per cable)
Capacity reduction due to charging currents	No capacity reduction by charging currents
No additional costs of the converter stations	Additional costs involved due to the requirement of converter stations at either end of the transmission line

The principle barriers for submarine cables and related projects around Scotland are restrictions on how sea and seabed areas may be used and financial barriers for profitable operation of offshore wind farms. In UK waters, owners of vessels who can prove that they



have sacrificed an anchor, net or other fishing gear to avoid damaging a submarine cable or pipeline will receive compensation from the owner of the cable or pipeline. This is likely to affect the costs of installations and operations of offshore wind power plants. Also, offshore wind farms can occupy significant areas of seabed. It is currently not clear whether the development of these areas will potentially affect the routing of future submarine cables, or whether routing through leased areas will remain possible. If wind farm developers enjoy exclusive rights to occupy their areas, the developers of future submarine cable systems could be disadvantaged by the need for costly re-routes around or between leased areas.

Proposed North Sea super-grid

Offshore wind power has the potential to become one of the largest-scale solutions for pollution-free electricity supply. Moreover, offshore wind power will likely be an essential measure for achieving the CO2 emissions reduction targets. The potential for offshore wind along the coast of Scotland and into the Irish Sea and North Sea is vast (wind speeds are higher than on land and there are fewer concerns over suitable sites). The implementation of the first offshore wind farms has demonstrated the viability of the concept and a proposal to create a super-grid of HV sub sea transmission networks covering amongst others the North & Irish seas has been proposed.

In the EU region, a combination of submarine power cables taking power from offshore wind farms and international interconnectors could be a logical solution as such projects would fall on the same undersea route. Combining offshore wind farm grid connections and sea interconnectors can be beneficial with respect to cost, revenues and risk management.

With respect to cost, the immediate advantage is the of reduced cost of cable laying and the cable itself. With regard to revenues, at least two factors are important. The sub sea power cable receives a base load from the wind farm. The capacity utilization is thus not totally dependent on trading opportunities. This will result in more certain cash flows. The other factor is that the wind electricity can be sold in two markets, depending on the price in the two markets at a specific moment. Failure of the shore connection is a major risk for the revenues of an offshore wind farm. A shore connection to two sides reduces this risk considerably because the electricity can always flow to one side.

The financial viability of a super-grid project will depend on financial backers having sufficient levels of confidence in the cable technology. Europacable believes the technology is available to develop such a project and the project should be supported by the Scottish Government.

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