

Energy relationship with the UK

1. EXECUTIVE SUMMARY

- 1.1 There is an AC Interconnector (AC I-C) connecting the Isle of Man to the UK, which provides and gets electricity to and from the UK. To achieve net zero by 2050 will require the reduction of emissions from power generation. As emissions are accounted at the emissions source, i.e. in the country where the electricity is generated the export relationship with the UK should form part of any future considerations.
- 1.2 The interconnector is also used to import electricity and therefore decarbonisation could potentially be achieved by the Isle of Man becoming a net importer of energy. However based on current consumption the capacity of the interconnector would not be able to service the Isle of Man's current peak electrical demand so existing generation assets would be required. Particularly if the anticipated future take-up of electric vehicles and air-source heat pumps, for example, occurs.
- 1.3 Emissions from energy supply contributed to 24% of total greenhouse gas (GHG) emissions in the 2017 Isle of Man inventory. This relationship needs further exploration in terms of cost/benefits/CO₂ for import/export scenarios, with particular regard to emissions savings and security of supply.

2. OVERVIEW

- 2.1. Electricity interconnectors are physical links which allow the transfer of electricity across borders. Interconnectors derive their revenues from congestion revenues. Congestion revenues are dependent on the existence of price differentials between markets at either end of the interconnector. Britain's electricity market currently has 4GW of interconnector capacity (not including cables that connect different parts of the UK's domestic electrical grid):
 - 2GW to France (IFA)
 - 1GW to the Netherlands (BritNed)
 - 500MW to Northern Ireland (Moyle)
 - 500MW to the Republic of Ireland
- 2.2. There are a further seven interconnectors with delivery dates up to 2022, connecting the UK to other European nations such as Belgium, Norway and Denmark as well as additional interconnectors to Ireland and France (figure 1).

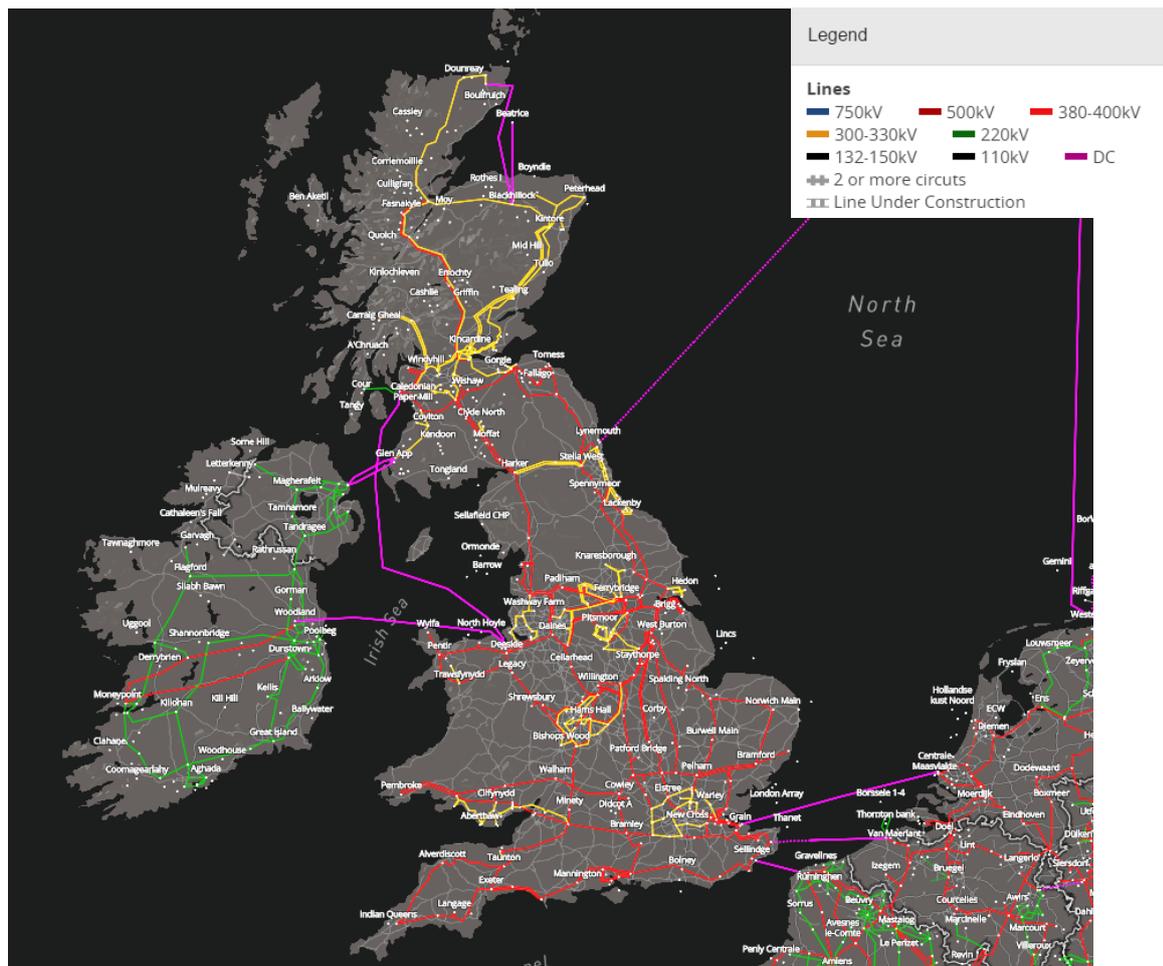


Figure 1. Interconnectors and domestic grid networks in the British Isles.

2.3. Under the present regulatory regime based on EU and GB requirements, there are two general routes for interconnector investment:

- A regulated route under the 'cap and floor' regime. Through the cap and floor approach developers identify, propose and build interconnectors and there is a cap and floor mechanism to regulate how much money a developer can earn once in operation. If applying for a cap and floor regime developers have to comply with all aspects of European legislation on cross border electricity infrastructure.
- As an alternative to the cap and floor model, developers can still seek exemptions from regulatory requirements. Under this route developers would face the full upside and downside of the investment and would usually apply for an exemption from certain aspects of European legislation in order to increase the safeguards for the business case of their investment.

Isle of Man: Generation, exports and imports.

2.4. There is an AC Interconnector (AC I-C) connecting the Isle of Man to the UK. With an undersea section of 104 km, it is the longest AC cable in the world. It was laid in

1999 between Bispham (UK) and Douglas (IOM) and commercial operations commenced in November 2000. It was initially capable of continuous operation of 40 MW at 90 kV. Manx Utilities own and operate the asset, which is now rated to import/export capacity of 67 MW and is used primarily to export surplus electrical energy generated at the Pulrose CCGT to the UK market. For security reasons, island imports are limited to c.55MW.

- 2.5. In 2018, the total electricity demand in the Isle of Man was approximately 363 GWh (Isle of Man Government, 2019). In the same year, the MUA generated 434 GWh at the Pulrose CCGT (with additional 3.8 GWh from hydro-electric/EfW and 4.7 GWh from diesel generation). MUA exported 95 GWh of electricity to the UK, capitalising on market conditions to generate £3.2 million revenue. MUA plan to export over 170 GWh in 2019/20 due to combined EU and sterling carbon prices providing over £18 per MWh profitability. By operating the CCGT at a greater capacity and exporting surplus generation, the MUA also maximises the thermal efficiency of the CCGT raising it from 43% to 49% and thus reducing the carbon intensity per MWh produced.
- 2.6. The IOM ambition to achieve net-zero CO₂e by 2050 will require the reduction of emissions from power generation (199,000 tonnes, 2017) to near-zero. In the short-term, the MUA could reduce the IOM GHG account by c.43 kt (5% of net CO₂e, 2017) by no longer generating electricity to export to the UK. This would come at an opportunity cost of £3.2 million per year for the MUA.
- 2.7. The IOM-UK AC I-C was available 99.5% of the time in 2017/18 (Manx Utilities Authority, 2018). If this asset were used to import electrical energy into the Isle of Man and offset generation requirements (up to 55MW), the emissions from generation in the Isle of Man would reduce further. However, existing generation assets would still be required since the capacity of the AC I-C would not be able to service the Isle of Man's current peak electrical demand (up to 80MW in winter evenings), see figure 2. The AC I-C would also not be capable of servicing the anticipated future increase in electrical demand from uptake of electric vehicles and air-sourced heat pumps, for example.

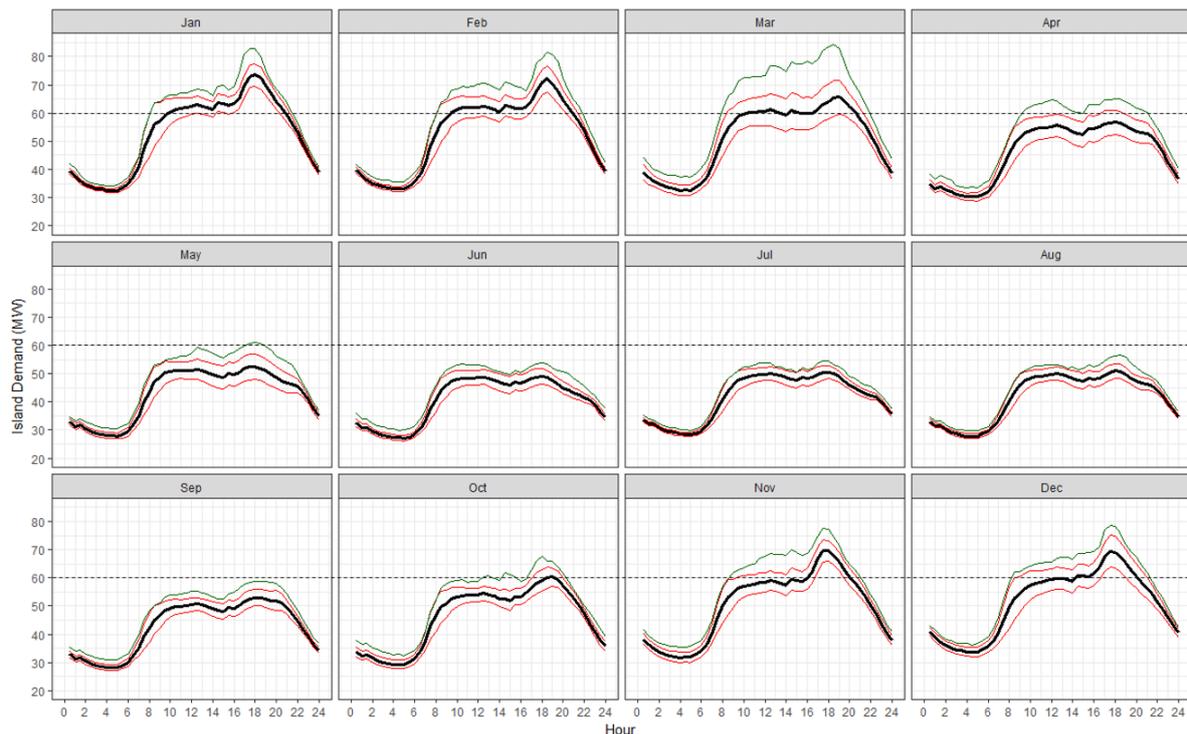


Figure 2 The average (black) +/- standard deviation (red) and maximum (green) daily electrical profile demand, by month, for 2018, where electrical demand = generation + imports – exports (not taking into account an estimated 12% efficiency loss during peak periods). The dashed line shows the 60MW supply capacity of the AC Interconnector to the UK.

- 2.8. In 2018, 6,490 hours of the year were met with electrical demand <55 MW that could be serviced entirely by the existing AC I-C (324 GWh). The remaining 2,270 hours were met with electrical demand in the Isle of Man greater than 55 MW, where an additional 15.3 GWh were demanded above the 55MWh that the AC I-C could supply. Therefore, the Isle of Man currently requires (as a minimum) a generation asset with capacity up to 30MW for use during peak-demand to produce an estimated 15.3 GWh per year. Therefore, 15.3 GWh would be required from domestic generation, which would represent 3.5% of current electrical generation and reducing total CO₂e emissions by c.23%. This could come from existing generation assets, clean renewables or battery storage that is charged during off-peak demand.
- 2.9. Since emissions are accounted at the emissions source, i.e. in the country where the electricity is generated rather than used, the IOM could potentially decarbonise nearly all of the 199,000 t CO₂e by becoming an energy importer i.e. reversing the role of the island from a generator and exporter. Commissioning an additional DC interconnector (DC I-C) with greater capacity would remove all generation needs on the island into the future, but may come into conflict with existing Energy policy, including the requirement to have enough generation capacity to meet island demand if the two largest generation assets (currently the Pulrose CCGT and AC I-C)

go offline. A large DC I-C (500MW capacity) may facilitate additional renewable generation projects (such as offshore wind, see WP11).

3. RECOMMENDATIONS

- 3.1. MUA and IOMG to undertake economic & CO₂e cost/benefit analysis of large DC I-C. Identify risks to island supply from import scenario.
- 3.2. IOMG to analyse European competition law and 'state aid concerns'.
- 3.3. MUA and IOMG to undertake cost/benefit analysis of immediate emissions savings opportunity by ceasing to export electricity to the UK.

4. REFERENCES

Isle of Man Government, 2019. *Isle of Man in Numbers*, Douglas: Isle of Man Government.

Manx Utilities Authority, 2018. *Annual Report 2017/18*, Douglas, Isle of Man: MUA.