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Isle of Man
Government

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**A Report by the Council of Ministers on
the Renewable Energy Target**

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1. Introduction

To The Hon. C. Christian MLC, President of Tynwald and the Honourable Council and Keys in Tynwald assembled.

1. The Minister for Environment, Food and Agriculture brought forward a motion in May 2010 that was agreed by Tynwald for a renewable energy target of 15% electricity generated from renewable sources by 2015.
2. Following agreement of the motion, the Department of Economic Development sought expressions of interest to design, build and operate a 20 megawatt onshore wind farm. Although significant interest was received, it was decided not to progress with an onshore wind farm due to the likely economic implications.
3. The Minister for Economic Development made a commitment in the October 2012 sitting of Tynwald to report back on progress towards the target. The Council of Ministers Environment and Infrastructure Committee, has reviewed the policy and now reports back to Tynwald on progress made towards the target and outlines associated wider policy issues.
4. As outlined in the "Agenda for Change" approved by Tynwald in January 2013, the Environment and Infrastructure Committee will lead work to deliver Government's strategic priorities in this area, including:
 - Use our natural resources to work towards building a post carbon fuelled Island
 - Identify sustainable ways to reduce the financial and environmental cost of energy in the medium to long term
 - Address the issues posed by the effects of climate change
 - Produce a marine spatial plan to guide appropriate future commercial use of our territorial seas
 - Encourage sustainable economic activity in harmony with our natural resources



Hon P A Gawne MHK

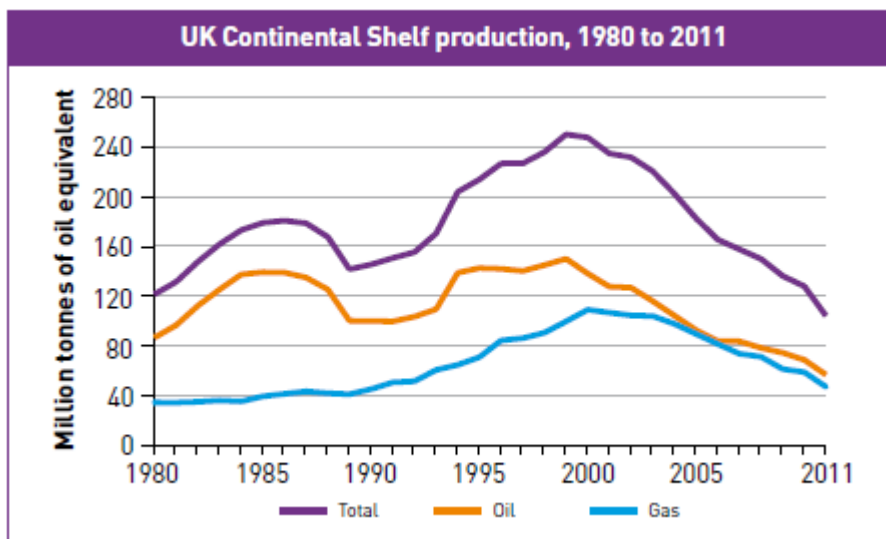
Chair – Environment and Infrastructure Committee

2. Background

Energy is vital to a modern economy, being needed for heating and lighting of homes, travel and for powering businesses and economic development. Energy policy across the world is evolving in response to rising fossil fuel prices, issues over security of supply and the need to reduce carbon emissions to combat climate change.

The UK's indigenous energy sources are in decline (see Figure 1). The UK already imports 36 per cent of the coal, gas and oil that it used in 2011 and, by around 2020, the UK could be dependent on imported energy for three-quarters of its total primary energy needs¹.

Figure 1 UK Continental Shelf Production



Source: UK Department of Energy and Climate Change

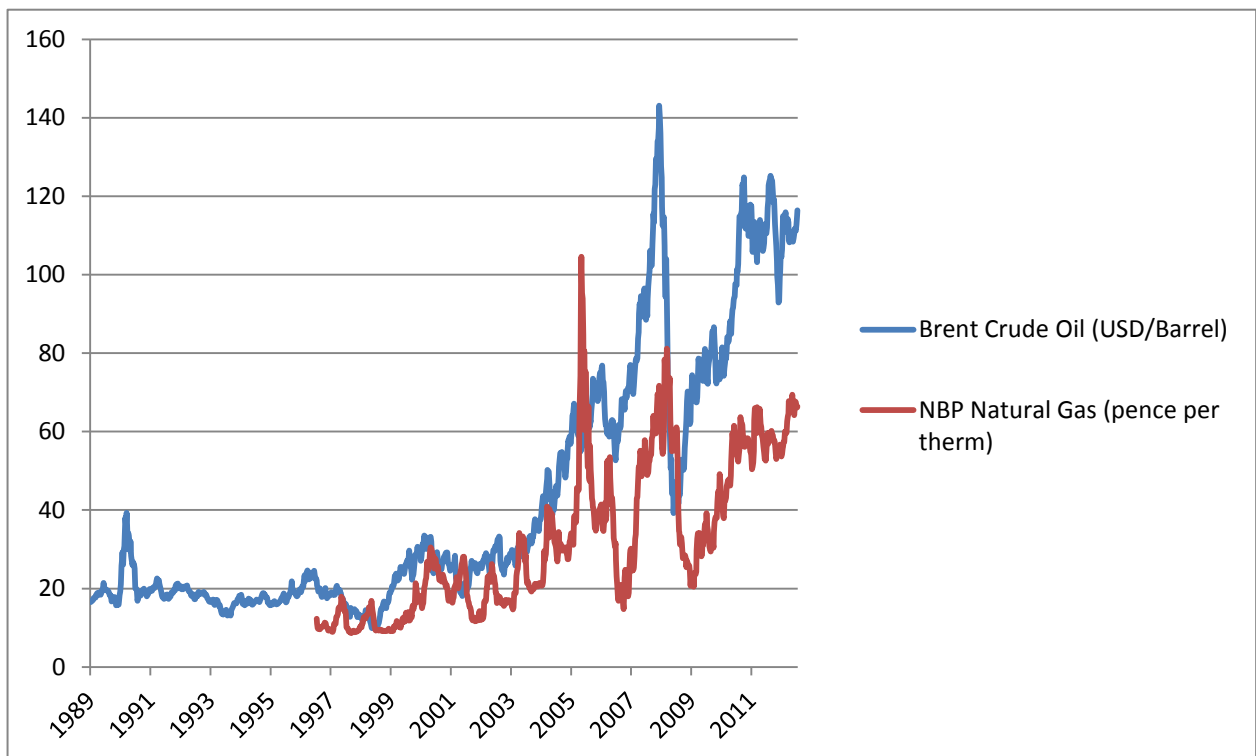
Likewise, European fossil fuel production continues to decline and Europe is heavily dependent on imports meeting greater than 50% of its energy needs. Future dependency on imported energy is considered a potential risk for security of supply, particularly in the context of rising global demand and finite fossil fuel reserves.

Fossil fuel prices have significantly increased and fluctuated since 2000 with global Brent oil currently trading above \$100 per barrel (see Figure 2). Future fossil fuel price predictions from the UK Department of Energy and Climate Change project further significant price increases².

¹ http://www.decc.gov.uk/media/viewfile.aspx?filepath=publications/white_paper_03/file10719.pdf&filetype=4&minwidth=true

² www.bis.gov.uk/files/file51365.pdf

Figure 2 Brent Oil & Natural Gas Prices



Source: MEA

The need for renewable energy is required to address the economic security of supply implications of being a net energy importer in a market with shrinking resources and the threat of climate change while ensuring continued affordable energy is available.

3. Progress to Date

Based on the 2011/12 figures provided by the MEA, the Isle of Man currently generates approximately 3.2% of its electricity from renewable sources with approximately 2.6% from the Energy from Waste plant (EfW) and 0.6% from the hydro-electric station at Sulby. It is estimated that a further 1.8% of electricity may be generated from micro generation including combined heat and power plants (CHP) however, we are unable to confirm this figure as the electricity is consumed locally and not distributed using the MEA grid.

In the near future we expect increased energy efficiency amongst the public and private sector and further increasing levels of micro generation.

4. Options to Achieve Target

A review of renewable energy options for the Isle of Man was performed with specific reference to the resources available, technology readiness and scope for deployment on the

Island³. To achieve the target of 15% electricity generated from renewable sources by 2015 it would be necessary to increase the existing 1.5 megawatt (MW) of power generated from renewable sources by generating an additional 6 MW output of renewable energy.

4.1 Wind Energy

Wind energy is a developed renewable technology for generating electricity having been in commercial use in the UK for over 20 years. A single 20 MW onshore wind farm site is capable of delivering an average 6 MW output that would generate approximately 12% of the Island's electricity needs.

Significant interest was generated when the Department of Economic Development previously sought expressions of interest for developing a 20MW onshore wind farm on the Isle of Man. Initial evaluation suggests that electricity could be provided from an onshore wind farm for as little as £60 – 80 per megawatt hour (MWh) in year 1 increasing in line with the Isle of Man Retail Price Index. Currently natural gas is purchased by the Manx Electricity Authority (MEA) at 60 pence/Therm and is used to generate electricity for £50 per MWh (excluding operating costs). An onshore wind farm would have an annual benefit of £4 million to the MEA resulting from reduced gas usage and increased electricity export revenue. However, the wind farm tariff at £60 – 80 per MWh and additional associated costs for the MEA including reserved capacity for shadow generation and a reduced efficiency of gas turbines would annually cost the MEA £4.8 – 6.2 million. This would increase the overall cost of electricity to the consumer by up to 3% or an additional 0.14 – 0.49 pence per kWh. In the current economic climate, non essential increases in tariffs for electricity should be avoided.

The MEA currently has sufficient generation capacity for Island demand and exports approximately 20% of electricity generated to the UK. There is no immediate requirement for additional electricity generation capacity, and the current generation assets have a life span of another 20 years. It is important that Government continues to maximise the investment already made in the gas network and generation assets.

Noting the above, any large scale windfarm projects, both on and offshore will need to export energy generated. In the UK subsidies are paid to companies to incentivise the generation of renewable energy. Access to the UK renewable energy subsidies is only possible where "joint projects" have been agreed with the Department of Energy & Climate Change. Legislation for "joint projects" is currently progressing in the UK with the Energy Bill providing the necessary powers to enable agreed projects to be eligible for renewable incentives from 2017 where the energy generated is exported to the UK⁴. Such renewable incentives will be absolutely necessary for offshore renewable energy projects in the Isle of Man territorial seas for export of energy generated from more expensive offshore wind and tidal projects.

³ <http://www.gov.im/lib/docs/daff/enviro/Energy/acamainreport.pdf>

⁴ <http://services.parliament.uk/bills/2012-13/energy.html>

Any planning application for an onshore wind farm would likely receive several objections from local residents. This could significantly delay any installation resulting in the target date not being achievable by 2015.

There is a global move to a low carbon economy and the carbon emissions saved from larger offshore projects would be significantly greater than carbon emissions saved from a 20 MW onshore wind farm.

Although an onshore wind farm is likely to be the most cost effective approach for meeting the target of 15% electricity generated from renewable sources it is proposed this target be superseded with a carbon reduction target aligned more closely with the international community. Furthermore, development of offshore energy for export from wind and tidal power in the Isle of Man territorial seas would deliver a greater renewable energy and low carbon benefit.

4.2 Biomass

Research has been conducted by Department of Environment, Food and Agriculture (DEFA) into the potential use of biomass products including willow and eucalyptus. While both of these renewable fuels can be grown locally, they cannot be grown in sufficient quantity to deliver 6 MW of electricity generation.

The UK has developed a number of willow coppice fired power stations for electricity generation including a site at Lockerbie. This site has an electrical output of 44 MW, but requires approx 10,000 tonnes of coppice willow per week. The Isle of Man has an estimated maximum yield from the DEFA forestry estate of 8-10,000 tonnes per year.

Council of Ministers has a policy for biomass to be the preferred fuel for heating all new and refurbished public buildings and where boiler replacement is being implemented, as long as the lifetime costs are better than or equal to alternative forms of fuel.

4.3 Anaerobic Digestion

Research has been conducted into the potential for use of anaerobic digestion to generate biogas using locally sourced biomass material. The 2009 DEFA agricultural census indicates that the Isle of Man has less than 4,000 pigs, 18,000 beef and 6,000 dairy cattle. Based on these figures less than 1 MW of electricity could be generated if all biogas could be captured using current estimates of farm slurries. Domestic refuse waste could be used to supplement the farm slurry however, this is already being used to generate electricity from waste on the Island through the EfW.

4.4 Tidal

Small pilot studies of up to 1.2 MW have been trialled in the UK and Europe. The Isle of Man is well situated for using tidal power however, the commercially available technology has not developed sufficiently to currently generate 6 MW for the Island's needs at an affordable cost. Recently the UK has increased the level of support for electricity generated from tidal power.

4.5 Wave

Small pilot studies up to 0.5 MW size have been trialled in the UK and Europe. The Isle of Man is well situated for using near shore wave energy power however, the commercially available technology has not developed sufficiently to generate 6 MW for the Island's needs at an affordable cost. Recently the UK has increased the level of support for electricity generated from wave power.

4.6 Hydro

Currently an average 0.3 MW of the Island's electricity is produced using the hydro-electricity station at Sulby. The Isle of Man Water and Sewage Authority has recently installed an energy recovery turbine at Sulby which will generate an additional 0.1 MW. It would be difficult to expand existing sites and expensive to build further dams to deliver an average 6 MW of hydro-electric generation. A previous study by students at Exeter University suggested a hydro pumped storage scheme was technically feasible however, the cost would be prohibitive⁵.

4.7 Solar

The cost of solar photovoltaic (PV) has recently significantly decreased⁶ however, efficiency of technology is still only around 10% which does not make generation affordable for Island use.

4.8 Micro generation

Micro generation projects tend to be up to 50 kW in scale. It would be difficult to ensure sufficient uptake of micro generation projects to generate 6 MW of electricity. Providing continued certainty for the Home Generation standing charge rebate may encourage further uptake in micro generation.

Further low carbon opportunities include increased uptake of electric vehicles and heat pumps on the Island.

5. Future Options

The policy of generating 15% of electricity from renewable sources could be superseded with policies to introduce a carbon reduction target and by developing potential offshore energy production in the Isle of Man territorial seas for export.

⁵ <http://www.gov.im/lib/docs/ded/Energy/iomenergystrategyreport2010.pdf>

⁶ <http://www.energysavingtrust.org.uk/Generate-your-own-energy/Solar-panels-PV>

5.1 Greenhouse Gas Reduction Target

The publication of the Stern review report⁷ on the economics of climate change confirmed that the scientific evidence⁸ is now overwhelming that climate change presents a serious global risk.

5.1.1 International context

The United Nations Framework Convention on Climate Change was established in 1992 with the aim of stabilizing greenhouse gas (such as carbon dioxide, methane and nitrous oxide) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. This was the international acceptance that the burning of fossil fuels adds greenhouse gases to the atmosphere and is a major contributor to climate change. The Convention enjoys near universal membership, with 192 countries having ratified the Convention.

The Convention was followed by the Kyoto Protocol which committed signatories including the UK to quantify greenhouse gas emissions and reduction commitments. The Isle of Man Government is committed to the principles of the Kyoto Protocol and has joined the UK in its ratification of the Protocol. This, in turn, means that as co-signatories to the Kyoto Protocol, the Isle of Man is committed to implementing policies that will reduce our levels of greenhouse gas emissions, thus playing our part in taking urgent global action to tackle climate change.

The EU is making a transition towards a competitive low carbon economy and is preparing for reductions in its domestic emissions by 80% by 2050⁹. The EU roadmap involves electricity playing a central role and the share of low carbon technologies in the electricity mix is estimated to increase from around 45% today to nearly 100% in 2050. The EU has implemented a strategy to generate 20% of energy requirements from renewable sources by 2020. To achieve the EU target, the UK has a strategy for a transition to a low carbon economy. Recognising the economic necessity, the UK has through the Climate Change Act 2008 set legally binding targets to reduce greenhouse gas emissions below 1990 levels by 80% by 2050¹⁰.

Recently, Jersey has also issued a consultation on an energy plan which contains a framework to achieve a reduction in greenhouse gas emissions of nearly 80% lower than 1990 levels by 2050¹¹.

5.1.2 Isle of Man context

The Isle of Man cannot escape the effects of climate change however, it can assist the global community by reducing its greenhouse gas emissions. In seeking to reduce the

⁷ http://www.hm-treasury.gov.uk/sternreview_index.htm

⁸ <http://www.ipcc.ch/ipccreports/ar4-wg2.htm>

⁹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0112:FIN:EN:PDF>

¹⁰ http://www.opsi.gov.uk/acts/acts2008/ukpga_20080027_en_1

¹¹ <http://www.gov.je/Government/Consultations/Pages/EnergyPolicyConsult.aspx>

Island's dependence on imported primary energy supplies it will not only be ensuring our Island is on a good footing for a sustainable future, but will also be seen as an internationally responsible jurisdiction assisting in the tackling of climate change on a global scale.

Previous policies and initiatives have assisted the Isle of Man to stabilise carbon emissions while enjoying continued economic growth. The carbon emissions for each unit of electricity generated on the Isle of Man has significantly decreased in recent years with natural gas replacing oil as the major primary source of energy. In addition, the Energy from Waste (EfW) plant also contributes a proportion of power to meet the Islands electricity demand. The EfW replaces landfill for disposal of domestic waste which also avoids the release of more potent greenhouse gases such as methane.

Previous successful Government energy efficiency initiatives have included insulation of social housing (COSY homes), domestic energy efficiency advice including Energy Doctor and the MEA Home Energy Officer. Funds have been made available to Government from the Energy Initiative Capital Fund and local businesses from the Department of Economic Development's Green Business loan scheme to implement energy efficiency projects.

Significant opportunities exist for further energy efficiency especially in domestic properties which currently account for greater than 40% of total Island carbon emissions (data provided by MEA, Manx Gas, Manx Petroleum and Ellan Vannin Fuels). Reducing energy usage in domestic properties could increase household disposable income for spending in local businesses and also assist with tackling fuel poverty (where greater than 10% of household income is spent on fuel costs). The Isle of Man Government may consider introducing a similar Green Deal scheme which recently launched in the UK offering loans for home owners to reduce their energy consumption.

Energy prices have significantly increased since 2000 and are expected to continue rising. Reducing the Island's dependency on imported fossil fuels will provide some economic certainty regardless of increasing fossil fuel prices and likely price fluctuations in an unpredictable global energy market, issues over security of supply and the need to reduce greenhouse gas emissions to combat climate change.

5.2 Develop Potential Offshore Energy Production

The Isle of Man territorial seas account for greater than 87% of the Island's total territory. Significant progress has recently been made to develop the Marine Spatial Plan to create a stringent consenting regime which will give consent for all future types of development within the marine environment.

5.2.1 Renewable Energy

Recent EU policy has set energy objectives to ensure future sustainability, competitiveness and security of supply. This includes reducing greenhouse gas emissions by 20%, increasing the share of renewable energy to 20% and improving energy efficiency by 20%, all by 2020. The EU Renewable Energy Directive commits each member state to make a contribution

towards the target of 20% renewable energy by 2020¹². The UK contribution is a target of 15% which is the lowest in Europe. With the significant recent investment particularly from wind power, the UK has increased its energy from renewable sources to 3.8% in 2011. The UK requires significant further investment in renewable energy if it is to meet the European target.

The EU Renewable Energy Directive allows joint projects whereby a new offshore or onshore renewable energy project in a third country (including Crown Dependencies), can be co-financed by a Member State if the energy produced in the third country is imported into the EU. British Irish Council (BIC) Energy Ministers have agreed to cooperate to deliver an "All Islands Approach" to develop renewable energy resources for use within the British Isles and for export to Europe. Legislation to enable joint projects has been included in the Energy Bill which is progressing in the current UK legislative programme.

A significant opportunity exists for the Isle of Man to lease its seabed for the generation of renewable energy for export to assist the UK to meet its national and European renewable energy targets. Furthermore, offshore installations will require onshore facilities to meet the operation and maintenance requirements and the Isle of Man is well positioned to provide this service¹³.

5.2.2 Gas

Although gas is not a renewable source of energy it is a cleaner source of energy with less carbon emissions than other sources of fossil fuel.

Further carbon reductions are likely to occur in the Isle of Man following the completion of the expansion of the natural gas network to the South, West and North of the Island as domestic customers whose oil boilers are coming to the end of their lives may consider switching to natural gas if close to the new gas network.

Gas currently forms an integral part of the UK's power generation mix contributing approximately 40% in 2011¹⁴. During 2011 power generation by gas declined sharply by approximately 18% due to high gas prices and falling coal and carbon taxes.

The UK Government expects that gas will continue to play a major role in the electricity generation mix over the coming decades, alongside low-carbon technologies as a diverse generation mix balances risks and uncertainties of different technology options, including uncertainty on future gas prices. However, there is a need to ensure the security of future supplies of affordable gas.

During the 1990's the Isle of Man Government issued several prospecting licences to petroleum companies. All of these licences have lapsed, however with the increased fossil fuel prices and improvements in technology it is possible that any gas deposits in Isle of Man territorial seas may now be economically viable to extract.

¹² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF>

¹³ <http://www.gov.im/lib/docs/ded/Energy/DED2012/cleantechinfocus15may2012.pdf>

¹⁴ <http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/oil-gas/7165-gas-generation-strategy.pdf>

Hydrocarbon deposits in the Isle of Man territorial seas may also contain significant quantities of coal. Coal gasification is a well established technology and several countries including Australia produce clean fuel from onshore coal deposits^{15,16}. The technology involves production of a Syngas (mixture of hydrogen and methane) underground which can be extracted to the surface using directional drilling. Several licences have been issued for offshore coal gasification in the UK and initial trial projects are expected to commence in 2013.

A significant opportunity exists for the Isle of Man to licence extraction of gas for export to the UK. Furthermore, new technologies including coal gasification expands the hydrocarbon resource available in the Isle of Man territorial seas.

6. Conclusion

The target of 15% electricity generated from renewable sources by 2015 initiated a forward momentum towards a low carbon economy. Government has evaluated the opportunities and identified that greater renewable energy and low carbon benefit can be generated from potential development of renewable energy projects in the Isle of Man territorial seas.

Whilst the most cost effective option to achieve the 15% target of generating electricity from renewable sources is from an onshore wind farm, there would be significant challenges including planning in delivering this within the identified timescales.

Proceeding with an onshore wind farm would take a minimum of 2 years to plan and install turbines. It will therefore not be possible to achieve the 15% target of generating electricity from renewable sources by 2015.

The Isle of Man Government has previously invested heavily in the generation of electricity from gas and the existing plant has a lifespan of almost 20 years left. Generation of electricity from additional sources would reduce the financial return on the existing plant. Furthermore, in the current economic climate it is likely that any energy price increases, however small, would be detrimental to economic growth.

The EU, UK and Jersey have greenhouse gas reduction targets to reduce greenhouse gas emissions of 80% lower than 1990 levels by 2050. Taking into account these greenhouse gas reduction targets it would be appropriate to supersede the 15% target of generating electricity from renewable sources by 2015 with the following policies:

- Greenhouse Gas reduction target

The Minister for Environment, Food and Agriculture working with the Council of Ministers Environment and Infrastructure Committee will develop the strategy to reduce greenhouse gas emissions of nearly 80% lower than 1990 levels by 2050. This reduction target will also encompass heating and transport.

¹⁵ <http://www.ucgassociation.org/>

¹⁶ <http://coal.decc.gov.uk/en/coal/cms/publications/mining/gasification/gasification.aspx>

- Develop potential offshore energy production

The Minister for Economic Development working with the Council of Ministers Environment and Infrastructure Committee will develop the strategy for potential economic development and revenue opportunities in our marine environment from energy production. Government will work with commercial partners to produce renewable energy from offshore wind, tidal power and clean energy from gas and coal gasification for export to neighbouring jurisdictions.

7. Recommendations

Council of Ministers recommends that:

- i. Tynwald acknowledges that the target of 15% electricity generated from renewable sources by 2015 will not be achieved for the reasons set out in the report.
- ii. Government should adopt the greenhouse gas emissions target for the Isle of Man of 80% reduction of 1990 levels by 2050.
- iii. Government should explore opportunities to develop potential offshore energy production in Isle of Man territorial seas for export to neighbouring jurisdictions and this may include the establishment of strategic partnerships.