2 Rationale and alternatives

2.1 Need for the Project

2.1.1 Introduction

Since the adoption of the Kyoto Agreement in 1997 there has been increasing concern over the security of supply of energy from fossil fuels and a growing awareness of their impact on the environment and climate.

Climate change impacts are one of the key concerns of the EU, and renewable sources of energy are seen as essential alternatives to fossil fuels, which are regarded as a major contributor to greenhouse gas emissions. In 2007 the EU agreed new climate and energy targets to be achieved by 2020. These targets are based on a 20% reduction in greenhouse gas emissions, the achievement of 20% energy efficiency and the production of 20% of the EU's energy consumption from renewable sources. Individual and legally binding targets have also been set for each member state under the EU Renewable Energy Directive 2009/28/EC to ensure that the 2020 targets are achieved.

Ireland is in a unique position with regard to developing this new industry forward. The technology to harness the wave energy resource is still at development and testing stages and no commercial full-scale device is in operation as of yet. On the critical path for proving technology is the requirement for testing and demonstration in an open ocean environment such at Belmullet. The test site will deliver this requirement and will also deliver the following benefits:

- It will support the delivery of Government and EU policy for implementation of the Ocean Energy strategy and job creation initiatives. Evidence shows that an Irish Ocean Energy industry could support 17,000-52,000 jobs and a net present value of around €4–10bn by 2030 (SQW 2011).
- It will facilitate the development of new technologies, thus supporting the Government's commitment to develop the smart economy.
- It will be the final test facility required by international industry to demonstrate and prove the commercial viability of ocean energy devices for deployment off the Irish coast. This will provide a focal point to develop and test ocean energy products and services in Ireland.
- It will provide a catalyst for new commercial opportunities to ensure Ireland and Irish companies are at the forefront of developments in ocean energy.
- It will enable important research into the development of ocean energy in the most extreme climates, helping justify investment in commercial projects that are more productive, but with more risk.
- It will provide a means to reduce dependence on fossil fuels, reduce emissions and develop an indigenous secure and renewable energy source.

2.1.2 Need for renewable energy

The Government's 2007 White Paper on sustainable energy indicates that global energy demand is predicted to increase by 50% to 2030 and fossil fuels will remain the dominant source to meet this energy requirement.

Ireland's population and economic growth in the latter part of the 20th century and beginning of the 21st century has resulted in increased energy demand. Total primary energy demand (including transport, heating and electricity) in Ireland was 16.3 Mtoe in 2008, and is expected to grow to 17 Mtoe by 2020. This trend includes a 1.2% average annual reduction in primary energy requirement to 2012 and a 1.2% average annual growth thereafter to 2020 (SEAI 2009).

To ensure that energy demand is met sustainably into the future in a manner that allows climate change to be tackled and while maintaining social and economic growth, alternative sources of future energy supply need to be developed and implemented.

Figure 2-1 shows the current all-island fuel mix.

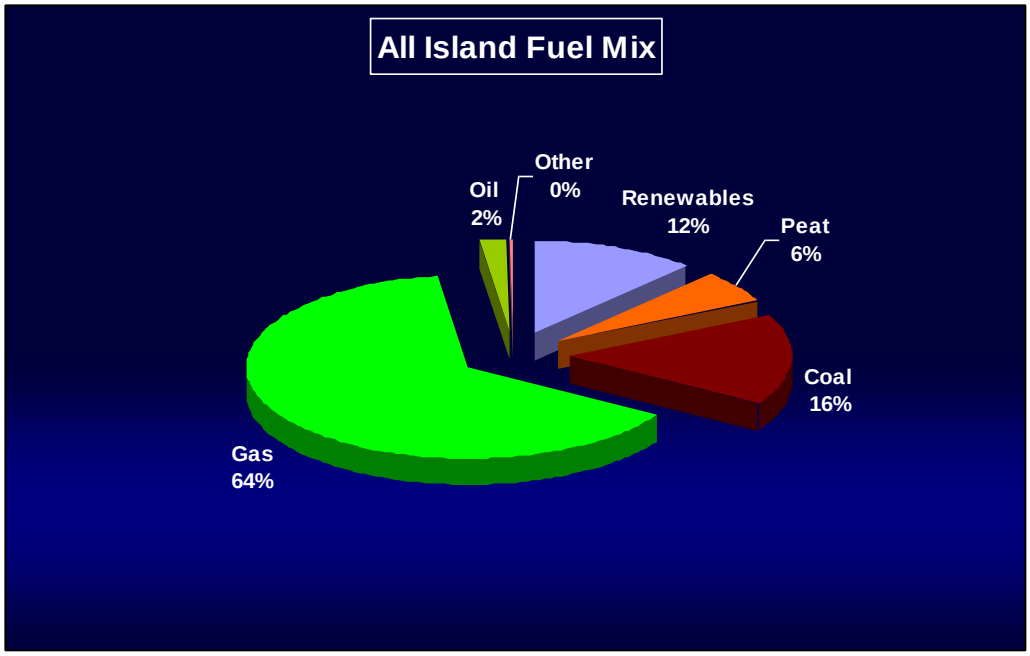

Figure 2-1: All Ireland fuel mix

Source: Commissioner for Energy Regulation (CER) - Fuel Mix Disclosure and CO_2 Emissions 2010, CER/11/129, July 2011

The development of home-grown renewable sources of energy will ensure future sustainable growth and for that reason is central to overall energy policy in Ireland. Such development will lead to the following:

- Reduction in dependence on fossil fuels
- Improvement in security of supply
- Reduction in greenhouse gas emissions.

Renewable energy creates environmental benefits, delivers green jobs to the economy, and makes a contribution to national competitiveness.

2.1.3 Renewable energy resource in Ireland

Some 14.4% of electricity generated in Ireland in 2009 came from renewable sources, exceeding the EU 2010 interim target of 13.2% generation (Dennehy et al., 2010). Wind energy accounted for 10% of this. The total installed capacity for energy generated from wind sources was 1,264MW in January 2010. A further 155MW from wind sources have been contracted and an additional 3,900MW proposed within the Gate 3 planning process. In addition, some 601.5 MW of offshore wind energy is due to be connected between 2010 and 2017.

According to the Strategic Environmental Assessment (SEA) of the draft Offshore Renewable Energy Development Plan (OREDP, 2011), the potential amount of accessible[1] wave energy development is greater than 17,500MW, nearly three times the current generation capacity from all sources in Ireland The wave energy resource of the Irish coast is vast, available and greatly exceeds that available to other EU states. This means that Ireland is in a unique position to harness this renewable resource and to develop this new industry.

2.1.4 Targets for renewable energy in Ireland

The EU Directive (2009/28/EC) on the promotion of the use of energy from renewable sources establishes the basis for the achievement of the EU's 20% renewable energy target by 2020. In seeking to achieve the overall EU goal, it also sets individually binding renewable energy targets on each member state. Under this Directive Ireland has been set a mandatory target of 16% of gross final consumption (heat, transport and electricity) to come from renewable energy by 2020. Cuts will not be optional – they will be binding on Ireland under future EU and UN agreements, and Ireland will face hefty financial sanctions if it fails to meet them. An indicative target of 13.2% share of gross electricity consumption by 2010 has also been set in the Directive.

In addition, the Irish Government set its national targets for the production of electricity from renewable sources at 15% by 2010 and 33% by 2020 (Energy White Paper, 2007) and this was extended to 40% in the Government's Carbon Budget of October 2008.

The Government White Paper also set a specific target for the ocean energy sector of achieving 500MW of renewable marine energy for 2020.

2.1.5 National Renewable Energy Action Plan (Ireland)

Under Directive 2009/28/EC each Member State submits to the EU a National Renewable Energy Action Plan (NREAP) setting out how it plans to reach its overall individual target. Ireland's NREAP sets out a target of 16% of energy from renewable sources across the electricity, heat and transport sectors by 2020. This is made up from a 12% share of heat from renewable sources (RES-H), 10% share of transport from renewable sources (RES-T) and 42.5% share of electricity from renewable sources (RES-E).

In the 2001 European RES-E Directive, Ireland was set a target of moving from 3.6% RES-E to 13.2% RES-E by 2010. Ireland achieved 14.4% RES-E in 2009 and is on track to exceed the national target for 2010, which at 15% is higher than the European target.

With regard to the targets set out in the NREAP, the Government has identified offshore renewable energy (offshore wind, wave and tidal energy)to make a significant contribution to the RES-E element of Ireland's overall renewable energy target, highlighting the Government's target of 500MW for ocean energy (wave and tidal) by 2020 as set out in the Government's White Paper on Energy Policy (March 2007).

2.1.6 Delivering offshore renewable energy in Ireland

The Government's support for offshore renewable energy in Ireland is both technical and strategic.

At the technical level the Government has been actively supporting the delivery of the Ocean Energy Strategy for Ireland, which was adopted as Government policy in 2005. Its main focus is to introduce ocean energy into the wider portfolio of renewable energy and to develop an

[1] Accessible is defined as wave energy development potential in water depths of between 10m and 200m off the coast of Ireland

ocean energy sector. Currently a number of Irish companies are developing different ocean energy technology concepts. For example, two (Wavebob and Ocean Energy) use wave energy, and one (Open Hydro) uses tidal energy. Both Wavebob and Ocean Energy have deployed prototype devices at the Galway Bay quarter-scale test site, and Open Hydro has successfully deployed in a number of countries.

The Ocean Energy Development Unit (OEDU) of SEAI was established to implement the Government's decision to accelerate the development of ocean energy (wave and tidal) in Ireland. The objectives of OEDU are:

- The creation in Ireland of a centre of excellence in ocean energy technology
- The stimulation of a world-class industry cluster through such initiatives as the enhancement of research facilities, development of test sites and support for industry development
- The connection of 500MW of ocean energy by 2020

Complementing the OE Strategy, in 2007 the Irish Government adopted the strategy outlined in the Marine Institute's *Sea Change: A Marine Knowledge Research and Innovation Strategy for Ireland 2007-2013*. This strategy aims to drive the development of the marine sector in Ireland by:

- Strengthening competitiveness and sustainability of the marine sector
- Promoting economic stimulation and diversification
- Increasing research capacity
- Promoting regional development and North–South cooperation
- Improving public service
- Introducing improvements in environmental quality and management.

At a strategic level, the Department of Communications, Energy and Natural Resources (DCENR) is working on the preparation of the Offshore Renewable Energy Development Plan (OREDP), which describes the policy context for development of offshore wind, wave and tidal current energy in Irish waters for the period to 2030. The objectives of OREDP are to:

- Describe the policy context for development of the offshore marine renewables sector
- Provide information on the state of play on activities and initiatives that are underway in the marine renewable energy sector
- Set out some development scenarios for the period 2030
- Set out the long term vision for the sector

For the purposes of OREDP the Irish coast has been divided into 6 distinct assessment areas. The proposed AMETS site is located in Assessment Area 5: the West Coast, which has been identified as suitable for offshore wind and wave technology – see Figure 2-3.

A Strategic Environmental Assessment (SEA) has been undertaken and an Environmental Report and a Natura Impact Statement (NIS) have been published on the draft OREDP. A final version of the OREDP is currently being prepared and is due for completion in early 2012.

2.2 Alternatives to the project

A number of alternatives to the project are discussed in the following sections. These include the 'no action' option, (no development takes place), and also the option of meeting Ireland's renewable energy targets from other renewable energy sources.

2.2.1 No action option

In the context of evaluating alternatives, it is necessary to consider the potential effects of not developing the offshore wave energy test site.

One consequence of not developing the site is the risk that the offshore wave energy sector as a whole would not develop off the west coast of Ireland. This in turn would mean that the OREDP would not be developed to the same extent (only the offshore wind and some tidal energy components would be developed), with consequent non-displacement of fossil fuels in energy provision. The potential effects of not developing wave energy include the following:

- The Government's stated objective of achieving 500MW of wave energy by 2020 would not be achieved
- Ireland will be a risk of not achieving its proposed national target of 42.5% of energy from renewable sources by 2020 as set out in NREAP.
- EU targets for 16% of all energy consumed to be from renewable sources will be at risk
- There will be continued reliance on fossil fuels for energy needs with less reduction of carbon emissions. Extraction and transportation of fossil fuels such as oil and coal also have other environmental impacts associated with them including:
    - Loss of physical habitat through mining operations
    - Solid waste generation requiring disposal
    - Risk of oil spills
- The significant potential wave energy resource off the west coast would remain unutilised.
- There would be a missed opportunity for developing indigenous industry
- Reliance on external manufacturers
- A final critical piece of testing infrastructure would be missing – this would seriously compromise the Ocean Energy Strategy and the implementation of Sea Change but also devalue other testing infrastructure

The wave energy test site represents an important phase in the development of ocean energy. Large-scale commercial ocean energy development can only occur if it is underpinned by technology that is proven technically in an open ocean test site environment. Successful development of ocean energy worldwide would contribute significantly to reduction of the impact of climate change.

Failure to develop this renewable energy resource could be a missed opportunity to address some of the environmental effects of climate change, including:

- Continued effects on temperature, sea levels, precipitation, storminess, and sea temperatures
- Continued climate change effects on species and habitat distribution and abundance – this could lead to long-term changes in the marine environment as sea temperatures

deteriorate, particularly in waters off the coast of Ireland, which are regarded as being among the most biologically diverse due to their position in the Gulf Stream.

2.2.2 Alternatives to wave energy

Other potential sources of renewable energy could be developed to achieve the 2020 targets – for example, onshore and offshore wind, biomass, solar, geothermal or hydro power for example. These sources are limited either by resource and/or potential issues such as:

- Considerable loss of potential economic benefits from the development of a new industrial sector
- Increased pressure on aquatic environments and potential loss of status under the Water Framework Directive
- Increased pressure on sensitive habitats such as moorlands
- Increased adverse effects on landscape character and visual amenity
- Increased cumulative effects on birds, bats and other wildlife through habitat loss and disturbance
- There would also be limitations relating to intermittency of electricity supply from onshore wind. By contrast, wave energy is much more consistent
- Security of supply and increased portfolio diversity.

2.2.3 Implications of not developing the wave energy test site

There are wider implications of not developing the national wave energy test site. These relate directly to the risk that long-term development of commercial renewable wave energy would not occur.

Without AMETS, offshore WECs would not be tested in the world class Atlantic resource off the Irish coast and their reliance and capability will therefore not be proven in these conditions

The extensive renewable resource will remain untapped.

The risks to commercial investment in large-scale wave energy off the west cost would be too high in the absence of technology proven suitable for this environment.

There will be reduced diversification of energy supply, and Ireland will continue to rely heavily on imported fossil fuels for energy needs, with implications for security of supply. This in turn could lead to economic implications for businesses, enterprises and domestic users arising from price volatility.

Potential economic development which could be derived from the development of offshore renewable wave energy technology will not occur, representing a significant lost opportunity. Substantial economic investment is required to achieve wave energy – at all stages from technology development through to manufacturing, installation and maintenance – and there is also considerable potential for employment opportunities. If the test site is not developed, the opportunity to develop a substantial indigenous industry in offshore renewables could be lost.

2.3 Conclusion on need for Atlantic Marine Energy Test Site

The provision of the grid-connected wave energy test facility at Belmullet is required to meet one of the key initiatives set out in the Ocean Energy Strategy.

It will help underpin the Government's stated objective of producing 500MW from ocean energy by 2020. It will do this by providing a test facility where WECs can demonstrate their ability to perform and extract energy efficiently from the extensive wave energy resource off the coasts of Ireland. This testing is a necessary phase before commercial scale ocean energy development can proceed.

The ocean energy sector is rapidly developing and competition for investor funding for WEC development is high. Investor confidence in the area is high, and successful WEC testing of both single units and arrays off the west coast of Ireland will demonstrate the feasibility of commercial wave farm development in the long term, realising the energy potential of the resource.

Successful wave power energy development will lessen Ireland's dependence on imported fossil fuels, will lead to greater security of energy supply, and will provide viable alternatives to meeting Ireland's energy needs.

Successful WEC testing will also lead to potential future economic development associated with the development of a larger ocean energy sector in Ireland.

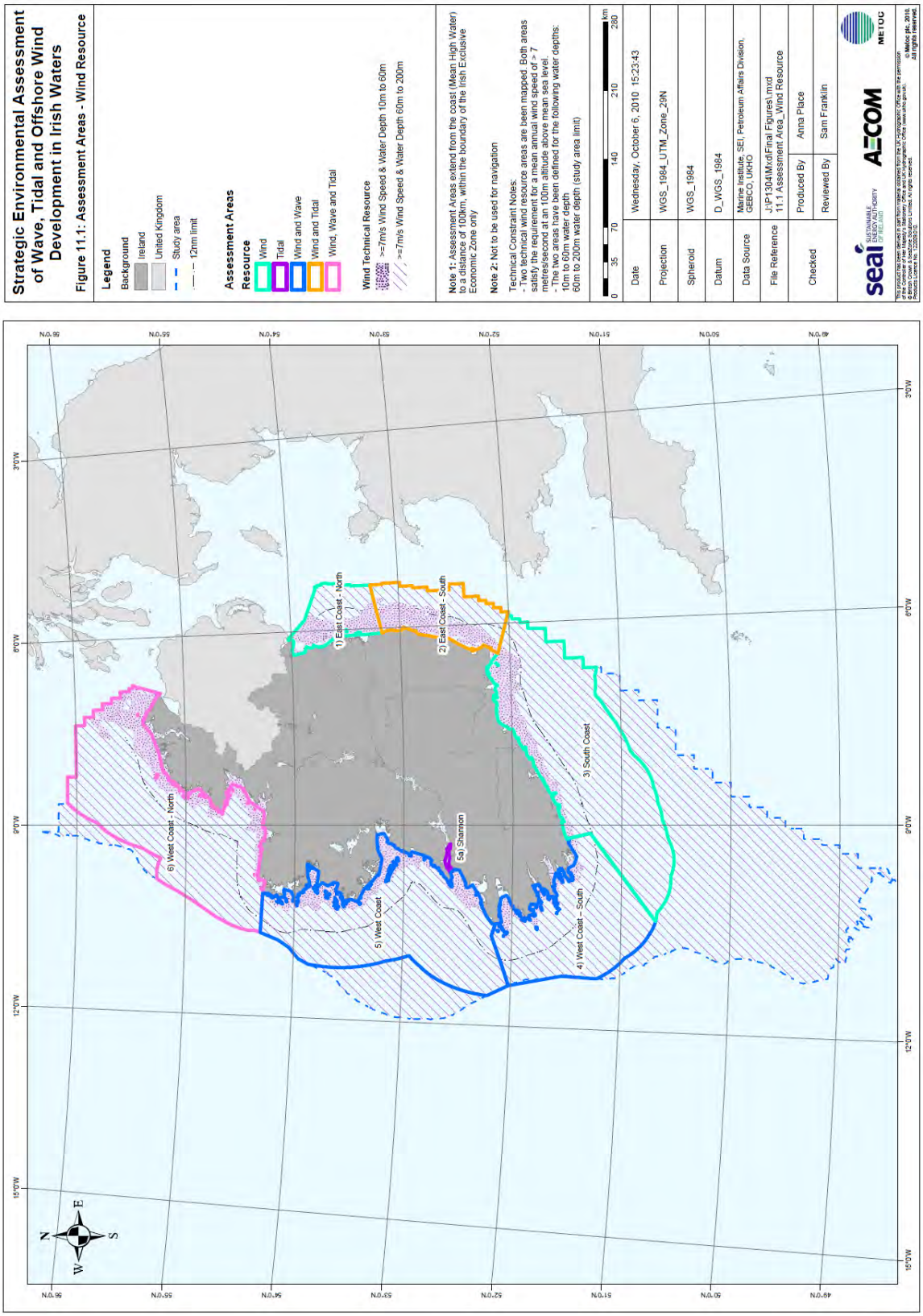

Figure 2-2: OREDP Assessment Areas

Source: Draft Ocean renewable development Plan Draft Report