



**Good Practices on Regional Research and
Innovation Strategies for Smart Specialisation**
Renewable Energy in Scotland

Scotland

December 2012

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1 Basic Data of the Practice

1.1 Title of the practice

Renewable Energy in Scotland

Developing a world leading position in Offshore Wind and Marine Renewable Energy

1.2 Precise theme/issue/policy tackled by the practice

The areas tackled by the practice include:

- ✓ Clusters
- ✓ Innovation friendly business environments for SMEs
- ✓ Research infrastructures, centers of competence and science parks
- ✓ Universities
 - Digital Agenda for Europe
- ✓ Key enabling technologies
 - Cultural and creative industries
- ✓ Internationalisation
 - Financial engineering instruments
- ✓ Innovative public procurement
- ✓ Green growth
 - Social innovation

In particular:

- ✓ Open innovation
- ✓ User driven innovation

Process of regional change initiated:

- Transition
- Modernisation
 - ✓ Diversification
- Radical foundation of a new domain

1.3 Geographical range of the practice

Scotland, NUTS Level 1: UKM

1.4 Contact details

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1.5 Sources of information

For more information:

- on offshore wind in Scotland, please visit Scotland's Offshore Wind Portal at <http://www.offshorewindscotland.com>
- on the support and services provided for the offshore wind industry by Scottish Enterprise, <http://www.scottish-enterprise.com/your-sector/energy/offshore-wind.aspx>.
- on renewables in Scotland, please visit Scottish Renewables' website at <http://www.scottishrenewables.com>

2 Introduction: Regional Smart Specialisation Background

The overarching direction for Scotland's future prosperity is articulated in the Government Economic Strategy (GES). The core objectives of 'Smart Specialisation' in Europe 2020 of 'smart, sustainable and inclusive growth' fit well with the GES. The GES highlights innovation as a key economic driver, influencing productivity and thereby growth of companies and sectors. It also recognises that innovation is broader than the traditional focus on technology and R&D, requiring "input from numerous sources - customers, competitors, academia and other business"

The delivery of Scottish Innovation policy is articulated in the business plans of Scottish Enterprise, Highlands and Islands Enterprise and the Scottish Funding Council. Scottish Enterprise's approach is predominantly focussed on the innovation systems associated with our key sectors. The goals are to enhance the operation of the relevant innovation system, expand the community of innovative companies, increase their investment in innovation and accelerate the commercialisation process leading to successful new products and services. Scottish Enterprise has various support mechanisms for the delivery of innovation support directly to Scottish businesses along with key sector projects which prioritise innovation through appropriate targeted activity. Most importantly, Scottish Enterprise works in partnership with academia and other relevant organisations and trade bodies that support Scottish innovation systems.

Scotland's economic development objectives are focussed on the development of our main growth sectors: Creative Industries; Energy; Financial Services; Food & Drink; Life Sciences; Technologies & Engineering and Tourism. Together, they account for 46% of total Scottish GVA (2010), with energy (including North Sea oil & gas revenues) accounting for almost 20%. In employment terms, they account for 30% of jobs, with tourism the largest contributor. These sectors all have industry-led strategies outlining their aims and objectives, along with the innovation aspirations they plan to achieve. All the sectors have Industry Leadership Groups which contain industry, academia and public sector experts who determine the vision, strategic direction, and ambitions for the sector.

The rationale for applying a sector specialisation approach to economic development is well proven especially in current turbulent economic conditions. These specialisms are expected to outperform the average and to provide a disproportionate impact on the economy.

Scotland is supportive and engaged in the European Commission's Regional Innovation and Smart Specialisation agenda (RIS3) but has not registered on the "Smart Specialisation Platform". Instead, Scotland is one of a few regions that have been asked by the Commission to work' directly with it to develop their Smart Specialisation Strategy.

Scotland has abundant natural energy resources from both hydrocarbon and renewable origins and as a result, energy can be produced from a range of fuels and sources. From the oil and gas fields of the North Sea, to the potential for harnessing power from a wide variety of renewables, the Scottish energy industry is one of the most diverse and vibrant in Europe and is Scotland's strongest sector in economic terms with overall GVA amounting to around £19 billion per annum.

Renewables Policy Context

The policy context for energy specialisation is underpinned by strategic statements at EU, UK and Scottish levels. Much of the policy direction behind renewable energy is driven by wider climate change objectives. In Scotland, the development of offshore renewable (wind, wave and tidal) capacity is being guided primarily through the Scottish Government's (SG's) 2020 Routemap for Renewable Energy in Scotland (Nov 2012). The principal relevant Government targets include:

- Reduce emissions of greenhouse gases from 2010 levels by at least 42% by 2020 and at least 80% by 2050.
- Meet at least 30% of total energy demand from renewable sources by 2020. It is anticipated that this would be achieved by:
 - 100% of electricity demand from renewables (50% by 2015)
 - 11% of heat demand from renewables
 - 10% of transport fuel demand by renewables
 - A 12% reduction in Scotland's final energy use .

With 206 GW of offshore wind, wave and tidal resources, Scotland has almost 40% of the total UK resource and 25% of Europe's offshore wind potential. Exploitation of one third of this by 2050 would amount to installed offshore capacity of up to 68GW, making the UK the largest offshore renewables market in the world.

In the case of onshore renewables, we anticipate that the energy mix will evolve significantly with hydrogen and bio-energy making a much bigger contribution in the longer term. Scottish Enterprise is actively considering how these longer-term opportunities may emerge and grow by identifying the required technologies, the global market potential, wider economic implications and the market failures.

There is therefore a combination of economic, environmental and social opportunities spanning the production of energy and the development of new industries. Scottish Enterprise's current approach is to maximise the market deployment of **offshore renewables**, with ambitious targets for the development and deployment of offshore renewable technologies. The approach covers:

- **Innovation:** developing new technologies and methods to reduce costs, enable greater reliability and enable effective operation;
- **Infrastructure:** the delivery of infrastructure to facilitate renewables for manufacturing/installation;
- **Supply chain:** opportunities across all areas of design, manufacture, installation, operations and maintenance; and
- **Company growth:** stimulating the development, attraction and growth of business activity.

In line with other parts of the world that are currently seeking to develop renewables energy industries, Scotland has a mix of indigenous players and inward investors both in core activities and across the supply chains. However, Scotland also has a specific opportunity to capitalise on the strengths of the North Sea Oil & Gas industry. Many Oil & Gas companies have developed internationally competitive skills and technologies for operating in a challenging marine environment that can now be applied to offshore wind, wave and tidal industries.

3 Description of the Practice

3.1 Executive summary

The Renewables Routemap¹ sets out the context for public and private sector action. According to the Routemap, over the next decade to 2020, renewables in Scotland could provide:

- up to 40,000 jobs¹ and £30bn investment to the Scottish economy;
- significant displacement and reduction in carbon emissions;
- a strengthening of future energy security through the harnessing of sustainable indigenous resources;
- and a transformational opportunity for local ownership and benefits.

The Scottish Government has expressed its determination to ensure that Scotland benefits from the low carbon opportunity - and renewable energy is at the heart of that ambition. Scotland already meets nearly 30% of its electricity demand (equivalent), and nearly 3% of heat from renewable sources. Both rates lead the way in the UK.

Scotland's 100% renewable electricity target is the most ambitious in the European Union. Meeting 100% of our electricity consumption from renewables in 2020 means that, together with the 11% renewable heat and 10% renewable transport targets, Scotland's overall share of renewable energy will be at least 30% by 2020. This exceeds the EU's 2020 renewable energy target of 20% and will be double the UK's agreed target of 15%. In reaching 30% renewable energy by 2020, Scotland's target is on a par with that for Denmark (30%), Portugal (31%), and considerably higher than Germany (18%), Ireland (16%), Spain (20%) and France (23%).

Industry Priorities

- **Access to finance:** meeting Scotland's ambitious renewable energy targets will require substantial investment across a range of areas. Access to finance therefore will be crucial and it will be important for the UK Government's Electricity Market Reform proposals to provide appropriate support for renewables along with market confidence to underpin investment.
- **Efficient and effective planning and consenting:** ensuring the right level of direction and support for renewables at Scottish and UK levels.
- **Grid/Smart Grids:** the Grid in Scotland - as in the rest of the UK - was principally designed for a different era of coal-fired and nuclear power generated close to centres of demand. It is now in need of renewal, upgrading and reconfiguration. The best sources for new offshore renewable energy are found at the peripheries of the current network, and significant enhancements are required to establish an appropriate grid that will allow Scotland to harvest and export its vast resources of clean energy and manage the variability of supply and demand effectively.
- **Fuel Sources:** sustainability of supply is a key factor in the bio energy and energy from waste sectors where renewable energy objectives need to be carefully balanced against supply and other environmental considerations.

¹ Scotland's Renewables Routemap 2012

- **Skills and employment:** meeting the ambitions for renewable energy in Scotland will require a significant supply of skilled labour across a broad spectrum of attainment.
- **Supply chains:** establishing globally competitive supply chains through strategic smart specialisation approaches covering appropriate related and supporting industries.
- **Infrastructure:** implementation of the National Renewables Infrastructure Plan and further investment in secondary infrastructure.
- **Innovation and R&D:** Innovation and research and development within the renewables industry are essential to drive down capital and operational costs, increase adoption, and reduce risk and uncertainty.
- **Public engagement:** engaging with a wide range of audiences on the importance of promoting Scotland's transition to a low carbon economy, the role of renewables in that process and the benefits arising for jobs, skills, and quality of life.

3.2 Key features of the practice

The renewables opportunities in offshore wind and marine energy are at different stages of evolution. Offshore wind is emerging, to a significant extent, from existing and long-established onshore wind activity while marine energy is forging a completely new path based on radical innovation. Offshore wind is therefore further advanced and many of the key features of our practice can be more readily illustrated via our offshore wind work.

Our strategic analysis identifies a number of key elements that need to be addressed for the opportunities to be realised. They include:-

Investment in infrastructure: New infrastructure will be required to support both offshore wind and marine energy deployment. Key infrastructure requirements include: sites for volume manufacturing and O&M activities with access to appropriate quayside facilities, vessels, office facilities and on/off-shore accommodation for personnel.

Appropriate supply chain: The scale of the offshore wind opportunities both in Scotland and the rest of the UK means there will be great demand from developers for services, infrastructure and skills within the same timeframe. There is a risk that the supply chain in Scotland may not be adequately prepared in time to meet and take advantage of the opportunities that will exist both north and south of the border and further afield.

Ongoing innovation of technologies and practices: There is a real need to drive down the costs of offshore wind development, developers estimate by approximately 30%, reducing the risk to developers and guaranteeing the delivery of the proposed developments across the UK by 2020. The ongoing innovation and development of new and existing technologies and operations will be a factor in driving down current costs, stimulating greater confidence in the technologies and attracting private investment. Recent assessments conclude that cost savings and innovation in the offshore wind sector could reduce its Levelised Cost of Energy (LcoE) to about £100/MWh by 2020 and £60/MWh by 2050. The key features of our approach here are to support support effective test, demonstration and deployment of devices so that the industry will be able to invest in mass production and subsequently export of high-value products and related services.

Regulation of and access to the electricity grid: As noted earlier, the UK's current grid capacity and configuration is inappropriate to support the amount of new supply coming from offshore renewable sources (especially offshore wind) and the distributed location of the new supplies. Considerable infrastructure upgrades are required along with the development of new technologies for managing supply and demand more flexibly.

Managing the marine environment: As the users of Scotland's seas continue to grow, managing the marine environment for a number of important uses is a challenging and complex task. The challenges include resource issues, rapid transfer to a new regime, streamlining of processes and consistency with other planning regimes in UK waters. Marine Scotland's co-ordinated approach to licensing can be considered an important example of public sector innovation designed to promote energy industry development as well as safeguard the natural environment and the rights of existing users.

Necessary and available skills: Companies across the UK involved in the renewable energy industry have reported difficulties in recruiting skilled personnel in, for instance, the fields of engineering (electrical, mechanical), design, project management and the marine environment. This is due in part to a general shortage of graduates specialising in such disciplines in the UK, combined with a difficulty in attracting experienced personnel from other sectors due to competition with other more established industries (in particular, the oil and gas industry). This will be exacerbated by competition for skills from the construction and other engineering sector.

Finance: Tackling the issues above, in line with developers' timelines, will take investment of unprecedented sums of money, on levels way beyond Government's and utilities current expenditure limits. Therefore, innovative funding solutions must be sought to attract the significant levels of private sector investment needed if the offshore wind sector is to deliver as planned.

In order to address this set of challenges, a consensus and partnership approach is required to ensure all stakeholders work to the same agenda and contribute the required resources to ensure the plan is delivered.

3.3 Detailed content of the practice

The main elements of Scottish practice for both offshore wind and marine energy are evident from the above and can be further illustrated by highlighting some specific high impact projects that are being pursued through a strategic, co-ordinated, partnership-based approach to help realise the maximum economic and societal benefits. A selection is therefore described below in 3 main project areas:

- Investment;
- Innovation; and
- Supply Chain.

Investment

The Saltire Prize

The Saltire Prize is £10 million award that forms a central part of Scotland's strategy to build its green export industry by attracting significant private sector investment. It is a unique international challenge

that will confirm Scotland's ambition to become the leading force in clean, green, marine energy that will encourage revolutionary commercial breakthroughs in wave and tidal energy. The winner will be the team or organisation that achieves the greatest volume of electrical output over the set minimum hurdle of 100GWh over a continuous two year period, using only the power of the sea. The prize sparked global interest before four companies were selected to enter the Grand Challenge phase and they are currently deploying their marine energy devices in Scottish waters.

“POWERS” & “WATERS”

The POWERS project will invest up to £40m over 5 years to support prototype development of next generation offshore wind turbines. This is a targeted intervention aimed at offshore wind turbine manufacturers. This intervention is a key component part of the integrated suite of support available to offshore wind inward investors and seeks to anchor turbine manufacturing operations in Scotland as well as develop the indigenous supply chain. WATERS is a similar initiative designed to help prototyping of marine energy devices. SE and partners are committing up to £19m in WATERS to support private sector investment.

Renewable Energy Investment Fund (REIF)

REIF is operated by the Scottish Investment Bank (a subsidiary of SE) on behalf of the Scottish Government, Highlands and Islands Enterprise and Scottish Enterprise. With £103m to deploy over three years, it aims to accelerate:

- The development of marine renewable energy and associated technology;
- The uptake of community-owned renewable energy schemes; and
- Renewable heating schemes across Scotland.

The National Renewables Infrastructure Fund

The National Renewables Infrastructure Fund (N-RIF) has been established to support the development of port and near-port manufacturing locations for offshore wind turbines and related developments including test and demonstration activity, with the overall aim of stimulating an offshore wind supply chain in Scotland. This fund is in addition to Regional Selective Assistance (RSA) and other funding that will be available for companies creating new jobs in this industry in Scotland.

Green Investment Bank

The Green Investment Bank, headquartered in Edinburgh is a UK-wide entity that will invest £3 billion of UK Government money to leverage private sector capital to fund projects in priority sectors from offshore wind to waste and non-domestic energy efficiency.

Innovation, R&D, Test & Demonstration Facilities

An extensive set of initiatives aimed at promoting innovation are in place. The main ones relating to R&D, test and demonstration include:

The Energy Technology Partnership

With around 250 academics and 600 researchers, the Energy Technology Partnership (ETP) is the largest power and energy research partnership in Europe. It works by combining excellence from 12 Scottish Universities and is supported by Scottish and UK Government research funds, Scottish Enterprise, other public bodies and industry. ETP members lead or participate in energy related RD&D programmes and investments valued in excess of £300 million. The members of the ETP are active across the spectrum of energy sectors (renewables oil & gas, power generation,) and also across all aspects of the RD&D pipeline, from conceptual and feasibility studies, through to applied research, testing, development, demonstration and commercial deployment.

Scottish Energy Lab

The Scottish Energy Laboratory (SEL) is a network of Scotland's leading research, test and demonstration facilities. The SEL contains 44 distinct national energy technology test facilities with a combined investment of roughly £250m. The SEL was developed to strengthen collaboration across Scotland's key energy R, D&D facilities and to support innovative companies to access them. The Scottish Energy Lab provides national and international companies with a single point of entry into Scotland's:

- key energy research, development and demonstration facilities;
- comprehensive energy technology development and commercialisation support; and
- extensive and world class supply chain.

The following is a brief description of three key SEL facilities supporting Scotland's renewable energy sector specialisation:

- **European Marine Energy Centre (EMEC)**

Established in 2003, The EMEC is the first and only centre of its kind in the world to provide developers of both wave and tidal energy converters – technologies that generate electricity by harnessing the power of waves and tidal streams – with purpose-built, accredited open-sea testing facilities.

EMEC is now one of the key facilities within the Scottish Energy Lab. With 14 full-scale test berths, there have been more grid-connected marine energy converters deployed at EMEC than any other single site in the world, with developers attracted from around the globe. These developers use the facilities to prove what is achievable in some of the harshest marine environments, while in close proximity to sheltered waters and harbours. EMEC also operates two scale test sites where smaller scale devices, or those at an earlier stage in their development, can gain real sea experience in less challenging conditions than those experienced at the full-scale wave and tidal test sites.

Beyond device testing, EMEC provides independently-verified performance assessments, a wide range of consultancy and research services, and staff have worked closely with Marine Scotland to streamline the consenting process.

- **European Offshore Wind Deployment Centre**

The European Offshore Wind Deployment Centre (EOWDC) is a research, development and testing centre that will consist of an array of turbines (up to 15) situated in deep water off the coast of Aberdeen. EOWDC is intended to act as a test bed for a range of next-generation turbines, cables and other kit, while also providing a benign, near-shore marine environment for installers and maintenance firms to try out new methods and instruments. The project will be of national and international importance in terms of value and scale.

- **Power Networks Demonstration Centre**

The Power Networks Demonstration Centre (PNDC) will be a unique purpose-built facility located adjacent to the Scottish Power Training Centre in Central Scotland. Construction of a 13,000sq.ft. facility is underway and will house a centre to encourage the development and deployment of new technology in the field of power systems and active network control. PNDC will be owned and managed by the University of Strathclyde under the direction of member organisations.

International Technology And Renewable Energy Zone (ITREZ)

ITREZ is Scotland's International Technology and Renewable Energy Zone. It is a global research and development hub, bringing business and academia together to work collaboratively on the development of the offshore renewables sector. The heart of ITREZ is in Glasgow city centre where Scottish Enterprise's Industry Engagement Building and the University of Strathclyde's Technology and Innovation Centre are being built. Companies are co-locating around the area with developers SSE, Scottish Power Renewables and Gamesa, all within a few miles.

ITREZ offers the facilities, funding and expertise to help industry and academia work together to create innovative products and services that are essential for the growing renewables sector. The growing hub of companies is capitalising on Scotland's offshore renewables opportunities and establishing Glasgow as an internationally recognised centre of excellence for research and development, design and engineering of renewables.

Offshore Renewable Energy (ORE) Catapult Centre

The Offshore Renewable Energy Catapult is a UK-wide body that will focus on the development of technologies applicable to offshore wind, wave and tidal power. It will be located within ITREZ in Glasgow and will officially commence operation in Summer 2013. The ORE Catapult will look to:

- identify and address the barriers that inhibit the development and application of innovation in the offshore energy sector, allowing new technologies to move from early stage towards commercial use;
- serve as a first port of call for those seeking innovation services by not only having our own in house innovation expertise but also by being heavily interconnected to other sources of innovation, learning and business across the UK and beyond; and
- work collaboratively with others to ensure innovation investment activities and programmes are strategically prioritised, coordinated and with sufficient learning to capitalise on lessons learned.

Supply Chain

Offshore Wind Diversification Support

Scotland has a major opportunity to capitalise on the strengths that exist in its existing industrial base. This specific project is seeking to encourage existing firms to diversify into the offshore wind supply chain, in particular, from the Oil & Gas industry. The main activities include market intelligence gathering, production of market reports, information dissemination, a range of events and one-to-one support to companies. In addition, the Offshore Wind Expert Support programme offers free advice and guidance on diversification activities to help companies diversify into the Offshore Wind industry. The product, delivered by specialists with knowledge and experience in the offshore wind sector, provides up to two days one-to-one support. It is supported by the European Regional Development Fund Lowlands and Uplands Scotland Programme 2007-13.

3.4 Bodies and stakeholders involved

The scale of the challenge, the timescales involved and the complexity associated with developing our renewables industries calls for effective governance arrangements. Accordingly, the First Minister established the Scottish Energy Advisory Board (SEAB) in 2009 for high-level, effective, open and informed engagement between ministers, the energy industry and other relevant bodies on the main challenges facing the overall energy sector in Scotland.

The SEAB is jointly chaired by the First Minister and Professor Jim McDonald, Principal of the University of Strathclyde. It meets quarterly and brings together industry experts, academics, public sector bodies and consumer representatives to work collectively to deliver Scotland's energy potential and secure Scotland's energy future. The strategic guidance provided by the Scottish Energy Advisory Board is already driving action in a number of areas such as skills, infrastructure and low carbon investment.

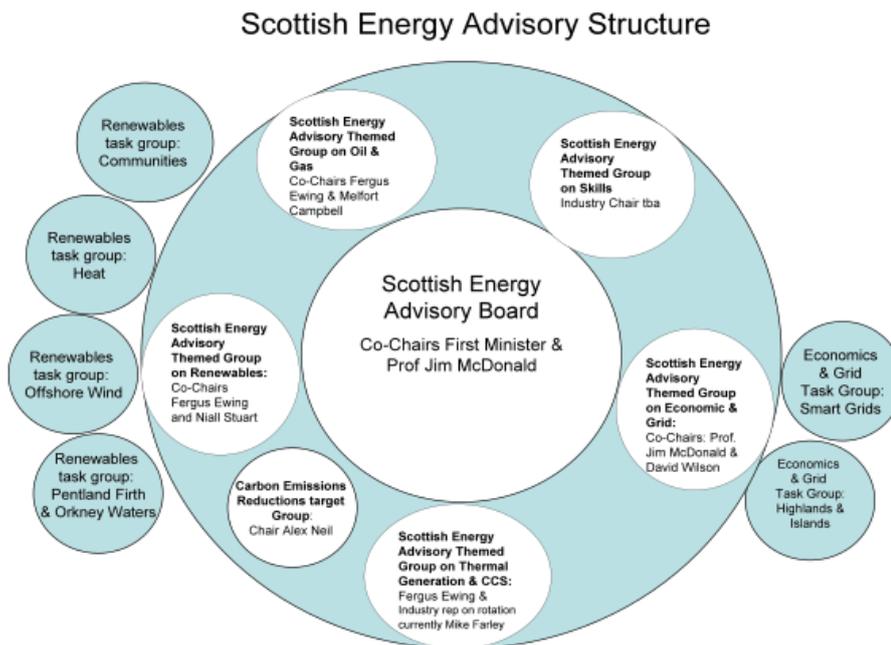
As the energy sector is made up of a number of industry subsectors with different characteristics and challenges, five themed subgroups have been established. The subgroups have clear terms of reference; are accountable to the Scottish Energy Advisory Board; and, like the Board, they provide advice to ministers and enterprise bodies on the challenges and opportunities in their particular sector. The five themed subgroups are:

- the Renewables Industry Leadership Group;
- the Oil and Gas Industry Leadership Group;
- the Thermal Generation and Carbon Capture and Storage Industry Leadership Group;
- the Skills Industry Leadership Group; and
- the Economics and Grid Industry Leadership Group.

This comprehensive governance structure provides a forum for strategic discussion on the current and future energy challenges and opportunities for Scotland. Its remit is to develop the Scottish industry view on these issues, to include potential synergies between the oil and gas, thermal generation, carbon capture and storage, and the renewables sectors, delivering a low carbon economy and ensuring the security of Scotland's energy supply maximising opportunities in a sustainable way for Scotland's communities. In more detail, key roles include to:

- Provide strategic level collaboration and communication on key issues
- Understand and articulate the Scottish industry view on these issues
- Inform and test existing and developing policy
- Enable rapid response to changes in the operating environment
- Initiate actions for discussion and advice to Government and themed groups.
- Take forward and co-ordinate action of themed groups to inform policy.

The structure of the SEAB can be depicted as follows:



The Renewables Industry Leadership Group includes:

- Scottish Government: renewable energy policy in Scotland; deployment of strategic funds such as the Saltire Prize; planning and consents authority and responsible for strategic environmental assessments.
- Highlands and Islands Enterprise and Scottish Enterprise: shared objectives and plans in relation to sub-sectors.
- Scottish Renewables Forum: industry membership organisation - lobbying; industry events; supply chain networking, marine, offshore wind and bioenergy working groups.
- Industrial and Power Association: industry membership organisation.
- Skills Development Scotland: training and skills development.
- Energy Technology Partnership: university partnership engaged in energy related R,D&D.
- Energy Technology Centre: test, demonstration and commercialisation capability.
- Crown Estate: issue leases, licences and consents for offshore renewable projects.
- Department for Energy and Climate Change (DECC): Part of the UK Government responsible for Renewable Energy Strategy, Strategic Environmental Assessments and Marine Deployment Funds.
- Carbon Trust: Accelerator Programmes.
- Technology Strategy Board: promotion and funding of technology innovation.

- Scottish Energy Lab: Virtual Hub with assets of £250M that enables companies to access the most appropriate test and demonstration assets for their technologies.
- Offshore Renewable Energy Catapult: UK centre for accelerated development of offshore renewables technology..

3.5 Timescale and maturity

Scotland's comparative advantage in renewables comes from a unique combination of factors, including:

- an abundance of wind, tidal and wave resources;
- an internationally competitive company base in offshore oil & gas that can diversify to operate in offshore renewables;
- a heritage in renewables - through hydro-electricity dating from the 1930s, which still generates over 10% of Scotland's electricity and more recently onshore wind, which has become a mature industry and which accounts for over 60% of renewable electricity capacity in Scotland; and
- public support for renewables and the Scottish Government's lead in setting renewable targets that go further than those of most European countries.

Lined up together, these comparative advantages, along with Government interventions such as those described above, are providing investors with confidence to locate and invest in Scotland. The overall ambition is to capitalise on the potential to harness local renewable sources to develop and consolidate renewable activity in Scotland and subsequently to internationalise the company base. The Scottish offshore renewables industry should therefore develop over the next 30-40 years, with significant scale expected to be achieved by 2020, continuing to grow through 2030 and beyond.

3.6 Legal framework

As a publicly-funded body which invests substantial resources in the economic development of Scotland, Scottish Enterprise (SE) is involved in the provision of State Aid. Most of the assistance given to businesses by Scottish Enterprise is covered by European State Aid rules and as such we are required to publish our own State Aid schemes. These provide the basis for assistance offered by Scottish Enterprise through a range of products and services. Assistance is discretionary, based on the merits of the proposed project, and an assessment of need which is subject to rigorous due diligence appraisal. Support for Scotland's activity in this sector is provided through a range of mechanisms provided under various State Aid schemes including:

- Scottish Enterprise Business Support Scheme
- Scottish Enterprise Training Scheme
- De minimis regulation
- Scottish R&D&I Scheme
- Support for Investment / Regional Aid
- Property Projects
- Environmental Protection
- Export Aid

There is no automatic entitlement to support from Scottish Enterprise. Assistance will be offered through a range of products and services delivered by Scottish Enterprise, based on the merits of the proposed

project, and an assessment of need for assistance subject to rigorous due diligence appraisal and internal approval by Scottish Enterprise.

Under General Provisions, Aid can be awarded to enterprises of all sizes. Applicants must submit an application for assistance to Scottish Enterprise before work on the project or activity has started, and the application must be approved in writing before work can commence on the project. The State Aid Unit, part of the Enterprise, Energy and Tourism Directorate of the Scottish Government, aims to assist those involved in approving or granting public funding within State Aid rules.

3.7 Financial framework

Scottish Enterprise's major projects have been described in foregoing sections. In summary, some of the main elements include:

- the £70 million National Renewables Infrastructure Fund;
- the £103 million Renewable Energy Investment Fund;
- £20 million investment in the International Technology and Renewable Energy Zone;
- the £40 million POWERS fund and the £19m WATERS fund;
- the £900k Offshore Wind Expert Support programme; and
- substantial investment in a range of projects covering infrastructure and support for businesses at strategic sites including: Fife Energy Park; Energetica (Aberdeen to Peterhead); the ports of Dundee and Leith in the Renewable Energy Enterprise East Area; Energy Technology Centre (East Kilbride); and the Scottish Energy Laboratory network.

Close partnership working with Highlands and Islands Enterprise characterises some of the key projects, for example, NRIF and the European Marine Energy Centre. Partners also contribute in their own way towards our wider renewables objectives, for example, the Scottish Government's £10 million Saltire Prize continues to incentivise 'revolutionary breakthroughs' in wave and tidal energy.

These projects are all in addition to the support which SE and Scottish Development International is providing to growing numbers of renewables companies to encourage inward investment, growth, internationalisation and innovation, including: account management, Scottish Investment Bank, R&D and SMART grants, Regional Selective Assistance and Scottish Manufacturing Advisory Service.

Scottish Enterprise also conducts foresighting and acts as a 'thought leader', communicating information and intelligence which describes and raises the profile internationally of opportunities in renewables, CCS and LCTs and how to exploit them.

Finally, it is worth noting that the Green Investment Bank is headquartered in Scotland and will use £3 billion of UK government money to leverage private sector capital to fund projects in green priority sectors, including parts of energy.

4 Monitoring and Evaluation

The development of our offshore renewable energy industries is still at a relatively early stage and it is important for SE and its key partners to continue to monitor progress towards our common objectives for renewables and ensure that we will be readily able to evaluate our impacts. Monitoring and evaluation are therefore overseen by the SEAB and its appropriate sub-groups. To assist with these tasks:

SE has established a comprehensive monitoring and evaluation framework for offshore wind; and

The Scottish Government has updated its original Routemap for Renewable Energy In Scotland and more recently (January 2013), its Offshore Wind Route Map.

Comprehensive statistics on production and consumption of energy are also produced by the UK Department of Energy and Climate Change.

5 Lessons Learnt

Scotland has learned much in its long energy development journey in Offshore Wind and Marine Renewable Energy. Foremost is the importance of, and challenges in, policy deployment through a high performing partnership spanning private and public sectors. Our experience confirms that creating and maintaining such a high performance partnership requires at the national level:

- Clear mission and objectives;
- Motivated partners;
- Meaningful activities;
- Effective governance; and
- Performance management.