

## 2 Climate Change and the Need for the Project

### 2.1 Introduction

1 This chapter sets out the rationale for the project in terms of its contribution towards meeting Scottish Government emissions reduction and renewable energy generation targets. It provides an explanation of climate change and the policy context for the project and the background to the need for the project at a national level. Further discussion of the regulatory and policy context of the project is set out in **Chapter 6: Legislation and Planning Policy**.

### 2.2 Why do we need Renewable Energy?

2 Scotland, and the UK as a whole, requires new, renewable, sources of energy to combat climate change and ensure that a secure supply of electricity is available to meet increased future demand. The provision of new renewable energy projects, such as the Neart na Gaoithe offshore wind farm, will help the government meet legally binding national and international targets on climate change.

#### 2.2.1 Combating Climate Change

##### 2.2.1.1 What is Climate Change?

3 Global climate change is widely recognised as one of the greatest environmental, social and political challenges facing the world today. One of the principal causes of climate change is a rise in the concentration of atmospheric carbon dioxide (CO<sub>2</sub>), to which fossil-fuelled electricity generation is a major contributor.

4 Evidence that man-made change is occurring outside the predicted natural cycles is internationally acknowledged, and is strongly endorsed by the most recent report of the Intergovernmental Panel on Climate Change (IPCC)<sup>1</sup>. The summary of the report states that:

*“Global greenhouse gas emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004. Carbon dioxide (CO<sub>2</sub>) is the most important anthropogenic greenhouse gas. Its annual emissions grew by about 80% between 1970 and 2004. The long-term trend of declining CO<sub>2</sub> emissions per unit of energy supplied reversed after 2000.”*

5 The summary goes on to assert that:

*“Most of the observed increase in global average temperatures since the mid-20<sup>th</sup> century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations.”*

6 The latest UK Climate Projections (UKCP09), released in June 2009, suggest that the changes to the climate over the coming decades are likely to be more severe than previously assessed for all emissions scenarios. This is an effective and timely reminder of the importance of developing a range of solutions to mitigate society’s effect on emissions.

7 Successive UK and Scottish Governments have made progressively more determined efforts to curb emissions of greenhouse gases (GHGs) through attempts to reduce dependence on fossil fuels, most notably for electricity generation. There is now a great deal of political and social support for sustainable energy solutions. The sustainable use of energy implies a commitment to improve energy savings and efficiency, and also to generate electricity from renewable sources of energy such as wind, biomass, solar and hydropower.

8 In addition to the environmental stresses created by climate change, and the need to respond to its challenges, the UK is now a net importer of oil, and its indigenous non-renewable energy supplies continue to decline. By 2020, the UK could be dependent on imported energy for three quarters of its total primary energy needs. This may make the UK more vulnerable to price fluctuations and interruptions to supply caused by political instability or conflicts in other parts of the world. The best way of maintaining energy reliability is through diversity and security of supply. Therefore, the UK needs a broad mix of energy sources, many suppliers and many supply routes. Renewable energy, and wind power in particular, has been identified as a key aspect of the UK’s energy mix<sup>ii</sup>.

##### 2.2.1.2 Implications of Climate Change

9 The IPCC estimates that if the global population continues to grow at the projected levels, with a corresponding continued reliance on fossil fuels, global temperatures could rise by 2.4-6.4°C on pre-industrial levels by 2099. Temperatures have risen by an average of 0.74°C across the globe from 1906 to 2005 and are predicted to rise further<sup>i</sup>.

10 The effects are predicted to be widespread, including extensive flooding, displacement of populations, drought in some areas and global food shortages. Extremes of weather are also predicted with intense storms potentially becoming more common.

##### 2.2.1.3 Reduction of Emissions through Adoption of Renewable Energy Technologies

11 Emissions of GHGs attributable to human activities increased by 70% between 1970 and 2004, and in 2006, levels of GHGs in the atmosphere were higher than at any point in the last 650,000 years. Carbon dioxide is considered to be the most important anthropogenic GHG; between 1970 and 2004 annual global emissions of CO<sub>2</sub> increased by 80%<sup>i</sup>.

12 The combustion of fossil fuels such as oil, coal and natural gas accounts for over 80% of global energy generation<sup>iii</sup> and as a by-product of combustion, produces the majority of GHGs as emissions. In 2008, over 40% of global CO<sub>2</sub> emissions were produced by the generation of electricity and heat<sup>iv</sup>. The generation of energy from renewable sources can be considered to offset energy which would otherwise have been generated using fossil fuels.

13 Emissions of CO<sub>2</sub> can be reduced through the displacement of conventional generation sources with low carbon technologies as well as careful management of energy supply and use, and through increased energy efficiency<sup>v</sup>. Emphasis has been placed on the contribution of renewable energy technologies in meeting international emissions reductions targets with the G8<sup>1</sup> concluding in 2010 that *“Diversification of energy is crucial and the energy mix should include as many renewable sources of energy as possible”<sup>vi</sup>*.

### 2.2.2 Climate Change and Renewable Energy Policies

#### 2.2.2.1 The Need for Offshore Wind in Scotland

##### 2.2.2.1.1 National Legislation and Policy

14 On 26 November 2008, two statutes received Royal Assent that, together, provide a framework for UK climate and energy policy: the Climate Change Act 2008<sup>vii</sup> and the Energy Act 2008<sup>viii</sup>. The Climate Change Act 2008 sets a target to reduce the emission of greenhouse gases in the UK by 80% of 1990 levels by 2050. Within Scotland, the Climate Change (Scotland) Act 2009 received assent on 4 August 2009. It sets ambitious targets for cutting carbon dioxide and greenhouse gas emissions. The targets include:

- cutting emissions by at least 80% from 1990 levels by 2050;
- cutting emissions by at least 42% from 1990 levels by 2020;
- a reduction in greenhouse gas emissions year on year, every year, from 2010 to 2050;
- increasing the rate of reduction from 2020 onwards to at least 3% per year;

15 To meet these ambitious targets, the Scottish Government Climate Change Delivery Plan has been prepared to target investment and effort across a range of relevant sectors, and renewable energy has a fundamental place in this strategy.

16 The Scottish Government issued the Renewables Action Plan<sup>ix</sup> (RAP) in June 2009, which provides a rolling update, identifying what is required in the renewables sector to achieve Government objectives. This document is part of the *“framework for success”<sup>x</sup>* towards realising the renewables challenge. The RAP refers to imperative action required to address climate change (demonstrated by Scotland’s world leading carbon reduction targets of 42% for

<sup>1</sup> The G8, also known as the Group of 8, is an assembly of world leaders who meet annually to discuss global issues (Understanding the G8, 2011).

2020 and an 80% reduction target for 2050) and states that this imperative is driving development across a range of policy interests. It makes reference to the Scottish Government's commitment to achieve a headline target of 20% of Scottish energy use coming from renewable sources by 2020 (this target has now been superseded as discussed below). Specific targets include 50% of electricity demand from renewable sources by 2020, and the RAP sets out the framework for action in the specific area of renewable energy. Key objectives include:

- to establish Scotland as a UK and EU leader in the field;
- to ensure maximum returns for the Scottish domestic economy; and
- to meet targets for energy from renewables, and for emissions reductions, to 2020 and beyond.

17 Scottish Planning Policy (SPP) (February 2010)<sup>xi</sup> also emphasises the importance of tackling climate change and, in particular, addresses the need to reduce greenhouse gas emissions and continue to develop renewable energy resources.

18 Since publication of the RAP, the Scottish Government has set higher targets, to encourage the renewable energy industry to respond. In September 2010, the UK Government raised the 2020 target for electricity to be generated from renewable sources to 80%. In May 2011, the Scottish Government raised the target even further, to generate the equivalent of 100% of Scotland's gross annual electricity consumption from renewable sources by 2020.

19 Following the announcement of the new renewables targets, the Scottish Government published the 2020 Routemap for Renewable Energy in Scotland in July 2011. This is an update and extension to the RAP. Meeting such ambitious targets will require a range of renewable energy technologies, including offshore wind farms such as Neart na Gaoithe.

20 Offshore wind energy represents the most viable method of delivering the significant proportion of the UK and Scottish targets, which can only be delivered by 2020 through the use of proven generation technologies (wind turbines). While onshore wind also has a significant contribution to make to targets there is concern that the onshore environment is less likely to be able to accommodate the scale of development required.

21 Moving offshore allows deployment at a far greater scale than can realistically be achieved onshore. Additionally, moving offshore can take advantage of a higher wind resource; with both higher speeds and more consistent wind available.

#### 2.2.2.2 National Planning Policy

#### 2.2.2.3 Scottish Planning Policy

22 Scottish Planning Policy (SPP) (2010) is the statement of the Scottish Government's policy on nationally important land use planning matters and replaces individual, topic based policy guidance, including SPP 6 'Renewable Energy' which has now been revoked. The policy states that whilst hydroelectric and onshore wind power are currently the main sources of renewable power, other sources are soon to play an important role in meeting national targets, including offshore wind. Paragraph 192 of the policy states "it is essential that development plans take into account the infrastructure and grid connection needs of the off-shore renewable energy generation industry. Development plans should identify appropriate locations for facilities linked to the manufacture, installation, operation and maintenance of off-shore wind farms and wave and tidal devices". This statement reinforces the support for offshore renewable energy developments and associated Onshore Works that are necessary to meet Government targets.

#### 2.2.2.4 National Planning Framework for Scotland 2

23 The National Planning Framework for Scotland (NPF) 2 was published in June 2009 and is a strategy for Scotland's long term spatial development. The Framework highlights the need for key improvements to the electricity transmission system to facilitate the development of Scotland's renewable energy resources. The document outlines the need for, and consideration of, upgrading, reinforcing, replacing and rebuilding a number of existing routes, whilst recognising the necessity for new connections and route modifications, taking account of opportunities for unlocking the potential of additional renewable energy resources.

24 The Scottish Government is committed to realising the power generating potential of all renewable sources of energy to establish Scotland as a leader within the renewable energy market, with regard to the development of technologies and export of energy. To achieve this objective, it is essential to expand the mix of renewable energy

technologies and tap into the energy available from wave and tidal power, biomass and offshore wind. The NPF aims to "develop Scotland's renewable energy potential whilst safeguarding the environment and communities."

## 2.3 Contribution of the Development

25 RenewableUK has developed an equation (Homes Supplied =  $B \times 0.3 \times 8760/4700$ ) which calculates the number of homes that can be supplied with energy generated by a wind farm project<sup>xii</sup>.

26 In the equation, B is the installed capacity of the wind farm in kW, in this case taken to be 450,000kW, 0.3 is the RenewableUK stated capacity factor (dimensionless) and 8760 is the number of hours in one year. The average UK household annual energy consumption is taken to be 4700 kWh/household<sup>xiii</sup>.

27 Applying this equation for Neart na Gaoithe Offshore Wind Farm, using a capacity factor of 30%, it is estimated to produce enough electricity each year to meet the needs of the equivalent of 251,617 households. Using what is contended to be a more representative capacity factor of 40%, the number of households increases to 335,489.

28 The City of Edinburgh has approximately 218,774 households<sup>xiv</sup>. In applying the equation, the Neart na Gaoithe Offshore Wind Farm would generate more locally produced electricity each year than the annual domestic demand of a city of this size.

## 2.4 References

<sup>i</sup> IPCC (2007) *Fourth Assessment Report on Climate Change 2007: Synthesis Report*.

<sup>ii</sup> Department of Trade and Industry (dti) (2003) *Energy White Paper: Our Energy Future – creating a low carbon economy*. Published by TSO (The Secretary Office).

<sup>iii</sup> OECD/IEA (Organisation for Economic Co-operation and Development/International Energy Agency), 2010a. *Key World Energy Statistics 2010*. Paris, IEA.

<sup>iv</sup> OECD/IEA (Organisation for Economic Co-operation and Development/International Energy Agency), 2010b. *CO<sub>2</sub> Emissions from Fuel Combustion. Highlights*. Paris, IEA.

<sup>v</sup> Edenhofer, O. R., Pichs-Madruga, R., Sokona, Y., Seyboth, K., Matschoss, P.R., Kadner, S., von Stechow, C., 2011. *Summary for Policy Makers*. In: IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation [ed: Edenhofer, O. et al.]. Cambridge/New York, Cambridge University Press.

<sup>vi</sup> Fitzgerald, E. and Demneri, N., 2010. *Muskoka G8 Summit: Issue Assessment Report*. University of Toronto.

<sup>vii</sup> OPSI (2008) *Climate Change Act 2008*. Available at: [http://www.opsi.gov.uk/acts/acts2008/ukpga\\_20080027\\_en\\_1.htm](http://www.opsi.gov.uk/acts/acts2008/ukpga_20080027_en_1.htm)

<sup>viii</sup> OPSI (2008) *The Energy Act 2008*. Available at: <http://www.legislation.gov.uk/ukpga/2008/32/contents>

<sup>ix</sup> Scottish Government (2009) *Renewables Action Plan*. Available at: <http://www.scotland.gov.uk/Publications/2009/07/06095830/0>

<sup>x</sup> Scottish Government (2011) *2020 Routemap for Renewable Energy in Scotland*. Available at: <http://www.scotland.gov.uk/Resource/Doc/917/0118802.pdf>

<sup>xi</sup> Scottish Government (2010) *Scottish Planning Policy*. Available at: <http://www.scotland.gov.uk/Resource/Doc/300760/0093908.pdf>

<sup>xii</sup> RenewableUK (2011) *Calculations for wind energy statistics*. Available online from: <http://www.bwea.com/edu/calcs.html>

<sup>xiii</sup> RenewableUK (2012) Available online from: <http://www.bwea.com/edu/calcs.htm>

<sup>xiv</sup> General Register Office for Scotland (2010). Available online from: <http://www.gro-scotland.gov.uk>