



2 The need and policy framework for renewable energy and the Gwynt y Môr Offshore Wind Farm

The following sections provide a review of the need for renewable energy on a global and national basis, the UK policies developed in meeting the need for clean, sustainable, renewable energy supply and the current and anticipated contribution made by wind power in the UK.

2.1 The global perspective

The development of renewable energy generation in the UK is driven by the need to combat the effects of climate change through the reduction of emissions of greenhouse gases, thereby moving towards a more sustainable future. The following sections present the background to this need in terms of the causes of climate change and its implications on a global, European and UK scale.

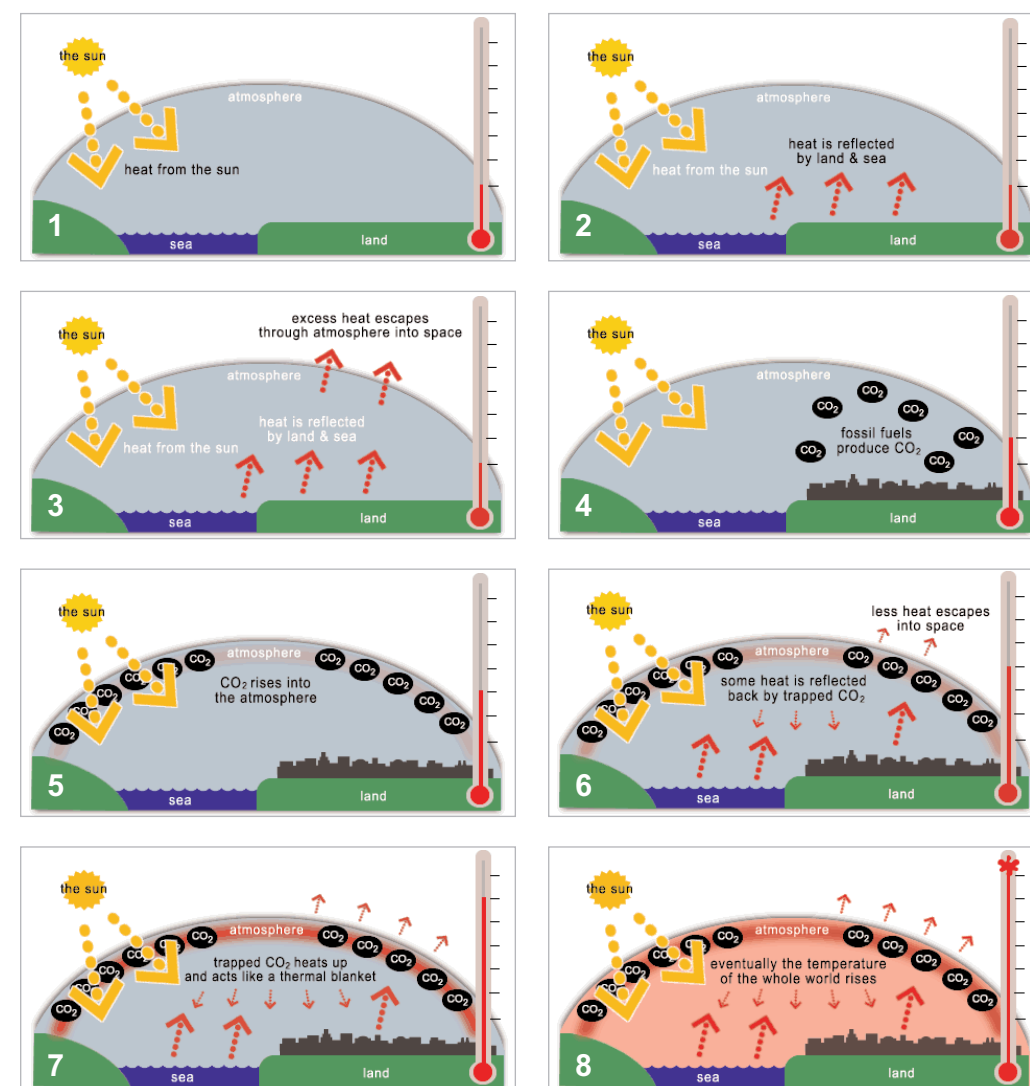


Figure 2.1 The greenhouse effect.

2.1.1 The causes of global climate change

Climate change is driven by the greenhouse effect. This effect, describes the phenomenon by which solar radiation from the sun entering the earth's atmosphere is prevented from escaping by various gases (the 'greenhouse gases') in the air. These gases trap heat because they readily absorb infrared radiation from the earth's surface thereby warming the earth's atmosphere. The gases that do this naturally are mainly water vapour and carbon dioxide. Without this natural greenhouse effect, the earth would be over 30 °C cooler and would be too cold to be habitable. However, as greenhouse gas concentrations rise well above their natural levels, the additional warming that will take place will lead to climate change and could threaten the future sustainability of the planet.

The most important greenhouse gases implicated in climate change are carbon dioxide, methane, nitrous oxides, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. Chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) are also powerful greenhouse gases but they are being progressively phased out as they also damage the stratospheric ozone layer.

Climate change is regarded by many as one of the most serious threats facing the world's environment, economy and society (DETR, 2000). There remain those who argue either that climate change is not happening to any significant extent, or who see it as no more than a natural stage in the cycle of the climatic system of the world. However, the consensus of scientific opinion, as presented to world governments by the Intergovernmental Panel on Climate Change (IPCC), is that there is a link between man's actions and a variety of climate-related issues. These include rising sea and air temperatures, rising sea levels, melting ice caps and changes in the pattern and severity of a range of meteorological conditions.

The IPCC, formed in 1988, has the role of providing an understanding of the risk of climate change, its potential impacts and options for adaptation and mitigation. The IPCC advice is that the world's population should act on the basis that climate change is indeed occurring and that actions taken now should seek to address those factors which can be identified as most likely to cause current and future problems. Our own Prime Minister, Tony Blair, has indicated that

"Climate change is the world's greatest environmental challenge".

The second assessment report of the IPCC (1995) forecast an increase in average global temperatures of between 1 and 3.5° centigrade over the next 100 years, compared with only 0.5° in the 20th Century. Sea level rise in the last century was as much as 25 cm and is predicted to rise in the coming century by as much as four times that rate.

A third assessment report was adopted in 2001 (IPCC, 2001), and from it the IPCC indicated that the temperature of both the land and the sea had increased, and the frequency and intensity of devastating phenomena, such as El Niño, had markedly risen. They attributed this fact to:

"Since the pre-industrial era, the atmospheric concentrations of greenhouse gases have increased due to human activities, reaching their highest recorded levels in the 1990s, and most have continued to increase."

In the past 200 years, the IPCC notes that the concentration of carbon dioxide has increased by circa 34% from 280 to 368 parts per million (ppm), with similar increases observed for other greenhouse gases. Projected

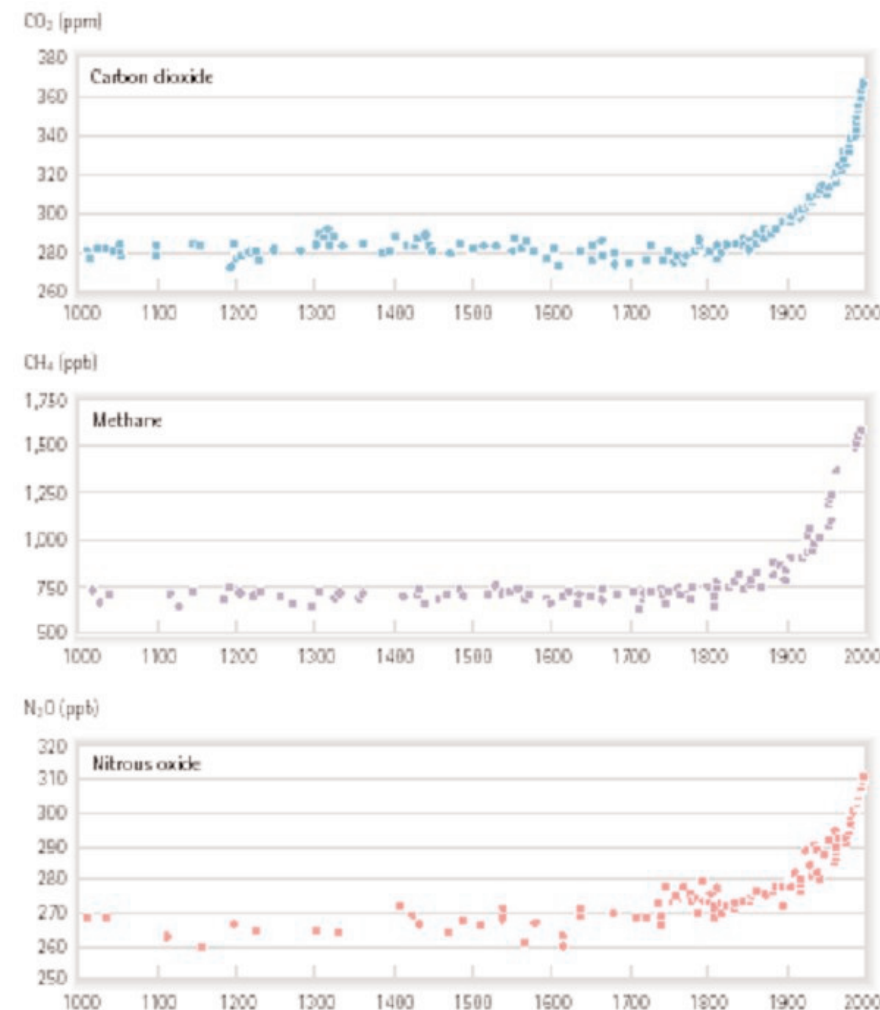


Figure 2.2 Increases in greenhouse gas emissions during the industrialised era (UNFCCC, 2004)

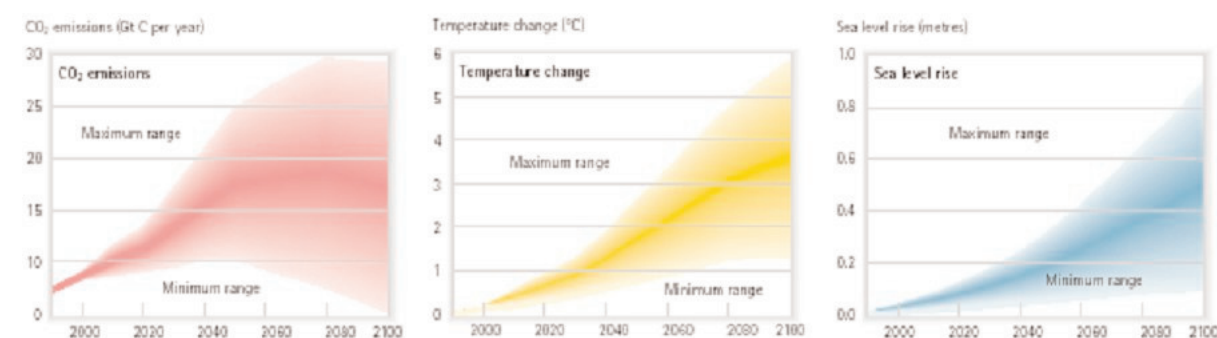


Figure 2.3 Projected associated effects of emissions on temperature and sea level change (UNFCCC, 2004)

future concentrations range from 540 to 970 ppm by the year 2100, depending on future social, demographic, economic and technological developments. The third assessment report of the IPCC concludes that:

“In the light of new evidence and taking into account the remaining uncertainties, most of the observed warming over the past 50 years is likely to have been due to the increase in greenhouse gas concentrations.”

2.1.2 The implications of global climate change

With regard to the global implications of climate change, Defra has summarised the possible outcomes (www.defra.gov.uk, 2005). Increasing sea level rise will threaten the existence of some small island states and put millions of people at risk. An additional 80 million people could be at risk from flooding with the majority of these in southern and south east Asia. Africa is expected to experience significant reductions in cereal yields, as are the Middle East and India, and an additional 290 million people could be exposed to malaria by the 2080s, with China and Central Asia likely to see the largest increase in risk.

In some areas, water resources for drinking and irrigation will be affected by reduced rainfall or as ground water in coastal zones suffers from salination as sea levels rise. People’s lives may be put at risk from an increased frequency of droughts and flooding. An additional three billion people could suffer increased water stress by 2080 with northern Africa, the Middle East and the Indian subcontinent likely to be the worst affected. By the 2070s, large parts of northern Brazil and central southern Africa could lose their tropical forests because of reduced rainfall and increased temperatures. If this happens, global vegetation, which currently absorbs carbon dioxide at the rate of some 2-3 gigatonnes of carbon (GtC) per year, will become a carbon source generating about 2 GtC per year by the 2070s and further adding to carbon dioxide build up in the atmosphere.

In the UK, climate change is predicted to result in changes in atmospheric temperatures, rainfall and sea level rise. The UK Climate Change Programme (UK CCP, 2002) noted that four of the five hottest years ever recorded in the UK over a period of 330 years had occurred in the last ten years. Far more of the winter rainfall totals now also come from intense storms than previously.

In addition the UK CCP report identified a range of other possible effects of climate change in addition to the more obvious climatic changes. For example, lower summer rainfall will affect the need for irrigation and the timing of crop yields, while pests and diseases that can flourish in milder winters and hotter summers could become more prevalent. There will be changes to habitats, and consequently the pattern of wildlife, both flora and fauna, may change.

As examples of the concerns that are being expressed by national bodies outside government at the effects of climate change, the Royal Society for Protection of Birds (RSPB), English Nature, World Wildlife Fund (WWF) concluded in 2003 that:

“If global warming is not constrained to a 2 °C rise by 2010, the outlook for birds, other wildlife and people will be bleak and costly.”

Modelling of the likely effects on biodiversity, conducted in association with the RSPB, has suggested that as many as 30% of all species might be committed to extinction as a result of predicted climate change (Thomas et al, 2004).

Socio-economic effects are also predicted. The summary report on climate change for the insurance industry (ABI, 2004) highlights the effects that changing weather patterns are having. For example, weather-related claims on property insurance doubled to £6 billion between 1998 and 2003, compared

with the previous five years, and the report predicts that unless action is taken to curb climate change, there will be continued steep rises.

2.1.3 Mitigating against climate change

The significance of climate change effects, linked to the fact that man has undoubted control over the way in which he manages the environment (and in particular emissions of gases such as carbon dioxide and methane), means that whatever doubts might be raised about the effectiveness of taking measures to control greenhouse gas emissions, scientists and policymakers have concluded that these measures must be taken.

The most recent IPCC assessment report (2001) addresses the options available for the mitigation of the predicted climate change scenarios. A wide range of issues are covered in this report including reduction of emissions from existing sources, energy efficiency, carbon sinks, and the promotion of alternative, sustainable energy sources. Amongst the most significant contributions made since 1995, the IPCC cites the market introduction of wind turbines as an example of the possible shift to what it terms 'zero-emission technologies' as one of a range of more sustainable, low-carbon, renewable energy supplies to replace conventional fossil fuel generation.

The use of renewable sources as an increasing proportion of total energy consumption is, therefore, seen as a key part of the ultimate sustainable solution, alongside energy efficiency and energy conservation. The use of renewable resources also brings benefits with regard to the security of energy supply and provides opportunities for economic development through the establishment of manufacturing industries.

The issue of renewable energy and specifically the role of wind farms in the UK was debated in the House of Commons on 25th October 2004. It was initiated by an opposition motion which recognised the major challenge that climate change represented for the 21st Century and regretted that renewable energy supplied only 2.7% of Britain's energy needs.

In his response, Mr O'Brien, the then Minister for Energy, stated:

"The Prime Minister made it clear that climate change is the world's greatest environmental challenge. Burning fossil fuels produces greenhouse gases and carbon emissions, which can raise the earth's temperature. That could lead to changes in temperature patterns, which could mean an increase in droughts, which affect crop yields, tornadoes, flooding and extinction of some vulnerable species of wildlife.

Energy demand in the UK and across the world is rising, while the availability of fossil fuels is expected to decline in the long term. The issues are serious and all governments must respond to them with long-term solutions. We must develop sustainable, secure and diverse supplies of energy for the future. The UK has set a target to reduce carbon emissions by 60% by 2050.

There is no single means of delivering that target. Better energy efficiency is crucial but insufficient in itself. Green energy – renewable generation – has a key role to play. It can contribute towards secure energy supplies, create new investment and bring new jobs. The UK has set a demanding target for 10% of our electricity generation to be supplied by renewable energy by 2010. In 1997, renewables contributed 0.7% of our electricity. That has been tripled by Labour, but there is still a long way to go to hit our target of 10%.

To achieve that target, we need to make use of all renewable sources. We expect 7 or 8% of the 10% generation to come from wind energy. Other technologies will be hard pushed to produce the rest.

The suggestion that other energy sources can hit the target by themselves is plain fantasy. Roughly half the 7 to 8% will come from onshore wind generation and half from offshore wind generation. Today, renewable electricity, mainly from wind farms, supplies enough electricity to light up Manchester. In theory, up to 2 million homes could be lit from wind power. But the plain fact is that, without a substantial increase in onshore wind developments, the 10% target is unachievable.

We are not focussed on onshore wind farms to the exclusion of other energy sources – the UK has a vast potential renewable source, and we want to take forward a wide range of renewable technologies – but wind energy currently offers the best, the most cost-effective and the only truly serious potential for expansion in the short to medium term.

The Minister's words represent a recent and clear assertion of government policy, and of the central role of wind in that policy in seeking to mitigate against the future effects of climate change.

2.1.4 The global response to the challenge of climate change

The international community's collective response to climate change is embodied in the United Nations Framework Convention on Climate Change. Established at the 1992 UN Conference on Environment and Development, which was held in Rio, the convention sets out an overall framework for intergovernmental efforts to tackle the challenge posed by climate change.

The ultimate objective of the convention is stated as follows:

"...to achieve, in accordance with the relevant provisions of the convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

Following on from the 1992 convention, the Kyoto protocol was adopted by the member states in 1997, and ultimately became legally binding in February 2005 following ratification by Russia. This protocol sets targets and timetables for reducing greenhouse gas emissions from developed countries, with the initial, legally binding commitments on reductions due by 2008-2012. A collective reduction of 5% (compared with 1990 levels) is required by that time for developed nations with a requirement for member states to impose domestic policies and measures in order to achieve their individual targets.

Policies to be imposed by member states are tied not only to reducing emissions but also to encouraging a more sustainable and responsible approach to energy use in both the industrial and domestic sectors. The idea of emissions trading and credits is also proposed in the protocol in order to assist some nations in meeting their global commitments in the appropriate timeframes.

Most recently, the global response to climate change was reflected in the prominence of the issue at the 2005 G8 summit held at Gleneagles in Scotland. Here the G8 nations were joined by the leaders of Brazil, China, India, Mexico, and South Africa. The resulting summit statement sets out a united common purpose in tackling climate change, promoting clean energy and achieving sustainable development. All nations at the summit agreed climate change is happening now, that human activity is contributing to it, and that it could affect every part of the globe. The statement realised that global greenhouse gas emissions must

decline through the development of a low-carbon economy.

The summit resulted in “The Gleneagles Plan of Action”, which demonstrates a commitment to develop markets for clean energy technologies, to increase their availability in developing countries, and to help vulnerable communities adapt to the impacts of climate change.

2.2 The European perspective on climate change

The European Community ratified the United Nations Framework Convention on Climate Change in 1994 by Decision of Council Directive 94/69/EC. Further recognition of the issue of climate change and the commitment to reduce emissions of greenhouse gases is provided by Council Decision 2002/358/EC of 25th April 2002, which approved the Kyoto protocol and set out the commitments to limit and reduce emissions agreed by the Community and its member states for the initial period (2008 to 2012).

The commitment for the European Union as a whole is to reduce emissions by 8% by the end of the commitment period, and then by a further 1% per year from 2012 to 2020, with a long term goal of a 70% reduction from 1990 levels (European Commission, 2002). Most recently, at the start of 2005, the EU Council of Ministers, in considering the future climate change policies for post 2012, suggested ambitious greenhouse gas reduction targets of 15-30% by 2020 and 60-80% by 2050, when compared with 1990 baseline levels. However, EU leaders at their subsequent summit agreed only to flexible targets for 2020 concluding that a 15-30% cut in greenhouse gas emissions “should be considered” for 2020, but only “in the light of future work on how the objective can be achieved.”

Since ratification of the Kyoto protocol, the European Commission has responded in a variety of ways in seeking to address the contributing factors of climate change. Most notably measures include a directive to promote electricity from renewable energy, but also voluntary commitments by car makers to reduce CO₂ emissions by 25% and proposals on the taxation of energy products.

In 1997, a Commission white paper proposed to double the EU target for renewables to 12% by 2010, the vast majority of which was to be met from wind energy. In 2001 that figure was raised still further (EU Directive EC 2001/77/EC) so that renewables should meet 22.1% of the total electricity consumption figure by 2010. The latest Commission communication of June 2004 (European Commission Communication 366, 2004) goes even further than the directive, requiring member states to achieve the targets being set country by country. Notably, the Commission also proposes to review the obstacles and objections that may block the development of offshore wind energy as well as the environmental requirements which need to be met.

2.3 Climate change in the UK – the big challenge

The challenges of dealing with climate change have been recognised in UK government policy for well over a decade. The UK government white paper “This Common Inheritance”, published in 1990, described global warming as:

“One of the biggest environmental challenges now facing the world”.

More recently, in a speech to the Business and Environment Programme in September 2004 the Prime Minister, Tony Blair, stated that:

“Our effect on the environment, and in particular on climate change, is large and growing... What is now plain is that the emission of greenhouse gases, associated with industrialisation and strong

economic growth from a world population that has increased six fold in 200 years, is causing global warming at a rate that began as significant, has become alarming and is simply unsustainable in the long-term.”

He went on to say:

“Over the last century average global temperatures have risen by 0.6 degrees Celsius: the most drastic temperature rise for over 1,000 years in the Northern Hemisphere.”

The UK’s Chief Scientific Adviser, Sir David King stated in an article in 2004:

“In my view climate change is the most severe problem that we are facing today, more serious even than the threat of terrorism.”

Non-governmental organisations, such as the RSPB and Greenpeace, have echoed these sentiments expressed by the UK government, with the RSPB stating that:

‘The RSPB views climate change as the most serious long-term threat to wildlife in the UK and globally and, therefore, we support the government’s target to source 15% of electricity from renewables by 2015.’

In the briefing report of the UK Climate Impacts Programme (UKCIP02, 1998) on climate change scenarios for the UK, the Environment Minister Margaret Beckett stated that:

“Evidence is growing that the UK climate is warming and we expect this trend to continue...average annual temperatures for the UK may increase by between 2 °C and 3.5 °C by the 2080s depending on the scenario. In future we may also experience wetter winters and substantially drier summers.”

The UKCIP report highlighted the possible implications for the UK as follows:

- the UK climate will become warmer, not only on land but also at sea
- high summer temperatures will become more frequent whilst very cold winters will become increasingly rare
- winters will become wetter and summers may become drier everywhere
- snowfall amounts will decrease throughout the UK
- heavy winter precipitation (rain and snow) will become more frequent
- relative sea level will continue to rise around most of the UK’s shoreline. Extreme sea levels will be experienced more frequently
- the Gulf Stream may weaken in the future with subsequent further effects on climate change.

In March 2000, the UK Government launched its draft Climate Change programme. This programme is designed to meet the UK’s commitments under the Kyoto protocol to cut greenhouse gases by 12.5% by 2008-2012 with a cut in CO₂ of 20% by 2010, relative to the 1990 baseline levels. The programme sets out an integrated package of policies and measures designed to improve and promote energy efficiency and stimulate the development of sustainable, more efficient sources of power generation. With regard to renewable energy, the strategy states that:

“The government and the devolved administrations recognise the importance of developing renewable sources of energy as part of the drive for sustainable development and the long-term response to climate change”

The strategy also makes specific reference to offshore wind farm development in seeking to address the issues of climate change, stating that:

“The government recognises that a significant proportion of the 10% target will need to be achieved through longer-term technologies, such as offshore wind...”

The UK held the G8 Presidency during 2005. It is an indication of the level of concern and the seriousness that the UK government attaches to climate change issues that Tony Blair chose to focus on during the recent G8 summit at Gleneagles in Scotland.

2.3.1 The UK national renewable energy policy

The UK Government policy that has been developed in response to global warming can be traced through a series of papers and measures since the Energy Paper 55 of 1988, and the Electricity Act of 1989, which created the concept of the Non-Fossil Fuel Obligation, whereby each of the regional electricity companies had to buy a proportion of their electricity from renewable sources.

These early measures were followed by the white paper “This Common Inheritance” in 1990, which identified an initial renewable generating capacity of 1000 MW by 2000. This figure was raised to 1500 MW in 1993 following the government’s review of the coal industry. The need to follow sustainable practices in the economy and the environment was set out in “Sustainable Development – a Better Quality of Life”.

The change in the Government in 1997 led to a reinforcement of the approach to renewable energy. One of the first steps was the publication of New and Renewable Energy Prospects for the 21st Century in March 1999, which confirmed the government’s commitment to the development of renewables, the 5% target by 2003 and the 10% target by 2010, together with the need to ensure that even after 2010, the contribution that they can make would continue to rise.

The report of the Royal Commission on Environmental Pollution was published in 2000 and suggested even more drastic measures to reduce emissions so that within a century the levels would be an 80% reduction of those that occurred in 1990. It stressed that with an abundant wind resource both on land and at sea, together with wave and tidal currents, every attempt should be made to harness these resources in meeting the need for electricity generation from renewable sources.

In the spring of 2002 the Energy Review of the Performance and Innovation Unit (PIU) in the Cabinet Office was published. This unit was asked by the Prime Minister to examine the long-term challenges for energy policy in the UK and to set out how energy policy can ensure competitiveness, security and affordability in the future. Of particular significance in the report are the following key points:

- the focus of UK policy should be to establish new sources of energy which are, or can be, low cost and low carbon
- the immediate priorities of energy policy are likely to be most cost-effectively served by promoting energy efficiency and the role of renewables
- the target for the proportion of electricity generated from renewables should be increased to 20% by 2020
- institutional barriers, and specifically planning problems, regarding renewables should be addressed urgently – national planning guidance needs to make it clear where there is a national case for new investment in energy-related facilities by establishing the relevant national and regional context for each type of development

- surveys on the acceptability of renewable power plants carried out by independent institutions have generally been supportive of renewable energy and the support increases once the power plant has been built
- there should be a greater emphasis on pro-active planning for energy developments at the sub-regional level, especially in the light of the move towards more renewable and decentralised generation.

Following on from the PIU report, the Government produced the white paper on energy, entitled “Our Energy Future – creating a low-carbon economy”, published in February 2003. The foreword by the Prime Minister sets out a new direction for energy policy in which the Government set out on a path to reduce carbon dioxide emissions by 60% by 2050 (compared with 1990 levels). This milestone in energy policy is based on four pillars – the environment, energy reliability, affordable energy for the poorest and competitive markets for business, industry and households. A key aim of this policy was to provide industry with the confidence to invest in the delivery of the goal of sustainable energy policy. The white paper was published in the context of the position that, by 2007, the UK will be a net importer of oil and by 2010 of natural gas. The security of energy supply alongside the protection of the environment remains one of the key government objectives.

The white paper states that the energy supply system will have to adapt to accommodate more renewables, with the key aims that:

“In this white paper we set the ambition of doubling renewables’ share of electricity generation in the decade after that. In reducing carbon dioxide emissions, our aim is to strengthen the contribution of energy efficiency and renewable energy sources. This white paper sets out the policies we believe are necessary to achieve that. They mean energy efficiency and renewables will have to achieve far more in the next 20 years than they have until now. We believe that such ambitious progress is achievable.”

The white paper goes on to state that renewables will play a vital part in the new thinking about electricity supply. To reach the targets for 2010 alone, the rate of build of new renewable plant will need to be of the order of 1250 MW a year for the next seven years, and yet by 2003 only 1200 MW of all renewables excluding hydro-electric had been installed in the UK. While the target is 10% by 2010, it will be 20% by the year 2020.

The white paper is unequivocal in its statement that we must:

“Scale up substantially our deployment of renewables in order to secure economies of scale and reduce costs significantly.”

The white paper also addresses specifically the use of offshore wind farms in meeting the UK government target of 10% by 2010 and in moving towards the target of 20% by 2020, stating:

“Given our experience in offshore engineering, we should be able to expect offshore wind farms to make a strong contribution to our carbon aims. Delivering our carbon aims will require the rapid expansion of offshore wind not only within territorial waters but beyond”

2.3.1.1 The renewables obligation

The Renewables Obligation (RO) is the Government’s main policy instrument for delivering the increased levels of renewables generation required to meet the targets. The Energy white paper describes the mechanism in the following terms:

“We have introduced a Renewables Obligation for England and Wales in April 2002. This will incentivise generators to supply progressively higher levels of renewable energy over time.”

The Renewables Obligation was introduced in April 2002 and requires licensed electricity suppliers to source an annually increasing percentage of their electricity sales from renewable sources.

The Renewables Obligation aims to stimulate the renewables market to generate the growth required to achieve the generation of 10% of UK electricity supplies from renewables by 2010. This was subsequently extended under a review of the Renewables Obligation in December 2003 with the announcement by the government that the targets from renewables would be increased to 15% by 2015/2016.

The extension was formally adopted following the Renewables Obligation Order 2005, which came into force on 1st April 2005. The changes to the Obligation were the subject of a statutory consultation during 2004.

The percentage target increases year-on-year; the target for 2005/2006 being 5.5% and rising to 15.4% by 2015/16.

The annual percentage targets as set out in the relevant legislation are detailed in Table 2.1.

Obligation compliance period	Percentage
2002/3	3.0
2003/4	4.3
2004/5	4.9
2005/6	5.5
2006/7	6.7
2007/8	7.9
2008/9	9.1
2009/10	9.7
2010/11	10.4
2011/12	11.4
2012/13	12.4
2013/14	13.4
2014/15	14.4
2015/16	15.4

Table 2.1 Annual percentage of electricity sales that are required from renewables sources

For comparison, the first annual report on the implementation of the Energy white paper, reported in the 2004 House of Lords Select Committee Report on Renewable Energy, estimates that the share of electricity supplied to customers from eligible RO sources was just 2.0% in 2003. This compares with the Obligation level of 4.3% for 2003/4, and indicates a considerable shortfall in the generation required to meet the Obligation. The DTI has recently confirmed to the House of Lords Science and Technology committee that the government’s 15% 2015 target relates to eligible RO technologies only.

The eligible renewable technologies under the Renewables Obligation comprise:

- landfill and sewage gas
- small hydro (under 20 MW declared net capacity) or larger hydro if commissioned after 1st April 2002
- onshore and offshore wind
- biomass (including biomass co-fired in conventional fossil-fuelled plant)
- geothermal power
- tidal and wave power
- solar power.

There is a consensus that both onshore and offshore wind will need to play a major role if the targets are to be met. For instance, the House of Lords Science and Technology committee summarised the position thus:

“The government’s projections show that the bulk of the new renewable generating capacity between now and 2010 is expected to be in the form of wind energy, both onshore and offshore. In practice there appears to be no alternative. The United Kingdom has a huge potential wind resource, and the technology for converting wind energy to electricity, at least onshore, is mature and reliable.”

On the practical implementation of wind, the same committee concluded:

“The relative maturity of wind generating technology, and the scope for expansion given the United Kingdom’s favourable wind profile, mean that it already has the potential to make a major contribution to renewable energy development.”

With regard to offshore wind energy, the House of Lords report was somewhat more circumspect in noting the potential technological difficulties in operating in the marine environment, stating that:

“The next few years will be crucial, and it remains to be seen whether offshore wind power can fulfil the vital role assigned to it within the government’s energy strategy.”

Considering the place of offshore wind generation in the overall context of renewable energy supply, it is noted that offshore wind energy is currently more expensive to develop than onshore wind but does build on the proven technology deployed at onshore sites. Moreover, offshore wind is now proven in the UK at the scale of Round 1 developments, such as North Hoyle, and offers the prospect for much larger contributions than onshore developments in the future. In that sense it is strategically vital to meeting government targets in the longer term towards 2015. Offshore wind is currently also a far more proven, technologically developed and economic option compared with the other developing marine renewables such as wave or tidal generation.

2.3.1.2 The renewables innovation review

Completed by the DTI in February 2004, the Renewables Innovation Review aimed to:

- identify the key renewable technologies for the delivery of UK targets and aspirations
- identify the key technologies for the delivery of the UK’s wider carbon reduction aspirations
- identify the key renewable technologies that offer opportunities for the creation of economic benefits for the UK
- identify the barriers to the development and deployment of key renewable technologies
- understand better the innovation process in key renewable energy sectors
- identify the most cost-effective government measures to facilitate the delivery of UK targets.

The report findings note that the 2010 renewable electricity target can still be met if barriers to wind deployment can be eliminated.

The report concluded that both onshore and offshore wind can deliver almost all the required growth in renewable energy to meet the 2010 target, and wind power is likely to continue to be the dominant renewable technology to 2020.

2.3.1.3 'Creating a low-carbon economy'

In July 2005 the Government published 'Creating a Low-Carbon Economy – Second Annual Report on the Implementation of the Energy White Paper'.

This report highlights the commitments made in the white paper and provides a summary of the practical steps taken towards the long-term goals.

Reporting on the government's targets for a reduction of CO₂ to 20% below 1990 levels by 2010, the report indicates that currently UK greenhouse gas emissions are 12.5% below those 1990 baseline levels and on target to meet the 2010 target. However, CO₂ emissions are currently predicted to be 14.5% below baseline levels by 2010 – some way short of the government's 20% target.

The report, therefore, recognises the need to do more in the UK to meet longer-term aspirations. Three primary themes for achieving the environmental goals set out by the Government are highlighted – emissions trading, increasing renewable capacity and improving energy efficiency.

The report reviews the progress made with regard to renewables capacity, notably the progress made through the Renewables Obligation and the recent changes made in England and Wales to the planning process which seeks to encourage renewable development (i.e. the introduction of PPS1 and PPS22 in England and TAN 8 in Wales). Looking ahead, the second annual report highlights the current review of the Renewables Obligation alongside a number of other measures as key in seeking to get back on track with regard to the emissions targets, highlighting the important role of renewable energy in the future UK electricity supply portfolio and in seeking to combat the effects of climate change.

2.3.2 Summary of the UK policy

It can be seen that government policy towards the deployment of renewable energy sources has remained consistent and strong over a period of at least 15 years, with an increasing importance attached by the Government on the exploitation of renewable energy sources in seeking to achieve the demanding targets set out in response to the Kyoto protocol.

Currently the UK is committed to reducing CO₂ emissions by 20% by 2010 and by 60% by 2050 when compared with the 1990 baseline levels. In seeking to help to achieve these targets and reverse the trends of climate change, the UK is committed to supplying 15% of its energy needs from renewable sources by 2015 and with an aim of 20% of energy from renewables by 2020. A number of technologies will contribute to this target, including biomass and landfill gas. However, onshore and offshore wind have been consistently highlighted by UK government (and indeed international) policy as offering the most likely sources of a very considerable portion of this target in the short to medium term.

This strong commitment by the UK Government to the development of offshore wind as a key source of renewable energy is reflected in the announcement of Round 2 of UK offshore wind development in which the Government awarded 7.2 GW of generating capacity. Gwynt y Môr should be seen in the context of, and as a response to, the consistent policy of the UK Government to the development of renewables generally, to wind energy specifically, and to offshore wind energy in particular.

2.4 The Welsh Assembly's renewable energy policy

Gwynt y Môr is located within the territorial waters of Wales and therefore Welsh government renewable energy policies are relevant. The National Assembly for Wales debated renewable energy in May 2000 in response to a motion put forward by the Minister for the Environment, Planning and Transport. The motion noted that the Government of Wales Act 1998 included a reserve power to ensure the Assembly delivered a share of climate change commitments and enforced the view that Wales should make an equitable contribution to the Kyoto target. The motion was subsequently amended and was carried unanimously. The amended motion includes the following text:

"The National Assembly for Wales, recalling its statutory responsibility to promote sustainable development, agrees to work in partnership with the UK Government, the Scottish Executive and Department of the Environment (Northern Ireland) to deliver the Kyoto target of a reduction in greenhouse gas emissions of 12.5% below 1995 levels by 2008-2012 and a domestic bill of a 20% reduction in carbon dioxide emissions below 1990 levels by 2010 and recognises the major opportunities in Wales for a dynamic renewable energy industry, calls upon statutory bodies such as the Countryside Agency and Countryside Council, and local authorities to co-operate positively in the advancement of this industry whilst also recognising the responsibility of all sectors to significantly improve energy efficiency and notes the draft climate change programme described in Climate Change Wales issued to members 4 April 2000".

One of the key policy objectives stated in Planning Policy Wales (PPW) is:

"To promote the generation and use of energy from renewable sources and energy efficiency, especially as a means of reducing the effects of climate change;"

The Assembly's aim is to secure the strongest economic development policies to support growth and prosperity in Wales and recognise in this the importance of clean energy, both as an economic driver and to promote the commitment to sustainable development.

PPW calls on local planning authorities to:

"Facilitate the development of all forms of renewable energy and energy efficiency and conservation measures where they are environmentally and socially acceptable. They should make positive provision for such development to meet society's needs now and in the future by:

- *considering the contribution that their authority area can make towards developing and facilitating renewable energy and energy efficiency and conservation through their UDPs*
- *ensuring that development control decisions are consistent with national and international climate change obligations, including a contribution to renewable energy targets, having regard to emerging national and*

international policy on the levels of renewable energy required and on appropriate technologies; and recognising the environmental, economic and social opportunities that the use of renewable energy resources can make to wider planning goals and objectives and the delivery of renewable energy targets.”

The Draft Ministerial Interim Planning Policy Statement (MIPPS) on Renewable Energy, issued in June 2004, highlights the assembly’s commitment to delivering an energy programme which contributes to the reduction of carbon emissions and recognises the renewable energy targets of 4 TWh per annum by 2010 and 7 TWh per annum by 2020. It also states that the assembly’s aim is to secure the right mix of energy provision for Wales through the next two decades, whilst minimising the impact on the environment.

It is proposed that this is achieved by strengthening renewable energy production and placing a greater focus on energy efficiency and conservation. The draft also states that, in the short-term, wind power offers the greatest potential for an increase in the generation of electricity from renewable sources.

The policy statement indicates that:

“The need for wind turbines is established in the short-term through environmental imperative and international treaty and is a key part of meeting the assembly’s targets for renewable electricity production.”

In respect of the Welsh Assembly’s planning policy, the aims set out above with regard to the promotion of renewable energy are laid out in relevant guidance on the approach of the National Assembly for Wales to renewable energy development, notably in Planning Guidance (Wales): Planning Policy (2002), TAN 5: Nature Conservation and Planning, TAN 8: Renewable Energy and TAN 11: Noise. Notably there is as yet no national guidance relating to offshore wind energy development.

Most recently, the Welsh Assembly has produced specific planning guidance on renewable energy projects in Wales in the form of Technical Advice Note 8 (TAN 8), adopted in July 2005. TAN 8 policy sets out a target of 800MW of onshore wind and a further 200MW from currently consented offshore wind and other renewable energy technologies by 2010.

TAN 8 includes the following statement on the specific subject of offshore wind farm developments:

“Offshore wind farms are more efficient generators of electricity than onshore installations but they lie outside the land use system, so it is not appropriate for this TAN to include detailed guidance for them. The electricity they generate, however, will count towards meeting the targets for renewable energy and reducing carbon emissions. Local planning authorities are consultees in the offshore decision-making process. Planning permission may be required for onshore installations associated with offshore wind farms. Local planning authorities should plan positively for such installations and minimise their environmental impact.”

2.5 Local policy

The following sections review the local and regional planning guidance in relation to Gwynt y Môr. It should be noted that local authority plans and statutory powers extend only to the low water mark. The planning policies are, therefore, only of direct relevance to the onshore components of the Gwynt y Môr project – notably the onshore buried cabling, substation development, cable end sealing compound and associated works. These onshore components will be consented through an application under the Town and Country Planning Act. Local authorities are statutory consultees under the Section 36 process administered by the DTI but have no consenting powers in that respect.

The local planning policies have been considered in the preparation of this Environmental Statement and in the consideration of the potential effects of the onshore components of the Gwynt y Môr project, most notably in completing the onshore environmental impact assessment presented in Chapter 11.

2.5.1 The Denbighshire County Council Unitary Development Plan

The Denbighshire County Council Unitary Development Plan (UDP) was adopted in July 2002 and covers the period 1996 – 2011. In relation to the Gwynt y Môr project the UDP provides the guidance for the onshore elements of the Gwynt y Môr development in relation to the Town and Country Planning Act 1990. Section 54A of the 1990 Act provides that applications for planning permission shall be determined in accordance with the provisions of the development plan unless material considerations indicate otherwise. Compliance with development plan policies for the purposes of Section 54A should be with the plan as a whole, with the starting point being policies of direct relevance to the specific development proposed.

The following sections review the relevant UDP policies in relation to the development of renewable energy before going on to consider the policies set out in relation to the siting of the proposed onshore components of the Gwynt y Môr project.

The Denbighshire Council UDP Policy MEW 8 is related specifically to renewable energy development and advises that:

‘Development that generates or captures energy from naturally sustainable sources will be supported in principle as far as is compatible with other plan policies. In particular, development will only be permitted where there is no unacceptable effect to the environmental quality of the locality’.

MEW 8 notes that the relevant national planning guidance (Planning Policy Wales, 2002) advocates the exploitation and development of renewable energy sources wherever they have the prospect of being economically attractive and environmentally acceptable. MEW 8 states that Denbighshire Council is committed to considering the contribution the plan area is able to make in meeting need on a local, regional and national basis. Equally, MEW 8 also notes that there is no justification for such a contribution to be at the expense of other important concerns such as landscape and nature conservation protection. In order to reconcile these different issues the UDP notes the need to balance the commitment to encourage renewable energy with the local and national need to conserve the environment and the landscape for its own sake.

Policy MEW 10 of the UDP goes on to address wind farm development specifically and states that wind turbines or wind farms, including any ancillary associated developments, will be permitted provided that:

- 1 all details of associated ancillary development are submitted with the planning application as an integral part of the scheme.
- 2 there is no unacceptable harm to: the setting of listed buildings; conservation areas; areas or features of archaeological; historic or architectural importance.
- 3 the proposal will not unacceptably harm the character and appearance of the landscape especially the AONB, AOB, LLA's, historic landscapes or the Snowdonia National Park.
- 4 the proposal does not lead to unacceptable noise levels to residential amenity in the surrounding area.
- 5 there is no unacceptable risk or nuisance to the public arising from wind turbines, such as safety, shadow flicker, or radio interference.

- 6 the existing road network is adequate to serve the development, or is made adequate, and suitable access is provided to the network.
- 7 the proposal would not lead to an unacceptable cumulative visual impact in an area where zones of visibility overlap. Particular attention will be paid to the potential effects of a proliferation of such developments in any one area.
- 8 the proposal does not cause unacceptable harm to the enjoyment of the landscape for recreational and tourism purposes.
- 9 there is no unacceptable effect on ground waters or private water supplies.
- 10 there is no unacceptable effect on nature conservation interests.

It is noted that in addition to MEW 8 and 10, Denbighshire Council is proposing the development of Special Planning Guidance for renewable energy, but that such guidance currently remains unavailable for consideration.

A number of general strategy policies, which form part of the UDP, which have been considered in relation to the Gwynt y Môr project and its associated onshore components, including:

In relation to Sustainable Development (General Development Strategy 2.3), the UDP proposes a number of objectives including:

- maintenance of high and stable levels of economic growth and employment
- social progress which recognises the needs of everyone
- effective protection of the environment
- prudent use of natural resources.

In relation to the Environment (General Development Strategy 2.6), the UDP notes a number of objectives amongst which are the following:

- to encourage high quality sustainable development throughout the plan area
- to minimise environmental pollution to air, water or land and to strictly control hazardous development,

and in relation to Resources (General Development Strategy 2.5), the UDP undertakes to:

- to support, where practicable and appropriate, energy generation from renewable sources
- to embrace the principles of sustainable development and the County's Local Agenda 21 Strategy.

In relation to the UDP policies set out by Denbighshire County Council for the sites of the onshore development activities, notably the onshore substation site, cable end sealing compound, associated road development and the required NGT connection works, the following have been considered:

Plan Policy ENV2: Area of Outstanding Natural Beauty (AONB): The UDP policies protect the Clwydian Range AONB, which lies to the south of the substation site and associated grid connection works, against developments that conflict with the planning objectives to conserve and enhance the natural beauty of the area. Major industrial or commercial developments would not be permitted within the AONB unless there is demonstrated overriding national need and there are no alternative sites. The proposed works do not lie within this area.

Plan Policy ENV3: Local Landscape Area: Local Landscape Areas (LLA) are areas outside the AONB or Area of Outstanding Beauty designations that are considered to be of particular local landscape value. The policies associated with this designation protect these areas of local landscape value from

developments that are not capable of being integrated into the landscape without harming the qualities and character that led to its designation. An area covered by LLA designation lies to the west of St Asaph Business Park, associated with Bodelwyddan Castle, a CADW Registered Historic Park and Garden. The onshore cabling may pass to the west of the St Asaph Business Park through an area identified under Policy ENV3 and may therefore lead to some temporary effects of on the landscape value of this area. However, the burial of the cables and proper re-instatement of the cable route means that longer term, permanent effects in relation to policy ENV3 will not occur. None of the major onshore components, such as the onshore substation and associated works or the grid connection infrastructure such as the overhead lines or the cable end sealing compound lie within the area covered by this policy.

Plan Policy REC1: Protection of Existing Open Space: According to policies presented in REC1 development that would result in the loss of public open space would only be permitted if: the open space can be retained and enhanced through the redevelopment of a small part of the site; alternative open space provisions of equitable community value are made available; there would be an overall community gain from the development and the loss of open space would have no adverse effect on local open space provisions or the amenity or character of the area. There is a REC1 allocated playing field in the St Asaph Business Park, to the north of the substation site but this will not be affected by any of the proposed onshore works.

Plan Policies EMP1, EMP2, EMP3: Employment Allocations and St Asaph Business Park: The largest of the allocated areas for economic development is the St Asaph Business Park located to the south of the A55(T) between St Asaph and Bodelwyddan, immediately north of the substation site and on the route of the onshore buried cable route. St Asaph Business Park is a site safeguarded for high quality employment. Development will only be permitted within the allocated area providing that: it is of the highest quality, design and layout; it is of low density; incorporates substantial landscaping measures that are sympathetic to its rural location; and it maintains or incorporates landscape or nature conservation features or habitats. The onshore substation lies to the south of the St Asaph Business Park and outside of the area covered by these plan policies.

2.5.2 The Conwy County Borough Council development plan framework

The Colwyn Borough Local Plan was adopted in 1999 and covers the area of the former Colwyn Borough. Work began on the plan in 1992 by Colwyn Borough Council and after local government reorganisation it was progressed to adoption by Conwy County Borough Council. It covers the period 1996 to 2006. This adopted plan covers the area of coast between Llandulas and Kinmel Bay together with the area inshore of the coast as far south as Cerrigydrudion and as such encompasses all of the parts of the Conwy Borough Council district affected by the onshore components of the Gwynt y Môr project (essentially the buried onshore cabling). Conwy Borough Council advise that the adopted plans should be used in considering planning applications and the Colwyn Borough Local Plan has therefore been used as the basis for assessing the onshore components of the project in relation to local planning policy.

The Colwyn Borough Local Plan does not contain any policies specific to renewable energy or wind farm developments in the same way as the Denbighshire UDP.

Specific spatial planning policies set out by the local plan which may be considered of relevance to the onshore components of the Gwynt y Môr project include the following:

Policies CN6, 7, 9 and 10 cover the coastal strip within which the export cables would be landed and relate to

coastal planning and coastal defence issues. Specifically, the policies are set out as follows:

- policy CN6: Development in areas of undeveloped coastline outside settlement limits that will adversely affect the open character, nature conservation value or coastal processes of the coastal zone will not normally be permitted
- policy CN7: Development in areas of the coastal zone within settlement limits will only be permitted where it is for a tourism and recreation related use that requires a coastal location
- policy CN9: The planning authority will permit the carrying out of coast protection works where the open character or nature conservation value of the coastal zone is taken fully into account
- policy CN10: Development that requires an increase in the level of coastal protection will only be permitted where the necessary improvements are carried out at the expense of the developer.

The potential effects on coastal processes and defence are considered by this Environmental Statement. The temporary disruption of the coastal environment and the burial of the onshore cables means that there will be no lasting effect on the character, amenity use or nature conservation value of the coastal zone nor on the coastal processes and integrity of the coastal defence works.

Policy CN5: this relates to the restriction of development in areas designated as green barriers and includes a designated area between Abergele and Towyn, immediately to the south of the development coastal strip. Development in areas covered by policy CN5 will only be permitted where it does not detract from the open character of the area. The burial of the onshore cabling will lead to some short term visual or noise effects in the areas covered by these policies but following completion of the works and appropriate re-instatement, no longer term effects on these areas or these policy objectives would occur. Notably, npower renewables have chosen to bury all onshore cabling to the substation site, thereby avoiding the need for overhead transmission lines which might otherwise have had a significant effect on these areas in relation to these policy objectives.

Policies CTR4 and CTR 5 relate to potential highways schemes and cross at two locations the coastal plain to the south of the developed coastal strip would be crossed by the onshore buried cables. In both cases, these policies require that the land covered by the plan policy designations which may be required for road improvement schemes should be protected from other development. In addition, policy CTR5 undertakes to encourage the highways agency to undertake the highlighted scheme during the plan period. Suitable burial of the onshore cables in agreement with the Local Authority will ensure that no future effects on highways development would occur.

Policy CR4 relates to the provision of new major public open spaces and allocates a number of sites for this purpose. One such site lies immediately to the southwest of the Tir Prince raceway and may be crossed by the buried onshore cables where the cable landfall is made at Towyn. Another such space is allocated under this policy at the Pensarn Gap where cables landed at the Pensarn option would be routed. Temporary disruption of these areas and their potential or existing amenity use may occur during cable installation. However burial of the cables and appropriate re-instatement of the land will ensure that there are no longer term effects on these areas or these local plan policy objectives.

Policy CH3 sets out areas for development required in the urban areas and main villages in order to meet housing requirements. One such area lies to the east of Towyn Way East and is an area that could be crossed by the onshore buried cables in the event of a cable landfall at Towyn. Appropriate burial of the cables, in agreement with the Local Authority should ensure that there are no long term effects on the future development use of these areas.

Policy CE4 provides for the allocation of land for development to meet local employment requirements. One such site lies immediately adjacent to the sewage works at Pensarn and is an area that would be crossed by the buried onshore cables in the event that the Pensarn landfall option was selected. Appropriate burial of the cables, in agreement with the Local Authority should ensure that there are no long term effects on the future development use of these areas.

In addition to the Colwyn Borough adopted local plan, it is noted that there is a draft UDP produced by Conwy County Borough Council in 2001 but which remains un-adopted pending the anticipated preparation of a Local Development Plan. Following advice provided by Conwy Borough Council through their planning portal (<http://conwy.leadpartners.co.uk/>, September 2005), this draft plan has not been considered further since the relevant development areas are covered by the adopted Colwyn Borough plan.

2.6 Summary of Welsh national and local policy

The review of the relevant Welsh policy, both nationally from the Welsh Assembly and locally in relation to the relevant UDPs, has highlighted the generally supportive stance with regard to renewable energy development. Specifically, a number of key conclusions are relevant:

- the Welsh Assembly policy endorses and supports offshore wind and recognises its importance in contributing to the achievement of Welsh renewable energy targets
- the Welsh Assembly policy calls for “a dynamic renewable energy industry” in Wales
- Wales has set targets for renewable energy supply of 4 TWh by 2010 which is likely to equate to around 10% of Welsh electricity consumption at that time, and for 7 TWh by 2020
- whilst onshore planning policies do not apply directly to offshore renewable developments, they do reflect a positive commitment to facilitate major growth of renewables provision in Wales
- whilst the local UDPs do not relate to offshore wind farm development, they do support the provision of associated ancillary development such as the onshore components for Gwynt y Môr. The onshore project components have been appropriately sited and designed but, that being the case, appear to comply with all of the relevant local UDP policy guidance.

2.7 Why wind power?

The preceding sections on the global and national implications of climate change and the associated global, European, national and regional policies that have been put in place to reduce greenhouse gas emissions have consistently referred to the need to develop renewable energy. Specifically, wind power is consistently highlighted as a key renewable energy technology. The following sections provide a brief overview of wind power, its advantages and its current status in the UK with a specific focus on offshore wind power.

2.7.1 Wind turbines – clean, sustainable and renewable generation

Wind turbines that generate electricity generally consist of rotor blades, which rotate around a horizontal hub. The hub is connected to a gearbox and generator, which are located inside the nacelle. The nacelle is the large part at the top of the tower where all the electrical components are located. Most modern wind turbines have three blades, which face into the wind; the wind turns the blades round, this spins the shaft, which connects to a generator. The generator in turn, is the machinery that produces electrical energy from mechanical energy.

As has been demonstrated in the preceding sections of this chapter, the global imperative of tackling the issues of climate change necessitate the exploitation of clean, renewable resources to offset the production of harmful greenhouse gases. The wind is one such clean, inexhaustible fuel, which is easily converted to electricity without any of the harmful by-products associated with conventional sources of power, such as nuclear and fossil fuel energy. The production of electricity from wind energy represents a truly sustainable use of natural resources and leaves no harmful legacies for future generations.

The need to tackle climate change not just in the future but immediately also promotes the use of wind energy amongst all of the other available renewable technologies. Wind turbines are a mature technology that is easily deployable in a dependable and cost efficient form. Other renewable technologies are developing but few if any are able to contribute very large generating capacities in the short to medium term.

Wind energy is also one of the cheapest of the renewable energy technologies. It can be competitive with new clean coal-fired power stations and cheaper than new nuclear power. The cost of wind energy varies according to many factors. An average for a new onshore wind farm in a good location is 3-4 pence per unit of electricity, which is competitive with new coal (2.5-4.5 p) and cheaper than new nuclear (4-7 p). Electricity from offshore wind farms can be more expensive because of the greater expense involved in their construction but equally offshore wind farms offer the potential for large generating capacities making very substantial contributions to the UK energy supply. However, as the UK's indigenous fuels, such as gas, oil and coal-run out, prices will rise accordingly. When the cost of damage to the environment and our health from fossil fuel sources of generation is taken into account, the gap narrows.

2.7.2 Sustainability – the energy balance of wind turbines

The comparison of the energy used in manufacture with the energy produced by a power station is known as the 'energy balance'. It can be expressed in terms of energy 'pay back' time; that is the time needed to generate the equivalent amount of energy used in manufacturing, transporting and erecting the wind turbine or power station.

The average wind farm in the UK will pay back the energy used in its manufacture within one year, and over its lifetime a wind turbine will produce over 30 times more energy than was used in its manufacture (www.bwea.co.uk). The larger turbines that will be used offshore involve greater amounts of raw materials (principally steel), which means that they take somewhat longer to achieve an energy balance, but conversely will generate more power over their life – up to 35 times more (www.vestas.com).

This compares favourably with coal or nuclear power stations, which deliver only a third of the total energy used in construction and fuel supply. When the cost of the fuel is included in the calculation, fossil fuel or nuclear power stations never achieve an energy pay back. Wind energy not only achieves pay back within a few months of installation but does so from a fuel that is clean, sustainable and inexhaustible.

2.8 Wind power in the UK

In the UK much of the existing renewable generation capacity is contributed by onshore wind farms. Up to the end of 2004 a total of 101 wind farm developments were operational, totalling 1,234 turbines, with a generating capacity of almost 980 MW. These existing wind farms supply an equivalent of 547,725 homes

with renewable energy and represent the annual offset of approximately 2,215,000 tonnes of CO₂ emissions when compared with coal-fired power generation (www.bwea.com, 2005).

Contrary to some reports, the variable nature of supply, due to the fact that wind power is an intermittent generation technology, does not pose a particular problem for the national grid. Detailed studies have shown that the UK transmission system can accommodate up to around 20% of its capacity from intermittent generation sources.

Wind energy in the UK is also bringing additional benefits beyond the supply of clean, sustainable energy. Wind energy is the fastest growing energy sector in the UK. Currently, companies working in the wind sector sustain over 4,000 jobs, and this is projected to increase as the industry grows. In addition to direct manufacturing jobs, various other sectors are involved in wind energy development, ranging from environmental consultancy, electrical and civil engineering to financial and legal services. The Department of Trade and Industry has estimated that Round 2 of offshore wind developments alone could bring a further 20,000 jobs to Britain.

2.8.1 Public attitudes to wind power in the UK

Many public attitude surveys have been conducted in relation to wind farms in a variety of locations around the UK and all tend to show a very similar response. Surveys conducted since the early 1990s across the country near existing wind farms have consistently found that most people are in favour of wind energy. A public attitude survey in 2003 for all governments in England, Wales, Scotland and Northern Ireland found that 85% of the general public supported both on and offshore wind energy.

Additional surveys show that twice as many visitors would return to an area than would stay away because of a wind farm, while the majority of local residents say that they were in favour of increasing the size of their local wind farm (BWEA, 2004).

A survey by Friends of the Earth Cymru (2002), undertaken by an independent market research company, highlighted similar levels of support for wind energy amongst the Welsh population. A number of key points can be taken from the study:

- when asked whether they would support the doubling of wind turbines on land in Wales, over seven in ten (71%) of Welsh adults stated they would
- when asked their preference for electricity production between a nuclear power station and offshore wind turbines, nearly nine out of ten respondents (87%) stated offshore wind turbines
- offshore wind turbines had the greatest support in north Wales (90%).

A wide variety of independent reports by government and organisations such as MORI have repeatedly demonstrated a consistent level of support for wind farms from between 70-80% of the public over the past decade, including those in areas where wind farms have already been developed. Independent resources on the internet contain numerous references to public attitude surveys (for example www.mori.com).

An independent survey completed for the Welsh Tourist Board during 2003 similarly confirmed the general findings of previous studies in relation to the attitudes of visitors to Wales on wind farms. Of the visitors questioned, 75% were positive or neutral in their attitude to wind farms, with some 24% expressing negative views. Negative views expressed tended to focus on impacts on landscape and the enjoyment of scenery (it is worth noting that the Welsh Tourist Board consider offshore wind farms beyond 8 km from the coast to be acceptable and expressed no objection to the Gwynt y Môr project during the scoping process).

Key environmental groups, such as Greenpeace, fully endorse the principle of offshore wind development, as long as there are no unacceptable environmental impacts. This is because of the contribution it can make to reduce emissions of greenhouse gases.

2.8.2 The UK offshore experience

The UK has potentially the largest offshore wind resource in the world, with relatively shallow waters and a strong wind resource. The UK has been estimated to have over 33% of the total European potential offshore wind resource – enough to power the country nearly three times over.

The first large scale offshore wind farm in the UK, North Hoyle Offshore Wind Farm, was commissioned in 2004 and the second, Scroby Sands, came on line at the end of that year. Together with the Blyth pilot project this makes a total of 124 MW of offshore wind generating capacity currently operating around the UK coast. Further Round 1 projects are in the process of being constructed, such as the Kentish Flats Offshore Wind Farm in the Thames Estuary, which will be on line by the end of 2005, with several further sites planned to commence construction during 2005/6. The total capacity from the eleven Round 1 sites that are either operational, under construction or have received the necessary development consents currently amounts to over 1 GW.

The Round 2 offshore wind farm process, of which Gwynt y Môr is a major part, has identified 15 sites for development representing a potential total of up to 7.2 GW of electricity generating capacity, equivalent to 7% of UK supply. The continued development of offshore wind farms, therefore, is expected to be a major contributor towards the government's 2015 target for renewable generation.

Regionally, the North Hoyle Offshore Wind Farm already makes a significant contribution to the renewable targets set out by the National Assembly for Wales. In addition, the Rhyl Flats and Scarweather Sands projects are also fully consented. Gwynt y Môr could significantly increase the contribution of offshore wind to Welsh targets and, when operational, would have a capacity equivalent to the electricity demand of around 40% of all Welsh households.

