The Carbon Trust & DTI Renewables Network Impact Study

Annex 1: Capacity Mapping & Market Scenarios for 2010 and 2020

November 2003

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Glossary

BWEA	British Wind Energy Association
CCGT	Combined cycle gas turbine
CHP	Combined Heat and Power
CHPA	Combined Heat and Power Association
DUKES	Digest of UK Energy Statistics
GW	Gigawatt
MW	Megawatt
NGT	National Grid Transco
RO	Renewable Obligation
ROCs	Renewable Obligation Certificates
SYS	Seven Year Statement
TIWG	Transmission Issues Working Group
TWh	Terrawatt hour

1 Introduction

This paper is Annex 1 of the Renewables Network Impact Study for the Carbon Trust and the DTI, and summarises the capacity mapping exercise and scenarios undertaken as part of the overall study. It should be read in conjunction with Volume 1 of this study, which summarises the findings from each separate Annex within a single short report.

The individual annexes to Volume 1 of the Renewables Network Impact Study comprise the following five parts:

Annex 1: Capacity Mapping and Scenarios (this paper)

Annex 2: Transmission Network Topography Analysis

Annex 3: Distribution Network Topography Analysis

Annex 4: Intermittency Literature Survey and Roadmap

Annex 5: Grid Code Compliance

This study was commissioned by the Carbon Trust and the DTI in June 2003 on behalf of the DTI's Renewables Advisory Board to assess the ability of the electricity networks to accommodate the Government's target to have 10% of electricity generated from renewable energy sources by 2010 and its aspiration to double that percentage by 2020.

Objectives of the Renewables Network Impact Study

The study's key objectives, as set by the Renewables Advisory Board, the Carbon Trust and DTI, are as follows:

- To undertake a forward renewables capacity mapping exercise derived from the generation companies' investment plans to 2010, and if the capacity mapping exercise indicates that the planned level of activity is unlikely to meet the 2010 target, to devise and consider a small number of scenarios whereby the 10% target could be achieved.
- To determine how the transmission and distribution networks need to evolve to enable the Government's 2010 target of 10% of electricity supplied from renewable sources and the aspiration to double that percentage.
- To investigate the network issues regarding the intermittent nature of renewable generation and the characterisation of renewable generation with regard to grid code compliance.
- To provide insights into the actions and the stepping stones required between now and 2020 for the key decisions and investments relating to the transformation of the transmission and distribution network, and those issues likely to affect the rate of progress toward the targets.

The study also analyses whether there are potential network impacts on renewables expansion from a simultaneous expansion of the UK's CHP capacity to meet the Government target of 10GW of CHP by 2010. The study's terms of reference were finalised in June 2003. It therefore has based its considerations on the then renewables targets as set down in the Energy White Paper. The majority of the research had been carried out and completed by the time the Government announced in November

2003 its decision to set a new target of 15% of renewables electricity sales by 2015 and to extend the Renewables Obligation to 2015. However, the impact of this important development in the stimulation of more renewables generation capacity is considered briefly as they impact on the key conclusions reported.

All aspects of this paper were consulted with the project's Advisory Group. This was created by the Carbon Trust and the DTI and it comprises representatives from the following entities:

- Ofgem
- the Renewable Power Association (RPA)
- the British Wind Energy Association (BWEA)
- the Distribution Network Operators (DNOs)
- the Technical Steering Group (TSG) of the Distributed Generation and Co-ordination Group (DGCG).

1.1 The Capacity Mapping Exercise

The capacity mapping exercise contained within this paper is based on actual planned renewable generation projects and developers' business plans. Some scenario development was undertaken to show plausible ways in which the gap could be bridged in order to achieve the Government's 2010 target and its 2020 aspiration. The issues this raises for the development of the transmission and distribution systems are described below.

For the 2010 target, a "bottom up" approach was used to build up renewable power capacity on the networks, by taking information provided by project developers on actual projects and longer-term business plans. CHP development is currently on hold; therefore the study relies on predictions about likely capacity additions to 2010. Gathering and filtering real project data is the aspect of the study referred to as capacity mapping. The shortfall between developers' plans and the 2010 target has been addressed by creating scenarios. This approach allows the network models to analyse the impact of actual and highly likely developments lowering the reliance on scenarios and projections.

For 2020, due to the lack of business planning data for the longer term, the renewable power and CHP capacity added to the network for the period 2010-2020 is entirely based on the scenarios summarised in this paper.

The structure of this paper is as follows:

- Section 2 reviews how the data for capacity mapping was built up and screened
- Section 3 discusses the scenarios developed for meeting the 2010 target
- Section 4 describes the scenarios for 2020
- Section 5 summarises the key uncertainties that can prevent or delay the implementation of a renewable power project.

2 Capacity Mapping

2.1 Identified Projects

The following sources of information were used to identify renewable power projects currently under development within the UK:

- BWEA's database of wind power projects
- Power UK's Power Tracker database of power project development in the UK
- the Land Use Consultant's database provided by AEA Technology
- direct contact with 17 major project developers

Table 2-1 summarises the results of the searches for renewable power project data. The table shows that wind power projects dominate the available information with some 11 550 MW of wind generation either planned or already under construction. This represents 89% of the total unscreened capacity. This highlights the continuing growth of wind power within the UK, the current difficulties in developing biomass schemes, and the infancy of wave and tidal generation technologies.

Table 2-1: Unscreened Project Capacities up to 2010

Technology	Number of individual projects	Total MW	Average Plant Size (MW)	Capacity Factor	Total TWh represented
Onshore Wind	232	7691	33	0.28	18.86
Offshore Wind	21	3856	184	0.37	12.50
Biomass	44	440	10	0.65	2.51
Landfill Gas	338	736	2.2	0.85	5.48
Hydro	123	205	1.7	0.45	0.81
Wave & Tidal	4	2	0.5	0.45	0.008
TOTAL	**762**	**12 930**			**40.17**

Although the study's primarily focus is renewable power generation, information was also sought on CHP development to assess the potential impacts on the network of simultaneous CHP development. The information obtained from project developers and other sources indicates that CHP development at present is on hold due to adverse market conditions.

2.2 Screened Data

The capacity represented in Table 2-1 provides a total of 40.2 TWh. This is 112.5% of the 2010 target of 35.7 TWh, as defined in Section 3. However, it is unrealistic to expect that all of the projects summarised in the table will successfully reach operational status.

The data was screened based on the probability of success for each project and classified as follows:

- Definite or very likely projects: these include projects that have already gained planning permission or are in the application phase with a good chance of achieving planning permission due to their location (i.e. Scotland, and other areas with good track records for approving wind power developments). Success rates for wind projects in Scotland, once applications have been made, can typically be between 70% and 80%, while developers in England face a much harder and prolonged process.

- Projects likely to go ahead: these include projects which are yet to submit planning applications, but are still deemed to have a reasonable chance of success (i.e. greater than 50%) based on size and location. These also include more detailed business plans provided by developers (i.e. totals broken down into individual projects).

- Less firm project data, currently expected to have a low chance of implementation. This includes longer-term plans provided by developers (i.e. aspirational totals for 2010 but without information on individual future projects).

Some projects were disregarded and not included in the analysis because they were deemed not to become operational by 2010. These included, for example, projects at a very early stage of development (i.e. wave and tidal developments, and very large offshore wind projects), or projects undefined in terms of size, location and timescale.

Real projects identified in the capacity mapping exercise are mapped onto the transmission and distribution networks in three separate steps:

- Step One: this maps definite or highly likely projects identified from the first stage of screening
- Step Two: this adds in projects likely to go ahead as identified from the second stage of screening
- Step Three: this uses less firm project data and the scenarios developed by Mott MacDonald to take the total renewable power capacity up to the 2010 target

CHP project development is currently on hold. As a result of this and discussions held with the Advisory Group and the CHP Association (CHPA), the study assumes that 74% of the Government's 2010 CHP target is met. This is mapped onto the networks in Step Three. The location of CHP plants is based on information obtained from developers. (This is discussed in more detail in section 3.2.2).

This three-step approach to modelling the networks allows a high degree of realism to be built into the models as they integrate a large proportion of real known projects. The approach also acknowledges that uncertainties exist in the project data and that this can increase as development timescales extend closer to 2010. This is represented in the levels of uncertainty associated with each of the steps; Step One being definite and Step Three being the most uncertain.

Table 2-2, Table 2-3 and Table 2-4 summarise the project capacities identified at each screening stage. Table 2-2 and Table 2-3 were used directly in the network modelling process. A full listing of projects is included in Appendix A.

Taking the most certain data, Table 2-2 and Table 2-3 together, there is sufficient capacity to meet 72.2% of the 2010 target (25.8 TWh). Of this combined capacity, wind power alone represents 52.9% (18.9 TWh) of the 2010 target. Step Two indicates that significant onshore wind is currently underway, with commissioning dates typically falling in 2004 to 2005.

Table 2-2: Real Project Capacities for Step One

Technology	Number of individual projects	Total MW	Average Plant Size (MW)	Capacity Factor	Total TWh represented
Onshore Wind	123	1367	11.1	0.28	3.35
Offshore Wind	8	800	100	0.37	2.59
Biomass	7	89.1	2.9	0.65	0.07
Landfill Gas	338	736	2.2	0.85	5.48
Hydro	41	28	0.7	0.45	0.11
Wave & Tidal	4	2	0.5	0.45	0.007
TOTAL	**517**	**2 944**			**11.6**
				Step One % 2010 Target	**32.5%**

Table 2-3: Real Project Capacities for Step Two

Technology	Number of individual projects	Total MW	Average Plant Size (MW)	Capacity Factor	Total TWh represented
Onshore Wind	76	4 636	61	0.28	11.4
Offshore Wind	6	486	81	0.37	1.6
Biomass	20	206	10.4	0.65	1.2
Landfill Gas	-	-	-	0.85	-
Hydro	11	14.6	1.3	0.45	0.06
Wave & Tidal	-	-	-	0.45	-
TOTAL	**111**	**5 343**			**14.2**
				Step One + Step Two % of 2010 Target	**72.2%**

Table 2-4 shows the least firm real projects. These projects have longer-term or unspecified completion dates, or size and/or location that indicate a much less definite outcome. The table also includes aspirational targets provided by developers, which they did not break down into individual projects. This information is incorporated into the scenarios developed for 2010 by indicating where scenario-based MWs should be located.

Table 2-4: Real Project Capacities for Step Three

Technology	Number of individual projects	Total MW	Average Plant Size	Capacity Factor	Total TWh represented
Onshore Wind	32	1 691	67 MW	0.28	4.1
Offshore Wind	8	2 570	259 MW	0.37	8.3
Biomass	17	222	13.1 MW	0.65	1.3
Landfill Gas	-	-	-	0.85	-
Hydro	71	162	2.3 MW	0.45	0.6
Wave & Tidal	-	-	-	0.45	-
TOTAL	**128**	**4 645**			**14.3**

From the tables it can be seen that onshore wind power will dominate the renewable generating capacity installed between the present time and 2010. Within this technology, a high proportion of the

installed capacity will be in Scotland. Wave and tidal technologies are currently at pre-commercial stage in their development, with the only current firm projects being prototype or demonstration installations. Biomass is not expected to make more than a modest contribution to the 2010 target because it depends on improvement in fuel economics and plant performance. Landfill gas power is currently seeing a sizeable level of development.

The information gathered from developers and others on real projects also indicates a steady growth in offshore wind power, with current projects being followed by developments of increasing scale, both in terms of total MW installed and individual turbine sizes. This pattern of development has been taken through into the 2020 scenarios, with offshore wind increasing steadily while the rate of development of onshore wind projects gradually slows down as available sites are used up. Wind power, both onshore and offshore, is still expected to dominate other renewable technologies in 2020.

3 2010 Renewable Obligation Compliance Scenarios

This section explains the scenarios created for compliance with the 2010 target. This is done by first defining the level of the 2010 target and then explaining the general electricity market context within which renewables will develop. The 27.8% capacity shortfall to meet the 2010 targets is then established by looking at three possible renewable scenarios; two scenarios analyse capacity mixes based on the same level of demand, the other is a demand sensitivity. This exercise determines likely renewable capacity mixes and locations and it determines whether scenario-based projects will be connected to the transmission or distribution networks.

All this information is then modelled using Mott MacDonald's market model to find conventional and renewable plant operating forecasts to 2010 and plant capacity load factors. These are the inputs to the transmission and distribution network models.

3.1 The Renewable Obligation Target

The Renewable Obligation (RO) target is expressed as a percentage of sales by licensed suppliers in each year to 31 March.

The figures for 2002 from the Digest of UK Energy Statistics (DUKES) show public electricity suppliers' sales of 320 TWh[1]. The growth rate between now and 2010, is expected to be close to the growth of underlying electricity consumption. This presumes that there will not be a significant change in the share on consumption met by on-site generation, which is not counted in sales by licensed suppliers.

The latest edition (2003) of National Grid Transco's (NGT) Seven Year Statement (SYS) projected an annual growth rate of 1.6% between 2002/03 and 2009/10. However, this growth rate is likely to be high because NGT's projections do not include full adoption of the Energy White Paper's energy efficiency initiatives. This study scales down the growth rate to 0.9%, as this provides a demand figure for 2010 which will represent steps being taken towards the Energy White Paper's efficiency goals, but is still higher than would be implied by the full achievement of the Energy White Paper efficiency targets. This growth rate also reflects the view that there will be some growth in on-site generation, due to the increased take up of CHP, including micro CHP plant in the latter half of the decade. Applying this growth to the 2002 figure provides a licensed sales figure of 343.6 TWh in 2010 and a RO target of 35.7 TWh.

[1] This is very different from taking a percentage of the annual electricity requirements on the grid, which seems to have been an approach adopted on a number of occasions by studies examining aspects of RO compliance. The main difference arises because licensed sales are measured at the customer's meter, while electricity requirements are measured at the station's meter, so do not net out losses on the transmission and distribution systems and electricity consumed by pumped storage plants. Secondly, sales by licensed suppliers exclude end-user demand that is met from on-site license exempt generation. Also, some embedded generation, which is excluded from the Grid's annual requirements, will be counted in licensed sales (suitably scaled for losses).

3.2 The Generation Market Context

3.2.1 Key Assumptions

Scenarios of renewable generation development are undertaken within a wider context of the generation market. This section outlines Mott MacDonald's view of a plausible central case for the UK generation market in 2010 and also indicates the main areas of uncertainty. The assumptions have been consulted with the Carbon Trust, the DTI and the project's Advisory Group.

A presumption of this analysis is that the future will not be a business-as-usual world, for two reasons:

1. the government is clearly seeking to reshape national energy policy in order to encourage energy efficiency and distributed generation;
2. the UK will be required to join the European Union's (EU) Emission Trading Scheme in 2005, which will for the first time put a price on generators' and other large fossil fuel users' carbon emissions.

Our base scenario assumes the following:

- The EU emission trading scheme is introduced in 2005 and price of carbon will rise from around €4-5/t CO2e in 2005/06 to €10/t CO2e in 2010. This price projection will reinforce the firming in power prices, which is expected in the second half of the decade as the plant margin tightens. It is estimated that the €10/t carbon price will add an extra £4/MWh to baseload power prices.
- Plant margins are expected to tighten as around 5-6 GW of plant is taken off line, main comprising nuclear (3.8 GW) and coal (2 GW). As of September 2003, electricity forward prices for 2004 and 2005 had increased 20% and 30% respectively compared to the levels seen in 2002, largely on the back of these expectations.
- It is likely that from 2005 wholesale prices will provide a reasonable return for new Combined Cycle Gas Turbine (CCGT) development; however lenders will initially be cautious about rushing to finance new projects. Nevertheless we expect a revival in the CCGT ordering programme from 2005, with around 5 GW of new plant projected to be on line by 2010.
- There is a modest level of return of mothballed plant (700 MW of CCGT), 2 GW of extra Flue Gas Desulphurisation (FGD) committed taking the total to 10 GW, an extra 1.8 GW of international interconnectors (Norway 1.2 GW and Ireland 0.6 GW)
- The sulphur cap set at 250 kt of SO_2 is implemented.

A fuller description of the market context is provided in Appendix B.

Reflecting these assumptions the projected mix of generation in 2010 will be considerably different from today's mix. Gas fired generation is expected to increase from 35% in 2002 to 55%, while coal fired generation is expected to decline from 33% to 23%. The nuclear share is likely to decline from 25% to 16%. These shares relate to the share of generation met by transmission contracted capacity and so exclude embedded and distributed generation.

This shift in generation mix is likely to change the geographical pattern of conventional generation slightly towards the south as new CCGTs are more likely to be located in the south than the north, while the closed coal capacity is likely to be in the north. The closure of the Magnox stations and Dungeness B will take out slightly more southern generation than northern generation, so this will

mitigate the shift towards the south. On the demand side, it is likely that there will be a contrary shift towards the south. This reflects the relatively higher economic and population growth and the greater increase in air-conditioning demand in southern Britain versus the north. It is uncertain whether the demand shift will fully offset the generation shift, but on balance it would be reasonable to assume that the bulk power flows from the conventional generation to demand will not fundamentally shift from today's patterns.

3.2.2 CHP Assumptions

This study is largely focused on the issues relating to the connection and integration of a level of renewable generation that would allow compliance with the government's RO targets. In evaluating this question it has been necessary to look at whether there are potential network impacts on renewables expansion from simultaneous expansion of the UK's CHP capacity. This has involved making a projection of additional CHP capacity.

The government has set a UK national target for CHP capacity to reach 10 GW by 2010. This compares with approximately 4.8 GW installed by in 2002 reported in DUKES, which implies more than a doubling in capacity in eight years (650 MW of net addition a year). This is a huge rate of addition given that there has been no net increase over the last two years.

NGT's 2003 SYS projects an addition in England of Wales of 300 MW pa of embedded capacity. NGT acknowledges that its projections will not allow achievement of the 10 GW target, and that this projection is at the high end of expectations of developers.

Our own assessment based on discussion with the project's Advisory Group and the CHPA is that the NGT's figures should be lowered to around 200 MW pa. Over eight years this will give an addition of 1 600 MW of embedded CHP in England and Wales. If we add 200 MW of net addition in Scotland and Northern Ireland this gives a net addition of 1.8 GW to the UK embedded CHP total.

We have assumed that this addition will include approximately 300 MW of micro CHP installed at consumers' sites, which leaves 1 500 MW of new capacity connected to Distribution Network Operators' (DNO) networks.

There is also likely to be some additional CHP capacity connected to the transmission networks. On the assumption that 20% of the projected new CCGT capacity (5 GW) will be CHP, this would provide a further 1 000 MW of CHP transmission-connected capacity. Assuming no significant closures of current CHP capacity this would take the UK total installed capacity to 7.4 GW (74% of the target).

3.2.3 Waste to Energy Assumptions

Waste to Energy based on municipal and/or commercial waste is not RO eligible. Nevertheless, it needs to be considered to evaluate potential implications for the networks. There is around 445 MW of waste to energy plants operating in England and Wales and around 25 MW in Scotland. There is however little development of new projects at present, as waste to energy projects are unpopular amongst local communities and developers are finding it difficult to get planning permits. At the moment there are just two projects under construction, at Pitsea (11 MW) and Rainham (20 MW), both in Essex. However, it is likely that more projects will be added by 2015 because Waste Policy dictates a move away from landfill as an option for waste disposal. The study assumes that 20 MW of

capacity comes on line every year between 2004 and 2015, which takes total waste to energy capacity to 621 MW in 2010.

3.2.2 Sensitivities Regarding Demand and Conventional Generation Mix

The main sensitivities relate to the level of licensed sales that will directly affect the level of renewable energy that needs to be generated. The pattern of generation will have a second order impact on renewable generation, via the different loadflows on the transmission network.

It is possible to run high and low variants of our base demand scenario, however the study will focus on a low sensitivity as this is more consistent with the direction of government energy policy outlined in the Energy White Paper. While the base case represents some slippage in the implementation of the White Paper proposals, we have provided a low scenario that is broadly consistent with the White Paper aspirations. Under this scenario, licensed energy sales in 2010 would fall to 307 TWh, some 4% below the level seen in 2002 and 11% below the base case. This implies that the RO target is reduce from 35.7 TWh to 32 TWh. The impact of this reduction on the renewable capacity needed for 2010 is shown in Section 3.3.3.

The main sensitivities with regard to the generation pattern relate to the balance between coal and gas fired generation. Our base scenario includes a significant displacement of coal by gas, both as existing CCGTs are operated at a higher load factor due to significant carbon penalties affecting coal, and as new CCGTs come on line. It is possible that no new CCGTs will be brought on by 2010 and that carbon penalties on coal plant will not be so severe as to force all coal out of base-load. The difference between such scenarios could be as much as 40 TWh. While this has a big impact on the energy mix and loadflows its impact on transmission capacity requirements may not be so marked, as a large amount of coal plant will be required to stay online under all scenarios, which include a large amount of wind. The coal plant will be required for meeting peak demand and providing reserve.

3.3 Compliance Scenarios

The capacity mapping exercise identified real projects likely to go ahead that represent 72.2% of the 35.7 TWh RO target for 2010. This means that an additional 27.8% of capacity equating to 9.9 TWh of energy is needed. There are different ways in which this output could be provided.

Landfill gas is currently cheap and offers a relatively high capacity factor. The study assumes that real projects with planning permission will go ahead due to favourable project economics but that no increase is seen in the scenarios to 2010. This is because existing real projects are likely to use about 90% of the existing resource and new landfill sites are unlikely to be developed due to the move away from landfill as a waste disposal option as encouraged by UK's Waste Policy.

Biomass energy is not expected to achieve major penetration by 2010. There are currently no successful projects based on energy crops and all the biomass plants in operation and development are based on waste stream biomass. Energy crops are still expensive and considered to be experimental. The Energy White Paper predicts that they will become commercial in the early part of the next decade. For the 2010 scenarios a modest increase in biomass based mainly on waste stream projects is added.

Wave and tidal energies are likely to be commercially available in the market post 2010, so no new capacity additions have been included in the 2010 scenarios.

Solar energy has not been taken into account in our scenarios as it is assumed to be embedded within the users' sites and it is therefore netted-off the DNOs' demand. By December 2002 approximately 3.63 MW of PV cells had been installed, and currently just 1.27 MW of future projects has been approved for funding. While this translates into a relatively high number of PV units it does not have a material effect on the RO target for 2010.

As landfill resources are limited and energy crops are currently subject to economic constraints, the extra capacity needed is thus more likely to come from Scottish onshore wind and English offshore wind, in line with recent DTI proposals. For this purpose we have formulated two different scenarios;

- High Scottish Onshore Wind Scenario
- High English Offshore Wind Scenario.

3.3.1 High Scottish Onshore

Table 3-1 shows the additional capacity required above that from real projects and Table 3-2 indicates the capacity and generation required to meet the 2010 RO target given by real projects and the High Scottish Onshore Scenario.

This scenario assumes 6.3 GW of total installed onshore wind capacity in Scotland by 2010 (see Table 3-2). To reach this figure an average of 1 GW needs to come on line each year, which is clearly an ambitious target. This scenario is in line with longer term business plans and with other studies such as the Renewable Energy Transmission Study (RETS), and scenarios prepared for Workstream 1 of the TSG.

Table 3-1: Capacity Additions under the High Onshore Wind Scottish Scenario

Technology	England	Scotland	Wales	Northern Ireland	Total MW	Total TWh
Onshore wind	77.8	1 551	36.9	79.4	1 745.1	4.3
Offshore wind	520	600	0	90	1210	3.9
Landfill gas	0	0	0	0	0	0.0
Biomass	210	10	14	0	234	1.3
Small hydro	4.5	80.6	8.1	0	93.2	0.4
TOTAL	812.3	2 241.6	59.0	169.4	3 282.3	9.9

Table 3-2: 2010 Capacity based on Real Projects and the High Scottish Onshore Wind Scenario

Technology	England	Scotland	Wales	Northern Ireland	Total MW	Total TWh	% RO Target
Onshore wind	844	6 279	484	151	7758	19.03	53.3
Offshore wind	1346	816	220	90	2472	8.01	22.4
Landfill gas	649	48	32	6	736	5.48	15.3
Biomass	358	80	14	1	452	2.57	7.2
Small hydro	11	103	20	2	135	0.53	1.5

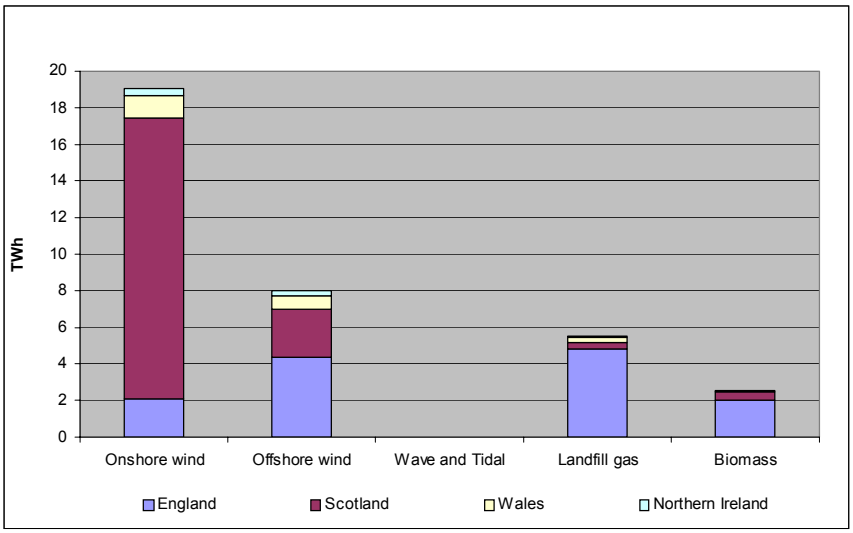
Under this scenario, the rest of the UK accounts for 19% of onshore wind capacity by 2010. One of the reasons for this low penetration is the limited number of good sites available in the rest of the UK compared to Scotland.

In contrast to wind, most biomass development is expected to occur in England, with 80% of the total commissioned in this scenario. As already mentioned, biomass development is currently limited, therefore it is assumed that just an average of 20 MW a year of new biomass capacity is commissioned by 2010.

In terms of the specific location of scenario driven projects, the capacity mapping exercise provides information on where renewable development is currently taken place. Longer term business plans and real projects included in Step Three provide insights on where new developments may take place. Based on this information and an analysis of the resource potential in different areas, the extra capacity required to meet the 2010 target, as summarised in Table 3-1, is located in specific areas of Scotland and the rest of the UK. Also, depending on the size of the expected development, scenario driven projects are connected to either the transmission or distribution networks. The results of this exercise are included in Appendix D.

Figure 3-1 shows that onshore wind contribution will be around 53% of the total RO target. This situation highlights the importance of onshore wind to meet the target and the implications in case this technology does not perform as expected.

Figure 3-1: 2010 Generation based on Real Projects and the High Onshore Scenario



3.3.2 High English Offshore

As an alternative to the scenario discussed above, the 2010 target could also be met by a significant increase in offshore wind development. Due to the shallower waters and the closer proximity to markets England and Wales is considered better placed to take offshore wind. This is reflected by the current DTI/Crown Estates efforts, which has focused largely on England and Wales.

Although this scenario focuses on offshore wind mainly in England and Wales, Scottish onshore wind retains a strong position in any scenario for 2010. This situation is influenced by the current state of onshore wind development north of the border. Also, offshore wind is unlikely to make a very large

impact by 2010 because some financing and technology performance issues remain to be resolved. The assumptions regarding other technologies remain the same as in the High Onshore Scenario.

Table 3-3 shows the scenario-driven capacity additions made under this scenario.

Table 3-3: Capacity Additions to Real Projects for the High offshore England Scenario

Technology	England	Scotland	Wales	Northern Ireland	Total (MW)	Total (TWh)
Onshore wind	77.8	-50	36.9	79.4	144.1	0.3
Offshore wind	1784	600	0	90	2474	8.0
Landfill gas	0	0	0	0	0	0.00
Biomass	210	10	14	0	234	1.3
Small hydro	4.5	80.6	8.1	0	93.2	0.3
TOTAL	2 076	640	59	169	2 945	9.9

In terms of the specific location of scenario driven projects, as with the High Onshore Scenario, projects have been located by looking at trends for existing development, at longer term business plans and real projects included in Step Three. The results of this exercise are included in Appendix D.

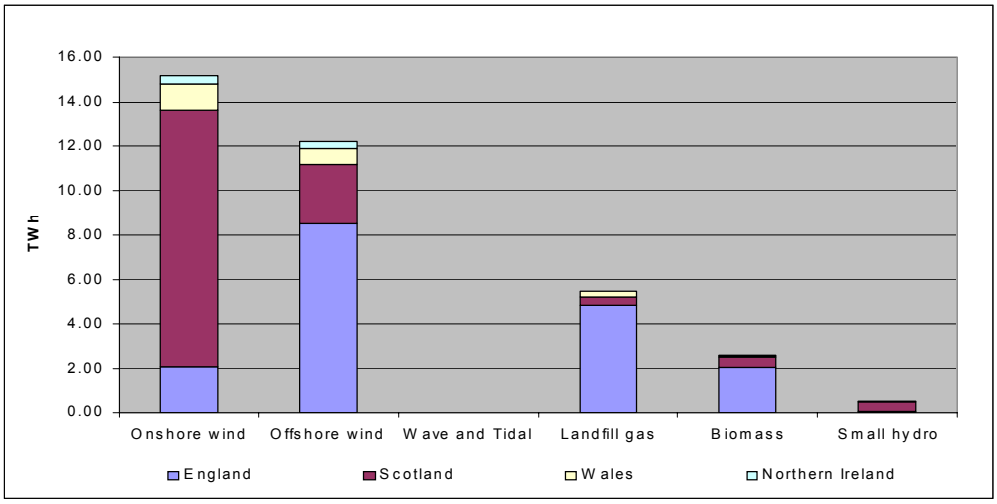
Table 3-4 and Figure 3-2 indicate the capacity and generation respectively required to meet the 2010 RO target given by combining the real projects from the capacity mapping exercise with the 2010 High English Offshore Scenario.

Figure 3-2 shows that 34% of generation is covered by offshore wind, whilst onshore wind still keeps a strong position with 42% of total renewable generation.

Table 3-4: 2010 Capacity based on Real Projects and the High England Offshore Wind Scenario

Technology	England	Scotland	Wales	Northern Ireland	Total MW	Total TWh	% RO Target
Onshore wind	844	4 701	484	151	6 180	15.2	42.2
Offshore wind	2 634	816	220	90	3 759	12.2	33.9
Landfill gas	649	48	32	6	736	5.5	15.2
Biomass	358	80	14	1	452	2.6	7.2
Small hydro	11	103	20	2	135	0.5	1.5

Figure 3-2: Generation by Region and Technology in High Offshore Scenario in 2010



3.3.3 Sensitivities

Any change in overall UK energy demand has a knock-on effect on the 2010 RO target as a percentage of licensed sales. For this reason we have analysed a sensitivity related to demand: a low case where the RO target is reduced from 35.7 TWh to 32 TWh.

This drop in demand is combined with the High Onshore Scottish Scenario to create a Low Demand High Onshore Scenario. The decrease in generation is assumed to come from offshore wind and biomass, as these technologies face the greatest uncertainties. It is also assumed that a greater reduction is obtained in Scotland than in the rest of the UK. This results in the following reductions:

- 600 MW less of offshore wind than in the High Scottish Onshore Scenario
- 110 MW less biomass than in the High Scottish Onshore Scenario
- 232.4 MW less of onshore wind in Scotland than in the High Scottish Onshore Scenario.

The total capacity (real and scenario projects) required to meet the reduced 2010 target is summarised in Table 3-5.

Table 3-5: 2010 Capacity based on Real projects and the Low Demand High Scottish Onshore Scenario

Technology	England	Scotland	Wales	Northern Ireland	Total MW	Total TWh	% RO Target
Onshore wind	844	6 046	484	151	7 525	18.46	56.8%
Offshore wind	1 346	216	220	90	1 872	6.07	18.7%
Landfill gas	649	48	32	6	736	5.48	16.9%
Biomass	278	50	14	1	343	1.95	6.0%
Small hydro	11	103	20	2	135	0.53	1.6%

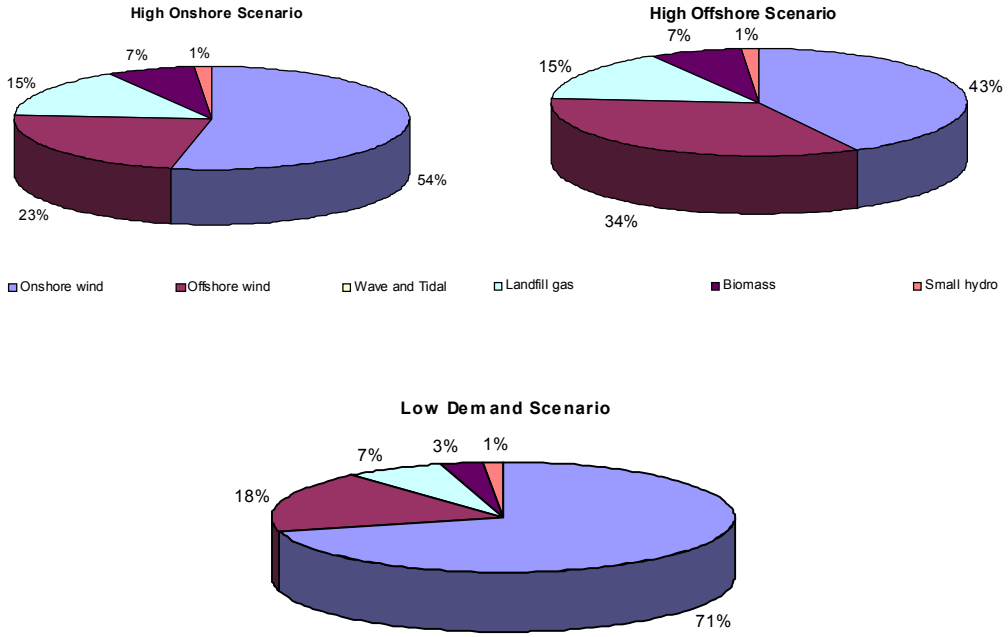
3.4 Summary of the 2010 Scenarios

Figure 3-3 shows how the RO target is met in all three scenarios: High Scottish Onshore Wind, High English Offshore Wind, and High Scottish Onshore Wind with Low Demand.

In all the scenarios approximately 75% to 77% of generation is met by wind. Even in the High Offshore Scenario, onshore wind provides a higher contribution. This is because of the amount of real onshore projects under development or planned. Offshore wind increases from 23% in the High Scottish Onshore Scenario to 34% in the High English Offshore Scenario, but is reduced to 18.7% in order to meet the lower RO target which results from the Energy White Paper. The High Offshore Scenario has an 11% lower contribution from onshore wind.

Biomass is expected to make a minor contribution to the target in 2010 for all scenarios, due to uncertainties regarding technology and fuels.

Figure 3-3: Generation Split by Technology for the 2010 Scenarios



4 2020 Renewable Obligation Compliance Scenarios

The structure of this section is the same as that for the 2010 scenarios and it covers the following:

- RO forecast
- General market context
- RO compliance scenarios

4.1 The Aspirational Renewable Obligation Target for 2020

The Renewable Obligation target for 2020 is assumed to be set at 20% of licensed suppliers' sales in the UK, which is consistent with the 20% aspiration target mentioned in the Government's Energy White Paper. The question then becomes, what is the appropriate level of sales for 2020?

Most plausible scenarios of demand development beyond 2010 will show underlying electricity demand either falling or stabilising. This reflects probable government initiatives to increase energy efficiency across end-user sectors, technological advances and saturation in some key underlying demand components (lighting, refrigeration and other white goods). The net effect of such developments is that energy demand growth will decouple from economic growth.

This study considers three demand scenarios:

- A base demand scenario with licensed electricity sales stabilising at the level reached in the 2010 base scenario, ie 343.7 TWh, giving an RO target of 68.7 TWh.
- A low demand scenario with licensed sales reducing at the rate assumed in the 2010 low scenario (0.5% pa) such that demand returns to 1995/96 level, ie 292 TWh. This scenario is broadly consistent with the Energy White Paper and gives an RO target of 58.4 TWh.
- A high demand scenario that assumes the same growth rate (0.9% pa) as in the 2010 base scenario. This gives a 2020 sales figure of 375.8 TWh and a RO target of 75.2 TWh. This scenario represents a near business as usual scenario, which must be considered unlikely in the context of the Government's Energy White Paper aspirations. However, this scenario has been included to reflect the view of many industry experts who believe that electricity demand growth will not be stabilised or even reversed, given consumers appetite for new and multiple appliances (air-conditioning, always on PCs and brown goods) and their reluctance to adopt more frugal behaviour. It also presents a more challenging situation for the electricity networks in terms of accommodating sufficient renewable capacity.

4.2 The Generation Market Context

4.2.1 Key Assumptions

Scenarios of renewable generation development are undertaken within a wider context of the generation market. The key assumptions have been consulted with the Carbon Trust, the DTI and the project's Advisory Group and are summarised as follows:

- The generation market in 2020 will undoubtedly reflect increased constraints on carbon generating activities when compared to 2010 and so our Base Case scenario adopts a carbon price of €15/tCO_2e versus €10/tCO_2e.
- The generation market will be a dominated by gas, with a moderate contribution from renewables and very small contributions from coal – used mainly for reserve and back-up – and nuclear. This clearly entails a large addition of CCGTs as well as a considerable OCGT and renewables build, even taking account of the reduction in overall generation arising from the decline in electricity sales. It also presupposes that the government is comfortable with such a high reliance on gas, most of which will be imported by that time.
- All the existing nuclear stations with the exception of Sizewell B are expected to close by 2020. This will remove a further 5 GW of generation compared with 2010. It is also likely that around 10 GW of coal fired plant will be closed leaving 8-10 GW of FGD fitted plant in 2020.
- Power prices are likely to be at around the same level in real terms as in 2010, a level just high enough to encourage new CCGT build.
- Under our base scenario, described below, about 80% of transmission connected generation will be accounted for by gas with 78% from CCGTs, and 2% from OCGTs. Renewables are projected to account for 6.4% of transmission connected generation, and coal 6.1%. Supplies through interconnectors and nuclear generation make up 4.8% and 2.5% respectively.

Looking at alternative scenarios the main swing source in generation mix will be CCGT generation. This will depend on the level of demand on UK Grid and the level of CCGT build. It is also possible that nuclear generation could be much higher, due to plant being kept on longer and/or new plant being brought on. Our high demand case includes higher nuclear generation than the base case. Changes in the relative prices of coal and gas may also have an impact on the generation mix, although the high carbon penalties for coal versus gas, means that coal has to substantially undercut gas to displace it. It is possible that IGCC plant combined with carbon separation and storage would allow coal to compete with CCGT on variable cost terms, however the capital costs are likely to be so high that we have excluded this option.

The main assumptions for the base scenario and the alternative scenarios for 2020 are detailed in Appendix C.

4.2.2 CHP Assumptions

It would seem reasonable to assume that there will be continuing government support for an expansion in CHP capacity that will allow the 10 GW target to be achieved some time after 2010. This is likely to comprise a mix of large scale transmission connected projects based on CCGTs, smaller scale embedded plant and micro CHP installed at end-user sites. Very different mixes are possible, although it is likely that much of the expansion beyond 2010 will comprise distributed generation. The main constraint on large scale CHP developments is the lack of heat loads. There is a small chance that large scale development could be combined with novel energy crops in integrated biogas CHP plants.

The study's central assumption is that an extra 2.6 GW of CHP capacity is added beyond that projected for 2010. This 2.6 GW will be split into 1.3 GW of distributed generation, 0.7 GW of embedded generation, and 0.6 GW of transmission connected generation.

4.2.3 Energy from Waste Assumptions

Waste to Energy is not RO eligible, nevertheless it needs to be considered to evaluate potential implications for the networks.

As discussed in Section 3, it is likely that more projects will be added by 2015. We have assumed that 20 MW of capacity comes on line every year between 2004 and 2015, which takes total waste to energy capacity to 721 MW by 2015. After this point we have assumed that separate targets and legislation for waste minimisation and recycling result in no new waste to energy plants being built.

4.3 2020 Compliance Scenarios

Three scenarios have been developed for 2020. These are based on the 2010 High Scottish Onshore scenario with three different levels of demand for 2020:

- a Base Case Scenario which assumes 0% demand growth rate between 2010 and 2020 and giving a RO target of 68.7 TWh
- a Low Demand Scenario in which energy returns to 1995/06 levels of 292 TWh, which would give a RO target of 58.4 TWh (about 10 TWh less)
- a High Demand Scenario in which demand increases at 0.9% p.a. from 2010 to 2020 to give an RO target of 75.2 TWh.

The following assumptions about renewable power developments have been made:

- Biomass: Energy crops become economically feasible in accordance with the Energy White Paper.
- Wave and tidal: These technologies move to commercial viability, however deployment is still comparatively small compared to wind power. This concurs with the Energy White Paper.
- Offshore wind: Determined efforts are made in meeting DTI proposals. Scottish development presents more obstacles due to a shortage of suitable shallow water sites around the Scottish coast.
- Onshore wind : Good sites are almost exhausted from prior development to reach the 2010 target.
- Landfill: Capacity decreases as resources are depleted and no new sites are developed in line with waste management policies.

4.3.1 Base Demand Scenario

The Base Case Scenario provides a 68.7 TWh RO target. To comply with this target a capacity of 19.8 GW of installed renewable power has been assumed. This is broken down as follows:

- 8.2 GW of offshore wind, of which 82% is installed in England & Wales.
- 9.2 GW of onshore wind of which 75% is installed in Scotland.
- Biomass increases from 2010 levels as energy crops become commercially viable, with 1.9 GW of biomass, up from 452 MW in 2010. This assumes that an average of six 20MW projects are constructed per year.

- Wave and tidal energy start penetrating the market after 2010. The UK has probably one of the best marine resources and we have assumed 1.4 GW of wave and tidal capacity coming on line by 2020, as the main designs prove themselves during the last few years of this decade and become commercially viable from 2010-2015 onwards.
- Landfill decreases due to depletion of existing sources, leaving a total capacity of 359MW (and concerted moves to end landfilling in the UK).

The capacity additions assumed by the 2020 Base Case Scenario are shown in Table 4-1.

Table 4-1: 2020 Base Case Capacity Additions Compared with 2010 High Onshore Scenario

Technology	England	Scotland	Wales	N. Ireland	Total MW	Total TWh
Onshore wind	405	657	304	95	1462	3.5
Offshore wind	4746	513	351	71	5681	18.4
Wave and Tidal	455	325	600	46	1426	5.62
Landfill gas	-325	-29	-19	-4	-377	-2.80
Biomass	1361	38	22	0	1422	8.10
Small hydro	3	45	1	0	48	0.19
TOTAL					**9 662**	**33.0**

The rate of new onshore wind capacity additions decreases with just 1.46 GW of new generation compared to the High Onshore Scenario for 2010. This is due to most of the best sites having been already taken up by 2010. From 2020 onwards most new onshore developments can be expected to be a combination of replanting existing sites with larger units, and small-scale developments in a few new locations.

Offshore wind is assumed to be driven by opening new license areas and proving-up of technology. It therefore expands at a relatively high rate in the next decade, with about 5.7 GW of new additions and a total installed capacity of 8.5 GW. This compares with 3.8 GW assumed in the High Offshore Scenario for 2010.

Figure 4-1 and Figure 4-2 show the total capacity and generation respectively for the 2020 Base Case Scenario.

Figure 4-1: Total Capacity for the 2020 Base Case Scenario

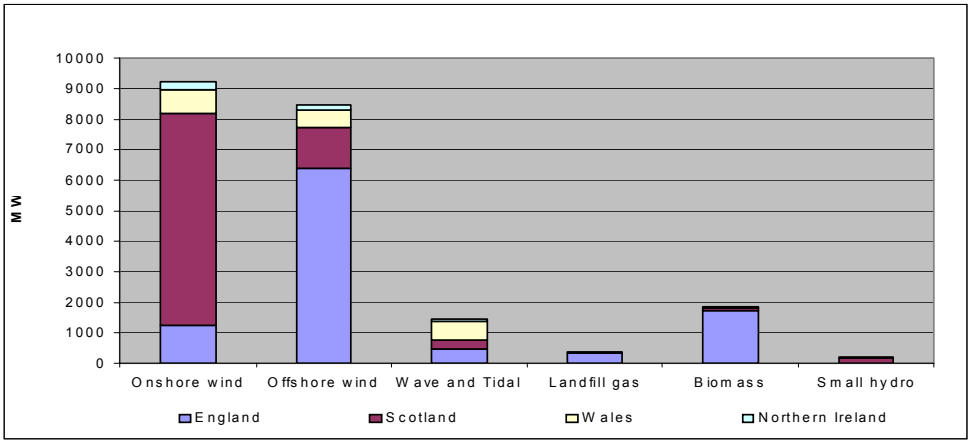
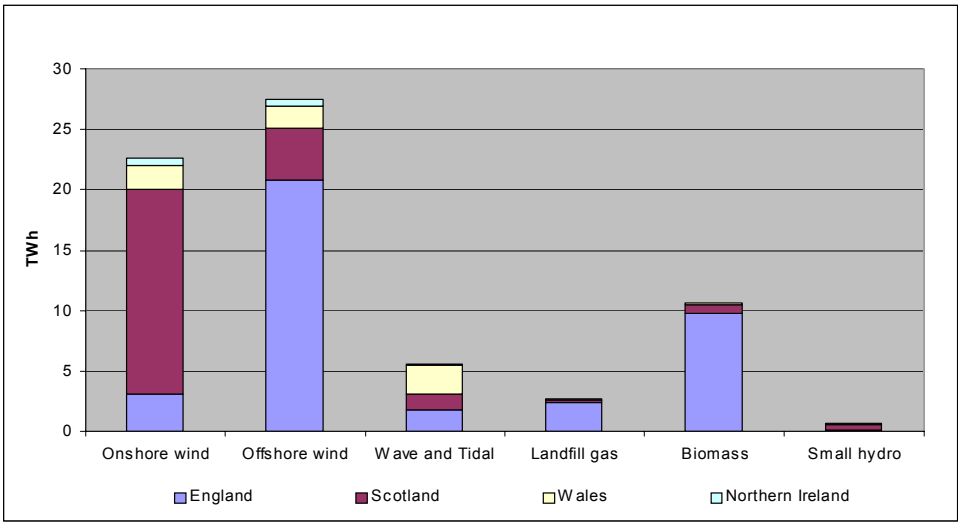


Figure 4-2: Generation for Base Scenario in 2020



4.3.2 Low Demand Scenario

This scenario assumes a return to 1995 demand levels, giving a RO target of 58.4 TWh, compared to 68.7 TWh from the Base scenario.

This target is assumed to be met by a mix of renewable capacity totalling 18.4 GW, which is 1.5 GW less than in the Base Case Scenario. The capacity is met as follows:

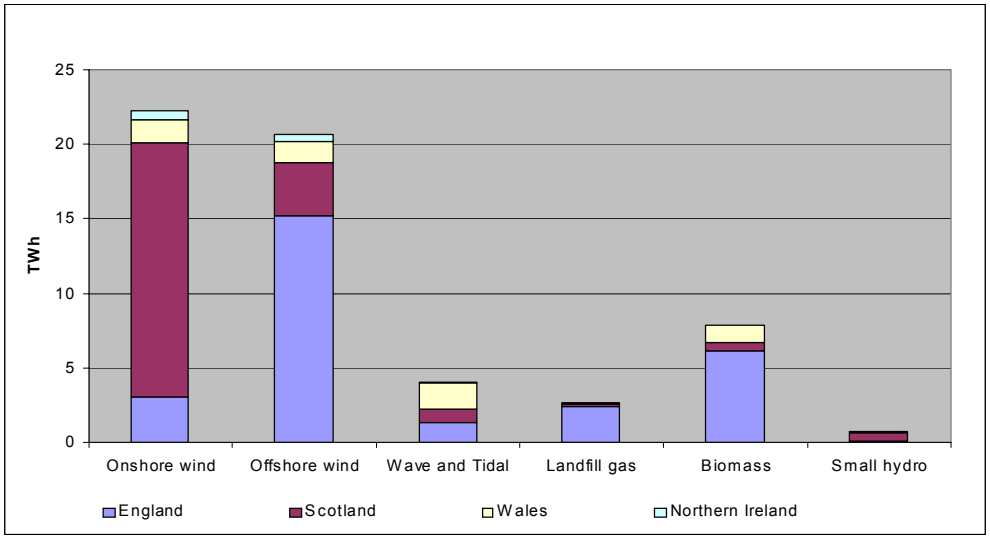
- 1.4 GW of biomass (300 MW less biomass than in the Base Case Scenario)
- 6.4 GW offshore wind capacity (a reduction of 2.1 GW from the Base Case Scenario)
- 1.04 GW of wave & tidal (a reduction of 386 MW from the Base Case Scenario)
- 9.1 GW of onshore wind (137 MW less than in the Base Case Scenario).

The total capacity split is shown in Table 4-2 and the corresponding generation in Figure 4-3.

Table 4-2: MW Capacity Split by Country and Technology for 2020 Low Demand Scenario

Technology	England	Scotland	Wales	Northern Ireland	Total MW	Total TWh	% of RO Target
Onshore wind	1249	6936	650	247	9082	22.3	38.2%
Offshore wind	4691	1097	433	161	6382	20.7	35.4%
Wave and Tidal	345	225	450	20	1040	4.1	7.0%
Landfill gas	325	19	13	3	359	2.7	4.6%
Biomass	1249	100	36	1	1386	7.9	13.5%
Small hydro	13	147	21	2	184	0.7	1.2%
TOTAL					**18 433**	**58.4**	**100%**

Figure 4-3: Generation for the 2020 Low Demand Scenario



4.3.3 High Demand Scenario

Our High Demand Scenario assumes demand increases at the same rate of growth as seen in the 2010 base scenario (0.9% pa) to give a 2020 sales figure of 375.8 TWh, with the aspirational RO target reaching 75.2 TWh.

This scenario requires 6.5 TWh of extra generation compared to the 2020 Base Case Scenario. In the 2020 Base Case Scenario it was assumed that most of the best onshore sites for wind have already been taken. This means that the additional 6.5 TWh for this scenario have to come mainly from offshore technologies or biomass.

The total capacity required to meet the 2020 aspirational targets based on the High Demand Scenario is summarised in Table 4-3.

Table 4-3: Total Capacity in the 2020 High Demand Scenario

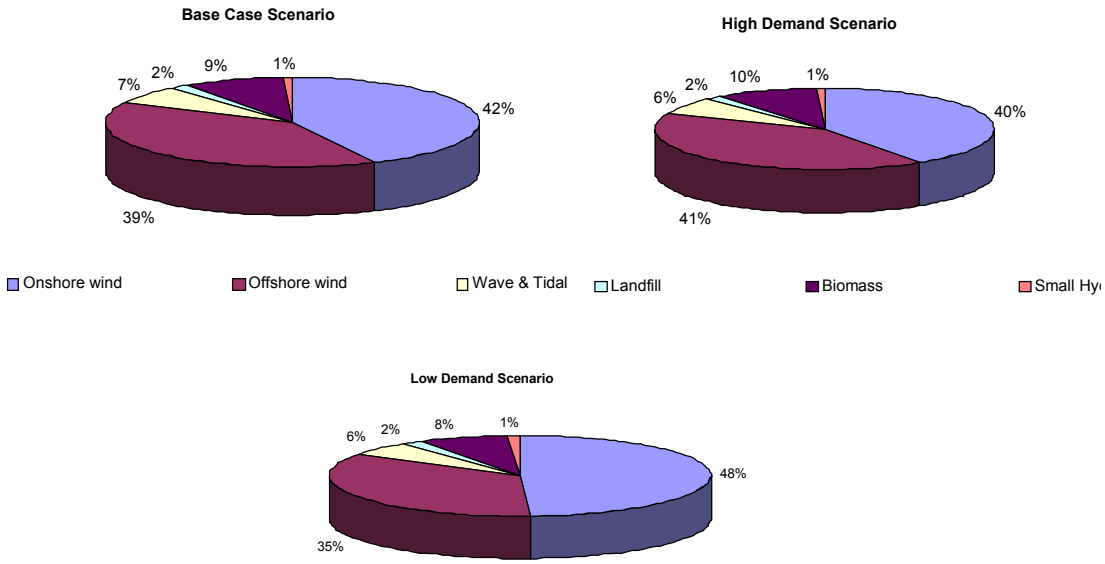
Technology	England	Scotland	Wales	Northern Ireland	Total MW	Total TWh	% of RO Target
Onshore wind	1375	6936	788	247	9345	22.9	30.5%
Offshore wind	6637	1651	753	251	9292	30.1	40.0%
Wave and Tidal	483	350	600	46	1479	5.8	7.7%
Landfill gas	325	19	13	3	359	2.7	3.6%
Biomass	2089	130	56	1	2276	13.0	17.2%
Small hydro	13	147	21	2	184	0.7	1.0%
TOTAL					**22 934**	**75.2**	**100%**

This scenario accounts for 1.5 GW of extra offshore wind and 416 MW of extra wave & tidal in England from the Base Demand scenario.

4.4 Summary of 2020 Scenarios

Figure 4-4 illustrates the different renewable technology mixes for each of the three 2020 scenarios. This figure indicates the continuing reliance on wind power to meet renewable power goals.

Figure 4-4: Generation Split by Technology for the 2020 Scenarios



5 Uncertainties

This section briefly summarises some of the uncertainties that can prevent or delay the implementation of a renewable power project. These gave arisen as a result of discussions held with developers and other industry participants. Any more detail in this area is beyond the scope of this work, although other studies exist that analyse this issue in more depth [1]:

- Finance/ future value of Renewable Obligation Certificates (ROCs)
- Planning permissions
- Insurance
- Grid connection requirements and connection costs
- Technology (which can affect the ability to gain finance and/or insurance)

5.1 Finance and Future Value of the ROCs

Discussions with project developers have raised the following comments:

- The ability to raise finance is greatly affected by the perceived risk(s) of each individual project and/or developer.
- Smaller developers find it harder to raise funds for their projects, and are potentially more susceptible to ROC price uncertainties than larger developers who often have their own supply arm (i.e. SP or SSE). The recent Government decision to increase the Renewables Obligation to 15% by 2015 greatly assists with the removal of ROC uncertainties.
- Big players such Shell, National Wind Power and Amec are more able to use their own internal funds and to secure project debt.
- One solution for smaller players is to join together to create portfolios of renewables projects to demonstrate a track record and improve their chances of obtaining finance.
- Another solution is joint venturing with major established developers.
- Securing a PPA for the plant's output at an early stage in the development can also assist with gaining finance, although difficulties in negotiating PPAs should now decrease given the new RO target for 2015.

5.2 Planning

The results of the study's capacity mapping exercise indicates that securing planning permits is typically the first major hurdle a developer encounters. This can be a lengthy process - up to two years in England and Wales, but much short in Scotland: one reason why many wind developers are currently concentrating on Scotland. The revised PPG22 aims to streamline the procedures while the setting up regional targets in England and Wales will provide an additional incentive for local

A.1.1 [1] There are other studies that have analysed these areas of uncertainty in more depth.. These include, amongst others, the L.E.K Study on Finance and Investment commissioned by the Renewables Advisory Board and published in September 2003.

authorities to support applications. In the end, wider social and political awareness of the benefits of renewable energies is needed if widescale deployment of renewables is going to be achieved.

5.3 Insurance

Given the lack of track record for some technologies, such as offshore wind, insurers are reluctant to provide suitable cover for developers. This exacerbates the challenge of raising finance.

5.4 Grid Connection

Securing grid connection and grid code compliance can be complicated and costly process for developers, especially for wind power projects, sited on sparse networks.

5.5 Technology Development

With the exception of onshore wind and landfill, lenders and insurers consider that most renewable technologies are unproven technology. This certainly applies to offshore wind and biomass. The former being a significant contributor to the 2010 target.

For 2020, the scenarios assume that offshore wind and later wave and tidal power develop in line with the Energy White Paper timelines. However, the effect of any underdevelopment in offshore technologies will clearly have an impact and meeting the 2020 aspirational target will depend far more on onshore technologies.

5.6 Conclusion

Mott MacDonald's expectation is that achieving around 70% of the target is possible by 2010, but given the current business environment for developers this may be an optimistic view. If the issues outlined above are not addressed a more realistic renewable contribution may be 55-60% of the 2010 target.

Appendix A Listing of Real Projects

Existing Windfarms			
Wind Farm	**Location**	**(MW)**	**Operator**
KS Winscales	Cumbria	1.98	Cumbria Windfarms
Great Orton II	Cumbria	3.96	Cumbria Windfarms
Oldside	Cumbria	5.36	Wind Prospect
Siddick	Cumbria	4.17	Wind Prospect
Blyth Harbour	Northumberland	2.70	AMEC Wind
Kirkheaton	Northumberland	1.80	AMEC Wind
Blyth Offshore	Northumberland	3.80	Blyth Offshore Wind Ltd
High Hedley Hope	County Durham	2.25	London Power Company (Northern)
Great Eppleton	Sunderland	3.00	AMEC Wind
Deucheran Hill	Kintyre	15.00	B9 Energy
Forss	Caithness	2.32	RES
Novar	Highlands	17.00	National Wind Power
Beinn Ghlas	Tayside	8.40	National Wind Power
Burra Dale II	Shetland	1.70	Shetland Aerogenerators
Burra Dale	Shetland	1.98	Shetland Aerogenerators Ltd
Tangy	Argyll & Bute	12.75	Scottish & Southern
Beinn an Tuirc	Argyll & Bute	30.00	B9 Energy
Thorfinn, Burgar Hill	Orkney	1.50	NEG Micon UK
Sigurd, Burgar Hill	Orkney	1.30	Hainsford Energy Ltd
Thorfinn, Burgar Hill	Orkney	2.75	NEG Micon UK
Bu Farm	Orkney	2.70	TXU Europe
Trysglwyn	Anglesey	5.60	National Wind Power
Llyn Alaw	Anglesey	20.40	National Wind Power
Rhyd-y-Groes	Anglesey	7.20	Powergen Renewables
Moel Maelogen	Conwy	3.60	Cwmni Gwynt Teg Cyf / EnergieKontor
Mablethorpe	Lincolnshire	1.20	Ecotricity
Lowca	Cumbria	4.62	Wind Prospect
Lambrigg	Cumbria	6.50	National Wind Power
Askam	Cumbria	4.62	Wind Prospect
Haverigg II	Cumbria	2.40	Agrilec Ltd
Harlock Hill	Cumbria	2.50	Baywind Fund
Kirkby Moor	Cumbria	4.80	National Wind Power
Haverigg 1	Cumbria	1.13	Cumbria Windfarms
Lendrum's Bridge	County Tyrone	5.94	B9 Energy
Owenreagh	County Tyrone	5.00	GE Wind Energy
Lendrum's Bridge II	County Tyrone	7.26	B9 Energy
Bessy Bell	County Tyrone	5.00	B9 Energy
Corkey	County Antrim	5.00	B9 Energy
Elliot's Hill	County Antrim	5.00	B9 Energy
Slievenahanghan	County Antrim	1.00	B9 Energy
Slieve Rushen	County Fermanagh	5.00	B9 Energy
Myres Hill	Galloway	1.80	NEG Micon UK
Altahullion	Londonderry	26.00	B9 Energy
Rigged Hill	Londonderry	5.00	B9 Energy
St Breock	Cornwall	4.95	Powergen Renewables
Bears Down	Cornwall	9.60	National Wind Power
Four Burrows	Cornwall	4.50	Renewable Energy Systems
Goonhilly Downs	Cornwall	5.60	Cornwall Light & Power
Cold Northcott	Cornwall	6.80	Cumbria Windfarms
Carland Cross	Cornwall	6.00	Renewable Energy Systems
Delabole	Cornwall	4.00	Windelectric
Somerton	Norfolk	1.50	Ecotricity
Blood Hill	Norfolk	2.25	Powergen Renewables
Hagshaw Hill	Lanarkshire	15.60	ScottishPower
Hare Hill	Ayrshire	13.00	ScottishPower
Windy Standard	Galloway	21.60	National Wind Power
Dun Law	Borders	17.16	ScottishPower
Bowbeat	Borders	31.20	Powergen Renewables
Rheidol	Ceredigion	2.40	Renewable Energy Systems
Mynydd Gorddu	Ceredigion	10.20	National Wind Power

Existing Windfarms

Wind Farm	Location	(MW)	Operator
Haffoty Ucha	Clwyd	0.60	Tegni Windpower
Haffoty Ucha II	Clwyd	1.70	Tengi
P & L	Powys	30.90	ScottishPower
Centre for Alternative Technology	Powys	0.60	CAT
Carno	Powys	33.60	National Wind Power
Cemmaes II	Powys	15.30	Cumbria Windfarms Ltd
Bryn Titli	Powys	9.90	National Wind Power
Llangwyryfon	Dyfed	6.00	Cumbria Windfarms
Dyffryn Brodyn	Dyfed	5.50	Renewable Energy Systems
Blaen Bowi	Carmarthenshire	3.90	Windjen Power Ltd
Parc Cynog	Carmarthenshire	3.60	Ecowind
Caton Moor	Lancashire	3.00	AMEC Wind
Coal Clough	Lancashire	9.60	Renewable Energy Systems
Royd Moor	South Yorkshire	5.85	Powergen Renewables
Chelker Reservoir	Yorkshire	1.20	Yorkshire Water Services
Ovenden Moor	Yorkshire	9.20	Yorkshire Windpower
Out Newton	Yorkshire	9.00	Powergen Renewables
Royal Seaforth Dock	Merseyside	3.60	Mersey Dock & Harbour Co
Lynch Knoll	Gloucestershire	0.50	Ecotricity

Wind Farms Under Construction or Definite

Wind Farm	Capacity	Location	
RES Office, St Albans	0.225	Hertfordshire	
Wharrels Hill, Bothel	10.4	Cumbria	
Haverigg I - repowering	3.4	Cumbria	
High Sharpley, Seaton	2.6	Durham	
Holmside Hall, Stanley	3.75	Durham	
Hare Hill, Haswell Plough	4	Durham	
High Volts, nr Elwick	6	Hartlepool	
Forss, Hill of Lybster	**2.32**	**Caithness**	**Recently completed**
Arnish Moor, Stornoway Trust Estate	2.7	Lewis	
Cruach Mhor, Kyles of Bute	50	Argyll & Bute	
Glens of Foundland	27.3	Aberdeenshire	
Craig Wind Farm	3	Scotland	
Boulruich, by Dunbeath	9	Caithness	
WWB Burgar Hill, Evie	5	Orkney	
Moel Maelogen, nr Llanrws	**3.6**	**Conwy**	**Recently completed**
Llangwyryfon - repowering	9.3	Dyfed	
Altahullion, Roe Valley	**22**	**Ireland**	**Recently completed**
Ness Point, Lowestoft	3.2	Suffolk	
Stags Holt, north of March	15.75	e	
Black Hill, Longformarcus	28.6	Borders	
North Hoyle Offshore, off Prestatyn	60	Clwyd	
Cefn Croes, Devils Bridge, Aberystwyth	58.5	Ceredigion	
Mynydd Clogau, nr Newton	11.22	Powys	

Rung One: Onshore Wind Power Projects with or near to gaining Planning Permission

Wind Farm	Capacity (MW)	Location	Developer
An Suidhe	30	Eredine Forest, Argyll & Bute	Powergen Renewables
Ardkinglass	15.75	Cairndow, Argyll and Bute	AMEC Wind Energy
Paul's Hill	56	Elgin, Moray	Fred Olsen Renewables
Cairn Uish/ Rothes	56	Elgin, Moray	Fred Olsen Renewables
Adrossan	25	Busbie Muir, Ayrshire	Airtricity
Edinbane	49	Skye	AMEC Wind Energy
Causey Mire	48	Caithness, Highlands	National Wind Power
Crystal Rig	49	Borders	Natural Power
Crystal Rig - Extension	13.5	Borders	Natural Power
Minch Moore	28	Borders	Amec
Paul's Hill - extension	21	Moray	Natural Power
Cairn Uish/ Rothes -Extension	21	Moray	Natural Power
Drumderg	30	Perthshire	
Artfield Fell	20	Dumfries & Galloway	
St Breock *repowering*	10.4	Cornwall	Powergen Renewables
Stag's Holt	14	Cambridgeshire	Windprospect/ Powergen
High Volts	6	Potters Farm, Elwick, Hartlepool	Powergen Renewables
Hare Hill	5.4	Haswell Plough, County Durham	Powergen Renewables
Holmside Hall	5.4	Stanley, County Durham	Powergen Renewables

Rung Two: Onshore Wind Projects

Wind Farm	Capacity (MW)	Location	Country	Developer
Kilpatrick Hills	61.5	Glasgow	Scotland	Airtricity
Baillie Windfarm	66.0	Highlands Region	Scotland	Dudley Developments
Millenium	68.0	Highlands Region	Scotland	West Coast Energy
Farr	70.0	Highlands Region	Scotland	Natural Power
Little Cheyne Court	75.0	Romney Marsh	England	Innogy
Bracco windfarm	75.0	N. Lanarkshire	Scotland	Airtricity
Strath Brora	90.0	Highlands Region	Scotland	West Coast Energy
Dunmaglass	100.0	Highlands Region	Scotland	RES
Gordonbush	100.0	Highlands Region	Scotland	SSE
Betty Hill	100.0	Sutherland	Scotland	North British Windpower
Braes o Doune	100.0	Stirling	Scotland	Airtricity
Corby Shank	102.0	Dumfries & Galloway	Scotland	GE
Lochelbank	108.0	Perth & Kinross	Scotland	National Wind Power
Clashindarroch	129.0	Aberdeenshire	Scotland	Amec
Hadyard Hill	130.0	Ayrshire	Scotland	SSE
Black Law	134.0	S. Lanarkshire	Scotland	ScottishPower
Carn Kitty	160.0	Moray	Scotland	Force 9 Energy
Eaglesham Moor	240.0	Eaglesham	Scotland	Scottish Power
Pairc	250.0	UK	SSE	
Whitelees	332.0	S. Lanarkshire	Scotland	ScottishPower
Crawford	550.0	Crawford	Scotland	Airtricity
Benn Aketil	21.0	Dunvegan, Skye(?)	Scotland	RDC
Finlarig	20.0	Tayside	Scotland	SSE
Bumley	12.0		England	United Utilities
Tees Wind North	45.0	nr Redcar, Teesside	England	AMEC Wind/Corus
Community scheme	0.9	Orkney	Scotland	Orkney Renewable Energy Ltd
Orkney	10.0	Orkney	Scotland	Your Energy
Isle of Flodda	2.0	Orkney	Scotland	Scot Renewables
Aultmore	56.0	Moray	Scotland	Amec
Mid Hill	45.0	Aberdeenshire	Scotland	Natural Power
Stoney Hill	39.0	Peterhead, Aberdeenshire	Scotland	Ron Shanks
Argyle	20.0	Argyleshire	Scotland	Atlantic
Beinn Tharsuinn	29.0	Highlands Region	Scotland	ScottishPower
Dounreay	18.0	Caithness	Scotland	ScottishPower
Inverleiver	29.0	North Argyll	Scotland	ScottishPower
Spurness Windfarm	8.0	Sanday, Orkney	Scotland	Spurness Wind Energy Ltd
Careston Estate	51.0	Highlands Region	Scotland	RES
Tir Mostyn and Foel Goch	21.3	Nantglyn, Denbigh	Wales	Windjen Power Ltd
Gwynedd	20.0		Wales	Anglesey Wind and Energy
Bretherdale	60.0	Whinesh	England	RDC
Bicker	24.0	Lincolnshire	England	Windprospect
Laughton	22.0	Lincolnshire	England	Your Energy
St Breock	10.0	Cornwall	England	Powergen
Swingdon	0.8	Devon	England	Farm Energy
March	2.0	Fenlands, Cambridgeshire	England	Private company
Co-op Coldham	15.8	March, Cambridgeshire	England	West Coast Energy
South Beach	7.2	Great Yarmouth, Norfolk	England	Ecotricity
EcoTech extension	1.5	Swaffham, Norfolk	England	Ecotricity
Gedney March	10.5		England	Windprospect
Glassmore	14.0	Cambridgeshire	England	Windprospect/ Powergen
Kettering	20.0	Northamptonshire	England	Your Energy
Cheverton Down	1.8	Bristone, Isle of Wight	England	National Wind Power
Ardeer	35.0	Irvine, Ayrshire	Scotland	ScottishPower
Ladyland	25.0	Ayrshire	Scotland	Anglesey Wind and Energy
Greenock	59.0	Inverclyde	Scotland	Airtricity
Hunterston	30.0	Ayrshire	Scotland	ScottishPower
Windy Standard - Extension	60.0	Dumfries & Galloway	Scotland	Natural Power
Haggy Hill	22.5	Dumfries & Galloway	Scotland	Angold
Minsca	40.0	Dumfries & Galloway	Scotland	Airtricity

Ffynnon Oer	21.0	Neath & Port Talbot	Wales	National Wind Power
Steyton	0.6	Milford Haven Way, Pembrokeshire	Wales	Private individual
Blaen Corrwg	20.0	Port Talbot	Wales	Ecogen/ Border Wind
Ffynnon Oer	30.0	Resolven	Wales	Innogy
Tir Mostyn	21.5		Wales	Windjen
WWG Cricket St Thomas	3.9	Chard, Somerset	England	National Wind Power
Ovenden Moor	40.0	Yorkshire	England	EPR/ Powergen
Royd Moor	40.0	Yorkshire	England	EPR/ Powergen
Various	60.0		UK	Confidential
Various	60.0		UK	Confidential
Various	60.0		UK	Confidential
Various	30.0		UK	Confidential
Various	300.0		UK	Confidential

Rung Three: Onshore Wind Projects

Wind Farm	Capacity (MW)	Location	Country	Developer
Various	100	Various	England	Confidential
Harestanes, Moffat	200	Dumfries & Galloway	Scotland	ScottishPower
Various	250	Various	Scotland	Confidential
Various	296	Various	Scotland	Confidential
Shetland	300	UK	SSE	Confidential
Lewis	600	Lewis	Scotland	British Energy/Amec
Goole Fields	48		England	Innogy
High Deepslack	20.4	Whinfell	England	RDC
Salter's Gate	11.2	Tow Law	England	RDC
Various	50		Scotland	Bizz Energy/ Atlantic
	25		Scotland	Ecogen
Newton	10		Wales	ScottishPower
Ferndale Rhondda	12	Cynon Taff	Wales	United Utilities
Sliabh Beagh	30	Tyrone	N. Ireland	Airtricity
Bessy Bell	11	Tyrone	N. Ireland	Airtricity
Callagheen	22.75		N. Ireland	RES/B9
Carrickuabratogue	18	County Fermanagh	N. Ireland	RES/B9
Garrane	18	County Fermanagh	N. Ireland	RES/B9
Lough Hill	13	County Tyrone	N. Ireland	RES/B9
Tappeghan	19.5	County Fermanagh	N. Ireland	GE/Airtricity
Fen Farm	20	East Anglia	England	Ecotricity
Wether Hill	20	Dumfries & Galloway	Scotland	ScottishPower
Clatto Hill	27	Fife	Scotland	ScottishPower
	50		Wales	Confidential
Wersa	39.5	Bridgend	Wales	Amec
Lower Winterbourne	20	Dorset	England	Your Energy
Shropshire	10	Shropshire	England	Anglesey Wind and Energy

Rung One: Offshore Wind Power Projects with Planning Permission

Wind Farm	Capacity (MW)	Location	Country	Developer
Scroby Sands	76	Offshore, Norfolk	England	Powergen Renewables
Barrow	108	7km off Walney Island, Cumbria	England	Warwick Energy
Kentish Flats	90	8.5 km offshore from Whitstable, Kent	England	GREP UK Marine Ltd
Burbo	90	Crosby	England	Seascape
Rhyl Flats	100	8 kms off Abergele, North Wales	Wales	Innogy (NWP) Offshore Ltd
North Hoyle	60	6km off N. Wales	Wales	Innogy
Robin Rigg	216	8.5 km off Rock Cliffe, Dumfries & Galloway	Scotland	Solway Offshore Ltd

Rung Two: Offhore Wind Projects

Wind Farm	Capacity (MW)	Location	Country	Developer
Scarweather Sands	60	9.5km off Porthcawl	Wales	United Utilities/ E2
Shell Flat	90	7km off Cleveleys	England	Elsam A/S
Shell Flat	60	7km off Cleveleys	England	ScottishPower
Shell Flat	108	7km off Cleveleys	England	Shell
Gunfleet Sands	108	7km offshore	England	GE
Inner Dowsing	60	5.2km off Ingoldmells	England	RES/ British Energy

Rung Three: Offhore Wind Projects

Wind Farm	Capacity (MW)	Location	Country	Developer
Moray Firth	1000		Scotland	SSE/Talisman
Tunes Plateau	150		N. Ireland	Consortium: B9, RES & PowerGen
Lynn	60	5km to 8km off Skegness	England	Amec
Southport	60	Off Birkdale	England	Energie Kontor
Cromer	100	6.5km off Mundsley	England	LPC
Teeside	100	1.5km off N. Yorkshire	England	LPC
Thames Estuary	1000		England	Powergen, with Farm Energy?
Various	100		England	Warwick Energy

Rung One Hydro Projects, Operational

Project	Capacity (MW)	Location	Country	Developer
Back Barrow Hydro Scheme, Cumbria	0.32	Cumbria	England	Low Wood Products Ltd
Swiss Lodore Hotel Hydro Scheme, Cumbria	0.21	Cumbria	England	Hydro Energy Developments Ltd
Loch Poll Hydro Project	0.23	Highlands	Scotland	Assynt Crofter's Trust
Stanley Mills Hydro Development	0.99	Tayside	Scotland	Innogy Hydro
Stoneywood Mill Hydro Scheme	0.62	Grampian	Scotland	Hydro Energy Developments Ltd
Cuileig Hydro Scheme, Highlands	3	Highlands	Scotland	Scottish Hydro-Electric plc
Novar Hydro Scheme, Highlands	0.92	Highlands	Scotland	Novar Estate
Ardtornish Hydro Scheme, Highlands	0.66	Highland (Lochaber)	Scotland	Ardtornish Estate
Auchtertyre Hydro Scheme, Central	0.59	Stirling	Scotland	Edinburgh Hydro Systems Ltd
Duror Hydro scheme, Highlands	0.69	Highland (Lochaber)	Scotland	Edinburgh Hydro Systems Ltd
Little Wyvis	0.63	Highlands	Scotland	Kenneth Stewart Blair Ninich
Glen Tarbut	0.83	Highlands	Scotland	EHS Group International
Ffestiniog Hydro Scheme	1.75	Gwynedd	Wales	
Cwmorthin Hydro Scheme	0.41	Gwynedd	Wales	
Dulyn Weir Hydro Scheme, Colwyn	0.5	Gwynedd	Wales	National Power Plc
Croesor Power Station Scheme, Gwynedd	0.5	Gwynedd	Wales	National Power plc
Afon Ty-Cerig Hydro Scheme, Gwynedd	0.195	Gwynedd	Wales	Dulas Ltd
Carrickaness Hydro Scheme	0.15	County Armagh	Northern Ireland	Hydro)
Blackwater Hydro Scheme	0.1	County Tyrone	Northern Ireland	McMullan & O'Donnell
Randalstown Hydro Scheme	0.5	County Antrim	Northern Ireland	Newmills Hydro Generation Ltd
Harperstown Hydro Project	0.25	County Antrim	Northern Ireland	Hillmount Properties (NI) Ltd
Benburb Hydro Scheme	0.07	County Tyrone	Northern Ireland	Mr John Mills
Sion Mills Hydro Scheme	0.78	County Tyrone	Northern Ireland	Herdmans Ltd
Park Mills Hydro Scheme	0.03	County Antrim	Northern Ireland	Armoy
Silent Valley Hydro Scheme	0.435	County Down	Northern Ireland	Northern Ireland Water Executive
Oaklands WTW Hydro Scheme	0.049	County Antrim	Northern Ireland	Northern Ireland Water Executive
Benburb Small Hydro Scheme	0.07	County Armagh	Northern Ireland	Benburb Centre
Old Walls Farm Hydro Scheme	0.07	Devon	England	
Beochlich Hydro Scheme	0.95	Strathclyde	Scotland	Blarghour Power Company Ltd
Llyn Brianne Dam	4.35	Dyfed	Wales	
Elan Valley Hydro Scheme	2.95	Powys	Wales	
Pontiscill Water Treatment Works	0.36	Powys	Wales	
Cynwyd Power Station Scheme, Denbighshire	0.13	Clwyd	Wales	National Power plc
Iwrch Hydro Power Station	0.36	Powys	Wales	Ambient Energy Ltd/ NOVERA
Borrowash Mill	0.17	Derbyshire	England	
Beeston Weir Hydro Scheme	1.66	Nottinghamshire	England	
Rhodeswood Hydro	0.24	Derbyshire	England	SHP PROJECTS LTD
Bottoms Reservoir Hydro	0.15	Derbyshire	England	SHP PROJECTS LTD
Torside Reservoir Hydro	0.24	Derbyshire	England	SHP PROJECTS LTD
Oswestry Water Treatment Works	0.36	Shropshire	England	
Burton Mill Hydro Scheme, Staffordshire	0.06	Staffordshire	England	Derwent Hydroelectric Power Ltd

Rung Two Hydro Projects

Project	Capacity (MW)	Location	Country	Developer
Garrogie Hydro	2	Highlands Region	Scotland	Innogy
Kingairloch	3.5	Highlands Region	Scotland	
Braevallich	2.5	Argyll & Bute	Scotland	Innogy
Holme Pierrepont Hydro Scheme	0.89	Nottinghamshire	England	
Ebley Mill Hydro Scheme	0.09	Gloucestershire	England	
Thirlmere Lake Draw-Off Tower	0.17	Cumbria	England	
Mode Wheel Lock Hydro Scheme	0.61	Greater Manchester	England	United Utilities
Irlam Lock Hydro Scheme	0.94	Greater Manchester	England	United Utilities
Garry Gualach Hydro Scheme	0.78	Highlands	Scotland	Bear Ellice Trust
Glen Kinglass	0.59	Argyll and Bute	Scotland	Wilson Energy Associates Ltd
Kingairloch	2.5	Highland	Scotland	Scottish and Southern Energy

Rung Three Hydro Projects

Project	Capacity (MW)	Location	Country	Developer
Romney Weir	0.2		England	Innogy
Ben Glas	1	Trossachs	Scotland	Ambient Hydro
Allt Fionn	1.4	Trossachs	Scotland	Ambient Hydro
River E	2	Highlands Region	Scotland	Innogy
Glendoe Hydro	100	Loch Ness	Scotland	SSE
Shieldaig/ Slattadale Hydro	3.55	Highlands Region	Scotland	Highland Light & Power
Russel Burn Hydro Scheme	0.53	Highlands	Scotland	MBM (116) Ltd
Garrogie Hydro Scheme	1.94	Highlands	Scotland	Edinburgh Hydro Systems Ltd. (Innogy)
Strath Melness Hydro Scheme	0.3	Highland	Scotland	Atlantic Energy
Urlar Hydro Scheme	0.98	Tayside	Scotland	Bolfraks Estate
Slattadale Hydro Scheme	1.45	Highland	Scotland	Highland Light and Power
Locheil Estate	1.32	Highland	Scotland	Highland Light and Power
Loch Arkaig Joint Connection	5.47	Highland	Scotland	Highland Light and Power
Inverpolly	0.95	Highland	Scotland	EHS Group International
Ben Glas	0.9	Central	Scotland	Ambient Energy (NOVERA)
Allt Fionn	0.9	Central	Scotland	Ambient Energy (NOVERA)
Banavie	0.4	Highlands	Scotland	British Waterways
Inverbain	0.9	Highlands	Scotland	INNOGY
River E Hydro Scheme	2	Highland	Scotland	Innogy
Eredine Hydro Project (Braevallich)	2.2	Argyll and Bute	Scotland	INNOGY Plc
Upper Glen Devon Reservoir	0.275	Clack Mannanshire	Scotland	Scottish Water
Quarter	0.15	Clackmannanshire	Scotland	Scottish Water
Douglas Water Hydro	2.2	Argyll and Bute	Scotland	Innogy
Invervar Hydro	1.1		Scotland	Innogy
Stronelairg	10.3	Highlands Region	Scotland	Innogy
Gelli Iago Hydro Scheme	0.18	Gwynedd	Wales	
Devils Bridge Hydro Scheme, Ceredigion	0.511	Dyfed	Wales	United Utilities
Twrch Hydro Power Station	0.475	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Ysgethin Hydro Scheme	0.86	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Cerist Hydro Scheme, Gwynedd	0.38	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Harnog Hydro Scheme	0.45	Gwynedd	Wales	Ambient Energy Ltd/NOVERA
Cwm Llan Hydro Scheme, Gwynedd	0.44	Gwynedd	Wales	Ambient Energy Ltd / Novera
Gain Hydro Power Station Scheme	0.55	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Dolhendre Hydro Scheme	0.45	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Treweryn Hydro Scheme	0.43	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Afon Tyn Y Cornel Hydro Scheme	0.195	Gwynedd	Wales	Dulas Ltd
Dwynant	0.31	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Dolgoch	0.3	Gwynedd	Wales	INGLEBY 451 LTD
Cadair	0.6	Gwynedd	Wales	INGLEBY 451 LTD/NOVERA
Marchlyn	0.34	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Llaethnant	0.43	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Mawddach	0.36	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Ogwen	0.4	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Cynfal	0.18	Gwynedd	Wales	Ambient Energy Ltd/ NOVERA
Treweunydd	0.75	Gwynedd	Wales	INGLEBY 451 LTD
Brenig	0.25	Gwynedd	Wales	DWR CYMRU CYFYNGEDIG
Ystwyth Hydro Power	0.4	Dyfed	Wales	AMBIENT HYDRO LTD/ NOVERA
Syfynwy	0.25	Dyfed	Wales	DWR CYMRU CYFYNGEDIG
Ganllwydd Hydro Power Station	0.645	Gwynedd	Wales	
Mickley Mill Hydro Scheme	0.44	North Yorkshire	Wales	Tanfield Lodge Estate
Gilford Mill Hydro Scheme	0.17	County Down	England	TCI Ltd
Mill-On-The-Exe Hydro Scheme, Devon	0.2	Devon	England	Alterpower Ltd
Thorverton Mill	0.07	Devon	England	MT & PR Baker
Radyr Weir Hydro Scheme, Cardiff	0.479	South Glamorgan	Scotland	United Utilities
Nant Haffes Hydro Scheme, Powys	0.402	Powys	Wales	United Utilities
Trannon	0.3	Powys	Wales	INGLEBY 451 LTD
Tywi	1.65	Carmarthenshire	Wales	United Utilities
Claerwen	1.05	Powys	Wales	United Utilities
Taf Fawr	0.4	Mid Glamorgan	Scotland	DWR CYMRU CYFYNGEDIG

Antermony Loch Hydro Scheme	0.08	Strathclyde	Scotland	Hydro Energy Developments Ltd
River Nith Low Head	0.51	Dumfries and Galloway	Scotland	CRE Energy Ltd / Scottish Power
Glen Trool	1	Dumfries and Galloway	Scotland	Ingleby 451 Ltd
Kirkthorpe Hydro Scheme	0.38	West Yorkshire	England	
Cromwell Weir Hydro Scheme	1.158	Nottinghamshire	England	United Utilities
Thrumpton Weir Hydro Scheme	0.952	Nottinghamshire	England	United Utilities
Oak Hurst Hydro Scheme	0.24	Derbyshire	England	Derwent Hydroelectric Power Ltd
Thrybergh Weir Hydro Scheme	0.2	North Yorkshire	England	Alterpower Ltd
Calver Mill	0.09	Derbyshire	England	Derwent Hydroelectric Power Ltd
Dulverton	0.08	Somerset	England	South West Energy Group
Tamworth Hydro Scheme	0.09	Staffordshire	England	Derwent Hydroelectric Power Ltd
Pershore Mill Hydro Scheme	0.22	Worcestershire	England	G Partridge & Sons (Millers) Ltd

Rung One Landfill Projects

Project	Capacity (MW)	Location	Country	Developer
Stangate (Ightham) Landfill Site	4.5	Kent	England	ARC Ltd (Greenways Landfill)
Offham Landfill Site, Kent	1.18	Kent	England	ARC Ltd (Greenways Landfill)
Shelford Landfill Scheme, Kent	1.94	Kent	England	Brett Waste Management Ltd
Offham Landfill Scheme, Kent	0.9	Kent	England	Waste Recycling Group
Offham - NFFO 5	0.963	Kent	England	HANSON WASTE MANAGEMENT LTD
Stangate - NFFO 5	0.96	Kent	England	Waste Recycling Group
Shelford Phase II	2.96	Kent	England	Hanson
Shelford Generation Plant II	7.26	Kent	England	BRETT WASTE MANAGEMENT LTD
Shelford Generation Plant II	7.266	Kent	England	ENERGY DEVELOPMENTS (UK) LTD
Shakespeare Farm Landfill Site	0.96	Kent	England	BIFFA WASTE SERVICES LTD
Former Pluckley Landfill Site	1	Kent	England	Farley Engineering/ Kent Weald Properties/Cleanaway
Beddingham 'B' Landfill Scheme	1.1	East Sussex	England	Haul Waste Disposal Ltd
Pebsham	1.91	East Sussex	England	BIFFA WASTE SERVICES LTD
Pebsham (Non-NFFO extension)	1	East Sussex	England	BIFFA WASTE SERVICES LTD
Mucking Gas Two Landfill Scheme	3.77	Essex	England	Energy Developments UK Ltd
Bellhouse Pit Landfill Scheme	2.7	Essex	England	Ex Waste Ltd/Combined Landfill Projects Ltd (CLP)
Aveley Methane - Sandy Lane Scheme	2.34	Essex	England	Aveley Methane Ltd
Aveley Landfill Scheme	3.68	Essex	England	Hanson Waste Management Ltd
Ongar Landfill Scheme	1.77	Essex	England	Hanson Waste Management Ltd
Pitsea Landfill Scheme	11.64	Essex	England	Cleanaway Ltd/EDL
Roxwell Landfill Scheme	1.26	Essex	England	Redland Aggregates Ltd (Lafarge Redland)
Ockendon 'B' Landfill Scheme	4.45	Essex	England	Haul Waste Disposal Ltd
Barling, Barling Hall Farm	1.91	Essex	England	CORY ENVIRONMENTAL LTD
Bellhouse South	3.88	Essex	England	CORY ENVIRONMENTAL LTD
Mucking 3	3.88	Essex	England	CORY ENVIRONMENTAL LTD
Bellhouse 2	0.988	Essex	England	COMBINED LANDFILL PROJECTS LTD (CLP)
Ongar - NFFO 5	0.96	Essex	England	HANSON WASTE MANAGEMENT LTD
Aveley - NFFO 5	1.2	Essex	England	HANSON WASTE MANAGEMENT LTD
Elsenham Power	0.97	Essex	England	NATURAL POWER LTD
Ockendon Area III	8.478	Essex	England	ENERGY DEVELOPMENTS (UK) LTD
Martins Farm Power	0.77	Essex	England	NATURAL POWER
Ugley	2	Essex	England	RMC
Ongar landfill scheme	1	Essex	England	Waste Recycling Group
Crumps Farm landfill	0.47	Essex	England	Edwards Waste Management
Rainham	20	Rainham	England	Cleanaway/EDL
Patteson Court Landfill Site, Surrey	1.82	Surrey	England	Biogeneration Limited / Biffa Waste Services
Trumps Farm Landfill Scheme, Surrey	2.93	Surrey	England	Renewable Power Systems Ltd
Norlands Lane Landfill Site, Surrey	2.7	Surrey	England	Thames Waste Management Ltd
Albury Landfill	2.42	Surrey	England	SITA
Redhill 2	0.9	Surrey	England	BIFFA WASTE SERVICES LTD
Runfold Landfill	1.21	Surrey	England	SITA
Farnham Landfill	2.4	Surrey	England	Hall Aggregates (South East) Ltd (RMC)
Seale Power	0.97	Surrey	England	Natural Power
Brockhurst Wood	2	Sussex	England	BIFFA
Elstow Landfill Site	1.76	Bedfordshire	England	Renewable Power Generation Ltd
Sundon Landfill Site	2.64	Bedfordshire	England	Renewable Power Generation Ltd
Arlesey Landfill Site	1.08	Bedfordshire	England	Shanks and McEwan (Arlesey Power)
L'Field Stewartby Landfill Site	10.66	Bedfordshire	England	Shanks and McEwan (L'Field Power) Limited
Brogborough Phase III	6.22	Bedfordshire	England	SHANKS & MCEWAN (SOUTHERN) LTD
Brogborough Phase IV	2.2	Bedfordshire	England	SHANKS & MCEWAN (SOUTHERN) LTD
Arlesey Landfill Site Non-NFFO	1.08	Bedfordshire	England	Shanks and McEwan (Arlesey Power)
Small Field Farm	2.86	Berkshire	England	HALL AGGREGATES (SOUTH EAST) LTD (RMC)
Colnbrook Landfill	1.91	Berkshire	England	HALL AGGREGATES (SOUTH EAST) LTD / RMC
Hermitage - NFFO 5	0.963	Berkshire	England	HANSON WASTE MANAGEMENT LTD
Woodley Landfill Reading	0.95	Berkshire	England	SUMMERLEAZE LTD
Chavey Power	0.77	Berkshire	England	NATURAL POWER
Newton Longville Landfill Site	0.94	Buckinghamshire	England	Shanks and McEwan (Bletchley Power)
Wapsey's Wood II Landfill Site	1.72	Buckinghamshire	England	Leigh Environmental Ltd (Paul Blower 01753 888140)
Bletchley Phase II	2.2	Buckinghamshire	England	SHANKS & MCEWAN LTD

Calvert Phase II	11.2	Buckinghamshire	England	SHANKS & MCEWAN LTD
Wapsey's Wood III	1.94	Buckinghamshire	England	SUMMERLEAZE LTD
High Heavens Landfill	1.92	Buckinghamshire	England	RENEWABLE POWER SYSTEMS LTD
Springfield Farm	10	Buckinghamshire	England	ONYX
Rainham Landfill Scheme, Phase I	3.88	Greater London	England	Cleanaway Ltd (EDL)
Rainham Phase II	16.95	Greater London	England	ENERGY DEVELOPMENTS (UK) LTD
Brazier Landfill Scheme	3.88	Hertfordshire	England	Pioneer Aggregates (UK) Ltd
Westmill Road	2.42	Hertfordshire	England	ENERGY DEVELOPMENTS (UK) LTD
Water Hall Generation Plant	1.21	Hertfordshire	England	ENERGY DEVELOPMENTS (UK) LTD
Hitchin, North Herts	1.5	Hertfordshire	England	BIFFA
Ardley Fields Farm Landfill Site	1.82	Oxfordshire	England	Haul Waste Limited
Sutton Courtenay Landfill Scheme	5.61	Oxfordshire	England	Hanson (formerly Greenways) Waste Management Ltd
Alkerton Landfill	0.9	Oxfordshire	England	SITA
Sutton Courtney - NFFO 5	6	Oxfordshire	England	HANSON WASTE MANAGEMENT LTD
Pitsea	11	Pitsea	England	Cleanaway/EDL
Winterton Landfill Site	3.77	Humberside	England	Humberside Wastewise Ltd / Coal Products Limited
Immingham Landfill Scheme	1.17	Humberside	England	Winerton Power Ltd
Humberfield Landfill Scheme	2.34	Humberside	England	Winerton Power Ltd / WRG
Gallymoor Landfill	2.86	Humberside	England	HUMBERSIDE WASTEWISE
Immingham	1.916	Humberside	England	NOVERA
Humberfield Quarry Landfill Site	2	Humberside	England	Integrated Waste Management
PG2 Bolam Power Generation	0.98	Durham	England	CLP
PG4 St Bedes Power Generation	2	Durham	England	DURHAM COUNTY WASTE MANAGEMENT LTD
PG4 St Bedes Power Generation	1	Durham	England	Natural Power
PG4 St Bedes Power Generation	2	Durham	England	DURHAM COUNTY WASTE MANAGEMENT LTD
PG1-Coxhoe Waste Disposal Site	3.8	Durham	England	Durham County Waste Management Company
PG5 Todhills Power Generation	0.98	Durham	England	Premier Waste Management Ltd
Chapman's Well	1	Durham	England	Natural Power
Mark's Quarry	1	Durham	England	Ener-G Natural Power Ltd
Burnhills Landfill Scheme	1.46	Gateshead	England	SITA
Kibblesworth Landfill Site	2.34	Gateshead	England	SITA
Burnhills Landfill	3.832	Gateshead	England	SITA
Ellington Road Landfill Site	0.94	Northumberland	England	Northumberland Waste Management Ltd (SITA)
Seghill Village Waste Disposal Site	1.42	Northumberland	England	Northumberland Waste Management Ltd (SITA)
Frankham Landfill	0.76	Northumberland	England	SITA
Harecrag Landfill	0.76	Northumberland	England	SITA
Sisters Landfill	0.76	Northumberland	England	SITA
Longhill	0.3	Northumberland	England	Natural Power
Brenkley Landfill	1.91	Tyne and Wear	England	SITA/Natural Power
Lochhead Landfill Scheme	2	Angus	Scotland	Natural Power
Tarbothill Landfill Site	2.2	Grampian	Scotland	Shanks & McEwan (Northern) Ltd
Knowehead Landfill Site/ Wellbank	0.93	Highlands	Scotland	BIFFA
Binn Landfill	1.92	Tayside	Scotland	SITA / Natural Power
Withyhedge Generation Plant	2.42	Dyfed	Wales	ENERGY DEVELOPMENTS (UK) LTD
Llandulas Landfill Scheme, Conwy	2.73	Gwynedd	Wales	Hanson (formerly Greenways) Waste Management Ltd
Holiday Moss Landfill Gas Scheme	2.9	Merseyside	England	BIFFA (formerly UK Waste Management Ltd)
Bromborough Dock Landfill Scheme	2.95	Merseyside	England	BIFFA (formerly UK Waste Management Ltd)
Bidston Moss Landfill Scheme	2.34	Merseyside	England	Bidston Methane Ltd
Billinge Hill Quarry Landfill Scheme	1	Merseyside	England	Bidston Methane Ltd.
Holiday Moss Gas to Energy II	0.86	Merseyside	England	BIFFA (formerly UK WASTE MANAGEMENT LTD)
Bromborough Dock	1	Merseyside	England	BIFFA
Caulklands Quarry	0.3	North York Moors	England	Natural Power
Harewood Whin Landfill Site	2.37	North Yorkshire	England	Yorwaste Ltd/Biogas
Allerton Park Landfill Scheme	0.95	North Yorkshire	England	Waste Recycling Group
Seamer Carr	1.33	North Yorkshire	England	YORWASTE LTD
Allerton Park - NFFO 5	0.96	North Yorkshire	England	HANSON WASTE MANAGEMENT LTD
Barnsdale Bar Landfill	6.05	North Yorkshire	England	WRG
Skibeden	0.6	North Yorkshire	England	Yorwaste
Scorton	1	North Yorkshire	England	Yorwaste
Mickleby	0.3	North Yorkshire	England	Yorwaste, Natural Power
West Tanfield	0.3	North Yorkshire	England	Yorwaste, Natural Power
Bilsthorpe Landfill Scheme	0.58	Nottinghamshire	England	Global Environmental
Burntstump Landfill Scheme	1.8	Nottinghamshire	England	Hanson (formerly Greenways) Waste Management Ltd

Burntstump NFFO 5	0.96	Nottinghamshire	England	HANSON WASTE MANAGEMENT LTD
Sutton Landfill site	3	Nottinghamshire	England	3 Sidings Court
Bairds Brey	1.699	Belfast	North Ireland	BIFFA (formerly UK Waste Management Ltd)
Dargan Road Landfill Site, Belfast	4.55	Belfast	North Ireland	Belfast City Council
United Mines Landfill Scheme	2.97	Cornwall	England	East Midlands Electricity Generation
Connon Bridge Landfill Gas Project	0.6	Cornwall	England	COMBINED LANDFILL PROJECTS LTD (CLP Envirogas Ltd)
Heathfield 'C' Landfill Scheme	2.22	Devon	England	Haul Waste Ltd
Deep Moor Gas to Energy	1.95	Devon	England	DEVON WASTE MANAGEMENT LTD
Heathfield 'A' Landfill	0.26	Devon	England	Viridor
Broad Path	2	Devon	England	Viridor
Chelson Meadow Gas to Energy Scheme	1.8	Plymouth (Unitary)	England	Devon Waste Management Ltd
Chelson Meadow 2	0.98	Plymouth (Unitary)	England	COMBINED LANDFILL PROJECTS LTD (CLP)
Dogsthorpe South Landfill Site	1.89	Cambridgeshire	England	Shanks and McEwan (Dogsthorpe Power)
Station Farm Landfill Scheme	1.956	Cambridgeshire	England	Natural Power
March Landfill Gas Project	0.98	Cambridgeshire	England	Combined Landfill Projects (CLP)
Godmanchester	3	Cambridgeshire	England	Natural Power /SITA
Somersham	0.6	Cambridgeshire	England	Natural Power / SITA
Dogsthorpe South Landfill Site	1	Cambridgeshire	England	Shanks and McEwan (Dogsthorpe Power)
Mountsorrel Landfill Site	1.51	Leicestershire	England	Redland Aggregates Limited/Combined Landfill Projects (CLP)
Bradgate Quarry Landfill Gas Scheme	2.47	Leicestershire	England	Hanson (formerly Greenways) Waste Management Ltd
Warren Quarry Landfill Gas Scheme	1.9	Leicestershire	England	Warren Energy Ltd
Cotesbach Landfill Gas Project	3.5	Leicestershire	England	LAFARGE REDLANDS AGGREGATES LTD
Enderby Warren Phase II	4.87	Leicestershire	England	United Utilities
Narborough Landfill	2.44	Leicestershire	England	SITA
Lount/Smoile	1.07	Leicestershire	England	SITA
Newhurst Quarry	2	Leicestershire	England	Waste Recycling Group
New Albion Landfill	2	Leicestershire	England	ONYX
Mayton Wood Landfill Site	1.51	Norfolk	England	Combined Landfill Projects Ltd (CLP)
Blackborough End Landfill Site	1.519	Norfolk	England	Combined Landfill Projects Ltd (CLP)
Attlebridge Landfill Site	1.17	Norfolk	England	Renewable Power Generation Ltd
Edgefield Hall Farm Landfill Site	0.6	Norfolk	England	Buyinfo Ltd
Costessey Landfill Gas Project	0.9	Norfolk	England	Combined Landfill Projects Ltd (CLP)
Feltwell	0.988	Norfolk	England	CLP
Aldeby - NFFO 5	0.963	Norfolk	England	HANSON WASTE MANAGEMENT LTD
Costessey Landfill Gas Project	2	Norfolk	England	Combined Landfill Projects Ltd (CLP)
Portley Ford Landfill Site	1.82	Northamptonshire	England	Biogeneration Ltd / Biffa Waste Services
Sidegate Lane Landfill Site	1.33	Northamptonshire	England	East Midlands Electricity Gen (Dev) Ltd
Brixworth Landfill Site	0.57	Northamptonshire	England	Renewable Power Generation Limited
Kilsby Landfill Scheme	0.96	Northamptonshire	England	Hales Waste Control Ltd
Rushton Landfill Gas Project	0.99	Northamptonshire	England	Combined Landfill Projects (CLP)
Weldon Phase 1 and 2	4.4	Northamptonshire	England	SHANKS & MCEWAN
Cranford	0.57	Northamptonshire	England	SITA
Corby	0.57	Northamptonshire	England	SITA
Sidegate Lane	2.42	Northamptonshire	England	NENE VALLEY WASTE LTD
Wooton	2	Northamptonshire	England	Viridor
Bramford Landfill Site	0.81	Suffolk	England	Renewable Power Generation Ltd
Foxhall Landfill Site	1.17	Suffolk	England	Renewable Power Generation Ltd
Lackford Landfill Scheme	1.17	Suffolk	England	Gengas Ltd
Wangford Landfill Scheme	0.87	Suffolk	England	Renewable Power Systems Ltd
Masons Power Plant Landfill Scheme	2.22	Suffolk	England	Haul Waste Disposal Ltd
Wetherden Landfill Gas Project	0.6	Suffolk	England	HUNTS REFUSE DISPOSAL LTD
Bramford	2	Suffolk	England	RMC
Standen Heath	1.5	Isle of Wight	England	BIFFA
Horton Landfill Site	1.82	West Sussex	England	Haul Waste Limited
Windmill Quarry Landfill Scheme	4.45	West Sussex	England	BIFFA (formerly UK Waste Management Ltd)
Brookhurst Wood Gas to Energy	2.55	West Sussex	England	BIFFA (formerly UK WASTE MANAGEMENT LTD)
Lidsey Landfill	1.44	West Sussex	England	LIDSEY LANDFILL LTD
Dunbar	2.2	East Lothian	Scotland	Viridor
Kaimes Landfill Site	2.4	Lothian	Scotland	ARC Ltd/ Waste Recycling Group
Bonnyrigg	2.18	Lothian	Scotland	Natural Power Ltd
Avondale	4	North Lanarkshire	Scotland	Shanks Avondale
Greengairs Landfill Scheme Phase I	1.89	Strathclyde	Scotland	Shanks & McEwan
Greengairs Landfill Scheme Phase II	1.89	Strathclyde	Scotland	Shanks & McEwan

Dalmacoulter Landfill Site	0.96	Strathclyde	Scotland	Natural Power
Greengairs Phase 3	1.96	Strathclyde	Scotland	Shanks and McEwan
Greengairs Phase 4	1.96	Strathclyde	Scotland	Shanks and McEwan
Gilgarf (formely Summerston)	1.35	Strathclyde	Scotland	Combined Landfill Projects Ltd (CLP)
Greengairs V	2.2	Strathclyde	Scotland	Shanks & McEwan (Northern) Ltd
Garlaff Landfill	1.3	Strathclyde	Scotland	Barr Environmental / CLP
Greengairs IV	2.2	Strathclyde	Scotland	Shanks & McEwan (Northern) Ltd
Auchencarroch Landfill	1.98	Strathclyde	Scotland	Auchencarroch Energy Ltd / CLP
Riggend	0.95	Strathclyde	Scotland	Natural Power
Drumshangie	0.95	Strathclyde	Scotland	Shanks
Dunlop Landfill Gas Scheme	2.41	Strathclyde	Scotland	Natural Power Ltd
Greenoakhill	3.94	Strathclyde	Scotland	Graveson Energy Management
Harn Hill Quarry Landfill Site, Avon	2.61	Avon	England	Biogas Technology Limited and Avon CC
Yanley Landfill Site, Avon	0.94	Avon	England	Terry Adams Ltd
Nant y Caws Landfill Site	1.34	Carmarthenshire	Wales	Renewable Power Generation Ltd
Standard Landfill Site, Clwyd	0.87	Clwyd	Wales	AD Waste Ltd
Dark Lane (Astbury) Landfill Scheme	1.95	Clwyd	Wales	Natural Power Ltd
Pen y Bont	1.96	Clwyd	Wales	SHANKS & MCEWAN (NORTHERN) LTD
Summerston Landfill	2.78	Glasgow City	Scotland	Combined Landfill Gas Projects (CLP)
Auchinlea Landfill Site	1.69	Glasgow City	Scotland	Natural Power
Tythegston Landfill Site	1.17	Mid Glamorgan	Scotland	Renewable Power Generation Ltd
Nant-Y-Gwyddon Landfill Scheme	0.95	Mid Glamorgan	Scotland	Cynon Valley Waste Disposal Ltd
Brynpica Landfill Site	1.5	Rhondda	Wales	Cynon Valley Waste Disposal/United Utilities
Lamby Way Landfill Site, Cardiff	2.93	South Glamorgan	Scotland	South Wales Power Ltd
Ferry Road Landfill Scheme, Cardiff	0.97	South Glamorgan	Scotland	South Wales Power Ltd
Briton Ferry	1.97	West Glamorgan	Wales	Neath Port Talbot Waste Management Co Ltd
Briton / Neath	2.22	West Glamorgan	Wales	NATURAL POWER
Ruabon	1.96	Wrexham	Wales	SHANKS & MCEWAN (NORTHERN) LTD
Maw Green Landfill Site	1.61	Cheshire	England	Waste Recycling Group
Gowy Landfill Site	1.61	Cheshire	England	Waste Recycling Group
Danes Moss Landfill Site	1.63	Cheshire	England	Waste Recycling Group
Butchersfield Landfill Site	2.87	Cheshire	England	NORWEB Generation Limited
Arpley Landfill Scheme 'A'	7.87	Cheshire	England	NOVERA
Arpley Landfill Scheme 'B'	7.87	Cheshire	England	NOVERA
Risley '3' Landfill Scheme	0.59	Cheshire	England	BIFFA (formerly UK Waste Management Ltd)
Risley '4' Landfill Scheme	5.9	Cheshire	England	BIFFA (formerly UK Waste Management Ltd)
Risley Gas to Energy III	0.9	Cheshire	England	BIFFA (formerly UK WASTE MANAGEMENT LTD)
Danes Moss Landfill Site	2	Cheshire	England	Waste Recycling Group / NOVERA / Amber
Riseley	2	Cheshire	England	BIFFA
Maw Green Landfill Site	2	Cheshire	England	Waste Recycling Group
Gowy Landfill Site	3	Cheshire	England	Waste Recycling Group
Glapwell	1.15	Derbyshire	England	YORKSHIRE ENVIRONMENTAL SOLUTIONS LTD
Bretby	0.9	Derbyshire	England	YORKSHIRE ENVIRONMENTAL SOLUTIONS LTD
Glapwell Power	1.95	Derbyshire	England	United Utilities / WRG
Staveley Power	0.97	Derbyshire	England	Waste Recycling Group
Bretby Power	1.55	Derbyshire	England	NATURAL POWER LTD
Arden/Birch Vale	3.09	Derbyshire	England	Natural Power
Pilsworth Quarry Landfill Scheme	2.96	Greater Manchester	England	Terry Adams Ltd
Ince Moss Landfill Scheme	0.62	Greater Manchester	England	Wimpey Energy Ltd
Chadderton Landfill Scheme	1.94	Greater Manchester	England	BIFFA (formerly UK Waste Management Ltd)
Red Moss Electricity Project	0.5	Greater Manchester	England	GREATER MANCHESTER WASTE DISP AUTH LTD
Kirkless Power	2.08	Greater Manchester	England	Waste Recycling Group (WRG)
High Moor Generation Plant	2.422	Greater Manchester	England	ENERGY DEVELOPMENTS (UK) LTD
Scouthead Power Plant	2.86	Greater Manchester	England	ONYX
Whinney Hill Waste Disposal Site	2.7	Lancashire	England	Combined Landill Projects Ltd (CLP)
Queen's Park Road Energy	1.77	Lancashire	England	COMBINED LANDFILL PROJECTS LTD (CLP)
Clifton Marsh Energy	2.69	Lancashire	England	SITA / Natural Power
Whinney Hill II Energy	1.78	Lancashire	England	SITA
Ulnes Walton Energy	1.336	Lancashire	England	SITA
Jameson Road	1.34	Lancashire	England	SITA
Lune Power	1.43	Lancashire	England	NATURAL POWER LTD
Deerplay Landfill Site	0.988	Lancashire	England	CAIRD ENVIRONMENTAL LTD
Horncliffe Quarry	1	Lancashire	England	Natural Power

Lincoln Landfill Scheme	1.95	Lincolnshire	England	Natural Power Ltd
Boston Landfill Scheme	1.27	Lincolnshire	England	Renewable Power Systems Ltd
Colsterworth Landfill Gas Project	2.6	Lincolnshire	England	Colsterworth Energy Ltd
Leadenham Landfill Gas Project	0.98	Lincolnshire	England	LINCWASTE LTD
Whisby Landfill Gas Project	1.3	Lincolnshire	England	LINCWASTE LTD
Kenwick Landfill Gas Project	0.63	Lincolnshire	England	LINCWASTE LTD
Clifton Hall	1	Manchester	England	BIFFA
Parkwood Landfill Scheme	1.17	South Yorkshire	England	Coal Products Ltd Energy
Bootham Lane	1.15	South Yorkshire	England	Waste Recycling Group
Beighton Landfill Gas Project	0.98	South Yorkshire	England	COMBINED LANDFILL PROJECTS LTD (CLP)
Skelbrooke Landfill Gas Project	0.98	South Yorkshire	England	DARRINGTON QUARRIES LTD
Meadow Hall Power	1.11	South Yorkshire	England	Shanks and McEwan
Warmsworth Power	0.775	South Yorkshire	England	NATURAL POWER LTD
Hatfield Power	1.95	South Yorkshire	England	NATURAL POWER LTD
Himley Wood Landfill Site	1.82	Staffordshire	England	Biogeneration Ltd / Biffa Waste Services
Howden Clough Road Landfill Site, Leeds	1.82	West Yorkshire	England	Biogeneration Limited / Biffa Waste Services
Cromwell Bottom Landfill Scheme	0.97	West Yorkshire	England	West Yorkshire Waste Disposal Authority
Lower Spen Landfill Scheme	2.91	West Yorkshire	England	West Yorkshire Waste Disposal Authority / EDL
Sugden End Methane Plant	0.97	West Yorkshire	England	West Yorkshire Waste Disposal Authority
West Riding Methane Plant	0.95	West Yorkshire	England	West Yorkshire Waste Disposal Authority
Peckfield Quarry Landfill Scheme	3.92	West Yorkshire	England	Natural Power Ltd
Welbeck	11.57	West Yorkshire	England	YORKSHIRE ENVIRONMENTAL SOLUTIONS LTD
Manywells Quarry	0.91	West Yorkshire	England	NATURAL POWER
Soothills Landfill	1	West Yorkshire	England	ONYX LANDFILL LTD
Atlas Power	0.77	West Yorkshire	England	NATURAL POWER LTD
Welbeck Power	11.7	West Yorkshire	England	NATURAL POWER
Paulsgrove Landfill Site	2.41	Hampshire	England	Associated Energy Projects plc
Netley Landfill Site	0.9	Hampshire	England	Leigh Environmental Limited
Bramshill Generation Station	0.94	Hampshire	England	ONYX HAMPSHIRE LTD
Hook Lane	0.57	Hampshire	England	ONYX HAMPSHIRE LTD
Somerley Generation Station	0.72	Hampshire	England	ONYX HAMPSHIRE LTD
Southleigh Landfill	1.44	Hampshire	England	ONYX LANDFILL LTD
Southleigh Landfill Non-NFFO	3.5	Hampshire	England	ONYX LANDFILL LTD
Sherfield English	0.6	Hampshire	England	SITA
Squabb Wood	2	Hampshire	England	Viridor
Netley Landfill Site, Hampshire	1.1	Hampshire	England	Hampshire Waste Services/ ONYX / Power Plant Services
Newmilton	2.8	Hampshire	England	ONYX
Whites Landfill Site	6.01	Dorset	England	Canford Renewable Energy Ltd
Warmwell	2	Dorset	England	Viridor
Tatchells	0.5	Dorset	England	Viridor
Beacon Hill	3	Dorset	England	Combined Landfill Projects (CLP) / SITA
Bothenhampton	0.6	Dorset	England	Combined Landfill Projects (CLP) / SITA
Hines Pit	0.6	Dorset	England	Combined Landfill Projects (CLP) / SITA
Dimmer Landfill Gas Scheme	2.34	Somerset	England	
Dimmer Landfill Site	1.91	Somerset	England	GENGAS LTD
Poole Generation Plant	2.42	Somerset	England	ENERGY DEVELOPMENTS (UK) LTD
Walpole Landfill	1.6	Somerset	England	THOMAS GRAVESON LTD
Williton	0.8	Somerset	England	NOVERA
Frampton Landfill Scheme	0.88	Gloucestershire	England	RMC environmental Services Ltd
Granville Landfill Site	1.39	Shropshire	England	Biogas Technology Ltd/Natural Power
Heathgates	0.57	Shropshire	England	Natural Power
Barnsley Lane Site	0.86	Shropshire	England	SITA
Betton Abbots	1.26	Shropshire	England	Natural Power / SITA
Candles/Coalmoor Landfill	2.85	Shropshire	England	ONYX LANDFILL LTD
Marchington Landfill	0.97	Staffordshire	England	THOMAS GRAVESON LTD/ Summerleaze
Dosthill Landfill Site	0.91	Staffordshire	England	BIFFA WASTE SERVICES LTD
Wilnecote Landfill Site	1.86	Staffordshire	England	BIFFA WASTE SERVICES LTD
Wyrley Power/ Wyrley Grove	0.775	Staffordshire	England	NATURAL POWER
Meece Landfill	1.75	Staffordshire	England	THOMAS GRAVESON LTD
Waverley Wood Farm Landfill Site	0.8	Warwickshire	England	Smiths Concrete Limited
Judkins Landfill Site Phase 3	1.15	Warwickshire	England	Greenways
Judkins Landfill Scheme	2.73	Warwickshire	England	Hanson (formerly Greenways) Waste Management Ltd
Ling Hall 1	0.95	Warwickshire	England	SUMMERLEAZE LTD

Waverley Wood II	2.42	Warwickshire	England	ENERGY DEVELOPMENTS (UK) LTD
Ufton	0.93	Warwickshire	England	BIFFA WASTE SERVICES LTD
Packington Generation Plant Phase 3	8.47	Warwickshire	England	ENERGY DEVELOPMENTS (UK) LTD
Edwin Richards Landfill Scheme	1.78	West Midlands	England	Hanson (formerly Greenways) Waste Management Ltd
Westbury Landfill Scheme	1.1	Wiltshire	England	Haul Waste Disposal Ltd
Compton Bassett Landfill	2	Wiltshire	England	HILLS MINERALS & WASTE LTD
Chapel Farm Landfill	0.96	Wiltshire	England	HILLS MINERALS & WASTE LTD
Studley Grange Generation Project	0.96	Wiltshire	England	RENEWABLE POWER SYSTEMS LTD
Whiteparish	0.75	Wiltshire	England	BIFFA
Sands Farm Quarry Landfill Site	1	Wiltshire	England	Viridor Waste Management
Hill and Moor Landfill Scheme	3.38	Worcestershire	England	Severn Waste
Sandy Lane Generation Plant	0.9	Worcestershire	England	ENERGY DEVELOPMENTS (UK) LTD
Carlin Howe/Dunsdale Generation	2.6		England	SITA
Roxby Gas to Energy	5.92		England	BIFFA
Green Road	1.5		England	BIFFA
Distington Landfill	1.77	Cumbria	England	THOMAS GRAVESON LTD
Shearman Field	1.9	Cumbria	England	ALCO WASTE MANAGEMENT LTD
Flusco	0.97	Cumbria	England	Summerleaze Regeneration Ltd
Todhills Power (NFFO 5)	0.91	Cumbria	England	NATURAL POWER LTD
Todhills Power (Non-NFFO)	0.3	Cumbria	England	NATURAL POWER
South Walney Landfill	0.18	Cumbria	England	Natural Power Ltd
Silent Valley Landfill Scheme	1.935	Gwent	Wales	Silent Valley Waste Services Ltd
Docksway Landfill Scheme	1.96	Gwent	Wales	Renewable Power Generation Ltd
Trehir Generation Project	1.26	Gwent	Wales	TREHIR DEVELOPMENT COMPANY LTD
Trecatti	1.85	Gwent	Wales	BIFFA WASTE SERVICES LTD

Rung 1 Biomass Projects

Project	Capacity (MW)	Location	Country	Developer
Holsworthy	1.5	Devon	England	
Brook Hall Estate Biomass Plant	0.1	Co. Londonderry	Northern Ireland	Brook Hall Estate
Blackwater Museum Biomass Plant	0.2	Co. Armagh	Northern Ireland	B9 Energy Biomass Ltd
Westfield Biomass Power Station	9.8	Fife	Scotland	EPR Scotland Ltd
Elean Business Park Biomass Plant	31	Cambridgeshire	England	European Development Corporation plc
Thetford Biomass Power Station	38.5	Norfolk	England	Fibrowatt Limited

Rung 2 Biomass Projects

Project	Capacity (MW)	Location	Country	Developer
Lockerbie	40	Dumfries & Galloway	Scotland	Powergen
Corpach	30	Fort William	Scotland	EPR/ Wiggins Teape
Four Ashes	15.5	Staffordshire	England	EPR
Corby	10	Anglia	England	Anglia Water
Peterborough	10	Anglia	England	Anglia Water
Eye Biomass Plant	5.528	Suffolk	England	South Western Power Limited (NOVERA)
Elean Business Park Biomass Plant	31	Cambridgeshire	England	European Development Corporation plc
Thetford Biomass Power Station, Norfolk	38.5	Norfolk	England	Fibrowatt Limited
Corby Biomass Plant, Northamptonshire	14.25	Northamptonshire	England	EPR Corby Ltd / Aztec Energy Ltd
Penpont Biomass Scheme, Powys	0.25	Powys	Wales	West Wales Energy Ltd
Suffolk Anaerobic Digestion Scheme	1.05	Suffolk	England	LRZ Ltd
Hydro Leeming Anaerobic Digester	0.5	North Yorkshire	England	Wilbert Farms/ AGTEC Ltd/ Milbury Systems/ Independent Green Energy
Oakley Littlewood	0.5	Bedfordshire	England	Bedfordia Farms
Limekiln Hill Quarry	1	Somerset	England	
Bulley's Hill STW	0.2	County Armagh	Northern Ireland	Northern Ireland Water Executive
Ballyrickard STW	0.14	County Down	Northern Ireland	Northern Ireland Water Executive
Armagh STW	0.08	County Armagh	Northern Ireland	Northern Ireland Water Executive
Antrim STW	0.1	County Antrim	Northern Ireland	Northern Ireland Water Executive
Magherafelt STW	0.03	County Londonderry	Northern Ireland	Northern Ireland Water Executive

Rung 3 Biomass Projects

Project	Capacity (MW)	Location	Country	Developer
Morayhill	12.9	Highland	Scotland	Energy Power Resources Ltd
Hydro Seamer Anaerobic Digestion Scheme	0.6	North Yorkshire	England	Milbury Systems
McGuckians Biogas Plant	0.25	County Antrim	Northen Ireland	McGuckians Pig Slurry Biogas
Winkleigh	23	Devon	England	Peninsula Power
Biogas Ltd	1.43		England	Holsworthy Biogas Company
Corby	20	Corby	England	EPR
Spalford Anaerobic Digestion Scheme	1	Lincolnshire	England	AGTEC / Milbury Systems / Independent Green Energy Ltd
Frome	7	Somerset	England	
Eccleshall	2.2	Staffordshire	England	
Whitchurch Hydro Anaerobic Digestion Scheme	2	Shropshire	England	AGTEC Ltd/ Milbury Systems
Hereford Biomass Project	20	Herefordshire	England	United Utilities
Nuneaton Anminal Waste Incinerator	5	Warwickshire	England	DeMulders and Sons
Roves Energy	2.5	Swindon	England	Roves Energy
Castle Cary	7	Wiltshire	England	
Acorn Power	35	England	England	Acorn Power
Bridgewater	42		England	EPR
	40		England	

Appendix B Assumptions and Background data for 2010 Demand Scenarios

	Base demand - MM best estimate	Base demand RO compliance	Low demand RO compliance	
Licensed electricity sales: TWh	343.6	343.6	307	
RO (10%) target: TWh	25.8	35.7	32.0	
UK grid energy requirements	392.3	392.3	350.5	Grows slower than licensed sales
Carbon price: €/t CO2e	10	10	10	
Baseload power price: £/MWh	28.1	28.1	28.1	Assumes inflation at 2%pa
Peak demand: GW	61	61	55	Assumes system load factor rises to 72-73%
Transmission connected capacity mix: GW				
Nuclear	8.7	8.7	8.7	All Magnox and Dungeness B closed
CCGT	28.9	28.9	28.9	Compares with 24GW existing and under construction
Coal	25	25	22	No significant closures
HFO	2	2	2	
OCGT	2.5	2.5	2.5	Modest new capacity added
Renewables	1	1.5	1.4	Dominated by wind
Imports	3.7	3.7	3.7	Nordic and Irish links added
Load reduction + storage	3	3	2.6	
Total	74.8	75.3	71.8	
Plant margin: %	22.6%	23.4%	30.5%	
Excluding interconnectors	14.2%	14.8%	19.2%	
Transmission connected generation mix: TWh				
Nuclear	62.5	62.5	62.5	
CCGT	215.2	215.2	215.2	
Coal	90.4	90.4	49.1	
HFO	0.5	0.4	0.4	
OCGT	4.2	2.8	2.6	
Renewables	3.1	4.6	4.3	
Imports	16.2	16.2	16.2	
Load reduction	0.3	0.3	0.2	
	392.3	392.3	350.5	
Implied annual load factors: %				
Nuclear	82.0%	82.0%	82.0%	
CCGT	85.0%	85.0%	85.0%	
Coal	41.3%	41.3%	25.5%	
HFO	3.0%	2.0%	2.0%	
OCGT	19.0%	13.0%	12.0%	
Renewables	35.0%	35.0%	35.0%	
Imports	50.0%	50.0%	50.0%	
Load reduction	1.0%	1.0%	1.0%	
% of transmission connected in total RO	11.9%	12.9%	13.4%	
Generation shares: %				
Nuclear	15.9%	15.9%	17.8%	
CCGT	54.8%	54.9%	61.4%	
Coal	23.0%	23.0%	14.0%	
HFO	0.1%	0.1%	0.1%	
OCGT	1.1%	0.7%	0.7%	
Renewables	0.8%	1.2%	1.2%	
Imports	4.1%	4.1%	4.6%	
Load reduction	0.1%	0.1%	0.1%	
Indicative CO2 emissions: mt CO2e				
CCGT	79.6	79.6	79.6	
Coal	90.4	90.4	49.1	
HFO	0.4	0.3	0.3	
OCGT	2.7	1.9	1.7	
Total	173.1	172.1	130.7	
Today's emissions: mt CO2e	198	198	198	
Reduction vs today	13%	13%	34%	

Appendix C Assumptions and Background data for 2020 Demand Scenarios

	Base demand	Low demand	High demand	
Licensed electricity sales: TWh	343.3	292	375.8	
RO (20%) target: TWh	68.7	58.4	75.2	
UK grid energy requirements	381	324	417	Grows slower than licensed sales
Carbon price: €/t CO2e	15	15	15	
Baseload power price: £/MWh	34	34	34	Assumes inflation at 2%pa
Peak demand: GW	60	50.5	65	Assumes system load factor rises to 72-73%
Transmission connected capacity mix: GW				
Nuclear	1.3	1.3	6	Only high scenario has more than Sizewell B
CCGT	40	34.2	41	Compares with 24GW existing and under construction
Coal	10	9	9	Only FGD equipment plant remain
HFO	2	1	1	Existing plant using ultra low sulphur fuel oil
OCGT	4	3	5	All new plant
Renewables	8	7	9	Dominated by wind, small amouts wave/tidal
Imports	4.2	4.2	4.2	Nordic and Irish links added
Load reduction + storage	4	3.5	5	
Total	73.5	63.2	80.2	
Plant margin: %	22.5%	25.1%	23.4%	
Excluding interconnectors	13.4%	14.4%	14.5%	
Transmission connected generation mix: TWh				
Nuclear	9.3	9.3	43.1	
CCGT	297.8	254.7	305.3	
Coal	23.4	16.3	16.8	
HFO	0.5	0.2	0.2	
OCGT	6.7	3.4	5.3	
Renewables	24.5	21.5	27.6	
Imports	18.4	18.4	18.4	
Load reduction	0.4	0.3	0.4	
	381.0	324.0	417.0	
Implied annual load factors: %				
Nuclear	82.0%	82.0%	82.0%	
CCGT	85.0%	85.0%	85.0%	
Coal	26.7%	20.6%	21.3%	
HFO	3.0%	2.0%	2.0%	
OCGT	19.0%	13.0%	12.0%	
Renewables	35.0%	35.0%	35.0%	
Imports	50.0%	50.0%	50.0%	
Load reduction	1.0%	1.0%	1.0%	
% of transmission connected in total RO	35.7%	36.8%	36.7%	
Generation shares: %				
Nuclear	2.5%	2.9%	10.3%	
CCGT	78.2%	78.6%	73.2%	
Coal	6.1%	5.0%	4.0%	
HFO	0.1%	0.1%	0.0%	
OCGT	1.7%	1.1%	1.3%	
Renewables	6.4%	6.6%	6.6%	
Imports	4.8%	5.7%	4.4%	
Load reduction	0.1%	0.1%	0.1%	
Indicative CO2 emissions: mt CO2e				
CCGT	110.2	94.2	113.0	
Coal	23.4	16.3	16.8	
HFO	0.4	0.1	0.1	
OCGT	4.3	2.2	3.4	
Total	138.3	112.8	133.3	
Today's emissions: mt CO2e	198	198	198	
Reduction vs today	30%	43%	33%	

Appendix D Breakdown of 2010 Renewable Capacities by Area

Definition of Terms

- RUNG 0 = includes capacity already connected or under construction
- RUNG 1 = real projects very likely to go ahead
- RUNG 2 = real projects likely to go ahead
- SCENARIO A = capacity added under the 2010 High Scottish Onshore Scenario
- SCENARIO B = capacity added under the 2010 High English Offshore Scenario
- TOTAL CAP A = total capacity installed under the High Scottish Onshore Scenario
- TOTAL CAP B = Total capacity installed under the High English Offshore Scenario
- LANDFILL: All the projects have been assumed to go ahead. Our Scenarios have not added any extra capacity.
- Key to area abbreviations:

Abbreviations	Area
N	North
H	Humberside
NY&NL	North Yorkshire and North Lancashire
SY&SL	South Yorkshire and South Lancashire
NW	North Wales
WM	West Midlands
M&A	Rest of Midlands and Anglia
SW	South Wales
Wi	Wiltshire
GL	Greater London
IL	Inner London
SC	South Coast
We	Wessex
P	Peninsula
E	Estuary
NS	North Scotland
SS	South Scotland
NI	Northern Ireland

Table D-1: Renewable Generation Capacity in MW by Region for 2010 Scenarios

AREA	N	H	NY&NL	SY&SL	NW	WM	M&A	SW	Wi	GL	IL	SC	We	P	E	NS	SS	NI	TOTAL
ONSHORE WIND																			
RUNG0	56	0	27.8	41.5	49.7	0	22.7	262.9	0.5	0.2	0	0	0	41.5	0	196.7	127.2	94	920.7
RUNG1	16.8	0	0	0	0	0	14	0	0	0	0	0	0	10.4	0	346.8	115.5	0	503.5
RUNG2	97	110	106	30	71.3	0	71	93.1	0	0	0	1.8	3.9	10.8	75	1689.9	2276	0	4635.8
SCENARIO A	20.4	30	45					6.9					5		7.2	1000	527	57	1698.5
SCENARIO B	20.4	30	45					6.9					5		7.2	-50		57	121.5
TOTAL A	190.2	140	178.8	71.5	121	0	107.7	362.9	0.5	0.2	0	1.8	8.9	62.7	82.2	3233.4	3045.6	151	7758.4
TOTAL B	190.2	140	178.8	71.5	121	0	107.7	362.9	0.5	0.2	0	1.8	8.9	62.7	82.2	2183.4	2518.6	151	6181.4
OFFSHORE WIND																			
RUNG0	3.2																		
RUNG1	198	0	0	0	100	0	0	60	0	0	0	0	0	0	166	0	216	0	740
RUNG2	0	0	0	426	0	0	0	60	0	0	0	0	0	0	0	0	0	0	486
SCENARIO A							55								500	200	400	90	1245
SCENARIO B	280	215	140	120			120								970	200	400	90	2535
TOTAL A	201.2	0	0	426	100	0	55	120	0	0	0	0	0	0	666	200	616	90	2474.2
TOTAL B	478	215	140	546	100	0	120	120	0	0	0	0	0	0	1136	200	616	90	3761
HYDRO																			
RUNG0																			
RUNG1	0.5	0	0	2.5	3.4	0.4	0	8.2	0	0	0	0	0	0.1	0	9.2	1	2.4	27.7
RUNG2	0.2	0	0	2.4	0	0.1	0	0	0	0	0	0	0	0	0	11.9	0	0	14.6
SCENARIO A					5	0.3				0.2	0	0	0.1	0.2	0	90			95.8
SCENARIO B					5	0.3				0.2	0	0	0.1	0.2	0	90			95.8
TOTAL A	0.7	0	0	4.9	8.4	0.8	0	8.2	0	0.2	0	0	0.1	0.3	0	111	1	2.4	138
TOTAL B	0.7	0	0	4.9	8.4	0.8	0	8.2	0	0.2	0	0	0.1	0.3	0	111	1	2.4	138
BIOMASS																			
RUNG0+RUNG1	0	0	0	0	0	0	77.5	0	0	0	0	0	0	1.5	0	9.8	0	0.3	89.1
RUNG2	0	20	0.5	0	0	15.5	34.7	0.3	0	0.5	0	0	1	0	0	30	40	0.6	143.1
SCENARIO A	0	0	0.6	4	0	29.2	28	13.7	25.5	0	0	8	49	64.4	0	0	0	0.3	222.7
SCENARIO B	0	0	0.6	4	0	29.2	28	13.7	25.5	0	0	8	49	64.4	0	0	0	0.3	222.7
TOTAL A	0	20	1.1	4	0	44.7	140.2	14	25.5	0.5	0	8	50	65.9	0	39.8	40	1.2	**454.9**
TOTAL B	0	20	1.1	4	0	44.7	140.2	14	25.5	0.5	0	8	50	65.9	0	39.8	40	1.2	**454.9**
LANDFILL																			
Total Capacity	43.3	14.1	20.5	136.5	16.2	33.3	65.3	34.8	11.1	176.3	0	28.7	21.8	12.8	71.2	7.1	36.7	6.2	**736**
TOTAL CAP A	435.4	154.1	199.3	638.9	245.5	34.1	228	525.9	11.6	176.7	0	30.5	30.7	75.7	819.4	3551.5	3699.3	249.7	**11106**
TOTAL CAP B	712.2	369.1	339.3	758.9	245.5	34.1	293	525.9	11.6	176.7	0	30.5	30.7	75.7	1289.4	2501.5	3172.3	249.7	10816

Table D-2: Renewable Energy Output in TWh by Region for 2010 Scenarios

AREA	N	H	NY&NL	SY&SL	NW	WM	M&A	SW	Wi	GL	IL	SC	We	P	E	NS	SS	NI	TOTAL
ONSHORE WIND																			
RUNG0	0.14	0.00	0.07	0.10	0.12	0.00	0.06	0.64	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.48	0.31	0.23	2.26
RUNG1	0.04	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.85	0.28	0.00	1.23
RUNG2	0.24	0.27	0.26	0.07	0.17	0.00	0.17	0.23	0.00	0.00	0.00	0.00	0.01	0.03	0.18	4.14	5.58	0.00	11.37
SCENARIO A	0.05	0.07	0.11	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.02	2.45	1.29	0.14	4.17
SCENARIO B	0.05	0.07	0.11	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.02	-0.12	0.00	0.14	0.30
TOTAL A	0.47	0.34	0.44	0.18	0.30	0.00	0.26	0.89	0.00	0.00	0.00	0.00	0.02	0.15	0.20	7.93	7.47	0.37	19.03
TOTAL B	0.47	0.34	0.44	0.18	0.30	0.00	0.26	0.89	0.00	0.00	0.00	0.00	0.02	0.15	0.20	5.36	6.18	0.37	15.16
OFFSHORE WIND																			
RUNG0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
RUNG1	0.64	0.00	0.00	0.00	0.32	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.70	0.00	2.40
RUNG2	0.00	0.00	0.00	1.38	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.58
SCENARIO A	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.62	0.65	1.30	0.29	4.04
SCENARIO B	0.91	0.70	0.45	0.39	0.00	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.14	0.65	1.30	0.29	8.22
TOTAL A	0.65	0.00	0.00	1.38	0.32	0.00	0.18	0.39	0.00	0.00	0.00	0.00	0.00	0.00	2.16	0.65	2.00	0.29	8.02
TOTAL B	1.56	0.70	0.45	1.77	0.32	0.00	0.39	0.39	0.00	0.00	0.00	0.00	0.00	0.00	3.68	0.65	2.00	0.29	12.20
HYDRO																			
RUNG0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
RUNG1	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.01	0.11
RUNG2	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.06
SCENARIO A	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.38
SCENARIO B	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.38
TOTAL A	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.01	0.54
TOTAL B	0.00	0.00	0.00	0.02	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.01	0.54
BIOMASS																			
RUNG0+RUNG1	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.06	0.00	0.00	0.51
RUNG2	0.00	0.11	0.00	0.00	0.00	0.09	0.20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.17	0.23	0.00	0.81
SCENARIO A	0.00	0.00	0.00	0.02	0.00	0.17	0.16	0.08	0.15	0.00	0.00	0.05	0.28	0.37	0.00	0.00	0.00	0.00	1.27
SCENARIO B	0.00	0.00	0.00	0.02	0.00	0.17	0.16	0.08	0.15	0.00	0.00	0.05	0.28	0.37	0.00	0.00	0.00	0.00	1.27
TOTAL A	0.00	0.11	0.01	0.02	0.00	0.25	0.80	0.08	0.15	0.00	0.00	0.05	0.28	0.38	0.00	0.23	0.23	0.01	2.59
TOTAL B	0.00	0.11	0.01	0.02	0.00	0.25	0.80	0.08	0.15	0.00	0.00	0.05	0.28	0.38	0.00	0.23	0.23	0.01	2.59
LANDFILL																			
TOTAL	0.32	0.10	0.15	1.02	0.12	0.25	0.49	0.26	0.08	1.31	0.00	0.21	0.16	0.10	0.53	0.05	0.27	0.05	5.48
TOTAL A	1.44	0.45	0.59	2.59	0.77	0.25	0.93	1.57	0.08	1.31	0.00	0.22	0.18	0.25	2.89	9.07	9.74	0.72	35.6
TOTAL B	2.35	1.14	1.04	2.98	0.77	0.25	1.14	1.57	0.08	1.31	0.00	0.22	0.18	0.25	4.41	6.49	8.45	0.72	35.8

Table D-3: Percentage Allocation of Renewable Generation to DNO-level connections

AREA	N	H	NL & NL	SY & SL	NW	WM	M&A	SW	Wi	GL	IL	SC	We	P
ONSHORE WIND														
Current Capacity or under construction	100%	0%	100%	100%	100%	0%	100%	100%	100%	100%	0%	0%	0%	100%
RUNG1	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%
RUNG2	100%	100%	100%	100%	100%	0%	100%	100%	0%	0%	0%	100%	100%	100%
2010-HighOnshore	100%	100%	100%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%	0%
2010-HighOffshore	100%	100%	100%	0%	0%	0%	0%	100%	0%	0%	0%	0%	100%	0%
TOTAL High-Onshore	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	100%	100%
TOTAL High-Offshore	100%	100%	100%	100%	100%	0%	100%	100%	100%	100%	0%	100%	100%	100%
OFFSHORE WIND	**All offshore wind has been connected to the transmission system**													
HYDRO														
RUNG1	100%	0%	0%	100%	100%	100%	0%	100%	0%	0%	0%	0%	0%	100%
RUNG2	100%	0%	0%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%
2010-HighOnshore	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	0%	100%	100%
2010-HighOffshore	0%	0%	0%	0%	100%	100%	0%	0%	0%	100%	0%	0%	100%	100%
TOTAL High-Onshore	100%	0%	0%	100%	100%	100%	0%	100%	0%	100%	0%	0%	100%	100%
TOTAL High-Offshore	100%	0%	0%	100%	100%	100%	0%	100%	0%	100%	0%	0%	100%	100%
BIOMASS														
Current Capacity or under construction	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	100%
RUNG2	0%	100%	100%	0%	0%	100%	100%	100%	0%	100%	0%	0%	100%	0%
2010-HighOnshore	0%	0%	100%	100%	0%	100%	100%	0%	100%	0%	0%	100%	100%	100%
2010-HighOffshore	0%	0%	100%	100%	0%	100%	100%	0%	100%	0%	0%	100%	100%	100%
TOTAL High-Onshore	0%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%
TOTAL High-Offshore	0%	100%	100%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%
Landfill (total)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	100%	100%	100%
TOTAL RUNG1	8%	0%	0%	100%	3%	100%	100%	12%	0%	0%	0%	0%	0%	100%
TOTAL RUNG2	37%	100%	100%	8%	43%	100%	100%	46%	0%	100%	0%	100%	100%	100%
TOTAL High-Onshore	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
TOTAL High-Offshore	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Note: A figure of 0% indicates that there is no generation allocated to that particular technology at either distribution or transmission level

Appendix E Breakdown of 2020 Renewable Capacities by Area

Table E-1: Renewable Generation Capacity Additions for 2020 Base Demand Scenario

AREA		N	H	NY&NL	SY&SL	NW	WM	M&A	SW	Wi	GL	IL	SC	We	P	E	NS	SS	NI	TOTAL
ONSHORE WIND	2010	190	140	179	71	121	0	108	363	1	0	0	2	9	63	82	3233	3046	151	7758
	Capacity Added	90	138	150	0	130			173						0	44	300	340	96	1461
	2020	280	278	329	71	251	0	108	536	1	0	0	2	9	63	126	3533	3386	247	9219
OFFSHORE WIND	2010	201	0	0	426	100	0	55	120	0	0	0	0	0	0	666	200	616	90	2474
	Capacity Added	400	400	400	700	171		1843	180							1000	514		71	
	2020	601	400	400	1126	271	0	1898	300	0	0	0	0	0	0	1666	714	616	161	8153
HYDRO	2010	1	0	0	5	8	1	0	8	0	0	0	0	0	0	0	111	1	2	138
	Capacity Added						10										36			46
	2020	1	0	0	5	8	11	0	8	0	0	0	0	0	0	0	147	1	2	184
BIOMASS	2010	0	20	1.1	4	0	44.7	140.2	14	25.5	0.5	0	8	50	65.9	0	39.8	40	1.2	454.9
	Capacity Added	40	40	50	60	0		140	22	152	120		196	200	200	160	18	20	1	1419
	2020	40	60	51.1	64	0	44.7	280.2	36	177.5	120.5	0	204	250	265.9	160	57.8	60	2.2	1873.9
LANDFILL	2010	43	14	21	137	16	33	65	35	11	176	0	29	22	13	71	7	37	6	736
	Capacity Added	-22	-8	-11	-70	-10	-16	-30	-28	-6	-102		-13	-12		-20		-25	-3	-376
	2020	21	6	10	67	6	17	35	7	5	74	0	15	10	13	51	7	12	3	359
WAVE&TIDAL	2020	100	100	55	75	275			325							50	125	275	46	1426
TO TAL FOR	2010	435	174	201.1	643	245	78.7	368.2	540	37.5	176.5	0	39	81	141.9	819	3590.8	3740	250.2	11560.9
TOTAL FOR	2020	943	744	790.1	1333	536	72.7	2321.2	887	183.5	194.5	0	221	269	341.9	2003	4458.8	4075	415.2	19788.9

All figures in MW

Table E-2: Renewable Generation Capacity Additions for 2020 Low Demand Scenario

AREA		N	H	NY&NL	SY&SL	NW	WM	M&A	SW	Wi	GL	IL	SC	We	P	E	NS	SS	NI	TOTAL
ONSHORE WIND	2010	190	140	179	71	121	0	108	363	1	0	0	2	9	63	82	3233	3046	151	7758
	Capacity Added	90	138	150	0	100			67						0	24	320	340	95	1324
	2020	280	278	329	71	221	0	108	430	1	0	0	2	9	63	106	3553	3386	246	9082
OFFSHORE WIND	2010	201	0	0	426	100	0	55	120	0	0	0	0	0	0	666	200	616	90	2474
	Capacity Added	390	435	450	450	130		700	100							900	104	177	71	
	2020	591	435	450	876	230	0	755	220	0	0	0	0	0	0	1566	304	793	161	6381
HYDRO	2010	1	0	0	5	8	1	0	8	0	0	0	0	0	0	0	111	1	2	138
	Capacity Added						10										36			46
	2020	1	0	0	5	8	11	0	8	0	0	0	0	0	0	0	147	1	2	184
BIOMASS	2010	0	20	1.1	4	0	44.7	140.2	14	25.5	0.5	0	8	50	65.9	0	39.8	40	1.2	454.9
	Capacity Added	40	40	50	60	0		120	22	80	80		106	106	101	100	5	20	1	931
	2020	40	60	51.1	64	0	44.7	260.2	36	105.5	80.5	0	114	156	166.9	100	44.8	60	2.2	1385.9
LANDFILL	2010	43	14	21	137	16	33	65	35	11	176	0	29	22	13	71	7	37	6	736
	Capacity Added	-22	-8	-11	-70	-10	-16	-30	-28	-6	-102		-13	-12		-20		-25	-3	-376
	2020	21	6	10	67	6	17	35	7	5	74	0	15	10	13	51	7	12	3	359
WAVE & TIDAL		100	100	45	50	175			275							50	75	150	20	1040
TO TAL FOR	2010	435	174	201.1	643	245	78.7	368.2	540	37.5	176.5	0	39	81	141.9	819	3590.8	3740	250.2	11561
TOTAL FOR	2020	933	779	840.1	1083	465	72.7	1158.2	701	111.5	154.5	0	131	175	242.9	1823	4055.8	4252	414.2	17392

All figures in MW

Table E-3: Renewable Generation Capacity Additions for 2020 High Demand Scenario

AREA		N	H	NY&NL	SY&SL	NW	WM	M&A	SW	Wi	GL	IL	SC	We	P	E	NS	SS	NI	TOTAL
ONSHORE WIND	2010	190	140	179	71	121	0	108	363	1	0	0	2	9	63	82	3233	3046	151	7758
	Capacity Added	90	138	150	0	130			173						0	44	300	340	96	1461
	2020	280	278	329	71	251	0	108	536	1	0	0	2	9	63	126	3533	3386	247	**9219**
OFFSHORE WIND	2010	201	0	0	426	100	0	55	120	0	0	0	0	0	0	666	200	616	90	2474
	Capacity Added	450	450	446	800	203		1843	330							1300	514	321	161	6818
	2020	651	450	446	1226	303	0	1898	450	0	0	0	0	0	0	1966	714	937	251	**9292**
HYDRO	2010	1	0	0	5	8	1	0	8	0	0	0	0	0	0	0	111	1	2	138
	Capacity Added						10										36			46
	2020	1	0	0	5	8	11	0	8	0	0	0	0	0	0	0	147	1	2	**184**
BIOMASS	2010	0	20	1.1	4	0	44.7	140.2	14	25.5	0.5	0	8	50	65.9	0	39.8	40	1.2	**454.9**
	Capacity Added	10	100	50	100	0	60	230	42	212	200		206	200	200	160	30	20	1	**1821**
	2020	10	120	51.1	104	0	104.7	370.2	56	237.5	200.5	0	214	250	265.9	160	69.8	60	2.2	**2275.9**
LANDFILL	2010	43	14	21	137	16	33	65	35	11	176	0	29	22	13	71	7	37	6	736
	Capacity Added	-22	-8	-11	-70	-10	-16	-30	-28	-6	-102		-13	-12		-20		-25	-3	-376
	2020	21	6	10	67	6	17	35	7	5	74	0	15	10	13	51	7	12	3	**359**
WAVE&TIDAL	2020	125	145	110	95	275		54	325							100	125	275	46	**1675**
TO TAL FOR	2010	435	174	200	643	246	79	354	526	37	177	0	39	81	142	819	3604	3739	251	**11106**
TOTAL FOR	2020	1238	1044	940	1563	760	132	2597	1316	243	275	0	265	269	342	2543	4622	4595	506	**22811**

All figures in MW