Onshore Wind: Powering Ahead

A Report Prepared by BWEA

March 2006

THE BRITISH WIND ENERGY ASSOCIATION

embrace the revolution

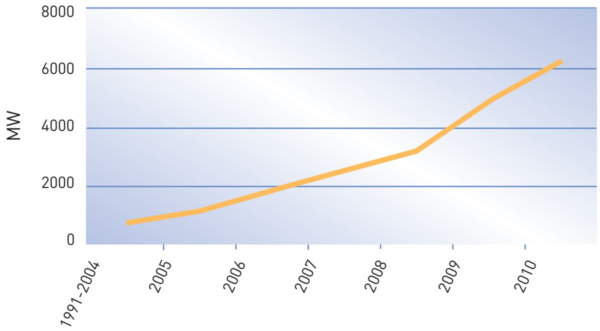
Executive Summary

Onshore wind is the leading renewable energy technology of the times. The UK in particular benefits from the best wind resource in Europe; an indigenous and free fuel supply which is not dependent on imports. Over the last three years, onshore wind build rates have doubled year on year and 2006 is no exception with 665 megawatts (MW) due to be completed by year end, twice that of 2005. With 3,000 MW already certain to be operational by 2010 from projects consented, under construction and currently operating, this report investigates how much additional capacity can progress through the planning system and be built by 2010.

In October 2005 BWEA undertook research to accurately forecast the delivery of onshore wind capacity in the UK by 2010. This research is the most robust and comprehensive ever produced about the onshore wind industry and will be used to inform Government of the contribution this sector will make to the energy mix and its significant role in meeting renewable energy and climate change targets.

The research produced a range of scenarios for onshore delivery and has concluded that the most realistic cumulative onshore wind capacity that will be delivered from operational and forecast projects is at least 6,000 MW or around 16 terawatt hours (TWh) of output by 2010, equating to nearly 5% of projected electricity supply.

Cumulative onshore delivery compiled from operational projects, existing and projected consents (based on average local planning authority approval rates & delays and a 50% approval rate with 36 month delays for Section 36 applications)



Cumulative year on year by country with 50% S36 approval, 36 month S36 decision delay

(91-04)	2005	2006	2007	2008	2009	2010
767	1,124	1,789	2,508	3,241	4,904	6,219

Comparative analysis of deliverables

- Onshore wind alone can deliver almost half the Government's 10% renewable energy target equating to nearly 5% of projected electricity supply by 2010
- By 2020, existing and forecast wind farms are poised to generate at least £4.2 billion for UK plc from the associated investment in development, construction and operation of wind farms and contributions to business rates, local communities and landowners. Further benefits will accrue over the remaining lifetime of projects.

6,000 MW of onshore wind in 2010 will:

- avoid burning the equivalent of 2.9 billion m3 of natural gas or 6 million tonnes of coal, or
- reduce gas imports by 45 days from the UK-Europe gas inter-connector
- avoid 6 million tonnes of carbon dioxide (CO2) emissions from gas-fired power stations or 13 million tonnes of CO2 emissions from coal-fired power stations
- amount to a total of around 3,500 turbines in the UK
- supply the electricity needs (annual average equivalent) of 3.3 million homes or 8 million people, equivalent to the combined populations of London & Glasgow or Scotland and Wales.

Methodology and Objectives

The methodology focused on statistical analysis of data from BWEA's UK Wind Energy Database (UKWED), the most definitive dataset of wind energy projects in the UK. As the industry association, BWEA is also in prime position to establish developer intentions in the near future and has conducted interviews with its member developers to inform forecast submissions.

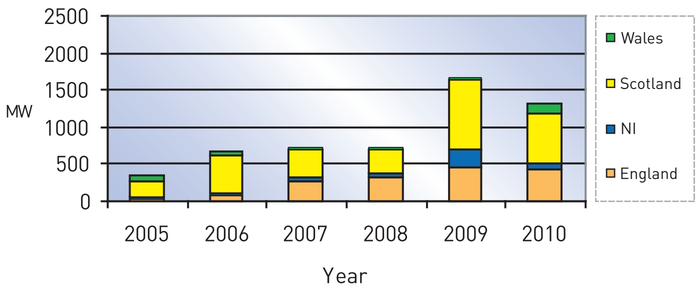
The key objectives of the study were:

- To provide an analysis of wind energy capacity in the planning system, and future submissions that may contribute to the 2010 target
- To determine how much local planning authority (LPA) submitted capacity might be approved in order to contribute to the 2010 target, according to average approval rates in each country taken over the last 4 years and a more conservative 40% approval rate scenario
- To determine how much Section 36 submitted capacity (applicable to projects over 50 MW) might be approved under different approval rate scenarios, and how this might be affected by different decision delay scenarios
- To assess the impact that restricted grid capacity may have on the 2010 forecast
- To assess the impact that continued non-determination of Section 36 projects in Scotland will have on the UK 2010 renewable energy target – current trends suggest that development may be constrained to 2,500 MW
- To assess the potential build scenarios in the Welsh Technical Advice Note 8 (TAN8) Strategic Search Areas
- To add the existing capacity which is built, under construction and consented to the investigations above to give a potential range of onshore wind development year on year to 2010 with cumulative totals and country breakdowns
- **To identify the most realistic assessment that onshore wind capacity can deliver in the UK year on year to 2010.**

Key Findings

- Onshore wind will deliver 50% more than previous projections, increasing to a cumulative total of at least 6,000 MW by 2010

LPA & Section 36 UK total year on year build by country with 50% approval rate & 36 month decision delay scenario

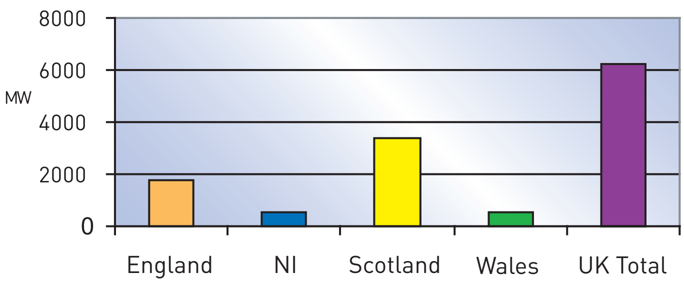


Year on year build by country with average LPA approval rates & delays, and 50% approval rates over 36 month delays for Section 36 projects (MW)

	2005	2006	2007	2008	2009	2010
England:	39	81	261	336	448	435
NI:	20	17	73	35	240	87
Scotland:	218	521	360	334	951	666
Wales:	80	46	25	28	24	127
Total:	**357**	**665**	**719**	**733**	**1,663**	**1,315**

- Scotland is expected to make the greatest contribution as it benefits from having the best wind resource in the UK

UK estimated 2010 build by country



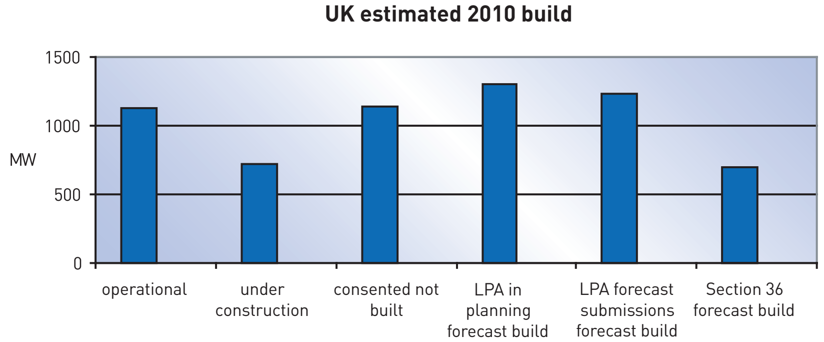
	(MW)
England:	1,774
Northern Ireland:	543
Scotland:	3,397
Wales:	505
UK Total:	**6,219**

- Approximately 3,000 MW of onshore wind development comprising operational, under construction and approved wind farms is confirmed for 2010
- Approximately 1,300 MW of onshore wind energy capacity currently in the local planning process (including appeals) is expected to be approved and built by 2010, given average approval rates and decision times

(continued)

Key Findings (cont)

- Approximately 1,250 MW of onshore wind energy capacity from forthcoming local authority planning submissions is expected to be approved and built by 2010, given average approval rates and decision times
- A range of 340 MW to 1,772 MW of onshore wind energy capacity currently in the Section 36 assessment process is expected to be approved and built by 2010, given alternate approval rate scenarios and decision delays. The most realistic forecast assumes 699 MW build by 2010 based on a 50% approval rate and 36 month decision times
- A range of onshore wind capacity between 4,681 MW (worst case) to 7,515 MW (best case) is deliverable by 2010. This range depends on a variety of factors: local planning authority approval rates & decision delays, Section 36 approval rates & decision delays, the level of development in the Welsh TAN8 Strategic Search Areas and the extent to which development in Scotland that would contribute to the 2020 target can to be brought forward for delivery in 2010

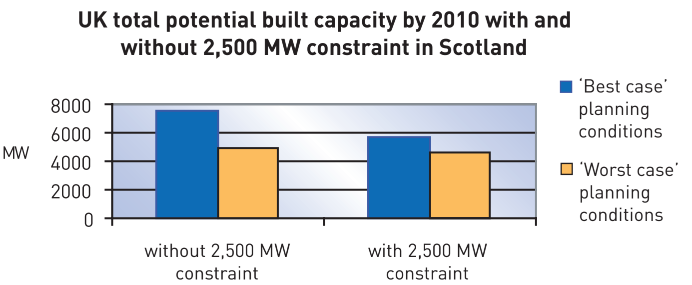


	(MW)
Operational:	1,124
Under construction:	723
Consented not built:	1,138
LPA in planning forecast build:	1,297
LPA forecast submissions forecast build:	1,238
Section 36 forecast build:	699
Total:	**6,219**

- The local planning process is very inconsistent with significant contrasts in performance across the four countries of the UK. Decision times are 10 months in England; 14 months in Scotland; 27 months in Wales and 28 months in Northern Ireland (wind farm planning applications supported by an Environmental Impact Assessment should be determined within 16 weeks). Approval rates range from 59% to 100% (by MW capacity) on average (based on decisions made between January 2002 and October 2005)

Key Issues

- Based on a 'business as usual' scenario for local decision making and a pragmatic approach to Section 36 decisions and timeframes, at least 6,000 MW of onshore wind will be delivered by 2010. This assumes existing approval rates at the local level with decisions being made at the existing rate of 10 to 28 months from submission. It also assumes a 50% approval rate with decisions times of three years for Section 36 applications
- The industry is ready and able to deliver at least 6,000 MW as long as the pace of the planning system does not deteriorate beyond the current decision times
- The TAN8 Strategic Search Areas are anticipated to contribute up to 221 MW of additional capacity relative to the 800 MW onshore target set by the Welsh Assembly Government
- Forthcoming planning decisions in Scotland are essential as 3,397 MW of the forecast capacity will need to be met in Scotland. Only 2,500 MW of onshore wind development in Scotland will be achieved if the existing trend of non-determination of Section 36 projects is maintained. Only 509 MW have been determined in the last two years while 3,267 MW were submitted during the same period
- Delivery of only 2,500 MW in Scotland would have a significant impact on the total UK built capacity by 2010. With no constraint, 4,999 MW to 7,515 MW of capacity could be built in the UK under 'worst case' and 'best case' planning conditions respectively. If development is constrained to 2,500 MW in Scotland, 4,681 MW to 5,654 MW of capacity would be the maximum range, thereby eliminating a capacity of between 318 MW and 1,861 MW from the UK 2010 target



Total UK potential built capacity with and without 2,500 MW constraint in Scotland (MW)

	Without constraint	With constraint
Best case planning Conditions	7,515	5,654
Worst case planning conditions	4,999	4,681

(continued)

Key Issues (cont)

- Grid capacity will not be a barrier to the installation of 6,000 MW of onshore wind by 2010 provided all the development activity is not targeted in the north of Scotland, although without upgrades it will be an increasing constraint to free access to the nominal capacity of the system at any one time. Grid capacity constraints also represent a significant barrier to maintaining the momentum of development for all renewable technologies early in the next decade
- Depending on the local planning and Section 36 decision making process, onshore wind could deliver much more than 6,000 MW – potentially as much as 7,515 MW.

Recommendations

- UK Government and devolved administrations in Scotland, Wales and Northern Ireland must maintain a positive and robust approach to national, regional and local planning policy in accordance with the Government's renewable energy and climate change targets
- Action must be taken to address local planning decision delays across the UK, in particular Wales and Northern Ireland where additional contributions to the 2010 renewable energy targets are severely constrained
- With the average decision time for Section 36 applications moving upwards, prompt action is required to ensure the necessary resources and skills are put in place to ensure quality and timeliness of decision making
- In driving forward the Welsh 800 MW onshore wind target, the Welsh Assembly Government must:
  - oversee efficient preparation of Supplementary Planning Guidance and ensure local planning authorities policy revisions are consistent with the Assembly's national policy on renewable energy as contained in TAN8
  - encourage development activity outside Forestry Commission-owned land within the Strategic Search Areas
  - oversee prompt decision making with the necessary resources being committed at the local level,
    - and for Section 36 projects, the Department of Trade and Industry should also ensure timely decision making and commit to additional resources in order to reflect the increase in development activity thus ensuring a greater contribution from Wales to the 2010 target
- To contribute up to £2.5 billion to the Scottish economy by 2020; ensure that 6,000 MW of onshore wind can be delivered in the UK, and provide the necessary confidence for future investment in all renewable technologies in Scotland, the Scottish Executive must:
  - avoid a hiatus of onshore wind delivery towards the end of this decade and therefore bring forward the early delivery of Scotland's 2020 renewable energy target
  - accelerate its decision making process for Section 36 applications - not all decisions are expected to be favourable but they must be made in realistic timescales
- Plans to reinforce the grid infrastructure in northern Scotland, mid-Wales and Northern Ireland should move forward urgently to facilitate the full utilisation of generating capacity; provide the necessary investor confidence for all renewable technologies and to avoid a hiatus early in the next decade at a time when momentum of onshore wind delivery must be maintained.

Contents

1. Introduction

The renewable energy context

1.1 Climate change is the most serious environmental threat to the world, indeed Sir David King, the UK's Chief Scientific Officer, considers climate change to be the most severe problem we are facing today. Climate change caused by greenhouse gas emissions, in particular carbon dioxide, will put millions of people at risk and cause irreversible loss of many plant and animal species. Sea levels are expected to rise by over 40 centimetres by the end of the century with many of the poorest countries in the world experiencing flooding, drought, food shortages and disease.[3]

1.2 The Kyoto Protocol is a legally binding agreement that commits signatory countries to reduce greenhouse gas emissions, and was formally ratified in 2005. The UK is committed to a 5.2% reduction in greenhouse gases below 1990 levels by 2008-2012, and the Royal Commission on Environmental Pollution has called for a 60% reduction of carbon dioxide emissions by 2050[5]. The UK is also committed to providing 10% of its electricity from renewable energy sources by 2010. The Renewables Obligation places a requirement on electricity suppliers to provide an increasing proportion of electricity from renewable sources; the current obligation is 5.5%, rising to 15.4% by 2015. Table 1 sets out the UK's emissions and renewable energy targets.[4]

1.3 Onshore wind energy is the most economically and technically advanced of all renewables, able to compete in cost with other conventional generation and deliver on a large scale. This report demonstrates that onshore wind will the make the largest contribution to renewable energy capacity by 2010, at least 6,000 MW. Onshore wind is now a well established renewable energy industry offering significant benefits through the reduction of carbon dioxide emissions, meeting renewable energy targets, securing electricity supply and delivering investment to UK plc.

Table 1: UK emissions reduction targets

- Reduce greenhouse gas emissions by 12.5% below 1990 levels by 2008-2012 as the UK's agreed commitment to the Kyoto Protocol[3]
- Reduce UK CO2 emissions by 20% below 1990 levels by the year 2010 as an aspiration for the UK Government[3]
- Produce 10 per cent of energy from renewable sources by 2010 and 15 per cent by 2015, with an aspiration of 20 per cent by 2020
- Put the UK on a path to reduce carbon dioxide emissions by some 60% by 2050, with real progress by 2020[5]
- Reduce greenhouse gases by 15-30 percent by 2020 from 1990 levels as proposed by the European Union.

1.4 BWEA has reviewed the installed onshore wind energy capacity that can be delivered by 2010. The extent of delivery will depend on a variety of factors, with planning approval rates and decision delays being the key factor. In order to understand what is likely to be delivered onshore, an analysis underpins this report, which assesses how much of the wind energy capacity currently or shortly to be submitted within the planning system will be built by 2010 under different planning scenarios.

2. Methodology & objectives

2.1 Objectives

The key objectives of the study are:

- To provide an analysis of wind energy capacity in the planning system, and future submissions that may contribute to the 2010 target
- To determine how much local planning authority (LPA) submitted capacity might be approved in order to contribute to the 2010 target, according to average approval rates in each country taken over the last 4 years, and a more conservative 40% approval rate scenario
- To determine how much capacity submitted under Section 36 of the Electricity Act (applicable to projects over 50 MW) might be approved under different approval rate scenarios, and how this might be affected by different decision delay scenarios
- To assess the impact that restricted grid capacity may have on the 2010 forecast
- To assess the impact that continued non-determination of Section 36 projects in Scotland will have on the UK 2010 renewable energy target – current trends suggest that development may be constrained to 2,500 MW
- To assess the potential build scenarios in the Welsh Technical Advice Note 8 (TAN8) Strategic Search Areas
- To add the existing capacity which is built, under construction and consented to the investigations above to give a potential range of onshore wind development year on year to 2010 with cumulative totals and country breakdowns
- **To identify the most realistic assessment that onshore wind capacity can deliver in the UK year on year to 2010.**

2.2 Data assumptions

- Post-consent to build delays – the time taken between planning approval being granted and commissioning of the wind farm – have been factored into the entire analysis. A report[6] by Land Use Consultants (LUC) for the Renewables Advisory Board (RAB) identifies the average consent to build delay in the UK as 20 months. However these delays have been increasing since 1995, and are likely to continue to do so due to a variety of factors. In particular, the growing demand for grid connection coupled with the increase in the size and scale of projects is leading to greater delays. The LUC report identifies projects over 50 MW as having the longest consent to build delays; 35 months in England and 27 months in Scotland.

Using this information and data from BWEA's UK Wind Energy Database (UKWED), the most definitive dataset of wind energy projects in the UK, it can be concluded that the size of project is directly related to post-consent delay. In response to this, a conservative assumption has been made that projects up to 50 MW will have a post-consent delay of two and a half years, except for Northern Ireland where a two year delay has been applied (NI employs a different system with Section 106 agreements negotiated as part of the planning assessment process which leads to a shorter post-consent to operation delay). Projects of 50-100 MW have been assigned a delay of three years and projects of 100 MW+ have a delay of four years applied. The post-consent to build delay affects the date by which an application must be determined, in order to be built by 2010.

- At the time the research was conducted, the Section 36 approval rate was 94%. It is unrealistic that this approval rate will be maintained, particularly given the large amount of capacity submitted. Therefore alternate approval rate scenarios of 30%, 50% & 70% have been applied.
- A 10% 'attrition rate' has been applied to all applications in planning, and all projects that are consented but not yet constructed. This compensates for projects that are downsized post consent, projects that get approved but do not get built and projects that are withdrawn from the planning process.
- A 25% 'attrition rate' has been applied to all estimated forthcoming projects. This compensates for projects that do not actually enter the planning system, projects that are downsized post consent, projects that get approved but do not get built and projects that are withdrawn from the planning process.
- It has been assumed that the majority of projects have applied for connection to the grid and are therefore in possession of, or awaiting a connection offer.
- The number of MW's in planning that will be approved in order to be built by 2010 is based upon average approval rates and decision delays for each individual country and type of application (local planning authority, Section 36 or appeal).
- For 2006 forecast planning submissions, an estimate was made based on developer questionnaire responses on their anticipated forthcoming planning applications. For 2007 forecast submissions, an estimate was made by taking an average across the previous five years submitted capacity. Forthcoming applications have only been included where it is estimated that they could be built by 2010, which depends on planning decision delays, therefore in England and Scotland applications up to 2007 have been included, for Wales and Northern Ireland, only part of 2006 forthcoming applications are included, due to lengthy average decision times.

2.3 Data Analysis

- There are some minor differences between headline figures depending on how the data has been analysed (by year,by country, by approval rate and decision delay), due to the effect of decimal figures in the breakdown
- Average approval rates and decision delays have been calculated using data from UKWED, BWEA's comprehensive wind energy database
- Wind farm developer questionnaires were used to estimate future applications. Twenty-two wind energy developers contributed to the questionnaire research from October 2005 to January 2006
- The average figures for approval rates and delays that have been provided are for the period between 01/01/2002 to 31/10/2005
- Average approval rate was calculated by the number of megawatts decided rather than the number of projects

3. Planning approval rates

3.1 Average approval rates vary by country and the type of application – whether it is local planning authority (LPA), Section 36 (S36) or an appeal. The analysis in this report uses average approval rates between 2002-2005 for LPA applications and appeals by country, therefore the results obtained reflect the current conditions and do not account for future increases or decreases in LPA approvals and appeals. For Section 36 applications it is not expected that the current 94% approval rate will be maintained, therefore three different approval rate scenarios of 30%, 50% and 70% have been applied, representing worst, medium and best case.

Local planning authority applications & appeals

3.2 There have been historical differences by country in local authority approval rates. Approval rates are calculated by MW capacity rather than scheme because this more accurately reflects renewable energy targets. The lowest approval rates have been seen in Wales, with 0%, 10% and 20% approval rates in some years, whilst Scotland has had high approval rates at around 80%, however the approval rate in Scotland dropped to 40% in 2005 , and this has lowered the average. In England approval rates have been around 60-70%, and Northern Ireland so far has a 100% approval rate. Average approval rates for 2002-2005 are set out in Table 2 below.

Table 2: 2002-2005 average local planning approval rates by MW		
	Planning applications	Appeals
England	77%	38%
Northern Ireland	100%	n/a
Scotland	59%	51%
Wales	63%	41%

3.3 It is not expected that the high approval rate in Northern Ireland will be maintained, therefore in order to provide a more conservative estimate an approval rate of 70% has been applied throughout the analysis.

3.4 The average time it takes for applications to be determined in each country has an impact on how much capacity can be delivered by 2010. For example it takes twice as long for an application to be determined in Wales than it does in Scotland therefore this has an effect on the amount of forthcoming planning applications that can be included for consideration. In Wales and Northern Ireland only a small capacity of forthcoming applications (that can be determined in time to be built by 2010) are included, due to the long average decision times in these countries.

3.5 Charts 1 & 2 illustrate existing planning applications and forthcoming applications (that could be built in time for 2010 taking into account decision delays), and of this, the capacity that is estimated to be built with the current average approval rates (with attrition rates factored in). It is estimated that there will be around 5,000 MW of capacity from local authority planning submissions (currently in planning & forthcoming) that could contribute to the 2010 target, of which approximately 2,500 MW is expected to be consented and built. Forthcoming capacity to 2010 for NI and Wales is low due to long planning decision delays. Charts 1 & 2 also illustrate a 40% approval rate scenario, with the estimated built capacity from local authority applications decreasing to around 1,700 MW. Therefore, approximately 800 MW of capacity may be lost from the 2010 target if local authority approval rates were to drop to 40%.

3.6 Chart 3 shows year on year build from capacity currently approved and awaiting construction in addition to forecast consents, with 2005 build illustrated.

Chart 1: UK current local planning & appeal applications expected built capacity

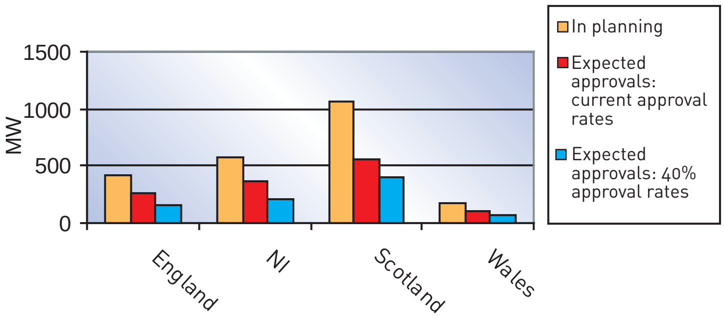


Chart 2: UK forthcoming local planning applications & appeals built capacity

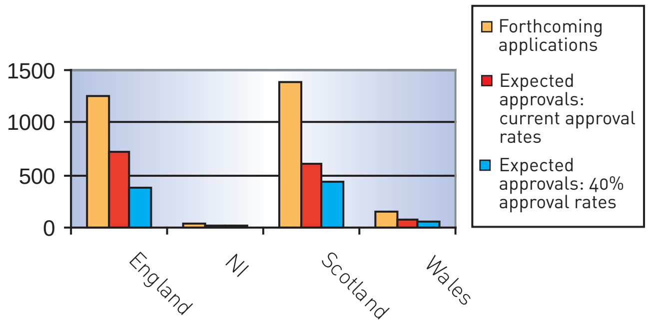


Table 3: UK current local planning & appeal applications and expected built capacity (MW)		England	NI	Scotland	Wales
Current applications		422	578	1,065	183
Expected built capacity	(current app. rate):	267	364	562	105
Expected built capacity	(40% app. rate):	154	208	408	66

Table 4: UK forthcoming local planning applications & appeal built capacity (MW)		England	NI	Scotland	Wales
Forthcoming applications		1,253	38	1,378	161
Expected built capacity	(current app. rate):	630	20	513	75
Expected built capacity	(40% app. rate):	337	11	437	52

Chart 3: Year on year build comprising existing LPA & Section S36 approved capacity, plus forthcoming LPA consents (current approval rates)

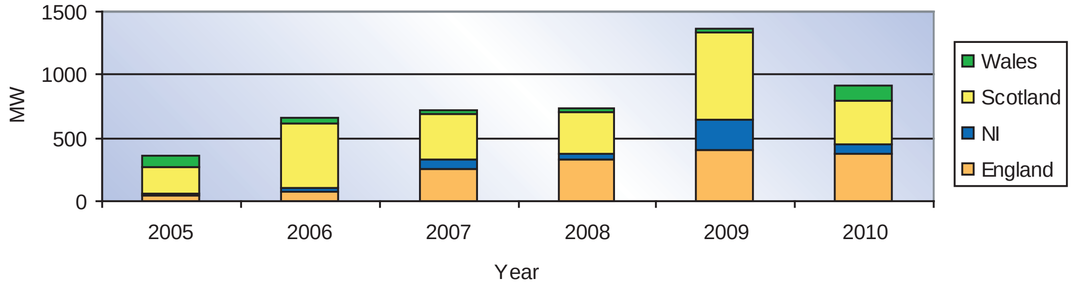


Table 5: Year on year build comprising existing LPA & Section 36 approved capacity, plus forthcoming LPA consents (MW)

	(1991-2004) (UK 767 MW)	2005	2006	2007	2008	2009	2010
England:		39	81	261	336	412	368
Northern Ireland		20	17	73	35	240	87
Scotland		218	521	360	334	683	338
Wales		80	46	25	28	24	127
TOTAL:		**357**	**665**	**719**	**733**	**1,359**	**920**

Section 36 applications

3.7 There are currently over 2,468 MW of Section 36 applications that could be determined in time to be built for 2010, therefore the approval rate for Section 36 applications has the potential to make a significant impact on the delivery of onshore wind capacity. An assumption has been made for Section 36 applications that the existing 94% approval rate will not be maintained, and three different approval rate scenarios have been applied to reflect best (70%), medium (50%) and worst case (30%) approval rates. Chart 4 illustrates the Section 36 capacity currently in planning (that could be built in time for 2010). Charts 5-10 illustrate the impact three different Section 36 approval rate scenarios would have on the total delivery of onshore wind, year on year to 2010.

Chart 4: Section 36 capacity in planning and potential delivery with three different approval rate scenarios

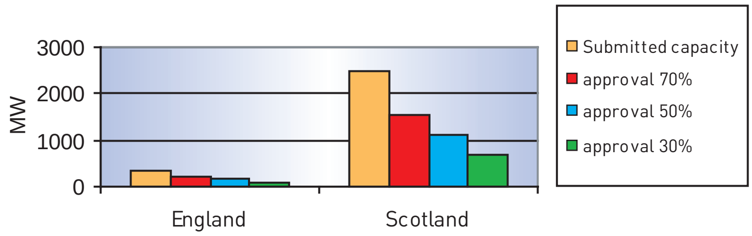


Table 6: Section 36 capacity in planning and potential delivery with three different approval rate scenarios (MW)

	England	Scotland
In planning:	343	2,468
Approval rate scenarios with 10% attrition factor included		
70% approval:	216	1,555
50% approval:	155	1,111
30% approval:	93	666

Chart 5: LPA & Section 36 year on year build by country with 30% Section 36 approval

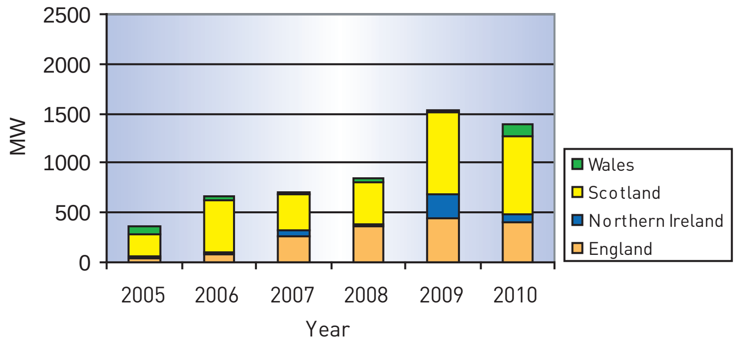


Chart 6: LPA & Section 36 cumulative year on year build with 30% Section 36 approval

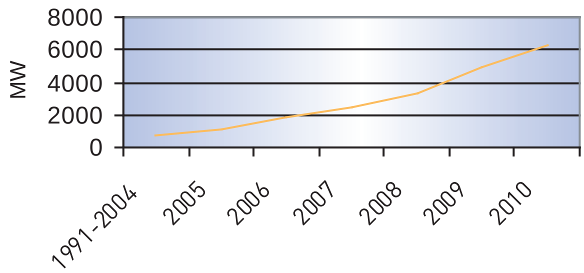


Table 7: LPA & Section 36 year on year build by country with 30% Section 36 approval

	2005	2006	2007	2008	2009	2010
England	39	81	261	358	452	399
Northern Ireland	20	17	73	35	240	87
Scotland	218	521	360	424	824	775
Wales	80	46	25	28	24	127
TOTAL:	**357**	**665**	**719**	**845**	**1,540**	**1,388**

Table 8: LPA & Section 36 cumulative year on year build with 30% Section 36 approval

(1991-2004)	2005	2006	2007	2008	2009	2010
767	1,124	1,789	2,508	3,353	4,893	6,281

Chart 7: LPA & Section 36 year on year build by country with 50% Section 36 approval

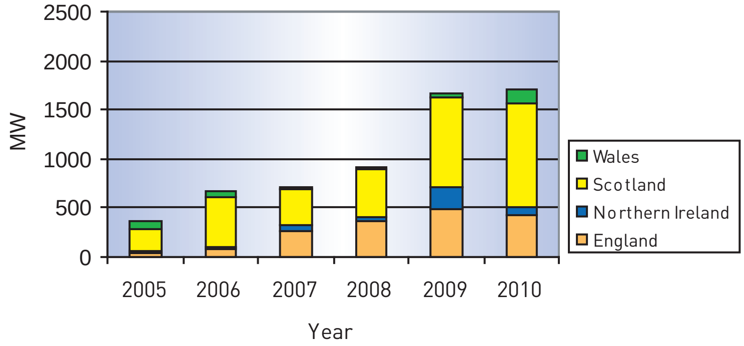


Chart 8: LPA & Section 36 cumulative year on year build with 50% Section 36 approval

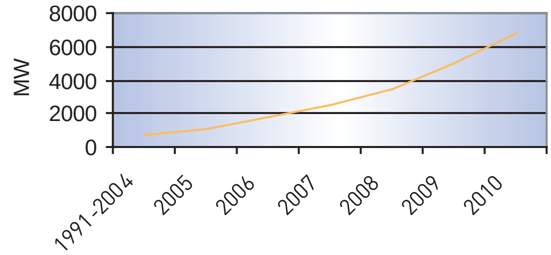


Table 9: LPA & Section 36 year on year build by country with 50% Section 36 approval

	2005	2006	2007	2008	2009	2010
England	39	81	261	372	479	419
Northern Ireland	20	17	73	35	240	87
Scotland	218	521	360	483	917	1,067
Wales	80	46	25	28	24	127
TOTAL:	**357**	**665**	**719**	**918**	**1,660**	**1,700**

Table 10: LPA & Section 36 cumulative year on year build with 50% Section 36 approval

(1991-2004)	2005	2006	2007	2008	2009	2010
767	1,124	1,789	2,508	3,426	5,086	6,786

Chart 9: LPA & Section 36 year on year build by country with 70% Section 36 approval

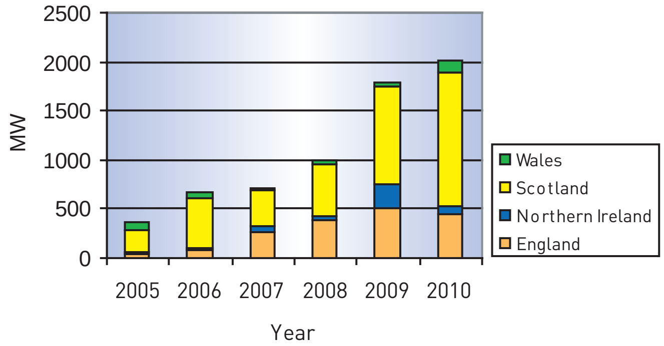


Chart 10: LPA & Section 36 cumulative year on year build with 70% Section 36 approval

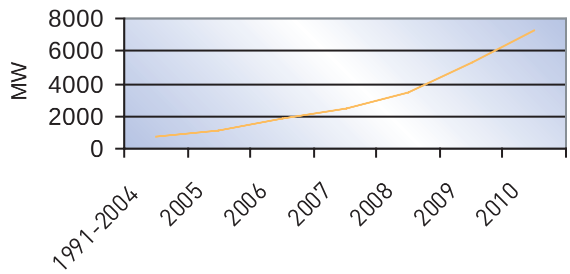


Table 11: LPA & Section 36 year on year build by country with 70% Section 36 approval

	2005	2006	2007	2008	2009	2010
England	39	81	261	386	506	440
Northern Ireland	20	17	73	35	240	87
Scotland	218	521	360	543	1,010	1,358
Wales	80	46	25	28	24	127
TOTAL:	**357**	**665**	**719**	**992**	**1,780**	**2,012**

Table 12: LPA & Section 36 cumulative year on year build with 70% Section 36 approval

(1991-2004)	2005	2006	2007	2008	2009	2010
767	1,124	1,789	2,508	3,500	5,280	7,292

4. Planning decision delays

4.1 The length of time it takes to determine an application remains a key barrier to the timely delivery of onshore wind. Average decision times also vary by country and type of application (LPA, S36 or appeal). By calculating average approval rates and decision delays it is possible to have an indication of how much capacity will be approved, and when. If post-consent to build delays are then included it is possible to indicate the capacity that can actually be built each year.

4.2 In Wales and Northern Ireland it currently takes on average 27 and 28 months respectively for local authority applications to be determined. In England and Scotland it is 10 & 14 months. Approximately 2,500 MW of local authority capacity (charts 1 & 2) in planning plus forthcoming submissions is estimated to be approved in time for 2010 build. However this will not be achieved if current local authority decision times increase; part of this capacity would be pushed into the next decade.

4.3 To date, Section 36 applications have taken an average of 21 months to be determined in the UK. This does not include data for the majority of Section 36 applications that are still awaiting a decision; therefore it is likely that the average decision time will increase. An increase in Section 36 decision delays will mean many current applications will not be determined in time to be built by 2010. Chart 12 illustrates the effect that increased decision delays combined with different approval rates would have on the estimated built capacity by 2010.

Chart 11: Potential S36 capacity that could be built by 2010 with different approval rate & decision delay scenarios

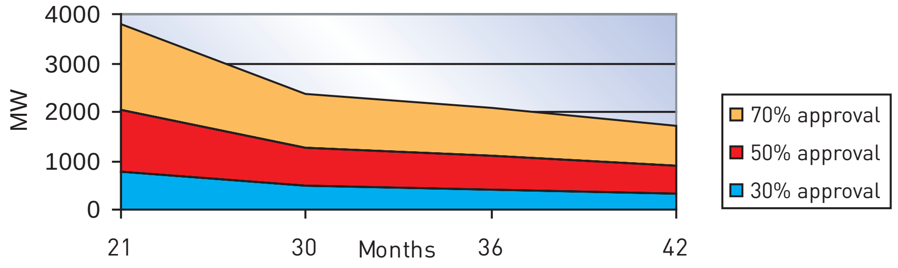


Table 13: Potential Section 36 capacity that could be built by 2010 with different approval rate & decision delay scenarios (MW)

	21 months	30 months	36 months	42 months
30% approval	759	474	420	340
50% approval	1,265	790	699	566
70% approval	1,772	1,106	979	793

4.4 With relatively few Section 36 decisions made in comparison to current capacity in planning, it is not known what the average approval rate and decision delays will be in the years leading up to 2010. Therefore the most realistic assessment of decision delays based on current trends is 36 months, and 50% has been selected as a conservative and realistic estimate for approval rates. **Therefore the headline build rates and associated economic benefits contained in the executive summary and conclusions are based on this scenario.** Chart 12 and Table 14 illustrate different Section 36 decision delay and approval rate scenarios, with the assigned scenario of a 36 month delay, 50% approval rate giving an estimate of **6,221 MW** built capacity by 2010.

Chart 12: UK total built capacity (including local authority applications & appeals) by 2010 with different S36 approval rate & decision delay scenarios

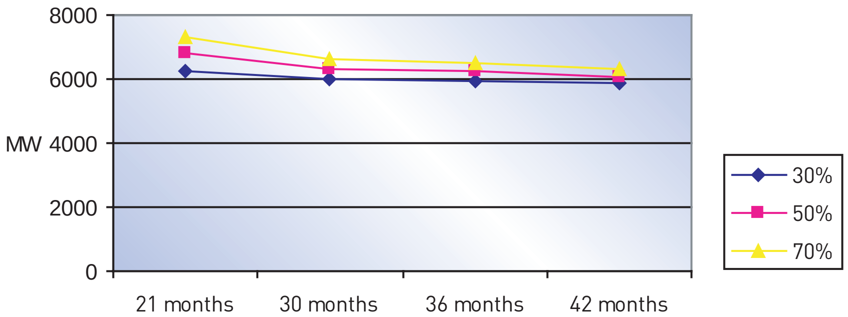


Table 14: UK total built capacity (including local authority applications & appeals) by 2010 with different S36 approval rate & decision delay scenarios (MW)

	21 months	30 months	36 months	42 months
30%	6,281	5,996	5,942	5,862
50%	6,787	6,312	6,221	6,088
70%	7,294	6,628	6,501	6,315

5. Grid Barriers

5.1 Grid infrastructure is essential to bridge the gap between the main population centres and the best sources of renewable energy. If the best sites in terms of energy resource and environmental impact are to be developed, the appropriate upgrades and extensions to the Transmission and Distribution networks must be implemented.

5.2 The grid is also critical to the amount of capacity that will be installed by 2010 and beyond, and this issue is particularly important in Scotland, Wales and Northern Ireland. Grid capacity is not considered to be a constraining factor to development in England by 2010.

5.3 There is a great deal of development interest in Scotland, and with reason. Scotland has 25% of Europe's wind resource, and is relatively unconstrained in regard to built development, with a robust national planning policy in place since the publication of NPPG6 in 2000. There is approximately 5,400 MW of capacity currently in planning in Scotland equating to 74 wind farm applications, in particular there is a great deal of developer interest in the SSE transmission area, in the north of Scotland.

5.4 There are two main barriers that arise from the grid: a) Limitations of grid capacity for new projects to connect: several upgrades are required in Scotland, Wales and Northern Ireland to allow new generators to connect to the grid, and b) The way the grid queue is managed - it is not necessary to hold an offer for connection to the grid system before a project enters the planning system, nor is it necessary for a project to have planning approval before applying for a connection offer, therefore a mismatch can occur between planning approval and grid offers, where potential capacity is wasted by projects that can't proceed though the planning system. A third barrier for some developers is this financial risk involved in accepting a grid offer for a project that may not materialise through the planning system.

Scotland

5.5 In the north of Scotland, some projects are being offered connection dates beyond 2010 that are dependent on system upgrades. However at present around 1,500 MW of projects (operational, under construction, in planning and scoping projects) in northern Scotland hold unconstrained offers for connection by 2010. The most significant upgrade with respect to the 2010 target is the proposed Beauly-Denny circuit, which would provide up to 1,000 MW of additional grid capacity.

5.6 A further 1,000 MW of projects hold offers which are contingent on the completion of the upgrade to the Beauly Denny circuit. Depending on the timing of the Beauly Denny upgrade, and again, how the queue for grid connection applications is managed, this 1,000 MW of capacity may be able to contribute to the 2010 target. Also of importance if Beauly-Denny is consented, is that offers for grid connections should be given in parallel to building Beauly-Denny; otherwise developers will not be able to proceed in time for 2010 with certainty of an offer. Approximately half the 1,000 MW Beauly-Denny contingent capacity is already submitted in the planning system, therefore 500 MW of Beauly-Denny contingent projects could be built if they receive planning permission. However if approval rates and decision delays are factored in, it is possible that none of the 500 MW in planning with a Beauly-Denny contingent connection offer could get built. The entire 1,000 MW Beauly-Denny contingent capacity could be utilised by 2010 if the grid queue is managed in a way that allows projects to be moved in the queue, depending on their planning status.

5.7 The remaining projects in northern Scotland that do not hold part of the 1,500 MW of unconstrained offers or the 1,000 MW Beauly-Denny contingent capacity, are currently being offered dates to connect of 2013 and later - dependent on a series of grid upgrades other than Beauly-Denny, including connectors from Lewis, Shetland and Orkney. These would not currently be able to contribute to the 2010 target unless their connection dates are brought forward when projects with earlier connection dates withdrew.

Wales

5.8 There is currently a shortage of available grid capacity in mid-Wales and in order for a significant proportion of the Wales 2010 onshore wind energy target to be connected, reinforcements are urgently required. There are current delays in securing the reinforcement while decisions on the necessary investment and route selection remain undetermined. This is leading to uncertainty for both the grid operators and wind farm developers in Wales.

Northern Ireland

5.9 The Northern Ireland grid infrastructure is able to accommodate approximately 400 MW of wind energy capacity without further important reinforcements. The Department of Enterprise Trade and Investment must give the strategic direction to Northern Ireland Electricity (NIE) to undertake a programme of grid reinforcements to allow Northern Ireland to meet its targets for 2012 and beyond. Grid infrastructure reinforcements require a long lead-time and must be addressed immediately to provide the appropriate transition to a low-carbon electricity industry in Northern Ireland.

5.10 Grid Recommendations

Scotland

The grid could potentially affect the delivery of a further 1,000 MW of capacity – this capacity could definitely be utilised, if the following actions are taken:

- Beauly-Denny is built in time for 2010 connections to be made, contributing 1,000 MW of connection capacity, which may or may not be fully utilised dependent on the management of the grid queuing system.
- Beauly-Denny is built and there is improved managing of the queuing system to allow more advanced projects to proceed ahead of those with a connection offer but which have fallen behind in the planning system, contributing an additional 1,000 MW to existing built, approved and under construction capacity by 2010.
- If a decision has been made to go ahead with the upgrade, individual project grid connection agreements should be administered in parallel to building Beauly-Denny, otherwise developers will not have certainty of a grid offer in time to build by 2010.
- Security measures and constraints are revised to allow greater existing grid capacity to be utilised

Northern Ireland

- In Northern Ireland the Department of Enterprise Trade and Investment must give the strategic direction to NIE to undertake a programme of grid reinforcements.

Wales

- Coordinated action by the Welsh Assembly Government, grid operators, Ofgem, local planning authorities and the wind industry must take place to ensure prompt investment, route selection and planning consent is forthcoming, to secure the necessary grid reinforcements.

6. Analysis by Country

England

6.1 For the 2010 target, the contribution that will come from England will largely depend on local authority application approval rates, given that there is currently only 343 MW of Section 36 projects in planning (some or most of which may be approved for 2010 build), compared to approximately 1,700 MW of local authority current and forthcoming applications (of which 850 MW is expected to be approved for 2010 build). Charts 13 and 14 illustrate the estimated built capacity for England up to 2010 including the three approval rate scenarios for Section 36 projects.

Chart 13: England year on year build

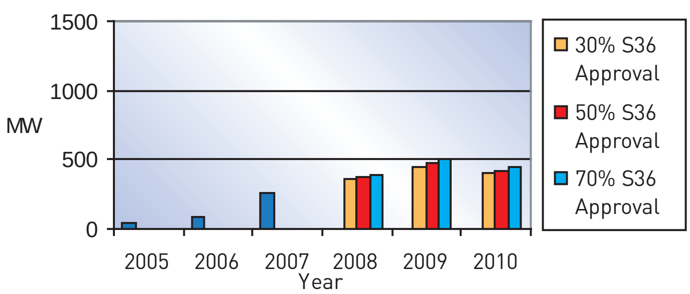


Table 15: England year on year build (MW)

1991-2004:	176
2005:	40
2006:	81
2007:	260
2008:	357 / 371 / 385
2009:	451 / 478 / 505
2010:	399 / 419 / 440
TOTAL:	**1,764 / 1,825 / 1,887**

Chart 14: England built capacity by 2010

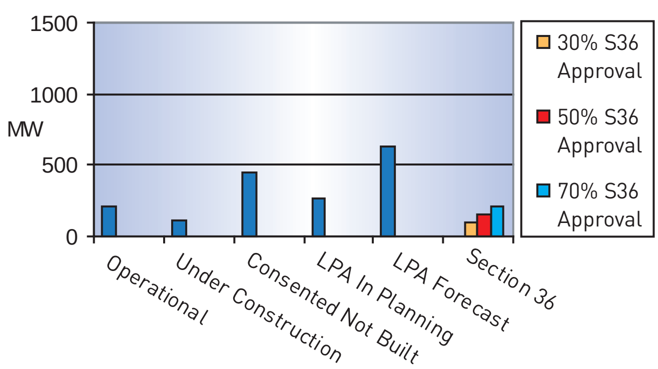
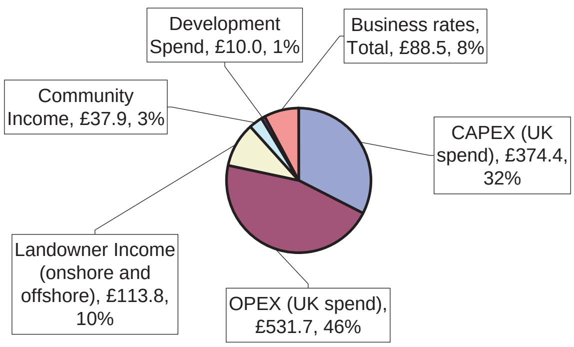


Table 16: England built capacity by 2010 (MW)

Operational:	211
Under construction:	112
Consented not built:	451
LPA in planning expected build:	267
LPA forecast submissions expected build:	630
Section 36:	93 / 154 / 216
TOTAL:	**1,764 / 1,825 / 1,887**

6.2 The most realistic assessment of onshore delivery based on the selected Section 36 scenario (50% approval rate with 36 month decision delay) means England will have 1,774 MW (table 27) built by 2010. This will generate at least £1,156 million (chart 15) from associated investment in development, construction and operation of wind farms and contributions to local communities and landowners, by 2020. As the average lifetime of wind farm projects is at least 20 years, this economic benefit is considered a minimum.

Chart 15: England wind energy benefits (£millions) 2006-2020, inclusive (total: £1,156.3)



Northern Ireland

6.3 There is significant capacity in planning awaiting a decision in Northern Ireland (approximately 570MW at the time of analysis), of which 384 MW will be determined in time to be built by 2010. With 159 MW already operational, under construction or consented the forecast total built capacity in Northern Ireland will total 543 MW by 2010. This will generate at least £349.5 million (chart 18) from associated investment in development, construction and operation of wind farms and contributions to local communities and landowners by 2020. As the average lifetime of wind farm projects is at least 20 years, this econmic benefit is a minimum. Due to the fact that the bulk of this capacity was submitted in late 2004 and 2005, and the long decision time in Northern Ireland, most of the build is estimated for 2009 and 2010. Charts 16 & 17 illustrate the estimated built capacity in Northern Ireland up to 2010.

Chart 16: Northern Ireland year on year build

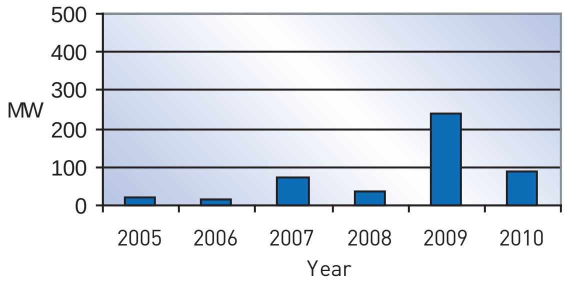


Table 17: Northern Ireland year on year build (MW)

1991-2004:	70
2005:	20
2006:	17
2007:	73
2008:	35
2009:	240
2010:	87
TOTAL:	**542**

Chart 17: Northern Ireland built capacity by 2010

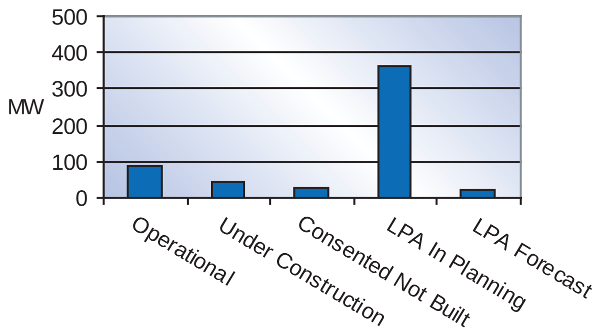
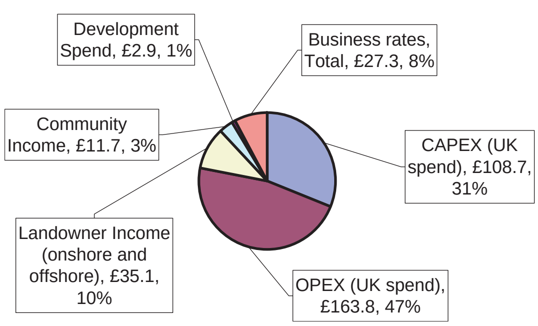


Table 18: Northern Ireland built capacity by 2010 (MW)

Operational:	90
Under construction:	41
Consented not built:	28
LPA in planning expected build:	364
LPA forecast submissions expected build:	20
TOTAL:	**543**

Chart 18: Northern Ireland wind energy benefits (£millions) 2006-2020, inclusive (total: £349.5)



Scotland

6.4 Taking account of local approval rates and decision delays, and the assigned Section 36 scenario, Scotland will deliver 3,397 MW by 2010 (table 25). This will generate at least £2,452 million (Chart 21) from associated investment in development, construction and operation of wind farms and contributions to local communities and landowners by 2020. As the average lifetime of wind farm projects is at least 20 years, this economic benefit is considered a minimum.

Chart 19: Scotland year on year build

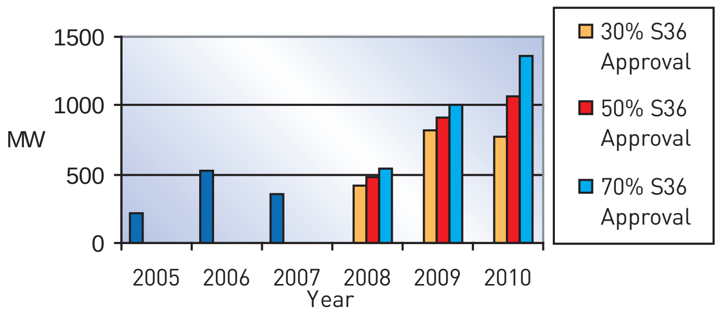


Table 19: Scotland year on year build (MW)

1991-2004:	351
2005:	218
2006:	521
2007:	353
2008:	423 / 482 / 542
2009:	824 / 917 / 1,010
2010:	775 / 1,067 / 1,358
TOTAL:	**3,465 / 3,909 / 4,353**

Chart 20: Scotland built capacity by 2010

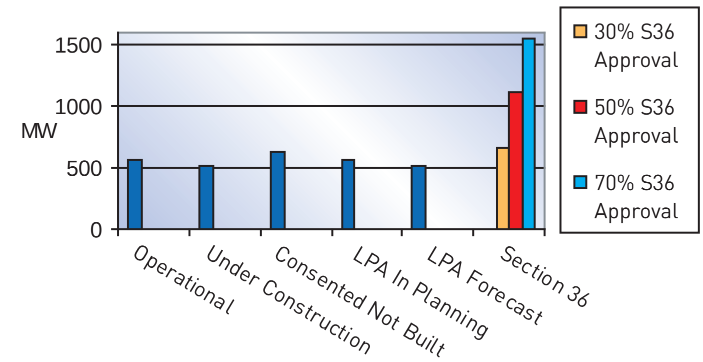
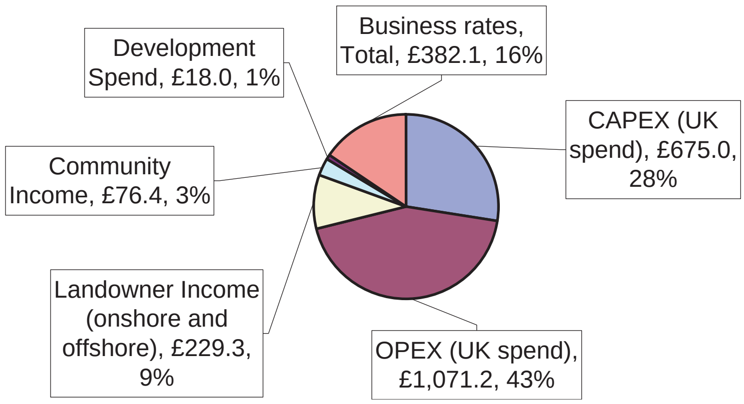


Table 20: Scotland built capacity by 2010 (MW)

Operational:	568
Under construction:	523
Consented not built:	635
LPA in planning expected build:	562
LPA forecast submissions expected build:	513
Section 36:	667 / 1,111 / 1,555
TOTAL:	**3,468 / 3,912 / 4,356**

Chart 21: Scotland wind energy benefits (£millions) 2006-2020, inclusive (total: £2,452)



Wales

6.5 505 MW is projected to be built in Wales by 2010, based on what is currently operational, under construction and consented not yet built (326 MW), plus 179 MW of capacity expected to be consented and built from projects in planning and forthcoming submissions. This will generate at least £277.8 million (Chart 24) from associated investment in development, construction and operation of wind farms and contributions to local communities and landowners, by 2020. As the average lifetime of wind farm projects is at least 20 years, this economic benefit is considered a minimum.

6.6 An additional 221 MW of capacity from the Technical Advice Note 8 (TAN8) Strategic Search Areas (SSA's) is achievable subject to timely decisions being made on projects within the SSA's. This additional capacity has been calculated by assessing the allocated capacity for each TAN8 SSA, and applying landowner and grid constraints. This comparatively low forecast will not meet the Welsh Assembly Government's 800 MW additional onshore wind target for 2010 set out in TAN8 - Wales's strategic planning policy for renewables. The reason for missing this target is the delayed publication of TAN8, combined with long local authority decision delays and reduced grid capacity. Wind industry developers are currently in the process of preparing applications for projects in the seven Welsh SSA's, but they were unable to invest in projects before the SSA's were announced in summer 2005.

6.7 In late 2005, Forestry Commission Wales (FCW) announced a programme for awarding Option Leases to wind farm development companies relating to the land they manage within the SSA's. It is unlikely that contracts will be awarded before late 2006 while developers will not commit resources to developing these projects until contracts are secured. Given the significant time period required to develop, consent and build projects this paper assumes that projects on FCW owned land will make no contribution to the TAN8 2010 targets. Despite these delays, many applications for large scale wind farm developments will be submitted in 2006, but taking into account decision times and consent to build delays, it is most unlikely that these projects will contribute to either the Welsh or UK 2010 renewable energy targets. In order to hasten the contribution that can be made in Wales by 2010, LPA resources must be urgently prioritised to secure robust local planning policy and timely decision making.

6.8 The situation in Wales could be greatly improved, and a significant portion of the 800 MW target built by 2010, if a coordinated effort is launched immediately between the wind industry, Welsh Assembly Government, local planning authorities, Ofgem and grid companies, with mutual aims to achieve timely planning decisions and ensure grid infrastructure reinforcements are in place by 2010.

Chart 22: Wales year on year build

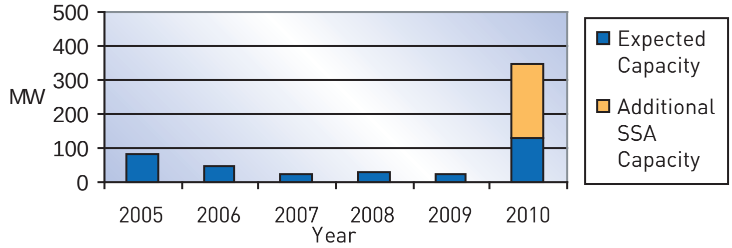


Chart 23: Wales built capacity by 2010

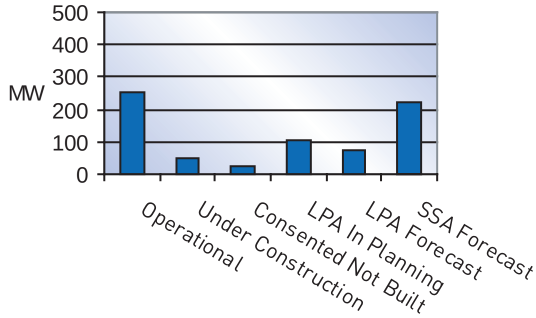


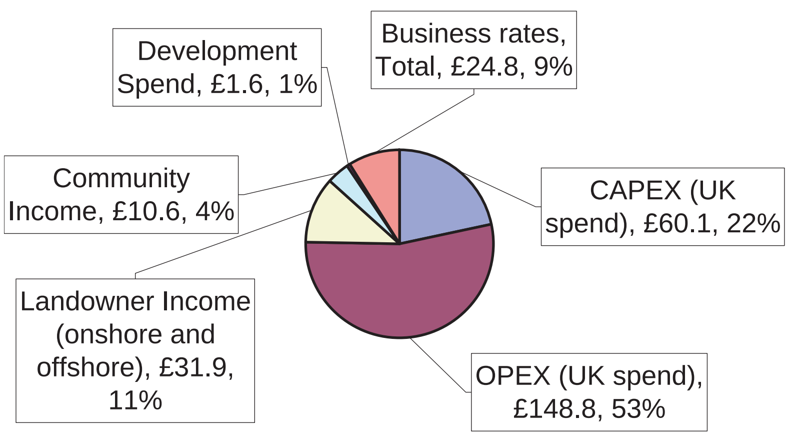
Table 21: Wales year on year build (MW)

1991-2004:	175
2005:	80
2006:	46
2007:	25
2008:	28
2009:	24
2010:	127 - 348
TOTAL:	**505 - 726**

Table 22: Wales built capacity by 2010 (MW)

Operational:	255
Under construction:	47
Consented not built:	24
LPA in planning expected build:	104
LPA forecast submissions expected build:	75
SSA Forecast	221
TOTAL:	**505 - 726**

Chart 24: Wales wind energy benefits (£millions) 2006-2020, inclusive (total: £277.8)



7. UK Total By 2010

7.1 The length of time it takes to determine an application remains a key barrier to the timely delivery of onshore wind. The development of onshore wind in Scotland by 2010 will have a significant effect on the total UK target by 2010; it has been identified in Scotland that onshore wind may contribute in the region of 2,500 MW to Scotland's target of 20% of electricity to come from renewable sources by 2010. However 3,397 MW of the UK estimated 6,200 MW forecast capacity by 2010 will need to be met in Scotland. The Scottish Executive has made clear 2,500 MW is not to be viewed as the limit to onshore wind development for 2010. Chart 25 illustrates the effect a 2,500 MW constraint might have on Scotland's contribution to the 2010 target.

7.2 Delivery of only 2,500 MW in Scotland would have a significant impact on the total UK built capacity by 2010. With no constraint, 4,999 MW to 7,515 MW of capacity could be built in the UK under 'worst case' and 'best case' planning conditions respectively. If development is constrained to 2,500 MW in Scotland, 4,681 MW to 5,654 MW of capacity would be the maximum range, thereby eliminating a capacity of between 318 MW and 1,861 MW from the UK 2010 target.

Chart 25: UK Total potential built capacity by 2010 with & without 2,500 MW constraint in Scotland

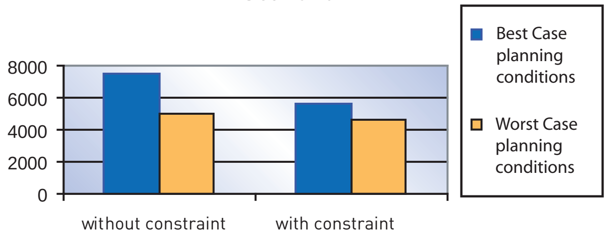


Table 23: Total UK potential built capacity with and without 2,500 MW constraint in Scotland

	Without constraint	With constraint
Best case planning conditions	7,515	5,654
Worst case planning conditions:	4,999	4,681

Chart 26: LPA & Section 36 UK total year on year build by country with 50% approval & 36 month decision delay scenario

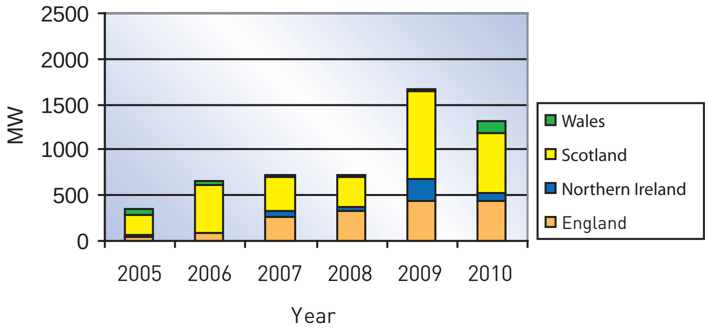


Chart 27: UK LPA & Section 36 cumulative year on year build with 50% approval & 36 month Section 36 scenario

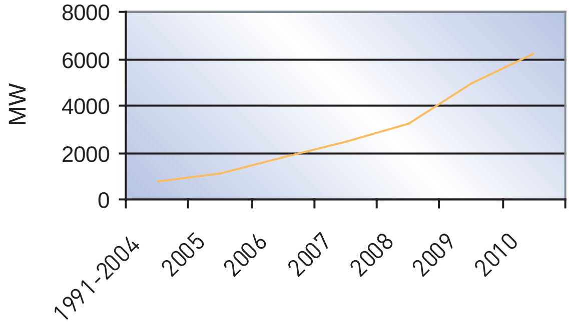


Table 24: Year on year by country with 50% approval rate and 36 month decision delay Section 36 scenario (MW)

	2005	2006	2007	2008	2009	2010
England	39	81	261	336	448	435
Northern Ireland	20	17	73	35	240	87
Scotland	218	521	360	334	951	666
Wales	80	46	25	28	24	127
TOTAL:	**357**	**665**	**719**	**733**	**1,663**	**1,315**

Table 25: UK Cumulative year on year with 50% approval rate and 36 month decision delay Section 36 scenario (MW)

(1991-2004)	2005	2006	2007	2008	2009	2010
767	1,124	1,789	2,508	3,241	4,904	6,219

UK Total Benefits to 2020

7.3 Using the selected 36 month delay, 50% approval rate Section 36 scenario which assumes an onshore wind energy capacity of 6,219 MW by 2010, a range of significant benefits will accrue, some of which have been quantified below. This range is attributable to the development, construction and operational phases of both the existing and forecast onshore wind capacity. Benefits that accrue during the operational phase have been aggregated for the period 2006-2020[7], inclusive. As such they under-estimate total benefits as wind farms have a typical life of 20-25 years and benefits from wind farms built up to 2010 will therefore accrue up to 2030-2035.

Chart 28: UK estimated 2010 build

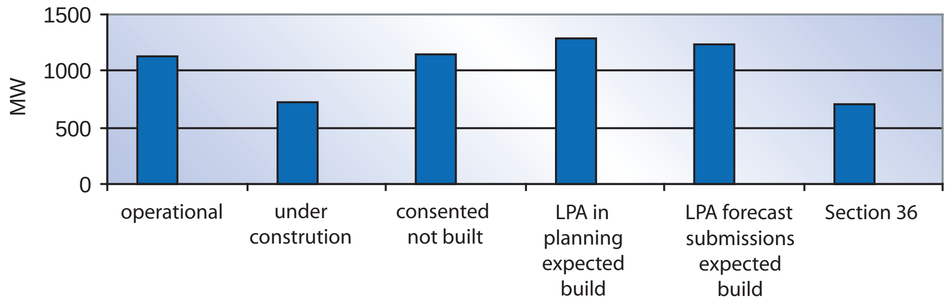


Table 26: UK estimated 2010 build (MW)

Operational:	1,124
Under construction:	723
Consented not built:	1,138
LPA in planning expected build:	1,297
LPA forecast submissions expected build:	1,238
Section 36:	699
TOTAL:	**6,219**

Chart 29: UK Estimated 2010 build by country

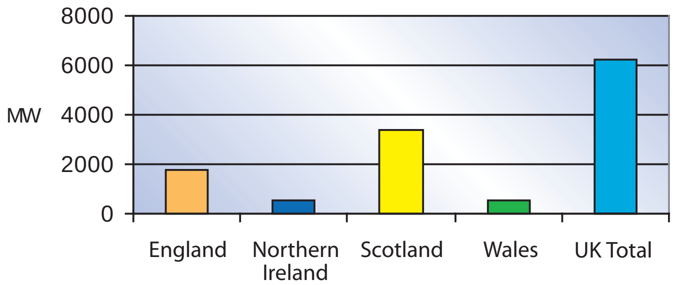


Table 27: UK estimated 2010 build by country(MW)

England:	1,774
NI:	543
Scotland:	3,397
Wales:	505
TOTAL:	**6,219**

7.4 Nonetheless, at least £4.2 billion of benefits have been identified including payments to landowners and communities in typically rural areas. Benefits to the UK relating to Capital Expenditure are also likely to be higher than the £1.2 billion assumed below. The significant build rate that is forecast would very likely lead to further UK manufacturing of wind turbines and their components, resulting in higher UK content than the 25% assumed in the calculations[7].

Chart 30: UK wind energy benefits (£millions) 2006-2020, inclusive (total: £4,235.6)

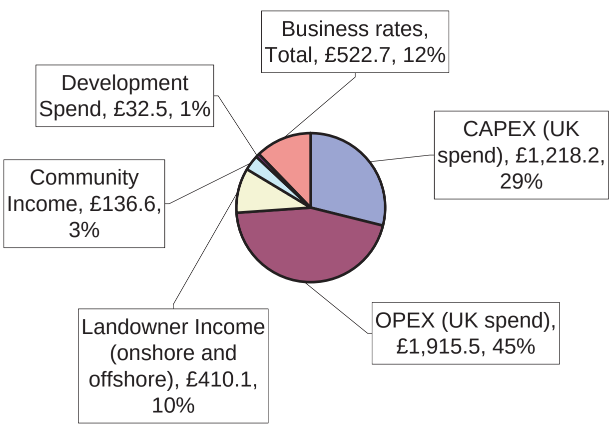


Table 28: UK economic benefits of onshore wind energy					
Benefit	**England**	**Northern Ireland**	**Scotland**	**Wales**	**Total (UK)**
Development Spend[8]	£10.0 million	£2.9 million	£18.0 million	£1.6 million	£32.5 million
Business Rates[9]	£88.5 million	£27.3 million	£382.1 million	£24.8 million	£522.7 million
Capital Expenditure (within UK)[10]	£374.4 million	£108.7 million	£675.0 million	£60.1 million	£1,218.2 million
Operational Expenditure (Within UK)[11]	£531.7 million	£163.8 million	£1,071.2 million	£148.8 million	£1915.5 million
Landowner Income[12]	£113.8 million	£35.1 million	£229.3 million	£31.9 million	£410.1 million
Community Income[13]	£37.9 million	£11.7 million	£76.4 million	£10.6 million	£136.6 million
TOTAL	**£1,156.3 million**	**£349.5 million**	**£2,452 million**	**£277.8 million**	**£4,235.6 million**

Table 29: Summary data table for onshore wind capacity by 2010 – planning scenarios

Section 36 (S36) currently in planning that will be approved, dependent on a range of scenarios:	
Current S36 capacity in planning that can be determined in 21 months & built by 2010:	2,812 MW
Current 21 month delay	
30% approval rate:	759 MW
50% approval rate:	1,265 MW
70% approval rate:	1,772 MW
30 month delay	
30% approval rate:	474 MW
50% approval rate:	790 MW
70% approval rate:	1,106 MW
36 month delay	
30% approval rate:	420 MW
50% approval rate:	699 MW
70% approval rate:	979 MW
42 month delay	
30% approval rate:	340 MW
50% approval rate:	566 MW
70% approval rate:	793 MW
S36 Range:	340 – 1,772 MW
UK local planning authority (LPA) applications	
In Planning	
LPA approvals expected existing approval rates:	1,183 MW
LPA approvals with 40% approval rate:	721 MW
Appeal Approvals Expected:	114 MW
Forthcoming Applications	
LPA approvals expected with existing approval rates:	1,148 MW
LPA approvals expected with 40% approval rate	747 MW
Appeal approvals expected:	90 MW
Wales TAN8 Strategic Search Areas (SSAs)	0 – 221 MW
UK Total confirmed	
Approved Not Constructed	1,140 MW
Under Construction	723 MW
Operational:	1,124 MW
(Total guaranteed:	2,987 MW)
UK range under existing LPA approval rates:	5,862 – 7,294 MW
UK range with 40% LPA approval rate scenario:	4,999 – 6,431 MW
UK range with 2,500 MW constraint to development in Scotland:	5,310 – 5,433 MW
UK range with 40% LPA approval & 2,500 MW constraint to development in Scotland:	4,681 – 4,804 MW
UK worst & best case range (including additional 221 MW capacity from Wales SSAs):	**4,681-7,515 MW**

8. Conclusions & Recommendations

Conclusions

8.1 Different ranges for the delivery of onshore wind in the UK by 2010 have been identified dependent on various planning scenarios; local planning authority and Section 36 approval rates, Section 36 decision delays, a 2,500 MW constraint to development in Scotland and the realisation of additional capacity in Wales through the TAN 8 Strategic Search Areas. Each of these scenarios have a significant impact on the delivery of onshore wind, however with a 'business as usual' scenario for local decision making and a pragmatic approach to Section 36 decisions and timeframes, at least 6,000 MW of onshore wind will be delivered by 2010. This assumes a 50% approval rate with decisions times of three years for Section 36 applications

8.2 The range of deliverable onshore wind capacity demonstrates that the industry is ready and able to deliver at least 6,000 MW as long as the pace of the planning system does not deteriorate beyond the current decision times and approval rates at local authority level, and three years with 50% approval rate at Section 36 level.

8.3 The TAN8 Strategic Search Areas are anticipated to contribute up to 221 MW of additional capacity relative to the 800 MW onshore target set by the Welsh Assembly Government providing that timely decisions on these applications are made.

8.4 Forthcoming planning decisions in Scotland are essential as 3,397 MW of the 2010 forecast capacity will need to be met in Scotland. Around 2,500 MW of onshore wind development in Scotland will be achieved if the existing trend of non-determination of Section 36 projects is maintained. Only 509 MW have been determined in the last two years while 3,267 MW were submitted during the same period.

8.5 Delivery of only 2,500 MW in Scotland would have a significant impact on the total UK built capacity by 2010. With no constraint, 4,999 MW to 7,515 MW of capacity could be built in the UK under 'worst case' and 'best case' planning conditions respectively. If development is constrained to 2,500 MW in Scotland, 4,681 MW to 5,654 MW of capacity would be the maximum range, thereby eliminating a capacity of between 318 MW and 1,861 MW from the UK 2010 target.

8.6 Grid capacity will not be a barrier to the installation of 6,000 MW of onshore wind by 2010 provided all the development activity is not targeted in the north of Scotland, although without upgrades it will be an increasing constraint to free access to the nominal capacity of the system at any one time. Grid capacity constraints also represent a significant barrier to maintaining the momentum of development for all renewable technologies early in the next decade.

8.7 Depending on the local planning and Section 36 decision making process, onshore wind could deliver much more than 6,000 MW – potentially as much as 7,515 MW.

Recommendations

- UK Government and devolved administrations in Scotland, Wales and Northern Ireland must maintain a positive and robust approach to national, regional and local planning policy in accordance with the Government's renewable energy and climate change targets

- Action must be taken to address local planning decision delays across the UK, in particular Wales and Northern Ireland where additional contributions to the 2010 renewable energy targets are severely constrained

- With the average decision time for Section 36 applications moving upwards, prompt action is required to ensure the necessary resources and skills are put in place to ensure quality and timeliness of decision making

- In driving forward the Welsh 800 MW onshore wind target, the Welsh Assembly Government must:

  - oversee efficient preparation of Supplementary Planning Guidance and ensure local planning authorities policy revisions are consistent with the Assembly's national policy on renewable energy as contained in TAN8
  - encourage development activity outside Forestry Commission-owned land within the Strategic Search Areas
  - oversee prompt decision making with the necessary resources being committed at the local level,

  and for Section 36 projects, the Department of Trade and Industry should also ensure timely decision making and commit to additional resources in order to reflect the increase in development activity thus ensuring a greater contribution from Wales to the 2010 target

- To contribute up to £2.5 billion to the Scottish economy by 2020; ensure that 6,000 MW of onshore wind can be met in the UK, and provide the necessary confidence for future investment in all renewable technologies in Scotland, the Scottish Executive must:
    - avoid a hiatus of onshore wind delivery towards the end of this decade and therefore bring forward the early delivery of Scotland's 2020 renewable energy target
    - accelerate its decision making process for Section 36 applications - not all decisions are expected to be favourable but they must be made in realistic timescales

- Plans to reinforce the grid infrastructure in northern Scotland, mid-Wales and Northern Ireland should move forward urgently to facilitate the full utilisation of generating capacity; provide the necessary investor confidence for all renewable technologies and to avoid a hiatus early in the next decade at a time when momentum of onshore wind delivery must be maintained.

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1 Refer to endnotes 7-14 for economic benefits calculations
2 Refer to Appendix 1 for full calculations on wind savings
3 http://www.defra.gov.uk/environment/climatechange/about/globaleffect.htm
4 http://unfccc.int/resource/docs/convkp/kpeng.html
5 http://www.rcep.org.uk/news/00-2.htm
6 http://www.dti.gov.uk/renewables/policy_pdfs/rab2005report.pdf
7 All benefits are accrued annually on the basis of Year X benefits multiplied by total installed capacity in Year X-1 with the value of benefits increasing in line with RPI (assumed to be 2.5% pa). No discount rate has been applied.
8 BWEA has estimated that average development spend in 2006, taking account of unsuccessful project spend, is £6,000 per MW installed. In the calculations, this benefit is shown during the year of first generation; in reality it would be earlier than this date.
9 Business Rates in 2006 are assumed to be £3,500 per MW installed in England, Northern Ireland and Wales and £7,500 in Scotland.
10 In consultation with its members, BWEA has assumed that the Capital Expenditure within the UK in 2006 is £225,000 per MW installed (25% of total Capital Expenditure of £900,000 per MW installed).
11 In consultation with its members, BWEA has assumed that the Operational Expenditure within the UK in 2006 is £21,024 per MW installed per year (80% of the total Operation Expenditure of £26,280 per MW installed per year, itself based on £10 per MWh generation).
12 In consultation with its members, BWEA has assumed that average, annual landowner payments in 2006 equate to £4,500 per MW installed per year.
13 In consultation with its members, BWEA has assumed that the average, annual community fund payment in 2006 equates to £1,500 per MW installed per year.

Appendix 1: Wind Energy Savings Calculations

Wind
Assumed load factor for wind of 30%
6GW will generate 15.77 TWh

Gas
Thermal efficiency of CCGT power stations is 48.6% (DTI Dukes)
So 1MWh generated requires 1/0.486 MWh energy = 2.06MWh
1m3 natural gas provides 11.06 kWh (Carbon Trust Energy Conversion Factors)
1MWh electricity requires 2.06 * 1000 / 11.06 = 186.26m3 natural gas to generate
It takes 186.26 million m3 gas to generate 1TWh
15.77 TWh wind avoids 15.77 * 186.26 million = 2.9 billion m3 natural gas

UK – Europe gas interconnector
"The UK import capacity of the Interconnector was increased from 8.5 bcm/y to 16.5 bcm/y on 8 November 2005. A second phase enhancement, due to be completed by December 2006, is progressing to schedule and will bring the UK import capacity of the system to 23.5 bcm/y."
HYPERLINK "http://www.interconnector.com/" \o "http://www.interconnector.com/" www.interconnector.com
The UK Europe interconnector can currently deliver 16.5 bcm/y
2.9 bcm is 17% current yearly import on interconnector = approx 64 days
Capacity of interconnector in 2010 is 23.5 bcm
2.9 bcm is 12% future yearly import = approx 45 days

LNG
Typical tanker holds 75,000 m3 LNG
1m3 LNG = 600m3 natural gas
1 tanker = 45million m3 natural gas
2.9bcm natural gas is equivalent to 64 LNG tankers

Coal
Calorific value of power station coal is 26.1GJ /t (dti energy staistics)
Thermal efficiency of coal fired power stations is 36.2% (Dukes table 5.10)
1MWh coal fired electricity requires 2.76MWh coal
26.1GJ = 26100MWs = 7.25MWh per tonne coal
2.76MWh coal is (2.76/7.25) = 0.38tonnes coal
1MWh coal generation requires 0.38 tonnes coal
1TWh coal generation requires 380,000 tonnes coal
15.77TWh avoids the use of 15.77 * 380,000 = 6 million tonnes coal

Electricity demand
Electricity demand in 2004 was 340TWh domestic demand was 116TWh (Dukes)
Assume 1% pa increase
2010 demand will be 360TWh and domestic will be 123TWh
15.77TWh will be 4.4% electricity demand and 12.8% of domestic demand

Household equivalents
Average Household electricity demand is 4700kWh (BWEA website)
15.77TWh is as much energy as used in 3.3million households
This is a population of approx 8m people. (assuming average 2.4 people per home – 60m people, 25m households)
8 million people is equivalent to the population of London and Glasgow
Or the 20 Biggest cities in UK combined (excluding London)
Or all of Wales and Scotland
City sizes at HYPERLINK "http://www.lovemytown.co.uk/Populations/PopulationsTable1.htm" \o "http://www.lovemytown.co.uk/Populations/PopulationsTable1.htm" http://www.lovemytown.co.uk/Populations/PopulationsTable1.htm

CO2 savings
Coal Generation
Coal produces 0.3 gCO2 for each kWh burnt (Carbon Trust Conversion factors - HYPERLINK "http://www.thecarbontrust.co.uk/energy/pages/page_64.asp" http://www.thecarbontrust.co.uk/energy/pages/page_64.asp)
Thermal efficiency of coal fired power stations is 36.2% (Dukes table 5.10)
1KWh (electrical) from a coal fired power station produces 0.3 / 0.362 = 0.83g CO2.
1TWh produces 830,000 tonnes CO2
15.77TWh wind power therefore avoids 13 million tonnes CO2

Gas generation
Gas produces 0.19 gCO2 for each kWh burnt (Carbon Trust Conversion factors - HYPERLINK "http://www.thecarbontrust.co.uk/energy/pages/page_64.asp" http://www.thecarbontrust.co.uk/energy/pages/page_64.asp)
Thermal efficiency of gas fired power stations is 48.6% (Dukes table 5.10)
1KWh (electrical) from a coal fired power station produces 0.19 / 0.468 = 0.41g CO2.
1TWh produces 410,000 tonnes CO2
15.77TWh wind power therefore avoids 6 million tonnes CO2

BWEA is the UK's largest renewable energy body with over 300 companies in membership. Formed in 1978, BWEA is leading the UK debate on the wind and marine renewables industries, acting as a central point of information for members, government and public alike. BWEA's specialist team provides members with essential market information and in-depth technical support. In addition, BWEA lobbies on behalf of members, conducts profile raising campaigns and organises business development opportunities throughout the year, including the industry's main annual conference and exhibition.

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