Summary: Intervention & Options

Department /Agency:	Title:	
DECC	Impact Assessment of proposals for a UK Renewable Energy Strategy - Renewable Electricity URN 09D/686	
Stage: Policy	**Version:** 1	**Date: 10 July 2009**
Related Publications: UK Renewable Energy Strategy Document; Redpoint/Trilemma (2009); Analytical Annex to RES; Overall RES IA.		

Available to view or download at:

http://www.decc.gov.uk/energy

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What is the problem under consideration? Why is government intervention necessary?

This IA analyses the impact of extending the RO to meet the UK's share of the EU 2020 renewable energy target and follows from the initial IA published alongside the Renewable Energy Strategy Consultation last year.Government intervention is necessary in order to address innovation market failures in the sector which results in many renewable energy technologies being less developed or deployed at a lower scale and higher cost than traditional energy technologies.Without Government support,the private sector will not invest sufficiently in innovation and deployment to meet our longer term goal

What are the policy objectives and the intended effects?

To achieve an increase in large scale renewable electricity in the UK from 5.5% in 2008 to the level required as the contribution from large-scale renewable electricity towards our overall target of 15% renewable energy by 2020.

What policy options have been considered? Please justify any preferred option.

The RES strategy considers indicative scenarios of 24%, 28%, 29% and 32% for large scale renewable electricity, to be achieved through a combination of measures including extension of the RO and measures to overcome non-financial constraints. Scenarios presented in this IA were identified based on: cost-effectiveness; ability to deliver the required share of renewable energy by 2020; and compatibility with broader energy policy.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?

The UK is required to submit a National Action Plan to the EU detailing how we intend to meet the target. Progress will be reviewed by the Commission every 2 years.

Ministerial Sign-off For consultation stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister:

.....Date:

Summary: Analysis & Evidence

Policy Option: Package 1	Description: Measures to achieve 29% renewable electricity

COSTS

ANNUAL COSTS	
One-off (Transition) **Yrs**	Description and scale of **key monetised costs** by 'main affected groups' Resource costs (net of cost of carbon, valued at the forecast carbon price) around £1.8 bn pa in 2020, and around £30.4 bn lifetime to 2030. Other costs include additional £2.8 bn onshore transmission and distribution costs over the lifetime.
£	
Average Annual Cost (excluding one-off)	
£ 2.3 bn	**Total Cost** (PV) **£ 33.2bn**

Other **key non-monetised costs** by 'main affected groups' Cost itemised are resource costs. Costs not included are costs of other policy measures to meet the target; including costs of removing barriers in the electricity sector (other than grid costs); indirect costs to the economy or increased energy prices, all of which could be significant.

BENEFITS

ANNUAL BENEFITS	
One-off **Yrs**	Description and scale of **key monetised benefits** by 'main affected groups' Benefits are monetised carbon benefits from the replacement of fossil fuels in electricity generation. Carbon saved in the electricity sector is covered by the ETS and is netted off the resource costs above, valued at the carbon price. Carbon savings valued at £6.1bn to 2030.
£	
Average Annual Benefit (excluding one-off)	
£ n/a	**Total Benefit** (PV) **£ n/a**

Other **key non-monetised benefits** by 'main affected groups' Additional benefits could include diversifying the energy mix; reducing dependence on fossil fuels; business and employment opportunities in developing and deploying renewable energy technologies.

Key Assumptions/Sensitivities/Risks Costs and benefits are estimated using central fossil fuel price, technology costs and carbon price assumptions. Under revised carbon price assumptions resource costs are £30.6 to 2030, with carbon savings valued at £9.4bn.

Price Base Year 2008	Time Period Years 20	**Net Benefit Range** (NPV) **£**	**NET BENEFIT** (NPV Best estimate) **£ -33.2bn**

What is the geographic coverage of the policy/option?			UK	
On what date will the policy be implemented?			2010	
Which organisation(s) will enforce the policy?			DECC and OGDs	
What is the total annual cost of enforcement for these organisations?			£ unknown	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			No	
What is the value of the proposed offsetting measure per year?			£ unknown	
What is the value of changes in greenhouse gas emissions?			£ n/a	
Will the proposal have a significant impact on competition?			Yes	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	Yes/No	Yes/No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ Decrease of £ **Net Impact** £

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Summary: Analysis & Evidence

Policy Option: Package 2	Description: Measures to achieve 28% renewable electricity

COSTS

ANNUAL COSTS	
One-off (Transition) **Yrs**	Description and scale of **key monetised costs** by 'main affected groups' Resource costs (net of cost of carbon, valued at the forecast carbon price) from £1.7 bn pa in 2020, £27.9bn lifetime to 2030. Other costs include additional £2.8bn onshore transmission and distribution costs over the lifetime.
£	
Average Annual Cost (excluding one-off)	
£ 2.1 bn	**Total Cost** (PV) **£ 30.7 bn**

Other **key non-monetised costs** by 'main affected groups' Cost itemised are resource costs. Costs not included are costs of other policy measures to meet the target; including costs of removing barriers in the electricity sector (other than grid costs); indirect costs to the economy or increased energy prices, all of which could be significant.

BENEFITS

ANNUAL BENEFITS	
One-off **Yrs**	Description and scale of **key monetised benefits** by 'main affected groups' Benefits are monetised carbon benefits from the replacement of fossil fuels in electricity generation. Carbon saved in the electricity sector is covered by the ETS and is netted off the resource costs above, valued at the forecast carbon price. Value of carbon saved is £5.6bn by 2030.
£	
Average Annual Benefit (excluding one-off)	
£ n/a	**Total Benefit** (PV) **£ n/a**

Other **key non-monetised benefits** by 'main affected groups' Additional benefits could include diversifying the energy mix; reducing dependence on fossil fuels; business and employment opportunities in developing and deploying renewable energy technologies.

Key Assumptions/Sensitivities/Risks Costs and benefits are estimated using central fossil fuel price, technology costs and carbon price assumptions. The numbers are based on economic modelling from Redpoint independent consultants.

Price Base Year 2008	Time Period Years 20	**Net Benefit Range** (NPV) **£**	**NET BENEFIT** (NPV Best estimate) **£ -30.7 bn**

What is the geographic coverage of the policy/option?			UK	
On what date will the policy be implemented?			2010	
Which organisation(s) will enforce the policy?			DECC and OGDs	
What is the total annual cost of enforcement for these organisations?			£ unknown	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			No	
What is the value of the proposed offsetting measure per year?			£ unkown	
What is the value of changes in greenhouse gas emissions?			£ n/a	
Will the proposal have a significant impact on competition?			Yes	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	Yes/No	Yes/No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ Decrease of £ **Net Impact** £

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Summary: Analysis & Evidence

Policy Option: Package 3	Description: Measures to achieve 32% renewable electricity

COSTS

ANNUAL COSTS	
One-off (Transition) **Yrs**	Description and scale of **key monetised costs** by 'main affected groups' Resource costs (net of cost of carbon, valued at the forecast carbon price) from £2.6 bn pa in 2020, £ 42.9bn lifetime to 2030. Other costs include additional £2.8 bn onshore transmission and distribution costs over the lifetime.
£	
Average Annual Cost (excluding one-off)	
£ 3.2 bn	**Total Cost** (PV) **£ 45.7 bn**

Other **key non-monetised costs** by 'main affected groups' Cost itemised are resource costs. Costs not included are costs of other policy measures to meet the target; including costs of removing barriers in the electricity sector (other than grid costs); indirect costs to the economy or increased energy prices, all of which could be significant.

BENEFITS

ANNUAL BENEFITS	
One-off **Yrs**	Description and scale of **key monetised benefits** by 'main affected groups' Benefits are monetised carbon benefits from the replacement of fossil fuels in electricity generation. Carbon saved in the electricity sector is covered by the ETS and is netted off the resource costs above, valued at the forecast carbon price. The value of carbon saved is £8.2bn by 2030.
£	
Average Annual Benefit (excluding one-off)	
£ n/a	**Total Benefit** (PV) **£ n/a**

Other **key non-monetised benefits** by 'main affected groups' Additional benefits could include diversifying the energy mix; reducing dependence on fossil fuels; business and employment opportunities in developing and deploying renewable energy technologies.

Key Assumptions/Sensitivities/Risks Costs and benefits are estimated using central fossil fuel price, technology costs and carbon price assumptions. The numbers are based on economic modelling from Redpoint independent consultants.

Price Base Year 2008	Time Period Years 20	**Net Benefit Range** (NPV) **£**	**NET BENEFIT** (NPV Best estimate) **£ - 45.7 bn**

What is the geographic coverage of the policy/option?				UK	
On what date will the policy be implemented?				2010	
Which organisation(s) will enforce the policy?				DECC and OGDs	
What is the total annual cost of enforcement for these organisations?				£ unknown	
Does enforcement comply with Hampton principles?				Yes	
Will implementation go beyond minimum EU requirements?				No	
What is the value of the proposed offsetting measure per year?				£ unknown	
What is the value of changes in greenhouse gas emissions?				£ n/a	
Will the proposal have a significant impact on competition?				Yes	
Annual cost (£-£) per organisation (excluding one-off)		Micro	Small	Medium	Large
Are any of these organisations exempt?		Yes/No	Yes/No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ Decrease of £ **Net Impact** £

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Summary: Analysis & Evidence

Policy Option: Package 4	Description: Measures to achieve 24% renewable electricity

COSTS

ANNUAL COSTS	
One-off (Transition) **Yrs**	Description and scale of **key monetised costs** by 'main affected groups' Resource costs (net of cost of carbon, valued at the forecast carbon price) from £ 1.03 bn pa in 2020, £15.7 bn lifetime to 2030. Other costs include additional £2.8 bn onshore transmission and distribution costs over the lifetime.
£	
Average Annual Cost (excluding one-off)	
£ 1.3 bn	**Total Cost** (PV) **£ 18.5bn**

Other **key non-monetised costs** by 'main affected groups' Cost itemised are resource costs. Costs not included are costs of other policy measures to meet the target; including costs of removing barriers in the electricity sector (other than grid costs); indirect costs to the economy or increased energy prices, all of which could be significant. .

BENEFITS

ANNUAL BENEFITS	
One-off **Yrs**	Description and scale of **key monetised benefits** by 'main affected groups' Benefits are monetised carbon benefits from the replacement of fossil fuels in electricity generation. Carbon saved in the electricity sector is covered by the ETS and is netted off the resource costs above, valued at the forecast carbon price. The value of carbon saved is £3.2bn by 2030.
£	
Average Annual Benefit (excluding one-off)	
£ n/a	**Total Benefit** (PV) **£ n/a**

Other **key non-monetised benefits** by 'main affected groups' Additional benefits could include diversifying the energy mix; reducing dependence on fossil fuels; business and employment opportunities in developing and deploying renewable energy technologies.

Key Assumptions/Sensitivities/Risks Costs and benefits are estimated using central fossil fuel price, technology costs and carbon price assumptions. The numbers are based on economic modelling from Redpoint independent consultants.

Price Base Year 2008	Time Period Years 20	**Net Benefit Range** (NPV) **£**	**NET BENEFIT** (NPV Best estimate) **£ - 18.5 bn**

What is the geographic coverage of the policy/option?			UK	
On what date will the policy be implemented?			2010	
Which organisation(s) will enforce the policy?			DECC and OGDs	
What is the total annual cost of enforcement for these organisations?			£ unknown	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			No	
What is the value of the proposed offsetting measure per year?			£ unknown	
What is the value of changes in greenhouse gas emissions?			£ n/a	
Will the proposal have a significant impact on competition?			Yes	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	Yes/No	Yes/No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ Decrease of £ **Net Impact** **£**

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Evidence Base (for summary sheets)

[Use this space (with a recommended maximum of 30 pages) to set out the evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Ensure that the information is organised in such a way as to explain clearly the summary information on the preceding pages of this form.]

Strategic Overview

6. This Impact Assessment focuses on measures to increase large scale renewable electricity as part of the strategy on how to meet the UK's share of the EU 2020 renewable energy target. The costs, benefits and wider impacts of the overall package across all three sectors are set out in the general IA.

Market Failure Analysis

7. Market failures occur when resources are allocated in a way which does not optimise welfare to society. An example is in climate change where greenhouse gas emissions impose an external cost to society which is not reflected in a cost of emiting GHGs. The EU has created the Emissions Trading Scheme (ETS) to introduce a price for carbon which covers some but not all sectors of the economy.

8. Carbon pricing has increased the cost of burning fossil fuels and has thereby induced the implementation of carbon abatement measures. However, given that the carbon price only covers a part of emissions (electricity production and other heavy energy using sectors) there are limits to the levels at which carbon prices can be used to address climate change.

9. Therefore, the EU has wanted to strengthen its commitment to reducing carbon emissions with additional measures besides carbon pricing, such as the active incentivisation of renewable energy technologies. The EU Renewable Energy Directive does this by committing the EU to meet 20% of its energy needs from renewable sources by 2020, with a binding share for the UK of 15%.

10. It is common for new technologies to take considerable time to develop in terms of their functionality, efficiency and affordability as well as their public acceptability. The need to overcome this time lag in the timeframe required is what underpins the EU Directive.

11. One reason for such time lags is that the innovation process often requires high upfront investment due to lengthy and costly research, with uncertain outcomes and payback periods, and which are therefore very risky. Investment in R&D, demonstration and deployment (RDD&D) is subject to positive externalities in the shape of new knowledge and skills which spread beyond the investor. As such the total benefits of renewables RDD&D are often difficult to appropriate, resulting in under investment in the economy as a whole. Government support in the form of grants and competitions as well as market/demand-driven support schemes can reduce the resulting undersupply of new technologies, speed up RDD&D where desirable and internalise the rewards associated with positive externalities.

12. Government support is particularly necessary to incentivise high levels of renewable energy because the costs are so high that investments would not be undertaken in the absence of additional support.

13. Other barriers to higher investment in innovative high-risk technologies include: electricity is largely homogeneous product where competition is on price alone, making it difficult for these technologies to compete with lower cost conventional generation; and the investments are long term and there is a lot of uncertainty over the course of government policy and future carbon prices, increasing the risk and hence cost of new technologies.

14. The RO as it now stands is unlikely to result in more than about 15% of renewable generation by 2020. If we want to increase the proportion of renewable electricity to the levels set out in the RES and required by the EU target, the RO will need to be modified and

extended. Subject to Parliamentary procedure and State Aid approval, we plan to implement changes to make the RO more effective in April 2010.

15. There are other reasons beside market failure which may justify Government intervention, including the way planning regimes work; deficiencies in the upstream supply chain; difficulties in gaining access to the grid; and conflict with other Government policies.

16. Finally, Government intervention is necessary in this specific case because we have a legal obligation in the form of the EU target.

Objectives

17. The objective is to increase renewable electricity to the level required as the contribution towards our overall target of 15% renewable energy by 2020. We estimate that this will be around 30% (including a contribution from small scale generation dealt with in a separate Impact Assessment) by 2020. We aim to do so in a cost effective way, and in a way that is most compatible with our other policy objectives.

Identification of Policies

18. This IA considers the impact of modifying the RO to incentivise a step change in renewable large scale electricity generation to 24%, 28%, 29% and 32%.

19. In order for the RO to work in incentivising renewable electricity, there are a number of measures that need to be taken, to address the non-financial barriers to renewable generation. These include planning constraints, grid constraints, supply chain and skill constraints. These are considered below.

Modifications to the RO

20. DECC employed a consortium led by Redpoint to look at the cost and impact of modifications to the RO which would incentivise the level of renewable electricity through large scale generation to meet the 2020 Renewable Target.

21. In the first part of the analysis Redpoint looked at options that limited the changes to the RO to only those considered absolutely necessary to make the RO consistent with the 2020 target. Two options were considered:

Minimum Change/Headroom only after 2015/16

- Extension of RO to 2037
- Extension of participation period to 20 years for new projects
- Fixed annual targets to 2015/16 and then headroom only
- 20% cap on Obligation size lifted
- Obligation size increased as necessary to maintain headroom
- Increase in headroom from 8%, to 10% in 2014

Fixed Targets + Headroom ("Fixed target")

- Extension of RO to 2037
- Extension of participation period to 20 years
- Existing targets until 2012/13 and then linear interpolation to 2020 target (adjusted for net banding)[1]
- Obligation size increased (if required past this point) to maintain headroom
- Increase in headroom % from 8% to 10%

[1] The logic for this target profile is that is provides an increased incentive ahead of 2015 but not before there is some prospect the current bottlenecks in grid connection and planning have begun to reduce.

22. The analysis indicated that Minimum Change was better than the Fixed Target option in providing renewable build at a lower cost to consumers in particular in situations of low fossil fuel prices. Redpoint analysis showed that in those cases the Fixed Target options would be less efficient than the Minimum Change option. Therefore, all the scenarios presented in this IA are based on the Minimum Change option. These changes will be considered in a consultation to be issued shortly.

23. In the second part of the analysis Redpoint looked at possible options to stabilise the revenue that renewable generators get from the wholesale electricity market to increase the efficiency and effectiveness of the RO. We will consult this summer on whether the RO should shield generators against fluctuation of the wholesale electricity price, and whether it is possible in practice to implement such a mechanism. The costs and benefits implications of such mechanism would be considered in a consultation to be issued shortly.

24. Details of the modelling assumptions and results from research conducted by Redpoint-led consortium are summarised in the Redpoint Report2. A summary table of costs and benefits of the different levels of deployment and fossil fuel price sensitivities is given below:

Table 1: Cost/Benefit analysis of Measures to increase Renewable Electricity

Table 1a: Annual Costs in 2020

	Resource costs £bn	**Consumer costs £bn**
24% renewable electricity **central fuel prices**	1.03	2.2
28% renewable electricity **central fuel prices**	1.7	2.5
29% renewable electricity **central fuel prices**	2	2.6
32% renewable electricity **central fuel prices**	2.6	4
28% renewable electricity **low fossil fuel prices**	3.5	3.6
28% renewable electricity **high high fuel prices**	0.4	0.7

Source: Redpoint-led economic modelling. Redpoint only modelled GB so we have increased the figures by 4% to include NI. Costs are at 2008 prices, discounted.

Note: numbers exclude the costs of reinforcing the grid.

[2] Implementation of the EU 2020 Renewable Target in the UK Electricity Sector: RO Reform. A Report for the Department of Energy and Climate Change, 2009

Table 1b: Cumulative Costs to 2030

	Resource costs £bn	**Consumer costs £bn**
24% renewable electricity **central fuel prices**	15.7	8.3
28% renewable electricity **central fuel prices**	27.9	27
29% renewable electricity **central fuel prices**	30.4	35.8
32% renewable electricity **central fuel prices**	42.9	50.4
28% renewable electricity **low fossil fuel prices**	55.6	44
28% renewable electricity **high high fuel prices**	6.8	0.16

Source: Redpoint-led economic modelling. Costs are at 2008 prices, discounted.

Note: numbers exclude the costs of reinforcing the grid.

(1) Resource costs are the change in the costs of generating electricity, including changes in investment costs, fuel costs, variable and fixed operating costs. Resource costs are net of the value of CO2 abated, calculated at the carbon price. A positive number indicates an increase in resource costs.

(2) Consumer costs represent a combination of the change in wholesale electricity prices, the change in net subsidy, and the change in system balancing costs. A positive number indicates an increase in consumer costs.

Definitions/Assumptions:

25. Costs are measured against a 'status quo', which is the counterfactual for assessing the impact of the different support schemes. It represents 'business as usual', where renewables policy follows the Energy Bill proposals, with banding of the RO, and an upper limit on the obligation size of 20% by 2020.
26. Resource costs presented are net resource costs, taking account of the value of carbon abated – valued at the forecast carbon price.
27. The analysis assumes that the extended RO provides 20 years of support for projects with a final end date of 2037. The size of the Obligation is related to the renewable target – assuming a linear increase between the starting year and the required 2020 level.
28. The maximum building rates were chosen with reference to external research by SKM consultants, who analysed barriers to renewable electricity, and estimated possible scenarios of build of renewable technologies to meet the 2020 target. All the core scenarios use SKM high build rates.
29. Banding levels have been adjusted consistent with achieving a specific level of renewables deployment namely 24%, 28%, 29% and 32%.
30. The analysis assumes that headroom is 8% in 2010, rising 0.5 percentage points per year to 10%. This is based on the analysis of the year-to-year volatility of the ROC output.
31. Additional assumptions on fossil fuel prices, carbon price, new plant costs and electricity demand are described in detail in Redpoint/Trilemma (2009) 'Implementation of the EU 2020

Renewable Target in the UK Electricity Sector: RO Reform. A Report for the Department of Energy and Climate Change, June 2009' published alongside the RES.

32. The £2.8 bn figure on onshore transmission and distribution costs is based on the ENSG Report "Our Electricity Transmission Network: A vision for 2020". March 2009.

Sensitivities:

Fossil fuel prices

33. The resource costs are lower in the high fossil fuel sensitivity since the incremental resources costs are less when conventional generation is more expensive. The opposite is the case under the low fuel sensitivity. The fossil fuel sensitivities have been examined on the 28% renewable generation scenario using DECC fossil fuel price assumptions.

Carbon price

34. Carbon price assumptions affect the resource cost because they affect the cost of conventional generation – the higher the carbon price, the higher the cost of emissions associated with burning fossil fuels, and therefore the lower the premium associated with renewable technologies. Carbon prices used throughout this analysis are as set out in the Analytical Note published with the RES. Since these assumptions were agreed, carbon prices have been updated and published in the IAG guidance. In order to test the sensitivity of costs to the new set of carbon prices, we ran the 29% renewable electricity central fuel prices on the updated estimates.

35. The new carbon prices reduce the resources costs (net of cost of carbon) to £30.6 bn as opposed to £33.2 bn in our central 29% renewable scenario.

Maximum build rates

36. The maximum build rates used in the core analysis are the 'High' build rates from the SKM report of 2008. To achieve these build rates would require a number of constraints being removed. To test the sensitivity to lower build rates, we have used the 'Low' build rates from the SKM report on the 28% base case scenario.

37. The lower maximum annual build rates significantly reduce deployment of renewables. There is around 13 GW less renewables capacity by 2020 in the 28% base case scenario as a result.

Impact on electricity prices and bills

38. Impact on energy prices is covered in depth in the general IA. An increase in renewable large scale electricity will affect electricity prices, as the consumer costs identified above are passed through into prices and bills. For our lead scenario (29%) this results in an increase in bills of around £63.82, £138.13 and 104.72 in 2020, 2025 and 2030 respectively for the average domestic consumer. The impact on bills for domestic and industrial consumers is summarised in Tables 2 a,b,c and d below. The impact on bills will not necessarily be as high as in the table below, if increased prices incentivise a reduction in electricity use.

Table 2a: Impact on Electricity Bills, resulting from measures to achieve **24%** renewable electricity

	% increase in **Domestic** Bills	% increase in **Industrial** Bills
2015	0%	0%
2020	10%	10%
Average 2011-2030	2%	2%

Table 2b: Impact on Electricity Bills, resulting from measures to achieve **28%** renewable electricity

	% increase in **Domestic** Bills	% increase in **Industrial** Bills
2015	1%	1%
2020	12%	12%
Average 2011-2030	7%	7%

Table 2c: Impact on Electricity Bills, resulting from measures to achieve **29%** renewable electricity

	% increase in **Domestic** Prices Bills	% increase in **Industrial** Bills
2015	1%	1%
2020	12%	12%
Average 2011-2030	9%	8%

Table 2d: Impact on Electricity Bills, resulting from measures to achieve **32%** renewable electricity

	% increase in **Domestic** Bills	% increase in **Industrial** Bills
2015	4%	4%
2020	18%	18%
Average 2011-2030	12%	12%

39. Again results vary according to fuel price assumptions. In the high fuel price case, price increases above the status quo are smaller than in the central case, and vice versa in the low fuel price scenario.

Impact on electricity market

40. Plant flexibility: Wind intermittency will increase the need for back-up capacity that will enable demand to be met when there is little renewable generation, e.g. on non-windy days. This back-up capacity is likely to be from flexible fossil-fuel power stations that are able to switch generation on and off quickly and cheaply (eg CCGTs). Therefore, our electricity security of supply will remain dependent on secure gas supplies.

41. Additional capacity requirements: a greater total absolute amount of capacity will be needed to maintain a sufficient surplus of supply over demand when there is a higher proportion of variable capacity in the mix. Since much of this capacity will not get to generate very often (only when demand is high and/or when wind output falls), it will need high prices on occasion (at peak times) in order to earn returns on investment.

42. Increase in price volatility: because of the variability of wind, price volatility and price spikes may increase.

43. Additional pressure on the networks: Reinforcement of the existing grid infrastructure and the provision of new transmission infrastructure is required to accommodate new generation such as large scale offshore wind developments.

Non-Financial Measures

44. Cross-cutting policies to address barriers in the planning system and supply chain and skills are covered in the overall Impact Assessment. For the electricity sector, the key non-financial barrier to renewable energy is the need to ensure appropriate grid infrastructure.

Grid infrastructure barriers: summary of costs and benefits of measures

45. The policies set out in this Strategy to address Grid infrastructure barriers to renewable electricity are:

Table 3: List of measures to address grid infrastructure barriers

a. Implementation of new and enduring grid access regime
b. . Incentives to Transmission Owners to make new grid investments.
c. Establishment of the new offshore transmission regime providing opportunities for new entrants to the market.
d. Connection of offshore wind farms in other European countries waters to the UK network.
e. Development of a smart grid policy, including funding and support for the demonstration of new technologies.

46. The likely costs of these measures are:

- Access reform: detailed arrangements are for industry groups to resolve. The costs of alternative access models will depend on the relationship of generation connection to investment (i.e. generation connecting ahead of investment will lead to additional constraint costs) and the extent to which those costs are socialise or met by generators.
- Infrastructure: the exact scale and locations of system extensions and reinforcements is uncertain and dependent on system planning standards. Initial estimates for onshore and offshore network costs are around £13bn-£16bn. Work to develop infrastructure ahead of commitments from generators (but in the light of known resources and potential developments) carries stranded asset risks. Most of this work will be relatively low cost system planning and design activity.
- Accelerated deployment: generation capital costs are already envisaged by higher renewable targets. Reformed access arrangements and faster infrastructure build will bring forward those costs (time-value of money)

47. The likely benefits from these measures would be:

- Accelerated deployment delivers the overall benefits (carbon savings etc.) of higher renewable targets at an earlier date.
- Access reform will in the medium to long term mean lower investment requirements, because more efficient use is made of the present and future network.
- Efficient and early delivery of infrastructure leads to lower constraint costs and maximises the amount of renewable electricity that can be supplied

Non-financial measures: summary of costs and benefits

48. Developers of renewable energy projects have highlighted that reductions to the time taken to achieve planning consent and shorter delays in connecting to the grid will be crucial to reducing development timescales and making the UK a desirable market in which to invest. The ability of supply chains for new renewables technologies to respond to increased demand will be vital to avoid longer lead times for the supply of key components and longer development timescales.

Monitoring and Evaluation

49. DECC is responsible for monitoring the impact of the RO on the development of renewable energy and collects detailed information on growth in renewable energy generation and projects under development.

Specific Impacts Test

Competition Assessment

50. The RO is a market-based instrument that operates in a competitive market for electricity. It is open to all participants in renewable generation. The way in which the RO recycles money from the buy-out fund should act as a positive incentive to competition between suppliers, and reduce barriers to entry for renewable electricity generators. The RO should help innovation in the renewable electricity market. Ofgem will monitor and promote effective competition in the electricity market.

Sustainable Development

51. The RO is aimed at increasing the deployment of renewable electricity generation in order to move the UK away from fossil fuel dependency towards a low carbon economy in preparation for a future when supplies of gas and oil will become tighter and more expensive.

52. The RO includes sustainability reporting requirements for the use of biomass in electricity generation. This will be reported annually and will help inform Government policy on sustainable use of biomass for electricity generation.

Environmental Impacts

53. The RO provides the Government's support scheme for renewables electricity generation. It incentivises investment in renewables projects which help to move the UK away from fossil fuel dependency towards a low carbon economy with consequential carbon savings from displaced fossil fuel generation.

54. Individual projects that are deemed to have the potential to cause significant adverse impacts are required to undertake an Environmental Impact Assessment (Directive 85/337/EEC) as part of the planning process.

55. The environmental impact of new electricity transmission infrastructure required to support the connection of increased levels of renewable electricity will be considered on a case-by-case basis under the normal planning and consenting system. As part of the planning application, individual projects will consider the options for minimising the impact on the environment.

Small Firms Impact Test

56. All small firms will be impacted through increased energy bills. Further detail is set out in the overall IA.

Carbon Assessment

57. The GHG emission reductions in the electricity sector will be determined by the overall cap on emissions (relative to what emissions would have been in the absence of the cap) and while the deployment of renewables in the electricity sector will help towards the meeting of the cap, it will not result in additional GHG emission reductions in the electricity sector above that implied by the cap. The Carbon saved is netted off the resource costs above, valued at the forecast carbon price. All assumptions used for this analysis, including fossil fuel and carbon prices, can be found in the Analytical Annex published with the Renewable Energy Strategy.

Risks

58. There are a number of risks that the measures set out in the strategy document might not deliver the amount of renewable energy required to reach 15% of overall energy use by 2020 – or that electricity may not deliver its required share. These include the risk that it will

not be possible to implement the measures proposed in the strategy by 2020; that policies will not prove sufficient to overcome the barriers; that the response from the investment community and individuals will not be sufficient to meet our targets; that costs will turn out to be greater than we have identified; and the risk that other constraints, supply side barriers, or unidentified impacts will emerge.

59. The Overall IA has more details on the specific impact tests.

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

Type of testing undertaken	*Results in Evidence Base?*	*Results annexed?*
Competition Assessment	Yes/No	Yes/No
Small Firms Impact Test	Yes/No	Yes/No
Legal Aid	Yes/No	Yes/No
Sustainable Development	Yes/No	Yes/No
Carbon Assessment	Yes/No	Yes/No
Other Environment	Yes/No	Yes/No
Health Impact Assessment	Yes/No	Yes/No
Race Equality	Yes/No	Yes/No
Disability Equality	Yes/No	Yes/No
Gender Equality	Yes/No	Yes/No
Human Rights	Yes/No	Yes/No
Rural Proofing	Yes/No	Yes/No

Annexes