Summary: Intervention & Options

Department /Agency:	Title: Impact Assessment of proposals for consultation on a UK Renewable Energy Strategy	
Stage: Consultation	**Version:** 7	**Date: 1 June 2008**
Related Publications: UK Renewable Energy Strategy Consultation Document.		

Available to view or download at:
http://www.berr.gov.uk/energy

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

This IA analyses options to meet the UK's share of the EU 2020 renewable energy target. Government intervention is necessary because: there is underinvestment by the private sector in green technologies due to uncertainties around the success of new technologies; there are barriers to entry in the short and medium term, such as economies of scale; companies may not capture all the benefits (positive externalities) of their R&D investment; and information constraints may result in a shortage of external finance for businesses involved in risky R&D.

What are the policy objectives and the intended effects?

The objective of the EU target is to address the two problems of climate change and energy security. Renewable energy can reduce greenhouse gas emissions and can potentially contribute to security of supply over the medium to long term. To deliver the UK share of the EU target for a 20% share of renewables in overall EU final energy consumption (electricity, heat and transport) by 2020.

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

This IA considers 3 scenarios: Scenario A (32% renewable electricity; 14% heat; 10% transport); Scenario B (32% electricity; 14% heat; 8% transport; 0.5% trading); Scenario C (28% electricity; 11% heat; 5% transport; 4% trading). These all add up to a 15% share of total UK energy, which would meet the proposed UK target. The scenarios have been chosen based on: cost-effectiveness; ability to deliver the required share of renewable energy by 2020; and compatibility with broader UK energy policy. Exclude costs of microgen electricity.

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

The Government will publish a Renewable Energy Strategy in spring 2009. Progress towards the 2020 targets will also be reviewed by the Commission against indicative targets every two years from 2012.

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: Scenario A	Description: **Burden share of target 15% renewable energy in 2020 through domestic deployment: 32% in electricity; 14% in heat; 10% in transport.**

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 in the traded sector) from £4.7 to £5.7bn pa in 2020, £62 to £71 bn lifetime to 2030. Includes grid reinforcement and tranmission and distribution costs and cost of overcoming barriers to renewable heat.
£	
Average Annual Cost (excluding one-off)	
£ 3.3bn	**Total Cost** (PV) **£ 67bn**

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 gen, heating and transport. Carbon saved in the ETS sector is netted off the resource costs above, valued at the carbon price. Carbon saved in the non-traded sector is valued at the shadow price of carbon £5.3 to £5.9bn by 2030.
£ N/A	
Average Annual Benefit (excluding one-off)	
£ £0.3bn	**Total Benefit** (PV) **£ £5.6bn**

Other **key non-monetised benefits** by 'main affected groups' Benefits are carbon savings and reduced purchase of ETS allowances only. 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 assumptions. Estimates are based on economic modelling from Redpoint consultants (electricity), and NERA consultants (heat). Transport estimates are provided by Dept Transport. Costs will depend on the precise instrument used to deliver the target.

Price Base Year 2008	Time Period Years 20	**Net Benefit Range** (NPV) **£ -£56 to -£66bn**	**NET BENEFIT** (NPV Best estimate) **£ -£61bn**

What is the geographic coverage of the policy/option?			UK	
On what date will the policy be implemented?			from 2012	
Which organisation(s) will enforce the policy?			BERR 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?			£ 5.6bn	
Will the proposal have a significant impact on competition?			Yes	
Annual cost (£-£) per organisation (excluding one-off)	Micro **unknown**	Small **unknown**	Medium **unknown**	Large **unknown**
Are any of these organisations exempt?	No	No	N/A	N/A

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

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

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

Summary: Analysis & Evidence

Policy Option: Scenario B	Description: 14.5% ren energy in 2020 through domestic deployment: 32% E; 14% H; 8% T; 0.5% trading

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 in the traded sector) from £4.5 to £5.4bn pa in 2020, £60 to £70 bn lifetime to 2030. Includes grid reinforcement and tranmission and distribution costs and cost of overcoming barriers to renewable heat.
£	
Average Annual Cost (excluding one-off)	
£ 3.3bn	**Total Cost** (PV) **£ 65bn**

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 gen, heating and transport. Carbon saved in the ETS sector is netted off resource costs above, valued at the carbon price. Carbon saved in the non-traded sector is valued at the shadow price of carbon, £6.2 bn to £6.3bn to 2030.
£	
Average Annual Benefit (excluding one-off)	
£ 0.3bn	**Total Benefit** (PV) **£ 6.3bn**

Other **key non-monetised benefits** by 'main affected groups' Benefits are carbon savings and reduced purchase of ETS allowances. Carbon savings from trading included. 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 assumptions. Estimates are based on economic modelling from Redpoint consultants (electricity), and NERA consultants (heat). Transport estimates are provided by Dept Transport. Costs will depend on the precise instrument used to deliver the target.

Price Base Year 2008	Time Period Years 20	**Net Benefit Range** (NPV) **£ -£54 to -£64bn**	**NET BENEFIT** (NPV Best estimate) **£ -59bn**

What is the geographic coverage of the policy/option?			UK	
On what date will the policy be implemented?			from 2012	
Which organisation(s) will enforce the policy?			BERR 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?			£ 6.3bn	
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:** **(Net) Present Value**

Summary: Analysis & Evidence

Policy Option: Scenario C	Description: 11% ren energy by 2020 domestic deployment, 28% E; 11% H; 5% T; 4% trading

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 in the traded sector) from £2.5 to £3bn pa in 2020, £35 to £39bn lifetime to 2030. Includes grid reinforcement and tranmission and distribution costs and cost of overcoming barriers to renewable heat.
£	
Average Annual Cost (excluding one-off)	
£ 1.9bn	**Total Cost** (PV) **£ 37bn**

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 replacement of fossil fuels in elec gen, heating and transport. Carbon saved in the ETS sector is netted off the resource costs above, valued at the carbon price. Carbon saved in the non-traded sector is valued at the shadow price of carbon, £6.9bn to £10.9bn to 2030.
£	
Average Annual Benefit (excluding one-off)	
£ 0.4bn	**Total Benefit** (PV) **£ 8.9bn**

Other **key non-monetised benefits** by 'main affected groups' Benefits are carbon savings and reduced purchase of ETS allowances, including carbon saved from trading. 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 assumptions. Estimates are based on economic modelling from Redpoint consultants (electricity), and NERA consultants (heat). Transport estimates are provided by Dept Transport. Costs will depend on the precise instrument used to deliver the target.

Price Base Year 2008	Time Period Years 20	**Net Benefit Range** (NPV) **£ -28bn to - £29bn**	**NET BENEFIT** (NPV Best estimate) **£ -28bn**

What is the geographic coverage of the policy/option?			UK	
On what date will the policy be implemented?			2012	
Which organisation(s) will enforce the policy?			BERR/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?			£ 8.9bn	
Will the proposal have a significant impact on competition?			Yes/No	
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:** **(Net) Present Value**

[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

1. UK policy on renewable energy seeks to help address two key challenges: tacking climate change and ensuring security of supply. In order to address these two challenges we helped secure agreement in the EU to an ambitious target to source 20% of the EU's energy from renewable sources by 2020. This includes a proposed target of 10% renewable transport, which is binding on each Member State.

2. The European Commission published its draft Renewable Energy Directive on 23 January 2008. The draft Directive proposes a share for the UK of 15% of energy to come from renewable sources by 2020. This would be a very challenging target, as our current renewable energy use is less than 2%.

3. We are consulting over Summer 2008 on how best to meet the UK's share of the 2020 target. This Impact Assessment accompanies the consultation document and considers the overall package of potential measures which we consider might be the most cost-effective way to meet the UK share. More detail on the costs and benefits of the potential measures in each sector are set out in the attached sectoral Electricity, Heat and Transport Impact Assessments.

4. The responses received to this consultation will contribute to the UK Renewable Energy Strategy, which we will publish in Spring 2009, once the EU Directive has been finalised and the UK's share of the target has been agreed.

5. The numbers set out in this IA are provisional estimates, based on our initial analysis only.

Market Failure Analysis

6. There are a number of justifications for Government action to address market failures in the renewable energy sector.

Market failure and renewable energy technologies

7. Market failures occur when resources are allocated in a way which does not optimise welfare to society. A typical example is climate change which is the result of greenhouse gas emissions, a negative externality or spillover. The EU has created the Emissions Trading Scheme (ETS) to introduce a price for carbon.

8. Carbon pricing has increased the cost of 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 an indicative 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, making this a risky enterprise. The proponents of the new technologies create positive externalities in the shape of new knowledge. Government support in the form of grants and competitions can reduce the resulting undersupply of new technologies, speed up research and development where desirable and reward the creation of positive externalities. 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. In addition, electricity is a homogeneous commodity so new entrants are not able to create niche markets for their products and have to compete on price alone, which is determined by lower cost conventional technologies.

12. The deployment process for medium-to-large scale renewable energy installations faces imperfect competition on more than one level. Capital and operating costs are high, and reaching cost-reducing economies of scale of production is difficult, likely to leave newcomers at a disadvantage in terms of entering that market *in the desired time span*.

13. Another instance of imperfect competition is, in the case of electricity, the fact that the energy transmission infrastructure is structured as a monopoly. This could potentially lead to the National Grid undersupplying the access network required by new energy producers. Some of the measures proposed in this document are addressing this failure.

14. There are also instances where it would already be commercially sensible to install renewable energy technology but many investors still lack sufficient information to persuade them to do so. Support for public and business information campaigns can rectify this type of market failure.

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. 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 of this consultation is to consult the public about different policy measures which will if combined effectively achieve the target of producing 15% of the UK's energy needs from renewable sources. The main option as set out in this IA does this in the most cost effective way and is compatible with our other energy policy. In addition this consultation seeks views on the long-term vision beyond 2020 towards a decarbonisation of the British economic towards 2050. Given the scale of the challenge the measures will apply at all levels across the UK economy (household, business, individuals, regional and local government).

18. The overarching objectives are to tackle climate change and security of energy supply. The Stern Review of the Economics of Climate Change made it clear that action is needed now to reduce the risks of dangerous climate change, for economic as well as moral reasons.

Identification of Potential Measures

19. The starting point in assessing the impact of the 2020 renewable target on the UK is to estimate the level of effort, in terms of output of renewable energy, needed to achieve a 15% UK share by 2020. The definition of Final Energy Consumption proposed by the Commission is on an energy output basis and includes transmission and distribution losses in electricity and heat and energy industry own use. It excludes non-energy use. It measures Final Energy Consumption on a net calorific value basis rather than on gross calorific value. Energy used for Aviation is also included.

20. In order to estimate the level of effort needed to meet the 2020 target, we need a projection of UK Final Energy Consumption in line with this definition, and a projection of renewable generation under current measures to increase renewable energy. This is shown in Table 1 below.

Table 1: Projected Final Energy and Renewable Energy Consumption in 2020

2020 Projections, current measures	**Final Energy Consumption, 2020, TWh**	**Renewable Energy, 2020, TWh**	**Renewable Energy % by Sector, 2020**
Heat	625	5	1%
Road Transport	719	25	5%
Electricity	399	57	14%
Final Energy Consumption	1742	87	5%

Note: The electricity sector includes electricity for heat and transport.

21. The table shows the projected level of Final Energy Consumption of 1742 TWh in 2020, implying that in order to meet a 15% renewable share, would need 261TWh of renewable energy by 2020, compared with 87TWh projected under current policies and measures. This would require a three-fold increase in renewable energy in just 12 years.

22. This level of increase can be applied across the different sectors in a number of ways. The scenarios presented in this IA are just a few illustrations of how this can be achieved. They were based on analysis and independent research of the level of renewable energy that could be achieved under various assumptions. Table 2 shows the level of effort by sector needed to meet the 2020 target for the three scenarios presented here.

Table 2: Illustrative combinations of renewable energy by sector to achieve the 2020 target.

	Scenario A		**Scenario B**		**Scenario C**	
	Renewable Energy as % sector FEC %	Renewable Energy 2020 for 15% TWh	Renewable Energy as % sector FEC %	Renewable Energy 2020 for 15% TWh	Renewable Energy as % sector FEC %	Renewable Energy 2020 for 15% TWh
Heat excl Elec	12%	78	12%	78	9%	55

Elec for heat that transfers to H sector due to renewable replacement	2%	12	2%	12	2%	12
Transport	10%	53	8%	42	5%	27
Electricity	32%	121	32%	121	28%	106
Trading	0%	0	0.5%	8	4%	62
Total	15%	264	15%	261	15%	261

Note: Totals may not sum exactly to 15% of the target due to rounding.

23. In constructing the different scenarios, we made some assumptions about those currently using electricity for heat in the electricity sector who could have their existing heating provision replaced by renewable heating and therefore would transfer from the electricity sector to the heat sector. This assumption was constant across the different scenarios in order to maintain consistency between the heat and electricity sector modelling. The assumption was based on an initial estimate of what might be feasible and cost effective for this group by 2020.

24. These scenarios are only possible descriptions of the UK energy sector in 2020 to make the consultation more suitable for real world questions and we do not expect any of these to be a precise representation of the future energy market. In summary, the Scenarios are:

- Scenario A: Burden share of target 15% renewables in final energy, all domestically produced (32% of electricity from renewables; 14% of heat; 10% of transport)
- Scenario B: Burden share of target 15% renewables in final energy, 14.5% of which is domestically produced (32% of electricity from renewables; 14% of heat; 8% of transport, 0.5% from trading)
- Scenario C: Burden share of target 15% renewables in final energy, 11% of which is domestically produced (28% of electricity from renewables; 11% of heat;5% of transport, 4% trading)

25. The different levels of effort by sector were based on an initial analysis of how much renewable energy could be feasible in heat and electricity by Enviros (2008) and SKM (2008b) respectively. These studies looked at non-financial constraints to further deployment in these sectors. For transport, the EU has a separate target of 10%, but given this is subject to sustainability issues being addressed, we also looked at the impact of lower shares in this sector. Different levels of effort by sector were combined based on both cost-effectiveness and achievability. There are of course many more possible scenarios to reach the overall 15% share, and these are indicative only.

26. Scenario A shows how the UK can deliver this challenging target within its own borders. Scenarios B and C imply the UK 15% share would not be met in the UK and rely on a degree of trading to deliver this share. Scenarios A and B reflect the step change for renewable energy described in the consultation document and are pushing towards high build rates in electricity and heat. Scenario B has a lower effort from transport should there be sustainability issues around the use of biofuels in this

sector. Scenario C reflects medium build rates associated with heat and electricity as detailed in the reports mentioned above.

Analysis of Potential Measures

27. The consultation document lists a large number of potential measures needed to facilitate the transition to the step increase in renewable energy. Where these are specific to a particular sector, these measures are set out in detail in the individual sector IAs. This IA includes measures which are cross cutting across different sectors.

28. The baseline scenario was based on the policies which formed the basis of the 2007 Energy White Paper.

Summary of costs and benefits

29. Resource costs of each of the scenarios were estimated on a sectoral basis. Further details are included in the detailed sectoral impact assessments. Where available, these include costs to overcome barriers to deployment of renewable energy technologies. These are excluded from the electricity sector estimates, so resource costs could be higher. Costs of trading cover a range based on intra-EU trading, based on Poyry Energy Consulting (see http://www.berr.gov.uk/energy/sources/renewables/strategy/page43356.html) and extra-EU trading.

30. The benefits are monetised benefits of carbon saved. In the traded sector these are valued at the carbon price. In the non-traded sector these are valued at the Social Cost of Carbon in line with Defra guidance http://www.defra.gov.uk/environment/climatechange/research/carboncost/index.htm Carbon savings from trading are assumed to accrue half to the traded and half non-traded sectors. This is a simplifying assumption due to lack of detail on the types of trading options there could be. Estimates have been discounted in line with Green Book guidance.

Table 3: Summary of estimated resource cost and savings of renewable energy scenarios to 2020 Target.

£bn Discounted, 2008 prices. Central Fossil fuel price assumptions	In 2020		cumulative to 2030	
Scenario A	**Lower**	**Upper**	**Lower**	**Upper**
Resource cost	-4.7	-5.7	-62	-71
Carbon Benefit	0.5	0.4	5.9	5.3
NPV	-4.2	-5.3	-56	-66
Scenario B				
Resource cost	-4.5	-5.4	-60	-70
Carbon Benefit	0.5	0.5	6.3	6.2
NPV	-4.1	-4.9	-54	-64
Scenario C				
Resource cost	-2.5	-3.0	-35	-39
Carbon Benefit	0.5	0.8	6.9	10.9
NPV	-2.0	-2.2	-28	-29

Notes:

1. Estimates based on central fossil fuel prices.

2. Costs associated with overcoming barriers to deployment of renewable electricity and with overcoming demand side barriers to renewable heat not included and totals could subsequently rise.

3. Range reflects costs associated with different financial incentives.

4. Resource costs in the electricity sector take account of the carbon price in the traded sector. Negative numbers reflect resource costs.

5. Totals may not sum owing to rounding.

31. The above estimates are based on BERR central fossil fuel price projections consistent with $70/bbl. Different fossil fuel prices affect the cost of renewable energy options because the cost of conventional generation, heating and transport sources will change. The table below shows the impact on resource costs of higher and lower fossil fuel prices in Scenario A.

Table 4 : NPV Cost and Savings of scenario to deliver 14% renewable heat, 32% renewable electricity and 10% renewable transport (15% renewable energy domestically) by 2020 – Different Fossil Fuel Price Sensitivities

Discounted £bn 2008 prices	In 2020		Cumulative to 2030	
Central Fuel Price	**Lower**	**Upper**	**Lower**	**Upper**
Resource cost	-4.7	-5.7	-62	-71
Carbon Benefit	0.5	0.4	5.9	5.3
Net Present Value	-4.2	-5.3	-56	-66
Low Fuel Price Sensitivity				
Resource cost	-5.8	-6.8	-88	-97
Carbon Benefit	0.5	0.6	5.8	7.3
Net Present Value	-5.3	-6.2	-82	-89
High Fuel Price Sensitivity				
Resource cost	-3.5	-4.7	-40	-55
Carbon Benefit	0.6	0.6	6.8	8.1
Net Present Value	-2.9	-4.2	-33	-47
High High Fuel Price Sensitivity				
Resource cost	-2.7	-3.8	-32	-46
Carbon Benefit	0.6	0.6	7.3	8.6
Net Present Value	-2.1	-3.1	-24	-37

Notes: 1. Assumptions on fossil fuel prices are consistent with: Central - $70/bbl; Low -$45/bbl; High - $70/bbl; and High High - $150/bbl in 2020. See http://www.berr.gov.uk/files/file46071.pdf for further details.

2. Figures based on BERR estimates of Redpoint et al (2008) research in electricity sector, and Nera (2008) research in the heat sector. Transport estimates are DfT estimates based on central biofuel price projections.

3. Resource cost estimates for the electricity sector take account of the carbon price in that sector. Negative numbers reflect costs.

Bioenergy

32. In order to model bioenergy across the different sectors of the economy, it was necessary to make some assumptions about the way this resource is used across different sectors. Because the modelling of the different sectors – heat, electricity in particular – was undertaken independently of each other, we needed to make some a priori assumptions about the available resource to these sectors, with the aim to get as close to an 'optimal' allocation of resources as possible – ie that biomass resource goes to its most cost-effective use.

33. The way this was done was to estimate the split in available UK resource (and projected imports in 2020) between heat and electricity, based on Poyry Energy Consulting (op cit) research on the least cost mix of technologies to achieve the 2020

target. This led to a roughly 50:50 split of (non-energy crop biomass) between heat and electricity, with all energy crops being allocated to the electricity sector. It was necessary to make this assumption to avoid double-counting of the projected biomass resources across competing uses. In practice the way biomass is allocated across different sectors will depend on many other factors, including how the market develops from a local to an internationally traded market; the relationship between suppliers and producers; the level of support available in different sectors; and the geographical match between sources and uses.

Bioenergy Measures

34. The potential measures considered in the consultation document to promote biomass across the heat and electricity sectors are included in this IA as they cut across two sectors and the costs and benefits cannot be split by sector. The potential measures under consideration are:

Table 5: Potential measures on bioenergy

a. Initiate research on new energy crops, including re-examining existing trial data to explore the potential of alternative biomass crops for energy, including examining the crops' impacts on local hydrology, biodiversity and landscape change;
b. Working with industry to conduct the field-scale site trials required to assess the environmental impacts of short rotation forestry species;
c. As far as reasonably practical, restrict some or all biomass waste from going to landfill;
d. Whether there is scope, encourage Local Authorities to collect food waste separately, either from households, or businesses, or both;
e. Require Local Authorities to make such waste available for anaerobic digestion treatment, as far as is practical;
f. Adapt the waste PFI scheme to encourage Local Authorities to offer long term contracts for the supply of waste wood;
g. Ensure Biomethane is supported by the new heat financial incentive
h. Work with Gas Transporters (including National Grid and the Gas Distribution Networks) and Ofgem to make a more detailed assessment of the legal, technical and regulatory requirements for flowing bio-methane directly into the gas pipe-line system and make this document publicly available as a guide for interested parties**.**
i. Develop an overarching biomass communications programme, working with the Regional Development Agencies, the Local Government Association, key regional and national bodies, and with relevant planning organisations to identify current and future information needs, and apply best practice communication approaches identified from within the regions and overseas. (This work would be linked to the proposed project on training Local Authorities, RDAs, planners and architects on renewable heat and biomass solutions, at Chapter 4).
j. Set up a public information/awareness raising programme which presents evidence-based facts on bioenergy, including energy from waste, to explain current Government

policy and to help inform individuals' decisions on their use of bioenergy and combined heat and power.

Costs and benefits of Bioenergy measures

35. Measures a and b are enabling measures. They would not generate carbon savings in their own right but enable carbon savings from heat and electricity measures to be realised. Assessing environmental impacts to ensure sustainability will, for example, ensure that calculated carbon savings are met.

36. Action designed to increase the use of biomass waste could release up to an estimated 9 million tonnes of waste food and 6 million tonnes of wood which are currently landfilled in the UK, with a combined energy value of 42 TWh. The proposed measures listed above (c to f) have the potential not only to release the carbon potential of this material but reduce methane emissions from landfill (currently much of this landfill gas is already used to generate energy although less efficiently than the proposals outlined here). The associated costs for landfill are about £22 per tonne, and once the landfill tax has been added, the cost rises to close to £50 per tonne. The escalator is increasing by £8 per year, so the additional costs reduce significantly depending on when a ban would come into effect.

37. From the perspective of Local Authorities further restrictions on landfilling biomass waste may have very little additional cost since the landfill tax escalator could have already rendered landfill more expensive than the alternatives. But this will depend on the cost and effectiveness of collection, separation and processing, and on timing which will vary across Local Authorities.

38. There will be costs to administer any scheme to collect food waste separately and to require local Authorities to make food waste available for anaerobic digestion. These will be, to some extent, offset by the additional energy and other benefits (such as a reduction in landfill as described above and the production of the digestate which is a soil conditioner). Further information on the costs of Local Authority food waste collection is expected to become available later this year, as a result of a series of trials coordinated by The Waste and Resource Action Programme.

39. The establishment of a public information/awareness raising programme (i) would involve, for example, the development of material and tools for a website, for inclusion in an advertising campaign linked to others mentioned in this consultation under the Act On CO2 campaign. The costs of the development of materials for a website and website management would be about £50,000 a year. The costs of an overall campaign will vary depending on the methods used, but may be in the region of £4 million to £13 million per year if it included television media. The benefits of awareness raising campaigns would allow the UK to fully maximise our waste and biomass potential, particularly for the exploitation of heat producing combustion plant. We have not monetised these benefits but believe they are important to overcome the barriers to the use of biomass in energy production.

40. Biomass is a key renewable resource in the UK, and has an important role to play in meeting our target. Estimates of the total UK potential for 2020 were based on work done for the Biomass Strategy and estimates of the likely future import penetration. In order to prevent double-counting of the available resource, we made a priori assumptions about how this was split between different sectors, based on the most

cost-effective split in research by Poyry Energy Consulting research [see footnote 2]. The measures detailed above will facilitate the development of an effective supply chain for biomass products which is a necessary condition of achieving the levels of renewable penetration in 2020.

Impacts

Impact on Greenhouse Gas Emission Reductions

41. The EU energy and climate package is designed to achieve a 20% reduction in EU greenhouse gas emissions compared to 1990, increasing to 30% in the event of an international climate agreement. The package splits the effort of achieving the target between the traded sector (i.e., in those sectors that fall under the EU Emissions Trading Scheme such as electricity generators, cement, steel, glass) and the non-traded sectors (e.g. domestic, transport). Some of the effort in both sectors will be achieved through the deployment of renewable energy.

42. The greenhouse gas (GHG) emission reductions from meeting a 15% renewable target in the UK will depend on what types of technologies are deployed in order to meet the target, some of which will be in the traded sector and others in the non-traded sector. The GHG emission reductions in the traded 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 traded sector will help towards the meeting of the cap, it will not result in *additional* GHG emission reductions in the traded sector above that implied by the cap.

43. Estimating the GHG emission reductions that are likely to result from meeting a 15% renewables target in the UK therefore requires an assessment of which types of renewable energy technologies will be deployed and the conventional energy sources that they will be replacing. Based on the current structure of the EU ETS, it is clear that large scale renewable electricity will be within the traded sector and that transport biofuels will be in the non-traded sector. The picture for renewable heat is, however, more complicated as it could be deployed through technologies such as industrial biomass heating, which is primarily in the traded sector, or through technologies such as biomass heating in the domestic or service sectors which is primarily in the non-traded sector.

44. Table 6 shows the estimated carbon savings in the non-traded sector from meeting a 15% renewable energy target in the UK in 2020 (Scenario A above).

Table 6: Estimated carbon saving in the non-traded sector from meeting a 15% renewable energy target in the UK in 2020

	Carbon saving in 2020 (MtCO2) – over and above savings in ETS	**Cumulative carbon saving to 2030 (MtCO2) – over and above saving in ETS**
Non-traded sector – transport and heat outside ETS	20-25	250-300

Note: 2020 estimates rounded to nearest 5MtC02, cumulative figures rounded to nearest 25MtC02. Estimates based on BERR analysis of Nera (2008), Redpoint et al (2008) and Department of Transport.

45. Renewable energy is an integral part of our strategy for reducing carbon emissions and will play an important part in meeting our domestic 2020 and 2050 goals (to reduce carbon emissions by at least 26% and 60% on 1990 levels respectively). The measures to incentivise uptake of renewables will interact with other low carbon options, particularly in the electricity market where they will impact on nuclear and Carbon Capture and Storage options. The analysis by Redpoint et al (2008) contains further analysis of the interaction of the renewables target with the rest of the electricity sector, and conventional generation technologies.

Impact of the Renewables Target on the EU Emissions Trading Scheme

46. There are interactions between the EU ETS and the renewables target in that the ETS should bring on the cheapest abatement options while the renewables target requires that Member States invest in renewable energy, which could potentially be more expensive. To the extent that the level of support for renewables would exceed the carbon price that is required to meet the 20% GHG target, it can be expected that investment in new renewable electricity (and some renewable heat) would displace lower-cost emissions reductions through the ETS. This will result in a lower carbon price (relative to a scenario where there is no renewables target) and higher overall costs of meeting a given GHG reduction target.

47. Assuming that most renewable heat and electricity will require an incentive in excess of what is likely to be provided by the carbon price in Phase III of EU ETS, the impact of the renewables target on the carbon price will be determined by the magnitude of the abatement from meeting the target (relative to the total abatement effort that is required from EU ETS). A more ambitious renewables target will, all things being equal, result in a larger fall in the carbon price.

48. Given that scheme participants can bank and borrow allowances across Phase III (and should do so in order to minimise their costs of compliance over time) it is necessary to consider the total abatement from the renewables target across the phase relative to the total abatement effort required from ETS. The impact of the renewables target will, therefore, be affected by the trajectory of renewables deployment. If effort to meet the renewables target is back-loaded (i.e., large additional amounts of renewables only deployed towards the end of the compliance period) then the impact on the EU ETS price will be smaller than if the target is met with a more linear deployment of renewables.

49. The level of the ETS cap will be the primary driver of the carbon price across Phase III. Based on the Commission's proposed ETS cap of 1,720 MtCO2 in 2020 and an estimate of business-as-usual emissions (i.e., what emissions would have been in the absence of the ETS), the total ETS effort in Phase III is approximately 4 GtCO2. Assuming that some renewables will be deployed in the non-traded sector and that effort to meet the renewables target is back-loaded, the total abatement effort in the

traded sector from additional renewables across Phase III will be around 1 GtCO2[1] (which equals around 25% of total Phase III ETS effort).

50. Table 7 shows the estimated carbon savings from the UK traded sector from meeting a 15% renewable energy target in the UK in 2020. The figures are based on analysis by Nera and Redpoint-led report and are based on the sectoral shares in Scenario A above.

Table 7: Estimated carbon saving in the traded sector from meeting a 15% renewable energy target in the UK in 2020

	Carbon saving in 2020 (MtCO2)	**Cumulative carbon saving to 2030 (MtCO2)**
Renewable electricity and heat in the traded sector	50-55	700-800

Note: 2020 estimates rounded to nearest 5MtC02, cumulative estimates to nearest 25MtC02

51. On these assumptions, there will be a significant amount of effort for the EU ETS to undertake after accounting for the abatement that will result from meeting the renewables target. While this is likely to result in the carbon price being lower than otherwise (relative to a scenario where there is no target to increase the deployment of renewable energy) it is likely that the impact would be relatively modest. It is also important to note that the figures presented above relate to the EU meeting a 20% GHG target. In the event of an international agreement, a 30% GHG target would apply and the ETS cap is likely to be tightened considerably. Under this scenario we would expect that meeting the renewables target would place less downward pressure on the carbon price. Increasing the scope of the EU ETS to include emissions from aviation is likely to have a similar effect. Given the central importance of the EU ETS to our strategy, we shall continue to analyse the potential impact on its operation of the renewables target.

52. It is difficult to predict the future level of the carbon price with any certainty as it will be affected not only by the level of the cap and the deployment of renewables but also by a range of factors such as fossil fuel prices, access to international project credits and the rate of economic growth, particularly in the new member states. However, modelling by the Commission projects a central carbon price of €39/tCO2 in 2020, which compares to their projection of €49/tCO2 if there were no renewables target and a price today of around €24/tCO2. Carbon price will be a key factor influencing investment in electricity generation to 2020 and beyond, and we need a strong carbon price if we are to see the full range of low carbon options brought forward over the longer term, including renewables, nuclear and CCS.

[1] This calculation assumes abatement from meeting the renewables target in 2020 of around 388MtCO2 (based on analysis by Poyry). It assumes that the renewables target is met according to the indicative trajectory as set out in the Renewables Directive and that around 65% of total savings occur in the traded sector. This implies that small amounts of additional renewables begin to come on line in 2013 but that large increases in renewables only occur towards the end of the decade. The assumed abatement from renewables in the traded sector is as follows: 2013 – 30MtCO2; 2014 – 30MtCO2; 2015 – 70MtCO2; 2016 – 70MtCO2; 2017 - 140MtCO2; 2018 – 140MtCO2; 2019 – 190MtCO2; 2020 – 252MtCO2.

Impact on Security of Supply

53. The UK market has sought to address the security of supply concerns raised by increasing import dependency through diversification. A higher level of renewable energy in the energy mix should have a positive impact on geo-political security of supply, in that it is likely to reduce the amount of fossil fuel consumed in Europe, and hence Europe's dependency on fossil fuel imports, on an annual basis. The precise extent to which it will do so will depend on the extent to which different forms of energy supply – gas or coal powered electricity generation, nuclear electricity generation, gas heating, petrol for transport – are displaced by renewable energy.

54. The target to increase renewable electricity to over 30% creates some specific challenges for electricity security of supply because the renewable sources produce variable and intermittent output. This is discussed further in the Electricity IA.

55. In the heat sector, both solar thermal and ground or air-source heat pump installations reduce the risk (to their own consumers) of supply disruption due to fuel or transmission system failures, and exposure to fossil fuel price fluctuation. The security of supply from bio-thermal applications will depend on the security of supply of input fuel, which may be problematic in the short term if penetration of biomass installations grows more quickly than the capability to supply and distribute suitable biomass. This should be resolved in the longer term, however, as biomass prices encourage more supply from diverse sources into the market.

56. In terms of the security of supply of energy for the UK as a whole, greater use of renewable sources for heat generation should reduce overall demand for fossil fuels, in particular heating oil and perhaps eventually natural gas as well. The extent of this reduction in UK fossil fuel use depends upon the overall impact of heat policy on electricity demand. Fewer homes and businesses are likely to be directly heated using electricity as a result of renewable heat policy. However a substantial penetration of heat pumps - which use electric motors in the process of extracting heat from the air and the ground - could counteract this effect, leading to increased use of electricity in the heating sector (although an overall reduction in total energy used to provide the heating as heat pumps exploit natural heat occurring in the ground or air).

57. In the transport sector, biofuels can contribute to energy security by diversifying energy supply sources for transport, reducing our heavy dependency on a single energy source and increasing the number of supply sources and routes. The table below shows the estimated reduction in consumption of fossil fuels if the renewable energy proportions in Scenario A were to be achieved.

Table 8: Estimated reduction in use of fossil fuels with 15% Renewable Energy (Scenario A)

Reduction in the use of fossil fuels	In 2020	Cumulative to 2030
Gas (Mtoe)	9-10	825-840
Coal (Mtoe)	8-10	195-225
Oil (Mtoe)	2	345

Petrol/Diesel (ML) (Mtoe)	3,500 (3)	50,000 (40)

58. The renewable energy target could reduce UK consumption of fossil fuels by around 10% in 2020, and imply a 12-16% reduction in gas imports in 2020; and a 9-12% reduction in overall gas demand.

59. An increase in renewable generation of 32% in the electricity sector will entail a large increase in new investment in this market. Research by Redpoint et al (2008) shows that if this investment were to take place, de-rated peak capacity margins would be around 16-17% in the middle of the next decade, compared to around 15% in the absence of a renewables target. Post 2020 these fluctuate around 10%(+/-3%) and are generally lower in the higher scenarios due to more intermittent relative to conventional plant. This is slightly lower than historical averages of around 15% in the first part of this decade. Unexpected unserved energy is a probabilistic assessment of the electricity demand that cannot be met in each year due to situations where demand exceeds supply. If, for example, we expect on average there will be 2 hours where demand will exceed supply by 500 MW, unexpected unserved energy for that year would be 1 GWh. Expected unserved energy is close to zero in situations where the de-rated peak capacity margin exceeds 10% (as has been the case historically), but increases significantly where de-rated peak capacity margins fall below this level. Further details can be found in the Repoint et al (2008) study.

Impact on energy prices

60. Policies to increase renewable energy development will add to energy prices and bills. The contribution that renewables components make to energy bills will depend on how the costs of other components of energy prices change. Bills do not necessarily need to rise as much as prices – using less energy, and installing energy efficiency measures can help mitigate these effects. Table 9 below summarises expected impact on energy bills.

Table 9 : Impact on annual electricity prices and bills resulting from measures to achieve 32% renewable electricity.

32% renewable electricity – central fossil fuel prices	**Domestic Prices (Annual bills)**	**Industrial Prices (Annual bills, £000s)**
2010-2014	-1 to 4 % (£-3 to £13)	-1 to 4% (£-4 to £19)
2015-2019	1 to 5% (£3 to £19)	1 to 6% (£4 to £28)
2020-2024	9 to 15% (£32 to £53)	10 to 16% (£46 to £78)

2025-2029	10 to 14% (£33 to £48)	11 to 16% (£48 to £70)
2010 to 2030	6 to 9% (£20 to £33)	6 to 11% (£29 to £48)

Note: The range reflects the standard error of differences of changes from the status quo. In some years the impact of high penetration of renewables leads to lower short-run marginal costs which reduce wholesale prices. This impact is greater under high fossil fuel price assumptions.

61. The table shows that the biggest impact on prices and bills will be in 2020 and beyond as the level of renewable generation increases to 2020. These estimates are based on central fossil fuel prices in line with BERR central projections with an oil price of $70 per barrel. Under higher fossil fuel prices (in line with $95 a barrel) the percentage increase in electricity bills could fall by around a half, while under fossil fuel prices consistent with $150 per barrel, the increase could fall by around three-quarters of that shown above.

62. The cost of measures to incentivise the uptake of renewable heat would be expected to be passed onto customers by suppliers, so there will be an impact on gas bills and other fossil fuels used for heating. The precise scale of such impacts will depend on the scale of renewable heat options, their costs, and how well targeted a financial incentive in the heat sector could be made to operate in practice. The projected impact on gas bills in a scenario where we deliver 14% renewable heat, and assuming central fossil fuel price projections, are shown in Table 10 below.

Table 10: Impact on annual gas prices and bills resulting from measures to achieve 14% renewable heat.

	Domestic Prices (Annual Bills)	**Industrial Prices (Annual Bills, 000s)**
2010	0% (£0)	0% (£0)
2015	2 to 6% (£11-30)	3-7% (£3-9)
2020	18-37% (£104-209)	(24-49%) (£29-58)
2030	No higher than 2020	No higher than 2020

63. Under higher fossil fuel price assumptions the impact of our measures on prices and bills will reduce as the cost of conventional heating technologies increases. Under a scenario consistent with $150/bbl, the percentage increase in bills would be reduced by around a half. Those households who install renewable heat technologies, particularly those off the gas grid, could see reduced ongoing heating bills.

Impact on business

64. The main business sectors affected by the potential measures in the consultation document are:

- All users of energy for heat, electricity and transport;
- Companies involved in the supply of electricity;
- Companies involved in the generation of renewable electricity;
- Companies involved in the supply of heat, including renewable heat;
- Large energy users;
- Companies involved in the manufacture or supply of renewable technologies;
- Companies involved in the supply and distribution of transport fuels.
- Companies involved in the supply of biomass products to the UK

65. The main impact on businesses not involved in energy generation will be the increase in energy prices. Such increases will result in pressures in energy-intensive industries, which will likely lead to a lowering in the returns to other inputs (such as lower wages) and a contraction in these industries. The overall impact on labour demand will depend on the ability of other sectors to expand in response to this spare capacity in the labour market; on the ability of affected firms to switch from energy to other inputs; and on the extent of international competition facing such firms.

66. Whilst higher energy prices will adversely affect most businesses, there will be some companies which stand to benefit from new low carbon markets that are opening up. Whilst it is a challenge to predict where these successful markets will be, we anticipate that opportunities exist for companies that have the ability and motivation to innovate with new products, or fill supply chain requirements where there is insufficient supply. Examples of such markets could be areas such as the supply of components for onshore and offshore wind turbines, electric cabling, lightweight materials, efficient motors and drives, air separation units, marine propulsion systems, flue gas scrubbers, gasification/oxyfuel combustion and the development of specialist ships and ports for renewable generation installation and maintenance.

67. Major investments in renewable energy will also offer significant employment opportunities. We estimate that the UK expansion in renewable energy sector will potentially create up to 160,000 new jobs by 2020. A recent Douglas-Westwood report suggested the expansion in renewable electricity generation alone could create up to an additional 133,000 jobs[2]. In the area of renewable microgeneration (for electricity and heat) there could be around 1,100 maintenance and installation jobs by 2020 and up to 2,000 associated manufacturing jobs. Also, if the UK were to meet the EU biofuel target through domestic feedstock and refinery, this would sustain 13,000 agricultural jobs and 4,000 processing plant jobs.

68. There is of course no guarantee that these jobs will accrue in the UK- many may occur overseas, for example, in the manufacture and supply of components and

[2] Douglas Westwood study on renewable supply chain constraints – April 2008

inputs. However, the UK should be well placed to take a sizeable proportion if we get the frameworks right. There will also be the opportunity to create additional jobs in the UK to service the overseas

69. We now need to ensure that businesses operating in the UK are in a good place to compete in the low carbon markets where they should be strong. The global economy is moving to a low carbon footing with the EU leading the way across 27 member states within the single market of the EU. There may also be other impacts on industry as a side effect of products being used for renewable energy rather than other uses.

Wider Economic Impacts

70. The estimated costs shown in this IA are the direct resource costs of deploying renewable technologies in place of the conventional alternatives. The impact on the wider economy will be larger as the impact of higher costs feeds through to the rest of the economy. The increased costs caused by higher levels of renewable deployment will have a negative impact on GDP and competitiveness, and this impact could be greater in the short-term as the economy moves towards a higher renewable energy future. Oxford Economics have undertaken macroeconomic modelling work for BERR on various climate change and energy measures, including the renewable target. The results of these studies suggest that the impact of delivering 15% renewable energy could lead to a reduction in GDP of 0.5 to 1 percentage points lower than it would be without the renewable target, and a reduction in competitiveness of 1 to 1.5%.

71. The impact on the economy and particular sectors will depend on factors such as how intensely they use energy in their business; the opportunities to substitute away from energy; the relative costs to UK companies compared with their major competitors; and the extent to which the rest of the world undertake climate change mititagion measures.

Impact on innovation

72. Rapidly increasing development and use of renewable energy over a short period of time, and the prospect of a significant market demand for renewable energy technologies, will provide a market for all renewable technologies. This is expected to significantly enhance the drive to innovate in the electricity, heat and transport sectors, as well as in various enabling technologies.

73. This innovation will include both the refinement and improvement of existing energy technologies (such as reducing costs, improving efficiency, lowering maintenance requirements) and the development of new technologies (such as wave and tidal stream energy, currently at a prototype/demonstration stage).

74. In addition to the measures regarding the deployment of renewable electricity technologies, a range of potential ancillary options are consulted on that specifically address the development of newer, more innovative renewable technologies (such as premium support mechanisms and actions to address barriers to the development and deployment of specific technologies), as well as the intention to link

demonstration and deployment mechanisms more closely. These should ensure that the drive to deployment of renewable technology provides the best possible demand for innovative solutions.

Impact on fuel poverty

75. It is likely that the policy measures described in this document will add to the challenges we face in combating fuel poverty, due to the price rises described above. These price rises will also have secondary impacts in terms of conserving energy and stimulating energy efficient behaviour. The consultation seeks views on whether distributional additional measures might be necessary to address this projected increase in fuel poverty.

Impact on Devolved Administrations

76. The UK Renewable Energy Strategy will impact all energy consumers in the UK and depending on where investment in renewable energy projects actually occurs, will have different impacts across geographical regions. In particular any potential decision on developing tidal power projects in the river Severn would be an example of a major project with particular regional implications. Most onshore wind generation potential is in Scotland. Some of the key policy levers to deliver the target are devolved - for example, the Scottish Executive has responsibility for planning decisions for Scotland; and the implementation of Energy Bill powers relating to the Renewables Obligation are devolved to Scotland and Northern Ireland. The DAs are therefore, conducting their own work on the renewables target. We will be heavily dependent on contributions from each of the DAs in order to meet the UK target. They will be fully involved in the work and have opportunity to input meaningfully into the consultation process to ensure that it has a coherent approach to meeting the target in the most cost effective way.

Risks

77. There are a number of risks that the measures set out in the consultation document might not deliver the amount of renewable energy required to reach 15% of overall energy use by 2020. These include the risk that it will not be possible to implement the measures proposed in the consultation 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. It should also be recognised that given the EU negotiations on the Renewable Energy Directive are not yet complete, there are risks of changes that will require amendments to the final strategy. The three sectoral IAs set out the risks to each sector in particular.

78. We will seek to mitigate these risks by undertaking a full consultation and maintaining ongoing dialogue with stakeholders, including industry and investors, in order to identify any further constraints or issues.

Implementation

79. This document sets out potential measures to meet the UK's share of the EU 2020 renewable energy target. Following the outcome of the consultation we will produce a Renewable Energy Strategy, which will set out which measures we will implement, and how we would do so. This Impact Assessment does not consider implementation in great detail.

80. It is likely that some of the measures would require legislation, in particular: changes to the Renewables Obligation or the introduction of an alternative financial instrument; the introduction of a new financial instrument for heat and/or distributed energy; and changes to the Renewable Transport Fuel Obligation that go beyond simply raising its current threshold. If any of these were envisaged in the Strategy, we would seek a suitable legislative opportunity to carry them forward, and would take forward the other measures in the meantime.

Monitoring and Evaluation

81. The draft EU Directive says that Member States' progress towards 2020 targets will be reviewed against an indicative trajectory, every two years from 2012 onwards. This indicative trajectory is non-binding, and is the minimum level of renewables that Member States must deploy. If Member States fail to meet their indicative trajectory, then they must re-submit their national action plans, showing how they plan to get back on track to meeting their target. As well as submitting information about how close they are to meeting their targets, Member States must report to the Commission on a number of other issues. These reports will form the basis of a Commission report to the European Parliament and Council every two years from 2012 onwards.

82. Under the Energy Statistics Regulation 2008 (and its previous non-statutory obligation), BERR already collects and passes to the Statistical Office of the European Communities (Eurostat) statistics on the production and consumption of energy. Eurostat have designed the targets so that they can be measured using the existing system and so not require any additional statistics to be collected.

Specific Impact Tests

Small Firms Impact Test

83. The heat measures contained in this IA are likely to have a bigger impact on small firms. Further details of that impact are in the Heat IA. All small firms will be impacted through increased energy bills.

Competition Assessment

84. As discussed above, there are specific market failures associated with climate change that require intervention by the Government. These potential measures would go some way to correcting these failures. However we remain vigilant that our interventions will not unduly limit the number and range of firms in relevant markets, nor excessively limit firms' abilities and incentives to compete.

85. In terms of the impact on heat suppliers, there are several issues: First, small firms may find the policy more difficult to comply with; second firms selling heating oil etc will be affected by competition from renewable alternatives; third there will be a need to ensure that energy suppliers will not have a disincentive to select certain customers because, for example they could be entitled to other forms of support. This will be done by ensuring a form of balancing mechanism across all firms so that all pay an equal share of any financial support offered.

Sustainable Development

86. The potential measures set out in the consultation document need to be underpinned by the principles of sustainable development which means integrating social, environmental and economic objectives. The challenge is to establish a consistent and comprehensive framework that is able to assess the positive contribution of renewable energy to tackling climate change against potential impacts on other sustainable development priorities.

87. A range of potential environmental impacts will need to be considered including those on biodiversity, landscapes, air quality, soils and land, as well as the marine environment. In our consultation document, we discuss potential options for streamlining the implementation of existing environmental legislation, much of which is agreed at EU level. This is to help speed up the process and facilitate the delivery of the renewable energy target. However, it is important that in prioritising the renewables target we do not reduce the level of environmental protection afforded by existing legislation.

88. There are particular issues around the sustainability of biofuel and biomass supply. We are strongly of the view that all biofuels and biomass used in the UK should come from sustainable sources and are active in the EU and internationally in seeking agreed definitions.

Health Impact Assessment

89. Increased burning of biomass will have an effect on air quality. Increased use of biofuels in transport will also have an effect on air quality, reducing emissions from fossil fuels but increasing certain emissions from biofuels. Air quality regulations will not be changed – existing air quality standards will be maintained.

Rural Proofing

90. A large proportion of renewable energy is produced in rural areas, particularly for certain forms of renewables such as onshore wind and biomass. It is likely that a significant proportion of new renewable developments will occur in rural areas. The increase in renewable energy will affect businesses involved in the generation of renewable energy, including farmers who produce energy crops and biofuels. Most of these are likely to benefit from the measures produced in this document. We have not quantified these benefits but they are likely to add significantly to farm income as

prices for biomass and food rise due to the increased demand for agricultural products. It will also affect rural communities living in the vicinity of new developments (e.g. windfarms and biomass generators), including the visual effect of the renewable installations.

91. The potential measures in the consultation would raise energy prices, which would affect rural customers (as well as urban customers). However it is likely that that impact of this would be greater in urban areas, as this is where most energy-intensive industries are located. However, most customers off the gas grid live in rural areas, so, in the future, the uptake of renewable heat may be higher amongst rural populations who do not access to gas and rely on more expensive heating fuels such as oil.

92. There has been no separate or explicit assessment of the needs of rural areas.

93. Certain forms of renewable development impact disproportionately on rural areas, and there is often resistance to new developments from rural communities. Any resistance to new renewables projects has to be viewed in the light of the Government's commitment to source an increasing proportion of energy from renewable sources, in order to combat climate change. The planning system also has a role in ensuring that new developments are sited in suitable locations.

94. Some households will have increased options for energy provision, such as ground source heat pumps or biomass boilers which require certain amounts of land space for, for example, storage.

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
Small Firms Impact Test	Yes	No
Legal Aid	No	No
Sustainable Development	Yes	No
Carbon Assessment	Yes	No
Other Environment	No	No
Health Impact Assessment	Yes	No
Race Equality	No	Yes
Disability Equality	No	Yes
Gender Equality	No	Yes
Human Rights	No	No
Rural Proofing	Yes	No

Annexes

ANNEX A – EQUALITY IMPACT TESTS

Race Equality

The potential measures would affect all parties the same regardless of race.

Disability Equality

The potential measures would have the same effect on all parties regardless of disabilities.

Gender Equality

The potential measures would affect all parties the same irrespective of gender.

There may however be a disproportionate impact on vulnerable groups, as it is likely that the potential measures will add to the challenges we face in combating fuel poverty.