Title: **Draft Renewables Obligation Order 2011 – Sustainability criteria for biomass and bioliquids in the Renewables Obligation** **Lead department or agency:** DECC **Other departments or agencies:** DfT	Impact Assessment (IA)
	IA No: 10D/1020
	Date: 7 December 2010
	Stage: Development/Options
	Source of intervention: Domestic
	Type of measure: Primary legislation
	Contact for enquiries: Ewa Kmietowicz / Philipp Thiessen

Summary: Intervention and Options

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

Biomass is a finite resource with implications for the production of non-energy commodities so it is important to use it efficiently and sustainably. There are currently no provisions in place to ensure that the bioenergy resources used in the electricity sector deliver GHG savings on a life-cycle basis. There may also be negative impacts on biodiversity, water, and soils are not reflected in market prices. The proposed measures should help ensure that GHG mitigation activities in the UK electricity market through biomass generation do not lead to carbon leakage elsewhere, and give industry greater certainty in making investment decisions.

What are the policy objectives and the intended effects?

The policy objectives are four-fold. The introduction of sustainability criteria would aim to:
- ensure that growth in bioenergy also delivers on the UK's wider carbon and energy security ambitions,
- reduce uncertainty to encourage investment in new UK generation and biomass feedstock supplies,
- promote good practice on sustainable feedstock sourcing and drive underperformers to improve, and
- help secure the support of local government & public to proposed new bioenergy developments.

In addition failure to transpose the RED requirement introducing sustainability criteria for biofuels and bioliquids will lead to infraction proceedings by the Commission.

What policy options have been considered? Please justify preferred option (further details in Evidence Base)

For solid and gaseous biomass, the options considered are (i) do nothing (ii) comply with EU recommendations and (iii) implement stricter GHG savings criteria than those recommended by EU.

For bioliquids the options considered are: (i) do not implement RED obligations. and (ii) (preferred option): implement RED sustainbility criteria for bioliquids: Introducing sustainbility criteria would restrict incentives to only those bioliquids which passed the sustainbility criteria, and allow Government to support the contribution of bioliquds for electricity and heat towards the renewable energy target.

Options 1-3 show the impact of different biomass sustainability criteria, Option 4 shows the impact of the criteria for bioliquids. The intention is to introduce legislation in 2011, with a requirement for reporting starting in April 2011, and mandatory compliance by April 2013.

When will the policy be reviewed to establish its impact and the extent to which the policy objectives have been achieved?	It will be reviewed 2014
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	Yes

SELECT SIGNATORY 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 SELECT SIGNATORY:.. Date: November 2010...........

Summary: Analysis and Evidence — Policy Option 1

Description:

Implement sustainability standards for solid and gaseous biomass in the electricity sector in line with EU recommended criteria: 35% GHG savings in 2013 rising to 60% in 2018 relative to the EU recommended comparator. The EU recommendations are voluntary.

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
2009	2010	20	Low: -£120m	High: £290m	Best Estimate: £80m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low			Optional	£110m
High			Optional	-£300m
Best Estimate				-£90m

Description and scale of key monetised costs by 'main affected groups'

This is the impact of introducing sustainability criteria in line with EU recommendations in the large scale electricity sector. Sustainability standards could reduce the amount of biomass in electricity generation, which would have to be replaced by other technologies to meet the RES 2020 target. Costs relate to resource costs of renewable generation. Costs include estimated administration costs on biomass suppliers and operators.

Other key non-monetised costs by 'main affected groups'

The policy could lead to indirect land use changes (and associated GHG emissions) which are not known. There could be indirect costs on the economy of increased electricity prices and bills but the scale of these is likely to be minimal.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	
High	Optional		Optional	
Best Estimate			£0.1m	**£180m**

Description and scale of key monetised benefits by 'main affected groups'

Benefits include the value of higher GHG savings accruing due to the introduction of GHG savings thresholds. GHG savings are estimated on a lifecycle basis.

Other key non-monetised benefits by 'main affected groups'

There could be other benefits such as preservation of biodiversity, water and soil quality gains, nature protected areas and areas of high carbon stock. These are indirect impacts which are not possible to quantify. There could be indirect land use changes and associated impacts on GHG emissions which are currently not known.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5%

The key assumption is the supply of biomass now and in the future, and the life-cycle analysis (LCA) of these pathways. These are uncertain and different studies point to different estimates. Key uncertainties are how the supply and prices of biomass feedstocks respond to different criteria. Other uncertainties relate to costs of renewable generation technologies, and future electricity and carbon prices.

Impact on admin burden (AB) (£m):	Impact on policy cost savings (£m):	In scope

New AB:	AB savings:	Net:	Policy cost savings:	Yes/No

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			England and Wales		
From what date will the policy be implemented?			01/04/2011		
Which organisation(s) will enforce the policy?			Ofgem		
What is the annual change in enforcement cost (£m)?			n.a.		
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			No		
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** 8	**Non-traded:**	
Does the proposal have an impact on competition?			No		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:**	**Benefits:**	
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	**Micro**	**< 20**	**Small**	**Medium**	**Large**
Are any of these organisations exempt?	Yes	Yes	Yes	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on…?	**Impact**	**Page ref within IA**
Statutory equality duties[1] Statutory Equality Duties Impact Test guidance	No	Final Section
Economic impacts		
Competition Competition Assessment Impact Test guidance	Yes	Final section
Small firms Small Firms Impact Test guidance	Yes	Final section
Environmental impacts		
Greenhouse gas assessment Greenhouse Gas Assessment Impact Test guidance	Yes	
Wider environmental issues Wider Environmental Issues Impact Test guidance	Possible	Final section
Social impacts		
Health and well-being Health and Well-being Impact Test guidance	Possible	Final section
Human rights Human Rights Impact Test guidance	No	Final section
Justice system Justice Impact Test guidance	No	Final
Rural proofing Rural Proofing Impact Test guidance	Yes	Final
Sustainable development Sustainable Development Impact Test guidance	Yes	Final section

[1] Race, disability and gender Impact assessments are statutory requirements for relevant policies. Equality statutory requirements will be expanded 2011, once the Equality Bill comes into force. Statutory equality duties part of the Equality Bill apply to GB only. The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Summary: Analysis and Evidence — Policy Option 2

Description:

Implement sustainability standards for solid and gaseous biomass in the electricity sector of 60% GHG saving threshold relative to the EU comparator from 2013. (Preferred Option)

PRICE BASE YEAR	PV BASE YEAR	TIME PERIOD YEARS	NET BENEFIT (PRESENT VALUE (PV)) (£M)		
			LOW: -£190M	HIGH:£340M	BEST ESTIMATE £80M

COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	-£380m
High	Optional		Optional	£140m
Best Estimate				£120m

Description and scale of key monetised costs by 'main affected groups'

This is the impact of introducing minimum sustainability criteria of 60% life-cycle GHG emissions from 2013 in the large scale electricity sector. Sustainability standards could reduce the amount of biomass in electricity generation, which would have to be replaced by other technologies to meet the RES 2020 target. Costs relate to resource costs of renewable generation. Costs include estimated administration costs on biomass suppliers and operators.

Other key non-monetised costs by 'main affected groups'

The policy could lead to indirect land use changes (and associated GHG emissions) which are not known. There could be indirect costs on the economy of increased electricity prices and bills but the scale of these is likely to be minimal.

BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	
High	Optional		Optional	
Best Estimate				£200m

Description and scale of key monetised benefits by 'main affected groups'

Benefits include the value of of higher GHG savings accruing due to the introduction of GHG savings thresholds. GHG savings are estimates on a lifecycle basis.

Other key non-monetised benefits by 'main affected groups'

There could be other benefits such as preservation of biodiversity, waste and soil quality gains, nature protected areas and areas of high carbon stock. These are indirect impacts which are not possible to quantify. There could be indirect land use changes and associated impacts on GHG emissions which are currently unknown.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5%

The key assumption is the supply of biomass now and in the future, and the life-cycle analysis (LCA) of these pathways. These are uncertain and different studies point to different estimates. Key uncertainties are how the supply and prices of biomass feedstocks respond to different criteria. Other uncertainties relate to costs of renewable generation technologies, and future electricity and carbon prices. Price sensitivities are shown in Table 3 in the main text. The decision on the preferred option balances GHG savings with risk to higher prices and costs.

IMPACT ON ADMIN BURDEN (AB) (£M):			IMPACT ON POLICY COST SAVINGS	IN SCOPE
NEW AB:	AB SAVINGS:	NET:	POLICY COST SAVINGS:	Yes/No

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			Options		
From what date will the policy be implemented?			01/04/2011		
Which organisation(s) will enforce the policy?			ofgem		
What is the annual change in enforcement cost (£m)?					
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			Yes		
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** 9	**Non-traded:**	
Does the proposal have an impact on competition?			No		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:**	**Benefits:**	
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	**Micro**	**< 20**	**Small**	**Medium**	**Large**
Are any of these organisations exempt?	Yes	Yes	Yes	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on…?	**Impact**	**Page ref within IA**
Statutory equality duties[2] Statutory Equality Duties Impact Test guidance	No	Final Section
Economic impacts		
Competition Competition Assessment Impact Test guidance	Yes	Final section
Small firms Small Firms Impact Test guidance	Yes	Final Section
Environmental impacts		
Greenhouse gas assessment Greenhouse Gas Assessment Impact Test guidance	Yes	
Wider environmental issues Wider Environmental Issues Impact Test guidance	Possible	Final section
Social impacts		
Health and well-being Health and Well-being Impact Test guidance	Possible	Final section
Human rights Human Rights Impact Test guidance	No	Final section
Justice system Justice Impact Test guidance	No	Final section
Rural proofing Rural Proofing Impact Test guidance	Yes	Final section
Sustainable development Sustainable Development Impact Test guidance	Yes	Final section

[2] Race, disability and gender Impact assessments are statutory requirements for relevant policies. Equality statutory requirements will be expanded 2011, once the Equality Bill comes into force. Statutory equality duties part of the Equality Bill apply to GB only. The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Summary: Analysis and Evidence — Policy Option 3

Description:

Implement sustainability standards for solid and gaseous biomass in the electricity sector of 70% GHG saving threshold relative to the EU comparator from 2013.

PRICE BASE YEAR	PV BASE YEAR	TIME PERIOD YEARS	NET BENEFIT (PRESENT VALUE (PV)) (£M)		
			LOW: -£450M	HIGH: £860M	BEST ESTIMATE: £200M

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**-£960m**
High	Optional		Optional	**£350m**
Best Estimate				**£300m**

Description and scale of key monetised costs by 'main affected groups'

This is the impact of introducing minimum sustainability criteria of 70% GHG emission in the large scale electricity sector. Sustainability standards could reduce the amount of biomass in electricity generation, which would have to be replaced by other technologies to meet the RES 2020 target. Costs relate to resource costs of renewable generation. Costs include estimated administration costs on biomass suppliers and operators.

Other key non-monetised costs by 'main affected groups'

The policy could lead to indirect land use changes (and associated GHG emissions) which are not known. There could be indirect costs on the economy of increased electricity prices and bills but the scale of these is likely to be minimal.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**£510m**

Description and scale of key monetised benefits by 'main affected groups'

Benefits include the value of higher GHG savings accruing due to the introduction of GHG savings thresholds. GHG savings are estimated on a lifecycle basis.

Other key non-monetised benefits by 'main affected groups'

There could be other benefits such as preservation of biodiversity, waste and soil quality gains, nature protected areas and areas of high carbon stock. These are indirect impacts which are not possible to quantify. There could be indirect land use changes which are currently unknown.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5%

The key assumption is the supply of biomass now and in the future, and the life-cycle analysis (LCA) of these pathways. These are uncertain and different studies point to different estimates. Key uncertainties is how the supply and prices of biomass feedstocks respond to different criteria. Other uncertainties relate to costs of renewable generation technologies, and future electricity and carbon prices. Price sensitivities shown in Table 3 of the main text.

IMPACT ON ADMIN BURDEN (AB) (£M):			IMPACT ON POLICY COST SAVINGS	IN SCOPE
NEW AB:	AB SAVINGS:	NET:	POLICY COST SAVINGS:	Yes/No

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			Options		
From what date will the policy be implemented?			01/04/2011		
Which organisation(s) will enforce the policy?			ofgem		
What is the annual change in enforcement cost (£m)?			n.a.		
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			Yes		
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** 24	**Non-traded:**	
Does the proposal have an impact on competition?			No		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:**	**Benefits:**	
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	**Micro**	**< 20**	**Small**	**Medium**	**Large**
Are any of these organisations exempt?	Yes	Yes	Yes	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on…?	**Impact**	**Page ref within IA**
Statutory equality duties[3] Statutory Equality Duties Impact Test guidance	No	Final section
Economic impacts		
Competition Competition Assessment Impact Test guidance	Yes	Final section
Small firms Small Firms Impact Test guidance	Yes	Final section
Environmental impacts		
Greenhouse gas assessment Greenhouse Gas Assessment Impact Test guidance	Yes	
Wider environmental issues Wider Environmental Issues Impact Test guidance	Possible	Final section
Social impacts		
Health and well-being Health and Well-being Impact Test guidance	Possible	Final section
Human rights Human Rights Impact Test guidance	No	Final section
Justice system Justice Impact Test guidance	No	Final section
Rural proofing Rural Proofing Impact Test guidance	Yes	Final section
Sustainable development Sustainable Development Impact Test guidance	Yes	Final section

[3] Race, disability and gender Impact assessments are statutory requirements for relevant policies. Equality statutory requirements will be expanded 2011, once the Equality Bill comes into force. Statutory equality duties part of the Equality Bill apply to GB only. The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Summary: Analysis and Evidence — Policy Option 4

Description:

Introduce RED sustainability criteria for bioliquids in the RO in line with EU requirements.

PRICE BASE YEAR	PV BASE YEAR 2010	TIME PERIOD YEARS 27	NET BENEFIT (PRESENT VALUE (PV)) (£M)		
			LOW: -464	2,988	BEST ESTIMATE: 1,077

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**-1,715**
High	Optional		Optional	**778**
Best Estimate				**-283**

Description and scale of key monetised costs by 'main affected groups'

This is the impact of introducing sustainability criteria for bioliquids in line with the mandatory EU requirements on costs of meeting the RES. Sustainability standards could reduce the amount of liquid biomass in electricity generation, which would have to be replaced by other technologies to meet the RES 2020 target. Cost increases relate to increased costs of sourcing sustainable fedtocks and include estimated administration costs on biomass suppliers and operators.

Other key non-monetised costs by 'main affected groups'

The policy could lead to indirect land use changes which are not known, possibly with GHG impacts. There could be indirect costs on the economy of increased electricity prices and bills but the scale of these is likely to be minimal.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	**314**
High	Optional		Optional	**1,273**
Best Estimate				**793**

Description and scale of key monetised benefits by 'main affected groups'

Benefits consists of the value of higher GHG savings due to the introduction of GHG savings thresholds. GHG savings are estimated on a lifecycle basis.

Other key non-monetised benefits by 'main affected groups'

The direct GHG savings estimated here could lead to further benefits if indirect land use change effects of the policy are realised.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Key uncertainties concern the likely uptake of liquid biofuels in electricty generation. A smaller overall sector would result in reduced costs. Similarly, the availability of sustainably sourced feedstocks is uncertain. If constraints were less binding, the costs of sustainability standards would fall with higher availability of sustainable feedstocks.
Other uncertainties relate to costs of renewable generation technologies, and future electricity and carbon prices.

IMPACT ON ADMIN BURDEN (AB) (£M):			IMPACT ON POLICY COST SAVINGS	IN SCOPE
NEW AB: 5	**AB SAVINGS:**	**NET:** 5	**POLICY COST SAVINGS:**	NO

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			EU		
From what date will the policy be implemented?			01/04/2011		
Which organisation(s) will enforce the policy?			ofgem		
What is the annual change in enforcement cost (£m)?			0.1		
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			No		
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** -3 (lifetime)		**Non-traded:**
Does the proposal have an impact on competition?			No		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:**		**Benefits:**
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	**Micro** 0.001	**< 20** 0.001	**Small** 0.001	**Medium** 0.002	**Large** 0.002
Are any of these organisations exempt?	No	No	No	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on…?	**Impact**	**Page ref within IA**
Statutory equality duties[4] Statutory Equality Duties Impact Test guidance	No	Final Section
Economic impacts		
Competition Competition Assessment Impact Test guidance	Yes	Final section
Small firms Small Firms Impact Test guidance	Yes	Final
Environmental impacts		
Greenhouse gas assessment Greenhouse Gas Assessment Impact Test guidance	Yes	
Wider environmental issues Wider Environmental Issues Impact Test guidance	Possible	Final Section
Social impacts		
Health and well-being Health and Well-being Impact Test guidance	Possible	Final section
Human rights Human Rights Impact Test guidance	No	Final section
Justice system Justice Impact Test guidance	No	Final section
Rural proofing Rural Proofing Impact Test guidance	Yes	Final section
Sustainable development Sustainable Development Impact Test guidance	Yes	Final Section

[4] Race, disability and gender Impact assessments are statutory requirements for relevant policies. Equality statutory requirements will be expanded 2011, once the Equality Bill comes into force. Statutory equality duties part of the Equality Bill apply to GB only. The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in **References** section.

References

Include the links to relevant legislation and publications, such as public impact assessment of earlier stages (e.g. Consultation, Final, Enactment).

No.	Legislation or publication
1	EU Renewable Energy Directive – Promotion of the use of energy from renewable sources http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF
2	EU Communication on the practical implementation of the EU biofuels and bioliquids sustainability scheme and counting rules for biofuels. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:160:0008:0016:EN:PDF
3	EU Summary of Impact Assessment sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling COM(2010) 11 Final http://ec.europa.eu/energy/renewables/transparency_platform/doc/2010_report/sec_2010_0066_1_impact_assesment_summary.pdf
4	AEA 'UK and Global Bioenergy Resource 2010 (forthcoming)
5	E4Tech 2009 'Biomass prices in the heat and electricity sectors in the UK' http://www.decc.gov.uk/assets/decc/consultations/rhi/132-biomass-price-heat-elec-e4tech.pdf
6	Biomass Environmental Assessment Tool (BEAT 2) http://www.biomassenergycentre.org.uk/portal/page?_pageid=74,153193&_dad=portal&_schema=PORTAL
7	UK RES 2009: Overall Impact Assessment http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/res/res.aspx
8	NNFCC study on Bioliquid generation: size and costs – (forthcoming)
9	RTFO impact assessment http://www.opsi.gov.uk/si/si2007/draft/em/ukdsiem_9780110788180_en.pdf
10	Lifecycle GHG studies http://www.nnfcc.co.uk/metadot/index.pl?id=10478;isa=DBRow;op=show;dbview_id=2457 [1] http://www.renewablefuelsagency.gov.uk/page/guidance-v3

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Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the **Annual profile of monetised costs and benefits** (transition and recurring) below over the life of the preferred policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains an emission changes table that you will need to fill in if your measure has an impact on greenhouse gas emissions.

Annual profile of monetised costs and benefits* - (£m) constant prices Y_0=2010

	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7	Y_8	Y_9
Transition costs										
Annual recurring cost										
Total annual costs	0.0	0.0	0.0	-4.6	-5.3	-25.1	-25.0	-24.9	-24.8	-24.6
Transition benefits										

Annual recurring benefits										
Total annual benefits	0.0	0.0	0.0	3.9	4.7	26.0	26.4	26.8	27.3	27.8

* For non-monetised benefits please see summary pages and main evidence base section

Microsoft Office
Excel Worksheet

Evidence Base (for summary sheets)

Sustainability Standards for Solid and Gaseous Biomass used in the Electricity Sector

Problem under consideration

1. There are currently no mandatory sustainability criteria for solid biomass used in electricity generation. The EU has left the introduction of sustainability criteria for solid biomass to the discretion of each member state, with the EU only giving recommendations for potential criteria as outlined in their 25th February report (http://ec.europa.eu/energy/renewables/bioenergy/sustainability_criteria_en.htm). The lack of certainty over future sustainability standards creates additional risk for industry in sourcing fuel supplies and through releasing the necessary debt finance to develop biomass technologies needed for the UK to meet the 2020 renewable energy target. The lack of a sustainability scheme may also weaken public support for proposed new bioenergy plants both at a local and national level.

Rationale for intervention

2. The rationale for intervention relates to the UK climate change goals and the need to take urgent action against the damaging effects of global warming. Biomass electricity generation can play an important role in mitigating this impact, reducing carbon emissions and helping to meet the UK 2020 renewable energy target. Biomass is a finite resource s with implications for the production of non-energy essential commodities so it is important to use it efficiently and sustainably. The particular market failure being addressed is that there are no provisions in place to ensure that the feedstocks used in this system deliver GHG savings on a life-cycle basis. Market failures may also occur because the potential negative impacts on biodiversity, water, and soils are not reflected in market prices. The proposed measures should help ensure that GHG mitigation activities in the UK electricity market through biomass generation do not lead to carbon leakage elsewhere, and give industry greater certainty in making investment decisions.

3. Under the present international climate agreements, developed countries should report annually all emissions and removals associated with land us, land use change and forestry (LULUCF) as well as fertilizer production and use and energy used in agriculture, although only a subset of LULUCF emissions and removals are mandatory to take into account for meeting commitments. Developing countries have less demanding reporting requirements and no binding commitments. Under a future agreement more complete arrangements are likely, but it is unlikely that we shall get a complete account. Sustainability criteria are therefore likely to be needed for the foreseeable future.

Policy Objective

4. The introduction of sustainability criteria in this area primarily aim to optimise GHG savings and prevent adverse land use change such as deforestation, thus ensuring biodiversity and other environmental impacts are protected. Other important objectives are to ensure industry are given the certainty over investment conditions they need in order to meet the 2020 renewable energy targets, and to deliver the security of supply and green jobs benefits that these imply. The UK also aims to ensure that indirect adverse impacts are minimised – for example on global food supplies, indirect land use change – thus ensuring public support for the use of biomass in electricity generation.

Options considered

I. **Do Nothing**

5. Not introducing sustainability standards for solid biomass risks leading to electricity generators using feedstocks from unsustainable sources that deliver little or no GHG savings on a life-cycle basis, may sometimes lead to higher emissions, and have the potential to lead to destructive impacts on land use through deforestation or destruction of other carbon sinks. As set out in our Coalition's Programme, http://programmeforgovernment.hmg.gov.uk/files/2010/05/coalition-programme.pdf ,the Government believes that climate change is one of the gravest threats we face, and that urgent action at home and abroad is required. This primary driver, as well as the important role biomass is expected to play in meeting the 2020 RES target means that doing nothing is not an option.
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II. **Introduce sustainability scheme for Biomass and Biogas**

6. The Renewable Energy Directive ("RED") sets mandatory sustainability criteria for bioliquids used for electricity and heat generation (and biofuels used for transport). However, the introduction of sustainability criteria for solid biomass and biogas is at the discretion of each member state, with the Commission only giving recommendations for potential criteria as outlined in their 25 February 2010 report: http://ec.europa.eu/energy/renewables/bioenergy/sustainability_criteria_en.htm. The Commission's main recommendation is that for simplicity and clarity, member states who choose to introduce sustainability criteria for biomass and biogas should use criteria similar to those mandated for bioliquids and biofuels.

7. Sustainability reporting for biomass was introduced into the RO in April 2009. The intention was to develop knowledge and expertise ahead of a potentially more rigorous, EU-wide sustainability scheme. The current RO sustainability reporting requires generators to submit an annual report on their biomass feedstocks, such as the country of origin and any land use change since November 2005, but does not set a minimum standard to be achieved. Ofgem published the first year of sustainable data this summer. Introducing solid biomass and biogas sustainability criteria would provide certainty to industry around how the criteria would be applied in England and Wales.

8. In order to develop a sustainability scheme for biomass and biogas, the following elements of the scheme need to be considered:

   (i) The scope of the scheme in terms of production of biomass and which sources of biomass or biogas are covered

   (ii) Reporting requirements and whether the scheme should be voluntary or compulsory

   (iii) GHG savings performance criteria

   (iv) Coverage in terms of which end users are required to comply with the scheme.

   These are considered below.

Analysis of Options

(i) Scope of the Scheme in biomass production sources

9. The 2010 EU report on the requirement for sustainability criteria for solid and gaseous biomass recommends that the scope of the Scheme is similar to that mandated for bioliquids and biofuels:

- A restriction on the use of raw materials obtained from land with high biodiversity value, including primary forest, areas designated for nature protection purposes, and highly bio-diverse grassland.

- A restriction on the use of raw material obtained from land with high carbon stock. A restriction on the use of raw material obtained from land that was peatland in January 2008. Limited exceptions to the above restrictions on the use of raw materials as recognised by the RED in the sustainability criteria for bioliquids. For example, where it is shown that the harvesting of the raw material is necessary to preserve grassland status.

10. In addition the Commission recommends that use of waste is exempt from these sustainability criteria. This reflects both the routinely high greenhouse gas savings achieved and the challenge of setting default values for the wide range of possible waste feedstocks.

11. It is important to have consistency of application across the EU on these issues, not only because they protect areas of high carbon stock or biodiversity, but it gives bioenergy suppliers clear and consistent signals as to the sources that are excluded. If the UK chose to impose more or less stringent conditions this could impose higher costs to UK biomass generators if suppliers have to operate several different systems for sourcing and verification of products. It is not possible to quantify the likely extent of this.

(ii) Administrative costs

12. As noted above, sustainability reporting was introduced in the RO in 2009, which required generators to verify the source of their biomass and to report on any land use change impacts. The proposal is to go further than this, in requiring operators to assess their lifecycle greenhouse gas emissions saving relative to fossil fuel, taking into account the energy conversion efficiency of their particular plant. In addition generators will be required to confirm to the regulator that any materials other than wastes are not sourced from raw materials obtained from land important on carbon or biodiversity grounds

13. The EU has a Standard Cost Model to estimate the cost of chain of custody certification. This suggests a cost of between £700-2,500 per year for individual biomass producers. They suggest that when operators have to show actual GHG savings, costs could be 10-20% higher, implying an **additional cost of £70-£500** pa per biomass producers for GHG certification alone.

14. The EU calculates that there will be higher operating costs for those involved in the bio-energy chain – processors, manufacturers, traders and producers of 60-70% for assessing life-cycle GHG emissions compared with current reporting standards. There is insufficient information on which to base an industry wide estimate of this as we have no data on the number of such firms in this part of the supply chain.

15. The additional reporting requirements will result in additional verification and administrative costs for the regulator (Ofgem). Estimates for the RTFO suggest that Ofgem might incur initial IT and staff costs of around £1m for implementing that scheme – whether this full cost would need to be incurred for biomass depends on the precise scheme design and any savings from learning with doing that could be made.

16. As the verification procedures are voluntary under the RO, the administrative burden on biomass generators is uncertain. They are not obliged to undertake annual audited feedstock accounting, instead the regulator could undertake verification procedures for a sample of operators each year. Should generators decide to undergo these procedures, this could lead to cost of £15,000 for large operators and £1,500 for small operators, in

line with RTFO estimates. (http://www.opsi.gov.uk/si/si2007/draft/em/ukdsiem_9780110788180_en.pdf

(iii) GHG savings performance criteria

17. The Commission recommends that Member States that have or who introduce sustainability schemes for solid and gaseous biomass ensure that these are as far as possible, in line with the criteria as laid down in he RED, which aims to ensure consistency and equal treatment across uses. Article 17(2) sets out the following criteria for biofuels and bioliquids:

- Minimum GHG savings values of 35%, rising to 50% in 2017 and 60% from 2018 for installations in which production started on or after 1 January 2017.

The comparator against which the GHG savings are recommended to be measured is the EU-wide fossil fuel electricity (712.8 kgCO2 /MWh). This is a relatively high emissions factor when applied to the UK electricity sector. Average and marginal emissions factors for evaluation of policies to abate carbon in the UK electricity sector were published in July 2010 (http://www.decc.gov.uk/en/content/cms/statistics/analysts_group/analysts_group.aspx) This suggested average emission factors of 480kg/CO2/MWh in 2010 falling to 370kg/CO2/MWh in 2020, and a marginal emission factor of 393.9kg/CO2/MWh. The table below shows the EU recommended GHG emission savings when applied in the UK electricity market. The table shows that even the higher 60% threshold would only deliver lifecycle GHG savings of less than a third when compared with gas CCGT generation in the UK. This does not provide a benefit in the UK context and risks companies will manage down to the lowest common denominator.

Table 1: EU recommended minimum GHG emissions savings

	2010	2017	2018
Relative to EU comparator 712.8 kgCO2 /MWh	35%	50%	60%
Relative to UK marginal electricity emissions factor 393.9kg/CO2/MWh	-18%	10%	28%

Costs and Benefits

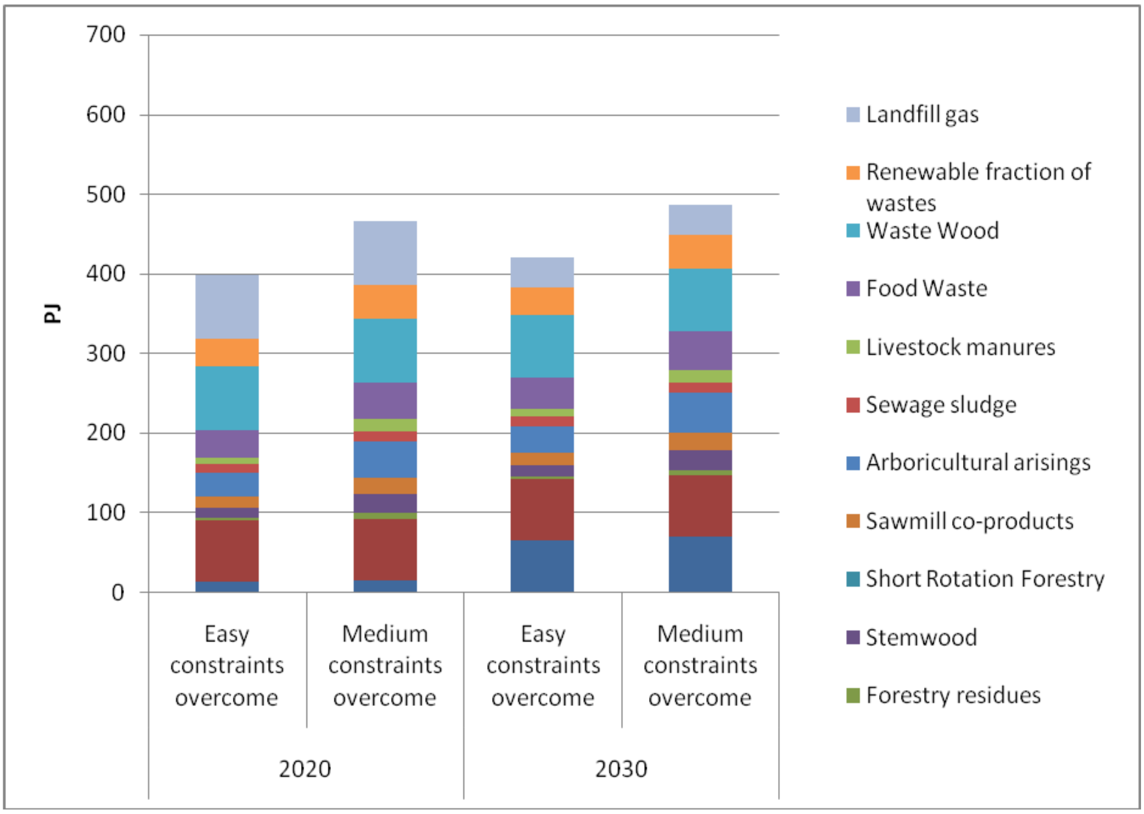
18. The starting point for estimating the impact of different sustainability thresholds in the UK electricity market is to estimate the potential level of generation and costs of biomass in the absence of the sustainability criteria and compare this with the costs associated with generation and costs once the criteria are implemented. The analysis presented here draws on analysis undertaken for the RES (http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/res/res.aspx) and subsequent analysis of biomass plant currently in the planning system that could come forward and contribute to the RES target.

19. Compared with this baseline, the implementation of sustainability criteria could impact on the supply of sustainable biomass feedstocks, or on prices or both. Recent work for

DECC[5] looked at the potential availability of different types of biomass feedstocks that could be available to the UK from domestically sourced feedstocks and through imports. This, as well as previous price analysis based on E4Tech (2009) op cit was used to develop scenarios for this analysis.

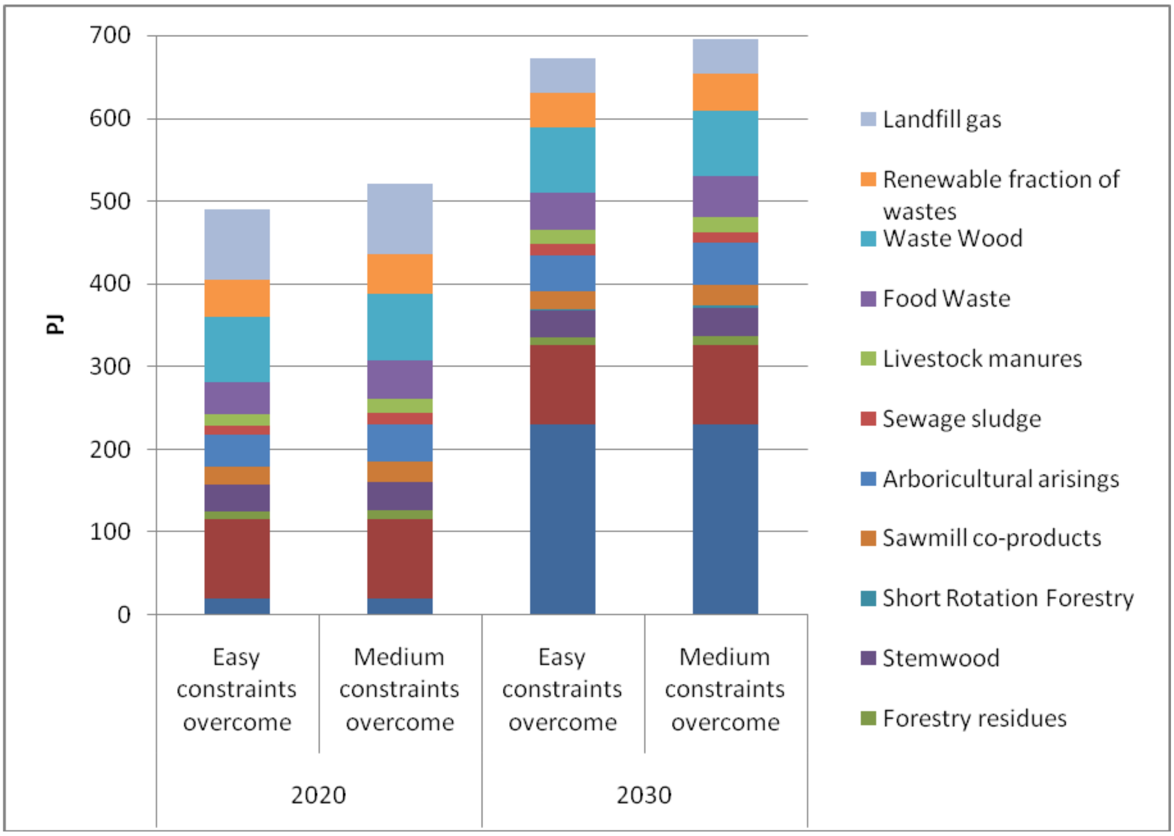
20. The AEA analysis modelled scenarios of biomass supply from UK sources and imports that could be available to generators in the UK at different price points and assuming varying levels of overcoming constraints to the development of the market. This analysis assumed that food and other competing land use uses would be met first – so the analysis attempts to eliminate or minimise any possible impacts on competing uses. In practice however this outcome is uncertain. The charts below gives an illustration of the range results. The analysis considered different non-financial barriers to development of the supply side of the market (for example technical, infrastructure, policy and market factors), and banded these into categories according to how difficult these were to overcome.

Chart 1: UK Biomass supply potential at £4/GJ, 2020 and 2030



5 AEA (2010) 'UK and Global Bioenergy Resource' (Forthcoming)

Chart 2: UK Biomass supply potential at £10/GJ, 2020 and 2030



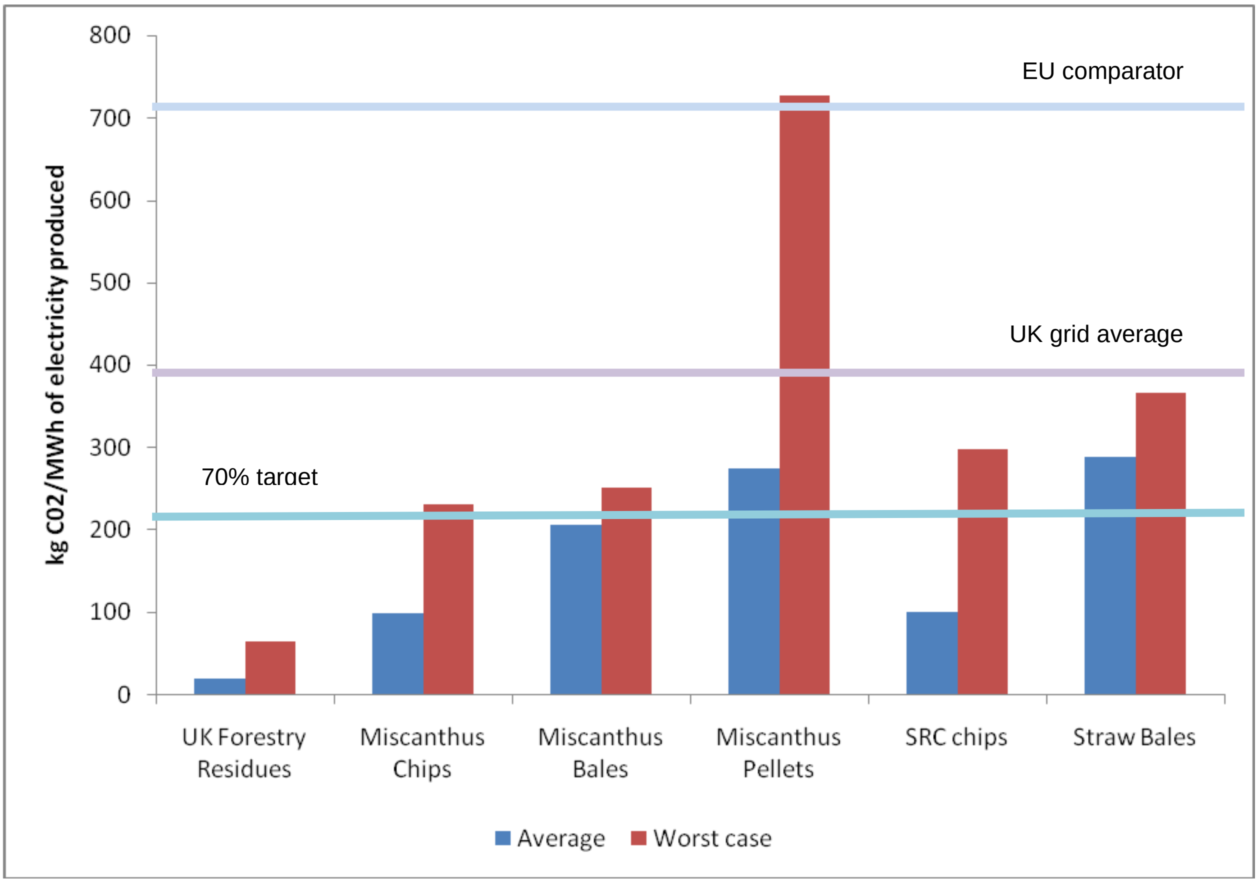
21. In order to estimate GHG lifecycle analysis (LCA) of the feedstocks that make up the potential supply curves, we matched this information with that contained in the BEAT model produced by the Environment Agency. The BEAT model estimates a range of cradle to grave GHG emissions on this basis for a number of feedstocks and applications. This information was used to estimate how much of individual feedstock types would pass different sustainability thresholds. As the BEAT model is limited in its analysis of imports, we supplemented this information with internal analysis of the potential LCA of imports using information from AEA on the likely country of origin of future imports. This included rough estimates of the range of transport emissions from that country to the UK and, for the worst case, an estimate of the worst case land-use that would be replaced and consequent land-use change emissions using factors from the Carbon Dioxide Information Analysis Center [6] with an uplift for potential soil carbon emissions released from removing rainforest based on those reported by Farigone[7].

22. The chart below gives the range of lifecycle GHG emissions from the BEAT model for UK feedstocks

[6] http://cdiac.ornl.gov/ftp/ndp017/table.html

[7] Farigone et al 2008 doi://10.1126/science.1152747

Chart 3: Range of lifecycle GHG emissions from UK sourced biomass feedstocks



23. Using the information detailed above, we estimated the impact of applying the EU criteria on a business as usual biomass baseline assuming no sustainability criteria were in place. We also tested the impact of more stretching GHG thresholds – the modelled scenarios are set out below:

(i) GHG savings thresholds in line with EU recommendations

(ii) 60% GHG savings relative to the EU comparator (28% relative to UK marginal emissions)

(iii) 70% GHG savings relative to the EU comparator (45% relative to UK marginal emissions)

We assume these would apply to all plant from 2013.

24. As set out above, the potential impact of these criteria depends on the projections of future supply, and the LCA of the feedstocks that comprise the supply curves. The AEA work shows that there is considerable uncertainty in future supply and results depend critically to what extent current market constraints are overcome, and on future price points. Under best case assumptions, there could be enough sustainable resource to meet the requirements of the RES (in both the heat and power sectors), whilst under the most conservative supply side assumptions and the strictest GHG thresholds, the amount of sustainable resource would be limited and the feedstock constraint would be biting. This suggests that the impact of the sustainability criteria could be to limit supply or to raise prices or both. It is impossible to predict the exact extent of these possible effects, therefore we have employed scenario analysis around the main impact. The different potential situations modelled are:

(i) Under the EU recommended GHG limit, we assume that the difficulty in securing sustainable feedstocks reduces supply by 5% in 2017 and 15% thereafter.

(ii) Under a 60% GHG threshold we assume that the availability of sustainable feedstocks reduces by 15% than would otherwise have been the case.

(iii) Under a 70% GHG threshold we assume that the available feedstocks that pass the threshold reduce by 25%.

(iv) To explore the impact on prices, we assume that all BAU generation goes ahead but that prices for feedstocks increase. Two scenarios are presented: where prices rise to the 'high' scenario for UK feedstocks, and (ii) where prices are set by marginal import prices.

25. To estimate the costs of the first three scenarios above, we need to make assumptions about which renewable technologies are deployed in the place of a reduced level of generation from biomass operators, in order to ensure that the RES target is reached. The analysis presents two assumptions: low estimates are based on additional onshore wind and high estimates based on additional offshore wind. These were chosen because they provide a range for potential cost impacts and there is spare deployment potential for these technologies up to 2020.

26. To estimate the carbon benefits, we assume full life-cycle emissions of the feedstocks that fail to meet the threshold are saved, irrespective of where the land-use change emissions occur. This is not in line with current emissions accounting convention which assumes biomass has zero emissions at the point of burn in the energy sector (because they are reported under land use) but is in line with counting biomass emissions on a life-cycle basis. Carbon saved is assumed to be valued at the traded price of carbon in line with IAG guidance.

27. As the tables below show, results are sensitive to the assumption made on which renewable technologies are deployed instead of biomass in order to ensure the RES target is reached. The results show that, as expected, carbon savings rise the higher the GHG threshold, but that these are not sufficient to offset the higher costs of offshore wind. In the lower cost scenario, onshore wind is cheaper than biomass generation and results in a positive NPV if this is the replacement technology.

Table 2: Cost Benefit Analysis of Different GHG threshold scenarios

	In 2020			To 2030		
	Onshore wind replaces biomass	Central – average onshore and offshore	Offshore wind replaces biomass	Onshore wind replaces biomass	Central – average onshore and offshore	Offshore wind replaces biomass
(i) Option 1: GHG emissions threshold in line with EU criteria						
Resource cost £m	10	-10	-30	110	-90	-300
Carbon benefit £m	10	10	10	180	180	180
NPV £m	20	0	-20	290	80	-120
(ii) Option 2: 60% GHG savings threshold relative to EU comparator						
Resource cost £m	10	-10	-30	140	-120	-380
Carbon benefit £m	10	10	10	200	200	200
NPV £m	20	0	-20	340	80	-190
(iii) Option 3: 70% GHG savings threshold relative to EU comparator						
Resource cost £m	20	-20	-70	350	-300	-960

Carbon benefit £m	20	20	20	510	510	510
NPV £m	40	0	-50	860	200	-450

Note: Estimates rounded to nearest £10m. (-) indicates a cost (+) a saving

28. As noted in paragraph 24 (iv) above, another plausible impact of the introduction of sustainability standards could be to lead to higher biomass prices. There is no way of predicting with accuracy the likely scale of this impact – partly due to the uncertainties associated with supply and how this is affected under different criteria, and partly because the biomass electricity market is currently dominated a few large operators and the way biomass prices are set in this market is not transparent. Therefore two different scenarios are presented: one where prices rise to the higher end of UK prices (~£13/MWh in 2020) and another where prices rise towards central import prices (~£24/MWh in 2020). These compare with a BAU assumption of £10/MWh. These are drawn from E4Tech (2009) scenarios. Table 3 below gives the cost benefit impact of these scenarios, assuming that the baseline level of biomass generation remains unchanged.

Table 3: Cost Benefit impact of higher biomass prices

	Prices in line with higher UK feedstock prices		**Prices in line with imported feedstocks**	
	In 2020	**to 2030**	**In 2020**	**to 2030**
Resource cost £m	-90	-1280	-470	-7100
Carbon benefit £m	20	510	20	510
NPV £m	-70	-770	-460	-6590

Note: Estimates rounded to nearest £10m. (-) indicates a cost (+) a saving

29. Under the higher biomass price assumptions, the NPV is always negative because the price impact dominates any saving that could accrue from using more sustainable biomass sources. Because of the difficulty in relating any particular price impact with different GHG thresholds, this scenario makes the simplifying assumption that the GHG savings associated with the strictest (70%) criteria apply. The risk of higher prices rises with stricter GHG sustainability criteria, therefore there is a need to balance higher GHG savings and higher costs to biomass generators.

30. There will be additional carbon savings from the sustainability criteria. These are 8, 9 and 24MtC02 by 2030 under Scenarios 1-3 respectively. The cost effectiveness (£/tC02) are the same across all of these scenarios - £13/tC02 using central case assumptions.

Risks and Sensitivities

31. As outlined above, the starting point for estimating the possible impacts of sustainability criteria in the RO, is the amount of biomass generation we expect under BAU assumptions, and the costs of technologies that could be needed to replace any shortfall in biomass. These assumptions are subject to uncertainty. On the cost side, information

from Mott MacDonald[8] has been used to base assumptions. But these are uncertain and changes in relative costs of wind vis a vis biomass generation costs will impact on overall results. For example if offshore wind costs were more in line with R3 costs, rather than an average of current offshore generation, then the NPV would fall from ***-£450m*** to ***-£1160m*** by 2030 in scenario (iii)

32. Another source of uncertainty is the precise level of lifecycle GHG emission that will be saved under the different thresholds. Whilst the coverage of feedstocks for which LCA information is available is quite extensive, uncertainty around how the supply side will develop and whether in practice operators will choose feedstocks in line with our assumptions on the LCA remains to be seen. A potential impact is that generators could move to using more imported materials such as cocoa husks as a means of improving their GHG performance. On the imports side, we have used information on LCA imports under 'best practice' assumptions, which avoid the worst land use change impacts. If we were to incorporate worst case values, for example where energy crops would have been grown on land previously used for forests, then the carbon saved would dwarf any higher generation costs. In this case carbon savings would rise from ***£510m to £3700m*** to 2030, resulting in a NPV of ***£3400m*** by that time under the strictest GHG threshold scenario above.

33. As well as uncertainty on the level of carbon savings that can be attributed to this policy, there is uncertainty on the value of any carbon saved. The values attached to the carbon savings in Table2 follow the central projection, with emissions in the electricity sector using the central value. If carbon savings were to follow the high values suggested by the IAG, the value of carbon saved would rise from ***£510m to £720m*** by 2030 under the strictest GHG threshold scenario.

Coverage by end user

34. EU recommends that small-scale users of biomass (less than 1MWe capacity) be exempt from the sustainability reporting standards. In the UK electricity market, this would exempt around 10% of the biomass schemes currently in planning. This would reduce the administrative burden on these operators by around £10,000 pa using the RTFO estimates noted earlier.

Indirect Impacts

35. Sustainability criteria on biomass in the UK or more generally across the EU could lead to indirect impacts which are difficult to value. These include benefits to bio-diversity, protection of areas of high carbon stock and/or nature reserves which, as well as safeguarding carbon sinks could have positive recreational or conservation benefits.

36. There could also be a range of indirect effects not captured above. It is also possible that demand for sustainable biomass could displace agricultural production onto uncultivated areas with impacts on food prices, biodiversity and land use change impacts. Such indirect impacts are very difficult to model due to the complex nature of agricultural markets, the uncertainties involved in assessing the cause and effect interactions and pathways, and the difficulties in projecting to the future. Whilst the cost benefit analysis above assumes substitution away from biomass into other renewable technologies, risks on indirect land use change factors remain. The Commission has recently consulted on the likely relevance of the indirect land use change problem (http://ec.europa.eu/dgs/jrc/index.cfm?id=1410&obj_id=11270&dt_code=NWS&lang=en) and on potential ways of addressing it. None of the above estimates takes account of

[8] Mott MacDonald http://www.decc.gov.uk/assets/decc/statistics/projections/71-uk-electricity-generation-costs-update-.pdf

possible costs and benefits associated with ILUC impacts. However, the 'worst case' direct land use change assumptions of Energy Crops replacing primary forests (see para 28 above) can be considered as a proxy to illustrate the possible scale of ILUC impacts and shows that these are likely to be significant.

37. The security of supply impacts of the sustainability measures are likely to be minimal. The move towards more wind generation could lead to more intermittent supplies, but this needs to be balanced against the gains from more sustainable biomass supplies. The measures could also impact on employment – for example in biomass related services - but the effects are likely to be negligible.

Summary of preferred option with description of implementation plan

38. The preferred option is to set the minimum GHG threshold at 60% relative to the EU-wide fossil fuel comparator, and to apply the criteria to all power generating plants of 1MW and above. This would ensure that the growth in biomass heat and electricity delivers significant carbon savings at the same time as making a significant contribution to achieving the UK's target of 15% renewable energy by 2020. Our decision on the preferred option balances higher GHG savings with the risk of higher biomass prices as set out above. At the same time it would limit the impact on smaller generators and small feedstock producers, who would struggle to engage with a complex sustainability scheme which would have a disproportionate impact on their costs.

39. These criteria would be introduced via the Renewables Obligation legislation for April 2011, and formally linked to eligibility for financial support from April 2013. This would allow for a phased introduction where generators and feedstock producers will have a year of reporting to familiarise themselves with the new system, and Government and the regulator will then have an opportunity to resolve any teething problems highlighted within the first set of reports due by 31 May 2012.

Sustainability Standards for Bioliquids used in Electricity Generation

Problem under consideration

40. The Renewable Energy Directive[9] requires that electricity generated from bioliquids must meet the mandatory sustainability criteria as set out in Article 17&18 of the Directive. For it to continue to receive financial support from the RO or count towards the renewable energy target, bioliquids need to be RED compliant.

Rationale for intervention

41. In order to address the problem posed by climate change, the UK has set stretching targets for a reduction in carbon emissions to 2050, and has a binding target to achieve 15% renewable energy by 2020. Biofuels and bioliquids can play an important role in this, but there is a need to ensure they deliver real benefits in terms of GHG emissions reductions and do not lead to carbon leakage elsewhere, or other damaging impacts on

[9] http://ec.europa.eu/energy/renewables/biofuels/sustainability_criteria_en.htm

the environment. Not implementing the sustainability criteria could lead to infraction proceedings by the EU.

Policy objective

42. The objectives of the policy are to ensure that the RED sustainability criteria are successfully implemented, that the use of bioliquids in electricity generation lead to substantial lifecycle GHG emissions reductions; that they do not lead to adverse impacts on land use change in the UK or abroad.

Options considered

(i) Do nothing; continue to support bioliquids in the RO which are not RED compliant.

(ii) Introduce sustainability criteria for bioliquids that are RED compliant.

Costs and Benefits

Option 1: Do nothing

43. Doing nothing would mean that the UK was in breach of the RED Directive and would lead to infraction proceedings by the EU. There would be an increased risk of supporting electricity generation from bioliquids which are not sustainable. This is not therefore a realistic option.

Option 2: Introduce sustainability criteria for bioliquids that are RED compliant

44. In order to be RED compliant, bioliquids used in the electricity sector must demonstrate lifecycle GHG savings of:

(a) 35% from the introduction of the criteria, unless produced in an installation in operation on 23 January 2008 when it will start from 1 April 2013

(b) 50% from 1 January 2017 and

(c) 60% from 1 January 2018 where produced in installations in which production started on or after 1 January 2017.

45. For bioliquids the savings are applied on an input basis and apply against reference values of 91 gr CO_2/MJ for bioliquids used in electricity generation and 77 gr CO_2/MJ for use in heat, set out in Annex V(C).19 of the RED. Table 4 summarises the implied maximum carbon intensity under the proposed sustainability standards.

Table 4: Maximum carbon intensity for different GHG thresholds

gr. CO_2/MJ	**35%**	**50%**	**60%**
Electricity	59.15	45.5	36.4
Heat	50.05	38.5	30.8

46. There are further provisions to prevent: conversion of land with a high biodiversity value (eg primary forests, grassland); or change the status of land with high carbon stock (forest and wetlands); the drainage of peatlands. (Bioliquids from wastes and residues other than those derived from agriculture, forestry, aquaculture and fisheries, are excluded from these provisions).

47. The RED prevents the UK from making additional sustainability criteria and Member States cannot refuse to award on sustainability grounds bioliquids which comply with the criteria. The RED also considers as renewable, biofuels and bioliquids manufactured from a process which requires the use of fossil fuel and results in the chemical

incorporation of fossil derived elements within the renewable fuel. One such process is the procudtion of Fatty Acid Methyl Ester – derived biodiesel – FAME. We are therefore extending the RO to biodiesel made partly from fossil fuel.

Costs and Benefits

48. In order to estimate costs and benefits of the proposed criteria, it is necessary first to estimate the potential level of generation and costs with bioliquids in the absence of the sustainability criteria and compare this with the costs associated with generation once the criteria are implemented. As bioliquids are a relatively small source of renewable generation, they were not modelled explicitly in the RES, but are part of a wider group of 'other renewable' technologies modelled by Redpoint/Trilemma (2009). Compared to this baseline, the implementation of sustainability criteria could impact on the supply of sustainable bioliquids and/or price. If the amount of generation from bioliquids is reduced under the sustainability criteria, then it is assumed that the gap would need to be filled by other renewable technologies in order to ensure the overall renewable energy target is still met.

49. It should be noted that this baseline is not equivalent to a 'do nothing' scenario. Without the introduction of the sustainability standards, it would be a breach of the directive to provide financial support to electricity generators using bioliquids which are not sustainable or indeed count their deployment towards the renewables targets. It is unlikely that any installation would come on stream in the absence of such subsidies. This baseline is therefore a purely hypothetical construct representing the continuation of current policies ('business as usual', BAU), even though this is not an available option.

50. This impact assessment covers sustainability criteria for electricity only. While most electricity generation from bioliquids is expected to occur in small to medium scale CHP units, we do not include an assessment of the heat outputs in this analysis.

Baseline capacity and generation from bioliquids

51. Based on the most recent Ofgem data, 30 generators were registered for incinerating (incl. co-firing) bioliquids in 2010/11 with 30 more having submitted applications for 2011/12. Half the currently registered operators have a stated capacity of less than one MW. Most of the new applicants would fall into that size band.

52. In 2009/10 around 140,000 tonnes of liquid biomass has been incinerated by registered generators, around 85% of this is accounted for by animal by-products and food wastes (not further specified). Tall Oil had a share of 8% with the rest made up by tallow (3.5%), soap washings (1.5%) and virgin (1%) and waste (1%) vegetable oils. Based on a 30% conversion efficiency, these could have generated around 200 GWh.

53. Based on current prices for virgin oil feedstocks and even waste oils (see table 7 below), generating electricity from bioliquids would appear to be a rather expensive option compared to using solid feedstocks or other forms of renewable energy. This would explain the small proportion of such feedstocks currently being used (mostly tall oil which has the lowest price due to limited competing uses).

54. Nevertheless, interest exists in expanding the use of bioliquids in CHP applications in certain 'niche' markets: their advantage is claimed to lie in their higher energy intensity and lower air pollutant emissions compared to solid biomass. In dense urban areas with high concern over air quality and where storage facilities are limited, bioliquids may offer the only bioenergy solution.

55. We asked the National Non-Food Crops Centre (NNFCC) to provide three scenarios for potential uptake of the various technologies and feedstocks by 2020. These were compiled based on existing plants, projects currently in the planning process and the

stated intention from industry. The following table summarises the scenario considered to be most 'realistic' by NNFCC. Two further, more optimistic scenarios were supplied as well[10].

Table 5: Central deployment scenario for bioliquid plant by 2020

	Avg plant size		Potential capacity (MW)			Efficiency		Generation (GWh)		
Technology	**MWe**	**MWth**	**No of plant**	**Electricity**	**Heat**	**Electrical**	**Thermal**	**Availability**	**Electricity**	**Heat**
Pure Plant Oil only CHP	20	13.5	2	40	27	36%	90%	85%	298	201
	0.2	0.26	6	1.2	1.56	36%	90%	85%	14	17.9
	0.2	0.26	12.5	2.5	3.25	36%	90%	85%	19	24.2
Used Cooking Oil CHP	1.5	2.25	30	45	67.5	36%	90%	85%	335	502.6
Pyrolysis oil only CHP	20	-	1	20	-	36%	90%	85%	149	
Flex fuel CHP (tall/pyrolysis etc)	20	7	2	40	14	50%	90%	90%	315	110.4
	8	2.8	2	16	5.6	36%	90%	85%	119	41.7
Flex oil co-firing	-	-	-	193.2	-	38%	-	85%	1,439	
FAME co-firing				32.25		38%		85%	240	
SUB TOTAL	-	-	-	**390**	**51**	**-**	**-**	**-**	**2,928**	**898**
Other industrial & CHP	-	-	-	264	313	36%	-	-	2,037	2,357
TOTAL	**-**	**-**	**-**	**654**	**432**	**-**	**-**	**-**	**4,964**	**3,255**

56. Bringing FAME(Fatty Acid Ethyl Ester) into the RO could potentially have a large impact on the size of the bioliquid sector. Based on current costs estimates, however, it would not appear to be an economically attractive feedstock and technology choice. If this was to change, it may displace some of the other bioliquid feedstocks described above. To avoid double counting, the NNFCC did not include separate estimates for dedicated generation using FAME. It is feasible to convert a PPO engine to use biodiesel and vice versa so any plants installed would essentially have some flexibility in what fuel to use and this choice will depend on relative feedstock costs at the time.

57. However FAME might be an option for existing diesel generators which could use that feedstock in the form of a blend or conversion of kit to run on 100% biodiesel. This is reflected in the line for co-firing FAME above. According to the NNFCC opinion (based on

[10]NNFCC report forthcoming

interviews with the industry), any additional uptake on this feedstock should be limited unless strong additional financial incentives were introduced. Based on the potential generation of co-firing with FAME given in the above table, and support equivalent to 1 ROC per MWh, the subsidy cost of including this in the RO could be around £9m in 2020 and £140m cumulative to 2030. However, support levels for all technologies will be reviewed as part of the RO banding review.

58. Given the small size of the bioliquid sector at the moment, forecasts of capacity and generation have to rely mainly on current planning applications and stated intentions from the industry. This implies significant uncertainties surrounding the assumptions of uptake.

59. It should also be noted that the assumptions on efficiency and availability reported in the table above would represent upper end estimates. It is likely that in reality the generation from the assumed capacity would be somewhat lower than assumed here. To that extent the costs and benefits listed below might also be interpreted as 'high end'.

Cost assumptions

60. To estimate resource costs, the costs of generating electricity using bioliquids need to be compared to the most likely alternative method for generating it.

61. The NNFCC has provided estimates of technology costs for the types of installations expected to be installed. The average figures as summarised below. Capital costs are assumed to be spread over the 20 years assumed lifetime of the installations using a cost of capital of 15%p.a. The operating costs are applied directly with the generation estimates shown in table 5 above.

Table 6: NNFCC cost estimates

	Capex (m£/MW)	Opex (£/MWh) (excl feedstock)
Pure Plant Oil CHP (medium size)	2.25	12
Pure Plant Oil CHP (small)	2	30
Used Cooking Oil CHP	1	15
Pyrolisis Oil CHP	0.8	19
Other Industrial CHP	1.35	21

62. The NNFCC also provided current prices and where possible variations and futures prices for the main feedstocks likely to be used in electricity generation. Given the need to secure long term contracts, operators typically pay a premium over spot prices. We approximate this premium using the difference between current spot and futures prices for delivery in 2011. Where price variations were not available, we have assumed the same variations as for similar feedstocks.

Table 7: Current prices of bioliquid feedstocks

Feedstock	Current £/t	Likely variations	Futures price 2011	GJ/t
UCO for direct combustion	£600	400-700		33

Tallow - cat 3	£500			38
Rapeseed oil	£644	300-800	£743	36
Sunflower oil	£754	400-900		38
Soy oil	£586	250-750	£698	38
Palm oil	£555	200-650	£619	39
Pyrolysis oil	£199	120-300		19
Biodiesel	£644			33
Tall oil	£380	350-450		35

63. In the absence of price projections, we have assumed current prices to apply over the lifetime of the projects (in real terms). The generation assumptions shown above together with the efficiency assumption and the calorific value of feedstocks determine the feedstock quantities to be used with these prices to complete the calculation of annual costs.

Substitute renewable technology

64. As outlined above, any shortfall of renewable energy generated from liquid biomass needs to be met by an expansion of an alternative renewable technology in order to meet the RES target. The analysis assumes that wind energy (on or off shore) are the replacement technologies as these provide a range for potential cost impacts and there is spare deployment potential for these technologies up to 2020.

65. For simplicity of exposition we assume an equal split between on and off shore wind expansion would be required to make up for any shortfall in bioliquids generation. To assess the costs of this additional deployment, we use levelised cost estimates from Mott MacDonald (2010). These costs are lower those calculated for the bioliquid electricity generation. Substituting bioliquid generation by wind thereby results in a resource cost saving compared to the counterfactual.

66. **Subsidy costs** relate to the different amount of ROC support available to different technologies, and were estimated by multiplying the difference in ROC entitlement with a projection of ROC prices in line with the lead scenario in the RES strategy.

67. Onshore wind currently qualifies for one ROC per MWh generated while offshore installations receive 2 ROCs/MWh. Compared to bioliquids, a MWh generated by 'average' wind thus receives the same 1.5 ROCs and the subsidy cost of switching between the two technologies is zero.

Administrative Burden

68. As outlined for solid and gaseous biomass above, sustainability reporting was introduced in the RO in 2009. The additional reporting requirements will, however, result in some additional verification and administrative costs for both operators and the regulator (ofgem).

69. According to Ofgem estimates, implementing the scheme might incur initial IT and staff costs of around £1m. The ongoing staff requirement during operation is expected to be 1-2 FTE's for the first two years rising to 2-3 FT's thereafter. Using average salary and overhead costs, this would imply approximate costs of £75,000 per year initially, increasing to £125,000 p.a for the regulator.

70. To qualify for ongoing support, it is expected that operators will have to verify the sustainability of their feedstocks on an annual basis. To estimate the impact of this verification requirement, we use an estimate from the Renewable Fuels Agency (RFA)

that estimates verification costs under the RTFO to be £15,000 pa for large operators and £1,500 pa for small ones.

71. In addition to this costs of verification, some additional administrative burden of a maximum of between one and two working days per operator might be expected. This would be assessed at £500 p.a. per operator.

72. Based on the assumed number and size of generators using bioliquids from the above tables, these costs would not be expected to exceed £200,000 p.a. for the entire industry. Compared to the expected resource costs and subsidies, this has a negligible impact on the cost benefit analysis reported in this Impact Assessment.

Benefits

73. The main benefit of the sustainability criteria is to limit the risk of environmental degradation through negative land use change, and to ensure that bioliquid feedstocks produce significant net increase in carbon savings. For the purposes of the UK carbon budgets bio-feedstocks are counted as zero carbon at the point of combustion in the energy sector. Emissions resulting from extraction, production and land use change are included in other sections of the carbon budgets. This assumes that imported feedstocks are fully covered in the carbon accounts of the originating country. . Under the present international climate agreements, developed countries should report annually all emissions and removals associated with land us, land use change and forestry (LULUCF) as well as fertilizer production and use and energy used in agriculture, although only a subset of LULUCF emissions and removals are mandatroy to take into account for meeting commitments. Developing countries have less demanding reporting requiremetns and no binding commitments. Under a future agreement more complete arrangements will probably apply, but it is unlikley that we shall get a complete account. Sustainability criteria are therefore likley to be needed for the foreseeable future.

74. For the purposes of the RED, the full lifecycle greenhouse gas emissions are to be taken into account at the point of combustion. Given a major motive for encouraging biomass in electricity generation is the reduction in global emissions, this method of accounting for the carbon impacts is followed in this impact assessment.

75. Carbon savings are valued in line with central estimates for carbon in the traded sector in the guidance from the Impact Assessment Group (IAG)[11].

Option 2: Implement the RED sustainability criteria for bioliquids

76. In order to assess the impact of introducing sustainability criteria for bioliquids, we need to consider how close the main feedstocks are to the RED suggested thresholds. Lifecycle GHG assessments are necessarily subject to variations as the outcome depends on a whole range of assumptions from land use change and yield rates over fertiliser and processing inputs through to intermediate and final transport to the incinerating plant.

77. In view of this uncertainty we use a range of values shown in the table below. The first column shows the results from a project carried out by Northern Energy[12] for the NNFCC while the other two columns are derived from the guidance published by the Renewables Fuels Agency (RFA). On the latter values we have taken out the emissions from refining the pure oils into biodiesel and allowed for varying degrees of last stage

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[4] http://www.decc.gov.uk/en/content/cms/statistics/analysts_group/analysts_group.aspx
[12] http://www.nnfcc.co.uk/metadot/index.pl?id=10478;isa=DBRow;op=show;dbview_id=2457

transporting to allow for variations over where the refining would have occurred. Only the RFA figures[13] were derived using the methodology in the RED.

Table 8: Range of estimates of lifecycle GHG intensity of bioliquid feedstocks

Feedstock	gr CO_2/MJ		
	NNFCC	RFA low	RFA high
Soy Bean Oil	43.0	36.8	38.1
Sunflower Oil	21.3	21.6	22.9
Refined Rapeseed Oil	34.2	32.9	34.2
Refined Palm Oil	28.8	20.1	43.8
Recycled Vegetable Oil	0.1	0.0	1.3
Tallow	-	0.2	1.5
Biodiesel (Vegetable Oil)	-	34.6	55.5
Biodiesel (tallow or UCo)	-	12.9	14.1

78. For Pyrolisis oil we assume municipal solid waste (MSW) as a feedstock and processing impacts equivalent to 10 grCO_2/MJ in the absence of better evidence.

79. On the basis of these 'typical', average values, all feedstocks listed above would continue to qualify for RO support beyond 2017 and most could even be used in new installations after 2018 as they would pass the minimum criteria shown in Table 4 above. However, as for any average figure, a wider range of lifecycle GHG is likely to be behind these figures. It is therefore likely that the criteria will require some operators to switch supplier or the choice of feedstock in order to ensure full sustainability evidence.

80. Criteria that limit production on land with a high carbon stock or high biodiversity serves as an additional constraint to feedstocks which are likely to generate land use change (such as expansion or oil seed crops that onto land that has not previously been used for agriculture).

81. It is impossible to predict the precise impact of sustainability criteria on those involved in generating electricity from bioliquids. The effects could be either a reduction in the amount of feedstock available and thus generation or an increase in the price operators have to pay in order to get certified sustainable supplies. In reality the effect will be a combination of the two.

82. In order to proceed with an ex-ante assessment of the impacts, we employ **scenario analysis** around the main impact. Further sensitivity analysis helps analyse the impact of changing some of the assumptions (e.g. on prices).

    a. To simulate severe difficulties in securing long term, certified sustainable supplies of vegetable oils, **scenario 1** assumes none of the pure plant oil installations to go ahead and only 50% of the other CHP's assumed to opt for bioliquids.

    b. To explore impacts limited on prices but assuming adaptable supplies, **scenario 2** assumes all generation go ahead but assumes prices for virgin vegetable oil feedstocks to be at the high rather than central estimates shown above.

    c. Our central **scenario3** is a combination of these two where 50% of plant oil installations and 75% of other potential CHP plant get built and vegetable oil prices rise to their high value.

[13] The RFA guidance and detailed GHG calculations are available at http://www.renewablefuelsagency.gov.uk/page/guidance-v3

In all three scenarios, the assumed lifecycle GHG emissions from all feedstocks move from the average value to the minimum value shown to reflect the impact on the average of removing the worst ones from the range. Table 9 below summarises the main costs and benefits of introducing the sustainability standards.

Table 9: Cost Benefit Analysis of sustainability standards for bioliquids

Costs, Benefits and NPV, m£	Scenario 1		Scenario 2		Scenario 3	
	2020	lifetime	2020	lifetime	2020	lifetime
Costs (positive values are savings)	98	1,715	-45	-778	16	283
Value of Carbon Savings Global	30	1,273	7	314	19	793
Net Present Value	**128**	**2,988**	**-37**	**-464**	**35**	**1,077**

Note: (+) indicates a savings, (-) a cost

83. To illustrate the magnitude of the price and availability effect, Table 9 shows the central price results for all three scenarios. The comparison reveals that the impact of price of feedstocks reduces the net present value (NPV) while limited supply would lead to more, cheaper alternative renewable energy and thus improves the NPV.

84. In addition to the central price assumption, sensitivity analysis was undertaken on different price assumptions under scenario 3. Table 10 gives the sensitivities for a lower (50%) and larger (150%) change in vegetable oil prices. It shows the present value (in 2010) of costs and benefits in 2020 and over the typical lifetime of the plants involved (20 years).

Table 10: Costs and benefits of price sensitivities for Scenario 3

Costs, Benefits and NPV, m£	High price effect		Central price effect		Low price effect	
	2020	lifetime	2020	lifetime	2020	lifetime
Costs (positive values are savings)	0	-3	16	283	33	570
Value of Carbon Savings Global	19	793	19	793	19	793
Net Present Value (NPV)	**19**	**790**	**35**	**1,077**	**51**	**1,363**

85. As outlined, the technologies replacing bioliquids have a lower cost; the more electricity generation is falling short, the higher the cost savings (negative cost in the table). Higher prices for feedstocks for the remaining operators partly offsets this cost saving. In the high prices sensitivity, the two effects almost exactly offset each other.

86. Carbon savings are determined by the reduction in average feedstock lifecycle GHG emissions and the relative better performance of the replacing technology but are independent of the price of feedstocks.

87. All these results are highly dependent on the combination of assumptions made on the effects of the policy and on various other drivers. Some of these effects are testable as sensitivities and outlined in the next section.

Risks and sensitivities

88. As outlined above, the starting point for estimating the impacts of introducing sustainability standards for liquid biomass is forming a baseline view on how much electricity might be generated from bioliquids in the absence of the policy at what economic cost and calculating the extent of GHG emissions savings compared to alternative technologies.

89. There are currently few operating plants generating electricity from liquid biomass. Similarly we are not aware of any alternative, available projections of future uptake in the industry. The analysis is therefore strongly dependent on a single study. It can be argued that in the absence of credible criteria little capacity could be built due to widespread concern over sustainability preventing planning permissions from being granted.

90. The availability of sustainably sourced feedstocks would be another way of estimating a potential size of the generating capacity. However, liquid biomass feedstocks are in direct competition with biofuels and to some degree with solid biomass, as well as other sectors, most notably food. The share e.g. of the global vegetable oil supplies used for energy or transport is currently well below 10%. This makes it difficult to estimate firm limits of feedstock availability to individual sectors.

91. Similarly the assumptions on the **cost side** (technology and feedstock) are subject to uncertainty. For example world market prices for vegetable oil might not be what operators effectively pay: the quality requirements for feedstock are likely to be less stringent than e.g. oils used in the food industry. If we reduced the cost advantage of ‘average wind over bioliquids by £20/MWh, central resource saving would fall from £287m to £120m and the NPV from £1,087m to **£910m**. The same would apply if the ‘average’ wind deployment turned out to be more expensive than the average cost assumption used.

92. The **values** attached to the **carbon savings** estimated here follow the central projection, with emissions in the electricity sector using the traded value. The value of global GHG savings in our scenario 3 would be higher using the high carbon values set out in IAG guidance. It would rise to £1,145m, thereby resulting in an NPV of **£1,428m**. Using the low value reduces benefits to £400m, the NPV to **£684m**.

93. As explained at the outset, this analysis ignores impacts on the **heat** side of bioliquid electricity generation. There are currently no sustainability criteria in the heat sector, and the impact on this sector would depend on future policy in this area, as well as on which heat sector technologies this would displace. These are too uncertain to model at this time.

Indirect Impacts

94. Many liquid feedstocks used to generate electricity and heat, such as oil seeds and waste oils, could be supplied to alternative markets such as food[14] and transport. Supplies of these feedstocks may be constrained, and a high diversion of liquid feedstocks into electricity generation may therefore effect our ability to meet the transport target.

95. The generation of a UK market for bioliquids may generate additional jobs if the production of the feedstock and processing is based in the UK and when additional jobs are required to build, service and maintain additional installations. These jobs are likely to substitute those from other sectors so there may be no net increase.

96. Additional environmental and social effects, both positive and negative, are likely to occur. There are sustainability concerns which fall outside the mandatory criteria, but the Commission have a commitment to monitor and propose action if appropriate. These include effects on air, soil and water, food prices and indirect land use change (ILUC). Indirect land use change occurs when an overall increase in demand for a feedstock displaces land which would otherwise be used for food, therefore causing additional conversion of land elsewhere. If the land converted was of high carbon stock, the net greenhouse gas emissions could be higher in the short term than burning the equivalent fossil fuel.

97. The Commission has recently consulted on the likely relevance of the problem posed by ILUC and on potential ways of addressing it.[15]

98. None of these indirect impacts have been included in the estimated benefits and costs above.

Specific Impacts Tests of biomass and bioliquids sustainability criteria

Statutory Equality Duties Impact Assessment

99. The same set of criteria apply equally across race, disability and gender, therefore there is no change expected in equality impact outcomes.

Competition Assessment

100. The same set of sustainability criteria will apply to all bioliquid installations equally and should not distort competition within the sector or between bioliquids and biofuels. The potential different criteria for solid and gaseous feedstocks might be similar in terms of ambition and required effort on the generators. The standards might instead encourage a more level playing field by setting an agreed market standard for 'sustainable biomass' across the UK and thereby create a more unified market for sustainable supplies. This would make it easier for smaller generators to source biomass that they can be confident is sustainable.

Small firms impact test

101. Whilst the total amount of subsidy received depends on the amount of generation, the compliance costs covered above would not be expected to vary with the size of the operator to the same degree. This would represent a potential disadvantage for small firms who could face similar costs in return for less overall support compared to larger operators. The magnitude of costs related to administration and verification outlined above would, however, not appear to be unreasonably high when compared to the likely amount of ROC support that even small installations would be entitled to.

[14] See for example the Gallagher review http://www.unido.org/fileadmin/user_media/UNIDO_Header_Site/Subsites/Green_Industry_Asia_Conference__Maanila_/GC13/Gallagher_Report.pdf

[15] http://ec.europa.eu/energy/renewables/consultations/2010_10_31_iluc_and_biofuels_en.htm

Carbon Assessment

102. The value of carbon savings from the different options in the solid and gaseous biomass sector are shown in Table 2 above. The volume of carbon savings are given in paragraph 29 above. The value of carbon savings from bioliquids sustainability criteria are provided in tables 9 and 10 above. The equivalent carbon savings from these measures is around 160,000 tonnes of CO_2 in 2020 or around 3mtC02 over the lifetime of the installations.

Wider Environmental Impacts

103. Increased combustion of biomass will have implications for local air quality and will need to be addressed through suitable remedial actions, such as the application of filters or scrubbers within the plant design. This and other local environmental impacts of new biomass plants, on local soil, water, air, land, biodiversity and amenities will be considered within the existing planning and permitting process. Regarding increased production of biomass feedstocks in the UK, we already have robust sustainable forestry management practices, and applications for an Energy Crops Grant are subject to an environmental appraisal and site visit.

104. Bioliquids typically have much smaller local air pollutant emissions and are often put forward as a solution in dense urban areas for that reason. The higher energy density also requires less transport to and storage at the combustion plant. This is a further advantage in urban areas.

Social Impacts

105. As mentioned above, the combustion of biomass and bioliquids will have implications for local air quality, which could impact on ***health and well-being***. Detailed determination of such impacts is complex and site specific. If the sustainability criteria reduce the level of biomass or bioliquid generation, then such impacts could be positive. In addition, pollution abatement technologies can be applied to reduce emission if required. and there is insufficient information on which to base an assessment.

106. On ***Human Rights Impacts***, if the proposals for sustainability criteria engage article 1 protocol 1 of the ECHR (protection of property) then we consider the proposals are compliant because (a) they will be implemented through legislation (b) they pursue a legitimate aim (that bioenergy should be sustainable) (c) they are necessary (as the only way to ensure the RO only supports bioenergy that meets the criteria) (d) they are proportionate (the sustainability criteria do not go further than necessary to achieve the aim). No other convention rights are considered to be potentially engaged by the proposals. In terms of ***Justice Impacts***, the proposals increase the legislative complexity of the RO. Lack of clarity in the provisions of the Renewable Energy Directive setting the bioliquid sustainability criteria may create potential scope to challenge decisions applying those sustainability criteria. These risks should be reduced by guidance from the Commission, Ofgem and DECC. Therefore, the proposal is not considered likely to increase the volume of cases going through the courts.

107. In terms of ***rural proofing***, a large proportion of biomass and bioliquid feedstocks are produced by the farming and forestry sectors. Therefore, increasing the proportion of energy from biomass is expected to mean new business and job opportunities in rural areas as part of an expanding UK biomass supply chain. Although there has been no separate or explicit assessment of the needs of rural areas, these proposals are set within this wider policy context and aim to ensure that the impacts on consumers and their bills are reasonable. is insufficient information on the geographical location of bio

Sustainable Development

108. The addition of sustainability reporting requirements for the use of biomass and bioliquids in electricity generation, will ensure that the growth in biomass electricity also delivers minimum carbon reductions and helps tackle dangerous climate change. In addition, the restrictions on use of materials that have been produced through negative land use change, will help protect lands important on carbon or biodiversity grounds.

Security of Supply

109. Dedicated biomass, including bioliquids, is ‘dispatchable’ so, unlike the majority of renewables, can be used to provide both base load and peak load power. This means that biomass electricity can perform a critical grid balancing role as larger amounts of intermittent power, such as onshore and offshore wind, comes online. However, growth in biomass electricity cannot take place without public support for new plants being built.. Credible sustainable criteria will help support both an effective, timely planning process, and reduce the associated risks for developers and investors.

Summary and preferred option with description of implementation plan

110. The introduction of the sustainability criteria for liquid biomass is compulsory under the RED. The present analysis suggests the costs of this introduction are likely to be small or negative while resulting in benefits of reduced global GHG emissions.

Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added to provide further information about non-monetary costs and benefits from Specific Impact Tests, if relevant to an overall understanding of policy options.

Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

Basis of the review: The effectiveness of this policy will be formally assessed as part of the banding reviews of the Renewables Obligation which are expected to be run every 4 years. The first review would therefore be scheduled to start in October 2014.
Review objective: To take account of any new evidence and to ensure regulations are operating as expected.
Review approach and rationale: Evaluation of the annual data on sustainability of the feedstocks used, provided by generators to Ofgem, consultation responses and stakeholder feedback as well as consideration of the available new research on biomass availability, supply chain innovation and good practice to fill evidence gaps. .
Baseline: The current baseline is no sustainability criteria are introduced.
Success criteria: Success will be measured against (i) evidence on lifecycle GHG emissions of biomass and bioliquids used in the electricity sector and (ii) evidence on sources of these feedstocks and (iii) the amount of deployment of bioenergy technologies in the electricity sector.
Monitoring information arrangements: Data as above will be collected through the implementing authority on an annual basis.
Reasons for not planning a PIR:

Add annexes here.