Regulation of Energy from Solid Biomass Plants

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AEA Technology
The Gemini Building
Fermi Avenue
Harwell International Business Centre
DIDCOT
OX11 0QR

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AEA Technology is certificated to BS EN ISO9001:2000 and BS EN ISO 14001:2004

	Name	**Signature**	**Date**
Author	P James and P Howes		
Reviewed by	P James		
Approved by	D Mitchell		

Executive Summary

The Environment Agency commissioned AEA Technology to undertake a review of the regulation of solid biomass plants in England & Wales. This report is the outcome.

Energy underpins almost every aspect of our economy and day-to-day lives. Factors such as population growth and changes in lifestyle have resulted in the global demand for energy increasing to unprecedented levels and **all the signs are that demand will continue to grow worldwide**.

Internationally **global warming** is recognised by many nations to be one of the most important challenges we face. Global warming is attributed to increased levels of greenhouse gases in the atmosphere as a result of the use of fossil fuels.

The UK's commitment to address the challenge of global warming are outlined in the **2003 Energy White Paper**[1]. One of the core goals set out is a commitment to put the UK on a path towards a reduction in greenhouse gas emissions of some 60% from current levels by about 2050, as recommended by the Royal Commission on Environmental Pollution, with real progress by 2020.

Electricity only accounts for a fraction of total energy consumption, and efforts are also being made in the UK to recognise the roles of **heat generation from renewable sources**.

Biomass is a particularly diverse renewable energy source: it may be used as a fuel for heat, power and transport. The use of biomass fuels benefits from the principles of the carbon cycle, whereby the carbon dioxide released in combusting plant materials, is balanced by carbon dioxide absorbed by the same plant matter whilst growing. Life cycle analysis has demonstrated that **the use of biomass fuels for heat and power generation is close to being carbon neutral.**

This report brings together in a single summary document the variety of guidance, legislation and other information relevant to the regulation of energy from solid biomass installations in England & Wales. It is hoped that gathering this information together in a single document will contribute to the improved exploitation of biomass, whilst ensuring a greater understanding of **the measures required to comply with environmental legislation**, and the protection of the environment as a whole. The report provides data that quantifies the status of solid biomass utilisation, comments on emerging trends, and describes the application of relevant waste management and biomass legislation and initiatives.

A diagram showing the structure of the report is shown in Figure 1-1, page 5.

[1] Our Energy Future – Creating a low carbon environment
http://www.dti.gov.uk/energy/whitepaper/ourenergyfuture.pdf

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Tables

Abbreviations used in this report

BAT	Best Available Techniques
BTF	Biomass Task Force
BREF	Best available techniques reference document
CCL	Climate Change Levy
CDM	Clean Development Mechanism
CV	Calorific value
DCLG	Department for Communities and Local Government
Defra	Department of Environment, Food and Rural Affairs
DNC	Declared Net Capacity
DTI	Department of Trade and Industry
EC	European Commission
EIA	Environmental Impact Assessment
EIT	Economies in transition
EJ/y	Exa (10^{18}) Joule
ERU	Emissions Reduction units
EU	European Union
EU ETS	European Emission Trading Scheme
GQCHP	Good quality combined heat and power
IPPC	Integrated Pollution, Prevention and Control
LAAPC	Local Authority Air Pollution Control
LEC	Levy exemption certificate
MIW	Municipal and industrial waste, as defined in the NFFO
MSW	Municipal Solid Waste
MW	Mega Watt
MWth	Mega Watt thermal
NFFO	Non Fossil Fuel Obligation
odt/y	Oven dried tonnes per year
PPC	Pollution Prevention and Control
REGO	Renewable Energy Guarantee of Origin
RMU	Removal units
RO	Renewable Obligation
ROCs	Renewables Obligation certificates
SRC	Short Rotation Coppice
t/y	Tonnes per year
TWh/y	Terra watt hours per year
UNFCC	United Nations Framework Convention on Climate Change
WID	Waste Incineration Directive
WFD	Waste Framework Directive

1 INTRODUCTION

1.1 Purpose of this report

The objective of this report is to bring together in a single summary document the variety of guidance, legislation and other information relevant to the regulation of energy from solid biomass installations in England & Wales. It presents summaries of each of the regulatory issues by providing;

- A general description of the issues / regulations
- Key requirements and procedures
- Contacts & links to further guidance

It is hoped that gathering together the relevant information in a single document will contribute to the improved exploitation of biomass, whilst ensuring a greater understanding of the measures required to comply with environmental legislation, and the protection of the environment as a whole.

1.2 What this report covers / does not cover

The structure of the report is shown in Figure 1-1 below.

The report deals with the regulation of the use of solid biomass in England & Wales, e.g. for heat and power generation. It does not deal with liquid biofuels, with situations where biomass is used in mobile units (e.g. vehicles), or where the material used may be classified as "hazardous waste" - when operators should consult with the Environment Agency[2].

The report covers all of the main legislation, relevant incentives and initiatives, and discusses some key associated issues and influences. Although the regulatory standards are discussed, the report does not go into the details of installation design. The report provides data that quantifies the status of solid biomass utilisation, comments on emerging trends, and describes the application of relevant waste management and biomass legislation and initiatives.

1.3 Who should use this report

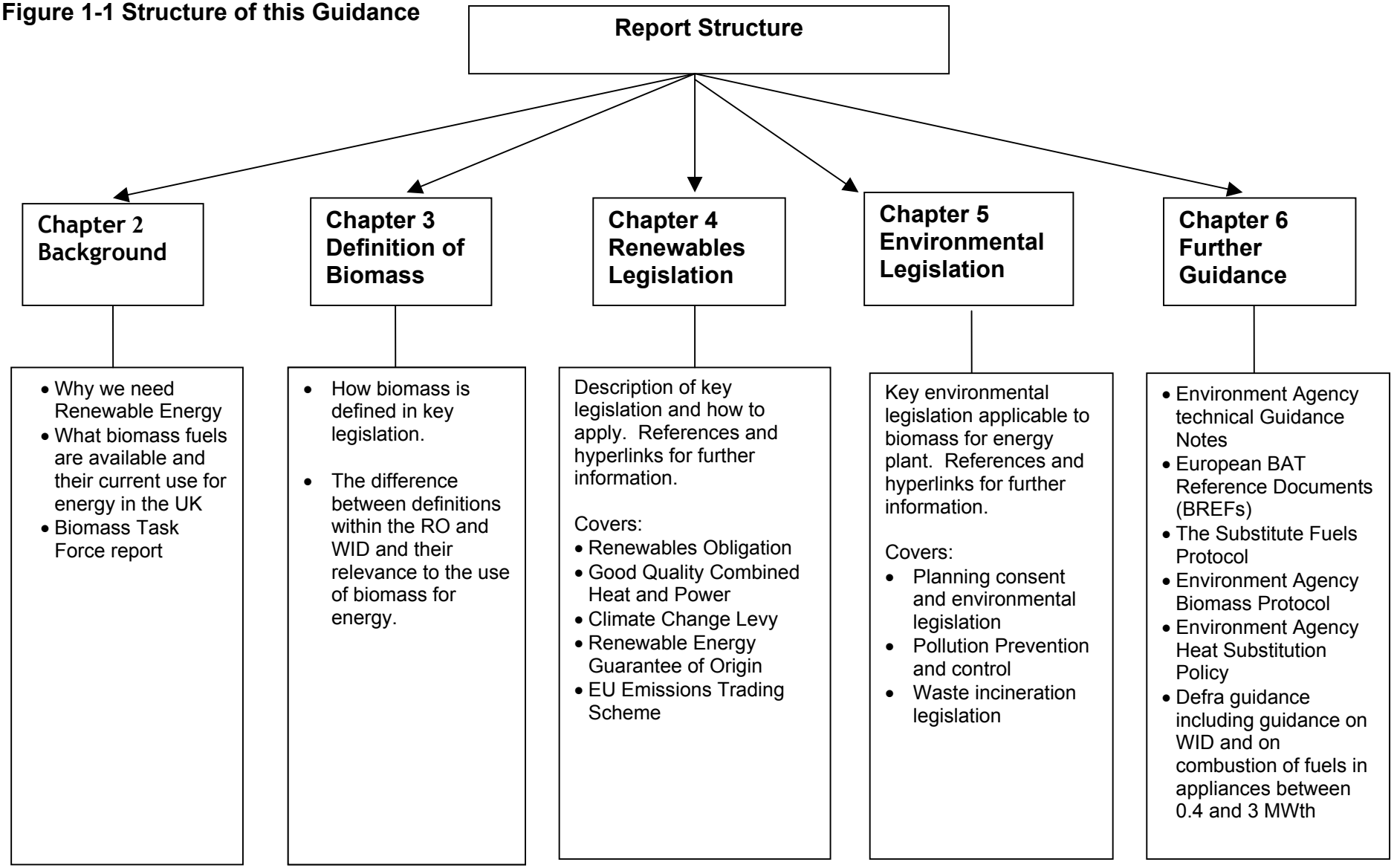
It is intended that this report is used by Environment Agency staff in applying the relevant legislation. It will also help the developers of biomass projects in understanding the regulatory requirements.

1.4 Status of this report

This report has no legal standing.

[2] Contacts are provided later in this report – see section 5.3

Figure 1-1 Structure of this Guidance



2 BACKGROUND

2.1 Introduction

This section describes the need for renewable energy and specifically the use/potential use of solid biomass fuels for heat and/or power in the UK. Definitions of biomass are provided later, in section 3.

This chapter also:

- Provides an overview on the availability and use of various types of biomass – see sections 2.3 and 2.4
- Introduces the Renewables Obligation (RO) - see section 2.5
- Summarises the findings of the recent Biomass Task Force report on the use of biomass in the UK – see section 2.6
- Describes the likely future trends in the use of solid biomass – see section 2.7

2.2 The need for renewable energy

Energy underpins almost every aspect of our economy and day-to-day lives. Factors such as population growth and changes in lifestyle have resulted in the global demand for energy increasing to unprecedented levels and **all the signs are that demand will continue to grow worldwide**. This has implications for us all, including the negative effects of climate change, air pollution, and, for the UK and much of Europe, increasing dependence on insecure, expensive and ultimately limited fossil fuel supplies.

Internationally **global warming** is recognised by many nations to be one of the most important challenges facing us. Global warming is attributed to increased levels of greenhouse gases in the atmosphere as a result of heavy and increasing use of fossil fuels. The major international framework for action on climate change is the UN Framework Convention on Climate Change (UNFCCC), which provides a forum to consider what can be done to reduce global warming and to cope with whatever temperature increases are inevitable.

In 1997, in recognition that legally binding measures were required, a number of nations within the UNFCCC adopted the **Kyoto Protocol**[3]. This Protocol has the objective of "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". It commits Parties to Annex 1 of the Protocol to individual, legally binding targets to reduce their greenhouse gas emissions. Parties to the convention that have ratified, accepted, approved, or acceded to it are bound by the Protocol's commitments. 161 countries have ratified the treaty, and introduced **carbon dioxide reduction targets**.

[3] http://unfccc.int/essential_background/kyoto_protocol/background/items/1351.php

The EU has agreed to an overall target to reduce its greenhouse gas emissions by 8% from the baseline 1990 levels by the first Kyoto Protocol commitment period (2008-2012) and has reached agreement on how this target will be redistributed across member states. The UK's target is to cut its greenhouse gas emissions by 12.5% within this time period. Other important aspects of the Kyoto Protocol are presented in appendix 7.7 to this report.

The UK's commitment within the UNFCC and its aims to address the challenge of global warming are outlined in the **2003 Energy White Paper**[4]. One of the core goals set out in the Energy White paper is a commitment to put the UK on a path towards a reduction in greenhouse gas emissions of some 60% from current levels by about 2050, as recommended by the Royal Commission on Environmental Pollution, with real progress by 2020. The Government is undertaking a review of energy policy this year (the "**Energy Review"** [5]). This was published in January 2006 and the consultation period is now closed. The Govenrment is committed to publishing a summary of the views expressed within three months of end of this consultation period and will issue a statement on energy policy in the summer. The review explores all options open to address climate change and includes issues such as low carbon technologies (e.g. biomass energy) in its terms of reference.

The EU and the UK Government have examined a number of ways to achieve the Kyoto targets. These include emissions trading and support to low carbon and sustainable technologies. Emissions trading is encompassed within the European Emissions Trading Scheme (EU ETS - see section 4.7). Support for low carbon and sustainable technologies (including energy efficiency and development of alternative sources of energy) is encompassed in a number of intitiatives, including legislation, support for research, development and design and marketing and promotion of the technologies. The **EU Renewables Directive** (2001/77/EC)[6] mandates the use of clean renewable based energy sources in EU member states. In the UK the government has set the objective of sourcing 10% of UK electricity supply from renewable sources by 2010[7], requiring an installed capacity of 10,000 MW of renewable generation (see section 4.1 on the Renewables Obligation).

Electricity only accounts for a fraction of total energy consumption, and efforts are also being made in the UK to recognise the roles of **heat generation from renewable sources** and the role renewable technologies could play in transport. **Biomass** is a particularly diverse renewable technology: it may be used as a fuel for heat, power and transport. The use of biomass fuels benefits from the principles of the carbon cycle, whereby the carbon dioxide released in combusting trees, plants etc., is balanced by carbon dioxide absorbed by the plant matter whilst growing. However, it is important that the biomass is produced in a sustainable way as it is only truly renewable if replaced. Life cycle analysis has demonstrated that **the use of biomass fuels for heat and power generation is close to being carbon neutral.**

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[4] Our Energy Future – Creating a low carbon environment
http://www.dti.gov.uk/energy/whitepaper/ourenergyfuture.pdf
[5] For more information see: www.dti.gov.uk/energy/review
[6] http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_283/l_28320011027en00330040.pdf
[7] http://www.dti.gov.uk/renewables/

2.3 Availability of biomass

There are indications that there is **considerable biomass resource** suitable for energy recovery in the UK.[8] The types of biomass currently being considered for heat and/or power generation are listed in Table 2-1. It can be seen from this table that biomass encompasses products and wastes from many different sectors. This makes it difficult to precisely quantify the total resource available. There is also a developing **international trade in biomass fuels** - such as those being used to supply the utility co-firing market in the UK – which is generally expected to increase and stabilise over the next decade or so. The International Energy Authority (EIA) Bioenergy Agreement is examining this potential (see www.bioenergytrade.org). Such fuels include agricultural and food processing residues that may have been traditionally used as animal feed; wood pellets; forestry residues from Eastern Europe, the Baltic and Canada; and wood processing residues from Scandinavia. This international resource is estimated to run into **millions of tonnes of biomass per annum**. However, some estimates indicate that the a realistic potential for biomass energy generation could be between 35 and 1130 EJ/y [9] worldwide, with a large proportion of this resource being found in the C.I.S and Baltic states, South and North America and the Far East[10].

The great variety of biomass fuels means that definitive and comprehensive data on the availability of all potential biomass fuels within the UK is not available. The recent Biomass Task Force report (see 2.6) estimated that around 20 million tonnes of biomass material could be available for energy recovery per year in the UK, with a significant proportion of this from energy crops.

The Carbon Trust Biomass sector review estimated that 41TWh/year could be delivered from existing biomass energy supply, based on existing availability and that there is scope to almost double the supply in the future, representing c.1.5% of current UK energy demand. **A summary of the biomass resource estimates for those fuels most likely to be used in the UK is presented in the appendix to this report** and is summarised in Table 2-1 below. The available data indicates that the current solid biomass resource is in the region of 9.4 million odt/y (not including the 8 million odt/y potential from energy crops). In addition there is a sludge resource of around 2 million t/y of sewage and industrial sludge, and an estimated 1.75TWh/y in animal manures and slurries.

Biomass is **generally bulky and expensive to transport**, is rarely available in a form suitable for immediate use as a fuel and the logistics and costs of collection, preparation, storage and fuel handling need to be considered. Therefore, when biomass energy schemes are planned, **the most important biomass fuel resource is generally that which is most readily available to the plant**. This is likely to be the resource in the immediate vicinity of the plant or within easy transport distance[11].

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[8] DTI Consultation on the Renewables Obligation, Biomass Task Force report.

[9] 1 EJ = 1 exajoule = 1 x 10^{18} J = 1 x 10^{12} MJ

[10] M Hoogwijk (Exploration of the ranges of the global potential of biomass for energy Biomass and Bioenergy 25 (2003) 119 – 133) – estimated potential worldwide of 35-1130 EJ/y; and IEA Bioenergy Agreement Task 40: Sustainable International Bioenergy trade provides information on international trade on: www.bioenergytrade.org

[11] For schemes within access to a deep sea port this can also include imported biomass.

Table 2-1 Biomass fuels likely to be used in the UK

	Fuels currently being considered or used	Comments
Energy crops	short rotation coppice, miscanthus	In the future the following may also be considered: switchgrass, reed canary grass, single stem trees and annual crops. Eucalyptus from abroad.
Forestry residues	woody residues from felling, thinning and other forestry operations	
Agricultural residues	poultry litter and straw	The following may also be considered: corn stover, sugar beet tops, feathers, horse bedding
Wood and paper processing residues	Untreated wood waste from sawmills, packaging, from wood products industry etc; paper sludge and other residues from pulp and paper production. Contaminated wood wastes, e.g. demolition waste, civic amenity wastes, waste from furniture and board manufacture.	To be eligible within the RO it must be shown that less than 10% of the CV is fossil derived. The burning of contaminated wood wastes is regulated under waste legislation that sets additional pollution control requirements (see section 6.1.2)
Other	wood from arboricultural operations	See comment above for contaminated wood waste.
Imported biomass fuels	Olive cake and other residues; palm kernel expeller; other palm oil processing resides; shea nuts and other residues; other agricultural residues (e.g. sunflower, cashew nuts, citrus pulp pellets etc)	These fuels are currently imported into the UK for co-firing.
Waste biomass fuels	Waste derived fuel e.g. cellulose fibres. Food processing residues e.g. coffee grounds, distillery residues, wheat/cereal pellets and co-products. Animal processing residues (e.g. tallow, MBM, blood and slurry), Fish processing residues.	High biomass refuse derived fuels may be developed and used in the future providing they can be demonstrated to be eligible for ROCs. See comment above for contaminated wood waste.

2.4 Current use of biomass for energy generation

Biomass is currently used to generate heat and/or power in the UK. Figures for electricity generation under the renewables obligation have been included section 2.5 below. In addition, some 5.6 million MWh of electricity was generated from biomass fuelled schemes in the 2003/4 Obligation period, from 616 biomass and co-firing schemes with an installed generating capacity equivalent to just under 800MW. In addition the Non-Fossil Fuel Obligation (NFFO) biomass fuelled schemes represented a further 855 MW installed capacity in over 482 schemes[12].

Biomass heat is more difficult to quantify, as there are many small schemes and no central database of information. However, the recent DTI Renewable Heat report[13] has attempted to quantify the current use of biomass (see Table 2-2), the resource potential both in terms of fuels available and the potential for use in the residential, commercial and industrial sectors. The current contribution of biomass schemes in operation was estimated to be 6.31 TWh/y.

Table 2-2 The current contribution of biomass to the UK Heat market[7]

Source	Contribution TWh/y
Wood combustion - residential	2.38
Wood combustion - industrial	3.09
Straw	0.84
Total	**6.31**

Source: DUKES 2004

2.5 The Renewables Obligation

The Renewables Obligation (RO) is the UK's main mechanism to encourage the uptake of renewable energy. The RO is administered by OFGEM (see section 4.2). Advice regarding specific issues on the RO should be sought from OFGEM. The RO requires licensed electricity suppliers to source a specific and annually increasing percentage of the electricity they supply from renewable sources. The current target for generation from renewable energy is 5.5% for 2005/06 rising to 15.4% by 2015/16.

For each megawatt hour of renewable energy generated, a tradable certificate called a Renewables Obligation Certificate (ROC) is issued. The principles of the RO and the mechanisms by which it works are detailed in Section 4.7. At the end of the 2004-2005 Obligation period there were 788 accredited schemes, and a total of 10,855,997 MWh of electricity were generated. 446 of these accredited stations use biomass fuels, either stand-alone biomass, co-firing, sewage gas or landfill gas power generation. These power stations generated just over 6.5million MWh electricity in the 2004-5 period (see Table 2-3).

[12] In these figures biomass is used in its widest sense and includes sewage gas, landfill gas and co-firing as well as stand-alone biomass schemes for the RO and sewage gas, landfill gas and energy from municipal and industrial wastes for NFFO.

[13] Renewable heat and heat from Combined heat and power plants – Study and analysis (2005), see: www.dti.gov.uk/renewables/policy_pdfs/heatreportfinal.pdf

The RO replaces and builds on the Non Fossil Fuel Obligation (NFFO). The NFFO assisted the industry by providing premium payments for renewables-generated electricity over a fixed period, with contracts being awarded to individual generators. Prior to the RO, the NFFO was the Government's major instrument for encouraging growth within the renewable energy industry and there are more than 400 NFFO projects currently operational. 282 of these are energy from biomass or waste fuels (including 329 from landfill and 31 from sewage gas).

Table 2-3 Statistics for 2004-5 Obligation period for biomass-fuelled scheme accredited under the RO. (Figures for the whole of Britain)

	No of schemes	Installed generating capacity (kW)	ROCs issued	% of total renewable power generated
Advanced Conversion Technology	3	3219	9903	
Biomass	13	160,402	829,924	7.6
Co-firing	30	1,203,265*	2,116,599	19.5
Landfill gas	299	683,209	3,335,570	33.6
Sewage gas	101	77,308	249,481	2.3

*Estimate of "renewable capacity" from co-firing.
Source: The Renewables Obligation: 3rd Annual Report, Ofgem (2006) www.ofgem.gov.uk

Table 2-4: Status of NFFO projects at December 2004

Technology	Contracted Projects		Contracted projects	
	Number	Capacity (MW DNC[14])	Number	Capacity (MW DNC)
Biomass	32	256	10	139.9
Landfill gas	329	699.7	215	455.5
MSW (MIW*)	90	1398.2	36	232.3
Sewage gas	31	33.9	21	27.2

Source: RESTATS: www.restats.org.uk/renewables_obligations.html
Notes
*MIW = Municipal and industrial waste. The NFFO orders included the generation of power from municipal and solid waste, which it defined as MIW. However, from NFFO 4 there were conditions. NFFOs 4 (1997) and 5 (2000) included power generation from municipal and industrial waste with combined heat and power and from municipal and industrial waste using fluidised bed technology. These included the use of non-gaseous sewage matter (up to 10% on a dry weight basis).
DNC = Declared Net Capacity.

[14] **DNC** - The term "Declared net capacity" is defined by Section 32(8) of the Electricity Act 1989. The Electricity Act 1989 (Modifications of Section 32(8)) Regulations 1990 (SI 1990 No 264) modified this definition as it applies to intermittent renewables such as wind. The DNC of a non-fossil fuel generating station which is driven by any means other than water, wind or solar power is the highest generation of electricity (at the main alternator terminals) that can be maintained indefinitely without causing damage to the plant less so much of that capacity as is consumed by the plant.

2.6 Biomass Task Force (BTF) Report

In October 2004 the Government launched the Biomass Task Force. With a focus upon England, its aim was to assist the Government and the biomass industry in optimising the contribution of biomass energy to renewable energy targets and to sustainable farming and forestry and rural economy objectives. The BTF was required to:

- Identify possible measures to stimulate the development of biomass energy and analyse the financial and broader economic costs and benefits of each recommendation.
- Work with the energy, agricultural and forestry industries, potential users of biomass and other stakeholders to identify barriers in the supply chain and ways of overcoming them.
- Make recommendations to industry and public bodies.

The primary focus of the study was on biomass for heat and electricity generation. The definition of biomass was in its widest sense i.e. any biological mass derived from plant or animal matter, (similar to the definition provided in Planning and Policy Statement 22, see Table 3-1).

The Task Force's findings were published in October 2005 and can be obtained from Defra (www.defra.gov.uk/farm/acu/energy/biomass-taskforce/index.htm). Boxes 1 and 2 below present a summary of the findings in the report. In addition the report makes a series of further recommendations concerning a number of activities to rationalise Government support for all aspects of biomass energy development; encourage and support the use of biomass; and provide information dissemination on best practice and data for potential developers. These are summarised in the appendices to this report.

Box 1: Estimates of biomass resource potential in UK from BTF report

The report estimates that somewhere in the region of 20 million tonnes of biomass material could be available for energy recovery, including:

- **Energy crops** - around 1 million hectares of land may be available for non-food uses in general. This could mean, on current yields, around 8 million tonnes of energy crops.
- **Waste wood** - Around 5-6 million tonnes of wood waste is currently generated, of which around 1.4 million tonnes were recovered in 2004. Studies suggest around 1.5 million tonnes of high quality waste wood and around 2-3 million tonnes of contaminated waste wood could potentially be recovered.
- **Solid and liquid biomass wastes -** these offer the greatest immediate sources of energy. The full potential from this resource needs to be quantified, but currently 2.5 million tonnes of municipal solid wastes are being used for energy generation, with potential for rapid increase. Around 3 million tonnes of wet animal slurries and manures are generated annually; 50% of these processed through anaerobic digestion would yield 1.1TWh/y.

Box 2: Key recommendations of the BTF report

Three of the key recommendations of the report are:

- A **single capital grant scheme** to grant aid all biomass heating boilers and the heat element of biomass-fuelled CHP plants at a level of 40% of the capital expenditure, for 5 years, with progress to be reviewed after 4 years. The estimated cost of this is £10-20 million/year.
- Facilitation of the development of supply chains through a second round of the **Bio-energy Infrastructure Scheme**, with grant funding of £3.5 million.
- The Task Force did not consider a Renewable Heat Obligation to be workable.

2.6.1 Defra / DTI response to BTF

The Government established a cross-departmental team to respond to the BTF recommendations. The Government's response was published in April 2006 and provides details of the areas that the Government intends to take forward. It is available on the Defra web site[15] and includes:

- A new five year capital grant scheme for biomass boilers and a second round of the Bio-energy Infrastructure Scheme;
- Agreement in principle to support for energy crops under the new Rural Development Programme for England;
- Provision of improved advice through the Forestry Commission and Regional Development Agencies;
- Further measures to integrate environmental assessment in the planning of energy crop development;
- Government leadership through public procurement of biomass;
- Action to improve the Renewables Obligation (already undertaken);
- More effective use of the planning system;
- Action to address regulatory barriers and develop Standards for biomass energy and fuels;
- Support for the EU Biomass Action Plan.

The Government also indicated that it is considering the use of energy from waste in the current Waste Strategy and Energy Reviews.

2.7 Likely future trends in biomass use

Future trends in biomass use will be dependent on a number of factors, including Government policy, market conditions (e.g. energy prices, security of supply for alternative fuels), farming practices and development of future alternatives to current fuel supplies (e.g. the development of the nuclear option, hydrogen fuels cells, development of alternative renewable energy).

[15] www.defra.gov.uk/farm/acu/energy/biomass-task-force/btfreport-govresponse.pdf

The Government response to the BTF report is important in respect of future initiatives to support the uptake of biomass and development of the biomass sector.

In the immediate future initiatives such as the Bioenergy Capital Grant scheme and support for co-firing under the RO are likely to stabilise the market for biomass fuel and increase the energy generated from this fuel. Co-firing of biomass alone accounted for 2.1 million MWh of electricity generation in 2004-5 (19.5% of the RO). In addition recent increases in energy costs have increased interest in biomass heat for public buildings and large-scale industrial use. These factors have already enabled biomass supply companies to become established within the UK. These companies can supply fuels to a pre-determined specification, particularly wood fuels. However, there have been issues with other fuels, particularly due to degradation on storage (both physical and microbiological) with imported food processing residues.

One of the key ongoing initiatives is the development and adoption of CEN standards (335 and 343), which is discussed later in this report (section 3.2.1). These standards will be important in establishing reliable biomass fuels and providing guidance to allow the fuels to be sampled and monitored using standard techniques.

2.8 Summary

Biomass is an alternative fuel that can be used to generate renewable heat and power, reducing carbon dioxide and associated emissions from fossil fuels. There is a large biomass resource in the UK and a growing market for international trade in biomass fuels. There is also growing interest in the use of biomass energy in response to Government and EU initiatives – and in response to increases in the price of gas and electricity.

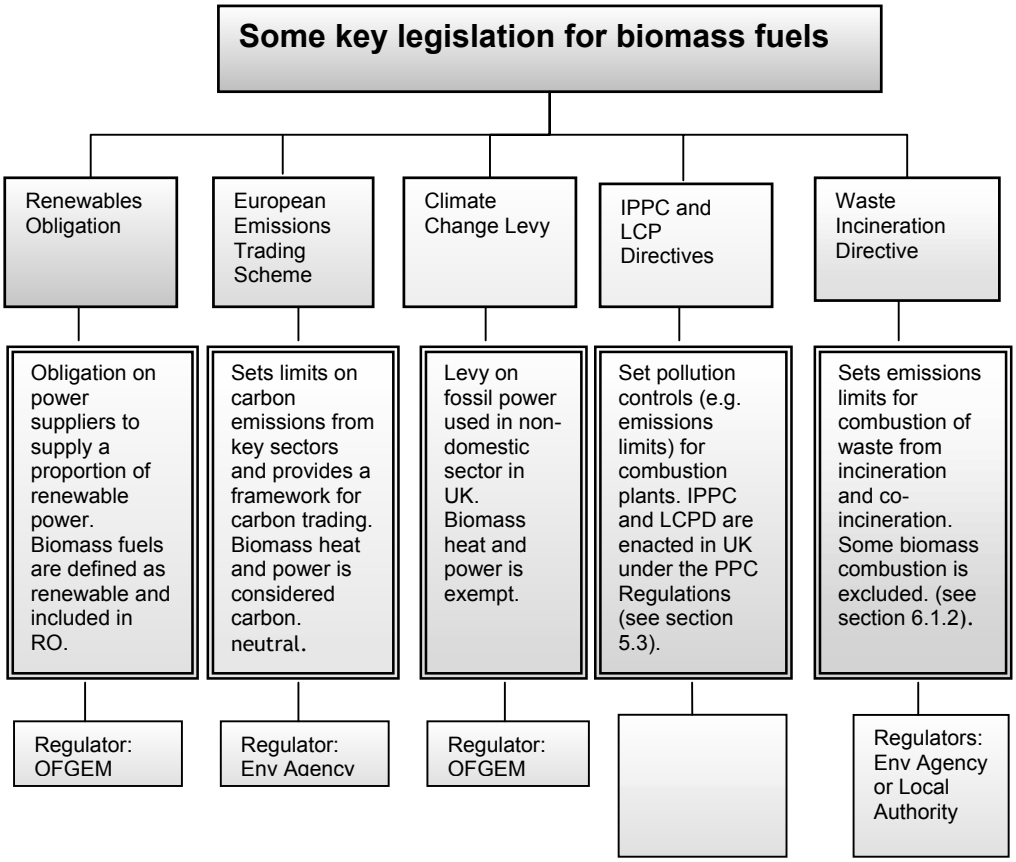
The recent BTF report puts forward a number of recommendations to encourage and facilitate the use of biomass. The Government response to this is fundamental to the development of biomass in the UK over the next few years.

3 DEFINITION OF BIOMASS

3.1 Introduction

There are a number of **different definitions of biomass**. The way in which legislation and regulations define biomass is key to the treatment of biomass fuels within that legislation. The different legislation under which biomass is defined and the organisations responsible for regulation is given in Figure 3-1 below.

Figure 3-1 Some key legislation for biomass fuels [16]



It is important to note that, some biomass fuels classed as "biomass" under the RO are also "waste" that is covered by Waste Incineration Directive (WID). This does not change their treatment under the RO, but has important implications regarding emissions control etc.

The treatment of mixed waste under the RO is dependent on the technology used for energy generation and on the biomass content of the waste. This chapter provides definitions of biomass within all legislation that are relevant to development of biomass energy plant and explains the relevance of these definitions, particularly with reference to the WID and the RO.

[16] Planning legislation is also significant and implements requirements under the Environmental Impact Assessment (EIA) Directive. See section 5.2 for further information.

In addition the chapter provides clarification of energy crops for the purposes of the RO. The legislation is described in detail in Chapter 4.

3.2 Biomass definitions

The term "biomass" covers a range of materials of biological origin, some of which may also be regarded as wastes. Various definitions of the term biomass are given in European[17] and UK legislation relating to renewable energy technology and combustion plant. It is therefore **important** that in each case, reference is made to the relevant definition.

The definition of biomass under the relevant legislation is summarised in Table 3-1 below. For the RO and WID some additional notes to clarify waste biomass are provided under the Table.

The planning process (see section 5.2) has a definition of biomass in Planning Policy Statement 22 (PPS22)[18], as follows:

Biomass is the biodegradable fraction of products, waste and residues from agriculture (including plant and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.

Sections 4, 5 and 6 of this report provide more in depth information on the legislation and policy.

[17] In accordance with the EU treaties, the requirements of EU legislation has supremacy over national legislation. However, with regard to European Directives, the obligations that these Directives give rise to are implemented via legislation issued by the UK Government. This means that Operators developing plant in England and Wales should generally refer to National Legislation in the first place. The relevant regulatory bodies should be consulted where there is any doubt.

[18] See footnote on first page of PPS22; at http://www.communities.gov.uk.

Table 3-1 Biomass definitions in Key UK Legislation[19]

Legislation	Biomass definition	Comments
The Renewables Obligation (RO) Order 2005 and proposed amendments 2006 (see note 1).	"Fuels used in a generating station of which at least 90%of the energy content (measured over a period of such a period and with such frequency as the Authority deems appropriate) is derived from plant or animal material or substances derived directly or indirectly therefrom (whether or not such matter or substances are waste) and includes agricultural, forestry or wood wastes or residues, sewage and energy crops (provided that such plant or animal matter is not or is not derived directly or indirectly from fossil fuel)". • If contamination with fossil fuel derived material exceeds 10% the input cannot be classified as biomass. • Waste derived fuels can be classed as biomass under the RO, providing they can be shown to be 90% biomass and they are not back mixed with waste. However, mixed wastes are not included as a biomass if the fuel taken as a whole is not biomass as defined above. • Energy crops are defined as a plant crop planted after 31st December 1989 and grown primarily for the purpose of being used as fuel. See: www.dti.gov.uk/renewables/renew_2.2.1.htm	The Order is administered by Ofgem who produce guidance on accreditation procedures (see section 4.1) Ofgem must be satisfied that the fuel complies with the requirements of the Obligation. Thus there must be evidence of the fuel's biomass content. Electricity generated from biomass that comes within this definition is eligible for ROCs.
The Waste Incineration Directive (WID) 2000/76/EC (see note 2) and the **Large Combustion Plant Directive (LCPD)** 2001/80/EC (see note 3)	Biomass is defined by both the WID and the LCPD as: "products consisting of any whole or part of a vegetable matter from agriculture or forestry, which can be used for the purpose of recovering its energy content as well as wastes listed below: i. vegetable waste from agriculture and forestry, ii. vegetable waste from the food processing industry, if the heat generated is recovered, iii. fibrous vegetable waste from virgin pulp production and from production of paper from pulp, if it is co-incinerated at the place of production and the heat generated is recovered, iv. wood waste with the exception of wood waste which may contain halogenated organic compounds or heavy metals as a result of treatment with wood-preservatives or coating, and which includes in particular such wood waste originating from construction and demolition waste, v. cork waste. WID exemptions are discussed in more detail in section 6.1.2	Guidance is available from Defra: www.defra.gov.uk/ppc/wasteincin/pdf/wid-guidance.pdf Biomass that comes within this definition is excluded from the WID. See also Sections 3.2.1 and 5.3 on requirements under pollution control and WID.

[19] There is also a definition of biomass in The Renewable Energy Directive 2001/77/EC (3) This states that 'renewable energy sources' shall mean renewable non-fossil energy sources (wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases).
'biomass' shall mean the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.

Legislation	Biomass definition	Comments
European Emissions Trading Scheme (EU ETS) 2003/87/EC (see note 4)	'Biomass' means non-fossilised and biodegradable organic material originating from plants, animals and microorganisms. This shall also include products, by-products, residues and waste from agriculture, forestry and related industries as well as the non-fossilised and biodegradable organic fractions of industrial and municipal wastes. Biomass also includes gases and liquids recovered from the decomposition of non-fossilised and biodegradable organic material. When burned for energy purposes biomass is referred to as biomass fuel. http://europa.eu.int/eur-les/pri/en/oj/2004/l_059/l_05920040226en00010074.pdf	Energy from biomass fuels is regarded as carbon neutral for the purposes of carbon emissions. A list of carbon neutral biomass fuels is provided in Section 4.7.
The Climate Change Levy (see note 5)	"Renewable source electricity" is exempt from the levy, and was originally defined by the Climate Change Levy (General) Regulations 2001 No.838[20]. However, this has been subject to a number of amendments via subsequent statutory instruments. The regulations do not contain a specific list of energy sources qualifying as "renewable" in this context, but HM Revenue and Customs have published a list in their Notice CCL1/4, which is their interpretation of SI 2001 No.838. The published list is now out of date since CCL1/4 has not been updated to take account of later statutory instruments. See: HMRC Reference: Notice CCL1/4 http://customs.hmrc.gov.uk	See appendix for more detailed information on CCL. The CCL also has an exemption for wastes (municipal and industrial wastes), with the presumption that only 50% of the energy output is deemed renewable (i.e. not more than 50% of the energy content of the waste is derived from fossil fuel).

Notes:

1. Proposed amendments: Renewables Obligations Order 2006. For draft 2006 order see: www.dti.gov.uk/renewables/renew_2.2.5.htm
2. The Waste Incineration Directive 2000/76/EC on the incineration of waste, http://europa.eu.int/comm/environment/wasteinc/newdir/2000-76_en.pdf
3. DIRECTIVE 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants (Large Combustion Plants Directive - LCPD) http://europa.eu.int/eur- lex/pri/en/oj/dat/2001/l_309/l_30920011127en00010021.pdf
4. Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_275/l_27520031025en00320046.pdf. See also: www.defra.gov.uk/environment/climatechange/trading/eu/nifo/directive.htm
5. The Climate Change levy and renewables exemptions. www.dti.gov.uk/renewables/publications/pdfs/dgdt100039.pdf

[20] Statutory Instrument 2003 No.604 The Climate Change Levy (General) (Amendment) Regulations 2003 added "biomass" as a renewable source to the original list but specifically excluded peat. Biomass is defined in SI 2003 No.604 states that " *"biomass" means fuel used in a generating station of which at least 98% of the energy content is derived from plant or animal matter, or substances derived directly or indirectly therefrom (whether or not such matter or substances are waste) and includes agricultural, forestry or wood wastes as residues, sewage and energy crops* ". This may be updated in the light of the forthcoming changes to the RO.

3.2.1 Note on the definition of wastes and biomass under the RO.

Table 3-1 above shows that there are differences in the definition of biomass between legislation. Of particular significance is that the RO defines biomass in order to include it in the scope of the regulations, whereas WID defines biomass wastes in order to exclude them from its scope. It is however important to note that because a waste falls within one of the exemptions under WID, this does not mean it ceases to be a waste, it simply implies that, although a waste, the requirements of the WID do not apply to it. Other requirements in respect of the management and control of wastes that arise (under the Waste Framework and associated UK legislation) continue to apply e.g. the need for certain permits, transfer documentation, etc.

The RO does not in general extend to mixed wastes, except where:

- "advanced conversion technologies" are used (e.g. pyrolysis or gasification), or
- if it can be demonstrated that 90% of the calorific value of a waste fuel is derived from biomass

The demonstration of the biomass content of waste is not straightforward. There is no standard test for biomass content of mixed wastes at present, although CEN/TC 343 is developing standards for Solid Recovered Fuels[21,19] and CEN/TC 335 deals with Solid Biofuels. Ofgem are in the processes of developing guidelines for the sampling and analysis of fuels under the RO.

Pending the development of standards, Operators will need to propose their own sampling and analysis techniques i.e. the onus is upon the operator to demonstrate a technically rigorous and suitable method for the demonstration of the biomass content of their fuel.

It is advisable for developers to discuss any proposed sampling and analysis regime designed to prove that a fuel is a biomass within the RO with Ofgem at an early stage in the accreditation of the plant.

The 2006 RO Order also extends to the electrical power generated from those energy from waste plants that meet certain Good Quality CHP (GQCHP) requirements. This is discussed further in section 4.3 below.

Thus, some waste biomasses may attract ROCs, but because they are wastes that do not meet one of the exclusions in WID, they will remain covered by WID. The application of the WID, the exclusions it contains and the implications of this legislation is discussed in section 6.1.2 of this report.

Where fuels are derived from or contain some waste, it is advisable for developers to discuss their fuels with the Environment Agency at an early stage in the design of their plant.

[21] Solid Recovered Fuels – Methods for the determination of biomass content. Draft Standard CEN/TC 343, January 2005.

[19] Note that SRFs are produced from non-hazardous waste and the word "recovered" should not be confused with "recovery of waste" under the Waste Framework Directive

3.2.2 Energy Crops

In their widest sense energy crops are any crops that are planted for the purpose of being used as a fuel. Some specific crops are more appropriate as energy crops. Most commonly these include short rotation coppice (SRC e.g. willow or poplar variants), and fast growing grasses such as miscanthus and reed canary grass. There has also been considerable research into those cultivars that are most suitable in the British climate and into optimal growing conditions.

Defra has operated an energy crops scheme in England to encourage the planting of these crops. This scheme recognised the risks farmers took when planting such new crops, particularly in uncertain markets. In particular the scheme recognised that the upfront costs of planting SRC and that it would be some time before an income was derived from these plantings. Grants were only available for SRC and miscanthus. These grants are currently being revised as part of the Common Agricultural Policy (CAP) renegotiations. The details of future energy crops grants will not be clear until these negotiations are complete. At present Defra are willing to consider applications to plant energy crops, but potential growers should contact Defra to find out the latest situation (see: www.defra.gov.uk/erdp/schemes/energy/establishment.htm).

Developers in England interested in planting their own energy crops should also refer to two guides:

- Best Practice Guide on SRC (Defra, 2002) www.defra.gov.uk/faram/acu/energy/src-guide.pdf
- Planting and growing miscanthus (Defra 2001) www.defra.gov.uk/erdp/schemes/energy/default.htm

Within the RO the definition of energy crops is wider; here it states that an energy crop is "a plant crop planted after 31st December 1989 and grown primarily for the purpose of being used as fuel". In theory this means that any crop can be used provided it can be shown that it was grown for the purpose of being used as a fuel. This includes energy crops from abroad. For further information see: www.dti.gov.uk/renewables/renew_2.2.1.htm

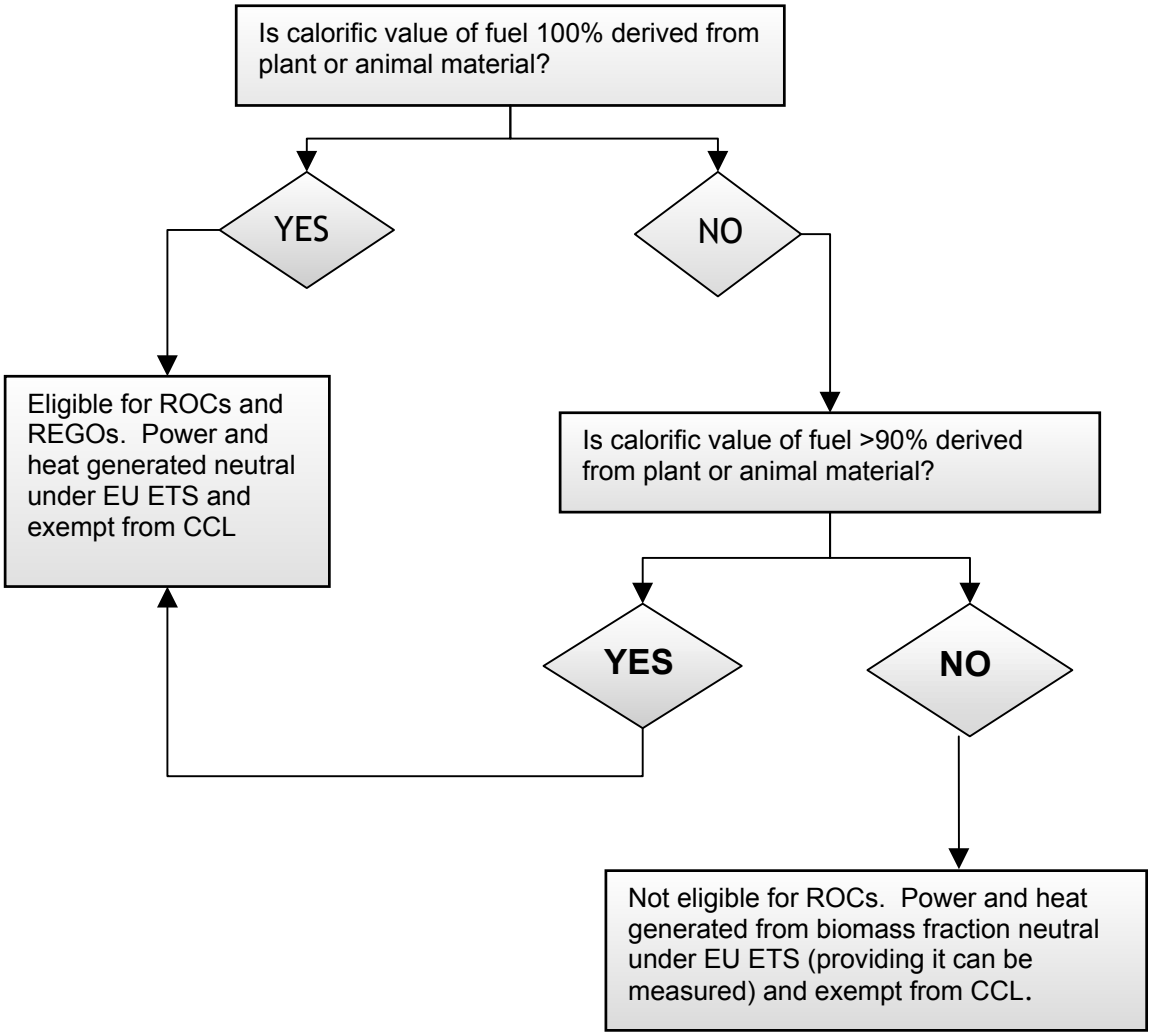
3.3 Summary

Biomass is defined differently within different legislation and, in addition, may be defined with the purpose of excluding it from the legislation (e.g. as in WID) or including it (e.g. in the eligibility criteria within the RO).

Inclusion as a biomass within renewables legislation and regulations will not prevent waste fuels being classed as a "waste" and hence the application of relevant waste management legislation (e.g. WID see section 6.1.2), nor will it mean that requirements under PPC can be avoided (see section 5.3). Developers should consult the relevant regulators to ensure that they correctly understand the requirements of the RO and relevant emissions regulations.

The following fuel decision charts summarise the decisions regarding whether or not a fuel is eligible for the RO.

Figure 3-2 Fuel decision Chart for the Renewables Obligation



4 APPLICABLE RENEWABLES LEGISLATION

4.1 Introduction

This section provides guidance on the renewable energy legislation that may apply to a biomass to energy plant. These are:

- The **Renewables Obligation** (section 4.2), including information on eligibility, definition of co-firing (as opposed to co-incineration) and accreditation and registration procedures.
- **Good Quality Combine Heat and Power**, as defined under the Renewables Obligation draft Order (2006) (section 4.3).
- The **Climate Change Levy** and Levy Exemption Certificates (section 4.4)
- **Renewable Electricity Guarantees of Origin** (section 4.5)
- The **European Emissions Trading Scheme** (section 4.7), including information on what activities come under EU ETS, where to obtain the forms for permits, monitoring and reporting and the annual verification process.

4.2 Renewables Obligation (RO)

General Description – targets and the buy out.
The RO is the main mechanism for Government support for the generation of electricity from renewable resources within the market place and it is one of the main mechanisms to assist the UK meet its targets under the Kyoto protocol.

The RO is enforced by an Order (Statutory Instrument), which was introduced in April 2002 and is in place until 2027. **The Order places a legal requirement on electricity suppliers to source an annually increasing proportion of electricity from certain eligible renewable energy sources**. If they are unable to do this they can pay a buy out fee. The proportion of electricity to come from RO eligible renewable sources was set at 3% in 2003. It increases annually to 10.4% in 2010 and 15.4 % by the financial year 2015/16. The current target for the RO is 5.5% (2005/06). At the moment the size of the Obligation does not increase beyond the 15.4 % by 2016. The option for a supplier to buy-out their obligation continues until 2027.

The targets for the RO are linked to the targets, to which the UK is committed under the EC Renewables Directive. This proposes that Member States adopt national targets for renewables that are consistent with reaching the overall EU target of 22.1% renewable derived electricity by 2010. The proposed UK share of this target is for 10% of electricity consumption to come from renewables eligible under the directive by 2010.

To demonstrate that they have met their share of the RO, **suppliers must obtain certificates for renewable power supplied**. These certificates (Renewable Obligation Certificates - ROCs, and SROCs in Scotland) are issued to generators in accordance with the metered output of eligible renewable electricity they have supplied. The certificates may be sold on to any supplier, with or without the electricity, and suppliers must redeem certificates with Ofgem (the Electricity and Gas Industries Regulator) at the end of each 12-month obligation

period to demonstrate compliance. If they do not have sufficient certificates suppliers must pay a **buy out fee**.

Thus, suppliers can meet their obligation by:

- **acquiring ROCs**
- **paying a buy-out price** (which was set at of £30/megawatt hour in 2002-3 and is adjusted annually by the retail price index, RPI), or
- **a combination of ROCs and paying a buy-out price.**

When a supplier chooses to pay the buy-out price, the money they pay is put into a buy-out fund. At the end of the "obligation period" the buy-out fund is redistributed or recycled to ROC holders[22] relative to the number of ROCs they hold (see below).

Operators of renewable power generating stations must register their station for it to be included within the RO. This process is known as **"accreditation"** and only after a station has become accredited and its operator has registered for an account on the ROC register can the station's output be included within the RO (this process is discussed further in section 4.2.3).

The total output of a renewable power generating station is eligible for ROCs, minus input power and any fossil generated power (for example for start up) and provided any power used by the station operator for its own purposes is covered by a sell and buy back contract.

One ROC is allocated for every 1 MWh of metered eligible renewable electricity generated. A supplier who holds ROCs to a certain proportion of his obligation will only need to pay a buy out fee for the remainder of its Obligation. If the supplier holds ROCs equivalent to his entire obligation then no buy-out payment is needed in that obligation period.

The redistribution or recycling of the buyout funds according to the ROCs held acts to provide an additional financial incentive for suppliers to purchase ROCs. The impact of redistribution is to alter the market price for eligible sources of renewable electricity based on the supply of those power sources. If there is a shortage of renewable power the market price could rise substantially. However, if suppliers meet their target or are just below meeting it, the ROC price would be expected to fall to the equivalent of the buyout fee, i.e. £30/MWh (adjusted by the RPI). Ofgem publishes data on the redistribution of funds and its impact on ROC price in their annual report on the RO.

As a result of the redistribution of buy out funds the price of the ROC provides an indication of the degree of compliance to the RO that has been achieved – the higher it is, the lower the level of compliance. It also provides the revenue stream for those participants who have commissioned eligible renewable generating capacity. The basic value of the ROC is the redistribution repayment for a ROC plus the £30/MWh (+ RPI) buy-out charge that is

[22] To obtain ROCs the generators must supply Ofgem with meter data recording gross renewable generation during the obligation period and this must be provided within two months of the end of the obligation period. The meter reading must be obtained within +/- 5 days of the start/end of the obligation period (+/-1 day for those submitting monthly data). Ofgem may allow estimates to be used where it has not been possible to obtain meter readings, but any data submitted after the two month deadline will not qualify for ROCs.

avoided. The value of ROCs has decreased over the 2004-5 period compared to the previous period, as a result of more renewable power coming on line.

4.2.1 Key requirements for eligibility for ROCs

A summary of eligibility for the RO is provided on the DTI website (see www.dti.gov.uk/renewables/renew_2.2.1.htm). This indicates that a waste to energy schemes treating mixed wasted are only eligible if:

- based on advanced conversion technologies (which are defined as gasification and pyrolysis processes); or
- where it can be demonstrated that 90% of the energy is derived from the biomass content of the fuel used.

The rules for biomass eligibility are encompassed in the definition of biomass in Table 3-1.

4.2.2 Co-firing and Co-incineration

The RO also introduces the concept of "co-firing" of biomass. This is sometimes confused with "co-incineration" - a term defined in the WID to distinguish between dedicated waste incineration plants and other situations where wastes may be burned in plant designed primarily for some other purpose e.g. the generation of energy or the production of material products. Box 4 below provides further information on the definitions of co-firing and co-incineration.

Box 4: Definitions of Co-incineration and Co-firing Plants.

Co-incineration plant (as defined in WID)

The Waste Incineration Directive defines "co-incineration plant" as follows:

"Co-incineration plant" means any stationary or mobile plant whose main purpose is the generation of energy or production of material products and:

- *which uses wastes as a regular or additional fuel, or*
- *in which waste is thermally treated for the purpose of disposal."*

If co-incineration takes place in such a way that the main purpose of the plant is not the generation of energy or production of material products but rather the thermal treatment of waste, the plant shall be regarded as an incineration plant."

As with incineration plant, this definition also covers the site and the entire plant including all co-incineration lines, waste reception, storage, on site pretreatment facilities, waste-, fuel- and air-supply systems, boiler, facilities for the treatment of exhaust gases, on-site facilities for treatment or storage of residues and waste water, stack devices and systems for controlling incineration operations, recording and monitoring incineration conditions.

Co-firing plant (as defined in the RO)
A plant is classed as a co-firing plant within the RO if it accredited by Ofgem as a co-firing plant, and it burns a combination of biomass and fossil fuels according to the requirements of the RO. Co-firing was introduced as a mechanism to "kick start" a biomass market in the UK, particularly for energy crops, after which it will be phased out (in 2016). There are specific rules that apply to co-firing, which include the requirement that a proportion of the biomass co-fired must come from energy crops from 2009:

- Any biomass can be co-fired until 31 March 2009 with no minimum percentage of energy crops.
- 25 % of co-fired biomass must be energy crops from 1 April 2009 until 31 March 2010.
- 50 % of co-fired biomass must be energy crops from 1 April 2010 until 31 March 2011.
- 75 % of co-fired biomass must be energy crops from 1 April 2011 until 31 March 2016
- Co-firing ceases to be eligible for ROCs after 31 March 2016.

In addition there is a limit or cap on the amount of a supplier's Obligation that can be met through co-firing. Currently this is capped at 25% of the supplier's Obligation. From April 2006 this cap will be decreased to 10% and it will be decreased again to 5% of the supplier's Obligation in 2011.

Table 4-1 Examples of co-incineration and co-firing plants and their eligibility for ROCs.

Example	Does the plant qualify for ROCs?	Comments
Mixed waste incineration plant	No	Incineration of mixed wastes is specifically excluded from the RO.
Incineration of waste derived fuel	Yes	Only qualifies where the biomass fraction of the fuel CV is >90%
Co-incineration of biomass fuels in cement kilns	No	No electricity is generated.
Combustion of mixed wastes in advanced conversion plant, e.g. pyrolysis and gasification plant	Yes	No need to demonstrate that the waste is a biomass. The use of the specified advanced conversion technologies qualifies for the RO.
Co-firing of clean biomass with fossil fuels in utility power stations.	Yes – providing the biomass fuel is not contaminated with fossil derivatives that contribute >10% of the CV.	Note also that the RO only allows the co-firing of fossil fuel and biomass; it does not allow the co-firing of more than one fuel (e.g. fossil fuels, biomass and waste fuels in one plant).
Co-firing of biomass derived from wastes with fossil fuel in power generation plant.	May be	If it can be demonstrated that CV of the waste fuel is 90% derived from biomass then it is eligible for ROCs. If this cannot be clearly demonstrated or the contribution from biomass is <90% the plant will not be eligible for ROCs.

4.2.3 How to obtain ROCs, LECs and REGOs

This section describes the process for obtaining ROCs. The procedure has similarities to that for obtaining Levy Exemption Certificates (LECs, from the Climate Change Levy) and Renewable Energy Guarantees of Origin (REGOs). Other relevant legislation concerning the Climate Change Levy (CCL) and (REGOs) are described later in this chapter. For more information on the CCL see section 4.4 and for REGOs see section 4.5.

There are **three stages** to obtaining ROCs, LECs and REGOs:

1. "Accreditation" - the plant supplying the energy must be accredited
2. "Provision of meter data" - data must be supplied on the heat and power used/supplied
3. "Issue of certificates" - on provision of evidence of generation, certificates are issued, which for ROCs and REGOs, is done via a dedicated register.

These processes are explained below:

Accreditation
ROCs and LECs are only issued to *accredited* power stations. Accreditation is not necessary for REGOS but it simplifies matters. Accreditation is achieved by submission of a form available from Ofgem's web site (www.ofgem.gov.uk)[23] - the same form can be used for the RO, CCL and REGOs. **A separate form must be completed for *each* renewable power station** by the station's operator.

Registration
In addition to accreditation, generators must also be registered on the ROC and REGO registers. These registers contain a record of the ROCs and REGOs issued. Each power station must have its own unique account. For data protection reasons, access to the account is limited to the account holder. Forms and declarations are available from Ofgem[24]

Further guidance for REGOs is available on the Ofgem site[25].

Metering and other routine requirements
Successful accreditation does not necessarily guarantee that electricity generated will qualify for ROCs, LECs or REGOs.

For biomass power stations within the RO there are ongoing requirements to demonstrate (on a monthly basis) that the input fuel is biomass as stipulated under the appropriate legislation. In other words, biomass fuel must be measured and analysed in the month in which it is used to generate electricity. Ofgem are currently preparing guidelines on fuel measurement and the sampling of biomass fuels.

In addition there are requirements to provide clear evidence of power generated and exported for supply. This is undertaken via agreed metering of power generation. Ofgem require information on meter readings and the kWh volume for both imported (if any) and exported electricity in any month, so all generators must provide these figures on a monthly basis, even when the generating station is not generating. The total amount of eligible renewable

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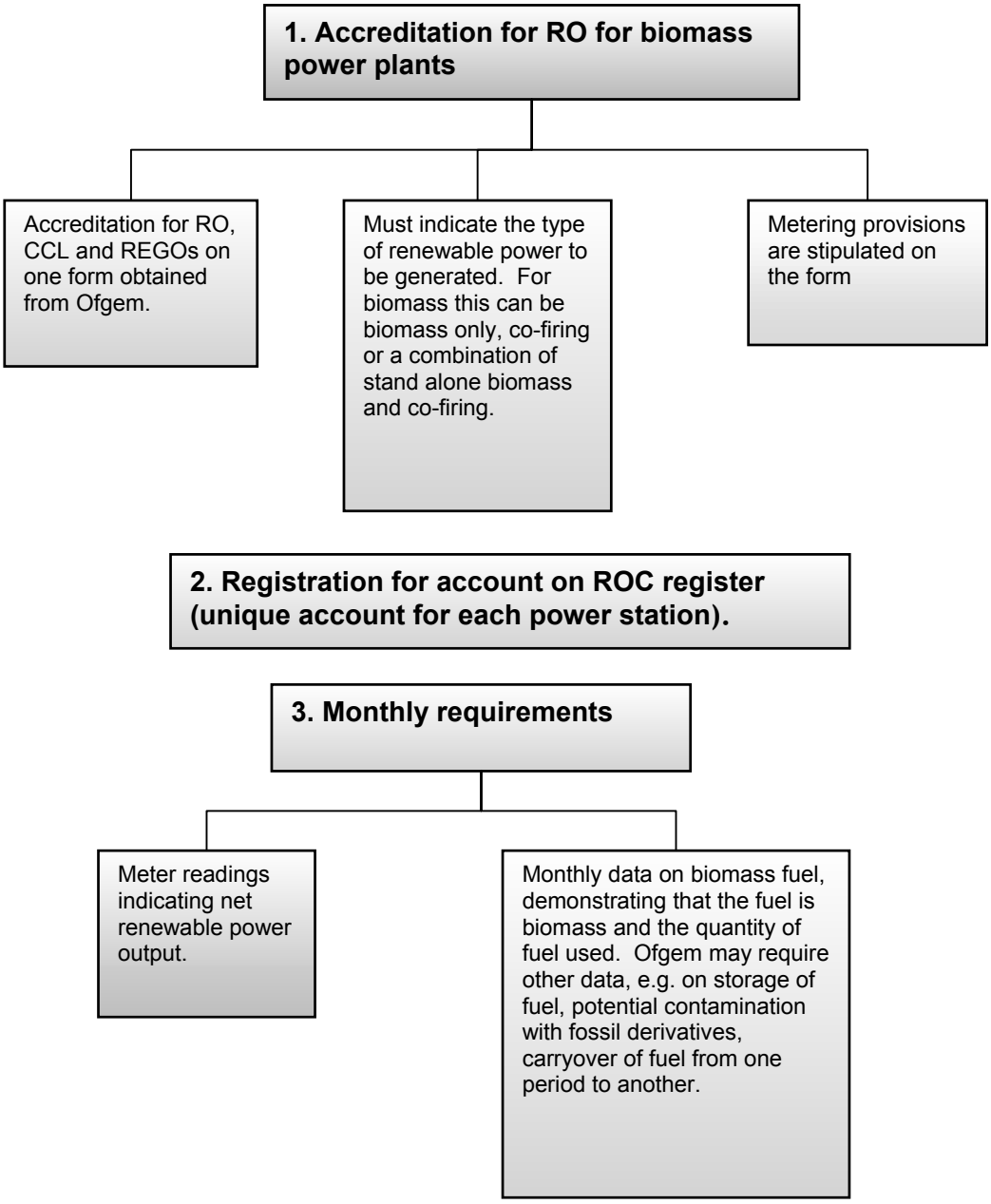
[23] Ofgem provide guidance: "Climate change levy exemption for renewables – Ofgem's guidance for generators and suppliers. Issue 1 Dec 2005". This can be found on the Renewable CCL part of the site.
[24] Forms for registration on the ROC register are to be found at
http://www.ofgem.gov.uk/ofgem/work/index.jsp?section=/areasofwork/rocregister.
Forms for the REGO registration are in Appendix 1 of "Ofgem's Registration Procedures for the REGO Register" available on Ofgem's website at:
http://www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/11434_REGO_Register_Registration_Procedures_v2_11May05.pdf
[25] Information note 20 May 2005 on the REGO register, available on the Renewable REGo part of Ofgem's web site.

electricity in kWh for the relevant month is also required. Details of proposed metering are required in the accreditation process, so that Ofgem can assess if they are adequate.

For the CCL Renewable LECs represent electricity consumed within the UK. To demonstrate this use, each accredited generator is required to provide Ofgem with an annual consumption declaration in advance at the start of the year. Ofgem audit generating stations and request evidence to support the consumption declarations (e.g. contracts for electricity supply)[26].

Figure 4-1 Procedures for obtaining ROCs for biomass power.



[26] See: Information Note 8: Renewables LEC Issue – Consumption Declaration & Associated Evidential Guidelines Version number: 4 Issue Date: 28/2/05, available from Ofgem Web site www.ofgem.gov.uk

4.3 Good Quality Combined Heat and Power (GQCHP)

The draft Renewable Obligation (RO) Order 2006 allows for energy from waste combined heat and power (CHP) plants to claim ROCs[27]. The proposals are explained in the Government's final position paper on the 2006 Draft Order[28]. This indicates that good quality combined heat and power (GQCHP) within the renewables obligation (RO) will be implemented using the Combined Heat and Power Quality Assurance (CHPQA) scheme in a manner similar to that currently used in the climate change levy (CCL - see section 4.4).

Energy from waste CHP schemes that are compliant with the Good Quality CHP benchmark (i.e. they have a high % efficiency of electricity generation and heat use) will receive ROCs on all of the biomass-generated electricity associated with the CHP part of the scheme. For those plants that are only partially compliant (i.e. those where the heat use is low or intermittent) ROCs will be received on a fraction of their electricity generation. This will be determined by the relationship between their qualifying power output (QPO) and their total power output (TPO), as for the CCL at present.

Example:

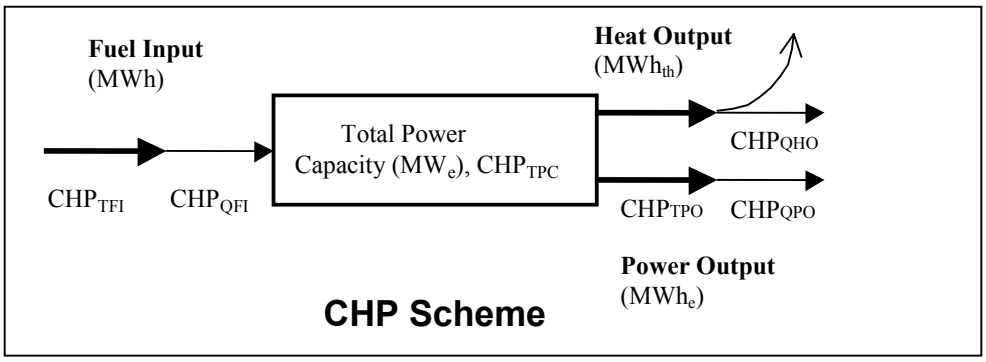
1. An EfW CHP plant that is fully exempt from the CCL and uses a waste stream that comprises 50% biomass will receive ROCs on 50% of their electricity generation,

2. An EfW CHP plant using the same waste stream but which is only 70% CCL compliant (that is, QPO is 70% of TPO) will receive ROCs on 35% (70% of 50%) of their electricity generation.

What is GQCHP?

The CHPQA scheme provides a methodology for assessing the quality of CHP Schemes in terms of their energy efficiency and environmental performance. This methodology is based on **"threshold criteria"**, which must be met or exceeded in order for the whole of the Scheme to qualify as 'Good Quality'.

Threshold criteria are set for the **"Quality Index"** (QI) and **Power Efficiency**, and both can be determined from just three sets of data: fuel used, power generated and heat supplied.



[27] Assuming the successful passage of the Renewable Obligation Order 2006 through Parliament
[28] (www.dti.gov.uk/renewables/renwe_2.2.5.htm)

A scheme qualifies as GQCHP for its entire annual energy outputs and fuel inputs where the QI and power efficiency equals or exceeds their respective thresholds (usually 100 and 20% respectively). If the QI is less than the threshold, the qualifying power output will be proportionately less than the total power output.

The general definition for QI is:

$$QI = (X \times \eta_{power}) + (Y \times \eta_{heat})$$

Where Power Efficiency (η_{power}) = CHP_{TPO}/CHP_{TFI} and
Heat Efficiency (η_{heat}) = CHP_{QHO}/CHP_{TFI}

The QI definitions (X and Y values) for various sizes and types of CHP Scheme are listed in the CHPQA Standard.

For a Scheme that does not achieve the threshold power efficiency threshold, the qualifying fuel input will be scaled back using the formula:

Qualifying Fuel input = Total Fuel Input (TFI) * (Achieved Power Efficiency/Power Efficiency Threshold)

CHP Schemes are certified under Defra's CHP Quality Assurance (CHPQA) programme (www.chpqa.com) and may qualify as GQCHP for all or part of its inputs, outputs and capacity.

The **CHPQA Standard and Guidance Notes** (download from www.chpqa.com) set out the detailed definitions and methods of calculation. Most schemes are expected to meet the **"threshold criteria"**, but where either or both the Power Efficiency or QI Threshold Criterion is not met, then only a portion of the scheme fuel input or power output qualifies as Good Quality CHP. These qualifying portions are the CHP_{QFI} (CHP qualifying fuel input) and CHP_{QPO} (CHP qualifying power output) respectively.

ROCs are only given on the biomass fraction of the waste and the fraction of electrical output (the Qualifying Power Output) that is certified by CHPQA as coming from GQ CHP.

How to calculate QPO (qualified power output) and eligibility for ROCs:

The CHP Qualifying Power Output (QPO) is the annual power generation or Total Power Output (TPO) from a CHP Scheme *that qualifies as GQCHP*.

If a Scheme meets the relevant threshold criteria (the CHPQA Quality Index or QI) in Annual Operation then the QPO=TPO, and in this case the whole of the scheme qualifies as GQCHP. If the scheme does not meet the threshold criteria the amount of electricity that qualifies as electricity output from Good Quality CHP (QPO) is scaled back proportionately.

Example:

If an EfW plant is fuelled by a waste stream that is 25% biomass fuel and the QPO is 90% of the TPO (the ratio taken from CHPQA Certificate), then 22.5% of its electrical output (i.e. 90% of 25%) is eligible for ROCs.

A CHPQA certificate validates performance over the previous calendar year and the QPO/TPO ratio used as the basis for awarding ROCs is based on the QPO/TPO ratio taken from the most recent CHPQA Certificate. As past performance does not necessarily reflect future performance, a reconciliation process takes place at the end of the year for CCL exemption on fuel to and electricity from Good Quality CHP, but there will be no reconciliation procedure for ROCs.

How to register your plant and apply for CHPQA Certification:

Apply to the CHPQA Administrator:

- Register (Form F1).
- Provide details of the CHP Scheme (Form F2 or F2(S)).
- Carry out an annual Self-Assessment based on operational data of the Scheme. Operating data over a calendar year will normally be required (Form F4 or F4(S)).
- For the Self-Assessment of proposed new (including replacement) and upgraded CHP Schemes (Form F3 or F3(S))

Comprehensive Guidance Notes can be down loaded from www.chpqa.com

Possession of a Secretary of State (combined heat and power) exemption certificate is necessary to demonstrate a legal entitlement to claim benefits available for Good Quality CHP (i.e. CCL exemption, Business Rates exception, ROCs, etc).

In order to receive a Secretary of State (CHP) exemption certificate for a CHP Scheme, a **copy** of the CHPQA Certificate with a letter requesting the exemption certificate needs to be sent to Defra's CHP Certification team.

Where to go for further information

The Administrator
CHPQA Programme,
Future Energy Solutions
The Gemini Building, Fermi Avenue
Harwell International Business Centre, Didcot. OX11 0QR
e-mail: chpqainfo@chpqa.com
tel: 0870 190 6196, fax: 0870 190 6334
www.chpqa.com

4.4 The Climate Change Levy

The Climate Change Levy (CCL) is an additional levy on non-domestic energy supply, which is offset by a reduction in employer's national insurance contributions. Legislation to implement the CCL is contained with schedules 6 and 7 of the 2000 Finance Act. The CCL came into operation on 1st April 2001 and is under the management of the Commissioners of Customs and Excise[29]. Accreditation is carried out via Ofgem.

Under the CCL non-domestic electricity customers are required to pay the levy as follows:

- 0.43p/kWh for electricity,
- 0.15p/kWh for gas,
- 1.17p/kg (equivalent to 0.15p/kWh) for coal and
- 0.96p/kg (equivalent to 0.07p/kWh) for liquefied petroleum gas (LPG).

The CCL does not apply to fuels used by domestic users or the transport sector or fuels used for the generation of other forms of energy (e.g. electricity generation) or for non-energy generation (e.g. the use of "fuels" as carbon sources for other purposes, such as a reductant in metal smelting). In addition there are various ways that the cost of the levy can be reduced. For example, there is an 80% discount from the CCL for sectors that agree to targets for improving their energy efficiency or reducing carbon emissions by specified deadlines. These are known as "climate change agreements" (CCA).

There are various other exemptions but that most relevant to biomass power generators is that **electricity from renewable sources is exempted from the CCL**. To qualify suppliers of renewable electricity must obtain **Renewables Levy Exemption Certificates** ("Renewable LECs"). These are issued in respect of eligible renewable output and are used to prove that the electricity supplied is from renewable sources. 1 MWh of renewable power is equal to 1 LEC. If this supply is then made to a non-domestic customer it will not attract CCL payments.

All electricity exported from an accredited generator qualifies for LECs. In order to qualify, meter data must be submitted to Ofgem each month within two months of the end of the month.

LECS for waste fuelled generating stations
The regulations allow for LECs to be granted for 50% of the electricity from power stations fuelled by waste. If the operator considers that the proportion of renewable energy content of the waste is higher than 50% and he can provide sufficient evidence to Ofgem then more than 50% may be claimed.

LECs for Biomass power generation
To claim LECs the biomass power station operators must provide the following information to Ofgem:

- The proposed % of biomass

[29] Further information on the CCL may be obtained from www.defra.gov.uk/environment/ccl/intro.htm#Introduction and http://customs.hmrc.gov.uk/channelsPortalWeb/App/channelsPortalWebApp.protal? . In addition www.natregs.gov.uk provides a summary of CCL.

- Full details of the biomass content showing proportions of each category by weight
- The CV (MJ/kg) of each category of feedstock, giving details of how this was obtained.
- A description of facilities for storing biomass
- Details of the supplier(s) of biomass, including names and addresses and a copy of extracts of contracts that detail the biomass content and contract duration.

Further information on the CCL and LECs is provided in the appendices to this report.

4.5 Renewable Electricity Guarantee of Origin (REGO)

The Renewable Energy Directive requires European Member States to ensure that a "guarantee of origin" can be issued on request for electricity generated from renewable sources. This is implemented in the UK through the Electricity (Guarantees of Origin of Electricity Produced from Renewable Energy Sources) Regulations 2003 S.I. No. 2562, which came into force in October 2003.

These regulations provide for a certificate of Renewable Electricity Guarantee of Origin (REGO) to be issued for each kWh of renewable energy generated and represent the UK's certificate of origin. REGOs are issued by Ofgem. Ofgem also maintain a REGO register and administer the accreditation of generating stations.

REGOs specify the energy sources from which the electricity was generated, the date and place of generation and enable generators to demonstrate that the electricity they sell is from renewable sources[30]. They are recognized across the EU and can be one of the forms of evidence used by suppliers to support green electricity tariffs. One REGO is issued for each kWh of eligible renewables electricity generated. REGOs can be obtained for the full output of a renewables generating station.

There is no compulsion to obtain REGOs, but they will have two important functions:

- REGOs form the principle basis of evidence of renewable supply under the Fuel Mix Disclosure provisions[31]; and
- They are likely to be one of the forms of evidence used by suppliers to support green electricity tariffs.

[30] For further information see: Renewable Energy Guarantees of Origin: Ofgem's Administrative procedures October 2004: www.ofgem.gov.uk/temp/ofgem/cache/cmsattach/8821_rego_procedures_sept04.pdf
See also: "Guarantees of Origin of electricity produced from renewable energy sources. Accompanying Guide – Statutory Instrument 2003 No 2562 – updated April 2005".
www.dti.gov.uk/renewables/policy_pdfs/regosguideapril05.pdf

[31] See DTI guidance: "Article 3(6) of Directive 2003/54/EC of the European Parliament and of the Council concerning Common Rules for the Internal Market in Electricity ("the Electricity Markets directive") requires Member States to ensure that each supplier informs customers of the mix of fuels used to produce the electricity it supplies. This requirement has been implemented by way of a new supply license condition introduced by means of regulation under section 2(2) of the European Communities Act 1972. Under this license condition, from 1 July 2007 suppliers must hold REGOs as evidence in respect of any renewable electricity in the mix of fuels given as information to customers."

4.6 Key requirements for accreditation and registration for ROCs, LECs and REGOs.

Information on the accreditation requirements is contained in section 4.2.3.

4.7 EU Emissions Trading Scheme (EU ETS)

The European Emissions Trading Scheme (EU ETS[32]) was introduced on 1st January 2005 and is one of the key European Union policies to help meet the EU's greenhouse gas emissions reduction targets under the Kyoto Protocol[33]. The scheme is based on the fundamental premise that creating a price for carbon through the establishment of a liquid market for emission reductions offers the most cost-effective way for EU Member States to meet their Kyoto obligations. The EU ETS is established in phases, the first phase of which runs from 2005-2007. The second phase, currently under development, will run from 2008-2012.

The EU ETS was established through binding EU legislation[34]. Phase 1 only covers carbon dioxide but other greenhouse gases or activities could be covered if Member States chose to do so, or if the EU ETS Directive is amended at a later stage.

In essence the EU ETS is based on six principles:

- It is a 'cap-and-trade' system
- Its initial focus is on CO_2 from big industrial and electricity supply sector emitters
- Implementation is taking place in phases, with periodic reviews and opportunities for expansion to other gases and sectors
- Allocation plans for emission allowances are decided periodically
- It includes a strong compliance framework
- The market is pan-EU but taps global emission reduction opportunities through the use of the Clean Development Mechanism and Joint Implementation, and provides for links with compatible national schemes

The scheme operates through the allocation and trade of greenhouse gas emissions allowances throughout the EU – one allowance represents one tonne of carbon dioxide equivalent. A cap on the total amount of emissions allowed from all the installations covered is set by each Member State. The allowances are then distributed within Member States to the qualifying installations. In the UK, the ETS is implemented via UK Regulations that are regulated by the Environment Agency for England and Wales, the Scottish Environment Protection Agency in Scotland and Department for the Environment and Heritage Services in Northern Ireland.

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[32] (see http://www.defra.gov.uk/environment/climatechange/trading/eu/index.htm for an operators guide, and http://www.environment-agency.gov.uk/business/444217/590750/590838/1009544/ for a summary). http://europa.eu.int/comm/environment/climat/pdf/highlights_ets_en.pdf "EU Action against climate change" (EC, 2005) provides further background on the EU ETS.

[33] The EU overall target is an 8% reduction in CO2 emissions compared to 1990 levels by the first Kyoto Protocol Commitment period (208-2012).

[34] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community

4.7.1 Who is covered by the EUETS and what are the implications?

Installations covered by the EU ETS are those that carry out activities listed in Schedule 1 of the UK Regulations. These include:

- Energy activities (e.g. boilers, electricity generation, combined heat & power)
- Production and processing of ferrous metals
- Mineral industries
- Pulp and paper industries

The UK Regulations require all installations carrying out any activity listed in Schedule 1 to hold a **greenhouse gas emissions permit**. The conditions of the permit will require installations to monitor and report emissions in accordance with the monitoring and reporting plan approved by the Regulator. Each year emissions data for the previous calendar year must be verified by an independent audit, and the equivalent number of allowances surrendered. All transfers and surrenders of allowances take place on electronic national registries.

A site becomes liable under the EU ETS when the sum of the site's rated combustion capacity exceeds 20MW (thermal). Once over this limit the site's CO_2 emissions are capped and strict monitoring is required. Emissions are required to stay within the cap or the site will need to trade carbon.

4.7.2 The treatment of biomass under EU ETS

Biomass boilers are also included towards the total site limit under the EU ETS. Therefore the replacement of fossil fuel boilers with biomass boilers would not reduce the qualifying capacity of the site for EU ETS. However, **CO_2 emissions from biomass boilers are rated as zero under EU ETS,** which means that any carbon emissions resulting from the biomass boilers will not count towards the site's emissions. This may help the site to meet its emissions targets or even to emit at levels lower than its target and thus sell surplus carbon allowances.

4.7.3 Registration and permitting for EU ETS

As indicated above, Schedule 1 of the EU ETS Directive sets out the sectors that come under EU ETS. Biomass to energy plant may come under or contribute towards energy activities and therefore may come under EUETS. As indicated above, biomass boilers are included within the 20MWth limit for EUETS. Anyone who wishes to know whether or not their process comes under the scope of EU ETS should consult this Annex and the Defra guidance[35].

Once permitted within the EU ETS operators are required to prepare and submit monitoring and reporting plans to the regulator. Emissions monitored under these plans will need to be independently verified. The requirements for EU ETS permitting, monitoring & reporting of verification are presented in Figure 4-2 below. Guidelines for monitoring and reporting

[35] www.defra.gov.uk/environment/climatechange/trading/eu/permits/index.htm - includes guidance notes on inclusion and on allocations. Essentially if an activity is included in Schedule 1 of the ETS and results in specified emissions, it comes under EU ETS.

greenhouse gas emissions under the EU ETS are published on the Europa web site[36]. In addition, to participants in the scheme must also have an account on the EU ETS Registry.

Once a year operators are required to ensure they have enough allowances to cover their installation's emissions. They can buy additional allowances (on top of their free allocation), or to sell any surplus allowances generated from reducing their emissions.

4.7.4 Contacts and further information

The regulators for the EU ETS are the Environment Agency in England and Wales. Contact details are:
Emissions Trading
The Environment Agency
Richard Fairclough House
Knutsford Road, Warrington WA4 1HG
e-mail for enquiries: ethelp@environment-agency.gov.uk

Further information and forms and guidance are available on the Environment Agency site: www.environment-agency.gov.uk/business/ follow: regulatory instruments/trading schemes/ EU/ Emissions trading scheme.

Figure 4-2 Extract from Defra guidance on the permitting and monitoring & reporting time schedule for EU ETS

Operator Timetable of Requirements for EU ETS permitting, Monitoring & Reporting Verification

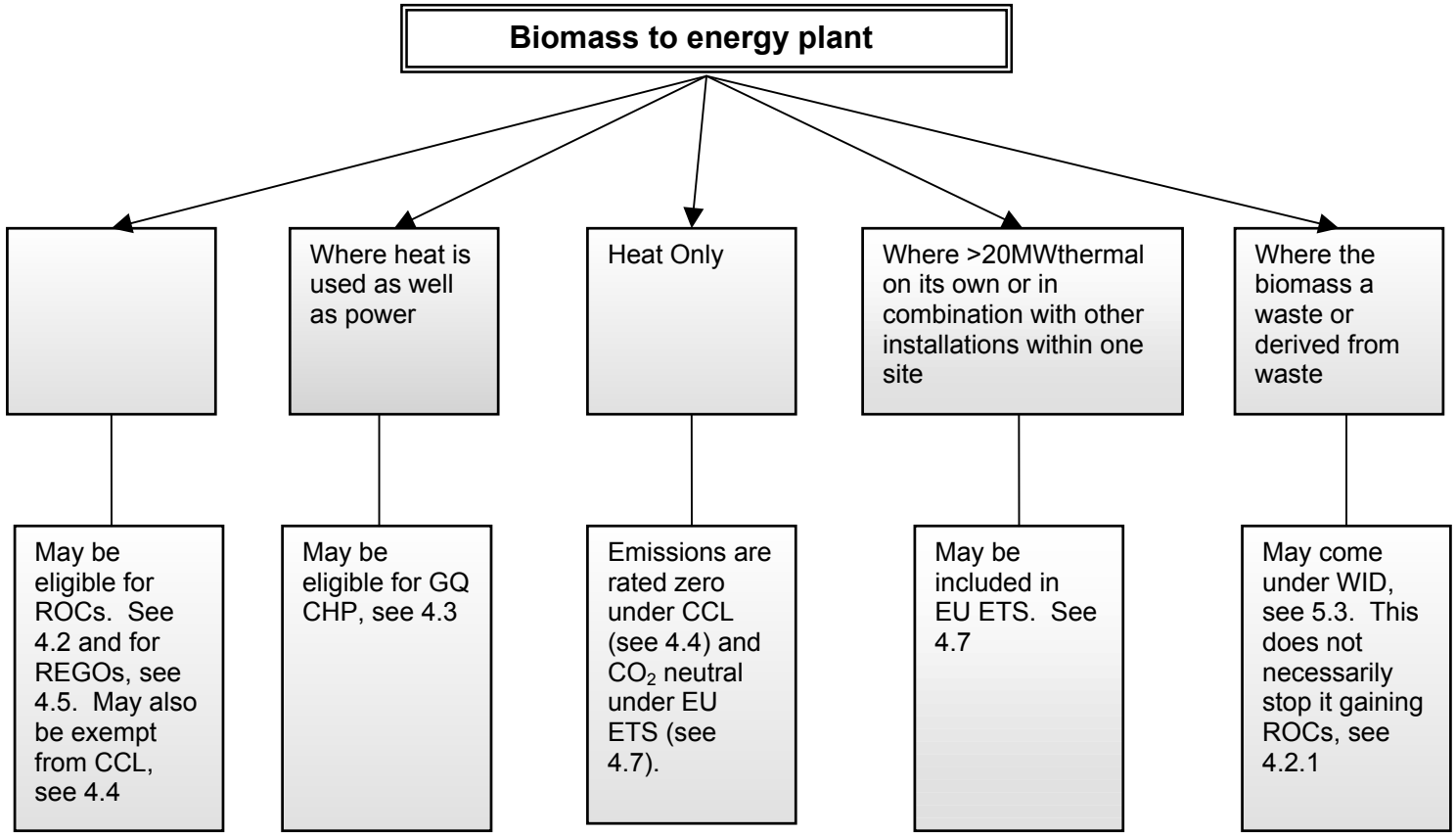
Step	Action	Deadline	Check
1	Determine if installation is with scope of scheme	01-Aug-04	☐
2	Apply for GHG Permit and submit Monitoring & Reporting plan	01-Sep-04	☐
3	Pay Permit application fee	Within two months of application	☐
4	Regulators issue permit and approve M&R plan	Within two months of application	☐
5	Implement approved M&R plan and commence monitoring	When permit granted	☐
6	Commence annual verification process	By June each year	☐
7	Seek any necessary variations to the permit and M&R plan	By November each year	☐
8	Operator to prepare annual emissions report	December each year	☐
9	End of monitoring for a given EUETS year	31 Dec each year	☐
10	Receive installations coming year's annual allocation of allowances	28 Feb each year	☐
11	Obtain final verification opinion statement from verifier	February/March each year	☐
12	Complete & submit verified annual emissions report to regulator	31 March each year	☐
13	Surrender allowances from account in the Registry	30 April each year	☐

[36] http://europa.eu.int/comm/environment/climat/emission/mrg_en.htm

4.8 Summary

Figure 4-3 below summarises the legislation that applies to energy generated from biomass heat. This chart shows what a plant may be eligible for and provides links to the sections covering the legislation.

Figure 4-3 Summary of legislation and regulations for heat and power from biomass energy plant.



5 APPLICABLE ENVIRONMENTAL LEGISLATION

5.1 Introduction

While the use of biomass as a fuel offers significant potential environmental advantages in terms of its role in reducing emissions of greenhouse gases, in common with all combustion (or other thermal treatment) plant, there remain the potential for the release of pollutants that can give rise to significant global and / or local pollution issues. The legislation described in this section aims to deal with these pollution issues. **It is advisable to consult with the Environment Agency at the project planning stage.** The first contact should be with Regional Support Units at Regional Headquarters.

The **purpose of this chapter** is to:

- Describe the environmental legislation applicable to the use of biomass
- Outline the procedures for those proposing to use biomass
- Provide a general understanding of the obligations that this legislation gives rise to
- Provide contacts for the relevant regulators
- Provide links and references to relevant further information

The issues covered are:

- Planning consent and environmental impact assessment – see section 5.2
- Pollution control permits – see section 5.3
- Section 5.3 also provides information about the requirements arising from legislation applicable to the burning of waste derived biomass (which is implemented via pollution control permits)

The Environment Agency has access to a software tool that enables them to undertake preliminary assessment of the likely environmental impacts of biomass energy schemes. This is referred to as the Biomass Environmental Assessment Tool or **BEAT**. This tool is intended to be used by the Environment Agency to assess its requirements for Environmental Impact Assessment at the planning stage. However, the Environment Agency may also be prepared to provide output sheets for other interested parties on request. Local Environment Agency Officers should be consulted about this.

5.2 Planning consent and environmental impact assessment

5.2.1 General Description

The majority of onshore renewable energy proposals represent development and require planning consent, unless they constitute "permitted development" (permitted development rights cannot apply to Schedule 1 development or to Schedule 2 development unless the local

planning authority (LPA) has screened to the effect that an EIA is not required). Offshore renewable energy developments are subject to a different consenting process.

Onshore renewable energy proposals, such as biomass and wind farm proposals, fall within Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (the EIA Regulations) and are therefore subject to an **Environmental Impact Assessment (EIA)** if they are considered likely to have significant effects on the environment.

For new, **electricity-generating stations over 50 megawatts,** development consent under Section 36 of the Electricity Act 1989 is required from the Secretary of State for the Department of Trade and Industry (DTI). In such cases it is also usual for developers to ask the Secretary of State for deemed planning permission under Section 90 of the Town and Country Planning Act 1990 at the same time.

Any **'thermal' biomass power stations** with a heat output of at least **300 megawatts** would fall under Schedule 1 of the EIA Regulations, which means an EIA would be mandatory.[37]

5.2.2 Preparing a planning application

The following sections describe the main elements of the planning process. Detailed requirements will vary according to the specific location and installation proposed. Readers are advised to contact the relevant planning authorities at an early stage (see also "contacts & further guidance" later in this section).

Initial consultation
It is advisable for developers to contact their local planning authority (LPA) and statutory bodies at an early stage in the selection and design of potential sites. For electricity-generating stations of >50MW electrical output the DTI is the determining authority[38], and should be included in this early contact.

Such consultations can usefully inform initial stages of the Environmental Impact Assessment (EIA) screening and scoping process. They can also help LPAs assess the potential acceptability of specific proposals, particularly their compatibility with the relevant development plan.

Public consultation
Early dialogue and consultation with the general public is a useful way of spreading information about particular projects. It can also help to counter both uncertainty and misconceptions regarding the nature and impacts of particular proposals.

Public consultation helps to identify legitimate public concerns about particular proposals; so that these can be addressed both in the detailed design of submitted proposals and in associated, supporting information.

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[37] Source = DTI web site : http://www.dti.gov.uk/energy/sources/renewables/planning/planning-process/process-england/page18681.html

[38] For **electricity-generating stations over 50 megawatts electrical output,** development consent under Section 36 of the Electricity Act 1989 is required from the Secretary of State for the Department of Trade and Industry (DTI).

EIA screening
Developers may formally request a screening opinion from the LPA before submitting a planning application. The purpose of a screening opinion is to inform the developer whether or not the LPA considers that a proposed development, such as a wind farm or biomass power station, constitutes an EIA development.

In making this determination, the LPA takes account of the 'selection criteria' prescribed in Schedule 3 of the EIA Regulations. If the developer does not request a pre-application screening opinion, the LPA will issue one when it receives the application. Should the developer disagree with an LPA's screening opinion that an EIA is required, then a screening direction can be requested from the Secretary of State.

Many developers submit an Environmental Statement with their application without a screening opinion if they already consider that a particular development will require an EIA. Obtaining such an opinion is, however, useful as it sets out the LPA's/Secretary of State's opinions as to why EIA is required.

EIA scoping
Before making a planning application, a developer can request a 'scoping opinion' from the LPA or the DTI. This request seeks the LPA's opinion as to the information to be supplied within the proposed Environmental Statement (a scoping opinion).

The request for a screening or a scoping opinion should include:

- a plan sufficient to identify the land in question
- a brief description of the nature and purpose of the development and of its possible effects on the environment
- other information or representations the person making the request may wish to provide or make.

LPAs and the DTI should adopt a scoping opinion within five weeks of receiving such a request, unless a longer period has been agreed in writing with the person making the request.

Production of Environmental Statements
Schedule 4 of the EIA Regulations sets out the information required for inclusion within Environmental Statements. This should include a description of the proposal, assessment of its likely significant effects, and a description of any proposed mitigation measures. There should also be a non-technical summary. Environmental Statements must be circulated to statutory consultation bodies for comment. In England these include the Environment Agency, the Countryside Agency and English Nature, and in Wales the Environment Agency and the Countryside Council for Wales.

5.2.3 Dealing with planning applications for renewable energy

Throughout much of the UK, the most significant renewable energy proposals in the foreseeable future are expected to relate to proposals for wind energy development.[39]

[39] http://www.dti.gov.uk/renewables/renew_3.4.1.htm

In addition to wind, it is likely that proposals for biomass generation will increase in number. Smaller proposals for ground-source heat, domestic solar/photovoltaic panels and domestic wind turbines are also likely to increase in number. [40]

The majority of planning applications for renewable energy developments are dealt with by the relevant LPA. As well as publicising the application in order to invite comments from third parties, the planning authority may consult various other parties with relevant interests or expertise, depending on the location, size and likely impacts of the development.

Appeals against refusal of planning permission, or against a grant of permission with imposed conditions that the applicant finds unacceptable, are heard by the Planning Inspectorate on behalf of the Secretary of State.

Submission of application

When submitting an application and the necessary plans and drawings, applicants should provide the appropriate fee and the requisite number of copies for circulation to the statutory consultees. It is important to show the full extent of the development as some renewable energy schemes can include works outside the main site, for example highway improvements to allow delivery of large turbine components. These should all be identified.

Determination

Unless the applicant and the LPA have agreed a longer period, if no decision has been made after eight weeks, the applicant can appeal on the grounds of non-determination.

In the case of applications accompanied by an EIA, the period of time available for determination is 16 weeks.

In the case of development consent applications submitted to the DTI there is no specified time period for determination, but the Secretary of State will have a duty to reach a decision within a reasonable timescale. An LPA has four months in which to advise the Secretary of State of its views on an onshore development. If the LPA objects then a public inquiry is mandatory. The view of the LPA is therefore crucial.

Planning conditions and planning obligations

LPAs have the power to grant conditional planning permission and to seek planning obligations from developers, in order to make acceptable development proposals which would otherwise be unacceptable.

Planning obligations should be used so that a proposed development is made to accord with published local, regional or national policies. For example, to require developers to:

- undertake off-site highway improvements or
- undertake habitat enhancements.

The legislative basis for planning obligations is Section 106 of the Town and Country Planning Act 1990[41].

[40] http://www.dti.gov.uk/renewables/renew_3.4.1.htm

[41] As amended by section 12 of the Planning and Compensation Act 1991

Any planning obligations must comply with Government policy set out in Circular 05/05 for England. In Wales, the relevant guidance is contained in the Ministerial Interim Policy Statement No. 01.2005, Planning Renewable Energy and is available at: http://new.wales.gov.uk/docrepos/40382/4038231121/403821/403821/4038212/mipps1-e.pdf?lang=en

In DTI cases, LPAs will suggest appropriate planning conditions to be imposed and will negotiate Section 106 agreements in respect of the proposal. While not party to the Section 106 agreements, the DTI will wish to be satisfied on that front before reaching a decision.

5.2.4 Contacts & Further Guidance

The **DTI web site** contains information regarding UK planning policy, legislation and the planning process in England, Wales, Scotland and Northern Ireland.
See http://www.dti.gov.uk/renewables/renew_3.4.htm

Planning Policy Statement 22 (PPS22) sets out the Government's policies for renewable energy in England, which planning authorities should have regard to when preparing local development documents and when taking planning decisions. Published August 2004. This replaces PPG Note 22. PPS22 and the companion guide can both be downloaded at the Department for Communities and Local Government (DCLG) web site: http://www.communities.gov.uk/.

The DCLG also provides at its web site information on the application of the **EIA Regulations** and a **Note on Environmental Impact Assessment for Local Planning Authorities.**

In Wales, Circular 11/99 – Environmental Impact Assessment, published by the Welsh Office, provides advice on implementing the EIA Regulations, and guidance on planning policy is provided by **Technical Advisory Note 8 (TAN8): Planning for Renewable Energy**. http://www.wales.gov.uk/subiplanning/content/tans/tan08/newtan8/tan8-e.htm

TAN 8 relates to the land use planning considerations of renewable energy, however UK and national energy policy provide its context. All decisions relating to renewable energy in Wales must take account of the Assembly Government's policy (Energy Wales – A Route Map). A summary statement on energy is contained in Annex A to TAN 8. A number of other annexes to TAN 8 also provide background to the development of planning policy for renewable energy in Wales.

Full information on planning policy in Wales can be viewed at:
http://www.wales.gov.uk/subiplanning/content/planningpolicy/final/contents-e.htm

5.3 Pollution Prevention and Control (PPC)

5.3.1 General Description

The need for a permit:

Pollution Prevention and Control (PPC) is a regime for controlling pollution from certain industrial activities. Operators are obliged to apply to the appropriate Regulator (see below) for a permit, and must comply with its conditions.

It is illegal to:

- **carry out an activity that is listed in the PPC Regulations without a permit**
- **not comply with the conditions in the permit.**

The Pollution Prevention and Control (PPC) regime implements the European Directive (EC/96/61) on integrated pollution prevention and control. The system of PPC replaced that of Integrated Pollution Control (which was established by the Environmental Protection Act 1990).

"New" installations fall immediately within the requirements of PPC. "Existing"[42] installations required to apply for permits in accordance with a defined implementation timetable between 2000 and 2007. This timetable and other guidance on definitions have been published by DEFRA.[43].

The permits issued under PPC are also used to implement the requirements of **other legislation**, including the Large Combustion Plant Directive (LCPD)[44] (for plants of >50 MW) and relevant requirements for public consultation, etc. Of particular relevance to **waste-derived biomass** are the requirements of the **Waste Incineration Directive**[45] (WID). The WID sets stringent emission limits and monitoring requirements that are implemented by introducing its requirements into PPC permits. **Further information about the WID and its applicability is provided in section 6.1.2.**

Do I need a PPC permit?

The activities to which PPC applies are listed in Part A of Schedule 1 to the PPC regulations (SI 2000/1973) as amended (see http://www.opsi.gov.uk/si/si2000/20001973.htm). The activities listed in these regulations are broadly divided by industry sector, and by size. These divisions determine who will regulate the installation, and hence with whom applications must be discussed and lodged (see below for more detail).

[42] The terms "new" and "existing" are defined in the legislation – the regulator may advise.
[43] Integrated Pollution Prevention and Control – A practical guide Edition 4 http://www.defra.gov.uk/environment/ppc/ippcguide/pdf/ippcguide_ed4.pdf
[44] The LCPD may be seen at: http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_309/l_30920011127en00010021.pdf
[45] Directive 2000/76/EC on the incineration of waste http://europa.eu.int/comm/environment/wasteinc/index.htm

In general, **wherever consideration is being given to the use of biomass as a fuel, this is likely to fall within one of the descriptions given in this legislation, and thus require a PPC permit**. PPC covers a very wide range of industrial activities, but the main activities covered by these regulations, and of relevance regarding the use of biomass as a fuel, are:

- Burning of any fuel or waste (in any type of plant)
- Gasification and pyrolysis of any fuel or waste

The requirement to apply for and hold a relevant permit applies whether the material is processed in a dedicated facility, intermittently or as an admixture.

What will the permit require me to do?

The permit obliges the Operator to meet various performance criteria, including **emission limits** for releases to the environment, to **monitor and manage** their compliance with these. In addition the regulator carries out **inspections** to ensure compliance.

Operators must use the Best Available Techniques (BAT) to control pollution from their industrial activities. The aim is to prevent, and where that is not practicable, to reduce to acceptable levels, pollution to air, land and water from industrial activities. Matters such as noise, vibration and energy efficiency are also considered. An objective of BAT is to balance the cost to the operator against benefits to the environment.

Guidance on the techniques and performance levels that may represent BAT are published by:

- The Environment Agency as PPC Technical Guidance Notes (for Part A activities – see below for guidance on definition), and
- DEFRA as Local Air Pollution Prevention and Control - Process Guidance (PG) Notes (for Part A (2) and Part B activities – see below for guidance on definition)

Further information on these guidance notes can be found in section 6.1.1 below. The UK guidance notes take account of European BAT Reference Notes (BREFs) issued under IPPC Directive (EC/96/61). Further information BREFs is provided in section 6.1.3.

Who will regulate the plant?

The regulator for PPC in England & Wales is either;

- The Environment Agency, or
- The Local Authority (District, Borough or Unitary Authority)

The PPC Regulations[46] set out which activities fall within the remit of each regulator, and hence to whom a permit application should be made. Information regarding the relevant activities and regulation are given in Table 5-1 below.

The Environment Agency regulates Part A(1) installations. Part A(2) installations are regulated by the relevant local authority – usually the district, London or metropolitan borough council in England and the county or borough council in Wales. However, the local

[46] The activities to which PPC applies are listed in Part A of Schedule 1 to the PPC regulations (SI 2000/1973) as amended http://www.opsi.gov.uk/si/si2000/20001973.htm

authority will always be a statutory consultee where the Environment Agency is the regulator, and vice versa. Part B installations are regulated by the Local Authorities for controlling emissions to air only. Defra and Devolved Administrations provides separate guidance on local authority air pollution control.[47]

To determine whether an installation falls in each of these categories, reference should be made to the PPC Regulations [48] and discussions held with the appropriate regulator.

The tables below show:

- Which activities are covered by which parts of the PPC Regulations – in Table 5-1
- The relationship between fuel type and the applicable legislation - in Table 5-2

[47] LAAPC Guidance notes available at: http://www.defra.gov.uk/environment/airquality/lapc/pgnotes/default.htm

[48] Statutory Instrument 2000 No. 1973 The Pollution Prevention and Control (England and Wales) Regulations 2000, see http://www.opsi.gov.uk/si/si2000/20001973.htm#sch1

Table 5-1 Summary of the regulation of biomass related activities under the PPC Regulations

Part of PPC Regulations	Regime	Regulator	Activity
Part A (1)	PPC	Environment Agency	Installations in which any Part A(1) activity is carried out, including: ▪ Combustion plants of > 50 MW thermal input burning any fuel ▪ Combustion plants of 3 – 50 MW thermal input burning fuels containing or derived from waste ▪ Cement or Lime kilns burning waste ▪ Incineration of non-hazardous waste in an incineration plant[x] with a capacity of 1 tonne or more per hour ▪ Unless carried out as part of an A(2) activity: incineration of hazardous waste in a plant that is exempt from the WID; or the incineration of non-hazardous waste in a plant that is exempt from WID and has a capacity of 1 tonne or more per hour ▪
Part A (2)	PPC	Local Authority	Installations in which any Part A(2) activity is carried out but no A(1) activity, including: ▪ Co-incineration of non-hazardous waste in any combustion plant associated with any Part A(2) activity and which has a thermal input of less than 50 MW ▪ Incineration of non-hazardous waste in an incineration plant with a capacity of less than 1 tonne per hour ▪ Co-incineration of non-hazardous waste in a co-incineration plant which is not otherwise an A(1) or A(2) activity ▪ Incineration of animal carcasses or animal waste in a plant which is exempt from the WID and which has a capacity of more than 10 tonnes per day but less than 1 tonne per hour
Part B	LAAPC	Local Authority	Installations in which any Part B activity is carried out but no A activity, including: ▪ Combustion plants of 20 – 50 MW thermal input, burning any fuel except that covered in Part A(1) above ▪ Combustion plant burnng fuels containing or derived from waste with a thermal input of 0.4-3 MW and which is exempt from the WID ▪ Incineration of non-hazardous waste in a plant which is exempt from the WID but which has a capacity of 50 kilogrammes or more but less than 1 tonne per hour

[x] Incineration plant and co-incineration plant have specific meanings in the PPC Regulations. Summarised, these definitions refer to the incineration or co-incineration of waste in plants where the WID applies. Co-incineration plant here means a plant whose main purpose is the generation of energy or production of material products and which uses waste as a regular or additional fuel

Table 5-2 Summary of the pollution control legislation applicable to waste and non-waste biomass fuels

Fuel scenario	Plant size	Pollution regulation applicable	Regulator
1 Biomass fuels e.g. coppice willow, and fuel residues of a similar nature arising from the manufacture of these fuels	< 20MW	No air pollution control permit required	none
	20 – 50MW	LAAPC (Part B PPC)	LA
	> 50 MW	LCPD applies (PPC Part A1)	EA
2. Waste or waste derived biomass exempted from WID, and fuel residues of a similar nature arising from their manufacture	< 0.4 MW and < 50 kg/hr	No air pollution control permit required	none
	0.4 – 3 MW and 50 – 1000 kg/hr	LAAPC (Part B PPC)	LA
	> 3 MW and / or > 1000 kg/hr	PPC (Part A1)	EA
	> 50MW	PPC (Part A1) LCPD applies	EA
3. Waste or waste derived biomass to which WID applies	< 3 MW	WID applies PPC (Part A2)	LA
	> 3 MW	WID applies PPC (Part A1)	EA

Note: The above is true for stand-alone combustion plants and incinerators. However, if the combustion activity is associated with an activity that is subject to LA control, then the waste burning plant will remain under LA control provided it is below 50MW.

5.3.2 Key Requirements

Operators of listed activities must:

- apply to their regulator for a permit
- be in possession of a valid permit to carry out the activity
- comply with the conditions in the permit
- use the Best Available Techniques (BAT)

Guidance on the techniques that are considered to represent BAT is described in sections 6.1.1 & 6.1.3 below.

Further guidance on the PPC procedure may be found in the "Practical Guide" to integrated Pollution Prevention and Control published by Defra: http://www.defra.gov.uk/environment/ppc/ippcguide/pdf/ippcguide_ed4.pdf. This guidance describes the key stages as follows:

Box 5: Key stages to the PPC permitting process

Stage 1 – Permitting

The procedure begins with the **preparation of an application** by the operator. Once the regulator receives a duly made application, it will consult various "statutory consultees" and the public. Operators should be encouraged to engage the public at the earliest opportunity.

Operators are required to **advertise** in one or more local papers and in the London Gazette details of the activity and its location together with a statement of where public representations should be made. After receiving comments from the public and statutory consultees, the regulator will then **determine the application**, either granting a permit with conditions or refusing it.

In making an application the operator must cover various environmental issues. These include:
(a) satisfactory environmental management of the installation;
(b) adequate compliance monitoring;
(c) assessment of polluting releases and the identification of BAT;
(d) compliance with other EU Directives, Community and national environmental quality standards (EQSs) and domestic regulations;
(e) energy efficiency, waste minimisation and management;
(f) the prevention of accidents.

The operator must also consider the **condition of the site** at the time of the original application. This will contribute to assessing the need for restoration when the installation closes (stage 3).

In determining the application, the regulator must be satisfied that the operator has addressed the above points appropriately. It is therefore the operator's responsibility to demonstrate that this is the case.

Stage 2 – Operation

Once the regulator has issued a permit, the operator of an IPPC installation will have to carry out **monitoring to demonstrate compliance with the permit conditions**. Regulators will also carry out their own monitoring and inspections, and have a range of enforcement powers.

Over time, **regulators may vary permits** to reflect changes in how installations are operated, or for other reasons. The regulator may vary permit conditions at either its own or the operator's instigation, with the possibility of consultation in either case. The regulator may also transfer permits from one operator to another, for example when one operator is taken over by another. More generally, regulators must **review permits** periodically, or whenever circumstances make a review necessary, such as when significant pollution occurs.

Stage 3 – Closure and Surrender

When an installation closes, an operator should apply to **surrender a permit**, to end regulation under IPPC and payment of the associated annual charges to the regulator. The application to surrender the permit must include a site report identifying, in particular, any changes in the condition of the site since the time at which the permit was issued. The operator is required to identify any steps that have been taken to avoid any pollution risk resulting from the operation of the installation or return it to a satisfactory state. If on closure the operator satisfies the regulator that they have removed any pollution risks and **restored the site to a satisfactory state**, the regulator accepts the surrender and gives the operator notice of its determination. The permit then ceases to have effect on the date specified in the notice of determination. If the regulator is not satisfied, it has to give notice of its determination stating that the application has been refused.

Standard application forms
The PPC Regulations allow **standard forms** to be produced for applications for permits, variations, transfers and surrenders. Where these forms are available, **operators must use them**.

5.3.3 Contacts & Further Guidance

Operators should consult with their regulator for further advice:

- Environment Agency national general enquiries line is 0870 506 506

- Environment Agency local offices are the first port of call, see: http://www.environment-agency.gov.uk/contactus/1017039/?version=1&lang=_e

- The relevant Local Authority should be contacted in respect of Part A2 and Part B activities. A useful list of UK Local Authorities with links to their web sites may be found at: http://www.tagish.co.uk/tagish/links/localgov.htm

Environment Agency PPC web pages contain guidance on the legislation, links to guidance documents and application information:
http://www.environment-agency.gov.uk/business/444217/444663/298441/?version=1&lang=_e

DEFRAs "Practical Guide" to integrated Pollution Prevention and Control :
http://www.defra.gov.uk/environment/ppc/ippcguide/pdf/ippcguide_ed4.pdf

6 FURTHER GUIDANCE

6.1 Introduction

Government and regulators have produced a variety of guidance documents that are relevant to users of biomass. These explain various procedures and policies, and set out standards etc. In this section these have been divided into:

- Environmental guidance - see section 6.1
- Renewable energy guidance - see section 6.2

The **purpose of this chapter** is to:

- Describe the additional guidance applicable to the use of biomass
- Provide a general understanding of any obligations that this guidance gives rise to
- Provide additional contacts and references as relevant

The guidance described is:

- PPC Technical Guidance Notes
- Guidance on Directive 2000/76/EC on the incineration of waste (WID) Ed.2, 2004
- European BAT Reference Documents (BREFs)
- The Substitute Fuels Protocol
- Protocol for the Burning Of Biomass Fuels in Power Stations
- Environment Agency Heat Substitution Policy
- Bio-Energy Infrastructure Scheme
- DTI / Ofgem – RO/ROCs
- Wood Fuel Guidance

6.1 Environmental Guidance

6.1.1 PPC Technical Guidance Notes

General Description

The Environment Agency publishes guidance on the Best Available Techniques (BAT) for installations it regulates under the PPC Regulations. The aim of the Guidance is to provide Operators and officers of the Regulator with advice on indicative standards of operation and environmental performance, relevant to the industrial sector concerned. It also aims (through linkage with the Permit Application Form templates) to provide a clear structure and methodology for Operators to follow to demonstrate they have addressed adequately all aspects of the PPC Regulations and relevant aspects of other environmental Regulations.

Of particular interest to the biomass sector are:

1. IPPC Sector Guidance Note Combustion Activities:
http://www.environment-agency.gov.uk/commondata/103599/consultation_final_1019680.doc

2. PPC: UK Technical Guidance: S5.01: Guidance for the Incineration of Waste and Fuel Manufactured from or including Waste
http://www.environment-agency.gov.uk/commondata/acrobat/incin_bat_guidance_854788.pdf

3. Secretary of State's Guidance for Combustion of Fuel Manufactured From or Comprised of Solid Waste in Appliances Between 0.4 and 3MW Rated Thermal Input
http://www.defra.gov.uk/environment/airquality/lapc/pgnotes/pdf/pg1-12.pdf

4. PPC : UK Technical Guidance : H1 Horizontal Guidance Note : Assessment & Appraisal of BAT
http://www.sepa.org.uk/pdf/ppc/uktech/ippc_h1.pdf

The purpose of this IPPC Horizontal Guidance Note for Environmental Assessment and Appraisal of BAT is to provide a methodology to assist Applicants in responding to the requirements described above and in the IPPC Sector and General Guidance Notes. In particular, this note provides:

- methods for quantifying environmental impacts to all media;
- a method for calculating costs of environmental protection techniques;
- guidelines on resolving cross media conflicts and making cost / benefit judgements.

5. PPC : UK Technical Guidance : H2 Horizontal Guidance Note : Energy Efficiency
http://www.sepa.org.uk/pdf/ppc/uktech/ippc_h2.pdf

The purpose of this IPPC Horizontal Guidance Note for Energy Efficiency is to provide supplementary information, relevant to all sectors, to assist applicants in responding to the energy efficiency requirements described in the IPPC Sector Guidance Notes. In particular, this note provides:

- further amplification of the interface between the regulatory requirements of IPPC and climate change or trading agreements, noting that continuing effort will be made to ensure that as far as possible the two regimes are complementary, for example for reporting of energy information;
- descriptions of the basic principles of energy efficiency and energy efficiency techniques;
- information on the requirements of cost-benefits appraisals for energy efficiency options using discounted cash flow techniques, appropriate discount rates and project lifetimes;
- a cost benefit benchmark in terms of £/tonne of CO_2, the value of which will be confirmed in the light of information arising from the Government's Climate Change Agreements and Emissions Trading mechanisms;
- conversion factors for assessing the environmental impact of the energy consumption.

Key Requirements

The sector technical guidance provides information on BAT including on:

- material storage and handling
- process control and combustion requirements
- flue gas pollution control techniques

- summary tables of achievable emissions

Contacts & Further Guidance

EA web pages containing industry sector guidance, information, best practice guides, links to licences and permits and cross sector guidance can be found at: http://www.environment-agency.gov.uk/business/444304/?version=1&lang=_e

This guidance can also be accessed via: http://www.sepa.org.uk/ppc/uktech/index.htm#s1

6.1.2 Guidance on Directive 2000/76/EC on the Incineration of Waste (WID) Edition 2, 2004.

It is **important** for those considering the use of biomass to consider whether the requirements arising from the Waste Incineration Directive (WID) applies, as it can have **very significant impacts upon the operational standards** required and this may result in **increased investment and operational costs**, to the extent that they may impact upon the overall viability of a project.

DEFRA guidance on the WID[49] describes the scope, regulatory and technical requirements of the waste incineration Directive (WID) and how they should be interpreted and applied. It also describes the UK approach and implementing legislation.

The information provided in the guidance includes:

- interpretation of the meaning of: waste, incineration and co-incineration plant,
- regulatory requirements of the Directive,
- technical aspects of the Directive including operating conditions,
- emission limit values for incineration and co-incineration plant, including example calculations for co-incinerators,
- monitoring requirements, and
- copies of the Regulations, directions to regulators, the Directive itself, and the European Waste Catalogue.

The Scope of the WID

The WID applies to incineration and co-incineration plants. Co-incineration plants include plant where waste is used as a fuel or is disposed of at a plant where energy generation or production is the main purpose.
A plant will only be an incineration plant or a co-incineration plant if it burns **waste** as defined in the Waste Framework Directive (WFD). However, **this definition is extremely broad** and there are in effect very few circumstances where by-products, co-products or residues are not classified as wastes. Such wastes will include municipal waste, clinical waste, hazardous waste, industrial and commercial waste, and waste derived fuels.

Exclusions from WID

[49] The guidance document on WID is available from the Defra web site: http://www.defra.gov.uk/environment/ppc/wasteincin/pdf/wid-guidance.pdf

Some plants which are burning certain "wastes" (which are defined as waste in the WFD) are, by the means of specific exemptions (see below), specifically excluded from regulation under the WID. This includes plants burning only animal carcasses or, in many circumstances, **vegetable and wood waste.**

It should be noted that a plant may burn one (or more) of these excluded wastes, alone or in combination with conventional non-waste fuels, and still be excluded from the WID, but the use of a waste that is not excluded will mean that WID applies.

The exclusions in the WID with the greatest potential relevance for biomass wastes are:

Vegetable waste from agriculture and forestry (Article 2(2)(a)(i):
Plants treating vegetable waste from agriculture and forestry are excluded from the Directive. This includes vegetable waste from horticulture, it may also include the container in which the plant has been grown.

Vegetable waste from food processing industry (Article 2(2)(a)(ii):
Plants burning only vegetable waste from the food processing industry are excluded providing the heat generated is recovered. Note that this exclusion cannot be claimed if the waste also contains material of animal origin.

Fibrous vegetable waste from pulp-making (Article 2(2)(a)(iii)):
Plants treating fibrous wastes from virgin pulp production and from production of paper from pulp, are excluded from the WID provided this happens on the site of waste generation and the heat generated is recovered. Wastes arising from the production of pulp are excluded only if the pulp production is from virgin materials. However, plants treating fibrous vegetable waste from paper production are exempted whether the pulp used is from virgin or recycled sources.

Wood waste (Article 2(2)(a)(iv)):
Plants treating only wood waste, with the exception of wood waste which may contain halogenated organic compounds or heavy metals as a result of treatment with wood-preservatives or coating, and which includes in particular such wood waste originating from construction and demolition waste, are excluded from the WID. Wood cannot be taken to include paper and card.

The Government recognises that some manufacturers producing, for example fibre board, do not use chemicals containing halogens or heavy metals in the manufacturing process. However, if the wood waste used for the manufacture of the fibre board was already contaminated, then the final product may be also contaminated (note: the WID doesn't specify at what point the contamination has to take place), consequently the exclusion might not be applicable. However, this is a question of fact and the onus is on the operator of the incineration / co-incineration plant to demonstrate that the wood waste originally used did not arise from treated wood.

Some untreated wood products, such as wood pallets, may become unintentionally or accidentally contaminated during their normal use with organic chemicals and / or heavy metals. However, the WID exclusion would still apply because the contamination is not "as a

result of treatment with wood preservatives or coating". Operators wishing to take advantage of this exclusion will have to demonstrate to the regulator that the contamination is accidental and not as a result of a treatment process.

The Environment Agency should be consulted about all biomass fuels where there remains any doubt as to whether or not they are a waste under the WID. However, plant that burns or co-incinerates only the materials listed in Table 6-1 below (alone; in combination with one another or other "excluded plant" wastes; or with non-wastes) would normally be considered to be excluded plant, and not therefore required to meet the requirements of the WID.

Table 6-1 Materials to which WID will not apply - because they are either not a waste or are excluded from the scope of WID

Material	Comment
Forest thinnings and residues (lop and top etc)	See Note 1
Forest products (including, inter alia, sawdust, co-products including chip and bark)	See Note 1
Clean recycled wood	See Note 2
Wood pellets	See Note 2
Cereal by-products from the food processing industry	See Note 3
Olive oil by-products including olive stones and olive cake	See Note 3
Rice husks	See Note 3
Rice pellets	See Note 3
Coconut husks	See Note 3
Coconut pellets	See Note 3
Sunflower husks	See Note 3
Sunflower pellets	See Note 3
Straw	See Note 1
Palm nut by-products including the milled palm nut, palm kernel expeller, palm oil and other by-products from the palm oil industry	See Note 3
Palm nut shells	See Note 3
Citrus pulp pellets	See Note 3
Soya bean hull pellets	See Note 3
Shea meal	See Note 3
Shea pellets	See Note 3
Illipe meal	See Note 3
Illipe pellets	See Note 3
Prickly acacia	See Note 1 or 3
Oil seed residue	See Note 3
Oil seed pellets	See Note 3
Eucalyptus	See Note 1 or 3
Oatfeed	See Note 3
Corn Cob pellets	See Note 1 or 3
Recycled/used vegetable oil	See Note 4
Energy crops (i.e. any crop purposely grown for energy, including, *inter alia,* annual and perennial crops, short rotation coppice, grasses such as Miscanthus etc).	See Note 5

Notes:

1. If the material is waste from agriculture or forestry and not contaminated with non-vegetable waste
2. If the material is uncontaminated with halogenated organic compounds or heavy metals as a result of treatment with wood-preservatives or coating.
3. If the material is vegetable waste from the food processing industry" **and** the heat generated by using it as fuel is recovered.
4. If the material, is waste from the food processing industry (uncontaminated by any products of animal origin) **and** the heat generated by using it as fuel is recovered.
5. If the crops were purposely grown for energy, then they would be considered a fuel and not a waste, and the WID would not apply.

Source: Environment Agency

Contacts & Further Guidance
The guidance document on WID is available from the Defra web site: http://www.defra.gov.uk/environment/ppc/wasteincin/pdf/wid-guidance.pdf

Queries regarding the application of WID should generally be directed to the local Environment Agency office:

- For Environment Agency local offices, see: http://www.environment-agency.gov.uk/contactus/1017039/?version=1&lang=_e
- Environment Agency national general enquiries line is: 0870 506 506

6.1.3 European BAT reference documents (BREFs)

General Description
Best available techniques reference documents (BREFs) are the product of the information exchange on "Best Available Techniques" (BAT), organised by the European Commission under Article 16.2 of the IPPC Directive. This information exchange is co-ordinated by the European IPPC Bureau (EIPPCB).

The EIPPCB programme is to produce 33 BREFs covering the main industrial sectors to which IPPC applies. Just over half of these have been finalised and are now formally adopted by the EU. This includes the guidance for the Large Combustion Plant sector.

Key Requirements
Most BREFs cover individual industrial sectors (e.g. large combustion plants), with other "horizontal" BREFs covering cross-sectoral subjects.

UK Technical Guidance Notes take account of information contained in relevant BREFs (if available) in setting out indicative BAT standards and expectations for England and Wales, Scotland and Northern Ireland. Thus, the responsibility for consideration of the standards set out in the BREFs lays with Member States, and individual operators do not have direct responsibility for implementing the standards the described in the BREFs. However, it may be anticipated that the information in the BREFs will influence future UK BAT guidance to some degree.

Contacts & Further Guidance
The European IPPC Bureau web site contains information about the IPPC Directive, BREFs and their production: http://eippcb.jrc.es. Available BREFs and draft documents can be downloaded at this site.

6.1.4 The Substitute Fuels Protocol

General Description
The substitute fuels protocol is document produced by the Environment Agency (updated 1 Feb 2005) to provide guidance on the procedures to be followed and the considerations to be given to the use of substitute fuels in cement and lime manufacturing installations. **It is relevant to situations where biomass is the intended substitute fuel.**

It defines substitute fuel as: *"any material proposed for use as fuel in cement and lime manufacture which replaces conventional fuel(s) such as coal, petroleum coke, natural gas or oil or existing substitute fuel."*

Under the Pollution Prevention and Control Act, the burning of substitute fuels (including biomass) in cement and limekilns, or other installations, is not permitted without making an application to the environmental regulator (Environment Agency or local authority – see section above on PPC) and obtaining its permission. In the case of new activities, this may be done as part of the application for a PPC permit. It may also be done as a variation to an existing PPC Permit.

The Protocol is based on the premise that existing installations wishing to use substitute fuel(s) need establish scientifically the facts about the **possible environmental impacts of its proposals**, so that the Environment Agency is able to make sound judgements as to whether or not the permanent use of substitute fuel(s) should be permitted and, if so, under what conditions.

The Protocol sets out arrangements for **public consultation** extending beyond statutory requirements, in order to facilitate a wider and better-informed determination process.

If the substitute fuel is "waste" Operators will also have to comply with the requirements of the Waste Incineration Directive (WID), which applies to the majority situations where waste or waste derived fuels are used. See section 6.1.2 on WID.

Key Requirements
The SFP describes the legal framework in respect of changing fuels, and describes the procedural and technical requirements of such.

The application procedure is summarised in the SFP as follows:

Table 6-2 Application procedure for new substitute fuel(s)

Stage	Activity
1	Consultation by operator
2	Application for substitute fuel burning
3	Consultation and assessment (as appropriate)
4	Permit to burn substitute fuel subject to trial evaluation
5	Commissioning trial phase
6	Reporting
7	Assessment of commissioning report
8	Announce outcome of commissioning trial

Each of the above procedural stages, including public consultation and application requirements are described in detail in the SFP itself, which may be downloaded at:
http://www.environment-agency.gov.uk/commondata/acrobat/revised_sfp_01_02_05_964920.pdf

The technical requirements set out in the SFP include:

- Plant technical requirements and BAT
- Plant operational requirements
- Fuel specification and quality assurance requirements

- Submission of a proposed commissioning trial programme
- Fuel storage and handling requirements
- Process, emissions and environmental monitoring requirements
- Reporting requirements

Contacts & Further Guidance
Queries should generally be directed to the local Environment Agency office:
- For Environment Agency local offices, see: http://www.environment-agency.gov.uk/contactus/1017039/?version=1&lang=_e
- Environment Agency national general enquiries line is: 0870 506 506

Download the complete SFP from the EA website at:
http://www.environment-agency.gov.uk/business/444304/444385/652896/131881/?lang=_e

6.1.5 Protocol For The Burning Of Biomass Fuels In Power Stations

This protocol provides guidance for applications for the co-firing of biomass in coal or oil fired power stations and details the procedure for application. The protocol outlines requirements for detailed physical and chemical characteristics of the proposed biomass fuel. If this is the first time such material has been co-fired at the power station, the operators are required to undertake a combustion trial. The trial must match as closely as possible the conditions under which the fuel will be burnt under continuous burn. The power station is required to monitor emissions from the trial and to report to the Environment Agency before continuous burn is permitted.

Providing the trial is successful the power station is then able to continuously co-fire any biomass fuel that falls within the physical and chemical properties of the fuel in the original trial. As many biomass fuels are of very similar characteristics this allows some flexibility to the power station in the fuels it may co-fire.

The protocol is reproduced in Appendix 7.5 of this report.

6.1.6 Environment Agency Heat Substitution Policy

General description
The policy objective is to ensure that applications requesting permission to burn or otherwise subject to heat these substitute materials are dealt with in a consistent but proportionate manner. The policy does not apply in circumstances where existing Environment Agency policy or guidance should be used e.g. Substitute Fuels Protocol (SFP).

The policy applies to processes involving combustion/gasification/pyrolysis, where conventional feedstock or fuels are being substituted by other materials, and their use is not specifically approved in a current authorisation/permit.

Key requirements
The main requirements are:
- Trials of new fuels are generally required prior to continuous use

- Trials must be specifically authorised by the EA
- Monitoring and reporting of results is required
- Consultation may be necessary
- The permanent use of the substitute material must represent BAT

Contacts & Further Guidance
The protocol is reproduced in Appendix 4 of this report.

Queries should generally be directed to the local Environment Agency office:

- For Environment Agency local offices, see: http://www.environment-agency.gov.uk/contactus/1017039/?version=1&lang=_e
- Environment Agency national general enquiries line is: 0870 506 506

6.2 Renewable energy guidance

6.2.1 Bio-energy Infrastructure Scheme

The Bio-energy Infrastructure Scheme is a UK-wide scheme, with total funding of £3.5m. The Scheme provides grants to producer groups and businesses to help the development of the supply chain required to harvest, store, process and supply certain biomass to heat, combined heat and power, and electricity end-users. Defra have produced a guide to the grants available under the Bio-energy Infrastructure Scheme and how to apply.

For more information contact:

Crops for Energy Branch, Area 4B
Department for Environment, Food and Rural Affairs
Nobel House, 17 Smith Square
London
SW1P 3JR
Tel: 020 7238 6244, Fax: 020 7238 6166
E-mail: industrialcrops@defra.gsi.gov.uk
Website: www.defra.gov.uk/industrialcrops

6.2.2 DTI/OFGEM – RO/ROCS

Guidance on RO/ROCs are referenced in the appropriate sections above.

6.2.3 Wood Fuel Guidance

The DTI produced good practice guidance on wood fuel from forestry and arboriculture in 1998. Although parts of the report have been superseded by other reports and legislation has changed these guidelines contain useful information on environmental impact, consultation and development of an energy plant. See: Wood fuel from Forestry and Arboriculture DTI 1998.

7 APPENDICES

Appendix 7.1	Biomass Resource estimates for the UK
Appendix 7.2	Summary of additional recommendations of the Biomass Task Force review and Government response
Appendix 7.3	Determination of a biomass fraction under EU ETS
Appendix 7.4	Note on definition of Renewable Source Electricity for CCL purposes
Appendix 7.5	Environment Agency Protocol For The Burning Of Biomass Fuels In Power Stations
Appendix 7.6	Environment Agency Heat Substitution Policy
Appendix 7.7	The basic principles of the Kyoto protocol

7.1 Appendix 1: Biomass resource estimates for the UK

Biomass type	Definition	Estimate and Reference[c]	Comments, including current use
Agricultural residues – Dry residues		13TWh/y (3)	
Chicken litter	Bedding material from broiler houses, comprising material such as wood shavings, shredded paper or straw, mixed with chicken droppings. Variable moisture content.	1,062,725 odt/y	Four plants in UK designed to take poultry litter with a total capacity (DNC) of 74.7 MWe. Some of these plants now take other waste fuels, such as MBM. Poultry litter is defined as a waste within the Waste Incineration Directive.
Cereal Straw	Residue from the production of cereal and seed crops, most commonly cereal straws from wheat, barley and oats and straw from oil seed rape and linseed crops. The crops typically yield between 3 and 4 tonnes/ha of straw.	3-4.5 million t/y surplus straw could be used for energy (1, 2)	200,000t/y used for electricity generation at Ely. A further estimated 170,000 tonnes/y are used in small-scale on farm schemes (1).
Other dry residues	Corn stover, sugar beet tops, feathers, horse bedding	Not known	Some of these fuels are currently used in co-firing or at established biomass plants in the UK. However, their potential for use is not known.
Agricultural residues – wet residues			
Farm slurries	Derived from three major sources, cattle pigs and egg-laying poultry	2,908,200t/y (2) (estimated equivalent to 1.8-2.3 TWh/y electricity or 4.01-4.9 TWh/y heat if AD is used to generate heat or power).	Currently slurry is spread on agricultural land. Increasingly stringent regulations may require some form of treatment prior to land spreading, such as anaerobic digestion. A recent DTI study (9) estimated that the AD market potential from farm manures is 0.45TWh/y now but could rise to 1.65 TWH/y by 2020.
Virgin wood fuels		1,460,000 odt/y (2)	
Forestry residues	Stem wood (7-14cm), poor quality stem wood, stem tips and branches	1,749,000 odt/y[a] (4) 1,060,000 odt/y (c. 6TWh/y)[b] (3)	See reports for assumptions behind these figures. Ref (5) indicates that at least 1 million t of wood fuel was being used in the UK for heating in 1999.
Primary wood processing co-products	Clean wood waste from saw milling: i.e sawdust, shavings and off cuts.	858,901 odt/y[a] (4)	

Biomass type	Definition	Estimate and Reference[c]	Comments, including current use
Arboricultural arisings	Waste from pruning and general maintenance of parks and gardens. May also include some civic amenity wastes.	492,000 odt/y[a] (4)	
Refined wood fuels	Pellets, briquettes	Increasing resource in UK and abroad.	The wood pellet supply within the UK is increasing, including a large (50,000t/y plant in Northern Ireland and plants in Wales and the North of England).
Energy Crops			
Short rotation coppice	Short rotation coppice (SRC) fast growing tree species – typically willow or poplar - that are grown intensively and harvested in winter every 2 to 5 years.	16,689 odt/y (4) Assuming an area of 680,000ha ref (3) estimates a resource of around 34-42 TWh/y. BTF (2) estimated 1 million ha available to produce 8,000,000odt of energy crops.	Other energy crops are also being investigated in the UK (e.g. switch grass, reed canary grass). Planting of SRC is increasing due to demand from the power industry for energy crops for co-firing. Currently there are between 2000 and 3000ha of SRC and a further 5700ha of SRC may be planted under the energy crops scheme. See: "Best Practice Guide on SRC" (DEFRA, 2002), www.defra.gov.uk/faram/acu/energy/src-guide.pdf
Miscanthus	Rhizomatous perennial grass that originates mainly from Asia. Rapid growth of multiple shoots 3 to 4 m in height in one season. The dead standing stems dry out through the winter and are typically harvested in late winter before the next year's shoots begin to grow.	See comment above. Currently around 4500-5000ha of miscanthus in the UK (7).	Planting of miscanthus may increase due to demands from development under the Bioenergy grant scheme and to provide additional fuel for established plants. See Defra's Best Practice Guide on Miscanthus for further information (Planting and Growing Miscanthus, Defra 2001, available from www.defra.gov.uk/erdp/schemes/energy/default.htm)
Waste fuels			
Waste Wood fuels	Waste wood from municipal, commercial and industrial sources. Will include a high proportion of treated wood wastes, depending on the source. Wood waste falls outside the scope of the WID unless the wood contains halogenated organic compounds or heavy metals as a result of treatment with wood preservatives or coatings, in particular wood originating from construction and demolition sites.	1,762,000 tpa (8)	This comprises treated wood waste in MSW: 450,000-730,000 t/y, including: civic amenity waste: 440,000-670,000t/y; commercial arisings: 71,000-101,000t/y Industrial construction and demolition wood waste~ 1,715,000t/y, including: Furniture waste: untreated: 186,000t/y and 212,000-468,000t panel and board waste/y. Demolition waste: 300,000t.y.

Biomass type	Definition	Estimate and Reference[c]	Comments, including current use
Sewage sludge	Solids residue remaining after sewage treatment. May contain anything from 4-95% solids, the remainder being water. Also known as "biosolids"	1.7mt dry sludge in 2004, expected to rise to 2.5 mt/year within 25 years. It is, not known what form this takes.	At 30% DS content sewage sludge is only autothermic, i.e. it will burn without energy input and with no energy output. Significant quantities of sludge could be available to generators, either in the form of sludge or pellets/granules. WID applies to the combustion of sewage sludge.
Cellulose fibres	Residue from cardboard and paper that cannot be recycled.	Not known	May be classed as a biomass and be eligible for ROCs if biomass content can be demonstrated to be sufficient to come under the RO biomass definition.
High biomass refuse derived fuels	Residues from waste processing plants, such as autoclaving or similar treatments.	None currently available. Resource potential not known.	Will come under WID. May be classed as a biomass and be eligible for ROCs if biomass content can be demonstrated to be sufficient to come under the RO biomass definition.
Industrial biomass wastes	e.g. paper sludges For industrial wood wastes see waste wood fuels above.	169,000t industrial sludge, 154,000 t common sludge was produced in pulp, paper and paper production in 2002 (6). Other industrial biomass waste production is not known.	Will come under WID. May be eligible for ROCs if it can be demonstrated that the biomass content of the fuel complies with the requirements of the RO.
Food processing residues	MBM, tallow, blood and bone meal residues, fish residues	Not known. Estimate for potential for AD from food processing residues: 1.75 TWh/y (heat only)	These come under WID
Cereal milling residues, also known as wheat feed, cereal co-product or milling co-products.	By-product of flour manufacture obtained from screened husked grains of wheat. It comprises fragments of the outer skins and of particles of grain. Variable in nature. Cereal milling residue is available as a dust or may be offered pelleted for use as a fuel.	Not known. Increasing quantities are thought to be available because of restrictions on its traditional market and the cost of landfilling.	May also be imported.

Notes:

[a] Current potential operationally available woodfuel resource. The total available wood fuel resource (forestry residues, sawmill co-product, arboricultural arisings and SRC) is equivalent to 3.6 TWh/y if used for electricity generation or 12.1 TWh/y for heat generation. For assumptions see (4).

[b] Includes arboricultural arisings.
[c] Note that increasing demand for transport fuels will affect these estimates.

References

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7.2 Appendix 2: Summary of additional recommendations of the Biomass Task Force review and Government response

The Biomass Task Force reported its findings in October 2005. The report can be obtained from Defra (www.defra.gov.uk/farm/acu/energy/biomass-taskforce/index.htm). They key findings are indicated in Section 2.6, but there were also additional recommendations, summarised below:

- Additional initiatives to support biomass heat should be considered, including
  - encouraging positive preference for the use of biomass in new build and refurbishment and within the Government and Local authority Estate;
  - initiatives to improve the take up of renewable energy within new residential, commercial or industrial development;
  - promotion of best practice for biomass boilers;
  - assistance for small-scale electricity generation;
  - long-term mechanisms for support for biomass energy through the EU ETS, the CCL and energy efficiency commitments; and
  - simplification of the requirements for co-firing.
- Initiatives to examine biomass waste are important:
  - The promotion and recognition of the energy value of waste as an asset;
  - a review of the Government's strategy for anaerobic digestion.
- Additional initiatives to support/develop the biomass supply chain include:
  - adoption of CEN TC 335 and 343 standards;
  - R,D& D activities to produce information and bankable performance data;
  - continuation of the energy crops scheme; and
  - a strategic environmental impact assessment for biomass, together with comprehensive life cycle analysis.
- Initiatives for institutional reform:
  - reforming the role of various Government departments and Agencies in taking forward the recommendations of the report and for dissemination of knowledge;
  - engagement with EU opportunities through the EU Biomass Action Plan;
  - initiatives to plug current skills gaps.

Government response the BTF Report:

The Government response to the BTF report was published as this report was being finalised. A copy of the report is available at the Defra web site:
http://www.defra.gov.uk/farm/acu/energy/biomass-taskforce/btfreport-govresponse.pdf

7.3 Appendix 3. Determination of a biomass fraction under EU ETS

The EU Emissions Trading System (EU ETS) has a requirement to determine the proportion of biomass used in energy processes, although all that is required is confidence in the level of biomass measured. The following provides an extract from the EU ETS guidelines[50] :
"The procedures applied to sample the fuel and to determine the biomass fraction shall be based on relevant CEN standards as soon as they are available. If CEN standards are not available ISO or national standards shall apply. Where no applicable standards exist, procedures can be carried out where possible in accordance with draft standards or industry best practice guidelines.

Methods applicable to determine the biomass fraction in a fuel could range from the manual sorting of components of mixed materials, to differential methods determining heating values of a binary mixture and its two pure components to an isotopic analysis of Carbon 14 – depending on the specific nature of the respective fuel mixture.

The laboratory to determine the biomass fraction must be accredited according to EN ISO 17025 ("General requirements for the competence of testing and calibration laboratories")

The determination of the biomass fraction in batches of materials shall follow generally accepted practice for representative sampling. The operator shall provide evidence that the derived values are representative and free of bias.

The respective value shall be used only for the batch of material for which it was intended to be representative.

The full documentation of the procedures used in the respective laboratory for the determination of the biomass fraction and the full set of results shall be retained and made available to the verifier of the emissions report.

If the determination of the biomass fraction in a mixed fuel is technically not feasible or would lead to unreasonably high costs the operator shall assume a 0% biomass share, i.e. complete fossil origin of all carbon in that particular fuel."

This methodology places the responsibility for finding an adequate measurement on the emitter providing a QA framework is followed for the sampling and testing.

[50] Guidelines for the monitoring and reporting of GHG emissions pursuant to Directive 2003/87/EC of the European Parliament 2004/156/EC.

7.4 Appendix 4: Note on definition of Renewable Source Electricity for CCL purposes

Taxable commodities for the purposes of the Climate Change Levy (CCL) are as follows:

- Electricity
- Natural gas
- Petroleum and hydrocarbon gases in a liquid state (LPG)
- Solid carboniferous fuels (i.e. coal, lignite, coke, petroleum coke, etc.)

In themselves, biomass and wastes as fuels do not attract the CCL. Only where such fuels are being used to generate electricity does the status of such fuels need to be considered to determine whether the electricity is considered as being from a renewable source.

"Renewable source electricity" is exempt from the levy, and was originally defined by the Climate Change Levy (General) Regulations 2001 No.838. However, this has been subject to a number of amendments via subsequent statutory instruments. The regulations do not contain a specific list of energy sources qualifying as "renewable" in this context, however, HM Revenue and Customs have published a list in their Notice CCL1/4, which is their interpretation of SI 2001 No.838. The published list is now out of date since CCL1/4 has not been updated to take account of later statutory instruments.
The CCL1/4 list of qualifying sources, updated for more recent amendments to the regulations is as follows:

- Biomass[51]
- Wind energy
- Hydro power, excluding hydro power from plants exceeding 10MW output
- Tidal power
- Wave energy
- Photovoltaics
- Photoconversion
- Geothermal hot dry rocks
- Geothermal aquifers
- Municipal and industrial wastes[52]
- Landfill gas
- Coal mine methane[53]

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[51] Statutory Instrument 2003 No.604 The Climate Change Levy (General) (Amendment) Regulations 2003 added "biomass" as a renewable source to the original list but specifically excluded peat. Biomass is defined in SI 2003 No.604 states that " *"biomass" means fuel used in a generating station of which at least 98% of the energy content is derived from plant or animal matter, or substances derived directly or indirectly therefrom (whether or not such matter or substances are waste) and includes agricultural, forestry or wood wastes as residues, sewage and energy crops* ". This may be updated in the light of the up coming changes to the RO.

[52] Paragraph 47 of SI 2001 No.838 defines the eligibility of **municipal and industrial wastes** with the presumption that only 50% of the energy output is deemed renewable (i.e. not more than 50% of the energy content of the waste is derived from fossil fuel). Generators can make a case to the relevant authority (OFGEM in Great Britain and OFREG in NI) that the station has more than 50% of its input fuel's energy content from non-fossil fuel sources. Where the relevant authority determines that more than 98% of the input fuel is from plant or animal sources the fuel will be considered to be fuelled 100% by renewable energy.

[53] Statutory Instrument 2003 No.2622 (C. 99) provides for **coal mine methane** to be regarded as a renewable source for the purposes of climate change levy.

7.5 Appendix 5: Environment Agency Protocol For The Burning Of Biomass Fuels In Power Stations

Environment Agency Work Instruction

Protocol For The Burning Of Biomass Fuels In Power Stations

Number:	177_04	**Status:**	Version 1	**Issue Date:**	31/03/04	**Review Date:**	01/04/05

Document Owner:	Chris McDonald	**Post:**	Technical Manager: Fuel Power and Metals
Document Author:	Richard Chase	**Post:**	Technical Adviser: Fuel Power and Metals
Primary Contact:	Richard Chase	**Post:**	Technical Adviser: Fuel Power and Metals

Approved by: (as set out in Schedule B of the NFSoD)	John Collins Martin Bigg	**Post:**	PIR Process Manager Head of PIR

Purpose:	To ensure consistent and appropriate application of Policy 205_01 to requests from operators of coal and oil fired power stations to substitute coal and oil with biomass materials.
Scope:	This Protocol should be applied by Agency staff regulating coal and oil-fired combustion processes under Part I of EPA90 and the PPC Regulations. It has been agreed with the Electricity Supply Industry's Joint Environment Programme. The Protocol should not be applied in circumstances where other existing Agency policy or guidance should be used e.g. Substitute Fuels Protocol (SFP).
Related Documents:	**Dealing with Applications made under EPA'90 and the PPC Regulations requesting permission to burn or otherwise subject to heat substitute materials** http://146.213.80.51/icontent/DocDir47/heat_substitute_materials_policy.doc **Large Combustion Plant Directive 2001/80/EC** http://europa.eu.int/eur-lex/pri/en/oj/dat/2001/l_309/l_30920011127en00010021.pdf **Waste Incineration Directive 2000/76/EC** http://europa.eu.int/comm/environment/wasteinc/newdir/2000-76_en.pdf **Pollution Prevention and Control Regulations SI 2000/1973** http://www.legislation.hmso.gov.uk/si/si2000/20001973.htm **Environmental Protection Act 1990** http://www.hmso.gov.uk/acts/acts1990/Ukpga_19900043_en_1.htm

If you have any queries relating to the content of this document, please contact the Primary Contact named above. If you have any suggestions for improvements, please contact the Document Owner.

If any term or acronym used in this document is unfamiliar you might find the definition in the Glossary, on the Agency's Intranet site:
Information Resources > Glossary of Terms and Acronyms.

Background

1) The operators of a number of power stations have expressed an interest in burning substitute fuels as part of their usual fuel mix. The protocol outlined here refers to the use of biomass under such circumstances.

Biomass fuels- Definition

2) The use of biomass fuels is largely due to the requirement for electricity producers to meet their Renewables Obligation. For the purposes of this protocol, a biomass is a material as defined by Article 2.11 of the revised Large Combustion Plants Directive – revised LCPD(2001/80/EC). It

should be noted that these materials are also excluded by Article 2.2(a) from the requirements of the Waste Incineration Directive(2000/76/EC). Details of these materials are attached.

Applications to burn Biomass

3) The initial application to burn biomass must contain detailed specifications of the physical and chemical properties of the biomass to be burned.
4) A trial of the burning of the biomass for the first time must always be undertaken before the Agency will consider its continuous burning.
5) The initial trial must represent, as closely as possible, the conditions proposed for the continuous burning of the biomass.
6) The initial trial should consider, as a minimum, the criteria attached at Annex A. Measurements of these criteria should be undertaken where technically appropriate, unless other methods are agreed in advance with the Agency.
7) Use of the biomass must cease at the end of the initial trial and the operator must submit a report of the trial to the Agency following the completion of the trial within a period agreed with the Agency(normally 28 days).
8) The Agency will assess the report and, within 28 days of receipt, notify the operator in writing whether or not the continuous burning of the biomass may recommence. If the burning is not to recommence, the Agency will provide the reasons.
9) Should the operator wish to substitute other biomass materials which are similar in chemical and physical properties to the original biomass substituted, an evaluation exercise must first be undertaken. The evaluation exercise is intended to be less onerous than a full trial and demonstrate that the plant can process the subsequent biomass material safely, efficiently and effectively.
10) Operators will notify the Agency in writing that they intend to burn biomass similar to that trialled, at least one week prior to undertaking such an evaluation.
11) The operator will submit a report of the evaluation exercise to the Agency within 28 days of its completion.
12) The operator may continue to burn the biomass immediately following the evaluation exercise unless the Agency requires its cessation.
13) It should be noted that the substitution rate (based on heat input) would not normally exceed that for the trial except where the operator can demonstrate, by extrapolation of trial data and through an evaluation exercise, that higher substitution rates are acceptable.
14) Where an operator wishes to exceed the throughput achieved during the trial (based on heat input) and is unable to demonstrate that the higher substitution rates are acceptable by the methods outlined in 13) above, then a further trial should be undertaken.
15) If the biomass substituted has significantly different physical or chemical properties to the original biomass trialled then a further trial will be required.
16) A successful biomass trial on one unit of a station would enable that biomass to be burnt at other, similarly designed, units at that station without additional trials.

DEFINITION OF "BIOMASS"

1) Article 2.11 of the revised LCPD(2001/80/EC) states that:

> ***"Biomass" means*** *products consisting of any whole or part of a vegetable matter from agriculture or forestry which can be used as a fuel for the purpose of recovering its energy content and the following waste used as a fuel:*
> *a) Vegetable waste from agriculture and forestry;*
> *b) Vegetable waste from the food processing industry, if the heat generated is recovered;*
> *c) Fibrous vegetable waste from virgin pulp production and the production of paper from pulp, if it is co-incinerated at the place of production and the heat generated is recovered;*
> *d) Cork waste;*
> *e) Wood waste with the exception of wood waste which may contain halogenated organic compounds or heavy metals as a result of treatment with wood preservatives or coating, and which includes in particular such wood waste originating from construction and demolition waste.*

2) Article 2.2(a) of the Waste Incineration Directive(2000/76/EC) excludes those products listed above from the requirements.

Annex A - Minimum Assessment Criteria for Biomass Fuels in Power Station Trials

Aspect	Consideration
Releases to Air	Sulphur dioxide
	Oxides of nitrogen
	Hydrogen chloride
	Hydrogen fluoride
	Particulate Matter(total and PM10)
	Heavy metals
	Dioxins and furans
	Total organic carbon
	Carbon monoxide
	PAHs
Releases to Water	Metals
	Chloride
	Free chlorine
	Suspended solids
	pH
Releases to land	pH
	Leachability
Other Aspects	Receipt storage and handling of substitute material
	Mill performance
	Burner performance and flame stability
	Boiler performance and slagging and fouling
	Electrostatic precipitator performance
	Ash handling
	Overall efficiency
	Plant degradation
	CEM performance
	Ash waste status and by-product saleability
	Odour assessment
	Review of operating procedures
	Review of BATNEEC/BPEO assessment

7.6 Appendix 6: Environment Agency Heat Substitution Policy

ENVIRONMENT AGENCY POLICY

Dealing with Applications made under EPA'90 and the PPC Regulations requesting permission to burn or otherwise subject to heat substitute materials

Policy Number: 205_01

Policy Statement:

This policy applies to decisions, made under Part I of EPA'90[1] and the PPC Regulations[2]. The policy applies to processes involving combustion/gasification/pyrolysis, where conventional feedstocks or fuels are being substituted[3] by other materials and their use is not specifically approved in a current authorisation/permit. The policy is designed to ensure that applications requesting permission to burn or otherwise subject to heat these substitute materials are dealt with in a consistent but proportionate manner. The policy does not apply in circumstances where existing Agency policy or guidance should be used e.g. Substitute Fuels Protocol[4] (SFP).

1. The Officer shall notify Head Office/Region that such an application has been received if there are National/Regional implications;
2. The Officer shall refer to the requirements of any Agency guidance that may be relevant to the application e.g. Substitute Fuels Protocol;
3. In certain cases, where the applicant's site is the subject of a high level of public interest, wider consultation may be required. The need for such consultation shall be determined at Area/Regional level;
4. The Officer shall require the Operator to conduct trials prior to permitting continuous use of the substitute material unless the Operator's authorisation/permit already allows for the use of such materials or the Operator can justify, in writing, that such trials are not necessary;
5. Trials shall only be authorised through the issuing of a Variation Notice, provided:
   - the change warrants such a Notice, as specified in the relevant legislation;

   or
   - such a trial has not been previously authorised.
6. The Officer shall require the Operator, through any Variation Notice (or in writing if a Variation Notice is not required) to submit a full report of the results of the trial. This should include, for example,
   - A comparison of the monitoring results when using substitute and conventional materials, where such information for the latter is available,
   - an assessment of the impact on local air quality,
   - a BPEO assessment, using Agency methodology or similar;
7. In some circumstances the Officer should consider whether to undertake consultation on the findings of any trial e.g. if there is public concern over the trial. In such instances the Officer shall consider requiring the Operator to cease using the substitute material during the assessment of the report of the trial;
8. Only authorise/permit the continuous use of the substitute material once the Agency is satisfied that this represents BATNEEC/BAT for that process/installation;
9. If acceptable, only give approval in writing or through a Variation Notice for continuous use. Any decision not to use a Variation Notice should be justified in the Decision Document;
10. Produce a Decision Document[5] that follows the Agency's agreed structure.
11. As required by the NFSoD, the Decision Document as well as any Variation Notice

allowing the trials, shall be submitted to Head Office / Region and Legal functions for approval. **Objectives:** To ensure that all applications requesting permission to use substitute material in a process in which they will be subject to heat are determined in a consistent, but proportionate manner.		
Policy Author: Dr N H Davies, PIR Policy Manager		
Policy Sponsor: Dr M G Bigg, Head of Process Industries Regulation		
Signature of Authorisation **By Policy Sponsor:**		
Version: 5	**Date:** 8-3-01	**Available from:** (e.g. Intranet location)

EXPLANATORY NOTE

Dealing with Applications made under EPA'90 and the PPC Regulations requesting permission to burn or otherwise subject to heat substitute materials

Policy Number: 205_01

Background

The Agency receives many applications from Operators requesting permission to use substitute materials in their processes. In some cases this involves the substitute material being burned e.g. as a fuel, or otherwise subjected to heat. Use of such materials often raises concerns with the public. In some instances the Agency has laid down guidance to its staff to ensure that applications are determined in a way that is both technically robust and allows for wider consultation e.g. the Substitute Fuels Protocol.

It is important that, when dealing with such requests from Operators, the Agency adopts, wherever possible, a consistent but proportionate approach during the determination.

Desired Outcomes

- Head Office/Regions aware when applications are submitted requesting permission to burn or otherwise subject to heat substitute materials in an authorised/permitted process.
- All such applications are subject to a consistent, but proportionate, assessment procedure by the Agency.
- Decision Documents are produced and agreed, along with the Variation Notice, by Head Office/Region Policy and Legal Functions.

Audience

All staff within the PIR, Waste Regulation and Legal Functions

References

- [1]Environmental Protection Act 1990
- [2]Pollution Prevention and Control Regulations 2000
- [3]Substitute Fuels Protocol for Cement and Lime Kilns
- [4]Substitute material is any material, which is proposed to replace conventional feedstock/fuels e.g. tyres as feedstock.
- [5]Decision Document structure for decisions under Part I of EPA '90 and PPC Regulations.

7.7 Appendix 7: The basic principles of the Kyoto protocol

The basic principles of the Kyoto protocol

Extracts from the UNFCCC web site: http://unfccc.int/essential_background/kyoto_protocol/items/3145.php

To achieve their targets, Annex I Parties must put in place domestic policies and measures. The Protocol provides an indicative list of policies and measures that might help mitigate climate change and promote sustainable development.

Parties may offset their emissions by increasing the amount of greenhouse gases removed from the atmosphere by so-called carbon "sinks" in the land use, land-use change and forestry (LULUCF) sector. Eligible activities are: afforestation, reforestation and deforestation and forest management, cropland management, grazing land management and revegetation. Greenhouse gases removed from the atmosphere through eligible sink activities generate credits known as removal units (RMUs). Any greenhouse gas emissions from eligible activities, in turn, must be offset by greater emission cuts or removals elsewhere.

The Protocol also establishes three innovative "mechanisms" known as joint implementation, the clean development mechanism and emissions trading. These are designed to help Annex I Parties cut the cost of meeting their emissions targets by taking advantage of opportunities to reduce emissions, or increase greenhouse gas removals, that cost less in other countries than at home.

Under the clean development mechanism (CDM), Annex I Parties may implement projects in non-Annex I Parties that reduce emissions and use the resulting certified emission reductions (CERs) to help meet their own targets. The CDM also aims to help non-Annex I Parties achieve sustainable development and contribute to the ultimate objective of the Convention.

Under joint implementation, an Annex I Party may implement a project that reduces emissions (e.g. an energy efficiency scheme) or increases removals by sinks (e.g. a reforestation project) in the territory of another Annex I Party, and count the resulting emission reduction units (ERUs) against its own target. In practice, joint implementation projects are most likely to take place in EITs[54], where there tends to be more scope for cutting emissions at low cost.

Under emissions trading, an Annex I Party may transfer some of the emissions under its assigned amount, known as assigned amount units (AAUs), to another Annex I Party that finds it relatively more difficult to meet its emissions target. It may also transfer CERs, ERUs or RMUs that it has acquired through the CDM, joint implementation or sink activities in the same way. In order to address the concern that some countries could "over-sell" and then be unable to meet their own targets, the Protocol rulebook requires Annex I Parties to hold a minimum level of AAUs, CERs, ERUs and/or RMUs in a commitment period reserve that cannot be traded.

Annex I Parties will submit annual emission inventories and regular national communications under the Protocol, both of which will be subject to in-depth review by expert review teams. Expert review teams have the mandate to highlight potential compliance problems – known as questions of implementation – that they find, and to refer these to the Compliance Committee if Parties fail to address them. Parties must also establish and maintain a national registry to track and record transactions under the mechanisms. As an added monitoring tool, the secretariat will keep an independent transaction log to ensure that accurate records are maintained. It will also publish an annual compilation and accounting report of each Party's emissions and its transactions over the year. All information, except that designated as confidential, will be made available to the public.

If a Party fails to meet its emissions target, it must make up the difference in the second commitment period, plus a penalty of 30%. It must also develop a compliance action plan, and its eligibility to "sell" under emissions trading will be suspended.

[54] EIT – Economies in transition.