

Introduction to bioenergy and waste incineration in the Renewables Obligation

Note: A DECC Consultation on changes to the Renewables Obligation banding (i.e. changes to which types of energy classed as renewable should attract which level of subsidies) has been published and runs until 12th January 2012. The consultation paper can be downloaded from

www.decc.gov.uk/en/content/cms/consultations/cons_ro_review/cons_ro_review.aspx . For a guide to how to respond to proposals on future subsidies for electricity (Renewable Obligation Certificates or ROCs) for bioenergy and waste, see www.biofuelwatch.org.uk/2011/rocs_introduction/ . For a discussion of the impacts of ROCs for bioenergy and waste, see www.biofuelwatch.org.uk/2011/rocs_impacts .

What is the Renewables Obligation?

This paper relates to England and Wales only. At present, the rules on the Renewables Obligation are identical in Scotland and England/Wales, but the Scottish Government has proposed different changes and is consulting on those. For a briefing about the position in Scotland, please see www.biofuelwatch.org.uk/2011/rocs_introduction_scotland¹.

The Renewables Obligation is the main subsidy scheme for electricity from energy classed as renewable. It sets a minimum level of renewable electricity - 12.4% at present - which energy companies must supply and which rises every year. Companies receive subsidies in the form of Renewable Obligation Certificates (ROCs) for every megawatt hour of renewable electricity they produce. The money for this is raised through a surcharge on electricity bills. Companies which fail to reach the target have to either purchase ROCs from companies that exceeded their target or make a 'buy-out' payment. Although the overall scheme is set out in primary legislation, the Secretary of State has wide-reaching powers to decide which types of renewable energy should be eligible for which subsidies.

The EU Renewable Energy Directive requires 20% of all energy to be produced from energy classed as renewable by 2020. Different targets apply to different member states - the one for the UK is 15%. However, there is no requirement on governments such as the UK's to subsidise bioenergy or any particular type of energy classed as renewable and the target could quite legally be met through sustainable wind, solar and tidal energy.

The text in red boxes explains how the consultation proposes to make changes from the 2009 Renewable Obligation Order.

Inadequate Consultation Scope

The Consultation proposes to change some of the bandings for different types of energy classed as renewable, however the only factors actually addressed are economic/financial ones. This is despite the fact that, as the DECC website explains, the Secretary of State should consider sustainability and climate (carbon) impacts when deciding on the level of subsidies for different technologies. Yet in the consultation, no account is taken of air quality, local & global ecosystems, carbon emissions and other climate impacts, social justice & human rights or soil & water health, nor of energy efficiency (with bioenergy for electricity being particularly inefficient).

For example, the consultation states:

1 Similar legislation applies to Northern Ireland and the Northern Irish Executive is expected to launch a similar consultation to the one published by DECC in the near future.

'In order to reduce excessive impacts on consumers bills and incentivise a sufficient level of deployment, we will need to reduce rents in the current banding levels, make use of the relatively cheap co-firing and conversion technologies. By setting support for the cheapest technologies at a level that ensures high deployment, we are able to minimise the amount of generation needed from our most expensive technologies.'

Co-firing of biomass with coal is the only type of energy that is to receive even more subsidies in future than today – regardless of how dirty, high-carbon and inefficient it is.

How high are the subsidies for bioenergy?

According to Biofuelwatch calculations, currently proposed and approved biomass power stations would, if they are all built, attract over £3 billion in subsidies through ROCs every year.

The number of ROCs available and thus the level of subsidy varies according to the type of energy produced. A full list of how many ROCs are available for which type of energy is available at tinyurl.com/3pwjzr9 (Tables 1 and 2). At present

- ^ half a ROC per MWh is available to co-firing of biomass (other than 'energy crops') without CHP;
- ^ one ROC per MWh is available to: co-firing of 'energy crops', co-firing of biomass with combined heat and power, standard gasification and pyrolysis, 'energy from waste' with CHP;
- ^ 1.5 ROCs per MWh are available to: co-firing of 'energy crops' with CHP, stand-alone ('dedicated') biomass power plants;
- ^ Biogas (anaerobic digestion), 'advanced' gasification and pyrolysis, stand-alone biomass power plants with CHP, and the burning of 'energy crops' attract 2 ROCs per MWh.

Proposed biomass ROC banding from April 2013:

Co-firing or energy crop	0.5 (no change)
Co-firing with CHP or energy crops	1 (no change)
Co-firing with CHP and energy crops	1.5 (no change)
Enhanced co-firing/conversion	1 (new incentive for co-firing 15% or more biomass with coal)
Coal to biomass conversion (complete, not co-firing)	1 (1.5 at present)
Dedicated biomass (i.e. biomass only power plants)	1.5 (as at present) until April 2016, then 1.4
Dedicated biomass with CHP	2 (as at present) until April 2015, then 1.5
Energy crops burnt in dedicated biomass plants	2 (as at present) until April 2015, then 1.9 until April 2016, then 1.8
Anaerobic digestion (biogas)	2 (as at present) until April 2015, then 1.9 until April 2016, then 1.8
Energy from waste with CHP	0.5 (down from 1)
Advanced biomass and waste pyrolysis and gasification	2 (as at present) until April 2015, then 1.9 until April 2016, then 1.8
Standard biomass and waste pyrolysis and gasification	0.5 (down from 1)
Electricity from landfill gas	No future ROCs (0.25 at present)

Note:

Liquid fuels for electricity generation (bioliquids) are included in the definition of biomass above, which means that the same bandings apply, however a specific overall cap for ROCs for bioliquids is proposed. For the first time, long-term subsidies for bioliquids will be guaranteed ('grandfathered') thus stimulating investment in this market, right up to the overall cap.

Over the last year, ROCs have been trading at a value of £48.70 each on average (tinyurl.com/3apcs4j). **Companies get ROCs for all of the electricity they produced from sources classed as 'renewable' – even if they are only fulfilling their legal requirement to generate (at present) 12.4% of their overall electricity that way.** Here are some examples of how many subsidies are available to companies:

If **W4B**, who have planning permission for two biofuel power stations (Portland and Bristol) with a combined capacity of 68MW go ahead and burn palm oil in both, they would receive **£53 million in subsidies a year** through ROCs (assuming each power station will operate for 8000 hours a year and the palm oil they intend to use qualifies as an 'energy crop').

If **Forth Energy** get permission for and build the four biomass power stations which they have proposed, with a combined capacity of 540 MW, then they would get at least **£315 million a year in subsidies** (based on 1.5 ROCs per MWh). If some of the biomass comes from 'energy crops' then they will receive even more ROCs.

Drax currently receives an estimated £43 million a year for burning over 1 million tonnes of mainly imported biomass.

Main changes proposed for biomass subsidies

* For **coal to biomass conversion** current legislation provides same level of support (1.5ROCs) as a new build dedicated biomass plant. The Government are proposing to reduce this to 1 ROC/MWh. However the consultation states that the Government is still confident that at this new subsidy level investments will go ahead.

* **Bioliquids** will be grandfathered (subsidy guaranteed for a period to stimulate investors) in the same way as biomass. However, an overall cap on ROCs for bioliquids is proposed which is discussed further below.

* **Enhanced co-firing**: A significant new incentive for co-firing far more biomass with coal than at present is proposed. Co-firing up to 15% of biomass with coal will continue to attract 0.5 ROCs/MWh, but co-firing 15% or more biomass with coal (called 'enhanced co-firing') will attract double those subsidies. This is to encourage larger coal power stations to partly switch to biomass. So far, ROCs could only be claimed for co-firing up to 12.5% biomass with coal and that cap will be removed. 15% is not an unappreciable amount of biomass. Drax currently co-fires 222 MW of electricity, which is approximately 6% of generation, which equates to 1.1 million tonnes of biomass. It is clearly profitable to increase this mix from 6% to beyond 15%. Drax intend to convert 4 GW of coal to biomass and with the likes of Eon have joined forces with the REA in their Back Biomass to lobby DECC to increase subsidies for co-firing.

* For the first time, **long-term subsidies for co-firing biomass** with coal will be guaranteed ('grandfathered').

NOTE: Guarantees about long-term subsidies, called 'grandfathering' are a political commitment rather than a legal instrument. Legally, any of the rules about ROCs can be changed at any time through secondary legislation, which needs very little parliamentary time.

What is classed as Combined Heat and Power (CHP) under the Renewables Obligation?

A power station can be classed as '**CHP**' and receive a higher rate of ROCs even if it only captures a small amount of heat and if its overall efficiency is as low as 35% and efficiency savings compared to electricity-only production are only 10%. By comparison, under the EU Cogeneration Directive, power plants should achieve 70% efficiency and, furthermore, the EU

Renewable Energy Directive states that, for biomass, governments should promote efficiencies of at least 85% in the residential and commercial sectors and at least 70% for industry.

Proposed changes to CHP ROC Banding

* At present, burning biomass, including bioliquids, with CHP (whether in dedicated biomass power plants or through co-firing) attracts an additional 0.5 ROC per MWh, referred to as an 'uplift'. It is proposed that this uplift would be abolished from April 2015 because 'renewable heat' would then be subsidised through the Renewable Heat Incentive (RHI). Companies could then obtain ROCs for the electricity they produce with CHP and RHI subsidies for the heat produced by the same plant. Dedicated bioliquids and biomass (including energy crops – unchanged at 2 ROCs (including an additional 0.5 ROC referred to as 'uplift' for a plant with CHP). However, the rules would only change for power stations commissioned after April 2015 – companies could choose to keep the higher ROCs banding for CHP if their power stations are already accredited by that date. Note: This is largely a technical adjustment to account for the Renewable Heat Incentive.

* The consultation asks whether coal-to-biomass conversion and enhanced co-firing of biomass with CHP should receive uplifting after 2013 if these additional bands are introduced. Extending a CHP uplift of 0.5 ROCs to these two new bands would mean that biomass conversion with CHP and enhanced co-firing of biomass with CHP would each receive 1.5 ROCs.

* Current Renewable Obligation legislation does not include an uplift for CHP with Advanced gasification and pyrolysis from waste. The consultation asks if an uplift should be introduced for those technologies with CHP

* CHP uplift has not so far been grandfathered (guaranteed). It is proposed that CHP uplift is grandfathered from 1st April 2013.

* It is proposed that 'ordinary' waste incineration with CHP should continue to attract ROCs, albeit at half the present level.

What is the definition of 'energy crops' under the Renewables Obligation?

The term '**energy crops**' covers crops and trees grown primarily for the purpose of bioenergy. This would include short-rotation coppicing (e.g. miscanthus or willow), rapeseed oil, but also palm oil from 'younger' plantations, established for the biofuel market or imported eucalyptus from 'dedicated bioenergy plantations'. This is a special incentive for monoculture plantations in the UK and abroad. Note that energy crops currently receive the highest number of ROCs – the same as offshore wind and double the number for onshore wind power.

New Proposed Energy Crop Definition

DECC 'are proposing to narrow the definition of "energy crops" to cover only a defined list of non-food crops, and to adopt a policy of grandfathering the energy crop uplift (as amended) from 1 April 2013'. Energy crops will only include:

- short rotation coppice of the species Alder (*Alnus*), Birch (*Betula*), Hazel (*Corylus avellana*), Ash (*Fraxinus excelsior*), Lime (*Tilia cordata*), Sweet chestnut (*Castanea sativa*), Sycamore (*Acer pseudoplatanus*), Willow (*Salix*) or Poplar (*Populus*) and,
- perennial grasses of the species Miscanthus, Panicum or Phalaris

The new definition would apply to biomass burnt in existing and new power stations. Although palm oil or imported eucalyptus would no longer get an extra 0.5 ROCs per MWh, they'd still be eligible for significant ROCs for bioliquids and biomass, just not that extra premium.

Will all biofuels, biomass and biogas be subsidised, regardless of how it is produced?

Biofuels are eligible for subsidies if they comply with very minimal 'sustainability and greenhouse gas standards' set out in the EU Renewable Energy Directive. The UK Government has announced that they will introduce very similar standards for biomass and biogas, for the

purpose of ROCs. Those standards ignore, amongst other things, human rights, hunger, land rights, pesticide poisoning and many types of biodiversity destruction. The 'greenhouse gas standards' are based on an accounting methodology which has been strongly criticised by the European Environment Agency's Scientific Committee (tinyurl.com/6eucukb). Regardless of what the standards say – there is no way of verifying whether companies meet them. Whatever claims they make – and get rubber-stamped by their consultants – will not be audited independently. And standards can never address the wider global impacts caused by an unsustainable overall demand for wood, plant oil and land.

What subsidies are available for electricity from waste generation?

Waste that is at least 90% derived from "plant matter, animal matter, fungi or algae" is classed as 'biomass'. Waste that is up to 90% derived from fossil fuels is classed as 'waste'. Electricity from the latter is eligible for one ROC per MWh as long as it is produced with Combined Heat and Power (CHP) – using the very broad definition explained above. Furthermore, electricity produced from 'advanced gasification and pyrolysis' is eligible for 2 ROCs per MWh, whether it is produced from biomass or from mainly fossil-fuel origin waste. And electricity produced from standard pyrolysis or gasification, including from waste, attracts 1 ROC per MWh.

By April 2011, only two waste incinerators had received ROCs (tinyurl.com/3sxqmfj): One in Fawley (Pyros), the other in Avonmouth (Wessex Water Services) and since then a waste gasification plant on the Isle of Wight (Energos) became the first of its kind to be accredited for ROCs (tinyurl.com/5u5lhy3). However, as with biomass power stations, waste incineration companies are also likely to be waiting for a decision as to whether such plants would receive a substantial level of ROCs long-term before commissioning new ones. And several of them have expressed an interest in building CHP, pyrolysis and gasification plants.

Meantime, electricity from burning for example chemically treated waste wood, papermill sludge, chicken litter, sewage sludge and other often very toxic waste is subsidised as 'biomass'.

For more details about ROCs for waste incineration, pyrolysis and gasification, see <http://ukwin.org.uk/resources/rocs/>

Energy from Waste (EfW), Advanced Conversion Technologies (ACT)

- * Energy from 'standard incineration' will continue to be excluded from ROCs.
- * Energy from landfill gas will be excluded from ROCs in future.
- * Energy from 'standard incineration' with CHP will get 0.5 ROCs per MWh, half the current rate.
- * Energy from standard pyrolysis and gasification (waste or biomass) will get 0.5 ROCs per MWh, half the current rate.
- * Advanced gasification and pyrolysis (waste or biomass) will continue to attract 2 ROCs/MWh, although that level is to be reduced slightly in future. Note that the efficiency standards for a gasification or pyrolysis plant to qualify as 'advanced' are relatively low.

How many biofuel (bioliquid) power stations are either planned or receiving ROCs?

So far, only one biofuel power station is operating and receiving ROCs. This is an 8 MW power station by Hargreaves subsidiary Rocpower in Wakefield. Due to problems with air pollution the power station has been operating only intermittently and well below its capacity.

Four biofuel power stations have obtained planning permission, as far as Biofuelwatch is aware, and have not yet been built: A 19.5 MW one in Beckton, East London (Blue NG), a 50 MW one in Bristol (W4B), an 18.5 MW one in Portland, Dorset (W4B) and a 6 MW one in Chelveston, Northamptonshire (Chelveston Renewable Energy). Each of the four planning application listed palm oil as a possible or likely feedstock.

Four such planning applications have been rejected or withdrawn. Two applications are currently pending – one for a 7MW power station in Barnsley (Rocpower), the other for a 14MW one in Llangefni, Anglesey (EcoPellets). Three other proposals have been published but have not resulted in planning applications as yet (Blackrod/Bolton – Blue NG, North Killingholme, North Lincolnshire – Blue NG, Shoreham-on-Sea near Brighton – Edgeley Green Power).

For full details, see: www.biofuelwatch.org.uk/wp-content/uploads/Biofuel-power-stations.pdf

All planning applications for biofuel power stations have faced opposition which may be the reason why industry developments are well behind those in Italy and Germany where similar subsidies have led to very large quantities of palm oil being burned for electricity and heat. CHP plants account for nearly half of all palm oil imports by Germany. On the other hand, W4B, who have permission to build two (largely) palm oil power stations have announced that they are waiting for the government's decision on ROCs banding at the end of 2011 before starting construction.

Experiences in the Netherlands have shown that electricity from biofuels is not economically viable without subsidies: There, significant quantities of palm oil were being burnt for electricity until, in 2008, the Government changed the rules in a curb on palm oil subsidies. Today, no or virtually no biofuels are being burned for that purpose.

Bioliqids Cap

- * Due to concerns over sustainability and competition with transport fuels it is intended to set a cap on bioliqids.
- * The cap will be set at 4% of each supplier's renewables obligation, broadly equivalent to around 2TWh/yr.
- * This equates to five power stations the size of the W4B plant at Avonmouth Bristol, i.e. five 50 MW bioliqid power stations. The developer, W4B was granted planning permission for this in February, 2011 but has been waiting for the findings of this consultation regarding ROC banding before commencing building.
- * The cap equates to 110,000 hectares of new plantations if palm is the only feedstock, or more land if other types of vegetable oil are included.
- * In line with a European Commission decision, it is proposed to increase the information that must be included in the annual bioliqid sustainability audit report. However, the author of the report is selected by the generator and is not independently audited.

How many biomass power stations are either planned or receiving ROCs?

Overall, biomass accounted for 82.5% of all energy classed as renewable in the UK in 2010 (tinyurl.com/6ynxs49) and given the Governments' support for major bioenergy expansion, it is unlikely to become any less dominant in future.

At present, biomass burning accounts for just over 518 MW electricity capacity in the UK, including both dedicated biomass power stations and co-firing with biomass. This amounts to 4.3 million tonnes of biomass a year being burnt, most of it wood. The single biggest producer of biomass electricity at this time is Drax, who co-fired more than 1.1 million tonnes of mostly imported biomass last year. Drax has recently had plans for two biomass-only power stations approved which will burn just under 3 million tonnes per year.

Current biomass burning in the UK is a small fraction of what is planned and has been approved. Several of the developers have indicated that they are waiting for an announcement on future ROCs banding before starting construction.

As of September 2011 new biomass electricity capacity of 2,560 MW has been approved but not yet built. Applications for another 1,342 MW are pending and a further 1,421 MW have been proposed but are not yet in planning. Those figures only include power stations 18 MW and larger. Operating all of those power stations, including existing ones would require at least 58 million tonnes of biomass a year, of which the vast majority will be wood. That is not

counting the wood required for smaller electricity and CHP plants, nor the projected expansion in the use of wood for heating, supported by the Government's Renewable Heat Incentive. By comparison, total UK wood production is less than 9 million tonnes a year. Not surprisingly, developers and DECC expect that most of the wood will be imported.

Burning biomass instead of coal

Current proposals are likely to result in much more co-firing of biomass with coal, which is additional to the burgeoning biomass electricity power station sector and dedicated biomass combustion. This increased demand for wood is still further compounded by full conversion from coal to biomass. This year RWE was granted permission to convert its 1,131 MW (1.1 GW) coal power station at Tilbury to a 750 MW 100% biomass power station. This will be far larger than any existing biomass power station worldwide and will burn an estimated 750 million tonnes of biomass, mainly imported wood, a year.

Biomass electricity is unlikely to be viable without subsidies.

What do ROCs mean for Anaerobic Digestion (biogas)?

ROCs are available for Anaerobic Digestion regardless if the feedstock is waste, e.g. food waste, or crops grown for this purpose. Experience with similar subsidies in Germany shows that biogas from new dedicated monocultures, especially maize, are particularly likely to benefit from such generic subsidies. The vast majority of biogas in Germany is produced from energy crops and not from waste. The first UK plans for making biogas from whole maize plants have already been submitted, for example in Kenninghall in Norfolk.

ROCs for biogas could increase land use

* The current subsidy level - 2 ROCs - is to be retained until the end of March 2015, and then marginally reduced to 1.9 ROCs for new biogas digesters as well as additional capacity added in April 2015 and then to 1.8 ROCs in April 2016.

* The consultation acknowledges the concerns raised above but proposes not to address the problem. Instead the consultation offers a vague assurance to future possible action - *"If evidence shows large-scale use of crops in AD and a resulting change in land used, we will consider measures to exclude from RO support the large scale use of crops in AD"*.