CONSULTATION ON THE RENEWABLES OBLIGATION ORDER 2011

Introduction

Biofuelwatch welcomes the opportunity to comment on the proposals for ROO 2011.

We oppose the use of industrial bioenergy and regard the current policy of promoting expansion of biomass and bioliquids in the power sector as deeply flawed.

Our following comments are limited to the chapters in the consultation concerning bioenergy.

Chapter 2 BIOMASS SUSTAINABILITY

Q8 Is 60% saving the right minimum GHG emission threshold?

Comment

No, this is not the 'right' minimum GHG emission threshold to use.

It is misleading to call it a 60% saving, when the baseline figure of 713 kgCO2 per MWh being used is much higher than the current carbon intensity of the UK national grid. (537 kgCO2 per MWh)

The Committee on Climate Change has recommended that policy ensure that the overall carbon intensity of UK grid electricity reduces to approximately 200 kgCO2/MWh in 2025 and to 80 kgCO2/MWh in 2030.

In their October 2009 report, *Meeting Carbon Budgets - the need for a step change,* they reported to Government with an analysis of the policies required to reduce emissions of greenhouse gases from electricity generation, from buildings and industry, heat and transport. In Chapter 4 they said:

(p 5) The average carbon-intensity of the power sector fell from 770 gCO2/kWh in 1990 to 527 gCO2/kWh in 2005. Intensity increased to 543 gCO2/kWh in 2007 but provisional estimates suggest intensity fell to around 537 gCO2/kWh in 2008.

(p1) Introduction and key messages
In our December 2008 report, we set out a range of scenarios to meet our 80% emissions reduction target in 2050. The common theme running through these scenarios was the need for early decarbonisation of the power sector, with the application of low-carbon electricity to transport and heat. We showed therefore that the carbon intensity of power generation should decline over time, whilst at the same time electricity demand could increase (Figure 4.1).

[Figure 4.1 shows: Declining carbon-intensity and increasing generation of electricity to 2050 shows a target for carbon intensity of approximately 200 gCO2/kWh in 2025 and 80 gCO2/kWh in 2030.]

(http://downloads.theccc.org.uk/docs/21667%20CCC%20Report%20Chapter%204.pdf)

Under the proposed ROO2011 scheme, biomass electricity in the early 2020s would be able to operate with a higher carbon intensity than the expected level for the national grid as a whole. By 2025 it would be significantly worse than the national grid, acting as an impediment to the UK's achievement of carbon reductions. If no new unabated coal and gas power stations are to be permitted, in the 2020s biomass electricity would, using official DECC figures, be the dirtiest form of generation allowed, and perversely it would be supported by the RO as a renewable technology. Using either stack emissions of CO2 or life-cycle greenhouse gas figures derived from the Manomet study and the Joanneum Research study, (see later) biomass already has a carbon debt of several decades when compared to coal.

Promoting biomass power generation with a carbon intensity as high as 285 kgCO2/MWh is wholly inconsistent with the trajectory recommended by the CCC.

It is also contrary to the responsibility set out in the EU Renewable Energy Directive as follows:

> *Article 13 (6)*
>
> *In the case of biomass, Member States shall promote conversion technologies that achieve a conversion efficiency of at least 85 % for residential and commercial applications and at least 70 % for industrial applications.*

Typical biomass electricity-only power stations operate with conversion efficiencies well below 50%, and the RO does not restrict financial support to those with at least 70% efficiency. **The RO does not promote high conversion efficiency technologies.**

The ROO is a demand-led financial support scheme with no cap. It has no mechanism for taking account of the relative climate performance of the different renewable energy technologies. This is a serious omission. Because of the market distortion effect of the ROO, the UK could face the situation in the 2020s where a significant proportion of its so-called renewable generation is provided by biomass (and bioliquid). As a result the UK would have achieved a smaller reduction of overall GHG emissions as a whole at a time when decarbonisation of the grid is vital to transition sectors like transport and heat away from fossil fuels. If bioenergy GHG emissions were fully assessed and factored into national carbon accounting, the true position would be even worse.

Biomass and bioliquid electricity is clearly the worst form of so-called renewable energy when assessed by GHG emissions savings. If in striving to meet the 15% RE target for 2020, the UK installs a significant amount of biomass / bioliquid generation, the overall climate impacts could be even worse than having no Renewable Energy target at all, due to the threat to forests, other ecosystems and soils which are vital for regulating the climate.

The difficulties caused by an over-provision of biomass electricity will be felt through the 2020s and beyond.

The 'lifecycle' assessment of GHG emissions from biomass electricity used in this calculation omits several key factors and as a result underestimates its negative climate effects. These include:

- the carbon debt from burning wood which has taken many years to sequester atmospheric carbon. We are aware that some biomass electricity can be generated from 'arisings' and residues which can be obtained without tree removal although overexploitation of residues depletes soils and soil carbon and seriously harms forest regrowth and biodiversity as well as the ability of forests to store carbon. It is evident, however, that the UK's very significant expectation for biomass electricity can only be met by harvesting whole trees, which will incur a great carbon debt. Even biomass generation from Energy Crops like Short Rotation Coppiced Willow, involves an initial carbon debt which can be significant.

- the additional climate warming effect caused by reduction of snow albedo through atmospheric black carbon and soot emitted when biomass is burnt. This effect was described by James Hansen and others in 2003, and by Mark Jacobson in August 2010. The UNECE has called for urgent action to reduce black carbon emissions.

- the indirect climate impacts, such as deforestation and grassland destruction particularly in the global South, the high GHG emissions from agro-chemical use associated with tree plantations.

Further discussion of these points is in our response to Question 15.

Finally, we believe a full assessment of the climate impacts of bioenergy must take into account the opportunity cost incurred when forest and other eco-systems are not allowed to regenerate. Possible longer term future carbon sequestration in mature forests is prevented when forests are destroyed to grow energy crops.

Summary. We do not believe that biomass electricity should be promoted at all. It is not feasible to set enforceable sustainability criteria and meaningful climate impact measurements. It is better to scrap biomass electricity than to persist with the fiction that it can be done sustainably. Scale is needed to bring down costs, and scale is impossible without unacceptable impacts.

If adopted to anything like the levels suggested, biomass electricity will slow or prevent rather than accelerate UK progress to a de-carbonised electricity grid and hence to meeting statutory carbon emissions savings required under the Climate Change Act.

Q9 Do you agree that the sustainability criteria restricting the types of land used should b consistent wit the criteria imposed on bioliquids by the RED?

Comment:

Biofuelwatch believes the sustainability criteria proposed for both biomass and bioliquids are inherently flawed. Our arguments are given in our response to Question 15.

Q10 Do you agree that generators over 50kW should be required to report etc

Comment:

Not relevant since we believe there should be no subsidies and therefore no need for sustainability criteria and associated reporting.

Q11 do you agree that for biomass generators of 1MW and above there should be a transition period of mandatory reporting etc

Comment:

Not relevant since we believe there should be no subsidies and therefore no need for sustainability criteria and associated reporting.

Q12 Do you agree that for biomass generators below 1MW compliance with the sustainability criteria should not be linked to the receipt of ROCs?

Comment:

Not relevant since we believe there should be no subsidies and therefore no need for sustainability criteria and associated reporting.

Q13 Do you agree with the exclusion of waste and sewage gas etc?

No comment

Q14 Do you consider that sustainable forestry management practices should be a mandatory part of the criteria or addressed in guidance? etc

Comment:

Imposing sustainable forestry management practices only has relevance if the total volume of biomass material at UK, EU and global level, can be taken sustainably. Assessing this is evidently very difficult and the precautionary principle ought to be applied.

The term ‘sustainable forest management’ is deeply flawed because it is used to describe industrial logging and industrial tree plantations which are inherently unsustainable.

In addition and most importantly, it is no use proposing forestry management practices if these cannot realistically be enforced. DECC has stated recently in their defence of a judicial review application (Helius Energy, Avonmouth) that the UK has no jurisdiction over forestry production in other countries:

“The biomass fuel needed for this and many other installations is likely to come from outside the UK. The UK government has no way of imposing, or enforcing, a standard for ‘sustainability’ on forestry operations in other EU Member States or third countries, and to do so could involve an unlawful restraint on trade.”

(THE QUEEN on the application of COEDBACH ACTION TEAM LIMITED
-v-
THE SECRETARY OF STATE FOR ENERGY AND CLIMATE CHANGE

CO/7004/2010)

Proposing sustainability criteria as part of a scheme to stimulate bio-energy is pointless if in the courts, the UK Government will assert that it is impossible to ensure that such criteria are met, and would be contrary to international trade legislation.

See also our responses to Question 15.

Q15 Do you have any other comments on the proposals in this chapter?

Comment:

The consultation proposes a method for assuring biomass sustainability through self-reporting of some aspects of the fuel supply chain. Biofuelwatch believes that:

1. the sustainability criteria approach is flawed: Not only are the criteria incomplete, they fail to take account of important 'collateral' effects of biomass production and combustion, they do not address demand, they cannot address indirect impacts, certification is unenforceable and will be used to greenwash industrial tree plantations and industrial logging that are inherently unsustainable

2. self-reporting is an implausible way to monitor against the criteria given the high reliance on imports, and the rapid expansion of global trade in biomass. It is simply not credible to expect a biomass certification scheme to succeed when there are major problems with existing certification schemes such as the FSC and PEFC

3. in any case with the volumes of biomass being considered, the wider environmental, economic and social impacts are so significant that the proposals could never achieve 'sustainability'

Our greatest concern is that the fast-growing demand for bioenergy in the UK and elsewhere in Europe is an unsustainable demand which, directly and indirectly, will lead to tree plantation expansion and more destructive logging, much of it in the global South.

Sustainability and greenhouse gas standards are a misguided approach which cannot and will not prevent serious negative impacts on the climate, on forests and grasslands, on forest-dependent peoples and other communities who will be affected by tree plantations and logging, and on UK communities who will be affected by more harmful air pollution.

A list published in The UK Renewable Energy Strategy 2009 included these points at p113:

"We consider that efficient and effective international sustainability criteria for solid biomass should include the following features:

• It should not lead to the degradation of natural or semi-natural ecosystems/habitats, to indirect land use change or to net biodiversity loss;

• Sustainability criteria should be subject to review so as to ensure there are no perverse outcomes, such as on food prices or land use, to promote continued development in best practice and continued greenhouse gas savings."

These desired features are not carried forward into the ROO 2011 proposals. The expansion of bio-energy envisaged cannot happen without degrading natural or semi natural ecosystems and habitats, without indirect land-use change or net biodiversity loss. In fact indirect land-use change is acknowledged in the consultation document as a factor that will need to be taken into account in assessing the performance of bioenergy (para 55).

The second point – reviewing the sustainability criteria in the light of evidence - is not mentioned at all in the ROO 2011 proposals.

Volume of biomass and level of imports

The 2009 Renewable Energy Strategy proposed a large increase in biomass energy and acknowledged that UK indigenous sources would be unable to meet the suggested level of consumption. Although in the subsequent NREAP, UK Govt was unable to offer any indication of the levels of imports:

"Our research looked at the potential supply of imports to 2020 and beyond. The analysis showed that the amount of global woody biomass resource could potentially be very large. This is based on the assumption that they are grown predominantly on abandoned agricultural land, with demands for land for food and for first generation biofuels feedstocks being supplied first. Achieving this potential would rely on a swift increase in energy crop planting. We have not estimated what proportion of bioenergy output will be from domestic sources and what proportion will be from imports."

"The analysis considered that biomass, specifically woody biomass, will increasingly become a globally traded commodity. Imported biomass products are likely to continue to play a role in the UK's use of bioenergy. We estimate that the global availability of biomass, taking into account sustainability constraints, is potentially some 55,00TWh per year by 2020."

The NREAP pointed to a swift increase in Energy Crop planting but current proposals for large biomass electricity generation are primarily based on imports of wood fuel from mature trees, not from Energy Crops. ConFor's assessment (see below) based on dialogue with the biomass generators found that there was actually little interest in using Short Rotation Coppice woodfuel:

"Some existing energy plants have indicated that they will take SRC material if it is available e.g. E.ON at Lockerbie, Wilton 10 and Drax. None of the existing or planned energy plants with generating capacity of 5MW or more included in this survey are expecting to depend on SRC crops as a base load fuel source over the next 15 years."

The poor economics of SRC compared with biomass from forests are confirmed in a statement from the Biomass Energy Centre website:

"In countries with large areas of existing forest and woodland there tends to be little interest in establishing dedicated energy crops. This is because although conventional forestry produces much lower levels of biomass output per hectare compared to many energy crops, the cost of producing each tonne of biomass in the forest are also significantly lower. Consequently there is little attraction in establishing energy crops on high quality agricultural land."

www.biomassenergycentre.org.uk/portal/page?_pageid=75,17301&_dad=portal&_schema=PORTAL

Since imported biomass from trees and residues is cheaper than home-grown SRC biomass, and is already available, generators will prefer that source of supply.

Even in the UK, more tree and 'energy crop' plantations will have disastrous impacts on biodiversity, potentially reduce food production (in Scotland, the Forestry Commission is acquiring good farmland in the Lowlands for this purpose) Plantations are likely to have seriously negative climate impacts by destroying native ecosystems, potentially including peatlands, moorlands, heathlands, and forests,

Large electricity generators need long-term fuel supply contracts in order to secure financing. Given the already tight supply situation in the UK, such contracts must inevitably look to imports from areas where there are established forests / plantations or where tree plantations grow fastest, which is in the tropics and subtropics. Proposals for possible future plantings of Energy Crops do not provide adequate security for financiers.

The response to the RES and RO 2009 banding has been a large number of proposals for medium-large biomass generation schemes of which a significant proportion is designed to use only bulk supplies of imported wood. Supplies are intended to come from as far as North & South America, and Africa.

Poyry/McKinsey has estimated that current proposals in the UK for biomass power will consume at least 35 million tonnes of wood per annum (tinyurl.com/39t7von). This level of consumption dwarfs the UK's production capacity and has led UK users of wood for construction and furniture etc to express concerns that their raw materials will be subject to significant supply and price pressures.

ConFor's April 2010 report - Wood Fibre Availability and Demand in Britain, 2007-2025, by John Clegg Consulting Ltd – has shown that there is **no** large resource of untapped woody biomass in the UK that could sustain any significant expansion of large biomass power generation. The Clegg report conservatively estimates 30 million tonnes additional demand for biomass. Total UK wood production is currently about 10 million tonnes.

The Forestry Commission's Woodfuel Strategy aims to develop an additional 2 million tonnes of biomass per year, though we have serious concerns over the impacts of greater deadwood, whole tree and even stump removal on biodiversity, forest carbon storage, forest soils and their ability to support trees in future, as well as about the likely expansion of tree plantations in the UK. Two million tonnes, however, does not even meet one third of biomass capacity planned by just one large generator - Drax.

ConFor estimated that imports at the level indicated to satisfy UK bio-energy aspirations would almost double the present global trade in wood pellets and chips.

To conclude – it is evident that the vast bulk of planned biomass burning for electricity implied by the UK RES and UK NREAP will have to be supplied by imports. This has major implications for sustainability. At a global level our current demand for wood is already highly unsustainable so any increase in the demand to provide bioenergy can never be sustainable.

Given the legal position of DECC that global free trade obligations restrict the UK's capability to monitor and control overseas production of biomass, Biofuelwatch has serious reservations that the proposals for sustainability – even in the limited and inadequate form they are advanced in the ROO2011 consultation – can ever be achieved.

Wider effects of this expansion of wood imports

The proposed UK expansion of biomass usage should be seen in the context of the global market for timber. The UNECE reported in August this year:

"The only segment of the [wood] market that grew in 2009 was wood used for energy (graph 4). Government policies to mitigate climate change and to improve energy security boosted renewable energy sources, of which wood is the key component. In the European Union, wood accounts for more than 50% of renewable energy sources. Incentives to promote wood energy have intensified competition for wood supplies. Demand for wood began to increase in early 2010, and in combination with the record low harvests, roundwood prices rose."

"Forest products markets are now global, as illustrated by China's meteoric rise over the past decade to become a major producer, consumer and trader of wood and paper products (graph 5). China has competed successfully on price and quality to seize market share from former leaders, such as Italy for furniture. However, to take advantage of lower manufacturing costs and to maintain competitiveness, UNECE region companies are now increasingly investing in production facilities in other countries in southeast Asia and South America."

In simple terms, there is already a global land grab to secure future supplies of wood for construction, paper/pulp and furniture and now for energy. See www.pulpmillwatch.org for example – a five fold global capacity increase was planned and under way before the financial crisis. A UK biomass strategy reliant on a near doubling of global wood pellet and wood chip production in the next few years will only exacerbate this, with all the consequential sustainability impacts and uncertainties.

As Europe and the UK use an ever-greater proportion of their own wood for bioenergy, wood imports for other markets increase. The direct and indirect impacts on land-use change, biodiversity and climate are likely to be similarly deleterious as those of bioliquid fuels, with the additional likelihood of greater forest degradation.

The expansion of wood-based bioenergy is already leading to an expansion of monoculture tree plantations, for example in West Papua, where Medco holds a concession for converting a large area of rainforest to dedicated tree plantations for woodchips and wood pellets for export, and in Brazil, where eucalyptus plantations are being expanded rapidly, at the expense of highly biodiverse and carbon-rich wooded savannah. Tree plantations for biomass exports to Europe are being established in the Republic of Congo.

In many parts of Scandinavia, old growth forest logging and other highly destructive logging has been documented and appears to be accelerating, due to attempts to 'harvest' ever more wood, not least for bioenergy. A letter signed by over 200 scientists worldwide as well as by thousands of individuals and many groups warns against the destruction of the last of Sweden's old-growth forests and states: "The Swedish Government and the Swedish Forest Industries Federation advocate further forestry intensification, with methods such as stump extraction, increased use of non-native tree species, restoration of ditches, and fertilization, which threaten the biodiversity even more." (http://protecttheforest.se/upprop/en).

In 2007 an Open Letter against the destruction of old-growth forests in Northern Finland was signed by 257 researchers who said: *" ...it can be reasonably stated that logging of natural forests causes irreversible change of habitat, and destroys an important part of our national heritage as well as genetic and species diversity. As a result, present and intended loggings in forested Lapland...are unsustainable and in obvious conflict with the biological diversity conservation agreements to which Finland is committed.*" The letter also warned that logging practices are seriously affecting the livelihood of the indigenous Sami people in Lapland (tinyurl.com/2veoj9b).

A study by Marshall Wise et al showed that carbon reduction policies which only account for fossil carbon will result in all natural forests and virtually all natural grasslands being destroyed by 2065

(www.sciencemag.org/cgi/content/abstract/324/5931/1183).

Another recent study by Robert McDonald et al shows that burning energy crops for electricity is the most inefficient use of land, requiring 2,844 – 4,294 km2/GW, more than any other type of electricity generation. By comparison, onshore wind requires 199-243 km2/GW, solar thermal 26-52 km2/GW and solar PV 52-130 km2/GW.

(www.plosone.org/article/info:doi/10.1371/journal.pone.0006802).

Subsidies for bioenergy lead to maximum land conversion and thus ecosystem destruction compared to other forms of renewable energy.

Monitoring and certification

A stretched international supply chain is virtually impossible to monitor or control. The experience with timber extraction for construction, furniture and paper production bears this out. It has been necessary for the EU to legislate this year to ban imports of illegally harvested timber even though voluntary certification schemes run by the FSC and PEFC have been in operation for many years. It is implausible that illegally harvested timber will not find its way into the biomass supply chain, as demand is stimulated by renewable energy financial incentives.

We believe that the concept of illegal timber is not very meaningful anyway. In Indonesia for example, what distinguishes legal from illegal timber is often just whether companies have paid for a logging licence - impacts on forests and communities are ignored.

A significant proportion biomass imports are likely to come from countries where governance arrangements are weak. An example is given in the Environmental

Investigation Agency report , 'UP FOR GRABS - Deforestation and Exploitation in Papua's Plantations Boom':

"Between 2000 and 2005 massive illegal logging and timber smuggling activities focusing on merbau timber in Papua led to 300,000 cubic metres of logs flowing unimpeded to China every month for the flooring sector. This was a billion dollar a year racket coordinated by international criminal syndicates facilitated by corrupt officials and security apparatus at the highest levels. In Indonesia commercial stocks of merbau are only found in Papua. Papuans were being robbed, typically receiving just US$ 10 for timber fetching over US$250 in China and sold as flooring for US$2,288 in the EU."

(http://www.eia-international.org/files/news566-1.pdf)

The 2010 "Report from the Commission to the Council and the European Parliament on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling" commented in relation to certain countries outside the EU, that:

"At a global level, deforestation and forest degradation continue...Among the root causes for deforestation and forest degradation are weak governance structures for forest conservation and sustainable management of forest resources, in particular in developing countries. A large number of countries are party to intergovernmental initiatives to put in place criteria and indicators to monitor sustainable forest management, but they are not entirely based on common principles and criteria and do not have a mechanism for verifying compliance with the agreed principles."

Primary forests logged industrially for the first time - certified or otherwise - are destroyed and what remains is permanently ecologically damaged. Logged primary forests' carbon stores, biodiversity and ecosystems will never be the same. Selectively logged rainforests become fragmented, burn more and are prone to deforestation.

Finally, we refer again to the statement by a DECC official that monitoring and controlling the sustainability of overseas forestry operations is outside the power of the UK:

"The UK government has no way of imposing, or enforcing, a standard for 'sustainability' on forestry operations in other EU Member States or third countries, and to do so could involve an unlawful restraint on trade."

Social impacts in producing countries

The proposed sustainability criteria ignore human rights, land rights, hunger and malnutrition, pesticide poisoning and all other impacts on people in producing countries.

They have been condemned by hundreds of civil society organisations, many of them from the global South. Forest-dependent people and other communities will be seriously affected by greater industrial logging and by tree plantation expansion.

New plantation concessions are already being granted, for example in Brazil, Guyana, Republic of Congo and West Papua. In West Papua, Medco has been granted a large concession for rainforest land to establish plantations for bioenergy

woodchips and pellets for export. In Brazil, Suzano Papel e Celulose is investing $1.3 billion in the production of wood pellets from eucalyptus for export to Europe. They have recently signed a Memorandum of Understanding for the supply of pellets to MGT Power, whose plans for a 295 MW biomass power station in Teesside have been approved and who are planning a similar power station in Tyneside.

Suzano is heavily involved in the development and promotion of Genetically Engineered eucalyptus. The wood is expected to come from Piaui, where the last remnants of the Atlantic Forests are being destroyed for eucalyptus and other plantations. Suzano and other Brazilian plantation companies have been denounced by civil society groups in Brazil for evicting indigenous peoples, Afro-descendent people and peasants (tinyurl.com/3x5jr8x).

Human rights abuses, including evictions and pesticide poisoning, slave-like working conditions, more hunger and malnutrition as people are displaced from their land, forests and pasture are turned into plantations – those realities of tree plantations will be entirely ignored under the proposed ROO 2011 sustainability criteria.

Black Carbon and soot

Black Carbon is considered by some scientists to be the second largest contributor to global warming after CO_2. Yet the biomass sustainability criteria and the carbon saving threshold proposed in ROO 2011 do not attempt to deal with the issue or apply any factor to allow for this deleterious impact of burning biomass.

Joan Ruddock MP as Energy Minister in the last government stated in November 2009: *"Specific estimates of black carbon emission have not been made in support of the development of the Renewable Energy Strategy*" (Written Answer, 24.11.09, col. 81W).

The UN's Economic Commission for Europe found that, *"Urgent action to decrease (black carbon) concentrations in the atmosphere would provide opportunities, not only for significant air pollution benefits (e.g. health and crop-yield benefits), but also for rapid climate benefits, by helping to slow global warming and avoid crossing critical temperature and environmental thresholds,"* (UNECE's Executive Body for the Convention on long-range transboundary air pollution, meeting in Geneva, 15-18 December 2008).

James Hansen's report in 2003, 'Soot climate forcing via snow and ice albedos' concluded:

"Summary. The soot effect on snow albedo may be responsible for a quarter of observed global warming. Restoration of snow albedos to something approaching pristine preanthropogenic values would have the double benefit of reducing global warming and raising the global temperature threshold at which dangerous anthropogenic interference with climate occurs.

Already, soot emissions from coal are decreasing in many regions with transition from small users to power plants with scrubbers. The largest source of soot in developed countries is now diesel fuel, and in developing countries biofuels are also important."

(http://www.pnas.org/content/101/2/423.long)

Mark Jacobson, director of Stanford University's Atmosphere / Energy Programme has written (for publication July 2010 in the Journal of Geophysical Research–Atmospheres.):

"Controlling soot may be the only method of significantly slowing Arctic warming within the next two decades. We have to start taking its effects into account in planning our mitigation efforts, and the sooner we start making changes, the better."

The Carbon Debt from burning biomass

Two important reports published this year and commented on below should inform the UK's use of biomass for energy, particularly at the scale envisaged. Both argue that it is erroneous to ignore the temporal aspect of so-called carbon-neutrality. In essence, they dismiss the idea that GHG emissions from burning biomass today can be immediately written down to zero because in time those emissions will be absorbed by future growth. There are in fact no guarantees that today's emissions from bioenergy will be cancelled out by future sequestration which would anyway need to be additional to allow the biomass emissions to be honestly written off.

The crucial mistake with writing down today's biomass emissions to zero is to ignore the imperative need to reduce actual emissions in the next few years, not just hope they will be absorbed at a later time or proceed on the basis that sequestration in the future is as effective as reductions today.

The proposals put forward as sustainability criteria in ROO 2011 do not require that adequate re-planting is undertaken to ensure that current biomass emissions are sequestered in the future, ***and in adequate time***. There is just a reliance on the market to ensure that such replanting occurs. This is a very risky policy. Furthermore, 'replanting' often means replacing natural ecosystems with monoculture plantations which lack biodiversity, deplete and pollute soils and water and often have serious negative impacts on communities.

The Manomet Centre for Conservation Sciences, Massachusetts, published 'Biomass Sustainability and Carbon Policy' in June 2010.

Their study assessed varying rates by which regrowing forests repays the carbon debt incurred by their removal and combustion. And notes that burning biomass emits more greenhouse gases than fossil fuels: *"Forest biomass generally emits more greenhouse gases than fossil fuels per unit of energy produced. We define these excess emissions as the biomass carbon debt. Over time, however, re-growth of the harvested forest removes this carbon from the atmosphere, reducing the carbon debt.*"

Manomet estimated the size of the biomass carbon debt for different situations: if biomass electricity is used to replace electricity generated by natural gas the time to repay the carbon debt may be up to 90 years; if it is displacing electricity generated by coal the repayment period is 21 years.

(for non-combustion electricity generation from wind and solar, the carbon debt period would be even longer)

The report concludes: *"So, over a long period of time, biomass harvests have an opportunity to recover a large portion of the carbon volume removed during the*

harvest. However, this assumes no future harvests in the stand as well as an absence of any significant disturbance event. Both are unlikely."

Secondly, in their May 2010 report, The upfront carbon debt of bioenergy', Joanneum Research state that the key aspect of sustainability with regard to biomass is whether or not terrestrial carbon stocks are maintained or improved:

"GHG sustainability in the case of biomass is, essentially, a question of maintenance of carbon stocks. Except for biomass converted to extremely recalcitrant forms (e.g., fossil fuels or recalcitrant soil carbon), biomass oxidizes sooner or later, regardless of whether humans intervene or not. Thus, maintenance of carbon stocks entails sufficient biomass growth, over some time period and spatial area, to 'make up for' biomass oxidized. Requirements for biofuels to meet sustainability criteria consequently represent imposing responsibility for regrowth of biomass, e.g. for what occurs at the first step in a biofuel's value chain – its cultivation."

They go on to note: "*Globally, as has been the case at least since 1860 (Schlamadinger and Marland 2000), there is a net loss of terrestrial carbon stocks"*

Joanneum Research point out that the GHG saving methodology used for the EU RED does not account correctly for the use of woody biomass from existing forests / plantations, because its time horizon for direct land use change is too short:

"To be eligible for compliance with the D on RES, a biofuel consignment's GHG profile must be calculated. Emissions due to cultivation of biomass, direct land-use change, conversion to a fuel, and transportation must be included. No attempt is made to include emissions due to indirect land use change at this time. …Emissions from direct land use change must be annualised over 20 years. This is a sufficiently short time frame so that biomass grown on land converted from forests, wetlands or recently drained peatlands would generally fail to meet the criteria as long as actual emissions are used. However, this method of calculating GHG emissions does not address the problem of emissions from extraction of biomass where lands remain in the same land use. In particular, the formula does not address emissions due to increased extraction of wood from forests already used for wood supply. As shown in Section 4, the 'value' of such biomass from the perspective of its contribution to reductions in GHG emissions within the time frame relevant to the RES, e.g., the 2020 targets can vary greatly. Use of wood for energy from forests already in use is more likely to occur in the case of use of biomass for heat and power than for biomass for biofuels, at least in the near- to medium-term."

Joanneum assess the carbon debt of different sources of woody biomass to replace non-biomass electricity generation. From Section 4 of the report:

4.1.1 Residues from managed forests
When harvest residues, previously left on the forest floor, are extracted for bioenergy, there is a carbon stock loss in the dead wood, litter and soil pools. It was estimated that the mitigation potential of such bioenergy material in a 20 year time horizon is reduced by 10-40% by this loss (CN=0.6-0.9).

4.1.2 Additional fellings from managed forests
It was assessed that additional fellings for bioenergy can produce a decrease of the overall C stock in the forest that significantly affects the GHG balance of the bioenergy material. In the short-medium term (20-50 years), additional fellings could produce more emissions in the atmosphere than a fossil fuel system (CN<0). In such

a case, the use of additional fellings would produce only very long term benefits, in the order of magnitude of 2-3 centuries.

4.1.3 Bioenergy from new plantations
The GHG balance of biomass from new plantations should include the C stock change due to the conversion from the previous land use (direct and indirect). The biomass source can be carbon neutral when the C stock change is zero or positive (e.g. conversion from abandoned croplands). If there is an initial carbon loss (e.g. conversion from a forest area), the biomass will produce an atmospheric benefit only after that the C stock change is fully compensated by the amount of avoided emissions in replaced fossil fuels.

Joanneum's findings show that the carbon debt from woody biomass can be as long as 300 years, but varies significantly depending on the source and previous land use. It is clearly an over simplification for the ROO 2011 sustainability and carbon saving criteria to be applied uniformly across all types of wood fuel. And of course to ignore the carbon debt altogether.

There was and still is often the claim that "young trees sequester more" as an attempt to justify cutting old growth forest and replacing with plantations. The US Center for Biological Diversity (CBD) has addressed this mistaken view:

"Contrary to popular belief, young forests do not have the highest carbon sequestration rates or net ecosystem productivity. In fact, Law et al. (2003) examined the variation in productivity and sequestration according to stand age. Net ecosystem productivity was actually the lowest in the initiation stands (9-23 years), moderate in young stands (56-89 years), highest in mature stands (95-106 years) and trended downward in the oldest stands (190-216 years), but was still greater than the youngest stands (Figure 4).

Figure 4: Net ecosystem productivity in ponderosa pine forests is greatest in mature forests (ages 95-106 years) and least in youngest stands (9-23 years old). Measured in grams of carbon per square meter per year. Negative numbers signify net emissions. Source: Law et al. 2003.

Law et al. (2003) also found that the old stands had the highest level of carbon storage in live mass by age 200 and it did not decline after that (mean 17.6 kg Cm -2). Overall ecosystem carbon storage increased rapidly until 150-200 years and did not decline in older stands (Law et al. 2003)."

"3. The Rate Of Carbon Uptake By Regeneration Does Not Offset The Loss Of Carbon Stocks From Clear-Cutting

It is true that the rate of carbon uptake by young trees in plantations and re-growth forests is high (Mackey et al. 2008). However, this carbon uptake over a rotation would not compensate for the amount of carbon presently stored in natural forests that would be lost if they were harvested (Harmon et al. 1990; Schulze et al. 2000). For example, Harmon et al. (1990) found that the conversion of 5 million hectares of old growth conifer forest to younger plantations in western Oregon and Washington in the last 100 years has added 1.5 X 109 to 1.8 X 10 9 megagrams of carbon to the atmosphere. In addition they found that there was 2.2 to 2.3 times as much storage in a 450 year old natural stand than in a 60-year old plantation and that carbon storage is reduced by 350-370 Mg of C per hectare as a result of conversion of old-growth to plantation."

(http://www.biologicaldiversity.org/programs/climate_law_institute/pdfs/Swamped_THP_Comments.pdf)

These findings are not new and appear to have been ignored by policy that is encouraging such rapid and uncapped expansion of bio-energy use in the UK - which can only realistically be achieved through massive new tree plantings, in turn enabled by massive clear-cutting.

Air Pollution

Both local and transboundary air pollution will be increased by expansion of bio-energy.

The UK Renewable Energy Strategy 2009 reported that up to 1.75 million life years would be lost in the UK in 2020 due to emissions caused by bioenergy expansion. This figure does not cover the health impacts of increased emissions of dioxins and furans, arsenic, mercury, hexavalant chromium, lead, cadmium and other toxins released as a result of wood combustion.

Although it is believed the majority of the mortality effects will arise from biomass heating systems sited in urban areas, nonetheless the presence of large biomass electricity power stations that are operated typically 8000 hours a year, and consuming many millions of tonnes of wood fuel per annum, must be a concern. Particulate emissions are very difficult to effectively screen. Several planned power station developments are sited in areas close to residential areas.

Biomass demand will lead to genetic engineering of trees

The growing demand for bioenergy is being used by companies such as ArborGen, Suzano and Weyerhaeuser to speed up the development of Genetically Engineered trees, such as cold-resistant eucalyptus and faster-growing trees. The UK Government's proposed 'sustainability standards' do not preclude use of woodchips and pellets from GE trees. In the UK, MGT Power's main woodchip supplier is now expected to be Suzano Papel e Celulose who are strongly involved in the development of GE tree plantations in Brazil. Forth Energy, who are proposing four large biomass power stations in Scotland, state that they want to burn large amounts of eucalyptus and list four regions for supplies (Florida, Baltic States, Scandinavia and UK) where eucalyptus is not commercially grown at present. They state that most of the wood will come from Florida. ArborGen have permission from the US government to plant 250,000 GE eucalyptus trees in the Southeastern US, including Florida (subject to a legal challenge by environmental organisations) and seek to commercialise GE eucalyptus in the region.

GE trees pose a serious risk to forests because they can spread across large areas, cross-pollinate with non-GE trees and mutate in ways which cannot be predicted. Furthermore, eucalyptus is highly invasive, requires large quantities of water and thus worsens groundwater depletion and droughts, and is very flammable. Furthermore, commercial release of GE trees would increase companies' financial incentives to replace forests and other ecosystems with such plantations. For more information, see: www.globaljusticeecology.org/stopgetrees.php

Chapter 3 BIOLIQUID SUSTAINABILITY

Q16 Do you agree with, where applicable, using the RFA technical guidance to calculate greenhouse gas emissions savings?

Comment

We do not agree that bioliquids should be used at all for large-scale electricity generation. On a full life cycle analysis and factoring in other environmental and social impacts, they produce a net disbenefit.

Q17, 18

No comment

Q19. Are there other reasons, unrelated to sustainability grounds why particular bioliquids ought to remain excluded from the RO?

Comment

Biofuelwatch believe that bioliquids should not be used for electricity generation.

The scope of the sustainability criteria in the RED omits two key impacts of bioliquids.

1. Social impacts

There are no social criteria in the EU Renewable Energy Directive. Even biofuels directly associated with serious human rights abuses can be classed as 'sustainable'.

2. 'Non-Climate' Environmental criteria

There is no requirement in the RED to protect soil, water or air, to safeguard agro-biodiversity or to protect ecosystems such as savannahs or secondary forests.

Q 20

No Comment

Q21 Do you have any other comments on the proposals in this chapter?

Comment

We believe that support under the RO for bioliquids must be suspended/withdrawn immediately. There is no requirement under any EU legislation for the UK to financially support the use of bioliquid electricity.

Using bioliquids for electricity generation does not reduce carbon emissions

A report commissioned by DECC in March 2010, 'NNFCC 10-016 Comparison of the greenhouse gas benefits resulting from use of vegetable oils for electricity, heat, transport and industrial purposes' looked at the GHG performance of various vegetable oils for electricity.

(www.nnfcc.co.uk/metadot/index.pl?id=10478;isa=DBRow;op=show;dbview_id=2539)

The aims of the study were:

To evaluate and compare the total GHG emissions associated with the production of refined vegetable oils derived from a range of specified biomass feedstocks and their subsequent use, whether as oils or derived biodiesel, in a range of end-use applications. The specified biomass feedstock consists of:

- *Used cooking oil available in the UK,*
- *Oilseed rape cultivated in the UK,*
- *Soy beans cultivated in the USA,*
- *Sunflowers cultivated in France,*
- *Oil palms cultivated in Malaysia, and*
- *Jatropha cultivated in India.*

The report concluded:

"Total net GHG emissions savings (ranging from 10% to 100%) are possible for using UK used cooking oil, in all end-use applications, in place of all the conventional fossil fuel-based alternatives considered in this study. Total GHG emissions savings (ranging from 3% to 76%) are also possible with all the other biomass feedstocks (derived from cultivated crops) considered in this study ***apart from****:*

• Using refined vegetable oil from UK oilseed rape, US soy beans, Malaysian oil palms and India jatropha to generate electricity instead of using natural gas (total net GHG emissions savings of -35%, -50%, -8% and -67%, respectively).

• Using refined vegetable oil from US soy beans and Indian jatropha to generate electricity instead of using UK grid electricity (total net GHG emissions savings of -6% and -18%, respectively)."

The NNFCC assessment shows that commonly proposed bioliquids i.e. oilseed rape, palm oil, and jatropha, will produce higher levels of GHG emissions than using natural gas to generate electricity. Using jatropha will produce more GHG emissions than the current UK electricity grid.

Many earlier peer-reviewed studies have also shown that, once CO_2 emissions from indirect land use change as well as indirect nitrous oxide emissions are taken into account, virtually all biofuels significantly worsen climate change.

Direct and indirect costs

Under the RO proposals and the current ROC banding, bioliquid electricity can be treated as renewable and financially supported with two ROCs when it has a greenhouse gas saving of just 35% compared to the EU fossil fuel comparator. This is an extremely poor saving in GHG emissions compared with onshore and offshore wind, and represents very poor value for money for the electricity consumer who is funding the support.

Continuing financial support for bioliquids has a significant opportunity cost. It discourages investment into alternative truly clean and renewable electricity technologies, and lessens the rate at which carbon emissions can be reduced.

Transport and power sectors

Studies published by the European Commission have shown that the current 2020 target for the transport sector cannot be sustainably met – evidently an additional large market for biofuels in the power sector on top of the fast expanding transport sector cannot be sustainable.

The Gallagher Review recommended in 2008 that the UK should adopt a slower rate of expansion of transport biofuel usage. This recommendation was accepted by Government. Yet the RO encourages biofuel usage in the power sector and since the 2009 banding review, has given bioliquid electricity from Energy Crops the highest level of financial support.

Policies on biofuel usage in transport and power are inconsistent.

Limited view of sustainability

There is no scientific or remotely credible way of calculating the full climate impacts of bioliquids. Indirect impacts are not just about 'hectare for hectare' displacement. They are also about the interaction between land prices and speculation, about the impacts of roads, ports and other infrastructure on forests, etc., about policy changes which affect land rights, about scarcely understood interactions between biodiversity, ecosystems and the climate, etc.

Indirect impacts affect biodiversity, communities, food sovereignty, and human rights. The EU RED ignores all of these; it even ignores all DIRECT impacts on people. The large-scale, often violent, displacement of indigenous peoples, other forest-dependent communities and small farmers will not be considered or addressed under EU ‘sustainability criteria’ at all.

Furthermore, biofuels link the price of food more closely to the price of oil, thus rendering food prices more volatile and, overall, significantly pushing them up.