October 2014

Briefing

DECC's biomass carbon calculator (BEAC) and what it means for bioenergy

Summary

This briefing explains DECC's Bioenergy Emissions and Counterfactual calculator (BEAC) and its implications for bioenergy policy.

- The new methodology used shows that GHG emission from burning biomass can be greater than from burning coal, but can also be low, depending on the type of biomass being burned.
- This is major change from the currently used methodology which assumes that the burning of biomass is always carbon neutral and accounts only for peripheral GHG emissions.
- DECC have acknowledged the implications, but so far there has been no policy response.
- The BEAC calculator urgently needs to be turned into a regulatory tool.
- It is critical that the UK Government allocates subsidies only to forms of bioenergy that are proven to be genuinely low carbon.
- Biomass subsides are likely to add up to far beyond £1billion. Spending some of this on bioenergy that results in higher GHG emission than coal is a colossal waste of taxpayers' money. It is not adequate to assume they are low-carbon.
- Actions needed:
    - DECC must amend the methodology used in the sustainability criteria for biomass so that the BEAC calculator is used to calculate the carbon emissions resulting from the burning of forest biomass.
    - DECC must set a date by which RO/CfD subsidies are awarded only to biomass sources that are found by the BEAC methodology to be below the threshold of 240 kg CO_2e/MWh. This should be April 2015 when the RO sustainability criteria become mandatory.
    - DECC must ensure independent verification of the type of biomass being burned in power stations.
    - The Industry must become more transparent and publish details of the type and origin of the biomass it burns.

Introduction

In mid-2012 DECC launched an in-depth investigation into the greenhouse gas (GHG) impacts of using forest biomass to produce electricity. Preliminary results from this work were presented in March 2013 and the final version of the BEAC biomass carbon calculator and the accompanying report "Life Cycle Impacts of Biomass Electricity in 2020" were published in July 2014.

The significant difference between the BEAC calculator and DECC's current biomass carbon calculator (which is based on the EU Renewable Energy Directive (RED) methodology) is that the BEAC calculator accounts for changes to the carbon stocks of forests that are being logged for bioenergy, while the RED methodology assumes that there are no changes to carbon stored in forests and accounts only for peripheral GHG emissions from transport, harvesting machinery and processing, as well as land use change emissions where they occur. A number of scientific studies[1] have shown that the changes to carbon stored in forests as a result of the harvesting of wood for bioenergy are highly significant and that the burning of biomass can therefore no longer be regarded as inherently carbon neutral.

The BEAC report's findings

The report investigates the net carbon emissions of 29 scenarios of different types of woody biomass sourced from North America, the main source of woody biomass imported into the UK.

The report concludes that scenarios that involve utilizing fine woody residues (e.g. bark, twigs and leafs or sawdust) that would otherwise be burned as waste or newly established tree plantations on low-carbon land can result in low net GHG emissions.

However scenarios that involve harvesting additional roundwood from naturally growing forests or converting forests into plantations result in high GHG or very high GHG emissions (depending on the rotation length and hence carbon stocks of the forests and plantations).

In this context the report points out that commercial forest thinnings are simply a specific way to harvest roundwood: I.e. thinnings are not "residues". This is an important clarification as it is sometimes claimed by biomass-burning power stations that burning "thinnings" was equal to the use of residues.

Out of the 29 scenarios investigated over time horizon of 40 years

- 16 would result in emissions that exceed the current GHG limit for biomass under the Renewable Obligation (RO) of 240 kg CO_2e/MWh.
- 11 of out of these 16 scenarios result in net emissions higher than natural gas (420 kg CO_2e/MWh).
- 6 scenarios out of these 11 turn out to be dirtier than coal (1064 kg CO_2e/MWh).

[1] E.g. European Environment Agency (2011) "Opinion of the EEA Scientific Committee On Greenhouse Gas Accounting in Relation to Bioenergy"; Mckechnie et al. (2011) "Forest Bioenergy or Forest Carbon? Assessing Trade-Offs in Greenhouse Gas Mitigation with Wood-Based Fuels"; "The upfront carbon debt of bioenergy" JOANNEUM Research (2010) etc.

Conversely if the current methodology for carbon accounting was used (which only accounts for the emissions from transport, harvesting machinery and processing) ALL of the 29 scenarios would meet the current 240 kg CO_2e/MWh (200 kg CO_2e/MWh from 2020) threshold in the RO's sustainability criteria.

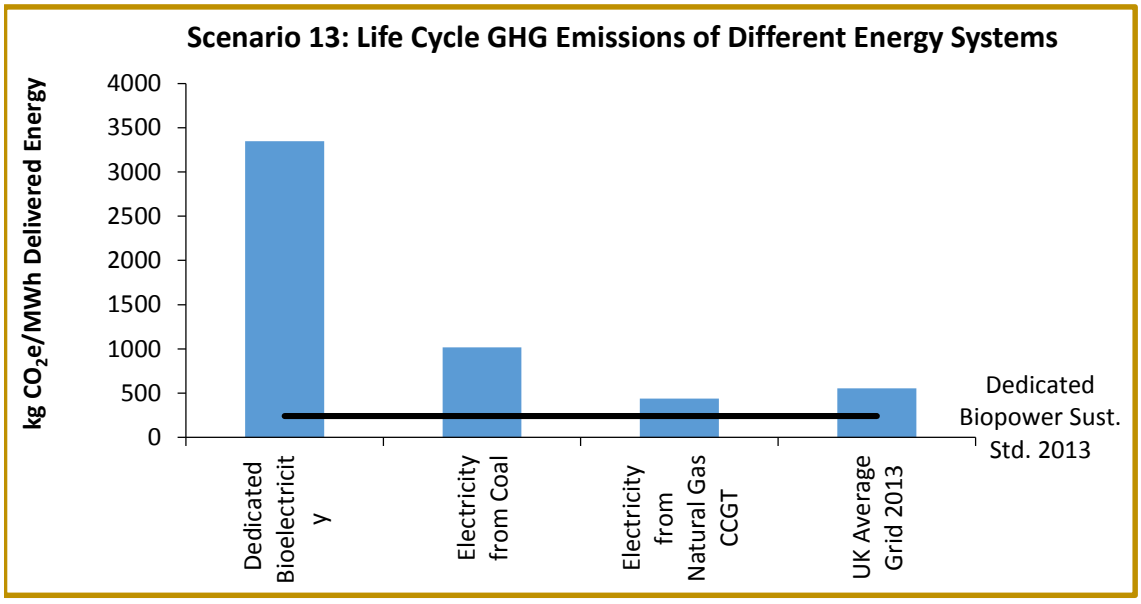
Indeed the report highlights "bioenergy scenarios that could lead to high GHG intensities (e.g. greater than electricity from coal, when analysed over 40 or 100 years) but would be found to have GHG intensities less than 200 kg CO_2e/MWh by the Renewable Energy Directive LCA methodology".[2]

This demonstrates why the current sustainability criteria are impotent in stopping biomass that could result in worse GHG emissions than coal from being burnt in power stations.

Roundwood from naturally growing forests

UK power stations are increasingly importing and burning wood pellets from roundwood harvested from forests in the South East of the US. Of the roundwood scenarios in the BEAC report the one that describes the practice of increasing the rate of logging of North American hardwood forests for wood pellets, which is reported from the SE of the US,[3] and often involving the clear-cutting of threatened forests (e.g. wetland forests) is scenario 13: "Electricity from pellets produced from additional wood (compared to cfl) generated by increasing the rate of harvest of naturally regenerated hardwood forest in Southern USA from every 70 years to every 60 years".[2]

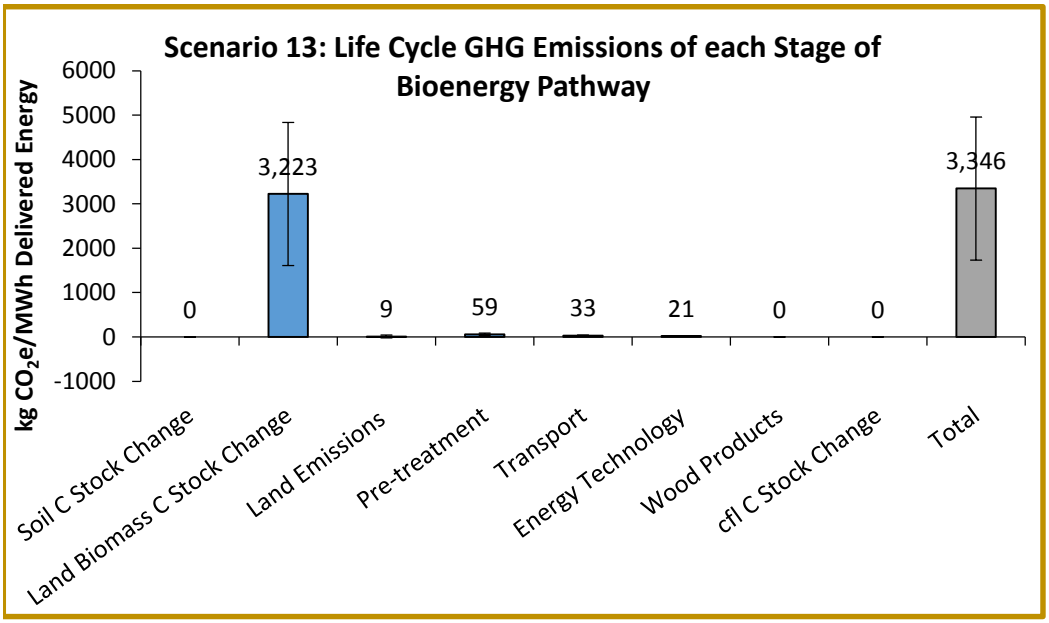
This scenario results in carbon emissions of 3346 kg CO_2e/MWh, more than three times the 1018 kg CO_2e/MWh that result from burning coal.



[2] Life Cycle Impacts of Biomass Electricity in 2020; DECC, July 2014
[3] http://www.nrdc.org/energy/forestnotfuel/enviva-wood-pellets.asp

This is approx. 14 times higher than the GHG emission maximum of 240 kg CO_2e/MWh that are allowed for biomass under the Renewable Obligation's sustainability criteria (this is the black line in graph above).

Looking at the sources of GHG emissions in the life cycle analysis of scenario 13 in the BEAC calculator as shown in the graph below it is clear the majority of emissions in this scenario result from the changes to carbon stocks in the forests. The emissions from the transport, processing and harvesting of the biomass are comparatively minor. This again demonstrates why the current biomass carbon calculator (which only accounts for the emissions from transport, harvesting machinery and processing, but not from the changes to forest carbon stocks) is unable to pick up the serious GHG implications of burning roundwood biomass for electricity.



What is needed?

The current methodology used under the Renewables Obligation and Contracts for Difference to calculate GHG emissions from burning biomass fails to account for emissions from changes in forest carbon stocks.

As a result DECC is unable to distinguish between types of biomass that might result in real GHG savings compared to fossil fuels and those that the BEAC calculator shows result in GHG emissions worse than coal.

Subsidies are paid equally to both.

Contract-for-Difference subsidies for coal-to-biomass conversions alone could add up to £1.1 billion per year.[4] Biomass subsidies under the Renewable Obligation could add up to another several hundred million pounds.

In order to put an end the wasting of taxpayers' money on such technologies that provide no value for money DECC needs to urgently amend the methodology used in the sustainability criteria for biomass so that the BEAC calculator is used to calculate the carbon emissions resulting from the burning of forest biomass, including changes to carbon stocks.

DECC must set a date by which RO/CfD subsidies are awarded only to independently verified biomass sources that are found - using the BEAC methodology - to be below the threshold of 240 kg CO_2e/MWh. This should be April 2015 when the RO sustainability criteria become mandatory.

[4] Subsidising Biomass Electricity - Contracts for Difference and what they mean for dedicated and converted biomass power stations, Biofuelwatch, January 2014