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DRAFT Renewables Obligation: Sustainability criteria for bioliquids

Document Type: Consultation

Ref : 16/11

Date of Publication: 10 February 2011

Deadline for response: 2 March 2011, 5.00PM

Target Audience:

Operators of generating stations using bioliquids for electricity generation, independent auditors, and other interested parties.

Overview:

This consultation document provides operators of generating stations using bioliquid fuel with guidance on how to demonstrate compliance with the sustainability criteria of the Renewables Obligation, and independent auditors with guidance on how to verify compliance with these criteria. It details the requirements of the legislation and what we expect from operators of generating stations and auditors.

It is not intended to be a definitive legal guide.

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Context

The Government's aim is that renewable energy will make an increasing contribution to energy supplies in the UK, with renewable energy playing a key role in the wider Climate Change Programme.

The Renewables Obligation (RO), the Renewables Obligation (Scotland) (ROS) and the Northern Ireland Renewables Obligation (NIRO) are designed to incentivise renewable generation into the electricity generation market. These schemes were introduced by the then Department of Trade and Industry (now the Department of Energy and Climate Change), the Scottish Executive and the Department of Enterprise, Trade and Investment respectively and are administered by the Gas and Electricity Markets Authority (whose day-to-day functions are performed by Ofgem). The schemes are provided for in secondary legislation.

The first Renewables Obligation Order came into force in April 2002, as did the first Renewables Obligation (Scotland) Order. The first Renewables Obligation Order (Northern Ireland) came into force in April 2005. All three Orders have been subject to regular review. The Orders place an obligation on licensed electricity suppliers in England and Wales, Scotland, and Northern Ireland respectively to source an increasing proportion of electricity from renewable sources. Suppliers meet their obligations by presenting sufficient Renewables Obligation Certificates (ROCs) to cover their obligations. Where suppliers do not have sufficient ROCs to meet their obligation, they must pay an equivalent amount into a fund, the proceeds of which are paid back on a pro-rata basis to those suppliers that have presented ROCs.

The EU introduced in 2009 a comprehensive and binding sustainability scheme. Under the European Renewable Energy Directive (RED), operators using bioliquids must meet specified sustainability criteria to be eligible for incentive schemes from national governments. The Department for Energy and Climate Change (DECC) transposed the requirements of the RED in the Renewables Obligation (Amendment) Order 2011 for England and Wales.

This guidance addresses changes made as part of the reform of the RO, relevant to bioliquids used for electricity generation. The introduction of sustainability criteria may have an impact on the number of ROCs that can potentially be claimed by bioliquid operators, thus on the RO as a whole.

Associated Documents

Readers should be aware of the following documents which support this publication.

- Renewables Obligation: Fuel Measurement and Sampling guidance
- Renewables and CHP Register User Guide
- Renewables Obligation: Guidance on Biodiesel and other fossil derived bioliquids
- Renewables Obligation: Guidance for generators

These documents are available on our website at www.ofgem.gov.uk

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Summary

This consultation document provides draft guidance to operators of generation stations using bioliquid fuels that wish to benefit from the RO on how to comply with sustainability requirements for bioliquids.

It sets out sustainability criteria for bioliquid fuels used for generation that are likely to be eligible to receive support under the Renewables Obligation Order (ROO) 2011, the Renewables Obligation (Scotland) Order 2011 and the Renewables Obligation Order (Northern Ireland) 2011 (the Orders). It provides assistance to bioliquid based electricity generators that wish to benefit from receiving Renewables Obligation Certificates under the Renewables Obligation (RO) by giving guidance on how to meet sustainability requirements and demonstrate this compliance to Ofgem.

The final version of this document will take effect on 1 April 2011. It will be updated to take account of any future changes made to the legislation.

We would like to seek feedback on the clarity and content of this draft document. Please provide feedback by 5pm on 2 March 2011. See Appendix 10 for more information on this consultation.

This document cannot anticipate every scenario which may arise. Where a scenario arises which is not addressed in these procedures, we will adopt an approach consistent with the relevant legislation. Any separate guidance published in addition to this document will be posted on our website. This is a guidance document only and it is not intended to provide comprehensive advice on how the Orders should be interpreted.

At all times, the onus is on the operators of generating stations to ensure that they are aware of the requirements of the Orders, and are confident as for the quality of data they obtain (for example from feedstock suppliers) to demonstrate compliance with the RO requirements. In instances where parties other than registered holders are involved in the RO (for example data collectors for the provision of providing monthly information), the operator of the generating station is responsible for ensuring any guidance is distributed accordingly.

1. Background

Chapter Summary

This chapter explains why we have produced this guidance and our approach to sustainability criteria for bioliquids.

1.1. This guidance explains the sustainability criteria for bioliquids under the Renewables Obligation (Amendment) Order 2011 (ROO 2011).

1.2. . Unless apparent from the context, where used in this document, the term "RO" refers to the Renewables Obligation, the Renewables Obligation (Scotland) and the Northern Ireland Renewables Obligation (NIRO). The term "ROCs" refers to Renewable Obligation Certificates (ROCs), Scottish Renewables Obligation Certificates (SROCs) and Northern Ireland Renewables Obligation Certificates (NIROCs).

1.3. "Ofgem", "us", "our" and "we" are used interchangeably when referring to the exercise of the Authority's powers and functions under the Orders. The term "the Act" refers to the Electricity Act 1989.

The nature of legislation

1.4. Some areas of the legislation are prescriptive, others give us discretion. Where the legislation is prescriptive, this guidance is intended to help operators of generating stations and verifiers understand what we require. Where the legislation gives us discretion, the document gives guidance as to how we might exercise that discretion. It also explains what we need, practically, from operators of generating stations and auditors to enable them to meet these requirements.

Our role under the Renewables Obligation

1.5. The RO and the Renewables Obligation (Scotland) Order (ROS) detail Ofgem's powers and functions in respect of the Renewables Obligation in England and Wales and in Scotland respectively. Those functions include:

- accrediting generating stations as being capable of generating electricity from eligible renewable energy sources
- issuing ROCs and Scottish Renewables Obligation Certificates (SROCs)
- establishing and maintaining a register of ROCs and SROCs
- revoking ROCs and SROCs where necessary
- monitoring compliance with the requirements of the Orders
- calculating annually the buy-out price resulting from adjustments made to reflect changes in the Retail Price Index
- receiving buy-out payments and redistributing the buy-out fund

- receiving late payments and redistributing the late payment fund
- publishing an annual report on the operation of and compliance with the requirements of the Orders
- publishing sustainability information for stations using biomass fuels

1.6. We cannot act beyond the scope of the powers laid down in the Orders. For example, we have no remit over the operation or regulation of the ROC market itself. Amendments to the relevant legislation in respect of the Renewables Obligation are a matter for the Secretary of State, Scottish Ministers and the Secretary of State for Northern Ireland.

1.7. We administer the NIRO on behalf of the Northern Ireland Authority for Utility Regulation (NIAUR) under an Agency Services Agreement. Under this agreement the Authority is required to carry out the functions listed above in respect of Northern Ireland Renewables Obligation Certificates (NIROCs). However the NIAUR continues to retain responsibility under the legislation for administering the NIRO.

Our approach

Working in partnership with industry to develop our administrative procedures and promote good practice

1.8. As the RO evolves, we continue to work in partnership with industry to develop our administrative processes, produce clear and consistent guidance for operators of generating stations and promote good practice. This is achieved by:

- The publication and updating of this guidance document, providing operators of generating stations with guidance and examples of good practice
- The provision of a standard auditing template to show generator's compliance with sustainability criteria for bioliquids, allowing us to assess all procedures on the same basis
- Consultation with stakeholders on key issues, allowing us to gauge industry opinion and shape our guidance and administrative processes accordingly

Legislative and administrative changes

1.9. We have needed to make a number of changes to our administrative processes as a result of the amendments by the ROO 2011, which come into effect on 1 April 2011. As the legislation continues to evolve and our administrative processes are developed further, we aim to inform operators of generating stations of the changes and the impact they are likely to have. It should be appreciated, however, that the onus is on operators of generating stations to ensure that they are complying with the RO legislation. Operators of generating stations who are in any doubt as to whether the legislative requirements are being met may wish to seek independent technical and legal advice, as appropriate.

This guidance document

1.10. The final version of this document will describe our expectations towards operators of generating stations and independent auditors of how to comply with sustainability requirements for bioliquids and verifying that compliance in order to receive ROCs. It is intended to be a working document and may be updated from time to time. It should be read in conjunction with other guidance documents listed in the Associated Documents section, and the RO regulations.

1.11. This will be a guidance document only. The onus will be with the operator of a generating station to ensure that it is aware of the requirements of the Orders. It will not be intended to provide comprehensive legal advice on how the Orders should be interpreted.

Queries

1.12. All queries in relation to our functions under the Orders should be emailed to renewable@ofgem.gov.uk. Written queries should be sent to the address on the front of this document clearly marked for the attention of the Renewables and CHP Administrator.

1.13. Any queries regarding future changes to the RO and wider policy should be directed to the Department of Energy and Climate Change (DECC). Contact details can be found at www.decc.gov.uk.

2. Overview of sustainability requirements and exemptions

Chapter Summary

This chapter outlines the land use and greenhouse gas emission saving sustainability criteria for bioliquids and sets out what the exemptions from those criteria are.

Sustainability requirements for bioliquids

2.1. The EU introduced in 2009 a comprehensive and binding sustainability scheme. Under the European RED[1], operators of generating stations using bioliquids must meet specified sustainability criteria to be eligible for support from national governments. The criteria apply to biofuels and bioliquids produced in the EU and to those imported into the EU from non-Member State countries.

2.2. This guidance document aims to provide assistance to bioliquid based electricity operators of generating stations that wish to benefit from receiving ROCs under the Renewables Obligation. It clarifies sustainability criteria for bioliquid generation technologies that are likely to be eligible to receive support under the Renewable Obligation Order (ROO) 2011, the Renewables Obligation (Scotland) Order 2011 and the Renewables Obligation (Northern Ireland) Order 2011. Government transposed the requirements of the RED in the ROO 2011. The ROO 2011 requires operators of generating stations to arrange an annual independent audit of the sustainability information they provide to Ofgem. This guidance document sets out verification requirements for independent auditors. This will minimise the risk of operators of generating stations or independent auditors interpreting the RO Orders differently from Ofgem and central government.

2.3. The sustainability requirements include:

- land criteria, relating to the type of land on which biomass used to produce bioliquid was cultivated, and
- greenhouse gas (GHG) emission saving criteria, relating to a percentage reduction in GHG emissions compared to a fossil fuel used to generate electricity.

2.4. As of 1 April 2011, meeting the sustainability criteria is a condition of operators of generating stations using bioliquids receiving support in the form of ROCs.

[1] Directive 2009/28/EC of the European Parliament and Council on the use of energy from renewable sources and subsequently repealing Directives 2001/77/EC and 2003/30/EC

Land criteria for bioliquids

Overview

2.5. From 1 April 2011 all bioliquids used for the purpose of electricity generation will have to meet the land criteria (along with the GHG emissions saving criteria outlined below) in order to be eligible for ROCs.

2.6. For a bioliquid to be regarded as compliant with the land criteria, the biomaterial from which it is made had to be either waste, residue (other than residues from agriculture, aquaculture, fisheries or forestry) or obtained from a permitted source.

2.7. To comply with land criteria, biomaterial used for bioliquid production cannot be obtained from land:

- that at any time during or after January 2008 was primary forest;
- that at any time during or after January 2008 was land designated for nature protection purposes (unless production of that biomaterial did not interfere with purposes for which this land was designated);
- that at any time in January 2008 was peatland (unless the cultivation and harvesting of biomaterial did not involve the drainage of previously undrained soil);
- that at any time in January 2008 was a continuously forested area (unless that land is still a continuously forested area);
- that at any time in January 2008 was a lightly forested area (unless that land is still a lightly forested area, or unless the resulting bioliquid meets the GHG emission criterion when the GHG emissions from land use change are included and the relevant percentage is calculated using actual GHG values);
- that at any time in January 2008 was wetland (unless that land is still a wetland).

Exemptions

2.8. Bioliquids from wastes and bioliquids from residues (other than agriculture, aquaculture, fisheries and forestry residues) are exempt from the land cover criteria.

2.9. The GHG emissions saving criteria still apply.

2.10. For more information on exemptions and on how to demonstrate compliance with land criteria, please see Chapter 4 of this guidance document.

Greenhouse gas emissions saving criteria for bioliquids

Overview

2.11. As of 1 April 2011 all bioliquids used for the purpose of electricity generation have to meet the GHG emissions saving criteria (along with the land criteria outlined above) to be eligible for receiving ROCs.

2.12. For a bioliquid used for electricity generation to be regarded as compliant with the GHG criteria, it needs to result in GHG emissions from its use being lower than the GHG emissions from the use of fossil fuel by at least the relevant percentage set out in the ROO 2011.

2.13. This relevant percentage of GHG saving will be 35% for all bioliquids used to generate electricity before 1 January 2017. This savings threshold will be subject to increases from this date onward, as explained below.

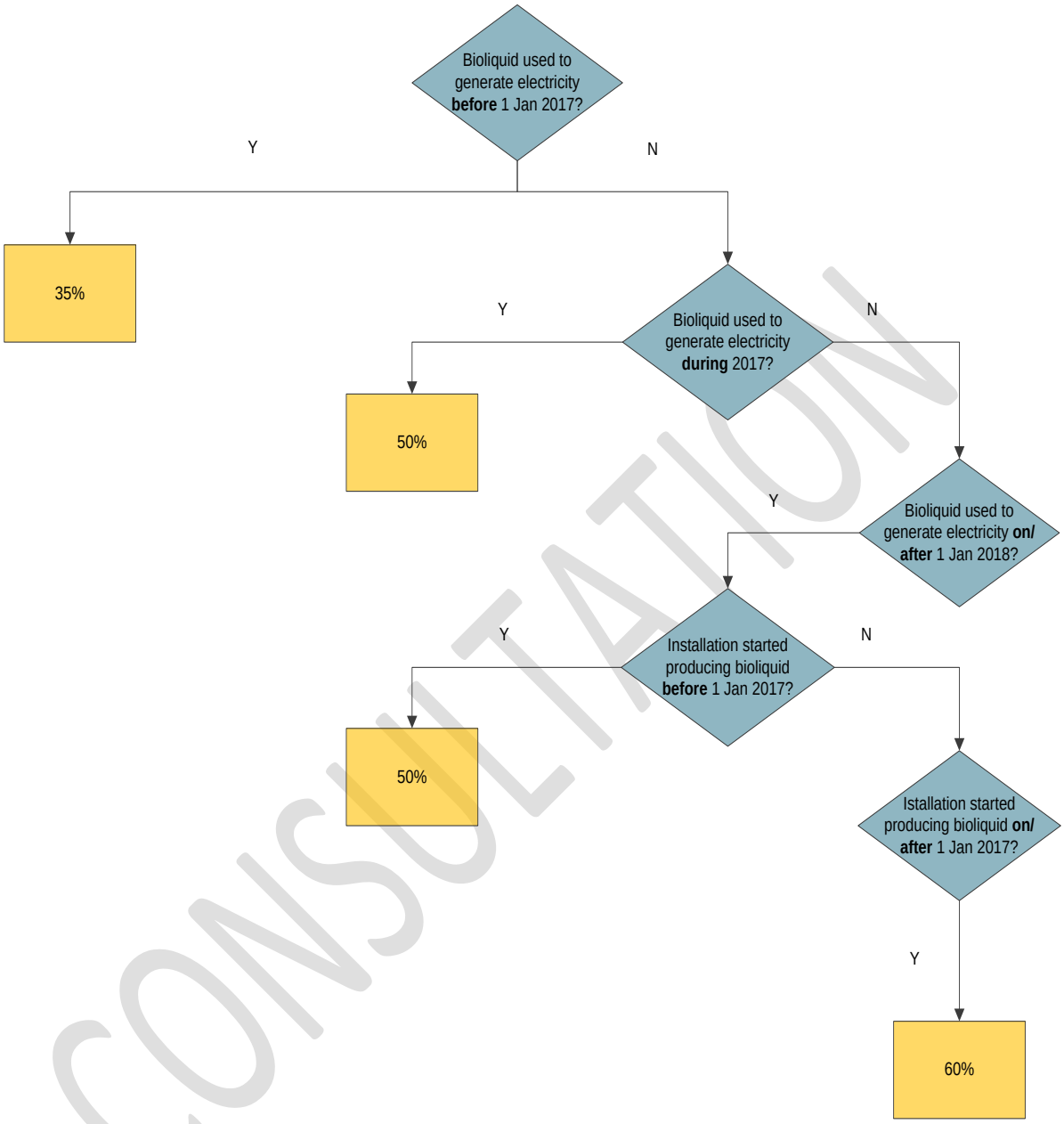

Figure 1: Change in the relevant GHG emissions saving percentage over time

2.14. The relevant percentage of GHG is as follows:

- Bioliquids **used** for generating electricity **before 1 January 2017** need to result in **35%** GHG emission saving.
- Bioliquids **used** for generating electricity **during 2017**, as well as bioliquids from an installation that started producing before 1 January 2017 that are

used for electricity generation purposes on or after 1 January 2018, need to result in **50%** GHG emission saving.

- Bioliquids from an installation that started producing on or after 1 January 2017, which are used for generating electricity on or after 1 January 2018, need to result in **60%** GHG emission saving.

2.15. The percentage difference between the GHG emissions from the use of the bioliquid and the use of fossil fuel has to be calculated using actual GHG values, mixed GHG values or the default percentage. All methods of how to calculate GHG savings resulting from the use of bioliquid are discussed in more detail in Chapter 5 of this guidance document.

Deemed compliance

2.16. If a bioliquid was produced by an installation operating on 23 January 2008, and this bioliquid is used for generating electricity before 1 April 2013, then it is deemed to be compliant with the GHG emissions saving criteria. Land criteria still apply.

2.17. For more information on how to demonstrate compliance with the GHG emissions saving criteria, please see Chapter 5 of this guidance document.

Mass balance

2.18. To validate the accuracy of bioliquid sustainability reports, a "chain of custody" must be established from the feedstock producer to the operator of generating station. The chain of custody describes the way in which sustainability information passes along the bioliquid supply chain. Establishing a chain of custody is therefore key to ensuring a connection can be made between sustainability information and claims relating to the feedstock and sustainability information or claims relating to the final bioliquid.

2.19. Following the requirements of the RED the chain of custody used must follow the rules of a mass balance type of chain of custody system. Other types of chain of custody (in particular book-and-claim) are not allowed and, therefore, equivalence trading of feedstocks is not allowed.

2.20. Detailed rules of how a mass balance system should work are explained in Chapter 6. In short, a mass balance system is a system in which 'sustainability characteristics' remain assigned to 'consignments' and to which the following basic rules apply:

- Consignments of raw material or bioliquid with differing sustainability characteristics can be mixed;

- Information about the sustainability characteristics and sizes of the consignments are required to remain assigned to the mixture;
- The sum of all consignments withdrawn from the mixture are described as having the same sustainability characteristics, in the same quantities, as the sum of all consignments added to the mixture.

2.21. All parties in the supply chain from farm to operator of generating station must follow a mass balance system as a means of transferring bioliquid information through the supply chain. Note that the mass balance system allows bioliquid information to be traced back through the supply chain, and therefore enables the verification of the information. The mass balance system itself is, however, not a part of the verification process.

Verification

2.22. Compliance with the RED land use, GHG emissions saving, and mass balance criteria must be demonstrated by operators of generating stations using bioliquids through independent verification.

2.23. The RED (Article 14(4), 2nd sub-paragraph) allows for recognised voluntary schemes to be used to demonstrate compliance with the RED sustainability criteria. Use of voluntary schemes requires up-front certification. An alternative to such up-front certification against recognised voluntary schemes is ex-post verification of the annual sustainability audit report. The ex-post verification might be especially useful for the year 2011, since not many recognised voluntary schemes are available at the time of publication of this guidance document.

2.24. Ex-post verification of the information that operators of generating stations hold to demonstrate that their bioliquid complies with the RO sustainability criteria is mandatory for the operator to be able to claim ROCs.

2.25. If a bioliquid supply chain is covered by voluntary schemes for all relevant criteria, compliance with those criteria does not need to be checked again. Voluntary schemes can be accepted by a verifier as evidence of compliance with the RO sustainability criteria for bioliquids. In this case, a verifier will just have to assess whether all relevant parties in the supply chain are indeed covered by the voluntary scheme.

2.26. Not all voluntary schemes are necessarily approved for all RO sustainability criteria - some are approved only for a specific scope. In this case, the operator of a generating station may use more than one voluntary scheme, or a combination of a voluntary scheme and ex-post verification.

2.27. An alternative option to using voluntary schemes is to conduct ex-post verification of the ROO 2011 requirements. This means that an independent verifier

will assess, by the end of each obligation period, whether an operator of a generating station under the RO has complied with the land use, GHG emissions saving and mass balance requirements. This is a useful interim option for a situation where limited voluntary schemes are available on the market.

2.28. Regardless of the option used, an independent verification is still required by the end of each obligation year.

Waste and residues

Exemptions for wastes and residues

2.29. Requirements for bioliquids from wastes and residues are different to requirements for bioliquids from other feedstocks.

2.30. Under Article 3(1), schedule A2 of the Renewables Obligation Order 2011, bioliquids meet the land criteria if they were made from biomaterial that was:

- A waste; or
- A residue (other than residue from agriculture, aquaculture, forestry or fisheries); or
- Obtained from a permitted source.

2.31. The Renewables Obligation Order notes that '"waste" has the meaning given to it in section 75(2) of the Environmental Protection Act 1990[2]. The RO Order does not define residues.

2.32. Additionally, materials that are wastes or residues are able to claim zero emissions at the point of collection, for the purposes of calculating GHG emissions. This may be done whether or not the residues are from agriculture, aquaculture, forestry or fisheries.

Demonstrating that a Fuel or Feedstock is Waste or Derived from Waste

2.33. Generally, a waste or waste-derived fuel will have documentation demonstrating it is, or was derived from, a waste. Such documentation could include waste transfer notes, end of waste certificates, or registered waste handler permits, as well as other relevant documentation. This is a useful option for demonstrating that a fuel or feedstock is a waste.

[2] 1990 c.43, as amended by section 120(1) of and paragraph 88(1) and (2) of Schedule 22 to the Environment Act 1995 (c.25).

2.34. In cases when it is not clear whether a substance is a waste, it will need to be decided on a case by case basis.

2.35. The definition of "sustainability information" set out in the ROO 2011 places burden on the generator to submit information to us to show that a bioliquid meets GHG emissions saving and land criteria. In practice, Ofgem is relying on the Annual Bioliquid Sustainability Audit Report to provide this information.

2.36. The onus is therefore on the operator to demonstrate to the satisfaction of their auditor that a bioliquid fuel used for generating electricity is a waste. Where a generator is uncertain whether a particular fuel qualifies as a waste, they are advised to use standard Environment Agency's procedures, as set out below.

Process for determining that a bioliquid or feedstock is a waste

2.37. The Environment Agency already has a process in place designed to consider submissions from organisations regarding the definition of waste. Decisions are made by a group known as the "End of Waste Panel". The main work of the Panel is considering whether an operator's waste derived object/material has ceased to be waste and is therefore a product and can be used in the same way as other non-waste products without the need for waste regulation.

2.38. The Panel is designed to make decisions on the status of materials from the perspective of the EU Waste Framework Directive (WFD). Insofar as WFD status can be translated to waste status under the RO then the Panel's decisions will apply to both. The Panel will not make decisions solely with reference to RO.

2.39. If there is a bioliquid feedstock that a generator thinks should be considered a waste, they can apply directly to the Environment Agency for a view from the Agency's End of Waste Panel. To form a view, the Panel needs to understand what the bioliquid feedstock is, how it arises, how it is treated, and used.

2.40. Once the End of Waste Panel has provided a view on the application, the operator should provide their auditor with a copy of the Panel's decision to demonstrate compliance with sustainability criteria (in this case, exemption), and therefore be eligible for ROCs.

2.41. Generators can find details of the Environment Agency's End of Waste process here: http://www.environment-agency.gov.uk/

2.42. Additionally, we have asked the Environment Agency to determine whether following bioliquid feedstocks, commonly used for electricity generation, qualify as wastes:

- Used cooking oil

- Tallow
- Glycerol
- Glycerol from virgin oil
- Glycerol from used vegetable oil
- Tall oil pitch
- Palm fatty acid distillate
- Waste pressings from the production of vegetable oils

2.43. The advice we received from the Environment Agency is summarised below in paragraphs 2.44 to 2.53.

Used cooking oil

2.44. Commonly called "UCO" or "WCO" (waste cooking oil), this is generally understood to mean purified oils and fats of plant and animal origin which are liquid at room temperature. These have been used by restaurants, catering facilities and kitchens to cook food for human consumption. They are wastes or residues as they are no longer fit for that purpose and are subsequently used as either feedstock for the production of biodiesel as fuel for automotive vehicles and heating or as a direct fuel. The following documents underpin the Environment Agency's regulation of the process of producing biodiesel from UCO:

http://www.environment-agency.gov.uk/static/documents/Business/MWRP_RPS_030_v2_biodiesel_22-12-10.pdf

http://www.environment-agency.gov.uk/static/documents/Business/Quality_protocol_for_biodiesel_.pdf

Tallow

2.45. Commonly called rendered animal fat, this is generally understood to mean hard fat that is obtained from the whole or part of any dead animal through the process of rendering. It is then used either directly for electricity generation, or as feedstock for the production of biodiesel as fuel for automotive vehicles. The following documents underpin the Environment Agency's regulation of the process of producing biodiesel from rendered animal fat:

http://www.environment-agency.gov.uk/static/documents/Business/MWRP_RPS_030_v2_biodiesel_22-12-10.pdf

http://www.environment-agency.gov.uk/static/documents/Business/Quality_protocol_for_biodiesel_.pdf

2.46. Although currently tallow is generally regarded as a waste in these circumstances, this position could change once the revised Animal By-Products

Regulation 1069/2009 (rABPR) takes effect. The rABPR lays down revised health rules as regards to animal by-products and derived products not intended for human consumption. It takes effect from 4 March 2011.

Glycerol produced from virgin oil

2.47. Where energy crops provide the feedstock, both the biodiesel and the glycerol may be intentionally produced for use as a fuel. Where glycerol from virgin crops is intentionally sought as a product, it will not be a waste or a residue. If it is not sought as an intentional product, it can be considered a waste or residue.

Glycerol produced from used vegetable oil/fat for use as a fuel

2.48. Glycerol that has been produced from used vegetable oil or fat and is destined for use as a fuel is a waste or production residue.

2.49. The Environment Agency's position statement on glycerol in relation to the production of biodiesel can be found by following the link below:

http://www.environment-agency.gov.uk/static/documents/Business/PS_025_Use_of_glycerol_from_biodiesel_manufacture_final_June_2010.pdf

Tall oil pitch

2.50. Crude tall oil arises from the process of pulping coniferous wood. The pulping process involves cooking woodchip in a chemical mixture and this gives rise to a soapy material which is separated from the pulp and liquor. It is then acidified and heated to convert it into tall oil.

2.51. Tall oil pitch can be considered a residue of this process. Additionally, tall oil pitch is provided by the Commission as an example of a residue.

Palm fatty acid distillate

2.52. As part of the refining of palm oil for food and other uses, the oil is heated to drive off fatty acids. These are then condensed and collected as the fatty acid distillate. The fatty acid distillate is an inevitable result of this process, and can be considered a waste or residue.

Waste pressings from production of vegetable oils

2.53. When a vegetable material such as olives is pressed to produce vegetable oil, the pressed material consisting of pips, skins, flesh etc. remains. This may be used as a fuel. The purpose of the process is to produce oil; the pressings can be considered a waste or residue.

Feedstocks that do not qualify as wastes or residues

Tall oil

2.54. A decision was taken by the Environment Agency in 2004/5 that tall oil is a virgin fuel. This appears to have been based on the fact that the range of components making up the oil (and hence the characteristics of the oil) can be controlled by varying the pulping process i.e. a technical choice is involved in its production. This would mean that it would fall into the category of product and would not fall into the definition of "processing residue" as per the Communication *("…a substance that is not the end product(s) that a production process directly seeks to produce. It is not a primary aim of the production process and the process has not been deliberately modified to produce it.").* In the particular case that was considered it was accepted that a technical choice was involved in producing fuel with certain characteristics.

Demonstrating that a fuel or feedstock is a residue

2.55. Residues are not defined in the RO Order. The Commission Communication on practical implementation (2010/C 160/02) defines processing residues as "a substance that is not the end product(s) that a production process directly seeks to produce. It is not a primary aim of the production process and the process has not been deliberately modified to produce it."

2.56. The following table lists residues that are presented as examples in the RED and subsequent Commission communications:

Table 1: Examples of residues

Residues *(exempt from land criteria)*	Residues from agriculture, aquaculture, forestry or fisheries *(need to meet land criteria)*
• Crude glycerine • Tall oil pitch	• Manure • Straw • Bagasse • Husks • Cobs • Nut shells

CONSULTATION QUESTIONS

Q1. Do you feel the introductory chapter clearly sets out what sustainability criteria and exceptions are?

Q2. Are the guidelines for wastes and residues appropriate?

3. Reporting carbon and sustainability information to Ofgem

Chapter Summary

This chapter outlines the requirements for operators of generating stations using bioliquids to report against sustainability criteria. This chapter should be read in conjunction with chapter 4 of the Renewables Obligation: Fuel Measurement and Sampling Guidance Document.

Introduction

3.1. Article 54 in the RO[3] sets out the requirement for operators of generating stations using biomass fuel to report against sustainability criteria. There are two elements of this reporting –

1. Annual report for biomass feedstock consignments for Generating stations over 50kW: All generating stations over 50kW, which generate electricity (wholly or partly) from biomass, are required to provide Ofgem with an annual report. Generating stations using waste, biomass wholly derived from waste, landfill gas or sewage gas are exempt from this requirement. This reporting requirement was introduced in the 2009 Order and includes various pieces of information concerning the biomass fuel(s) used during each obligation period. Details of how to report are outlined in Chapter 4 of the Renewables Obligation: Fuel Measurement and Sampling guidance document.

2. 2011 requirements for reporting land use and GHG emissions

    a. Generating stations, over 50kW, using solid and gaseous biomass**:** The ROO 2011 introduces further criteria to be reported against, namely land use and GHG emission savings. This requirement is mandatory for all stations using solid and gaseous biomass above 50kW and is required on a monthly basis as part of output data submissions. Ofgem will issue further guidance on the solid and gaseous requirements later in 2011.

        NB. Please refer to Chapter 4 in the Renewables Obligation: Fuel Measurement and Sampling guidance in the interim period before the separate guidance on solid and gaseous biomass is published.

    b. All generating stations using Bioliquids**:** The ROO 2011 introduces further criteria to be reported against, namely land use and GHG emission savings. This requirement is mandatory for ALL stations using

[3] Article 54 of the ROS and Article 46 of the NIRO also refer.

bioliquids and is required on a monthly basis as part of output data submissions. Please note if a bioliquid does not meet the set criteria the fuel will not be eligible for ROCs. In addition to this, the operator of a generating station will be required to submit an annual audit report. Information of how to report on these requirements is outlined below.

What to report and when

3.2. Every operator of a station using bioliquids to generate electricity will be required to report on sustainability criteria of each fuel consignment as part of their monthly output data submission. This is in addition to all other monthly reporting requirement, as agreed as part of the fuel measurement and sampling process, and should be done via the Renewables and CHP Register.

3.3. As outlined in Article 54A of the RO, operators of a generating station using bioliquids will also need to submit an Annual Bioliquid Sustainability Audit Report. This is to verify that each consignment of bioliquids reported as meeting the sustainability criteria does indeed meet these criteria.

Monthly Reporting

3.4. As part of each monthly output submission from April 2011, the operator of the generating station is required to enter information concerning the land criteria and GHG criteria for biomass fuels used within the month. For each bioliquid, the operator will need to input the following information –

- Land criteria - The operator is required to confirm whether the bioliquid has met the land criteria by selecting 'yes' or 'no'. If the bioliquid is exempt from the land criteria the operator of a generating station can select 'exempt'. If the operator does not know whether the bioliquid meets the land criteria they can select 'unknown'.

- GHG criteria - The operator is required to enter the percentage GHG emission savings from the use of the bioliquid in comparison to a fossil fuel comparative. If the bioliquid is exempt from the GHG criteria the operator can select 'exempt'. If the GHG emission saving is not known the operator can select 'unknown'.

3.5. Article 22A of the ROO 2011 states that no ROCs are to be issued in respect of any electricity generated by a generating station from a bioliquid, unless the bioliquid meets the land and GHG criteria.

3.6. If the option of 'unknown' is selected for either the land or GHG criteria for a bioliquid, the operator will not have demonstrated that the bioliquid meets the

sustainability criteria. The fuel therefore will be treated as if it has not met the sustainability criteria and so will not be eligible for ROCs.

3.7. The operator is required to report monthly whether each consignment of bioliquid used to generate electricity has met the sustainability criteria. The operator will need to report each consignment of bioliquid separately in their monthly output data submission. If bioliquids are blended prior to combustion, the operator will need to determine the proportions in which each consignment has been used to generate electricity. This will ensure that, in the case where one or more of the consignments is deemed unsustainable, no ROCs will be issued on the electricity generated from the unsustainable fuel.

Annual Bioliquid Sustainability Audit Report

3.8. Article 54A of the ROO 2011 requires stations generating electricity, wholly or partly, from bioliquids, to provide Ofgem with an independent Annual Bioliquid Sustainability Audit report by the 31 May immediately following the obligation period. For example the audit report for the 2011/2012 obligation period is due by 31 May 2012.

3.9. The Annual Bioliquid Sustainability Audit Report must

- Be prepared by a person independent to the generating station.
- Identify the systems used to produce the relevant sustainability information.
- Confirm that measures have been taken to prevent these systems against fraud and to ensure that they produce accurate and reliable results.
- Evaluate the adequacy of the frequency and methodology of any sampling carried out for the purpose of obtaining or checking relevant sustainability information.
- Evaluate the robustness of the data on which the relevant sustainability information was produced.
- Be prepared to an adequate standard.

3.10. The report will be deemed to have been prepared to an adequate standard if it complies with the International Standard on Assurance Engagements 3000 (ISAE3000 – 2010 edition) or equivalent.

3.11. Chapter 7 sets out verification requirements for independent auditors.

3.12. We recommend that it is best practice for generating stations to engage with independent auditors as early as possible in the process.

Annual Biomass Feedstock Consignments Report

3.13. In addition to the requirements set out above, all generating stations over 50kW which generate electricity (wholly or partly) from biomass (other than waste, biomass wholly derived from waste, landfill gas or sewage gas) should continue to submit their annual biomass feedstock consignments report.

3.14. This requirement was introduced in the 2009 RO Order and includes various pieces of information concerning the biomass fuel(s) used during each obligation period. Details of how to report are outlined in Chapter 4 of the Renewables Obligation: Fuel Measurement and Sampling guidance document.

Use of Annual Bioliquid Sustainability Audit Report findings

3.15. In the instance where an operator has received ROCs in respect of a bioliquid, which an independent audit report deems not to have met the sustainability criteria, Ofgem is required to revoke such ROCs.

3.16. The number of ROCs to be revoked will be equal to the number that has been issued in respect of the bioliquid in question, for the obligation year which the audit report covers.

Late or incomplete Annual Bioliquid Sustainability Audit Reports

3.17. In the instance where a sustainability audit report is not provided to Ofgem by 31 May immediately following the obligation period, Ofgem will postpone the issue of ROCs, up to the number of ROCs we estimate the report is due to cover.

3.18. In the instance where a sustainability audit report has been provided to Ofgem by the relevant date, but is either incomplete or is deemed not to have been prepared to an adequate standard, Ofgem will postpone the issue of ROCs, up to the number of ROCs we estimate the report is due to cover.

3.19. In both instances, these ROCs will remain postponed until such time as the adequate sustainability audit report is provided.

CONSULTATION QUESTIONS

Q3. Do you feel the reporting requirements have been explained clearly?

4. Demonstrating compliance with the land criteria

Chapter Summary

This chapter describes in detail how an operator of a generating station can demonstrate compliance with the land criteria of the RO.

Introduction

4.1. The land criteria of the ROO 2011 refer specifically to the production of raw material from either a plantation or farm. They do not apply to any other steps further down the supply chain.

4.2. The evidence for meeting the land criteria (e.g. maps, sustainability certificate) does not necessarily need to travel along the supply chain from the farm or plantation and it can stay with the land owner. However, any information or evidence should be kept and made available if required for verification purposes.

4.3. The information that needs to pass along the supply chain is the information that the operator of a generating station is required to report to Ofgem.

4.4. There are a number of options available to operators of generating stations to demonstrate compliance with the land criteria. These options principally make use of up-front certification by recognised voluntary schemes. In the absence of voluntary schemes ex-post verification is also permitted. The permitted options for demonstrating compliance with the land criteria are as follows:

- Voluntary schemes recognised by the European Commission (EC) for the land criteria (preferred);
- Voluntary schemes recognised by Ofgem as evidence of compliance with the land criteria;
- Voluntary schemes recognised by another EU Member State for the land criteria (subject to recognition by Ofgem); and
- Ex-post verification of information on land use in January 2008.

These options will be further discussed below (sections 4.7 to 4.22).

4.5. Our preferred option is the use of EC-recognised voluntary schemes. However, at the time of writing, no such schemes have been approved. Further details on this are included in paragraphs 4.9-4.20.

4.6. The EU Member States will have to report to the EC on the broader environmental and social impacts of biofuels and bioliquids (including soil, air and water protection and social issues). Voluntary schemes may provide one means to gather such information on wider sustainability issues. On 12 January 2011 the EC published a Decision[4] which states that the EC may recognise voluntary schemes for the purpose of providing accurate data on the additional environmental and social aspects. Operators of generating stations should provide information in their Annual Bioliquid Sustainability Audit Report on whether they have used a voluntary scheme and the name of that scheme.

Using voluntary schemes

4.7. The RED (Article 18(4), 2nd sub-paragraph) encourages the use of recognised voluntary schemes as one of the ways of demonstrating compliance with the land use criteria of the RED as outlined in 4.4.

4.8. The EC will undertake formal assessments of voluntary schemes[5] to judge whether they deem the schemes appropriate to demonstrate compliance with the RED sustainability requirements, including the GHG and land criteria, the mass balance and auditing requirements. Note that schemes will be approved for a specific scope only, e.g. one or more of the land criteria, the GHG criteria and/or the methodology to calculate actual values, and/or the mass balance. EC Decisions on voluntary schemes will be published on the EC's transparency platform[6].

4.9. Member States are required to accept all voluntary schemes that have been recognised by the EC. We will recognise any voluntary scheme recognised by the EC from the date the EC Decision is published[7]. Any Decision by the EC takes precedence over any assessment made by UK Government, or other Member States.

4.10. A situation may occur where the EC decides not to recognise a scheme for a scope for which Ofgem had previously recognised the scheme. In most cases, Ofgem will continue to recognise the scheme for that scope for the remainder of the obligation year, after which the scheme is only recognised for the scope for which the EC has recognised it, although in some cases the scheme may still be able to provide supporting evidence towards compliance.

4.11. For consistency in the UK policy on biofuels and bioliquids, Ofgem proposes to draw on the RED assessments conducted by the Renewable Fuels Agency (RFA) for

[4] Commission Decision of 12 January 2011 on certain types of information about biofuels and bioliquids to be submitted by economic operators to Member States (2011/13/EU)
[5] It is the responsibility of voluntary schemes to apply to the EC for recognition against the /RED.
[6] http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm
[7] Subject to parties in the supply chain being audited against the version of the voluntary scheme that the EC Decision refers to.

the Renewable Transport Fuels Obligation (see Appendix 3 – Voluntary schemes recognised by Ofgem for the results). These assessments were conducted for indicative purposes before all details of the RED and Communications were published, and, therefore do not guarantee that these voluntary schemes will pass an assessment by the EC.

4.12. We will recognise the RFA assessment results and will work with RFA on any future review of those results, e.g. when further information is known about the EC assessment protocol.

4.13. If a revised assessment indicates that a scheme should no longer be recognised, we will allow parties to continue to use the scheme for the remainder of the obligation year.

4.14. We will only accept evidence of compliance with a non-EU approved scheme as supporting evidence of compliance with relevant criteria (e.g. for land criteria this could be biodiversity, carbon stocks and/or peatlands).

4.15. If parties request a voluntary scheme to be assessed, we will liaise with the RFA to identify the most appropriate way of doing this based on whether the scheme is reported significantly in the UK, and whether the scheme is already in the process of applying for RED recognition by the EC.

4.16. To encourage harmonisation across the EU, we recommend for any voluntary scheme to apply for recognition by the EC in the first place.

4.17. We will engage with the RFA on the assessment of voluntary schemes, to facilitate consistency in UK policy on biofuels and bioliquids. In assessing voluntary schemes against the land criteria and audit quality.

4.18. A draft assessment protocol is set out in Appendix 2. This is based on the RTFO assessment protocol, with additional criteria added to the audit quality to bring it in-line with the EC Communication[8] published after the RTFO assessment protocol was developed.

4.19. We are currently assessing the REDCert[9] voluntary scheme.

4.20. It is also possible that other Member States will assess voluntary schemes at their own discretion. We intend to allow operators of generating stations to report voluntary schemes accepted by other Member States. We would however reserve the right to reject any voluntary scheme recognised by another Member State, should

[8] Communication on voluntary schemes and default values in the EU biofuels and bioliquids sustainability scheme (COM 2010/C 160/01).
[9] http://www.redcert.org/

our assessment indicate that the scheme does not sufficiently meet the RED requirements on land criteria or audit quality.

Ex-post verification

4.21. When parties use a recognised voluntary scheme to demonstrate compliance with the land criteria they will typically be audited by an independent third party before they obtain certification by the voluntary scheme. In that case the voluntary scheme is expected to contain additional guidance on how to demonstrate compliance with the land criteria.

4.22. Parties that supply raw material for bioliquid not certified by a voluntary scheme recognised for the land criteria will have to demonstrate that the raw material met the land criteria in January 2008. Any claim that the bioliquid met the land criteria will be verified in the annual sustainability report submitted to Ofgem (see Chapter 7).

Guidance on land criteria

4.23. Operators of generating stations will need to report to Ofgem (demonstrate to auditors) whether the bioliquid meets the land criteria. In the absence of a voluntary certification scheme recognised for the land criteria, operators of generating stations can report the category of the land, as per 1 January 2008, from which the bioliquid feedstock originates. The following categories of land apply:

- Cropland – non-protected
- Cropland – protected
- Grassland (and other wooded land not classified as forest) with agricultural use
- Grassland (and other wooded land not classified as forest) without agricultural use
- Forest >30%
- Forest 10-30%
- Wetland
- Undrained peatland
- Peatland
- Degraded land
- Settlement

4.24. Table 6 in "Appendix 4 – Guidance on land categories and their compliance with the RO land criteria" provides further detail on the land categories that are available for operators of generating stations to report and provides specific guidance on whether the categories comply with the land criteria of the RO.

4.25. Cropland specifically refers to land that is under control of the farm or plantation. It is feasible that the land under control of the farm is not exclusively cropland, but also includes other land uses (e.g. forestland). If the land cover does

include forestland, it will have to be demonstrated that there has been no conversion of that forestland after 1 January 2008. However, in an instance where the land used to produce the feedstock is cropland, "cropland" should be reported.

4.26. In some cases the actual land cover may not be the same as the land category designated in a country's land registry. For example, it is feasible that the land is/was designated for future agricultural purposes in a land registry, but the actual land cover (if you visit the site) is actually forestland. In this example, the land should be reported as forestland.

4.27. It should be noted that the categories "cropland", "grassland" and "forestland" specifically refer to the land cover, while the categories "peatland" and "wetland" in fact refer to other characteristics of the land, such as soil properties, that are not mutually exclusive with the former. For example, a forest may be located on peatland, and grassland may be located on a wetland. The land types "peatland" and "wetland" and their variations should always be reported in precedence over the land types "cropland", "grassland" and "forestland" and their variations. For example, if a plantation is located on peatland then this should always be reported as peatland, irrespective of whether it had forest or grassland on it.

4.28. In line with 4.25 and 4.27, the land category "Cropland - non-protected" can only be reported if the land in question fully meets the RED criteria on biodiversity, high carbon stocks and peatland. Similarly, the land category "Cropland - protected" can only be reported if operators of generating stations can provide evidence that the production of the bioliquid raw material did not interfere with the nature protection purposes of the land.

4.29. The EC is working to establish criteria and geographic ranges of highly biodiverse grassland, relevant to Article 17(3)(c) of the RED (originally due to be published in 2011). Until this is done, and reflected in future amendments to the RO, we will not require operators of generating stations to demonstrate compliance with the highly biodiverse grassland criteria.

4.30. When a definition is published, we propose it becomes effective for RO sustainability criteria purposes as of the obligation period immediately following its publication.

4.31. The EC is preparing a guidance document to help identify the status of the land in January 2008. The guidance document has no formal legal status, but is expected to provide further advice on how to demonstrate compliance with the RED land use criteria. The document is expected to be published on the EC Transparency Platform during 2011. In addition, the EC has asked the European Committee for Standardization[10] (CEN) to draft specific guidance on the provision of evidence that

[10] CEN Sustainability criteria for biomass: http://www.cen.eu/cen/Sectors/Sectors/UtilitiesAndEnergy/Fuels/Pages/Sustainability.aspx

the production of raw material has not interfered with nature protection purposes (Article 17(3)(b)). This work is also expected to be developed during 2011. Ofgem recommends that operators of generating stations draw additional guidance on the evidence that may be available to demonstrate compliance with the land criteria from these documents.

4.32. If a land-use change is permitted under the RED (e.g. non-highly biodiverse grasslands to cropland, or Forest 10-30% to Cropland), then a carbon stock calculation resulting from the land-use change will need to be performed and the associated GHG emissions calculated and added to the supply chain emissions of the bioliquid. The relevant GHG saving threshold will still need to be met for the bioliquid to be compliant with the RED. For further details, see paragraph 5.3.

CONSULTATION QUESTIONS

Q4. Do you feel the ways of demonstrating compliance with land criteria have been explained clearly?

Q5. Are there are any other voluntary schemes, other than REDcert that you would like to see assessed?

5. Demonstrating compliance with the Greenhouse Gas emissions saving criteria

Chapter Summary

This chapter describes how to demonstrate compliance with the RO GHG criteria.

Introduction

5.1. This section provides guidance to operators of generating stations and verifiers on how to comply with the GHG criteria for bioliquids set out in Article 17(2) of the RED and implemented in Schedule 1A of the ROO 2011.

5.2. An operator of a generating station may or may not use a bioliquid that is already certified under a voluntary scheme that is recognised by the EC for the GHG criteria. This guidance for compliance with the GHG criteria only applies when a bioliquid used has not been previously certified by an approved voluntary scheme as complying with the GHG criteria**.** It is likely that at this stage, most bioliquids will not be certified by a voluntary scheme that meets the GHG criteria.

5.3. As part of the RED implementation in the ROO 2011, electricity operators of generating stations are required to report on the carbon intensity of any bioliquid used in electricity generation for which the operator of a generating station receives a ROC, and prove their compliance with GHG saving thresholds. The methodology prescribed in Schedule A1 of the RO (and also described in detail in Part C of Annex V of the RED) must be used for all GHG calculations carried out for the purpose of claiming ROCs under the RO, unless a default value (from part A or part B of Annex V of the Directive) is used.

- **Thresholds:** Bioliquids must achieve at least a 35% GHG emissions saving. This figure will increase to at least 50% from 1 January 2017, and 60% from 1 January 2018 for bioliquids produced in installations which started production on or after 1 January 2017. The threshold savings are all relative to the fossil fuel comparator as defined in the RED. The change in the relevant GHG emissions saving percentage over time is illustrated in Figure 1.

- **Exceptions:** Bioliquids produced in installations that were already operational on 23 January 2008 do not have to meet the 35% GHG saving threshold until 1 April 2013.

- **Options for compliance:** Compliance with the GHG criteria can be met through using default values provided in the RED, actual data, or a combination of both. This chapter explains when it is relevant to use these different options. It is likely that at this stage, as there are a limited number

of default values in the RED, many operators of generating stations may have to use actual data in their carbon calculations.

- **Scope of calculations:** The carbon saving of the bioliquid is calculated relative to a fossil fuel comparator stated in the RED - 91g of carbon dioxide equivalent per megajoule [CO_{2eq}/MJ]. The carbon intensity of the bioliquid includes any direct land use change emissions associated with the production of the bioliquid.

5.4. The evidence for meeting the GHG criteria does not need to be transferred down the supply chain, but information or evidence should be kept and made available if required for verification purposes.

5.5. The information that needs to flow through the supply chain is the information that the operator of a generating station is required to submit to Ofgem. Such information is set out in chapter 3.

5.6. There are four options available to operators of generating stations to demonstrate compliance with the GHG criteria. In the absence of a recognised voluntary scheme, ex-post verification is permitted. In addition, an independent annual sustainability audit will always be required to verify the end of year data that operators of generating stations report to Ofgem. The permitted options are:

- Voluntary schemes recognised by the EC for the GHG criteria;
- Voluntary schemes recognised by Ofgem as evidence of compliance with the GHG criteria[11];
- Voluntary schemes recognised by another EU Member State for the GHG criteria;
- Ex-post verification (of reported GHG information).

Using voluntary schemes

5.7. The RED (Article 18(4), 2nd sub-paragraph) encourages use of recognised voluntary schemes as one way of demonstrating compliance with the GHG criteria of the RED.

5.8. The EC will undertake formal assessments of voluntary schemes that apply to them to judge whether they deem the schemes appropriate to demonstrate compliance with the RED sustainability requirements, including the GHG accounting rules (if applicable). Furthermore, schemes will be approved for a specific scope only,

[11] This option is currently not used in practice as Ofgem and the RFA have not developed an assessment protocol for the GHG criteria. Ofgem may use this option in future when more information is known on how the EC will assess voluntary schemes for the GHG criteria.

e.g. for GHG this could be for the use of actual values. Any EC Decisions will be published on the EC's transparency platform[12].

5.9. Member States are required to accept all voluntary schemes that have been recognised by the EC. We will recognise any voluntary scheme recognised by the EC from the date the EC Decision is published[13]. Any Decision by the EC takes precedence over any assessment made by UK Government, or other Member States.

5.10. The EU Member States are permitted to undertake assessments of voluntary schemes as part of their national system[14]. Ofgem aims to coordinate assessments of voluntary schemes with the Renewable Fuels Agency (RFA). To date, the RFA has not yet undertaken assessments of voluntary schemes for determining GHG values because traditionally schemes did not have a module for GHG calculations for the RED. As such, we currently do not recognise any voluntary schemes for GHG.

5.11. If no voluntary schemes are available to demonstrate compliance with the GHG rules, then operators of generating stations can report default GHG values and/or combine this with their own GHG calculations using actual values and the RED GHG calculation methodology. This will then be part of the scope of the ex-post verification (see paragraphs 5.12 to 5.13 and Chapter 7).

Ex-post verification

5.12. When parties use a recognised voluntary scheme for the calculation of GHG emissions, they will typically be audited by an independent third party before they obtain certification by the voluntary scheme. In that case the voluntary scheme is expected to contain additional guidance on how to perform GHG calculations.

5.13. Parties that are not certified by a voluntary scheme recognised for GHG calculations, and that can/do not make use of a default value, will have to perform their own GHG calculations (in accordance with the RED methodology). In that case, the correct calculation of GHG emissions and GHG savings will be subject to independent verification as a part of the annual sustainability report. Additional guidance is given in this chapter on how to perform GHG calculations in the absence of a voluntary scheme.

12 http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm

13 Subject to parties in the supply chain being audited against the version of the voluntary scheme that the EC Decision refers to

14 See Communication on voluntary schemes (2010/C 160/01), section 2.

Guidance on Carbon Intensity Calculation

Introduction

5.14. As mentioned in the introduction, an operator of a generating station may or may not use a bioliquid that is already certified under a voluntary scheme that is recognised by the EC for meeting the GHG criteria. It is likely that at this stage, most bioliquids will not be certified by a voluntary scheme that meets the GHG criteria.

5.15. The carbon intensity of the bioliquid is calculated from the sum of the emissions associated with all the inputs required in the production of the bioliquid as well as any direct land use change emissions associated with the production of the bioliquid (e.g. forest clearing carried out to cultivate the bioliquid feedstock).

5.16. The carbon intensity of a batch of bioliquid can be determined using one of the following approaches:

- If a default carbon intensity for the production pathway has been published in the RED (and replicated in this document), use this default carbon intensity. However, there are certain conditions that need to be met for using these defaults (see paragraph 5.19).

  NB. Not all default carbon intensities meet the GHG threshold. If the use of the default carbon intensity means that the consignment of bioliquid would not meet the required threshold, then actual data will have to be used to show compliance with the required GHG thresholds.

- If a default carbon intensity for the production pathway exists but actual data on the production chain is available and the operator of a generating station wishes to use it, a combination of disaggregated default values for some parts of the supply chain and actual values for the other parts may be used (see paragraph 5.41)

- By using a carbon intensity calculated based entirely on actual values following the methodology set out in paragraph 5.24.

5.17. There are constraints on which approach can be taken to determine the carbon intensity of a bioliquid. Figure 2 below summarises these constraints. Please refer to the paragraphs referenced in the figure for more information on the constraints and the approaches.

5.18. Where the operator of a generating station has a choice about using a default value or actual data, it will be up to the parties to determine their preferred approach. Please note the following:

- Actual calculations can be time consuming and may require a large amount of effort and verification.
- Default carbon intensities are conservative, i.e. they should generally be higher than carbon intensities calculated using actual data (especially the GHG emissions from the processing stage, as they were calculated by increasing typical emissions for this stage by 40%, see paragraph 5.47).

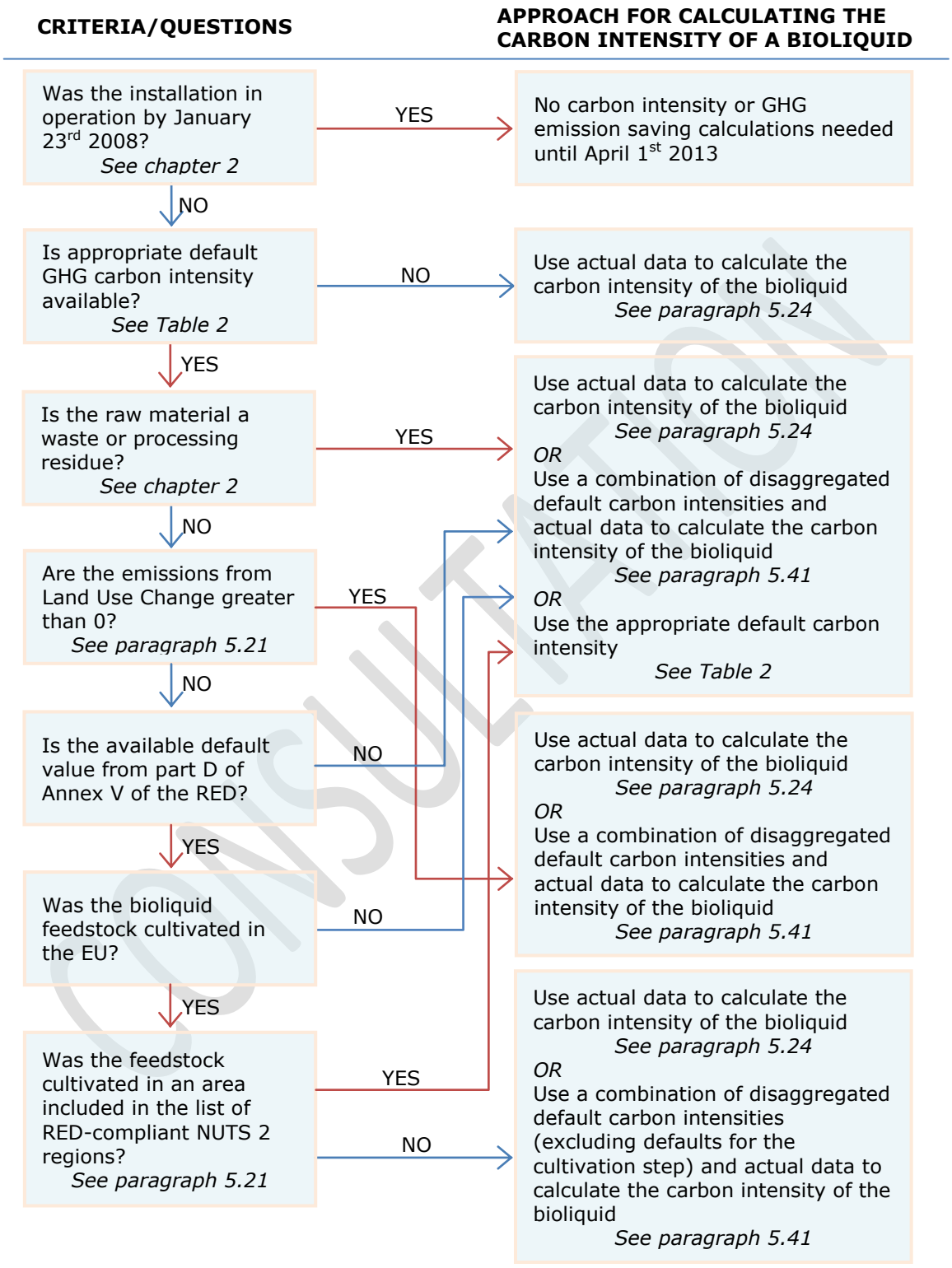

Figure 2: Carbon intensity calculation methods

Default Carbon Intensity

5.19. The EC has provided a series of default carbon intensities that can be used by any party for their GHG emission saving calculations, under the conditions outlined in the diagram above and discussed in more detail in paragraph 5.21.

5.20. Table 2 below shows the current version[15] of the list of default values. The Commission intends to update this list regularly (every two years starting in 2010). Please note that the first update (originally due 2010) has not yet been published. It is the operator of a generating station's responsibility to make sure that they are using the most up-to-date default carbon intensities published by the EC. We expect future updates to be published on the EC's online transparency platform[16].

Table 2: Default carbon intensities and disaggregated default values

Bioliquid production pathway	Default carbon intensity (CI) [gCO_{2eq}/MJ]	Disaggregated default values [gCO_{2eq}/MJ]			GHG saving[17] [%]
		Cultivation	Processing	Transport and distribution	
Ethanol pathways					
Corn ethanol, community produced (natural has as process fuel in CHP plant)	43	20	21	2	52.7
Farmed wood ethanol	25	6	17	2	72.5
Sugar beet ethanol	40	12	26	2	56
Sugar cane ethanol	24	14	1	9	73.6
Waste wood bioethanol	22	1	17	4	75.8
Wheat ethanol (process fuel not specified)	70	23	45	2	23.1

[15] As of January 10th, 2011.
[16] The European Commission transparency platform is available at: http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm.
[17] Note: This column has been added by Ofgem for indicative purposes only, and it does not form part of the original table published by the EC. We have calculated the GHG percentage value using this formula: *(CI of fossil fuel comparator – CI of bioliquid)/(CI fossil fuel comparator)*

Bioliquid production pathway	Default carbon intensity (CI) [gCO_{2eq}/MJ]	Disaggregated default values [gCO_{2eq}/MJ]			GHG saving[17] [%]
		Cultivation	Processing	Transport and distribution	
Wheat ethanol (lignite as process fuel in CHP plant)	70	23	45	2	23.1
Wheat ethanol (natural gas as process fuel in conventional boiler)	55	23	30	2	39.6
Wheat ethanol (natural gas as process fuel in CHP plant)	44	23	19	2	51.6
Wheat ethanol (straw as process fuel in CHP plant)	26	23	1	2	71.4
Wheat straw ethanol	13	3	7	2	85.7
Part from renewable sources of Ethyl tert-butyl ether (ETBE)	Equal to that of the ethanol production pathway used				
Part from renewable sources of Tertiary amyl-ethyl ether (TAEE)	Equal to that of the ethanol production pathway used				
Methanol pathways					
Farmed wood methanol	7	5	0	2	92.3
Waste wood methanol	5	1	0	4	94.5
Part from renewable sources of Methyl tert0butyl ether (MTBE)	Equal to that of the methanol production pathway used				
Biodiesel pathways					
Palm oil biodiesel (process not specified)	68	14	49	5	25.3
Palm oil biodiesel (process with methane capture at oil mill)	37	14	18	5	59.3

Bioliquid production pathway	Default carbon intensity (CI) [gCO_{2eq}/MJ]	Disaggregated default values [gCO_{2eq}/MJ]			GHG saving[17] [%]
		Cultivation	Processing	Transport and distribution	
Rape seed biodiesel	52	29	22	1	42.9
Soybean biodiesel	58	19	26	13	36.3
Sunflower biodiesel	41	18	22	1	54.9
Waste vegetable or animal biodiesel	14	0	13	1	84.6
Hydrogenated vegetable oil pathways					
Hydrogenated vegetable oil from palm oil (process not specified)	62	15	42	5	31.9
Hydrogenated vegetable oil from palm oil (process with methane capture at oil mill)	29	15	9	5	68.1
Hydrogenated vegetable oil from rape seed	44	30	13	1	51.6
Hydrogenated vegetable oil from sunflower	32	18	13	1	64.8
Pure vegetable oil pathways					
Pure vegetable oil from rape seed	36	30	5	1	60.4
Fischer-Tropsch diesel pathways					
Farmed wood Fischer-Tropsch diesel	6	4	0	2	93.4
Waste wood Fischer-Tropsch diesel	4	1	0	3	95.6
Dimethyl ether (DME) pathways					
Farmed wood DME	7	5	0	2	92.3
Waste wood DME	5	1	0	4	94.5

5.21. The use of these carbon intensities is subject to certain constraints:

- The party has to be able to prove that the carbon intensity reported does correspond to the actual bioliquid characteristics (which includes bioliquid type, feedstock and, if relevant, production process type). More information is provided on how this is proven in Chapter 7 on verification.

    - For bioliquid feedstocks produced in the EU, the default carbon intensity can only be used if the feedstock was cultivated in a region classified as level 2 in the Nomenclature of Territorial Units for Statistics (NUTS) which has been shown to have feedstock cultivation emissions lower or equal to the disaggregated[18] default value for feedstock cultivation. If the NUTS 2 region has higher cultivation emissions than the default, actual values must be used in the calculation of the cultivation emissions. However, default values for processing and transport and distribution can still be used. Member States' reports including lists of "RED-compliant NUTS 2 regions" per feedstock can be found on the European Commission transparency platform[16].

    - The default carbon intensities may also only be used if emissions from land use change are less than or equal to zero (see paragraph 5.52for how to perform these calculations).

5.22. If one of these points is not fulfilled, then the party must calculate the carbon intensity based either on a combination of actual values and disaggregated default values or on actual values alone (see following sections).

5.23. In addition it should be noted that if a operator of a generating station wishes to mix consignments of bioliquid with other consignments for the purpose of GHG calculation, they must report on each of the consignments separately.

Carbon intensity calculations based on actual values

5.24. The RED provides a methodology for calculating the carbon intensity of a bioliquid based on actual values. The section below sets out this methodology. The following sections then explain what input data and emission factors should be used by those wishing to use this methodology. Finally, a template for the necessary calculations is provided. Some worked examples using this methodology are also available online from Ofgem's website.

Methodology

5.25. The RED carbon intensity calculation methodology considers the life cycle GHG emissions associated with the bioliquid production. This means that all GHG emissions occurring during the production of the raw material and its processing into

[18] See paragraph 5.43 for an explanation of disaggregated default values

the final bioliquid should be accounted for. Furthermore, the GHG emissions occurring during the production of the energy and material inputs to the production steps should also be accounted for. This will include, for example, emissions from:

- fertiliser manufacture and transport
- pesticide manufacture and transport
- seed production and transport
- diesel, gasoline, heavy fuel oil and other fossil fuels production and transport
- chemicals for processing manufacture and transport
- electricity generation

5.26. The bioliquid supply chain (hereafter referred to as the "bioliquid chain") is made up of three main stages:

- Cultivation
- Production
- Transport and distribution

5.27. There may be more than one transport or processing step in the bioliquid chain. In Figure 3, the steps (or "modules") making up the three different stages are shaded in different colours. Many different bioliquid chain structures are possible, but chains usually start with the production of the raw feedstock (unless the feedstock used is a waste), which is transported to an industrial processing plant from where it undergoes a series of processing and transport steps before being transformed into the final bioliquid. There are then usually a series of distribution steps associated with the distribution of the bioliquid to the power plant. Figure 3 shows an example bioliquid chain under the RED.

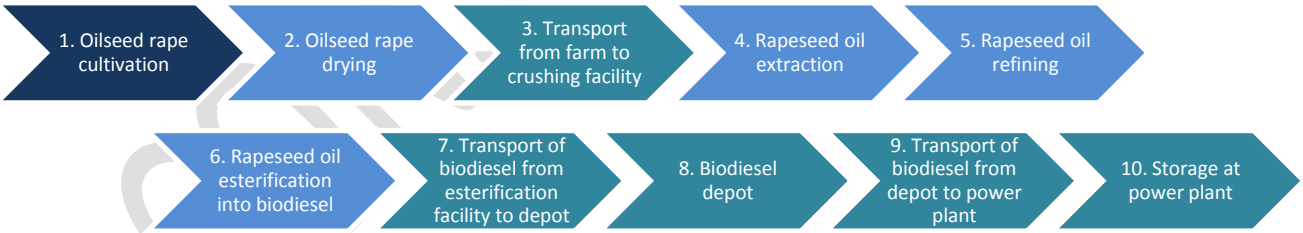

Figure 3: Example of a fuel chain structure. Rapeseed biodiesel.

(KEY - Dark blue: Cultivation, Blue: Processing, Teal: Transport and distribution)

5.28. The following steps explain how to calculate the carbon intensity of a bioliquid chain.

Step 1: Define the steps which occur during the production of a bioliquid. A step will be called a module in the rest of this document. A chain is thus composed of a

series of modules.

Step 2: Identify the main product which is exported from each module (e.g. oilseed rape, refined rapeseed oil, biodiesel, etc.). All emissions within a module will be calculated per tonne of this product (i.e. in $kgCO_{2eq}$/t product).

Step 3: Within each module identify all inputs (material and energy) which are likely to give rise to GHG emissions which will influence the final carbon intensity of the bioliquid by 1 percent or more.

Each input must then be measured and expressed per tonne of the exported product (i.e. in MJ or t input/t product).

Step 4: For each input, find an appropriate emission factor. The emission factor represents the amount of GHG emissions that occurred during the manufacture and distribution of an input (in $kgCO_{2eq}$/t input). See paragraph 0 for more information on emission factors.

Step 5: Within each module, multiply the inputs by their appropriate emission factors and add the results up. The final value is the total GHG emissions per tonne of output for this module (i.e. the material that is transferred to the next module in the bioliquid chain).

Step 6: Within each conversion module, identify if there are co-products, i.e. products that are produced (and which are not wastes, see section 2) alongside the main product and to which some of the emissions generated should be allocated), and decide on the most appropriate allocation treatment by following the rules in step 6a or 6b. If the co-product is a waste, the emissions associated with disposing of that waste should be included.

Step 6a: If the co-product is excess electricity from cogeneration, an emission saving should be calculated equivalent to the avoided emissions that the same amount of electricity would have produced when produced in an electricity only power plant using the same fuel.

This approach should be replaced by the approach in step 6b if the fuel used in the cogeneration unit is a processing co-product[19].

See paragraph 5 for the procedure for calculating the emission savings.

Step 6b: If the co-products are products that do not qualify for the emission saving in step 6a, an allocation factor based on the energy content of the co-products and main product should be calculated. See the paragraph 5.30 below for the procedure for calculating this allocation factor.

Step 7: For the cultivation module, make sure that the crop yield (in t product/ha.yr) has been collected.

N_2O emissions from soil should also be included in the cultivation module. They occur when nitrogen in the soil is converted to N_2O through naturally occurring processes. Biogeochemical models are the most sophisticated method for estimating these emissions from soils but are complex to use and require large amounts of data which are unlikely to be available. Instead, the RED recommends use of the IPCC methodology for estimating both direct and indirect N_2O emissions[20] when performing actual calculations. The use of Tier 1 of this

[19] In opposition to a cultivation co-product which would be eligible for the emission saving
[20] 2006 IPCC guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11 (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_11_Ch11_N2O&CO2.pdf)

methodology is recommended here because it simply correlates N_2O emissions with nitrogen fertiliser application rates. Please see the worked examples for an illustration of how N_2O emissions are calculated using this approach.

For all other modules, make sure that the efficiency (in t output/t input) of the module has been collected, as this is needed to establish the contribution that upstream emissions make to the final carbon intensity of the bioliquid.

For a conversion module, the efficiency is generally lower than 1. For transportation and distribution modules, the efficiency can be 1, if no losses occur during the transport.

Step 8: For each module, the contribution of that module to the total bioliquid carbon intensity now needs to be calculated (in gCO_{2eq}/MJ). This is done by taking the total GHG emissions per tonne of exported product for this module (as calculated in step 5), subtracting any emission savings for that module (as calculated in step 6a), multiplying them by any allocation factor of the module or any downstream modules (as calculated in step 6b), and finally divide it by the efficiency of any downstream modules (as determined in step 7).

Step 9: The new bioliquid carbon intensity can now be calculated by adding up the contribution of each module as calculated in step 8. This carbon intensity is expressed in $kgCO_{2eq}$/t bioliquid.

Step 10: Finally the carbon intensity has to be converted to gCO_{2eq}/MJ bioliquid, by dividing the results of step 9 by the energy content (in terms of lower heating value) of the bioliquid (in MJ bioliquid/kg bioliquid).

The energy content of typical bioliquids can be found in the standard emission factors list (see paragraph 0).

5.29. The following steps explain how to calculate the emission savings due to excess electricity cogeneration.

Step 1: Identify the amount of excess electricity being co-produced with the amount of heat used in the module[21].

Step 2: Determine the carbon intensity of electricity produced in an electricity only power plant using the same fuel as the co-generation unit (identified in step 1) by looking up the appropriate emission factor for the electricity.

Step 3: Give the output electricity a credit which is equal to the amount of exported electricity produced (per tonne of product), multiplied by the carbon intensity of power plant produced electricity (GHG emissions per tonne of electricity). This credit should be negative (i.e. reduces the carbon intensity of the bioliquid).

5.30. The following steps explain how to calculate the allocation factor associated with co-products.

Step 1: Calculate or look-up the energy content of all products exported from the

[21] In accounting for that excess electricity, the size of the cogeneration unit shall be assumed to be the minimum necessary for the cogeneration unit to supply the heat that is needed to produce the fuel

conversion plants (i.e. both the main exported product and all the co-products) – expressed in MJ/t of product.
NOTE: energy contents of the main co-products are part of the list of standard emission factors (see Table 2).

Step 2: Calculate the total energy contained in each product exported from the plant (including the main product and the co-products) by multiplying the amount of product (expressed in t product/t main product) by its energy content.

Step 3: Divide the energy of a tonne of main product by the total energy in all exported products – this is the allocation factor, i.e. the proportion of emissions which should be allocated to the main product.

5.31. If a feedstock is on the list of wastes and residues (see section 2), the methodology is exactly the same, except that there will be no emissions associated with cultivation and therefore no cultivation module. However emissions associated with collection of wastes and residues (if applicable) should be included.

Input data

5.32. For actual values collection, operators of generating stations should focus on parameters which have an impact on the overall results, i.e. inputs that change the carbon intensity by more than 1% when included. Data collection should especially focus on the data presented in Table 3.

Table 3: Data collection focus

Step in the supply chain	Focus for data collection
Crop production	Nitrogen fertilizer application rate Crop yield Fuel consumption for cultivation
Feedstock and liquid fuel transport	Transport distances
Conversion – e.g. bioliquid conversion or oilseed crushing	Efficiency[22] Fuel type and demand Electricity demand

5.33. It should be noted that the ROO 2011 makes a provision for "regional" cultivation data to be used in place of actual data. Following a requirement in the RED[23], European Member States have submitted reports which include a list of "regions" (of NUTS 2 size) and their associated cultivation emissions.

[22] i.e. tonnes of product (e.g. biodiesel) per tonne of input (e.g. rapeseed oil).

[23] Biofuel feedstocks produced in the EU must, if they want to use the EU default carbon intensity or a disaggregated default value for cultivation, come from a region (of a size classified as level 2 in the nomenclature of territorial units for statistics, NUTS 2) where the typical GHG emission from cultivation of that feedstock has been shown by the Member State

5.34. Although it has not been explicitly noted in the ROO 2011, Ofgem interprets this to mean that the total NUTS 2 level cultivation emissions reported by Member States and accepted by the European Commission can be used as regional cultivation emission averages instead of actual values.

Emission factors

5.35. A list of standard emission factors developed by the BioGrace project has been published on European Commission's transparency platform[24] as the set of emission factors and energy content values that were used to derive the RED default carbon intensities. These standard values can be used by parties wishing to calculate the actual carbon intensity of the bioliquid used.

5.36. If no appropriate emission factor or energy content can be found in this list, a value must be found in scientific literature (and a copy of this literature or its detailed reference provided to Ofgem as a part of verification process). The value used must fulfil the following requirements:

- The standard emission factor should be obtained from independent, scientifically expert sources.
- The standard emission factor should be updated as those sources progress their work.

5.37. When accounting for the consumption of electricity that is not co-produced within the bioliquid production plant, but which is imported from the grid, the emission factor for the electricity consumed should be equal to the average emission intensity of the production and distribution of electricity in the "region" where the bioliquid is produced. The emissions intensity of production and distribution in different regions should be taken from an authoritative source, e.g. the latest version of the IEA CO_2 emissions from fuel combustion database[25]. A region may be a sub-national region, a country or a supra-national region. If electricity *is* co-produced, follow the steps as outlined in paragraph 5.29.

5.38. If the electricity is provided from a power plant that is not connected to the electricity grid, operators of generating stations may use an emission factor equal to the emission intensity of the production of electricity in that specific power plant.

to be lower or equal to the disaggregated default value for cultivation published in the RED.

[24] The list of standard emission factors can be downloaded from: http://www.biograce.net/content/ghgcalculationtools/standardvalues

[25] Other sources may also be used.

Template for calculations and worked examples

5.39. A template summarising the calculations that need to be performed is shown in Appendix 6 of this document.

5.40. Ofgem has also prepared some worked examples for these calculations, which can be downloaded from http://www.ofgem.gov.uk. It should be noted that these worked examples are for information only. The data in the examples should not be used for reporting purposes. These only serve to illustrate how operators of generating stations can perform the calculations. Ofgem does not accept any responsibility for the accuracy of the data in these examples or any responsibility as to whether they represent the supply chains of the bioliquids used by operators of generating stations.

Combination of disaggregated default values and actual data

5.41. The third option for providing carbon intensity is to use a combination of actual data together with RED defined input data for different parts of the bioliquid supply chain.

5.42. As mentioned in the previous section on carbon calculations using actual values, bioliquid supply chains are divided into three stages:

- cultivation
- processing
- transport and distribution

5.43. The RED provides a breakdown of the overall carbon intensity for different bioliquids, into these different stages. The GHG emissions values provided for each of these parts are called disaggregated default values. If all 3 disaggregated default values are added together, the result is the total carbon intensity of the bioliquid chain (see Table 2).

5.44. The RFA in the UK and the Biograce project in the EU have provided a breakdown of the RED disaggregated defaults into their component input data. This information is incorporated into the Carbon Calculator (see paragraph 5.75) should operators of generating stations wish to use some of their input data in combination with some of these RED defined input data.

5.45. The RO permits the use of actual data in combination with default data or RED defined input data in the following three circumstances:

- Actual data for a whole stage, e.g. actual data provided for all transport modules within the transport stage, and disaggregated defaults for the other stages, e.g. for cultivation and processing.

- Actual data for individual modules within a stage, e.g. actual data for one of the transport modules, and RED defined input data for all the other transport modules.
- Actual data used for some inputs to a module and RED defined input data for the rest of the inputs, (respecting some rules on compulsory linkages, see paragraph 5.46).

5.46. There are some inputs to modules which are heavily interdependent– for example, the yield of many crops is influenced heavily by the amount of nitrogen which has been applied and as such, if actual data is provided for yield, actual data is also required for nitrogen input. These linkages are referred to here as compulsory linkages. They are summarised in the following table. The table below presents Ofgem's view in the lack of guidance from the European Commission. This approach may be updated when further guidance from the Commission becomes available.

Table 4: Compulsory linkages between interdependent parameters

Input one	Input two
Crop production	
Crop yield[26]	Nitrogen fertiliser application rate
Conversion	
Yield	Any co-product yield
Yield	Fuel or electricity use
Electricity or heat exported	Fuel use

5.47. It should be noted that the European Commission chose to take a conservative approach with respect to the disaggregated default value for processing. The disaggregated default value for all the processing stages for the different bioliquids was calculated using typical inputs to the processing modules, and then the resulting emission was multiplied by a factor of +40%.

5.48. However, if actual values are used to calculate emissions from the processing step, the 40% conservative factor does not apply if actual data is used for all of the following parameters within the same module:

- conversion efficiency
- quantity of fuel used
- electricity consumption, and
- chemicals consumption

[26] This compulsory linkage does not apply to sugar beet.

5.49. This removal of the conservative factor can be illustrated through an example. If a bioliquid chain is composed of 3 processing modules; oil extraction, oil refining and esterification:

- If an operator of a generating station reports actual data only on chemicals consumption for the oil extraction, the conservative factor will not be removed.
- If an operator of a generating station reports actual data on conversion efficiency, quantity of fuel used, electricity consumption and chemicals consumption for oil extraction, then the conservative factor will be removed for the oil extraction. It will however remain for the oil refining and esterification.
- If an operator of a generating station reports actual data on conversion efficiency, quantity of fuel used, electricity consumption and chemicals consumption for all 3 processing modules, then the conservative factor will be removed totally.

5.50. Please note the following constraints on the use of the disaggregated default values:

- The party has to be able to prove that the disaggregated default values used in the calculations do correspond to the bioliquid characteristics (which includes bioliquid type, feedstock and, if relevant, production process type).
- If the bioliquid feedstock was produced in the European Union, the disaggregated default value for the cultivation stage can only be used if the feedstock was cultivated in a NUTS 2 region which has been shown to have feedstock cultivation emissions lower or equal to that disaggregated default value. If the NUTS 2 region has higher cultivation emissions than the default, actual values must be used in the calculation of the cultivation emissions. Member States' reports including lists of "RED-compliant NUTS 2 regions" per feedstock can be found on the European Commission transparency platform[16].

Land use change emission calculation

Introduction

5.51. This section sets out how emissions due to land use change should be calculated. The same methodology should be applied for the calculation of emission savings from soil carbon accumulation via improved agricultural practices, such as for example the change from full to no tillage practice. Specific differences in the calculation of emissions from land use change and soil carbon accumulation are highlighted in paragraph 5.63.

5.52. The paragraphs below set out the rules for GHG emission calculations due to land use change. The European Commission's transparency platform has published

an annotated example of such emissions calculations which can be downloaded from their website[27].

5.53. Please note that all calculations in this section refer to *direct* land use changes. There are currently no requirements on operators of generating stations to report or include in their carbon intensity calculations, emissions from *indirect* land use change. The Directive may be amended to include this in the future.

5.54. Land use change related emissions shall be calculated based on the difference in carbon stocks of the land between the current and previous land use (on 1 January 2008), as shown in Equation 1.

Equation 1: Land use change emission

$$e_l = (CS_R - CS_A) \times 3{,}664 \times (1/20) \times (1/P) - e_B$$

Where:

e_l is the annualised GHG emissions due to land use change (in gCO_{2eq}/MJ)
CS_R is the carbon stock associated with the reference land use (i.e. the land use in January 2008 or 20 years before the feedstock was obtained, whichever the later) (in gC/ha)
CS_A is the carbon stock associated with the actual land use (in gC/ha). In cases where the carbon stock accumulates over more than one year, the value attributed to CS_A shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever the earlier
P is the productivity of the crop (in MJ/ha)
e_B is a bonus of $29gCO_{2eq}$/MJ is the bioliquid feedstock is obtained from restored degraded land under the conditions set out in the paragraphs below

5.55. Commission Decision 2010/335/EU of 10 June 2010 on guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive 2009/28/EC[28] defines the calculation of the carbon stocks as:

Equation 2: Carbon stock

$$CS_i = SOC + C_{VEG}$$

Where:
SOC is the soil organic carbon (in gC/ha)
C_{VEG} is the above and below ground vegetation carbon stock (in gC/ha)

27 http://ec.europa.eu/energy/renewables/biofuels/doc/ecofys_report_annotated_example_carbon_stock_calculation.pdf

28 This Decision is available online: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:151:0019:0041:EN:PDF

5.56. The main component of doing the land use change calculation is therefore estimating what the carbon stock is now and what it was in January 2008 or 20 years before the feedstock was obtained, whichever is the later. The following sections explain what the carbon stock estimates are based on, i.e.:

- Previous land use
- Climate and in some cases ecological zone
- Soil type
- Soil management (for both previous and new land use)
- Soil input (for both previous and new land use)

5.57. The location and nature of the land use change must be known by the operator of a generating station reporting land use change. When the change is known, it is possible to use the look-up tables in Commission Decision 2010/335/EU for the different parameters listed 2-5 above to estimate the change in carbon stock.

- Climate, ecological zone and soil type can be taken from maps and data provided in the Decision and on the EU Transparency Platform
- Soil management (whether full-till, reduced-till or no-till) and soil inputs (low, medium, high-with manure, and high–without manure) are factors that would need to be reported by the operator of a generating station reporting land use change

5.58. There are two land types (e.g. settlements and degraded land) for which the carbon stock has not yet been defined in the existing Decision. In the absence of a clear definition, Ofgem advises that settlements should be assumed to have no carbon stock and that the carbon stock of any land being claimed to be degraded land should be measured.

Soil organic carbon

Mineral soils

5.59. Parties may use several methods to determine soil organic carbon, including measurements[29]. As far as the methods are not based on measurements, they shall take into account climate, soil type, land cover, land management and inputs.

[29] Soil organic carbon levels can traditionally be measured using mass loss on ignition or wet oxidation However, newer techniques are being developed, which can either be carried out in the field or remotely (near infrared reflectance spectrometry, remote hyperspectral sensing).

5.60. As a default method, the following equation can also be used:

Equation 3: Soil organic carbon

$$SOC = SOC_{ST} \times F_{LU} \times F_{MG} \times F_I$$

Where:
SOC_{ST} is the standard soil organic carbon in the 0 – 30 cm topsoil layer (in gC/ha)
F_{LU} is the land use factor reflecting the difference in soil organic carbon associated with the type of land use compared to the standard soil organic carbon (no unit)
F_{MG} is the land use factor reflecting the difference in soil organic carbon associated with the principle management practice compared to the standard soil organic carbon (no unit)
F_I is the land use factor reflecting the difference in soil organic carbon associated with different levels of carbon input to soil compared to the standard soil organic carbon (no unit)

5.61. SOC_{ST} can be looked-up in Table 1 of Commission Decision 2010/335/EU[28] depending on climate region and soil type. The climate region can be determined from the climate region data layers available on the Commission's transparency platform[30]. The soil type can be determined by following the flow diagram on page 12 of the Commission Decision 2010/335/EU[28] or following the soil type data layers also available from the transparency platform[31].

5.62. F_{LU}, F_{MG} and F_I can be looked-up in Tables 2 to 8 of Decision 2010/335/EU,[28] depending on climate region, land use, land management and input.

5.63. If an operator of a generating station does not report a land use change but wishes the carbon intensity calculation to take into consideration an increase in soil carbon resulting from improved agricultural practices, the same calculations are performed but only F_{MG} or F_I will change between CS_R and CS_A.

Organic soils (histosols)

5.64. No default method is available for determining the SOC value of organic soils. The method used by parties should however take into account the entire depth of the organic soil layer as well as climate, land cover and land management and input. Such methods may include measurements.

[30] The climate region and soil type data layers are available online from http://eusoils.jrc.ec.europa.eu/projects/RenewableEnergy/

[31] This Decision is available online: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:151:0019:0041:EN:PDF

5.65. Where carbon stock affected by soil drainage is concerned, losses of carbon following drainage shall be taken into account by appropriate methods, potentially based on annual losses of carbon following drainage.

Above and below ground vegetation carbon stock

5.66. For some vegetation types, C_{VEG} can be directly read in tables 9 to 18 of Commission Decision 2010/335/EU[28].

5.67. If a look-up value is not available, vegetation carbon stock shall take into account both above and below ground carbon stock in living stock (C_{BM} in gC/ha) and above and below ground carbon stock in dead organic matter (C_{DOM} in gC/ha). These can be calculated based on the following equations:

Equation 4: Above and below ground carbon stock in living stock

$$C_{BM} = B_{AGB} \times CF_B + B_{BGB} \times CF_B$$

or

$$C_{BM} = (B_{AGB} \times C_{FB}) \times (1+R)$$

Where:
B_{AGB} is the weight of above ground living biomass (in kg dry matter/ha)
B_{BGB} is the weight of below ground living biomass (in kg dry matter/ha)
CF_B is the carbon fraction of dry matter in living biomass (in kgC/kg dry matter)
R is the ratio of below ground carbon stock in living biomass to above ground carbon stock in living biomass

Equation 5: Above and below ground carbon stock in dead organic matter

$$C_{DOM} = DOM_{DW} \times CF_{DW} + DOM_{LI} \times CF_{LI}$$

Where:
DOM_{DW} is the weight of dead wood pool (in kg dry matter/ha)
CF_{DW} is the carbon fraction of dry matter in dead wood pool (in kgC/kg dry matter)
DOM_{LI} is the weight of litter (in kg dry matter/ha)
CF_{LI} is the carbon fraction of dry matter in litter (in kgC/kg dry matter)

5.68. These values are determined as follows:

- B_{AGB} shall be the average weight of the above ground living biomass during the production cycle for cropland, perennial crops and forest plantations
- CF_B = 0.47
- B_{BGB} shall be the average weight of the below ground living biomass during the production cycle for cropland, perennial crops and forest plantations
- R can be read in tables 11 to 18 of the Commission Decision 2010/335/EU
- CF_{DW} = 0.5
- CF_{LI} = 0.4

Degraded land bonus

5.69. A bonus of 29gCO_{2eq}/MJ shall be attributed if evidence is provided that the land on which the bioliquid feedstock was grown:

- was not in use for agriculture or any other activity in January 2008; and

- falls into one of the following categories:
  (a) severely degraded land including such land that was formerly in agricultural use;
  (b) heavily contaminated land

5.70. The bonus shall apply for a period of 10 years from the date of conversion of the land to agricultural use, provided that a steady increase in carbon stocks as well as a sizable reduction in erosion phenomena for land falling under (a) are ensured and that soil contamination for land falling under (b) is reduced.

5.71. The Comitology process of the EC is currently working on a refined definition of severely degraded and heavily contaminated land. **Until further guidance is issued, no bioliquid will be eligible to claim the degraded land bonus.** We will update this guidance document to include the definition of degraded land before the bonus can be claimed.

GHG emission savings calculation

Methodology

5.72. GHG emission savings should be calculated using the following equation:

Equation 6: GHG emission saving equation

$$\textbf{GHG emissions saving} = \frac{E_F - E_B}{E_F}$$

Where:

E_B is the total GHG emissions (i.e. carbon intensity and land use change emissions) from the bioliquid

E_F	is the total GHG emissions from the fossil fuel comparator

5.73. The GHG emissions from the fossil fuel comparator depend on the use of the bioliquid. For the purposes of equation 6, the GHG emissions from the fossil fuel comparator are 91gCO_{2eq}/MJ.

5.74. A template for calculating the overall carbon savings is provided in Appendix 8 – Template for Carbon intensity calculations. In addition worked examples of these calculations are provided in a separate excel document available from http://www.ofgem.gov.uk.

GHG emission calculation tools

5.75. When calculating actual carbon intensities, the use of the Carbon Calculator[32], originally developed for reporting under the Renewable Transport Fuel Obligation (RTFO), is strongly recommended. The Carbon Calculator will facilitate the implementation of the RED life cycle calculation methodology for reporting the carbon intensity of bioliquids under the RO.

5.76. If the Carbon Calculator is used, the software automatically calculates the total emissions of the module being edited, and the contribution of that module to the overall fuel chain. It also identifies the key inputs required for any particular module, depending on what type of module it is (e.g. cultivation, transport and distribution, etc). Furthermore, accepted default emission factors are included in the Carbon Calculator. If an Excel workbook is used, the user has to perform all the required calculations as described in Appendix 8 and as illustrated in the worked examples available on our website.

5.77. The other advantage of the Carbon Calculator is that a bioliquid chain can be loaded with the RED defined input data already in it33. This makes it possible to perform calculations with a combination of actual and RED defined input data, as described in paragraphs 5.41 to 5.50. It should be noted that the Calculator only includes fuel chains for which RED default values exist; new chains cannot be developed by Ofgem and added to the Calculator. However users can create their own, new, fuel chains in the Calculator.

[32] The Carbon Calculator can be downloaded from the RFA's website: http://www.renewablefuelsagency.gov.uk/carboncalculator

[33] Based on the data from the BioGrace project, most default carbon intensities have been replicated in the Carbon Calculator. However, for a few bioliquid chains, the default input data used to calculate the RED default carbon intensities are not available. The Carbon Calculator does not provide default input data for these latter chains.

5.78. The Carbon Calculator User Manual[34] lays out rules on how to build a new fuel chain in the Carbon Calculator and how to calculate its carbon intensity.

5.79. Other tools may be used for calculating carbon intensities and emissions savings of bioliquids. However, we would recommend the use of the Carbon Calculator for its user interface (not spreadsheet based) and its level of consistency with the requirements of the RO. If other tools are used, it is the responsibility of the user to check their compliance with the methodological requirements of the RO.

CONSULTATION QUESTIONS

Q6. Do you feel the ways of demonstrating compliance with GHG emissions saving criteria have been explained clearly?

[34] The Carbon Calculator User Manual can be downloaded from the RFA's website: http://www.renewablefuelsagency.gov.uk/sites/rfa/files/Carbon_Calculator_User_Manual_for_RTFO_Year__3_RED_Ready%20v1.2.pdf

6. Demonstrating compliance with the Mass Balance rules

Chapter Summary

This chapter describes the requirements of the mass balance chain of custody system under the RO.

Introduction

6.1. Bioliquid data reported to Ofgem must be verifiable. Therefore the bioliquid data reported by the operator of a generating station has to be traceable back through all parties in the supply chain who take legal ownership over the feedstocks or product at any point. This is called a chain of custody. This chapter explains how the chain of custody works, outlines what rules apply and gives specific guidance for setting up a chain of custody where one does not yet exist.

6.2. The chain of custody is the method by which a connection is made between information or claims concerning raw materials or intermediate products and claims concerning final products. An essential aspect of the chain of custody system in the context of the RO is that it must be able to demonstrate that for each unit of bioliquid with certain carbon and sustainability characteristics reported to Ofgem, an equivalent amount of feedstock with the same carbon and sustainability characteristics has been added to the market. In other words, the mass balance ensures that no "double counting" of carbon and sustainability information occurs anywhere in the supply chain.

General requirements for the Mass Balance

6.3. The type of chain of custody permitted when bioliquids are used for the RO is a mass balance system[35] (note that a system using physical segregation, which is a more stringent system, generally also meets the requirements of a mass balance system). Other chain of custody types, such as book-and-claim, are not allowed and therefore by implication, equivalence trading is not allowed to be used under the RO.

6.4. Under the RO, a mass balance system is widely used for determining volumes of fuel used when bioliquids and fossil fuels are mixed. This fuel measurement requirement is separate from sustainability requirements, thus still applies.

[35] In line with the RED Article 18(1), the RO (Article 22A) requires a mass balance chain of custody system to be used Note that in January 2011 the EC published a review of chain of custody systems. This report confirms that mass balance remains the only chain of custody system allowed to be used under the RED. The EC will continue to monitor the situation and will report again in 2012.

6.5. For the RO, a mass balance system is a system in which 'sustainability characteristics' remain assigned to 'consignments' and to which the following basic rules apply:

- Consignments of raw material or bioliquid with differing sustainability characteristics can be mixed;
- Information about the sustainability characteristics and size of the consignments are required to remain assigned to the mixture; and

- The sum of all consignments withdrawn from the mixture are described as having the same sustainability characteristics, in the same quantities, as the sum of all consignments added to the mixture.

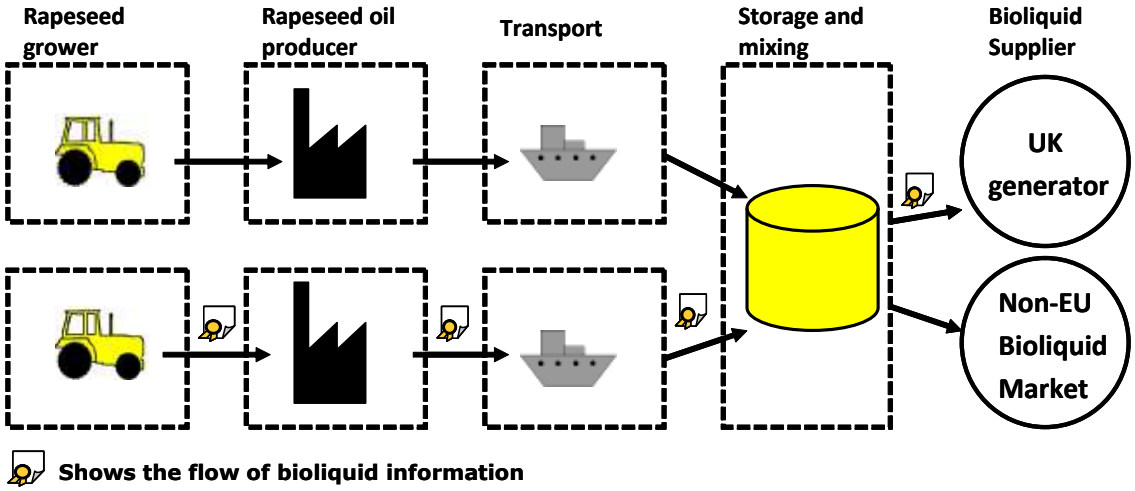

Figure 4: Example of a mass balance system

6.6. While the mass balance system effectively passes on the claims on the product with respect to compliance with the RO criteria, the underlying evidence for these claims does not need to travel up the supply chain. It can stay with the relevant party at the specific supply chain stage. However, any information or evidence should be kept and made available if required for verification purposes.

6.7. The information that needs to pass down the supply chain is the information that is required to demonstrate compliance with the RO land and GHG criteria. Paragraph 6.38 gives details of the information that is likely to be required.

6.8. There are two options available to operators of generating stations to demonstrate compliance with the mass balance requirements. In the absence of a recognised voluntary scheme, ex-post verification of the mass balance is permitted. An independent sustainability audit report will always be required to verify data that operators of generating stations report to Ofgem at the end of each obligation period. The permitted options are:

- Voluntary schemes recognised by the EC for the mass balance system (preferred);
- Voluntary schemes recognised by Ofgem as evidence of compliance with the mass balance system[36];
- Voluntary schemes recognised by another EU Member State for the mass balance system (subject to recognition by Ofgem)[36]; and
- Ex-post verification of mass balance chain of custody records.

These options will be further discussed below (sections 6.9 to 6.17).

Using Voluntary Schemes

6.9. The RED allows for the use of voluntary schemes as one way of demonstrating compliance with the mass balance rules.

6.10. As outlined in chapter 4, the EC will undertake formal assessments of voluntary schemes to judge whether they deem the schemes appropriate to demonstrate compliance with the RED sustainability requirements, including the mass balance rules. Furthermore, schemes will be approved for a specific scope only, e.g. the mass balance system. Any EC Decisions will be published on the EC's transparency platform[37].

6.11. Member States are required to accept any voluntary scheme that has been recognised by the EC. Ofgem will recognise any voluntary scheme that has been recognised by the EC from the date the EC Decision is published[38]. Any Decision by the EC takes precedence over any assessment made by UK Government, or other Member State.

6.12. Member States are also permitted to undertake assessments of voluntary schemes. Ofgem aims to coordinate assessments of voluntary schemes with the RFA. To date, the RFA has not yet undertaken assessments of voluntary schemes for mass balance. As such, Ofgem currently does not recognise any voluntary schemes for mass balance.

6.13. If no voluntary schemes are available to demonstrate compliance with the mass balance rules, then parties can set up their own mass balance system, which will then be part of the scope of the ex-post verification (see sections 6.14 to 6.17, Chapter 7, and Appendix 6 – Example templates for Mass Balance system).

[36] This option is currently not used in practice as Ofgem and the RFA have not developed an assessment protocol for the mass balance. We may use this option in future when more information is available on how the EC will assess voluntary schemes for the mass balance.

[37] http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm

[38] Subject to parties in the supply chain being audited against the version of the voluntary scheme that the EC Decision refers to.

Ex-post verification

6.14. When parties use a recognised voluntary scheme for the mass balance, they will typically be audited by an independent third party before they obtain certification by the voluntary scheme. In that case the voluntary scheme is expected to contain additional guidance on how to operate the mass balance.

6.15. Parties that are not certified by a voluntary scheme recognised for mass balance will have to set up their own mass balance system. In that case, the proper functioning of this mass balance system will be subject to verification during the ex-post verification of the data submitted by the operator of a generating station to Ofgem, see Chapter 7. As in this case there is no guidance available from a voluntary scheme, additional guidance is given in this chapter on how to operate such a mass balance.

6.16. We consider this option to be an interim solution until more voluntary schemes are recognised for mass balance purposes. We will be phasing this option out over time, as more voluntary schemes become available. The exact timing of phasing out this option will depend on the development and adoption of such voluntary schemes recognised for mass balance.

6.17. If some parties in a supply chain are certified against a voluntary scheme that is recognised for mass balance but other parties in the same supply chain are not, then these other parties should still set up their own mass balance system. For example, it is possible that a plantation and mill are certified against the same voluntary scheme, but the mill may then sell feedstock to a trader who is not. The trader (and parties it subsequently sells to) would then have to set up their own chain of custody system. Again, the correct functioning of their mass balance system will then be subject to verification during the ex-post verification of the data submitted by the operator of a generating station to Ofgem, see Chapter 7.

Guidance for operating a mass balance system

6.18. The guidance given is primarily meant for parties setting up a mass balance system in the absence of certification against a voluntary scheme that has been recognised for the mass balance. Where a recognised voluntary scheme is used, guidance will be given by the voluntary scheme.

Scope

6.19. Each party in the bioliquid supply chain, which is at any point the legal owner of the product, needs to put in place the administration necessary to maintain the chain of custody.

Responsibilities and procedures

6.20. Each company in the chain of custody should:

- Appoint a person or position with overall responsibility for compliance with the chain of custody procedures explained below;
- Have written procedures or work instructions to ensure implementation of the requirements as explained below.

6.21. Ensuring such a process is in place is the responsibility of an operator of a generating station, who wishes to claim ROCs under the RO.

Selling products with bioliquid data

6.22. Records of commercial transactions should enable parties in the supply chain, and the verifier appointed by the operator of a generating station, to trace back through the supply chain to verify any bioliquid claims made. A company that sells products with bioliquid data should specify the bioliquid data on the invoice or on a document to which the invoice refers.

6.23. The invoice or relevant document should include the following information:

- The name and address of the buyer;
- The date on which the invoice was issued;
- Description of the product – this must correspond to the description of the product given in the input and output records, see below;
- The quantity of the products sold with specific bioliquid data. If the invoice contains products with different bioliquid data, these shall be identified separately in such a way that it is clear to which products the bioliquid data refers.

6.24. A party in the chain of custody cannot sell more output with certain bioliquid data than its sourced input with the same bioliquid data (taking into account the relevant conversion factors).

Level and timeframe of the mass balance

6.25. The mass balance should be operated at least at the level of a site that a company owns/operates. For the purposes of mass balance sustainability requirements, a 'site' is defined as "one geographical location with precise boundaries within which products can be mixed". A site can include multiple silos or tanks, for example, as long as they are at the same physical site.

6.26. Figure 5 presents an example of the mass balance system at site level.

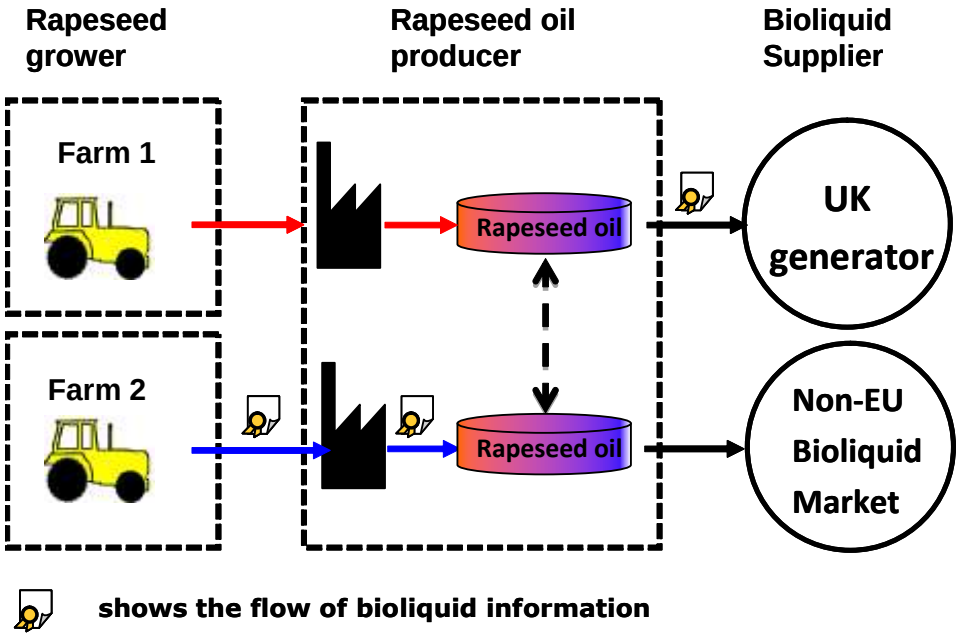

Figure 5: Example of a mass balance system at site level

6.27. The periodic inventory of bioliquid data shall not be negative. It is recommended that for all parties in the supply chain the periodic inventory is undertaken at least on a monthly basis. The period over which the mass balance has to be achieved must not exceed one year.

6.28. Operators of generating stations will be required to report accurately on their fuel use in the month of burn.

6.29. For any transaction, the traded amount of bioliquid data cannot exceed the traded amount of physical product.

Proportionate feedstock reporting

6.30. In passing bioliquid information through the supply chain, it is permitted to use a mass balance system to freely allocate bioliquid sustainability information to outgoing consignments *within a feedstock type* (e.g. if a party has a consignment of bioliquid composed of a mixture of rapeseed oils from different sources with different sustainability characteristics, that party is permitted to freely allocate the sustainability information to outgoing consignments of rapeseed oil bioliquid).

6.31. For the purposes of the RO, information on feedstock type itself must be representative of the actual feedstock mix from which the consignment was drawn.

EXAMPLE

Issue: Party X sources bioliquid which contains a mixture of palm bioliquid and rapeseed oil bioliquid. It sells half of this for consumption in the UK and the other half is sold outside the EU. Can X sell the bioliquid for consumption in the UK with only rapeseed oil data or does the bioliquid data of each outgoing consignment need to be representative of the actual feedstock mix?

Solution
Parties must practice 'proportionate feedstock reporting'. Bioliquid data of each outgoing consignment needs to be representative of the actual feedstock mix. So Party X must sell bioliquid as a mixture of palm and rapeseed bioliquid.

6.32. Terminology

- Reporting representative feedstock information will be called 'proportionate feedstock reporting'.
- In the example above, if parties were to allocate only rapeseed oil data to an outgoing consignment which physically contains both rapeseed oil and palm oil, this is called 'non-proportionate feedstock reporting'.

6.33. Note that the RTFO currently requires a proportionate feedstock reporting approach. However at the time of writing the RFA is consulting on whether to require this only for the part of the supply chain that produces or trades single feedstocks. Thereby this *may* not be a requirement for trading of finished blends of biofuel for transport from Year 4 of the RTFO (from 15 April 2011). In the interests of consistency of biofuel and bioliquid policy, we will discuss with RFA the outcomes of both Ofgem and RFA stakeholder consultations.

6.34. Note that companies who only supply bioliquids into the RO (and not to other countries) will automatically fulfil this requirement and no further steps need to be taken. Companies may, however, be required to show that they only supply bioliquid into the RO.

6.35. Under a proportionate feedstock reporting approach companies are free to use their own internal systems to track the feedstock mix of the bioliquid they supply. Companies can calculate the 'actual' feedstock mix of the fuel as it exits a mixed-feedstock tank either on a continuous or a discrete basis:

- Continuous calculation of the feedstock mix would involve calculating the feedstock proportions in a tank each time a new consignment enters the tank. The feedstock proportions reported for an outgoing consignment then represent the actual feedstock mix in that tank at that point in time;
- Calculation on a discrete basis is designed to involve less frequent re-calculation. When a tank is 'full' the overall feedstock mix and volume in the tank is recorded. That feedstock proportion is then used for all the outgoing consignments until the tank is 'empty'.

EXAMPLE

At a certain point in time a tank holds 1,000 tonnes of vegetable oil. The feedstock proportion is determined and recorded based on the last 1,000 tonnes added to the tank. This feedstock proportion is assigned to the next 1,000 tonnes that exit the tank. The process is then repeated for the next (for example) 1,000 tonnes added to the tank. Note that this methodology can still be used when fuel is continuously inputted and outputted from a tank – the concept of the tank being filled and emptied is purely for administrative purposes.

Record keeping

6.36. Each party in the chain of custody should, for at least a period of five years, keep the following records that should concur with the information on the invoices, to enable bioliquid data claims to be traced back through the supply chain:

- Input and output records of bioliquid data. Input records refer to the bioliquid data of products purchased from a supplier. Output records refer to the bioliquid data of products sold to a buyer. For each administrative consignment these records should include at least:
    - Invoice reference(s)
    - A description of the physical product to which the bioliquid data refer
    - The volume of physical input/output to which the bioliquid data refer
    - The supplying/receiving company
    - Transaction date
    - Any bioliquid data
- Conversion factor records. These records refer to the conversion factor of inputs to outputs (e.g. rapeseed to rapeseed oil). Each party in the supply chain can maintain records of its own conversion factors. A party may have more than one conversion factor. If no records are kept for the conversion factor the default value for the respective conversion, as used in the default GHG-calculations for the respective pathway must factor, must be used. This

is only possible if a default GHG-value exists for the pathway. For each conversion factor it must be clear from the records:

- To which input product it refers
- To which output product it refers
- The units in which the conversion factor is expressed
- The value of the actual conversion factor
- When the specific conversion factor was valid.

- The conversion factors may also be integrated in the input, output or inventory records as long as the requirements listed here are met

- Periodic inventory of bioliquid data. These records provide an insight into the balance of bioliquid data. Besides helping a company to manage its input-output balance, these records also assist in the verification of a party's mass balance records. The period between inventories is recommended to be no longer than one month, and records should include:

  - The inventory of bioliquid data at the beginning of the respective period. It must be clearly specified whether this is expressed in input-equivalents (before conversion factor) or output-equivalents (after conversion factor);

  - The volumes of inputs with identical bioliquid data in the respective period. These volumes must coincide with the input records described above;

  - The volume of outputs with identical bioliquid data in the respective period. These volumes must coincide with the output records described above;

  - The conversion factor(s) used in the respective period;

  - The inventory of bioliquid data at the end of the respective period (including the carbon intensity of the stock). It must be clearly specified whether this is expressed in input-equivalents (before conversion factor) or output-equivalents (after conversion factor).

6.37. Example formats for the records described above are illustrated in Appendix 6 – Example templates for Mass Balance system.

6.38. As part of the record keeping, the following bioliquid data is likely to be ensure a sufficient level of detail necessary to assess compliance with the RO land and GHG criteria:

- Bioliquid type: e.g. pure vegetable oil;

- Product: the intermediate product sold in the supply chain;
- Bioliquid feedstock;
- Production process type: only currently relevant for palm oil and wheat bioliquid feedstocks. Necessary information if want to indicate that a specific process characteristic has been used (e.g. methane capture in the palm oil mill), which would allow a lower default GHG value to be used (see section 5.21);
- Country of origin of the bioliquid feedstock;
- NUTS 2 compliant region: necessary to determine whether default GHG values are permitted to be (see section 5.21);
- Voluntary scheme: one option to demonstrate compliance with RO land, GHG and mass balance requirements (note voluntary schemes are only recognised for a certain scope, so may not include all criteria);
- Land Use on 1 January 2008: necessary to demonstrate compliance with RO land criteria in the absence of a voluntary scheme;
- Carbon intensity: necessary to demonstrate compliance with RO GHG criteria;
- Bonus degraded land: The RED allows a bonus of 29gCO2/MJ for cultivation on degraded and heavily contaminated land (see sections 5.69-5.71). Since no definitions on degraded and heavily contaminated land exist yet this bonus is not yet part of the RO;
- Factor soil carbon accumulation: The RED provides the possibility to deduct emissions from soil carbon accumulation resulting from improved agricultural practices (see section 5.63);
- Installation in operation on 23 January 2008: only to be reported by processing installations, necessary to demonstrate whether the bioliquid is exempt from complying with the GHG threshold until 1 April 2013;
- Crop yield, only to be reported by farm or plantation, necessary if actual GHG-values are used (see section 5.32);
- Nitrogen use, only to be reported by farm or plantation, necessary if actual GHG-values are used (see sections 5.32).

CONSULTATION QUESTIONS

Q7. Do you feel the ways of demonstrating compliance with Mass Balance rules have been explained clearly?

Q8. Do you think proportionate feedstock reporting should be required only for the part of the supply chain that produces or trades single feedstocks?

7. Auditing requirements

Chapter Summary

This chapter describes the requirements to verify compliance with the RO sustainability criteria.

General

7.1. Bioliquid generators are required to demonstrate compliance with the ROO 2011 sustainability requirements and the data must be independently verified before submitting to Ofgem as part of an operator's Annual Bioliquid Sustainability Audit Report (ROO 2011 Article 54A).

7.2. The verification is likely to be undertaken through a risk-based sampling approach and therefore not every single piece of data will be checked. The sample size is down to the professional judgement of the verifier.

7.3. Verifiers are required to follow the guidance set out in the ISAE 3000 standard, or equivalent.

7.4. Table 2 in the EC Communication on voluntary schemes (2010/EC 160/01) includes a number of example ways of showing that verifiers comply with the requirements to carry out verification. ISAE 3000 is explicitly mentioned as a standard which sets out how verification itself should actually be undertaken. The other verification standards mentioned are more relevant for verifiers to demonstrate their competence in carrying out an audit/verification. For example, the ISO 14064-3 standard could be an interesting one for verification specifically of the GHG data for the RED, but the standard does not give clear guidance on how to deal with supply chains and related sampling issues. Therefore, it would be more appropriate to use for one party in the supply chain in case they want to get their data verified.

7.5. Following verification, the auditor will provide the operator of a generating with a formal assurance opinion (a verification statement) on the reported data at least to a 'limited assurance level'. The term 'limited assurance' is defined in the International Standard on Assurance Engagements (ISAE 3000). This is a standard for non-financial assurance engagements.

7.6. In the interest of a successful verification process we strongly recommend that operators of generating stations liaise with their independent auditors at an early stage, to ensure that appropriate information and evidence is collected and all necessary systems are put in place.

Timing

7.7. It is the responsibility of the operators of generating stations, to provide an independent assurance opinion on the Annual Bioliquid Sustainability Audit Report to Ofgem by 31 May after the end of the obligation period which it covers. This opinion must be supplied regardless of the conclusion reached. Organising the verification is the responsibility of the operators of generating stations. For more information on reporting timeframes, please see Chapter 3.

What needs to be verified

Scope of verification

7.8. There is no requirement to pass physical evidence (such as copies of invoices etc.) from farms, processors or other suppliers along the supply chain. The party who generates the land, GHG and/or mass balance data retains this evidence. In verifying the data reported by an operator of a generating station, the verifier may expect to work back up the supply chain to the source data using the mass balance records. The co-operation of those in the supply chain is therefore vital.

7.9. Data subject to verification are, for example:

- Bioliquid type
- Bioliquid feedstock
- Production process type
- Country of origin of the bioliquid feedstock
- NUTS 2 compliant region
- Voluntary scheme(s) (including any additional checks/audits where these have been performed)
- Land Use on 1 January 2008
- Carbon intensity and associated data, for example if actual GHG values used actual data on, for example crop yield and nitrogen fertiliser use may need to be verified
- Whether installation was in operation on 23 January 2008, if the GHG grandfathering clause is used
- Mass balance records;
- Other information provided in the Annual Bioliquid Sustainability Audit Report.

7.10. An example of the data flow within a simplified supply chain is shown in Figure 6.

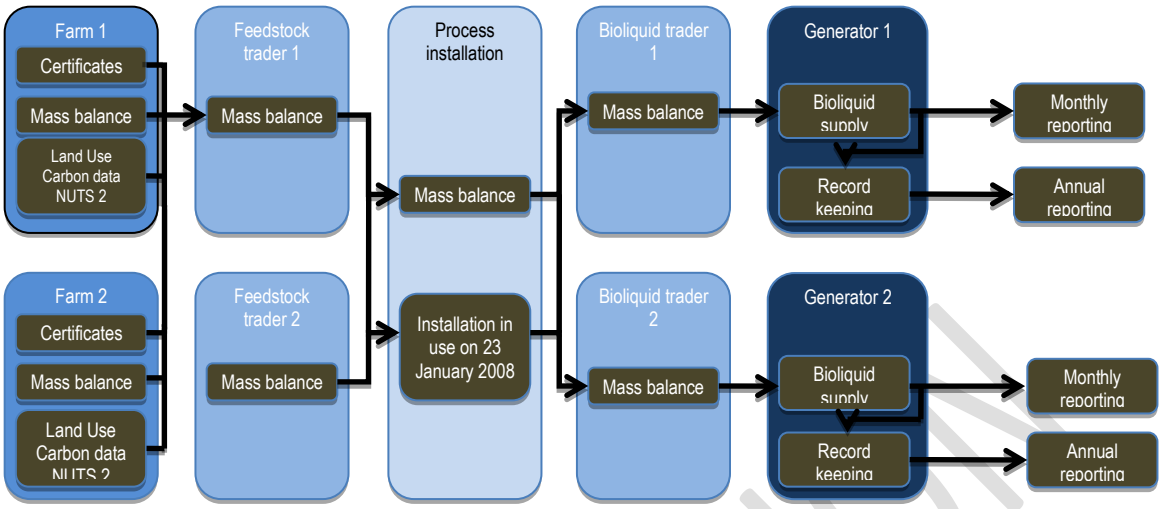

Figure 6: Example of the records kept by each party and data flow within the supply chain

The role of recognised voluntary schemes

7.11. Certificates of approved voluntary schemes are sufficient proof of compliance with the RO requirements for which the voluntary scheme has been recognised. In other words, the verifier can rely on the voluntary scheme and does not need to verify compliance of that party with those RO requirements for which the voluntary scheme is recognised. The verifier would need to verify that the party is actually certified by the relevant voluntary scheme.

7.12. It may occur that some parties in the supply chain are certified by a recognised voluntary scheme and other parties in the supply chain are not. In that case, the parties that are not certified are still subject to verification. It may also occur that a party is certified by a voluntary scheme that is recognised for part of the RO requirements but not all, for example a voluntary scheme that is approved for the GHG data but not for the mass balance. In that case, the party is still subject to verification on those RO requirements for which the voluntary scheme is not recognised: the mass balance in this example.

Setting up a system for reporting bioliquid data

7.13. To be able to produce bioliquid data that is of sufficient quality to demonstrate compliance with the RO criteria, operators of generating stations need to ensure that they and others in their supply chain have effective systems for reporting and obtaining and retaining sufficient and appropriate evidence to support their bioliquid data reporting.

7.14. We recommend that operators of generating stations appoint a single point of contact with responsibility for bioliquid data reporting.

7.15. All parties in the supply chain are required to have a document management system in place. This means they must have a verifiable system for the evidence related to the claims they make, that evidence must be kept for a minimum of five years and they must accept responsibility for preparing any information related to the verification of such evidence.

Good practice

7.16. It is good practice to:

- Liaise with the parties in the supply chain to ensure awareness of the need for co-operation and for a mass balance chain of custody;
- Produce data in a manner that is transparent and is as consistent as possible between years (allowing for improvements in method);
- Remove unnecessary complexity from the reporting system;
- Organise internal checks of the data;
- Ensure all parties supplying data are aware of the rigour required and that responsibility for supplying the data is allocated;
- Map the data flow within the organisation, such as between spreadsheets;
- Minimise the manual transfer of data;
- Ensure adequate controls around the data;
- Document the system (who does what, when etc.);
- Track data over time to help identify any misstatement.

7.17. Good systems reduce the cost of verification. The greater the confidence that can be placed on controls the less effort that needs to be given to verifying the data for the same level of assurance. The cost of verification can, therefore, be reduced if the verifier has confidence in the system that produced the data. Evidence of the effectiveness of controls can come from internal sources, such as management reviews and internal audits, as well as external audits, for example, of the chain of custody.

How to organise the verification

7.18. The operator of a generating station is responsible for engaging a verifier approved to carry out a limited-assurance engagement of the Annual Bioliquid Sustainability Report following the ISAE 3000 standard, or equivalent.

7.19. Verification of the Annual Bioliquid Sustainability Report will require the operator of a generating station to go through the following steps:

Step 1	Engage a verification body approved to carry out a limited assurance engagement of the Annual Sustainability Report as set out in the ISAE 3000 standard, or equivalent
Step 2	Submit the draft Annual Bioliquid Sustainability Report to the auditor
Step 3	Submit supporting information and evidence held by the operator of a generating station
Step 4	Host any visits from the auditor
Step 5	Respond to any auditor questions
Step 6	Correct any material misstatement identified by the auditor
Step 7	Submit the verification opinion to Ofgem with the Annual Bioliquid Sustainability Report

7.20. In selecting an auditor, operators of generating stations may wish to consider the following guidance. For example, the verification body could be required to demonstrate that it:

- Is independent of organisations involved in the production of bioliquids;
- Has established and maintains personnel records, which demonstrate that the verification personnel are competent;
- Has effective procedures for the training and recruitment of competent staff (employees and contractors);
- Ensures that the personnel involved in verification are competent for the functions they perform;
- Has systems to monitor the performance of verifiers and reviewers, which are reviewed regularly;

- Keeps up with verification best practice.

7.21. Limited assurance engagements aim to provide moderate assurance that the Annual Bioliquid Sustainability Report is without material misstatement. As such verifiers need to state that nothing has come to their attention to indicate material misstatement, given an appropriate level of investigation. ISAE 3000 provides guidance to verifiers about how they must go about the engagement.

7.22. The auditor will wish to visit the operator of a generating station. The auditor will review the consolidation process and meet the person responsible for the submission. The auditor will work along the supply chain, tracing the data flow and testing controls.

7.23. The auditor may select a risk-based approach; therefore, not every organisation in the supply chain is likely to be contacted. The exact approach may vary with each verifier and supply chain.

7.24. The duration of the verification process may be a number of weeks, particularly if the supply chain is complex or long and responses to information requests from the verifier are delayed. We recommend that operators of generating stations engage with their independent auditors as early as possible, long before the deadline date for submission of the Annual Bioliquid Sustainability Report and verification statement to Ofgem.

7.25. The auditor may wish to carry out tests during the year to reduce any end of year bottlenecks.

Good practice

7.26. It is good practice to engage auditors as early as possible in the process to maximise a company's opportunity to learn from the verifier and to help identify any mistakes early on. Common verification practice is for data to be supplied to the auditor in an organised evidence pack. This would be expected to include:

- The draft Annual Sustainability Report;
- High-level description of the supply chain (as is known, to help the auditor);
- Mass balance records;
- Contact details of the organisations in the previous stages in the supply chain (at least);
- Calculation spreadsheets (preferably supplied electronically so that auditors can test the formulae);

7.27. All the above information would be needed to verify the data. If not provided in an ordered fashion, the verifier will need to request information, which increases the verification effort required.

Assurance opinions

Content

7.28. It is standard practice for the verifier to submit a report, in addition to the opinion, to their client (the operator of a generating station). It is considered good practice if this report includes information on the overall effectiveness of the system in place to generate bioliquid data, as well as recommendations for improvement. Such information is intended to assist both us and operators of generating stations to understand the process and improve performance. In addition, such information maximises the knowledge transfer of the verifier to the party submitting their verified Annual Bioliquid Sustainability Reports.

7.29. The ISAE 3000 contains guidance on the standard content of a verifier's report. To further enhance the consistency of the verification between operators of generating stations and auditors, we propose a template, an example of which is included in Appendix 7 – Example verifier report template.

7.30. Note that where the criteria have not been met, suppliers should amend the relevant data. Operators of generating stations' Annual Bioliquid Sustainability Reports should not be signed off if this has not been actioned. Comments should be included on which and how much data was amended where appropriate.

7.31. Reports that fail to sufficiently address all of the information required in the template will not be accepted as providing an adequate level of assurance. We expect each of the points to be appropriately addressed in auditors' statements. Where evidence is not available for a particular point, we expect a statement explaining the reasons for its absence.

Verifier's opinion

7.32. The verifier will submit an opinion on the operator of a generating station's Annual Bioliquid Sustainability Report. The verifier will use their experience and judgement to determine if they believe that there may, or may not, be material errors in operator of a generating station's report.

7.33. An 'unqualified' opinion for the Annual Bioliquid Sustainability Audit Report could be worded, for example:

'Nothing has come to our attention to cause us to believe that the data has not been prepared, in all material respects, in accordance with the criteria.'

7.34. If there is material misstatement, the opinion could be worded, for example, as below:

'Nothing has come to our attention that causes us to believe that internal control is not effective, in all material respects, with the exception of:, X, Y, Z.'

Further Guidance

7.35. The RFA have developed a separate guidance for verifiers, which adds detail to the information contained in this chapter. This guidance was originally developed for the RTFO but we consider it relevant and useful for the RO (available from http://www.renewablefuelsagency.gov.uk/).

7.36. This guidance will be most useful for verifiers for the Annual Bioliquid Sustainability Audit Report, although it may also be a useful resource for operators of generating stations and other parties preparing for verification. The guidance includes:

- An overview of the purpose of verification;
- A description of the assurance process, including the key features of ISAE 3000 and the steps in an assurance engagement;
- The criteria for undertaking an RTFO assurance engagement, which should also be used for RO assurance engagements;
- The testing procedures that will be required;
- The evidence that should be obtained;
- An overview of the main features of an assurance statement; and
- A description of the competencies for auditors

CONSULTATION QUESTIONS

Q9. Do you feel the auditing requirements have been explained clearly?

Q10. Have you got any comments on or suggestions for the content of the verifier report template?

Appendices

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Appendix 1 - The Authority's Powers and Duties

1.1. Ofgem is the Office of Gas and Electricity Markets which supports the Gas and Electricity Markets Authority ("the Authority"), the regulator of the gas and electricity industries in Great Britain. This appendix summarises the primary powers and duties of the Authority. It is not comprehensive and is not a substitute to reference to the relevant legal instruments (including, but not limited to, those referred to below).

1.2. The Authority's powers and duties are largely provided for in statute (such as the Gas Act 1986, the Electricity Act 1989, the Utilities Act 2000, the Competition Act 1998, the Enterprise Act 2002 and the Energy Acts of 2004, 2008 and 2010) as well as arising from directly effective European Community legislation.

1.3. References to the Gas Act and the Electricity Act in this appendix are to Part 1 of those Acts.[39] Duties and functions relating to gas are set out in the Gas Act and those relating to electricity are set out in the Electricity Act. This appendix must be read accordingly.[40]

1.4. The Authority's principal objective is to protect the interests of existing and future consumers in relation to gas conveyed through pipes and electricity conveyed by distribution or transmission systems. The interests of such consumers are their interests taken as a whole, including their interests in the reduction of greenhouse gases and in the security of the supply of gas and electricity to them.

1.5. The Authority is generally required to carry out its functions in the manner it considers is best calculated to further the principal objective, wherever appropriate by promoting effective competition between persons engaged in, or commercial activities connected with:

- the shipping, transportation or supply of gas conveyed through pipes;
- the generation, transmission, distribution or supply of electricity;
- the provision or use of electricity interconnectors.

1.6. Before deciding to carry out its functions in a particular manner with a view to promoting competition, the Authority will have to consider the extent to which the interests of consumers would be protected by that manner of carrying out those functions and whether there is any other manner (whether or not it would promote competition) in which the Authority could carry out those functions which would better protect those interests.

[39] Entitled "Gas Supply" and "Electricity Supply" respectively.
[40] However, in exercising a function under the Electricity Act the Authority may have regard to the interests of consumers in relation to gas conveyed through pipes and vice versa in the case of it exercising a function under the Gas Act.

1.7. In performing these duties, the Authority must have regard to:

- the need to secure that, so far as it is economical to meet them, all reasonable demands in Great Britain for gas conveyed through pipes are met;
- the need to secure that all reasonable demands for electricity are met;
- the need to secure that licence holders are able to finance the activities which are the subject of obligations on them[41]; and
- the need to contribute to the achievement of sustainable development.

1.8. In performing these duties, the Authority must have regard to the interests of individuals who are disabled or chronically sick, of pensionable age, with low incomes, or residing in rural areas[42].

1.9. Subject to the above, the Authority is required to carry out the functions referred to in the manner which it considers is best calculated to:

- promote efficiency and economy on the part of those licensed[43] under the relevant Act and the efficient use of gas conveyed through pipes and electricity conveyed by distribution systems or transmission systems;
- protect the public from dangers arising from the conveyance of gas through pipes or the use of gas conveyed through pipes and from the generation, transmission, distribution or supply of electricity; and
- secure a diverse and viable long-term energy supply,

  and shall, in carrying out those functions, have regard to the effect on the environment.

1.10. In carrying out these functions the Authority must also have regard to:

- the principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed and any other principles that appear to it to represent the best regulatory practice; and
- certain statutory guidance on social and environmental matters issued by the Secretary of State.

1.11. The Authority may, in carrying out a function under the Gas Act and the Electricity Act, have regard to any interests of consumers in relation to communications services and electronic communications apparatus or to water or

[41] Under the Gas Act and the Utilities Act, in the case of Gas Act functions, or the Electricity Act, the Utilities Act and certain parts of the Energy Acts in the case of Electricity Act functions.
[42] The Authority may have regard to other descriptions of consumers.
[43] Or persons authorised by exemptions to carry on any activity.

sewerage services (within the meaning of the Water Industry Act 1991), which are affected by the carrying out of that function.

1.12. The Authority has powers under the Competition Act to investigate suspected anti-competitive activity and take action for breaches of the prohibitions in the legislation in respect of the gas and electricity sectors in Great Britain and is a designated National Competition Authority under the EC Modernisation Regulation[44] and therefore part of the European Competition Network. The Authority also has concurrent powers with the Office of Fair Trading in respect of market investigation references to the Competition Commission.

[44] Council Regulation (EC) 1/2003.

Appendix 2 – Assessment protocol for Voluntary Schemes

Introduction

1.1. This section contains Ofgem's assessment protocol for voluntary schemes.

1.2. Ofgem has developed an assessment protocol based on the RTFO assessment protocol, but with additional criteria added to the audit quality to bring it in-line with the EC Communication[45] published after the RTFO assessment protocol was developed.

1.3. Ofgem will assess voluntary schemes against two aspects, both of which must be complied with for Ofgem to recognise a voluntary scheme:

- RO land criteria;
- Audit, certification and accreditation processes.

1.4. All the RO land criteria are mandatory. Criteria on audit, certification and accreditation are defined as either mandatory or recommended. Voluntary schemes must include all the mandatory criteria to pass the assessment.

1.5. Ofgem will engage with the RTFO Administrator on the assessment of voluntary schemes, to facilitate consistency in UK policy on biofuels and bioliquids.

[45] Communication on voluntary schemes and default values in the EU biofuels and bioliquids sustainability scheme (COM 2010/C 160/01).

Requirements for the land criteria

The RO land criteria are contained in Schedule A2 of the ROO 2011. The table below refers also to the specific RED Article.

RED Article	Criteria	Guidance
Article 17(3)(a)	Conservation of primary forest and other wooded land	Biofuels and bioliquids shall not be made from raw material obtained from land that was primary forest or other wooded land in or after January 2008, whether or not the land continues to have that status Primary forest and other wooded land is defined as forest and other wooded land of native species, where there is no clearly visible indication of human activity and the ecological processes are not significantly disturbed.
Article 17(3)(b)	Conservation of protected areas	Biofuels and bioliquids shall not be made from raw material obtained from land that was a protected area in or after January 2008, whether or not the land continues to have that status. This includes areas designated: i) by law or by the relevant competent authority for nature protection purposes; or ii) for the protection of rare, threatened or endangered ecosystems or species recognised by international agreements or included in lists drawn up by intergovernmental organisations or the International Union for the Conservation of Nature, subject to their recognition in accordance with the second subparagraph of Article 18(4) of the RED. An exception is possible if evidence is provided that the production of that raw material did not interfere with those nature protection purposes.

RED Article	Criteria	Guidance
Article 17(3)(c)	Conservation of highly biodiverse grassland [46]	Biofuels and bioliquids shall not be made from raw material obtained from land that was highly biodiverse grassland in or after January 2008, whether or not the land continues to have that status. Highly biodiverse grassland is defined as: i) natural, namely grassland that would remain grassland in the absence of human intervention and which maintains the natural species composition and ecological characteristics and processes; or ii) non-natural, namely grassland that would cease to be grassland in the absence of human intervention and which is species-rich and not degraded, unless evidence is provided that the harvesting of the raw material is necessary to preserve its grassland status
Article 17(4)(a)	Conservation of wetlands	Biofuels and bioliquids shall not be made from raw material obtained from land that was wetland in January 2008 and no longer has that status. A wetland is land that is covered with or saturated by water permanently or for a significant part of the year. These provisions shall not apply if, at the time the raw material was obtained, the land had the same status as it had in January 2008
Article 17(4)(b)	Conservation of continuously forested areas	Biofuels and bioliquids shall not be made from raw material obtained from land that was continuously forested in January 2008 and no longer has that status. Continuously forested areas are defined as land spanning more than one hectare with trees higher than five metres and a canopy cover of more than 30%, or trees able to reach those thresholds in situ.

[46] The European Commission shall establish the criteria and geographic ranges to determine highly biodiverse grassland (RED 2009-28 EC Article 17(3)(c)). Further information is awaited following the Comitology process. Until this time Ofgem does not require operators of generating stations to demonstrate compliance with Article 17(3)(c).

RED Article	Criteria	Guidance
		These provisions shall not apply if, at the time the raw material was obtained, the land had the same status as it had in January 2008.
Article 17(4)(c)	Conservation of "10% to 30%" forested areas	Biofuels and bioliquids shall not be made from raw material obtained from land that was sparsely forested in January 2008 and no longer has that status. "10% to 30%" forested areas are defined as land spanning more than one hectare with trees higher than five metres and a canopy cover of between 10% and 30%, or trees able to reach those thresholds in situ, unless evidence is provided that the carbon stock of the area before and after conversion is such that, when the methodology laid down in part C of Annex V is applied, the greenhouse gas threshold (principle 1 above) would still be fulfilled. These provisions shall not apply if, at the time the raw material was obtained, the land had the same status as it had in January 2008
Article 17(5)	Conservation of peatlands	Biofuels and bioliquids shall not be made from raw material obtained from land that was peatland in January 2008. An exception is possible if evidence is provided that the cultivation and harvesting of that raw material does not involve drainage of previously undrained soil.

Requirements for the audit, certification and accreditation processes

Criteria	Norm	Conformance
Certification and audit		
1. Accreditation of Certification Bodies	Certification Bodies must be accredited to ISO Guide 65: 1996, ISO 17021: 2006, or justified equivalents	Mandatory
2. Management of the audit programme	Audits should be carried out in accordance with ISO 19011: 2002, or justified equivalent (i.e. to follow a Plan, Do, Check, Act approach).	Mandatory[47]
3. Audit frequency	Parties shall be audited once every 5 years for a full certification audit and once a year for a surveillance audit.	Mandatory
4. Audit competency	- Certification Bodies shall ensure that auditors are competent for the tasks which they are selected to perform in accordance to the guidance in ISO 19011: 2002, or justified equivalent. - Specific requirements relevant to the product that the Certification Body is certifying should be added as training requirements where appropriate (e.g. sugarcane, soy, palm oil etc).	Mandatory
5. Stakeholder consultation	A range of relevant stakeholders should be included in stakeholder consultation during site audits.	Recommendation
6. Public summaries of the certification audit	The certification body should publish public summaries of the certification audit. The summary should include overall findings of the certification audit, any details of noncompliance and any issues identified during the stakeholder consultation. Information should be available in both English and the relevant local language(s), if applicable.	Recommendation
Accreditation		
7. Accreditation process for	Accreditation Bodies shall 'Commit to comply' with ISO 17011: 2004, or justified equivalent. Commitment to compliance can be	Mandatory

[47] Note that in the UK RTFO norm for audit quality (prepared before the publication of the EC Communication on voluntary schemes) the criterion on "management of the audit programme" is only a recommended (Minor Must).

Criteria	Norm	Conformance
Accreditation Bodies	demonstrated through independent peer-review by an auditor that is recognised by either ISEAL48 or the IAF49.	
General		
8. Documentation management	Parties (and Certification Bodies): - Shall have an auditable system for the evidence related to the claims they make or rely on; - Keep evidence for a minimum period of 5 years; and - Accept responsibility for preparing any information related to the auditing of such evidence.	Mandatory

[48] ISEAL (International Social and Environmental Accreditation and Labelling Alliance) is an international non-profit organisation that codifies best practice for the design and implementation of social and environmental standards initiatives (http://www.isealalliance.org/).
[49] IAF (International Accreditation Forum). A full list of IAF Accreditation Body Members is listed on the IAF website (www.iaf.nu).

Appendix 3 – Voluntary schemes recognised by Ofgem

1.1. This section gives an overview of voluntary schemes recognised by Ofgem as evidence of compliance with the RO land criteria. The schemes included here have been assessed by the RFA.

1.2. Note that all schemes included in Table 5 pass the audit quality benchmark. Voluntary schemes can be recognised by Ofgem as evidence of compliance with one or both of the RO land criteria (note peatlands is included here within the carbon stock criteria).

1.3. An overview of EC-recognised voluntary schemes will be published on the EC Transparency Platform[50].

Table 5: Voluntary scheme assessment results

Voluntary Scheme name	Benchmarked Version	Benchmarked by	Indicative RED Biodiversity criteria	Indicative RED Carbon Stocks criteria
Bonsucro (formerly Better Sugarcane Initiative)	July 2010 (Production Standard) (including criteria 6)	RFA	Yes	Yes
Forest Stewardship Council (FSC)	2002	RFA	No	No
Genesis Quality Assurance (Genesis QA)	2008-09	RFA	Yes	No
Linking Environment and Farming Marque (LEAF)	October 2008 (Version 8)	RFA	No	No
RedTractor (formerly Assured Combinable Crops Standard)	July 2008	RFA	Yes	No
Roundtable on Sustainable Biofuels (RSB)	June 2010 (Standard for EU Market Access)	RFA	Yes	Yes
Roundtable on Sustainable Palm (RSPO)	October 2007	RFA	Yes	No
Round Table on Responsible Soy (RTRS)	June 2009 (Draft - Field Testing Version)	RFA	No	No
Sustainable Agriculture Network/Rainforest Alliance (SAN/RA)	April 2009 (including addendum)	RFA	Yes	No

[50] http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm

Appendix 4 – Guidance on land categories and their compliance with the RO land criteria

1.1. This section gives guidance on appropriate categories of land use in 1 January 2008 that can be reported to Ofgem as part of the operator's Annual Sustainability report. For each land category we indicate the conditions under which that land category would comply with the RO land criteria.

1.2. Operators of generating stations should also be aware that the EC is due to publish a report during 2011 that aims to help economic operators identify the status of the land for the purposes of the RED land criteria. In addition, the EC has asked the European Committee for Standardization[51] (CEN) to draft specific guidance on the provision of evidence that the production of raw material has not interfered with nature protection purposes (Article 17(3)(b)), and that the harvesting of raw material is necessary to preserve grassland's grassland status (Article 17(3)(c)(ii)). This work is also expected to be developed during 2011. Ofgem recommends that operators of generating stations draw additional guidance on the evidence that may be available to demonstrate compliance with the land criteria from these documents.

1.3. The RO land criteria are contained in ROO 2011, Schedule A2. Table 6 also refers to the specific Article numbers in the RED.

[51] CEN Sustainability criteria for biomass: http://www.cen.eu/cen/Sectors/Sectors/UtilitiesAndEnergy/Fuels/Pages/Sustainability.aspx

Table 6: Overview of the land categories that can be reported and their compliance with the land criteria of the RO (ROO 2011, Schedule A2)

Land category	Description	Biodiversity (RED Article 17(3))	High carbon stocks (RED Article 17(4))	Peatlands (RED Article 17(5))
Cropland - non-protected	The Cropland is not in a nature protected area as defined in RED Article 17(3)(b).This category includes cropped land, (including rice fields and set-aside[52]), and agro-forestry systems where the vegetation structure falls below the thresholds used for the Forest Land categories[53].	Complies	Complies	Complies
Cropland - protected	Same as above, but the Cropland is in a nature protection area as defined in RED Article 17(3)(b).	Complies if provide evidence that the production of the bioliquid raw material did not interfere with the nature protection purposes of the land. The appropriate evidence will depend on the specific nature protection purposes, however this might be expected to include evidence of actions taken to avoid damage to or actively maintain the nature protection purposes. Evidence could also be provided through reporting a voluntary scheme that meets the RED biodiversity criteria.	Complies	Complies

[52] Set-aside is a term related to the EU's Common Agricultural Policy (CAP). It refers to land taken out of production to reduce the risk of food surpluses, while increasing the opportunity for environmental benefits. From 2007 set-aside land has been abolished under the CAP.
[53] The EC Communication 2010/C 160/02 considers that perennial crop plantations, including oil palm plantations, are classified as cropland.

Land category	Description	Biodiversity (RED Article 17(3))	High carbon stocks (RED Article 17(4))	Peatlands (RED Article 17(5))
Grassland (and other wooded land not classified as forest) with agricultural use	This category includes rangelands and pasture land that are not considered Cropland, but which have an agricultural use. It also includes systems with woody vegetation and other non-grass vegetation such as herbs and brushes that fall below the threshold values used in the Forest Land category and which have an agricultural use. It includes extensively managed rangelands as well as intensively managed (e.g., with fertilization, irrigation, species changes) continuous pasture and hay land.	Complies only if the grassland is not a highly biodiverse grassland (see 4.28).	Complies if the GHG emissions of the resulting land use change are taken into account and the GHG savings threshold of 35% is still met (see chapter 5).	Complies
Grassland (and other wooded land not classified as forest) without agricultural use	This category includes grasslands without an agricultural use. It also includes systems with woody vegetation and other non-grass vegetation such as herbs and brushes that fall below the threshold values used in the Forest Land category and which do not have an agricultural use.	Complies only if the grassland is not a highly biodiverse grassland (see 4.28).	Complies if the GHG emissions of the resulting land use change are taken into account and the GHG savings threshold of 35% is still met (see chapter 5).	Complies
Forest >30%	Continuously forested areas, namely land spanning more than one hectare with trees higher than five metres and a canopy cover of more than 30%, or trees able to reach those thresholds in situ.	Complies if can demonstrate that the forest in question was not a Primary forest (i.e. no signs of human disturbance such as logging for example), and that the land was not in a designated	Complies only if provide evidence that the status of the land has not changed. Evidence of the nature and extent of the forest will need to be provided for January 2008 and the time	Complies

Land category	Description	Biodiversity (RED Article 17(3))	High carbon stocks (RED Article 17(4))	Peatlands (RED Article 17(5))
		area.	the raw material was harvested.	
Forest 10-30%	Land spanning more than one hectare with trees higher than five metres and a canopy cover of between 10% and 30%, or trees able to reach those thresholds in situ, unless evidence is provided that the carbon stock of the area before and after conversion is such that, when the methodology laid down in part C of Annex V of the RED is applied, the conditions laid down in paragraph 2 of Article 17 of the RED would be fulfilled.	Complies if can demonstrate that the forest in question was not a Primary forest (i.e. no signs of human disturbance such as logging for example), and that the land was not in a designated area.	Complies if the GHG emissions of the resulting land use change are taken into account and the GHG savings threshold of 35% is still met (see chapter 5).	Complies
Wetland	Namely land that is covered with or saturated with or saturated by water permanently or for a significant part of the year.	Complies only if can demonstrate that the wetland in question was not a primary forest, in a designated area, or a highly biodiverse grassland (see 4.29).	Complies only if provide evidence that the status of the land has not changed. Evidence of the nature and extent of the wetland will need to be provided for January 2008 and the time the raw material was harvested.	n/a
Undrained Peatland	Namely peatland that was not drained (either partially or completely) in January 2008.	n/a	n/a	Complies only if provide evidence that the land has not been drained.
Peatland	Namely peatland that was either partially or fully drained in January 2008.	Complies only if can demonstrate that the peatland in question was not a primary forest, in a designated area, or a highly biodiverse grassland (see 4.29).	n/a	Complies only if evidence is provided that the soil was completely drained in January 2008, or there has not been draining of the soil since January 2008. This means that for peatland that was

Land category	Description	Biodiversity (RED Article 17(3))	High carbon stocks (RED Article 17(4))	Peatlands (RED Article 17(5))
				partially drained in January 2008 a subsequent deeper drainage, affecting soil that was not fully drained, would breach the criterion
Degraded land	The land was not in use for agriculture or any other activity in January 2008; and Falls into one of the following categories: a) 'severely degraded land', including such land that was formerly in agricultural use and that, for a significant period of time, has either been significantly salinated or presented significantly low organic matter content and has been severely eroded; or b) 'heavily contaminated land' that is unfit for the cultivation of food and feed due to soil contamination.	At the time of writing the EC has not published further detail on how degraded land should be further defined. As such it is not possible to say whether or not degraded land would always automatically comply with the RO land criteria. This guidance shall be updated following the publication of the EC Decision, and any subsequent update of the ROO.		
Settlement		Complies	Complies	Complies

Appendix 5 – Relevant online documents and information for GHG emission saving calculations

Type of information	Specific reference	Link
General information and updates to the Renewable Energy Directive, default values and emissions factors	The European Commission online transparency platform	http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm
Land Use Change Emission Calculations	Commission Decision of 10 June 2010 on guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive 2009/28/EC	http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:151:0019:0041:EN:PDF
	The climate region and soil type data layers	http://eusoils.jrc.ec.europa.eu/projects/RenewableEnergy/
	Annotated example of land use change emission calculations	http://ec.europa.eu/energy/renewables/biofuels/doc/ecofys_report_annotated_example_carbon_stock_calculation.pdf
GHG emission calculation tools	The Carbon Calculator tool	http://www.renewablefuelsagency.gov.uk/carboncalculator
	The Carbon Calculator User Manual	http://www.renewablefuelsagency.gov.uk/sites/rfa/files/Carbon_Calculator_User_Manual_for_RTFO_Year_3_RED_Ready%20v1.2.pdf
	The BioGrace tool	http://www.biograce.net/content/ghgcalculationtools/excelghgcalculations
	The Dutch tool	http://www.senternovem.nl/gave_english/ghg_tool/index.asp

Appendix 6 – Example templates for Mass Balance system

1.1. This appendix provides several tables with examples of chain of custody records that parties in the supply chain could use. In the examples several steps in the supply chain are mentioned. In reality however there may be other steps in addition to these, for example for a biodiesel plant.

Table 7: Example of an output record from a farm supplying certified rapeseed to crusher C1

Consignment no.	Transaction date	Receiving Company	Product	Quantity (tonnes)	Country of origin	NUTS 2 compliant region	Voluntary Scheme	Land Use on 1 January 2008	Crop yield (t/ha)[54]	Nitrogen fertiliser (kg/ha)54
22001	16-1-2011	C1	Rapeseed	1,000	UK	Y	LEAF	Cropland - non protected	30	180

[54] Farmers/plantation owners can also report on carbon intensity but the key data are crop yield and use of nitrogen fertiliser.

Table 1: Example of an input record from a rapeseed crusher

This crusher receives certified rapeseed from farms F1 and F2.

Consignment no.	Transaction date	Supplying Company	Product	Quantity (tonnes)	Country of origin	NUTS 2 compliant region	Voluntary Scheme	Land Use on 1 January 2008	Carbon intensity (g CO2e/MJ)
22001	16-1-2011	F1	Rapeseed	1,000	UK	Y	LEAF	Cropland - non protected	30
22002	16-1-2011	F2	Rapeseed	1,000	UK	Y	LEAF	Cropland - non protected	30

Table 2: Example record of crusher conversion factor

Conversion parameters	Rapeseed to rapeseed oil
Input	Rapeseed
Output	Rapeseed oil
Unit	kg rapeseed oil / kg rapeseed
Value	0.40
Valid from	1-1-2011
Valid until	1-6-2011

Table 3: Example of an output record from a crusher

This crusher supplies operator of a generating station G with rapeseed oil

Consignment no.	Transaction date	Receiving Company	Product	feedstock	Quantity (tonnes)	Country of origin	NUTS 2 compliant region	Voluntary Scheme	Land Use on 1 January 2008	Carbon intensity (g CO2e/MJ)	Bonus degraded land	Factor soil carbon accumulation	Installation in operation on 23 January 2008
23001	20-1-2011	G	Rapeseed oil	Rapeseed	400	UK	Y	LEAF	Cropland - non protected	32	N	N	Y
23002	20-1-2011	G	Rapeseed oil	Rapeseed	800	UK	Y	LEAF	Cropland - non protected	36	N	N	Y

Table 4: Example of an input record from an operator of a generating station

This operator of a generating station receives palm oil based HVO from bioliquid producers B1 and B2

Consignment no.	Transaction date	Supplying Company	Bioliquid type	Feedstock	Production process	Quantity (tonnes)	Country of origin	NUTS 2 compliant region	Voluntary Scheme	Land Use on 1 January 2008	Carbon intensity (g CO2e/MJ)	Bonus degraded land	Factor soil carbon accumulation	Installation in operation on 23 January 2008
33001	20-1-2011	B1	HVO	CPO	Methane capture	900	Indonesia	-	RSPO	Cropland - non protected	29	N	N	Y
33002	20-1-2011	B2	HVO	CPO	-	300	Malaysia	-	RSPO	Cropland - non protected	62	N	N	Y

Appendix 7 – Example verifier report template

1.1. Below is an example of a verifier report template. The information in the table must be included in verifier's statement. See Chapter 7 for further information.

Title	To include the words 'independent assurance statement'
Addressee	The addressee is the party or parties to whom the statement is addressed. This will be the management of the operator of a generating station who has commissioned the verifier. This statement should also make clear the relevant responsibilities of the operator of a generating station and the verifier (i.e. the operator of a generating station is responsible for preparing the report, the verifier is responsible for performing limited assurance over the information in the report).
ISAE 300 statement	Include a statement that the engagement was performed in accordance with ISAE 3000 (NB. not simply 'with reference to').
Subject matter	A description of the subject matter and the information it contains including: Reference to the specific document covered by this statement i.e. the operator of a generating station's annual sustainability audit report.
Criteria	The criteria that the operator's annual sustainability audit report has been assessed against. These must ensure that the verification guidance issued by the UK Renewable Fuels Agency for the Renewable Transport Fuel Obligation (RTFO) have been adhered to. This guidance was originally developed for the RTFO but Ofgem considers it relevant and useful for the RO and requires verifiers to adhere to the guidance under the RO. Key elements of the guidance are: Traceability: Is the reported bioliquid data traceable back to the party or parties that generated the original source information through an appropriate Mass Balance? Is sufficient and appropriate evidence available to support all reported information, both quantitative and qualitative? Completeness: Has data been provided for each consignment? Does the annual sustainability audit report reflect the total volume of bioliquid reported under the RO?

	Consistency: Have consistent methodologies been followed for calculating and reporting actual carbon data? Are reported feedstock types for biofuel blends representative of actual feedstock types for the fuel supplied? Accuracy: Has the reported information been accurately collated?
Summary of work performed	A summary of the work performed, including any limitations on the nature, timing and extent of evidence-gathering procedures. This needs to be sufficiently detailed for readers of the assurance statement to readily understand what work the verifier performed and must include a description of what activities have been undertaken at the level of the operator of a generating station and how the evidence for bioliquid data up the supply chain has been tested. For example: Conducted interviews with _____ to obtain an understanding of _____. Conducted a review and testing of carbon and sustainability data measurement, collection and reporting systems and processes, including _____. Reviewed Mass Balance information, including _____. Conducted interviews with suppliers to determine _____
Limitations	Any limitations in the evaluation against the criteria. Stated limitations should be included only to clarify the extent of the verification activities – not as a contradiction to the formal opinion statement.
Conclusion and qualifications	The conclusion and any qualifications to that conclusion (note that operator Reports given with qualified conclusions will be carefully assessed but may not be accepted as fulfilling the requirements as set out by Ofgem).
Other relevant remarks	Any other relevant remarks (as appropriate) - these should be clearly separated from, and worded such that they do not affect, the conclusion.

Appendix 8 – Template for Carbon intensity calculations

Crop production module calculations

Crop Production							***Remarks***
Basic Data							
Yield @ traded moisture content	[$t_{feedstock}$ / ha.yr]	Y1					
Traded moisture content	[%]	TMC					
Energy content (dry)	[MJ / kg]	$EC_{feedstock}$					
Soil N_2O emissions							
				input [kg N nutrient / ha.yr]		Total emissions [kg CO_2e / $t_{feedstock}$]	
Direct N_2O emissions	[kg CO_{2eq} / kg N nutrient]	*value*	x	N_fert1	÷ Y1 =	A1	
Indirect N_2O emissions	[kg CO_{2eq} / kg N nutrient]	*value*	x	N_fert1	÷ Y1 =	A2	
Farming Inputs							
		Mass of input		Emission factor [kg CO_2e / kg nutrient]		Total emissions [kg CO_2e / $t_{feedstock}$]	
N fertiliser 1	[kg nutrient / ha.yr]	*N_fert1*	x	*value*	÷ Y1 =	A3	
				Emission factor [kg CO_2e / kg nutrient]		Total emissions [kg CO_2e / $t_{feedstock}$]	
P fertiliser	[kg nutrient / ha.yr]	*value*	x	*value*	÷ Y1 =	A4	
				Emission factor [kg CO_2e / kg nutrient]		Total emissions [kg CO_2e / $t_{feedstock}$]	
K fertiliser	[kg nutrient / ha.yr]	*value*	x	*value*	÷ Y1 =	A5	
				Emission factor [kg CO_2e / kg fertiliser]		Total emissions [kg CO_2e / $t_{feedstock}$]	
NPK fertiliser	[kg fertiliser / ha.yr]	*value*	x	*value*	÷ Y1 =	A6	
				Emission factor [kg CO_2e / kg nutrient]		Total emissions [kg CO_2e / $t_{feedstock}$]	
Mg fertiliser	[kg nutrient / ha.yr]	*value*		*value*	÷ Y1 =	A7	
				Emission factor [kg CO_2e / kg lime]		Total emissions [kg CO_2e / $t_{feedstock}$]	
Lime	[kg lime / ha.yr]	*value*	x	*value*	÷ Y1 =	A8	
				Emission factor [kg CO_2e / kg pesticides]		Total emissions [kg CO_2e / $t_{feedstock}$]	
Pesticides	[kg pesticides / ha.yr]	*value*	x	*value*	÷ Y1 =	A9	
				Emission factor [kg CO_2e / kg seed]		Total emissions [kg CO_2e / $t_{feedstock}$]	
Seeding material	[kg seed / ha.yr]	*value*	x	*value*	÷ Y1 =	A10	
				Emission factor [kg CO_2e / kg nutrient]		Total emissions [kg CO_2e / $t_{feedstock}$]	
N fertiliser 2	[kg nutrient / ha.yr]	*value*	x	*value*	÷ Y1 =	A11	Only jatropha
				Emission factor [kg CO_2e / kg nutrient]		Total emissions [kg CO_2e / $t_{feedstock}$]	
Na fertiliser	[kg nutrient / ha.yr]	*value*	x	*value*	÷ Y1 =	A12	Only sugar beet
				Emission factor [kg CO_2e / kg product]		Total emissions [kg CO_2e / $t_{feedstock}$]	
Empty Fruit Bunch compost	[kg product / ha.yr]	*value*	x	*value*	÷ Y1 =	A13	Only palm

Machinery Inputs							
Energy input to machinery		Amount of input		Emissions factor [kg CO_2e / MJ energy]		Total emissions [kg CO_2e / $t_{feedstock}$]	
	[MJ diesel / ha.a]	*value*	x	*value*	÷ Y1 =	A13	
Residue							
Residue removed from field							
	[kg residue / $t_{feedstock}$]	*value*					
Totals							
						Total emissions [kg CO_2e / $t_{feedstock}$]	
Feedstock cultivation	A1 + A2 + A3 + A4 + A5 + A6 + A7 + A8 + A9 + A10 + A11 + A12 + A13 =					**TOTAL**	
Contribution to overall fuel chain						Total emissions [g CO2e / MJBioliquid]	
	[(TOTAL ÷ downstream_yield) x downstream_allocation_factor] ÷ EC_Bioliquid =					**CONTRIBUTION**	

downstream_yield is a factor calculated by the multiplication of the yields of all downstream modules (excluding the yield of the current module). The number of downstream modules, and thus the number of yields to be multiplied to calculate the downstream_yield factor are dependent on specific chains. By default, the downstream_yield factor should be set to 1. If a module has no yield (e.g. Depot, Power Plant) 1 should also be used in the multiplication.

downstream_allocation_factor is a factor calculated by the multiplication of the allocation factors of the current module (if relevant) and all downstream modules. The number of downstream modules, and thus the number of allocation factors to be multiplied to calculate the factor downstream_allocation_factor are dependent on specific chain. By default, the downstream_allocation_factor should be set to 1. If a module has no allocation factor (e.g. Depot, Power Plant) 1 should also be used in the multiplication.

EC_Bioliquid is the energy content of the Bioliquid (expressed as Lower Heating Value) in MJ / t.

Drying and storage module calculations

Drying and Storage						
Basic data						
Yield	[t_{output} / t_{input}]	z_D&S				
Energy input						
				Emissions factor [kg CO_2e / MJ energy]		Total emissions [kg CO_2e / t_{output}]
Energy input 1	[MJ energy / t_{output}]	*value*	x	*value*	=	B1
				Emissions factor [kg CO_2e / MJ energy]		Total emissions [kg CO_2e / t_{output}]
Energy input 2	[MJ energy / t_{output}]	*value*	x	*value*	=	B2
Totals						
						Total emissions [kg CO_2e / t_{output}]
Drying and storage					B1 + B2 =	**TOTAL**
Contribution to overall fuel chain						Total emissions [g CO2e / MJBioliquid]
[(TOTAL ÷ downstream_yield) x downstream_allocation_factor] ÷ EC_Bioliquid =						**CONTRIBUTION**

downstream_yield is a factor calculated by the multiplication of the yields of all downstream modules (excluding the yield of the current module). The number of downstream modules, and thus the number of yields to be multiplied to calculate the downstream_yield factor are dependent on specific chains. By default, the downstream_yield factor should be set to 1. If a module has no yield (e.g. e.g. Depot, Power Plant) 1 should also be used in the multiplication.

downstream_allocation_factor is a factor calculated by the multiplication of the allocation factors of the current module (if relevant) and all downstream modules. The number of downstream modules, and thus the number of allocation factors to be multiplied to calculate the factor downstream_allocation_factor are dependent on specific chain. By default, the downstream_allocation_factor should be set to 1. If a module has no allocation factor (e.g. Depot, Power Plant) 1 should also be used in the multiplication.

EC_Bioliquid is the energy content of the Bioliquid (expressed as Lower Heating Value) in MJ / t.

Transport module calculations

Transport						
Basic data						
Yield	[t_{output} / t_{input}]	z_transp				
Input						
Distance	[tkm / t_{output}]	$dist_1$				
				Emissions factor [kg CO_2e / MJ fuel]		Total emissions [kg CO_2e / t_{output}]
Fuel	[MJ fuel / tkm]	*value*	x	*value*	x $dist_1$ =	C1
Totals						
						Total emissions [kg CO_2e / t_{output}]
Transport					C1 =	**TOTAL**
Contribution to overall fuel chain						Total emissions [g CO2e / MJBioliquid]
[(TOTAL ÷ downstream_yield) x downstream_allocation_factor] ÷ EC_Bioliquid =						**CONTRIBUTION**

downstream_yield is a factor calculated by the multiplication of the yields of all downstream modules (excluding the yield of the current module). The number of downstream modules, and thus the number of yields to be multiplied to calculate the downstream_yield factor are dependent on specific chains. By default, the downstream_yield factor should be set to 1. If a module has no yield (e.g. Depot, Power Plant) 1 should also be used in the multiplication.

downstream_allocation_factor is a factor calculated by the multiplication of the allocation factors of the current module (if relevant) and all downstream modules. The number of downstream modules, and thus the number of allocation factors to be multiplied to calculate the factor downstream_allocation_factor are dependent on specific chain. By default, the downstream_allocation_factor should be set to 1. If a module has no allocation factor (e.g. Depot, Power Plant) 1 should also be used in the multiplication.

EC_Bioliquid is the energy content of the Bioliquid (expressed as Lower Heating Value) in MJ / t.

Conversion module calculations

Conversion of feedstock to end-product or intermediate product						
Basic data						
Yield	[t_{output} / t_{input}]	z_proc				
Energy input						
				Emission factor [kg CO_2e / MJ energy]		Total emissions [kg CO_2e / t_{output}]
Energy input 1	[MJ energy / t_{output}]	*value*	x	*value*	=	D1
				Emission factor [kg CO_2e / MJ energy]		Total emissions [kg CO_2e / t_{output}]
Energy input 2	[MJ energy / t_{output}]	*value*	x	*value*	=	D2
				Emission factor [kg CO_2e / MJ energy]		Total emissions [kg CO_2e / t_{output}]
Energy input 3	[MJ energy / t_{output}]	*value*	x	*value*	=	D3
Chemical input						
				Emission factor [kg CO_2e / kg chemical]		Total emissions [kg CO_2e / t_{output}]
Chemical 1	[kg chemical / t_{output}]	*value*	x	*value*	=	D4
				Emission factor [kg CO_2e / kg chemical]		Total emissions [kg CO_2e / t_{output}]
Chemical 2	[kg chemical / t_{output}]	*value*	x	*value*	=	D5
				Emission factor [kg CO_2e / kg chemical]		Total emissions [kg CO_2e / t_{output}]
Chemical 3	[kg chemical / t_{output}]	*value*	x	*value*	=	D6
				Emission factor [kg CO_2e / kg chemical]		Total emissions [kg CO_2e / t_{output}]
Chemical 4	[kg chemical / t_{output}]	*value*	x	*value*	=	D7
				Emission factor [kg CO_2e / kg chemical]		Total emissions [kg CO_2e / t_{output}]
Chemical 5	[kg chemical / t_{output}]	*value*	x	*value*	=	D8
Emissions						
				Emission factor [kg CO_2e / kg CH_4]		Total emissions [kg CO_2e / t_{output}]
Methane emissions from conversion	[kg CH_4 / t_{output}]	*value*	x	*value*	=	D9

Co-products taken into account through allocation based on energy content						
				Energy content [MJ / kg]		Co-product 1 [MJ / MJ_{output}]
Co-product 1	[t co-product / t_{output}]	*value*	x	*value*	÷ $EC_{ethanol}$ =	D10
				Energy content [MJ / kg]		Co-product 2 [MJ / MJ_{output}]
Co-product 2	[t co-product / t_{output}]	*value*	x	*value*	÷ $EC_{ethanol}$ =	D11
				Energy content [MJ / kg]		Co-product 3 [MJ / MJ_{output}]
Co-product 3	[t co-product / t_{output}]	*value*	x	*value*	÷ $EC_{ethanol}$ =	D12
				Energy content [MJ / kg]		Co-product 4 [MJ / MJ_{output}]
Co-product 4	[t co-product / t_{output}]	*value*	x	*value*	÷ $EC_{ethanol}$ =	D13
				Energy content [MJ / kg]		Co-product 5 [MJ / MJ_{output}]
Co-product 5	[t co-product / t_{output}]	*value*	x	*value*	÷ $EC_{ethanol}$ =	D14
						Allocation factor [-]
			1 / (1 + D10 + D11 + D12 + D13 + D14) =			AF
Co-product pre-treatment (e.g. purification)						
				Emission factor for purification [kg CO_2e / t co-product]		Total emissions [kg CO_2e / t_{output}]
Co-product 1	[t co-product / t_{output}]	*value*	x	*value*	=	D15
Excess electricity taken into account through substitution						
				Credit factor [kg CO_2e / MJ electricity]		Total credit [kg CO_2e / t_{output}]
Excess electricity	[MJ electricity / t_{output}]	*value*	x	*value*	=	D16
Totals						
Conversion of feedstock to end-product or intermediate product						Total emissions [kg CO_2e / t_{output}]
D1 + D2 + D3 + D4 + D5 + D6 + D7 + D8 + D9 + D15 - D16 =						**TOTAL**
Contribution to overall fuel chain						Total emissions [g CO2e / MJBioliquid]
[(TOTAL ÷ downstream_yield) x downstream_allocation_factor] ÷ EC_Bioliquid =						**CONTRIBUTION**

downstream_yield is a factor calculated by the multiplication of the yields of all downstream modules (excluding the yield of the current module). The number of downstream modules, and thus the number of yields to be multiplied to calculate the downstream_yield factor are dependent on specific chains. By default, the downstream_yield factor should be set to 1. If a module has no yield (e.g. e.g. Depot, Power Plant) 1 should also be used in the multiplication.

downstream_allocation_factor is a factor calculated by the multiplication of the alloction factors of the current module (if relevant) and all downstream modules. The number of downstream modules, and thus the number of allocation factors to be multiplied to calculate the factor downstream_allocation_factor are dependent on specific chain. By default, the downstream_allocation_factor should be set to 1. If a module has no allocation factor (e.g. Depot, Power Plant) 1 should also be used in the multiplication.

EC_Bioliquid is the energy content of the Bioliquid (expressed as Lower Heating Value) in MJ / t.

Fuel depot module calculations

Fuel depot						
Energy input						
				Emission factor [kg CO_2e / MJ energy]		Total emissions [kg CO_2e / t_{output}]
Energy input 1	[MJ energy / t_{output}]	*value*	x	*value*	=	E1
Totals						
						Total emissions [kg CO_2e / t_{output}]
Fuel depot					E1 =	**TOTAL**
Contribution to overall fuel chain						Total emissions [g CO2e / MJBioliquid]
[(TOTAL ÷ downstream_yield) x downstream_allocation_factor] ÷ EC_Bioliquid =						**CONTRIBUTION**

downstream_yield is a factor calculated by the multiplication of the yields of all downstream modules (excluding the yield of the current module). The number of downstream modules, and thus the number of yields to be multiplied to calculate the downstream_yield factor are dependent on specific chains. By default, the downstream_yield factor should be set to 1. If a module has no yield (e.g. Depot, Power Plant) 1 should also be used in the multiplication.

downstream_allocation_factor is a factor calculated by the multiplication of the alloction factors of the current module (if relevant) and all downstream modules. The number of downstream modules, and thus the number of allocation factors to be multiplied to calculate the factor downstream_allocation_factor are dependent on specific chain. By default, the downstream_allocation_factor should be set to 1. If a module has no allocation factor (e.g. Depot, Power Plant) 1 should also be used in the multiplication.

EC_Bioliquid is the energy content of the Bioliquid (expressed as Lower Heating Value) in MJ / t.

Power plant module calculations

Power plant						
Energy input						
				Emission factor [kg CO_2e / MJ energy]		Total emissions [kg CO_2e / t_{output}]
Energy input 1	[MJ energy / t_{output}]	*value*	x	*value*	=	F1
Totals						
						Total emissions [kg CO_2e / t_{output}]
Power plant					F1 =	**TOTAL**
Contribution to overall fuel chain						Total emissions [g CO2e / MJBioliquid]
[(TOTAL ÷ downstream_yield) x downstream_allocation_factor] ÷ EC_Bioliquid =						**CONTRIBUTION**

downstream_yield is a factor calculated by the multiplication of the yields of all downstream modules (excluding the yield of the current module). The number of downstream modules, and thus the number of yields to be multiplied to calculate the downstream_yield factor are dependent on specific chains. By default, the downstream_yield factor should be set to 1. If a module has no yield (e.g. Depot, Power Plant) 1 should also be used in the multiplication.

downstream_allocation_factor is a factor calculated by the multiplication of the alloction factors of the current module (if relevant) and all downstream modules. The number of downstream modules, and thus the number of allocation factors to be multiplied to calculate the factor downstream_allocation_factor are dependent on specific chain. By default, the downstream_allocation_factor should be set to 1. If a module has no allocation factor (e.g. Depot, Power Plant) 1 should also be used in the multiplication.

EC_Bioliquid is the energy content of the Bioliquid (expressed as Lower Heating Value) in MJ / t.

Total Carbon intensity

Equation 7: Total carbon intensity calculation

$$\textbf{CI bioliquid } (gCO_{2eq}/MJ) = ECP + E_{DS} + E_T + E_{CV} + E_{FD} + E_{PP} + E_{LU}$$

Where:

E_{CP} is the emissions associated with the crop production module (gCO_{2eq}/MJ)
E_{DS} is the emissions associated with the drying and storage module (gCO_{2eq}/MJ)
E_T is the emissions associated with the transport module (gCO_{2eq}/MJ)
E_{CV} is the emissions associated with the conversion module (gCO_{2eq}/MJ)
E_{FD} is the emissions associated with the fuel depot module (gCO_{2eq}/MJ)
E_{PP} is the emissions associated with the power plant module (gCO_{2eq}/MJ)
E_{LU} is the emissions associated with direct land use change, if any (gCO_{2eq}/MJ)

Emissions savings from use of bioliquid

Equation 8: Emissions savings from use of bioliquid

$$\textbf{GHG emissions saving (\%)} = \frac{E_F - E_B}{E_F}$$

Where:

EB is the total GHG emissions (i.e. carbon intensity and land use change emissions) from the bioliquid, as per Equation 7

EF is the total GHG emissions from the fossil fuel comparator, taken from the RED ($91gCO_{2eq}$/MJ)

Appendix 9 - Definitions

GENERAL

Annual Bioliquid Sustainability Audit Report means the final report submitted by a generator to Ofgem after it has been verified by an independent auditor.

Biofuel means liquid or gaseous fuel for transport produced from biomass

Bioliquid means liquid fuel for energy purposes other than for transport, including electricity and heating and cooling, produced from biomass

Biomass means an individual fuel that has an energy content of at least 90 per cent that is derived directly or indirectly from "relevant material" (plant matter, animal matter, fungi or algae). For more detail refer to Article 4 (1) of the Renewables Obligation Order 2009.

Book-and-claim is a type of chain of custody system where the trade of the sustainability information (e.g. certificates) is decoupled from the physical product. This is not permitted under the RO.

Carbon intensity means the amount of greenhouse gases emitted during the production and consumption of a fuel. It is measured as the weight of GHGs emitted (expressed as CO_2 equivalents) per unit of energy in the fuel.

Conversion factor means the amount of output produced per unit of input. For example, the oil extraction rate or the amount of bioliquid produced per unit of vegetable oil.

Chain of custody describes the way in which sustainability information passes along the bioliquid supply chain

Equivalence trading is relevant to EU feedstocks and was originally practiced under the Common Agricultural Policy of the EU, although it is still practiced today. It describes the practice of crops grown under contract for energy use being substituted by other crops from within the EU which were not grown under an energy contract. This is a form of book-and-claim and is not permitted under the RO.

Ex-post verification, also referred to as an "**assurance engagement**", relates to an independent verifier assessing the validity of data or information (e.g. the annual report, or the GHG intensity of a certain intermediary product). This results in a statement from the verifier (also known as an "assurance opinion") in which the verifier draws a conclusion on the validity of the data or information.

Fossil derived bioliquid means bioliquid produced directly or indirectly from:

- Coal
- lignite
- natural gas (within the meaning of the Energy Act 1976(a))
- crude liquid petroleum, or

- petroleum products (within the meaning of the Energy Act 1976)

Fossil fuel comparator means the carbon intensity of the fossil fuel that the bioliquid replaces when it is used for power generation. This carbon intensity is defined in the RED.

Input (in the context of mass balance) means any physical input sourced by any party in the supply chain. For example rapeseed sourced by a rapeseed crusher or rapeseed oil sourced by a bioliquid producer.

Inventory means a stock of physical product or bioliquid data.

Limited assurance engagements aim to provide moderate assurance that the data or information is without material misstatement. Verifiers will make a statement such as nothing has come to their attention to indicate material misstatement, given an appropriate level of investigation. ISAE 3000 provides guidance to verifiers about how they should go about a limited assurance level engagement.

Mass balance is a type of chain of custody in which sustainability information remains assigned to consignments. The sum of all consignments withdrawn from a mixture must be described as having the same sustainability information, in the same quantities, as the sum of all consignments added to the mixture.

Non-proportionate feedstock reporting is the opposite of proportionate feedstock reporting. It means that when bioliquid is drawn from a consignment that contains a mix of different feedstocks, the feedstock mix reported does not have to be representative of the actual feedstock mix of the consignment from which it was drawn. This is not permitted under the RO.

Output (in the context of mass balance) means any physical output supplied by any party in the supply chain. For example rapeseed supplied by a rapeseed farm or rapeseed oil supplied by a rapeseed crusher.

Proportionate feedstock reporting means that when bioliquid is drawn from a consignment that contains a mix of different feedstocks, the feedstock mix reported must be representative of the actual feedstock mix of the consignment from which it was drawn.

LAND CRITERIA

The following definitions are considered land of **high biodiversity**:

Designated for nature protection purposes means designated in accordance with the law of the United Kingdom or any part of the United Kingdom or in accordance to the law of any country or territory outside the United Kingdom, for the purpose of protecting the natural environment

Primary forest means woodland of native species, where there is no clearly visible indication of human activity and ecological processes are not significantly disturbed

The following definitions are considered land of a **high carbon stock**:

Continuously forested area means land of an area of more than one hectare which includes:

- trees more than five metres tall providing a tree canopy cover of more than 30% or
- trees collectively having the capacity to provide a tree canopy cover of more than 30% which-
  (i) are more than five metres tall; or
  (ii) have the capacity to grow to a height of more than five metres

Lightly forested area means lands of an area of more than one hectare which includes:

- trees more than five metres tall providing a tree canopy cover of between 10% and 30%, or
- trees collectively having the capacity to provide a tree canopy cover of between 10% and 30% which-
  (i) are more than five metres tall; or
  (ii) have the capacity to grow to a height of more than five metres

Wetland area means land that is covered with or saturated by water-

- permanently; or
- for a significant part of the year

The following definition applies to **peatland**:

Peatland can be defined in a number of ways. A crucial characteristic of peatland for compliance with the RO is the extent to which the land is drained.

Appendix 10 - Glossary

A	
ASTM	American Society for Testing and Materials
B	
BS	British Standard
C	
CHP	Combined Heat and Power
CO_{2eq}	Carbon dioxide equivalent
D	
DME	Dimethyl ether
E	
EC	European Commission
EN	European Norm (Standard)
ETBE	Ethyl tert-butyl ether
EU	European Union
F	
FMS	Fuel Measurement and Sampling
G	
GHG	Greenhouse gas
I	
ISO	International Organisation for Standardisation
L	
LUC	Land use change
K	
kg	Kilogram
M	
MBS	Mass Balance system
MJ	Megajoule
MTBE	Methyl tert-butyl ether
N	
NIAUR	Northern Ireland Authority for Regulation
NIROC	Northern Ireland Renewables Obligation Certificate
O	
Ofgem	Office of Gas and Electricity Markets

R

RED	Renewable Energy Directive
RFA	Renewable Fuels Agency
RO	Renewables Obligation
ROC	Renewables Obligation Certificate
ROO 2011	Renewables Obligation (Amendment) Order 2011
RTFO	Renewable Transport Fuels Obligation

S

SoS	Secretary of State
SROC	Scottish Renewables Obligation Certificate

T

TAEE	Tertiary amyl-ethyl ether

V

VS	Voluntary scheme

Appendix 11 - Consultation Response and Questions

1.1. Ofgem would like to hear the views of interested parties in relation to any of the implementation issues set out in this document.

1.2. We would especially welcome responses to the specific questions which we have set throughout the document, and which are replicated below.

1.3. Responses should be received **by 5 pm on 2 March 2011** and should be sent to:

- Alicja Buczkowska
- New Schemes Development Team
- Ofgem, 9 Millbank, London SW1P 3GE
- 0207 901 7118
- Alicja.buczkowska@ofgem.gov.uk

1.4. Unless marked confidential, all responses will be published by placing them in Ofgem's library and on its website www.ofgem.gov.uk. Respondents may request that their response is kept confidential. Ofgem shall respect this request, subject to any obligations to disclose information, for example, under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004.

1.5. Respondents who wish to have their responses remain confidential should clearly mark the document/s to that effect and include the reasons for confidentiality. It would be helpful if responses could be submitted both electronically and in writing. Respondents are asked to put any confidential material in the appendices to their responses.

1.6. Next steps: Having considered the responses to this consultation, Ofgem intends to revise this guidance document in light of the feedback received during consultation period. Any questions on this document should, in the first instance, be directed to:

- Alicja Buczkowska
- New Schemes Development
- 9 Millbank, London SW1P 3GE
- 0207 901 7118
- Alicja.buczkowska@ofgem.gov.uk

1.7. Consultation questions

CHAPTER 2: Overview of sustainability requirements and exemptions

Q1. Do you feel the introductory chapter clearly sets out what sustainability criteria and exceptions are?

Q2. Are the guidelines for wastes and residues appropriate?

CHAPTER 3: Reporting carbon and sustainability information to Ofgem

Q3. Do you feel the reporting requirements have been explained clearly?

CHAPTER 4: Demonstrating compliance with land criteria

Q4. Do you feel the ways of demonstrating compliance with land criteria have been explained clearly?

Q5. Are there are any other voluntary schemes, other than REDcert that you would like to see assessed?

CHAPTER 5: Demonstrating compliance with the Greenhouse Gas emissions saving criteria

Q6. Do you feel the ways of demonstrating compliance with GHG emissions saving criteria have been explained clearly?

CHAPTER 6: Demonstrating compliance with Mass Balance rules

Q7. Do you feel the ways of demonstrating compliance with Mass Balance rules have been explained clearly?

Q8. Do you think proportionate feedstock reporting should be required only for the part of the supply chain that produces or trades single feedstocks?

CHAPTER 7: Auditing requirements

Q9. Do you feel the auditing requirements have been explained clearly?

Q10. Do you have any comments on or suggestions for the content of the verifier report template?

General questions

Q11. Does the document provide a clear explanation of how operator of generating stations can show that they meet the sustainability criteria for bioliquids under the RO? If not, which areas are unclear and why?

Q12. Are there any other outstanding issues that need to be addressed in any of the chapters?

Q13. Are there any parts of the guidance document that you think are inconsistent with the draft legislation? If yes, which parts and why?

Appendix 12 - Feedback Questionnaire

1.1. Ofgem considers that consultation is at the heart of good policy development. We are keen to consider any comments or complaints about the manner in which this consultation has been conducted. In any case we would be keen to get your answers to the following questions:

1. Do you have any comments about the overall process, which was adopted for this consultation?
2. Do you have any comments about the overall tone and content of the report?
3. Was the report easy to read and understand, could it have been better written?
4. To what extent did the report's conclusions provide a balanced view?
5. To what extent did the report make reasoned recommendations for improvement?
6. Please add any further comments?

1.2. Please send your comments to:

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