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Renewables Obligation: Sustainability criteria for bioliquids

Guidance

Reference: 182/11

Publication date: December 2011

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Overview:

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

This 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.

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 (the 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 sustainability requirements of the RED in the Renewables Obligation (Amendment) Order 2011 for England and Wales. The devolved administrations also undertook this action for the ROS and NIRO respectively.

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.

Guidance

- Renewables Obligation: Recognised Voluntary Schemes
  Published as an associated document to the Sustainability Criteria for bioliquids guidance

- Renewables Obligation: Sustainability Criteria for Solid and Gaseous Biomass for Generators (>50kW)
  http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/FuelledStations/Pages/FS.aspx

- Renewables Obligation: Biodiesel and Fossil Derived Bioliquids Guidance
  http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/FuelledStations/Pages/FS.aspx

- Renewables Obligation: Fuel Measurement and Sampling Guidance
  http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/FuelledStations/Pages/FS.aspx

- Renewables Obligation: Guidance for Generators
  http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/Pages/RenewablObl.aspx

- Renewables and CHP Register User Guide
  http://www.ofgem.gov.uk/Sustainability/Environment/RCHPreg/Pages/RCHPreg.aspx

Legislation

Europe

- Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009
  http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF

England and Wales

- The Renewables Obligation Order 2002 for England and Wales
  http://www.legislation.gov.uk/uksi/2002/914/contents/made

- The Renewables Obligation Order 2009 for England and Wales
  http://www.legislation.gov.uk/uksi/2009/785/contents/made

- The Renewables Obligation (Amendment) Order 2010 for England and Wales

http://www.legislation.gov.uk/uksi/2010/1107/contents/made

- The Renewables Obligation (Amendment) Order 2011 for England and Wales http://www.legislation.gov.uk/ukdsi/2011/9780111507353/pdfs/ukdsi_9780111507353_en.pdf

Scotland

- The Renewables Obligation (Scotland) Order 2002 http://www.legislation.gov.uk/ssi/2002/163/contents/made
- The Renewables Obligation (Scotland) Order 2009 http://www.legislation.gov.uk/sdsi/2009/9780111003268/contents
- The Renewables Obligation (Scotland) Amendment Order 2010 http://www.legislation.gov.uk/sdsi/2010/9780111007860/contents
- The Renewables Obligation (Scotland) Amendment Order 2011 http://www.legislation.gov.uk/sdsi/2011/9780111012352/contents

Northern Ireland

- The Renewables Obligation Order (Northern Ireland) 2005 http://www.legislation.gov.uk/nisr/2005/38/contents/made
- The Renewables Obligation Order (Northern Ireland) 2009 http://www.legislation.gov.uk/nisr/2005/38/contents/made
- The Renewables Obligation (Amendment) Order (Northern Ireland) 2010 http://www.legislation.gov.uk/nisr/2010/134/contents/made
- The Renewables Obligation (Amendment) Order (Northern Ireland) 2011 http://www.legislation.gov.uk/nidsr/2011/9780337983696/contents

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Executive Summary

This document provides guidance to operators of generation stations using bioliquid fuels that wish to benefit from the Renewables Obligation (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 through the Renewables Obligation Order 2009 (as amended 2011) (ROO), the Renewables Obligation Scotland Order 2009 (as amended 2011) (ROS) and the Northern Ireland Renewables Obligation Order 2009 (as amended 2011 Amendment) (NIRO). These are collectively referred to as the Orders. It provides assistance to bioliquid based electricity generators that wish to benefit from receiving Renewables Obligation Certificates (ROC) under the RO by giving guidance on how to meet sustainability requirements and demonstrate this compliance to Ofgem.

This document cannot anticipate every scenario which may arise. Where a scenario arises which is not addressed in this guidance, 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 to the quality of data they obtain to demonstrate compliance with the RO requirements. In instances where parties other than generators 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 Orders.

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 ROO 2009 (as amended), and the Renewables Obligation (Scotland) Order (ROS) 2009 (as amended), 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
- forwarding to the Secretary of State a summary of the sustainability information submitted during the obligation period.

1.6. We cannot properly 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

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 2011 amendments to the RO, 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.

1.10. 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

1.11. This document describes the requirements of operators of generating stations and independent auditors on how to comply with sustainability requirements for bioliquids and verify 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 Orders.

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

Queries

1.13. All queries in relation to our functions under the Orders should be emailed to renewable@ofgem.gov.uk. Written queries should be sent to Ofgem, 9 Millbank, London, SW1P 3GE, clearly marked for the attention of the Renewables and CHP Administrator.

1.14. Any queries regarding future changes to the ROO for England and Wales 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. For the ROS and NIRO, contact details can be found at www.scotland.gov.uk and www.detini.gov.uk.

2. Overview of sustainability requirements and exemptions

Chapter Summary

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

Sustainability requirements for bioliquids

2.1. In 2009, the European Union (EU) introduced a comprehensive and binding sustainability scheme. Under the European Renewable Energy Directive (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 requirement was transposed by government into the Renewables Obligation Order 2009 (as amended in 2011) making it effective as of 1st April 2011.

2.3. This guidance document aims to provide assistance on the sustainability criteria for stations generating electricity from bioliquids that wish to receive support under the Renewables Obligation.

2.4. The sustainability requirements include:

- land criteria, relating to the type of land on which biomass used to produce bioliquid was cultivated in reference to January 2008, and
- greenhouse gas (GHG) emission saving criteria, relating to a percentage reduction in GHG emissions of production of a bioliquid in relation to a fossil fuel comparator[2] .

2.5. For generating stations using bioliquids to generate electricity, meeting the sustainability criteria is a condition for receiving support in the form of ROCs.

2.6. It is important to note that all Member States are obliged to transpose the requirements of the RED into any applicable national legislation. Any operators

[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

[2] Annex V, Part C, Paragraph 19 of the RED outlines that for electricity the fossil fuel comparator for bioliquids shall be 91gCO_{2eq}/MJ.

wishing to claim ROCs for electricity generated from bioliquids and supplied to customers or used in a permitted way in the UK will have to comply with the requirements of the UK legislation. Compliance with another Member State's requirements in itself may not provide sufficient evidence to demonstrate compliance with the UK requirements.

Land criteria for bioliquids

Overview

2.7. All bioliquids used for the purpose of electricity generation will have to meet the land criteria[3] outlined below in order to be eligible for ROCs.

2.8. For a bioliquid to be regarded as compliant with the land criteria, the biomaterial from which it is made had to be obtained from a permitted source.

2.9. To comply with land criteria, biomaterial used for bioliquid production is obtained from a permitted source, unless it is obtained from land that:

- at any time during or after January 2008 was primary forest;
- 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);
- at any time in January 2008 was peatland (unless the cultivation and harvesting of biomaterial did not involve the drainage of previously undrained soil);
- at any time in January 2008 was a continuously forested area (unless that land is still a continuously forested area);
- 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);
- at any time in January 2008 was wetland (unless that land is still a wetland).

[3] See Schedule A2 to the Orders

Exemptions

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

2.11. For more information on these exemptions please see the Wastes and Residues section below.

2.12. Information on how to demonstrate compliance with land criteria is available in Chapter 4 of this guidance document.

Greenhouse gas emissions saving criteria for bioliquids

Overview

2.13. All bioliquids used for the purpose of electricity generation have to meet the GHG emissions saving criteria[4] to be eligible for receiving ROCs.

2.14. 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 comparator by at least the relevant percentage set out in the Orders.

2.15. 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 (see Figure 1).

[4] See Schedule A1 to the Order

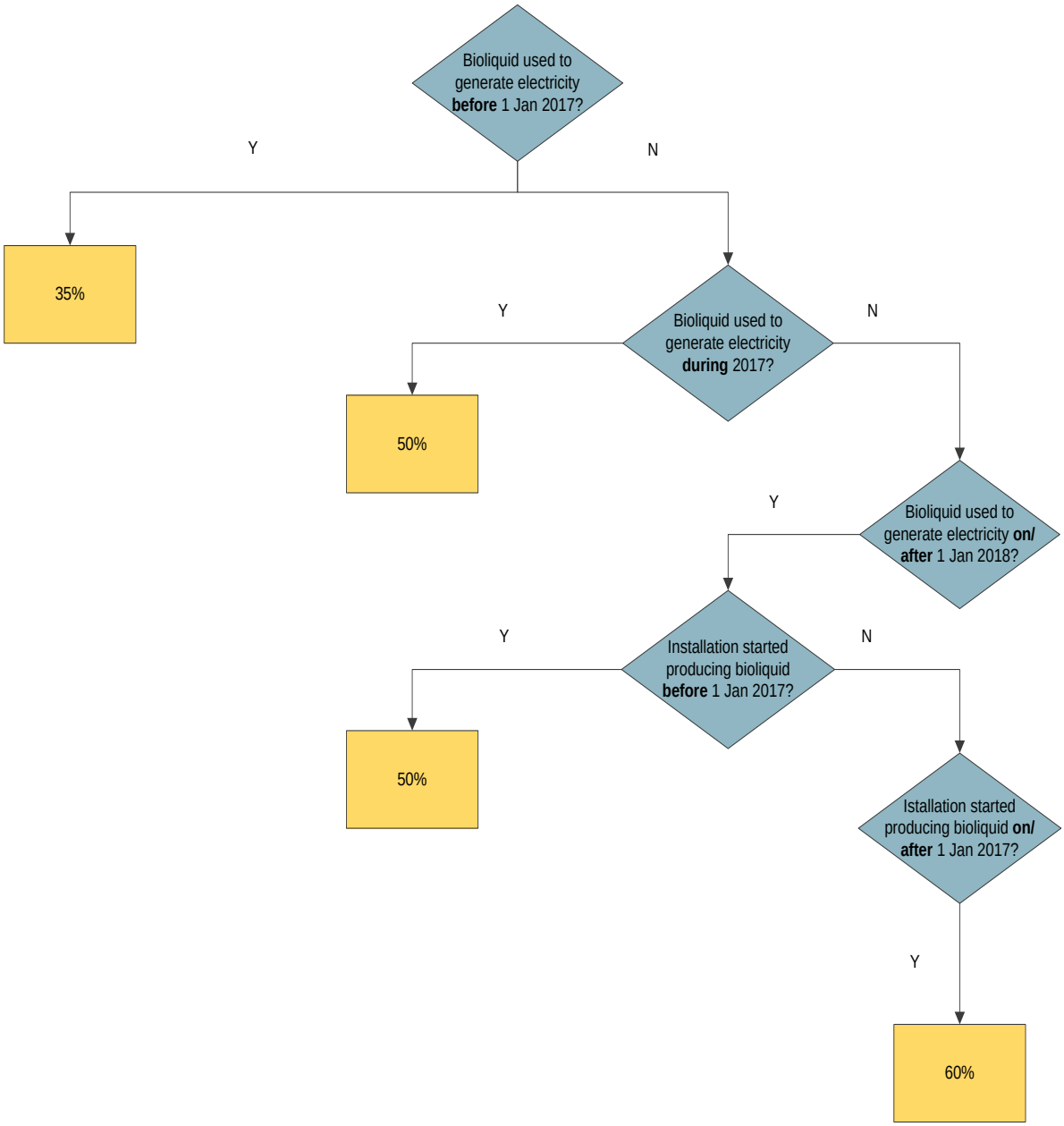

Figure 1: Change in the relevant GHG emissions saving percentage over time

2.16. 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[5] 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.

2.17. The percentage difference between the GHG emissions from the use of the bioliquid and the use of fossil fuel has to be calculated using the actual value method, the mixed value method or the default percentage. All methods of how to calculate GHG savings are discussed in detail in Chapter 5.

Exemptions

2.18. If a bioliquid was produced by an installation operating on 23 January 2008 at the latest, and this bioliquid is used for generating electricity before 1 April 2013, then it is exempt from having to report against the GHG emissions saving criteria.

2.19. In calculating the emissions, an operator can assign zero emissions to wastes, agricultural crop residues and residues from processing prior to the process of collection. More information on this is provided in the Wastes and Residues section below.

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

Mass balance

2.21. Mass Balance is a way of maintaining information where different consignments of bioliquid have been mixed or stored together. It ensures that a party can account for the volumes of bioliquid entering and leaving the mixture and the sustainability information that is associated with each bioliquid consignment.

2.22. To validate the accuracy of bioliquid sustainability claims, a chain of custody must be established from the feedstock producer to the operator of the generating station.

[5] See also the definition of installation in Appendix 10.

2.23. The chain of custody describes the way in which sustainability information passes along the bioliquid supply chain. By establishing a chain of custody, an operator is able to demonstrate that a connection can be made between the feedstock, the final bioliquid and the sustainability information.

2.24. Article 22A specifies that the chain of custody used must follow the rules of a mass balance system. Chain of custody systems with more stringent rules for tracking products, such as systems that require physical segregation of products, would be expected to meet the mass balance chain of custody rules (see paragraph 2.25). However, less stringent chain of custody types, such as book-and-claim, are not allowed, which means equivalence trading of feedstocks is not allowed either.

2.25. 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.

2.26. All parties in the supply chain from the source to the operator of a generating station must follow a mass balance system as a means of transferring bioliquid information through the supply chain. This transfer of information should be verified and is included in the scope of the Annual Bioliquid Sustainability Audit Report

2.27. Detailed rules of how a mass balance system should work are explained in Chapter 6.

Verification

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

Voluntary schemes

2.29. Voluntary schemes are certification schemes that offer a route to providing assurance that fuels meet aspects of the RO sustainability criteria.

2.30. The RED[6] allows for recognised voluntary schemes to be used to demonstrate compliance with the sustainability criteria. Use of voluntary schemes requires up-front certification.

2.31. 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 relevant criteria (e.g. land, GHG, etc).

2.32. Voluntary schemes typically have a specific scope for which they are recognised. In this case, the operator of a generating station may use more than one voluntary scheme, or a combination of a voluntary scheme and collection of other information, to demonstrate compliance with the criteria.

2.33. As well as the voluntary schemes approved by the European Commission (EC), the UK has also recognised a number of voluntary schemes. For more information on the schemes and their scope please see the associated document Renewables Obligation: Recognised Voluntary Schemes.

2.34. It is possible that other Member States will assess voluntary schemes at their own discretion. Operators of generating stations may choose to use voluntary schemes accepted by other Member States to provide evidence towards compliance with the sustainability criteria, however we will not automatically accept a voluntary scheme recognised by another Member State as proof of compliance.

Collection of information for ex-post verification

2.35. An alternative to such up-front certification against recognised voluntary schemes is an independent verification of information collected by operators against each of the criteria.

2.36. This verification takes place after the bioliquid has been used to generate electricity, and is therefore referred to as "ex-post" or "post-use" verification.

Annual Sustainability Bioliquid Audit Report

2.37. The Orders outline that operators must have an independent audit undertaken on an annual basis. This should verify the bioliquid sustainability information and the systems or methods in place for the gathering of this information.

[6] Article 18(4) of RED

2.38. 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[7]. 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.

2.39. Where an operator has collected information on the sustainability criteria, rather than making use of a voluntary scheme, the verifier will need to review this information to determine whether this demonstrates compliance with the criteria.

2.40. The Annual Bioliquid Sustainability Audit Report is a mandatory requirement. For information regarding the timelines for this audit report please see Chapter 3. For more information on auditing and verification, see Chapter 7.

Wastes and residues

2.41. As set out in the overview of the land and GHG criteria, requirements for bioliquids from wastes and residues are different to requirements for bioliquids from other feedstocks. The requirements are summarised below in Table 1.

2.42. To qualify for the wastes and residues exemptions, a bioliquid must have been made from a waste or a residue. Bioliquids will qualify for an exemption even if they are no longer a waste at the point of use, such as a biodiesel made from waste cooking oil.

2.43. A list of all the common feedstocks and our view on their classification for the purposes of reporting to Ofgem under the Orders is set out Appendix 2.

[7] The European Commission Communication on voluntary schemes (2010/C 160/01) says that "a voluntary scheme should ensure that economic operators are audited before allowing them to participate in the scheme." As such a voluntary scheme should offer a higher percentage of auditing and therefore a higher level of up-front assurance than ex-post verification of information on land-use, which would only verify a sample of the claims made through the supply chain.

Table 1: Summary chart of reporting requirements under the Orders

Fuel Category	Land Criteria	GHG criteria	
		Emissions *up to* the process of collection	**Emissions *from* the process of collection**
Waste	✗ **Exempt**	✗	✓
Residues (excluding residues from processing, fisheries, forestry, aquaculture and agriculture)	✗ **Exempt**	✓	✓
Processing residues	✗ **Exempt**	✗	✓
Residues from agriculture	✓	✗	✓
Residues from forestry	✓	✓	✓
Residues from fisheries and aquaculture[8]	✓	✓	✓
Products/co-products	✓	✓	✓

Definitions

2.44. What constitutes a waste or a residue relies on interpreting the Orders, the RED, Commission Communications, and the existing UK and EU law on wastes.

2.45. This is a complex area. There is often not a definitive answer to the question of whether a substance is a waste or a residue. The guidance material aims to give guidance that is as clear and consistent as possible in this area.

[8] We understand that the treatment of residues from fisheries and/or aquaculture may be considered further by the government during 2012.

Definition of Waste

2.46. The ROO and the ROS note that waste has the meaning given to it in section 75(2) of the Environmental Protection Act 1990 (EPA)[9]. The NIRO gives it the meaning set out in to the Waste and Contaminated Land and (Northern Ireland) Order 1997[10]. Following these definitions, broadly we consider a waste to be a material which the holder discards, intends to discard, or is required to discard.

Definition of Residues

2.47. Neither the Orders nor the RED defines residues. However, there is some information provided in Communications from the Commission.

2.48. The Commission Communication on practical implementation (2010/C 160/02)[11] 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."

2.49. The Communication (2010/C 160/02) also notes that "agriculture, aquaculture, fisheries and forestry residues are residues that are directly produced by agriculture, fisheries, aquaculture and forestry; they do not include residues from related industries or processing". Although Commission Communications are not binding on member states, and are not transposed into the Orders, Ofgem generally intends to have regard to their guidance (consistent with UK law).

2.50. This definition of residues from agriculture, aquaculture, forestry and fisheries, can be interpreted to mean that such residues are those generated in the process of harvesting the material being sought. Once the product is removed from the point of harvest and processed elsewhere, any residues generated become processing residues.

Allocating Emissions - Process of Collection

2.51. "Process of collection" refers to the beginning of the process of collection. This includes all transport involved in collecting the waste or residue and transporting it for further processing. For example, used cooking oil may be collected from different restaurants and food processing plants. The transportation of this used cooking oil will need to be calculated and allocated to the final bioliquid fuel.

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[9] See section 75(2) of the *Environmental Protection Act 1990*. This definition applies to the ROO (Article 2), the ROS (Article 2) and the NIRO (which holds a different definition: "waste" has the meaning given to it in Article 2(2) of the Waste and Contaminated Land and (Northern Ireland) Order 1997 (a) but does not include gas derived from landfill sites or gas produced from the treatment of sewage).
[10] See section Waste and Contaminated Land and (Northern Ireland) Order 1997
[11] Commission Communication on practical implementation (2010/C 160/02) - http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:160:0008:0016:EN:PDF

Demonstrating that a Fuel or Feedstock is Waste or Residue

2.52. The tables in Appendix 2 are not intended to be an exhaustive list. If a substance is not on the list, it does not mean the substance is not a waste or residue. Operators may wish to use additional fuels that qualify as a waste or a residue.

2.53. It is not possible to lay down definitive or absolute rules as to when particular materials will be waste or not. A value judgment has to be made taking into account the circumstances of each case, and applying the case law principles and indicators.

2.54. Ofgem may periodically review and update this list, if sufficient evidence emerges to indicate that a substance should be treated differently.

2.55. If an operator wishes to make use of the waste and residues exemptions, they must have evidence to demonstrate this. This evidence will be verified by the Annual Bioliquid Sustainability Audit Report. This means that an operator must demonstrate to the auditor's satisfaction that a bioliquid fuel used for generation is, or is derived from, a waste or residue.

2.56. For demonstrating that a fuel is a waste or derived from a waste, useful documentation may include permits and certificates (such as waste transfer notes or end-of-waste certificates) issued by the Environment Agency.

2.57. It is important to note that the Environment Agency has an important role, under the WFD, in determining whether a substance is a waste or is derived from waste. The Orders must have regard to this when implementing the objectives of the RED, but it may mean that there are instances where a material is classified as a waste by the Environment Agency but this is not definitive for the purpose of the ROO.

Applying to Ofgem to have a substance recognised as a waste or residue for the RO

2.58. Where an operator is uncertain whether a particular fuel qualifies as a waste or as a residue, and cannot use the documents described above, the operator can apply to Ofgem for a view. It is the responsibility of operator to demonstrate to Ofgem's satisfaction that substances are wastes or residues.

2.59. Further details on the process for determining whether materials are wastes or residues will be available on our website from early 2012. Broadly, we will ask the operator to provide information on the processing that results in the substance. Ofgem will consider the evidence provided by the operator, and will seek technical advice where appropriate. Ofgem will then come to a view on whether the substance is a waste or residue for the purposes of the RO.

2.60. When assessing a material, Ofgem will have regard to the objectives of the RED, as well as our role and responsibilities in administering the Orders. As a result, there may be occasions where materials that are determined to be wastes by the Environment Agency under the WFD, are not also classified as waste for the purposes of providing information to Ofgem against the Order's sustainability criteria.

2.61. Furthermore, while we endeavour to be as consistent as possible with other government departments, such as the Department of Transport and its view on biofuel classification, there may be occasions where our role and responsibilities under the Orders, lead us to a different view on the same material.

2.62. Ofgem's view on whether a substance is a residue or a waste is relevant to the RO sustainability criteria only. Ofgem's view is not applicable to the status of substances under the Waste Framework Directive, and will have no influence on the Environment Agency when the Environment Agency is making decisions on substances. This applies both to the tables in Appendix 2, and to any subsequent views Ofgem reaches on wastes and residues for the RO.

Wastes as Dedicated Biomass

2.63. We note that there is a definition of wastes in Ofgem's Fuel Measurement and Sampling guidance document. That definition of wastes relates to the energy content of fuels derived from fossil sources. It is different from the definition of wastes for sustainability purposes. For sustainability purposes, a waste can be entirely biomass, such as used cooking oil, and therefore remain eligible for dedicated biomass ROCs.

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. Under the Orders[12] operators must provide particular information to Ofgem for the sustainability of their bioliquid. This information consists of -

- Annual Sustainability Report for generating stations with a DNC of greater than 50kW. This reporting requirement was introduced in the 2009 Orders and includes various pieces of information concerning the biomass fuel(s) used during each obligation period. Details of how to report, and the relevant exemptions, are not covered in this guidance document. Instead they are outlined in Chapter 4 of the Renewables Obligation: Fuel Measurement and Sampling guidance document.

- Monthly reporting against Land and GHG Criteria. This reporting requirement is mandatory for ALL stations using bioliquids and is required on a monthly basis as part of output data submissions. Please note if a bioliquid does not meet the criteria the fuel will not be eligible for ROCs.

- Annual Bioliquid Sustainability Audit Report. This is to be submitted by all generating stations using bioliquids by 31st May following the obligation period. This is required to verify the information used to determine compliance with the land and GHG criteria. Chapter 7 outlines this requirement in more detail.

Land and GHG criteria: What and when to report

3.2. Every operator of a station using bioliquids to generate electricity will be required to report against the land and GHG criteria of each fuel consignment as part of their monthly output data submission. This should be reported via the Renewables and CHP Register as part of the monthly submission.

[12] Article 54 of the ROO and ROS and Article 46 of the NIRO.

3.3. As outlined in Article 54A[13], the operator will also need to submit an independent Annual Bioliquid Sustainability Audit Report to Ofgem. This report consists of an independent "verifier opinion" and is to verify that the bioliquids reported as meeting the sustainability criteria throughout the obligation period, indeed meet these criteria.

Monthly Reporting

3.4. As part of each monthly output submission, 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 GHG emission savings. 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 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 the land and/or the 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 are deemed unsustainable, no ROCs will be issued on the electricity generated from the unsustainable fuel.

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

Annual Bioliquid Sustainability Audit Report

3.8. All stations generating electricity, wholly or partly, from bioliquids, must provide Ofgem with an independent Annual Bioliquid Sustainability Audit report by the 31st May immediately following the obligation period. For example the audit report for the 2011/2012 obligation period is due by 31st May 2012.

3.9. The Annual Bioliquid Sustainability Audit Report must:

- Be prepared by a person independent to the generating station (an independent verifier).
- Identify the systems used to produce the relevant sustainability information.
- Confirm that measures have been taken to protect 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 (ISAE 3000 – 2010 edition) or equivalent.

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

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

Use of Annual Bioliquid Sustainability Audit Report findings

3.13. 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.

3.14. 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

3.15. If an Annual Bioliquid 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.

3.16. Where an Annual Bioliquid Sustainability Audit report has been provided to Ofgem by 31st May immediately following the obligation period but is either incomplete or is deemed not to have been prepared to an adequate standard, Ofgem will postpone the issue of ROCs. This will be up to the number of ROCs we estimate the report is due to cover.

3.17. In both scenarios, these ROCs will remain postponed until such time as the adequate Annual Bioliquid Sustainability Audit Report is provided.

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, outlined in Schedule A2, refer specifically to the production of the raw material. They do not apply to any other steps further down the supply chain.

4.2. Operators may wish to share information related to the land criteria with other parties in the supply chain, but the physical evidence for meeting the land criteria (e.g. maps or sustainability certificates) should stay with the feedstock producer. Any information or evidence should be kept and made available if required for verification purposes.

4.3. The permitted options for demonstrating compliance with the land criteria are as follows[14]:

- Voluntary schemes recognised by the European Commission (EC) for the land criteria;
- Voluntary schemes recognised by Ofgem as evidence of compliance with the land criteria; and
- Collection of information on land use of the farm/plantation in January 2008 for ex-post verification.

4.4. Figure 2 is available to aid the operator in selected the relevant option for demonstrating compliance. Each of these options will be further discussed below.

[14] The RED also permits the use of recognised bilateral or multilateral agreement concluded by the European Union with third countries to demonstrate compliance with sustainability requirements. At the time of writing this guidance no such bilateral or multilateral agreements exist. Ofgem intends to allow generators to make use of such bilateral or multilateral agreements as and when they are agreed and recognised by the EC. This option shall be incorporated into this guidance at such a time as it becomes necessary.

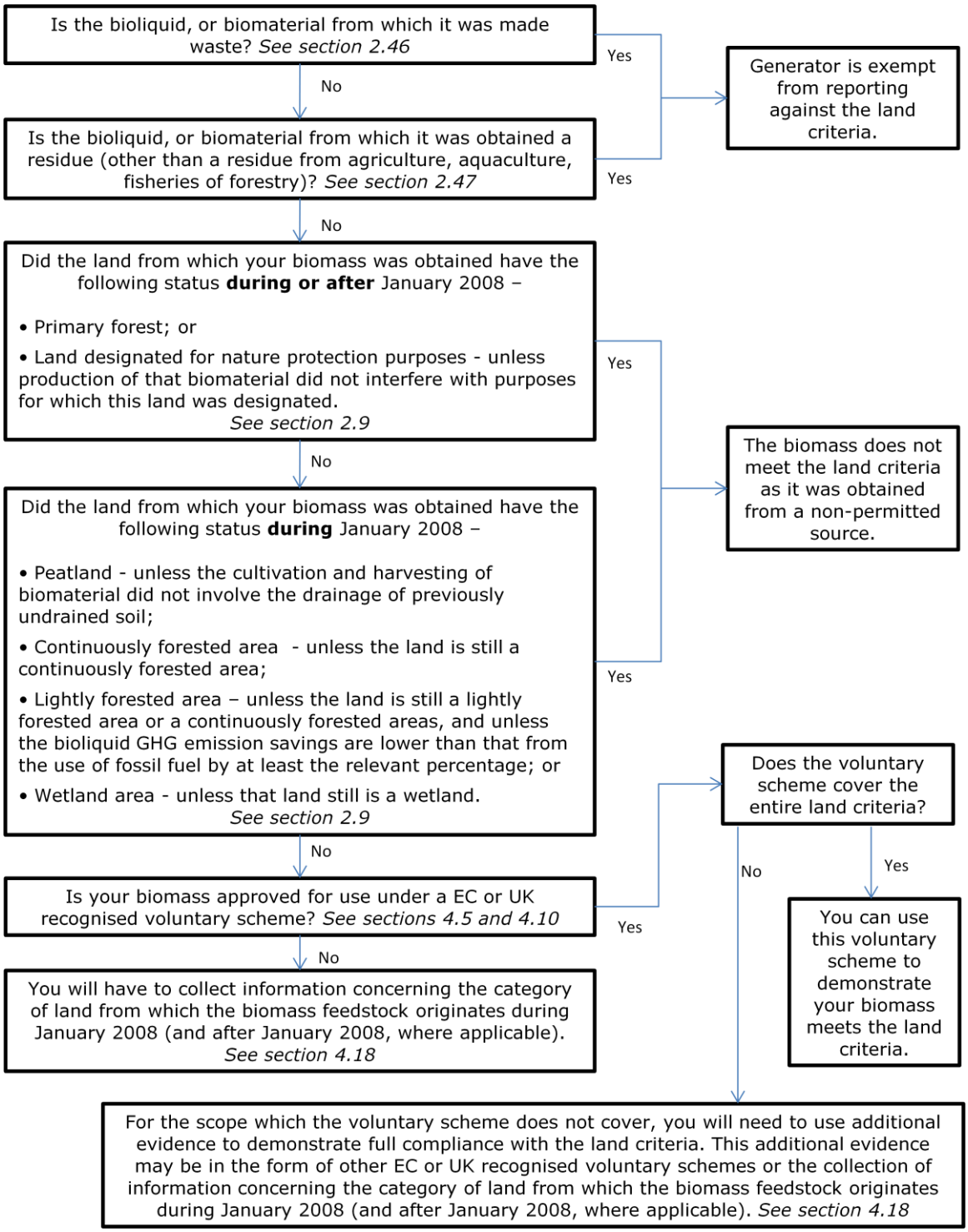


Figure 2: Demonstrating compliance with the land criteria

Using EC approved voluntary schemes

4.5. The RED[15] encourages the use of recognised voluntary schemes as one of the ways of demonstrating compliance with the land use criteria.

4.6. The EC will undertake formal assessments of voluntary schemes[16] 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[17].

4.7. Member States are required to accept all voluntary schemes that have been recognised by the EC. Any Decision by the EC takes precedence over any assessment made by UK government, or other Member States. Ofgem will recognise any voluntary scheme recognised by the EC from the date the EC Decision is published[18].

4.8. 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 useful to provide supporting evidence towards compliance.

4.9. The EC have approved a number of voluntary schemes. A summary of these schemes, and the date which these were approved has been published as an associated document to this guidance – Renewables Obligation: Recognised Voluntary Schemes. More detailed information regarding the scope of these schemes can be found on the EC's transparency platform.

Using UK recognised voluntary schemes

4.10. For consistency in the UK policy, Ofgem will recognise the assessments of schemes conducted by the Renewable Transport Fuels Obligation (RTFO) Administrator. 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.

[15] Article 18(4), paragraph 2
[16] It is the responsibility of voluntary schemes to apply to the EC for recognition against the RED.
[17] http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm
[18] Subject to parties in the supply chain being audited against the version of the voluntary scheme that the EC Decision refers to.

4.11. The associated document to this guidance – Renewables Obligation: Recognised Voluntary Schemes outlines the schemes that have been assessed by the RTFO administrator and the scope which these schemes cover.

4.12. Ofgem will work with the RTFO Administrator on any future review of those assessments, 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 to demonstrate compliance with the land criteria for the remainder of the obligation year.

4.14. After that obligation year a voluntary scheme explicitly not recognised by the EC can only be used to provide supporting evidence towards compliance with relevant criteria.

4.15. If parties request a voluntary scheme to be assessed, we will liaise with the RTFO Administrator 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. A draft assessment protocol against the land criteria is set out in Appendix 3. 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[19] published after the RTFO assessment protocol was developed.

Collection of information for ex-post verification

4.18. Where an operator is using a bioliquid to generate electricity which is not covered by a voluntary scheme, they must collect information to demonstrate compliance with the land criteria.

4.19. Operators should do this by collecting information on the land use of the farm/plantation in January 2008 (and after this date, where applicable).

4.20. This information on land use is then verified by an independent auditor as part of the Annual Bioliquid Sustainability Audit Report. For further guidance on verification, see Chapter 7.

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

Land Categories

4.21. Categories of land include:

- 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% cover)
- Forest (10-30% cover)
- Wetland
- Undrained peatland
- Peatland
- Degraded land
- Settlement

4.22. Appendix 4 provides further detail on the land categories and provides specific guidance on whether the categories comply with the land criteria of the RO.

4.23. Cropland specifically refers to land that is under control of the farm or plantation. It is possible that the land at a single 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 January 2008. However, in an instance where the land used to produce the feedstock is cropland, "cropland" should be reported.

4.24. 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.

4.25. 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.

4.26. In line with 4.23 and 4.25, 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.

4.27. If a land-use change is permitted under the Orders (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.

Useful Resources

4.28. It may be useful for operators to draw on other sources of guidance to aid with the process of determining the land use and gathering evidence of this.

4.29. The European Commission has produced a guidance document for economic operators to help identify the status of the land in January 2008. This guidance document has been produced for use with bioliquids and biofuels to demonstrate compliance with the RED land use criteria and is available on the Transparency Platform[20].

4.30. For UK sourced biomass the Department for Environment, Food and Rural Affairs (Defra) is likely to be a useful source of information regarding land use. They have compiled a list of evidence sources within the UK that might be useful for operators in demonstrating compliance with the Orders land criteria. This table has been designed specifically for biofuels under the RTFO[21] and is not designed to be an exhaustive list. Operators may need to draw on several sources as the work undertaken by Defra was not specifically to show compliance with the Orders sustainability criteria.

4.31. Other countryside agencies and the Forestry Commission/Northern Ireland Forestry Service may be able to assist operators.

Further work expected by EC

4.32. 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.

[20] Inventory of data sources and methodologies to help identify land status. Available at http://ec.europa.eu/energy/renewables/biofuels/sustainability_criteria_en.htm
[21] Available on DfT website – www.dft.gov.uk

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

4.34. The EC has asked the European Committee for Standardization[22] (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)). Once this has been published operators may find it a useful source of information.

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

5. Demonstrating compliance with the Greenhouse Gas emissions saving criteria

Chapter Summary

This chapter describes how to demonstrate compliance with the GHG emission savings 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 to the Orders.

5.2. Operators of generating stations are required to report on the GHG emissions associated with any bioliquid used in electricity generation where ROCs are awarded, and prove their compliance with GHG saving thresholds. Throughout this chapter we refer to these GHG emissions as 'carbon intensity'[23].

5.3. Operators may wish to share information related to the GHG criteria with other parties in the supply chain. The sharing of this information will aid the GHG calculations. The physical evidence for this information does not necessarily need to be transferred down the supply chain, but should be kept and made available since it may be required for verification purposes.

5.4. The permitted options available to operators of generation stations to demonstrate compliance with the GHG criteria are:

- Voluntary schemes recognised by the EC for the GHG criteria;
- Voluntary schemes recognised by Ofgem as evidence of compliance with the GHG criteria[24];
- Collection of information for ex-post verification - GHG information held by the operator showing whether or not a bioliquid meets the appropriate GHG threshold. This could relate to the correct use of a GHG default value or the

[24] This option is currently not used in practice as Ofgem and the RTFO Administrator 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.

correct application of the RED methodology to calculate a value using appropriate actual values.

Using EC approved voluntary schemes

5.5. The RED[25] encourages the use of recognised voluntary schemes as one of the ways of demonstrating compliance with the land use criteria.

5.6. The EC will undertake formal assessments of voluntary schemes[26] 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[27].

5.7. Member States are required to accept all voluntary schemes that have been recognised by the EC. Any Decision by the EC takes precedence over any assessment made by UK government, or other Member States. Ofgem will recognise any voluntary scheme recognised by the EC from the date the EC Decision is published[28].

5.8. 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 useful to provide supporting evidence towards compliance.

5.9. The EC has approved a number of voluntary schemes. A summary of these schemes, and the date which these were approved has been published as an associated document to this guidance – Renewables Obligation: Recognised Voluntary Schemes. More detailed information regarding the scope of these schemes can be found on the EC's transparency platform.

Using UK recognised voluntary schemes

5.10. At present there are no additional UK recognised voluntary schemes for the GHG criteria.

[25] Article 18(4), paragraph 2
[26] It is the responsibility of voluntary schemes to apply to the EC for recognition against the RED.
[27] http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm
[28] Subject to parties in the supply chain being audited against the version of the voluntary scheme that the EC Decision refers to.

5.11. If parties request a voluntary scheme to be assessed, we will liaise with the RTFO Administrator 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.

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

Collection of information – GHG calculations

5.13. Where an operator is using a bioliquid to generate electricity which is not covered by a voluntary scheme recognised for GHG calculations, they must determine the GHG emission saving by using one of the following methods:

- The default percentage[29] - the use of a default carbon intensity in relation to a specific production pathway as set out in the RED (see paragraph 5.19);
- The actual value method – calculating the carbon intensity based on actual values using the methodology set out in the RED (see paragraph 5.24); or
- The mixed value method – a combination of disaggregated default values[30] and for part of the supply chain, and actual values for other parts (see paragraph 5.45).

5.14. The correct use of a GHG default value and/or the correct calculation of GHG emission savings will be subject to independent verification as a part of the Annual Bioliquid Sustainability Audit Report.

5.15. This chapter will use the term "carbon intensity" in association with the GHG calculations for the bioliquid. The carbon intensity 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. Additional guidance on how to determine the carbon intensity of the bioliquid for each of the methodologies is given in this chapter.

5.17. There are constraints on which approach can be taken to determine the carbon intensity of a bioliquid. Figure 3 summarises these constraints. Please refer to

[29] 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

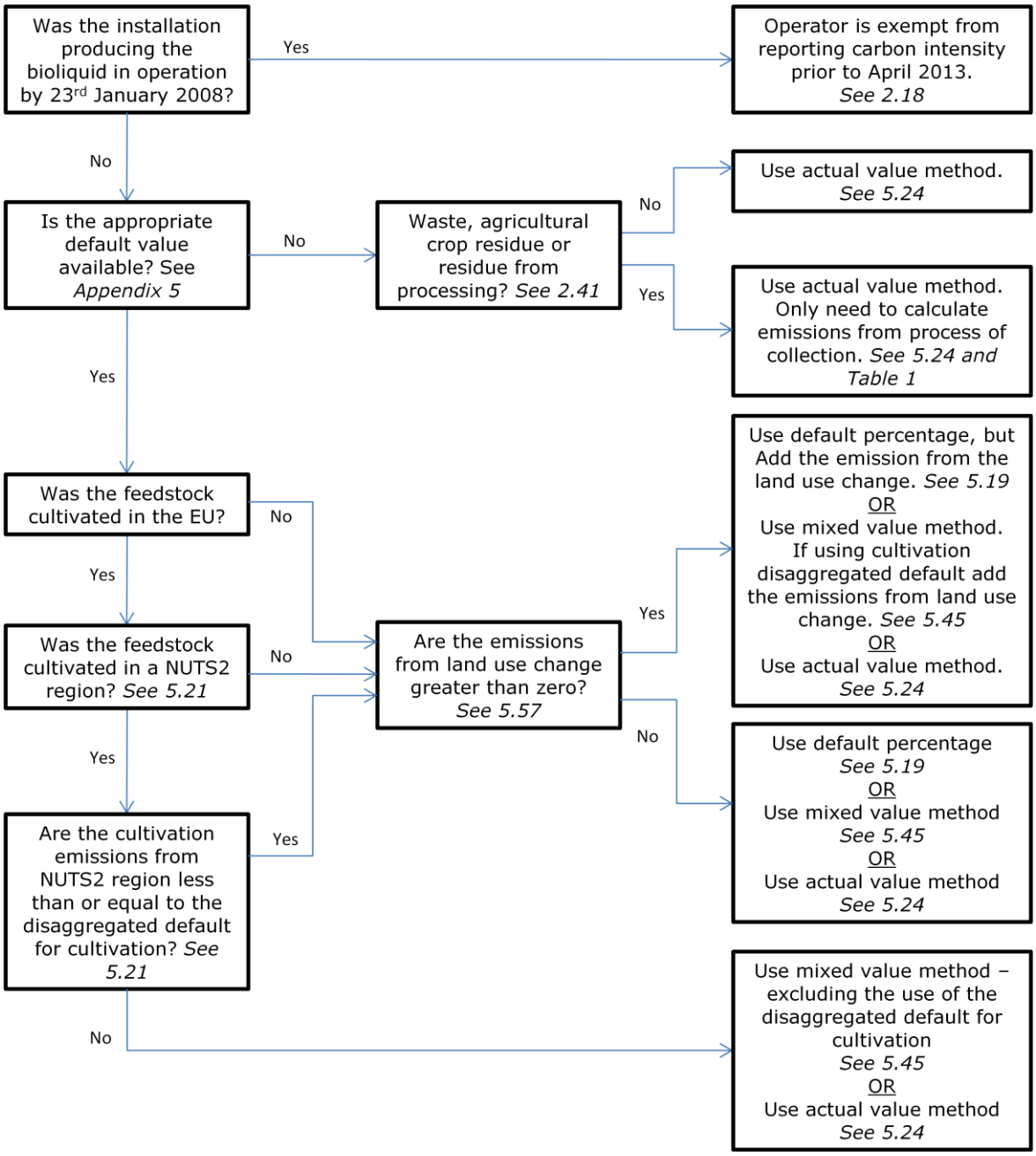
[30] Disaggregated Default Value is specifically defined in Schedule A1 of the ROO. Essentially, it is the value which corresponds to the Cultivation, Processing or Transport and Distribution stage which are determined in the RED by splitting a Default Value.

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 between a default value and 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 5.54).



N.B in all cases, actual data must be provided for the land use change component of the supply chain.

Figure 3: Carbon intensity calculation methods

The default percentage method

5.19. The EC has provided a series of default carbon intensities that can be used by the operator of a generating station to determine their GHG emission saving.

5.20. Appendix 5 shows the current version[31] of the list of default values. The EC intends to update this list regularly. 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[32].

5.21. The use of these default 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.

- The default carbon intensities may also only be reported if emissions from land use change are not greater than zero (see paragraph 5.57 for how to perform these calculations). For fuel chains in which land use change has occurred, the default value can only be used if combined with the emissions from the land use change.

- 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[33] default value for feedstock cultivation. If the NUTS 2 region has higher cultivation emissions than the default, the complete default carbon intensity cannot be used. Instead, actual values or the NUTS 2 regional value 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 EC transparency platform[32].

5.22. If one of these points is not fulfilled, then the operator must calculate the carbon intensity using either the actual value method or the mixed value method (see following sections).

5.23. In addition it should be noted that if an operator of a generating station wishes to mix consignments of bioliquid with other consignments of bioliquid for the

[31] As of 1 April 2011.
[32] The European Commission transparency platform is available at: http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm.
[33] See paragraph 5.49 for an explanation of disaggregated default values

purpose of GHG calculation, they must report on each of the consignments separately.

The actual value method

5.24. The Orders specify that when undertaking the actual value method, operators should refer to the methodology set out in Annex V, Part C of the RED[34].

5.25. The section sets out this methodology, and explains what input data and emission factors should be used by those wishing to use the actual value method.

5.26. A template for the necessary calculations is provided in Appendix 9. Some worked examples using this methodology are also available on Ofgem's website. 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.

Methodology

5.27. The 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 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

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

- Cultivation
- Production
- Transport and distribution

[34] Paragraphs 1, 2 and 5-18 only of Annex V, Part C of the RED.

5.29. There may be more than one transport or processing step in the bioliquid chain. In the example bioliquid chain (Figure 4), 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.

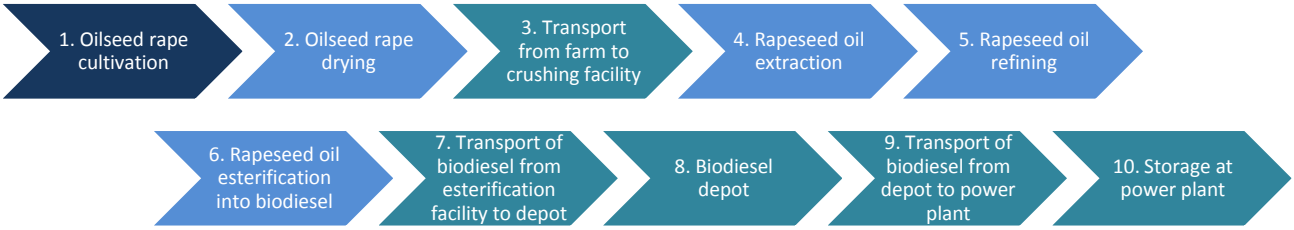


Figure 4: Example of a fuel chain structure using rapeseed biodiesel.

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

5.30. If a feedstock is on the list of wastes and residues (see Appendix 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 (where applicable) should be included. For example, if waste vegetable oil is collected from a number of different locations, the emissions associated with collection from those locations should be included in the GHG emissions calculations[35].

5.31. 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).

[35] In a situation where feedstocks are collected from a large number of different locations, it is acceptable to use an average journey distance for this transport of feedstocks.

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 5.40 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) 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[36].

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 paragraph 5.33 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[37] when performing actual calculations. The use of Tier 1 of this 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

[36] In opposition to a cultivation co-product which would be eligible for the emission saving
[37] 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)

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 5.40).

5.32. 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[38].

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).

Allocation Factors for co-products

5.33. In some cases, when a feedstock is produced, there are other useful products that are made at the same time. These are termed "co-products".

5.34. In these cases it is important that all of the emissions upstream of the point at which the co-products are produced are split between the different co-products (e.g. the rapeseed oil cultivation and emissions associated with pressing the seeds, should be split between the oil and the meal).

5.35. In most cases, the upstream emissions should be allocated between the different co-products based on the energy content of each co-product.

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

[38] 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

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

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.

Input data

5.37. 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 2.

Table 2: 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[39] Fuel type and demand Electricity demand Co-product yield and energy content[40]

5.38. The RTFO Administrator 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 should operators of generating stations wish to use some of their input data in combination with some of these RED defined input data.

5.39. 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

[39] i.e. tonnes of product (e.g. biodiesel) per tonne of input (e.g. rapeseed oil).
[40] The energy content of co-products should be based on their lower heating value (LHV). By convention, the LHV is considered to be the heat released during the combustion of a fuel, with starting temperature at 20°C and end-state temperature at 125°C for all products. For the purposes of the carbon intensity calculations laid out in this guidance, LHV can either be found in scientific literature (see paragraph 5.42) or measured in calorimeters.

linkages. The table summarises this information and presents Ofgem's view in the lack of guidance from the EC. This approach may be updated when further guidance from the EC becomes available.

Table 3: Compulsory linkages between interdependent parameters

Input one	Input two
Crop production	
Crop yield[41]	Nitrogen fertiliser application rate
Nitrogen fertiliser application rate	Soil N_2O emissions[42]
Conversion	
Efficiency	Any co-product yield
Efficiency	Fuel or electricity use
Electricity or heat exported	Fuel use

Emission factors

5.40. Emissions factors are used to calculate the GHG emissions associated with the production of an input material. For example, the emissions factor for nitrogen fertiliser is 5.88kgCO_{2eq} per kg of nitrogen (kgCO_{2e}/kgN) applied, based on the emissions from producing and transporting the fertiliser. This factor is used in combination with the application rate of the fertiliser (in kg N/ha) and the yield of the crop (in t/ha) to give the contribution of the use of the nitrogen fertiliser to the overall carbon intensity of the production of the crop (in kgCO_{2e}/t crop).

5.41. A list of the standard emission factors developed by the BioGrace project has been published on EC transparency platform[43] 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.

5.42. 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 the auditor as a part of verification process). The value used must fulfil the following requirements:

[41] This compulsory linkage does not apply to sugar beet.
[42] Note that actual input data does not need to be collected for soil N_2O emissions; the IPCC Tier 1 methodology can be used as described in step 4 of the table in paragraph 5.30, which calculates N_2O emissions based N fertiliser input. If the Carbon Calculator is used, N_2O emissions are automatically calculated from the nitrogen fertiliser applied, using the same IPCC Tier 1 methodology.
[43] The list of standard emission factors can be downloaded from:
http://www.biograce.net/content/ghgcalculationtools/standardvalues

- The standard emission factor should be obtained from independent, scientifically expert sources[44].
- The standard emission factor should be based on the most up-to-date reference available.
- The standard emission factor should be applicable for what it is being used for.

5.43. 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[45]. 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 5.32.

5.44. 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.

The mixed value method

5.45. 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. This is the mixed value method.

5.46. The mixed value method may also be useful for operators who wished to use the default method, but are unable to because of the NUTS 2 value constraints set out in 5.21.

5.47. As with the default percentage, the mixed value method can only be used if an appropriate production pathway exists[46]. The operator 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).

5.48. As mentioned in the actual value method section, bioliquid supply chains are divided into three stages:

[44] In the first instance, it is recommended to look to the EU Transparency Platform as the EC may decide to upload acceptable input data there.
[45] Other sources may also be used.
[46] See Parts D and E of Annex V of the RED

- cultivation
- processing
- transport and distribution

5.49. The RED provides a breakdown of the default 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 which is used for the default method (see Appendix 5).

Using the disaggregated default for the cultivation stage

5.50. If the bioliquid feedstock was produced in the EU, 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.

5.51. 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.

5.52. It should be noted that the RED makes a provision for "regional" cultivation data that can be used in place of actual data. Following a requirement[47] in the RED[48], European Member States, including the UK, have submitted reports which include a list of "regions" (of NUTS 2 size) and their associated cultivation emissions.

5.53. We understand 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[49]. Suppliers may use the accepted NUTS 2 level cultivation emissions whether these emissions are higher or lower than the disaggregated default published by the Commission for the cultivation step.

Using the disaggregated default for the processing stage

5.54. It should be noted that the EC 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

[47] Article 19(2) of the RED
[48] For the EU default carbon intensity of disaggregated default value for cultivation to be used for biofuel feedstocks produced in the EU, these feedstock must 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 to be lower or equal to the disaggregated default value for cultivation published in the RED.
[49] Paragraph 6 of Part C of Annex V to the RED, as applied by Schedule A1 ROO.

typical inputs to the processing modules, and then the resulting emission was increased by 40%.

5.55. 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
- co-product yields
- quantity of fuel used
- electricity consumption, and
- chemicals consumption

5.56. 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.

Land use change emission calculation

5.57. This section sets out how emissions due to land use change should be calculated. The EC transparency platform has published an annotated example of such emissions calculations which can be downloaded from their website[50].

5.58. Equation 1 is taken directly from the RED GHG calculation methodology[51]. Equations 2-5 are from the Commission Decision[52] regarding guidelines for the calculation of land carbon stocks (hereafter known as the "Commission Decision" in rest of this chapter). The Commission Decision was published to establish the rules for the calculation of land carbon stocks, both for the reference land use (CS_R) and the actual land use (CS_A).

[50] http://ec.europa.eu/energy/renewables/biofuels/doc/2010_bsc_example_land_carbon_calculation.pdf
[51] Annex V, Part C, Para 7.
[52] 2010/335/EU - Commission Decision of 10th June 2010 on guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive 2009/28/EC – available on the EC Transparency Platform.

5.59. The same methodology should be applied for the calculation of emission savings from soil carbon accumulation via improved agricultural practices. Specific differences in the calculation of emissions from land use change and soil carbon accumulation are highlighted in paragraph 5.72.

5.60. 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.

5.61. 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 (measured as mass of CO_{2eq} per unit energy)

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) (measured as mass of carbon per unit area, including both solid and vegetation)

CS_A is the carbon stock associated with the actual land use (measured as mass of carbon per unit area, including both soil and vegetation). 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 (measured as energy per unit per year)

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

5.62. The Commission Decision defines the calculation of the carbon stocks as:

Equation 2: Carbon stock

$$CS_i = (SOC + C_{VEG}) \times A$$

Where:

CS_i is carbon stock of the area associated with the land use *i* (measured as mass of carbon per unit area, including both soil and vegetation)

SOC is the soil organic carbon (measured as mass of carbon per hectare)

C_{VEG} is the above and below ground vegetation carbon stock (measured as mass of carbon per hectare)

A is the factor scaling to the area concerned (measured as hectares per unit area)

5.63. The key part of the land use change calculation is therefore an estimation of the change in carbon stocks. This is based on the difference between the carbon stock now and the carbon stock in January 2008, or 20 years before the feedstock was obtained, whichever is the later date.

5.64. The following sections explain what the carbon stock estimates are based upon, namely:

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

5.65. 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 the Commission Decision for the different parameters listed above to estimate the change in carbon stock.

- Climate, ecological zone and soil type can be taken from maps and data provided in the Commission 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 that land use change has taken place.

5.66. Definitions of the different land types are provided in Appendix 10.

5.67. There are two land types (settlements[53] and degraded land) for which the carbon stock has not yet been defined in the existing Commission Decision. In the absence of specified carbon stock for settlements, Ofgem advises that the carbon stock of the settlement should be measured. It also advises that the carbon stock of any land claimed to be degraded land should also be measured.

Soil organic carbon

Mineral soils

5.68. Operators may use several methods to determine soil organic carbon, including measurements[54]. As far as the methods are not based on measurements, they shall take into account climate, soil type, land cover, land management and inputs.

5.69. 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 is soil organic carbon (measured as mass of carbon per hectare)

SOC_{ST} is the standard soil organic carbon in the 0 – 30 cm topsoil layer (measured as mass of carbon per hectare)

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)

[53] Based on the 2006 IPCC Guidelines for National GHG inventories (Vol. 4), a settlement includes all developed land, including transportation infrastructure and human settlements of any size, unless they are already included under other categories.

[54] 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).

5.70. SOC_{ST} can be located in Table 1 of the Commission Decision depending on climate region and soil type. The climate region can be determined from the climate region data layers available on the EC transparency platform[55]. The soil type can be determined by following the flow diagram on page 12 of the Commission Decision or following the soil type data layers also available from the transparency platform.

5.71. F_{LU}, F_{MG} and F_I can be located in Tables 2 to 8 of the Commission Decision depending on climate region, land use, land management and input.

5.72. 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)

5.73. There is no default method available for determining the soil organic carbon (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. An appropriate method could be to measure the SOC of the soil.

5.74. 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

5.75. For some vegetation types, C_{VEG} can be directly read in Tables 9 to 18 of the Commission Decision.

5.76. If a look-up value is not available, vegetation carbon stock should be determined using the following equation:

$$C_{VEG} = C_{BM} + C_{DOM}$$

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

5.77. This takes into account both above and below ground carbon stock in living stock (C_{BM}) and above and below ground carbon stock in dead organic matter (C_{DOM}). See Equations 4a-d for calculating C_{BM} and C_{DOM}. For C_{DOM} the value of 0 may be used, except in the case of forest land (excluding forest plantations) with more than 30% canopy cover.

Equations 4a, b, c and d: Above and below ground carbon stock in living stock

$C_{BM} = C_{AGB} + C_{BGB}$ [a]

Where:

$C_{AGB} = B_{AGB} \times CF_B$ [b]

And:
$C_{BGB} = B_{BGB} \times CF_B$ [c]
Or
$C_{BGB} = C_{AGB} \times R$ [d]

Where:

C_{BM} is the above and below ground carbon stock in living biomass (measured as mass of carbon per hectare)

C_{AGB} is the above ground carbon stock in living biomass (measured as mass of carbon per hectare)

C_{BGB} is the below ground carbon stock in living biomass (measured as mass of carbon per hectare)

B_{AGB} is the weight of above ground living biomass (measured as mass of carbon per hectare)

B_{BGB} is the weight of below ground living biomass (measured as mass of carbon per hectare)

CF_B is the carbon fraction of dry matter in living biomass (measured as mass of carbon per hectare)

R is the ratio of below ground carbon stock in living biomass to above ground carbon stock in living biomass

5.78. The values for Equation 4a-d are determined as follows:

- For cropland, perennial crops and forest plantations, the value of B_{AGB} shall be the average weight of the above ground living biomass during the production cycle.
- For CF_B the value of 0.47 may be used.

- For cropland, perennial crops and forest plantations, the value of B_{BGB} shall be the average weight of the above ground living biomass during the production cycle.
- R can be read in Tables 11 to 18 of the Commission Decision.

Equation 5a, b and c: Above and below ground carbon stock in dead organic matter

$C_{DOM} = C_{DW} + C_{LI}$ [a]

Where:
$C_{DW} = DOM_{DW} \times CF_{DW}$ [b]

And
$C_{LI} = DOM_{LI} \times CF_{LI}$ [c]

Where:

C_{DOM}	is the above and below ground carbon stock in dead organic matter *(measured as mass of carbon per hectare)*
C_{DW}	is the carbon stock in dead wood pool (measured as mass of carbon per hectare)
C_{LI}	is the carbon stock in litter (measured as mass of carbon per hectare)
DOM_{DW}	is the weight of dead wood pool (measured as mass of carbon per hectare)
CF_{DW}	is the carbon fraction of dry matter in dead wood pool (measured as mass of carbon per hectare)
DOM_{LI}	is the weight of litter (measured as mass of carbon per hectare)
CF_{LI}	is the carbon fraction of dry matter in litter (measured as mass of carbon per hectare)

5.79. These values for Equations 5a to c are determined as follows:

- For CF_{DW} the value of 0.5 may be used
- For CF_{LI} the value of 0.4 may be used

Degraded land bonus

5.80. A bonus[56] 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

5.81. 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.

5.82. The EC are 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. This guidance document will be updated to include the definition of degraded land and to specify when the bonus can be claimed.

GHG emission savings calculation

5.83. GHG emission savings should be calculated using the following equation[57].

5.84. This is the figure that will be reported to Ofgem as part of each monthly output data submission.

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

[56] As set out in the RED - Annex V, Part C, Para 8.
[57] This equation is outlined in the RED – Annex V, Part C, Para 4.

5.85. 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[58].

GHG emission calculation tools

5.86. When calculating actual carbon intensities, the use of the Carbon Calculator[59] 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.

5.87. 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 instead, the user has to perform all the required calculations as described in Appendix 9 and as illustrated in the worked examples available on our website.

5.88. The other advantage of the Carbon Calculator is that a bioliquid chain can be loaded with the RED defined input data already in it[60]. This makes it possible to perform calculations with a combination of actual and RED defined input data. It should be noted that the Carbon 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.

5.89. The Carbon Calculator User Manual[61] lays out rules on how to build a new fuel chain in the Carbon Calculator and how to calculate its carbon intensity.

5.90. 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.

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[58] This figure is taken from Annex V, Part C, Para 19 of the RED.
[59] The Carbon Calculator and user manual can be downloaded from Ofgem's website http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/FuelledStations/cc/Pages/cc.aspx
[60] 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.
[61] The Carbon Calculator User Manual can be downloaded from the Ofgem website: http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/FuelledStations/cc/Pages/cc.aspx

6. Demonstrating compliance with the Mass Balance rules

Chapter Summary

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

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. The Orders require that a mass balance chain of custody system is used. This chapter explains how the mass balance chain of custody works, outlines what rules apply and gives specific guidance for setting up a mass balance 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 a mass balance chain of custody system 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.

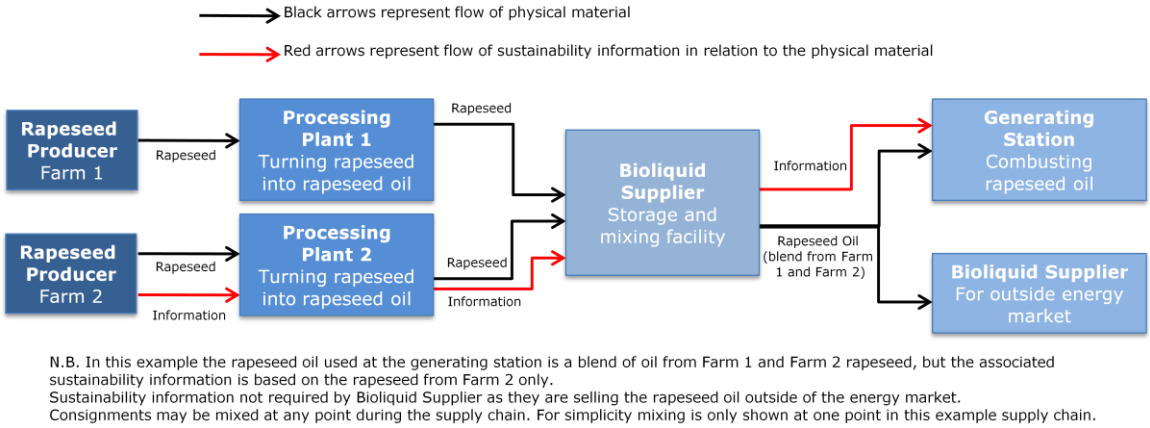
General requirements for the Mass Balance

6.3. The type of chain of custody permitted when bioliquids are used for the RO is a mass balance system[62] (note that a system using physical segregation, which is a more stringent system, generally also meets the requirements of a mass balance system). Other types of chain of custody (e.g. book-and-claim) are not allowed, and therefore, by implication, equivalence trading is not allowed to be used under the Orders.

[62] 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.

6.4. A mass balance system is a system in which 'sets of 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.



N.B. In this example the rapeseed oil used at the generating station is a blend of oil from Farm 1 and Farm 2 rapeseed, but the associated sustainability information is based on the rapeseed from Farm 2 only.
Sustainability information not required by Bioliquid Supplier as they are selling the rapeseed oil outside of the energy market.
Consignments may be mixed at any point during the supply chain. For simplicity mixing is only shown at one point in this example supply chain.

Figure 5: Example of a mass balance system

6.5. The mass balance system effectively passes information regarding claims on the product with respect to compliance with the criteria down the supply chain. The physical evidence for these claims does not necessarily need to travel up the supply chain, instead it can stay with the relevant party at the specific supply chain stage. This information or evidence should be kept and made available if required for verification purposes. Paragraph 6.38 gives details of the information that is likely to be required.

6.6. The permitted options for demonstrating compliance with the mass balance requirements are:

- Voluntary schemes recognised by the EC for the mass balance system;
- Voluntary schemes recognised by Ofgem as evidence of compliance with the mass balance system[63];

[63] This option is currently not used in practice as Ofgem and the RTFO Administrator 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.

- Collection of information and mass balance chain of custody records for ex-post verification.

6.7. These options will be further discussed below.

Using EC approved voluntary schemes

6.8. The RED[64] encourages the use of recognised voluntary schemes as one of the ways of demonstrating compliance with the land use criteria.

6.9. The EC will undertake formal assessments of voluntary schemes[65] 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[66].

6.10. Member States are required to accept all voluntary schemes that have been recognised by the EC. Any Decision by the EC takes precedence over any assessment made by UK government, or other Member States. Ofgem will recognise any voluntary scheme recognised by the EC from the date the EC Decision is published[67].

6.11. 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 useful to provide supporting evidence towards compliance.

6.12. The EC have approved a number of voluntary schemes. A summary of these schemes, and the date which these were approved has been published as an associated document to this guidance – Renewables Obligation: Recognised Voluntary Schemes. More detailed information regarding the scope of these schemes can be found on the EC's transparency platform.

[64] Article 18(4), paragraph 2.
[65] It is the responsibility of voluntary schemes to apply to the EC for recognition against the RED.
[66] http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm
[67] Subject to parties in the supply chain being audited against the version of the voluntary scheme that the EC Decision refers to.

Using UK recognised voluntary schemes

6.13. At present there are no additional UK recognised voluntary schemes for the mass balance requirements.

6.14. If parties request a voluntary scheme to be assessed, we will liaise with the RTFO Administrator 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.

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

Collection of information for ex-post verification

6.16. Where an operator is using a mass balance chain of custody which is not covered by a voluntary scheme, they must collect information to demonstrate compliance with the mass balance requirements.

6.17. Operators should do this by following the guidance set out in the remains of this chapter. In addition, they may wish to refer to the tables set out in Appendix 7 which provide templates for evidence collation.

6.18. This information on mass balance chain of custody is then verified by an independent auditor as part of the Annual Bioliquid Sustainability Audit Report. For further guidance on verification, see Chapter 7.

Guidance for operating a mass balance system

6.19. 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.

6.20. 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

6.21. 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.

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

Selling products with bioliquid data

6.23. 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.

6.24. 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 (i.e. separate administrative consignments).

6.25. 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).

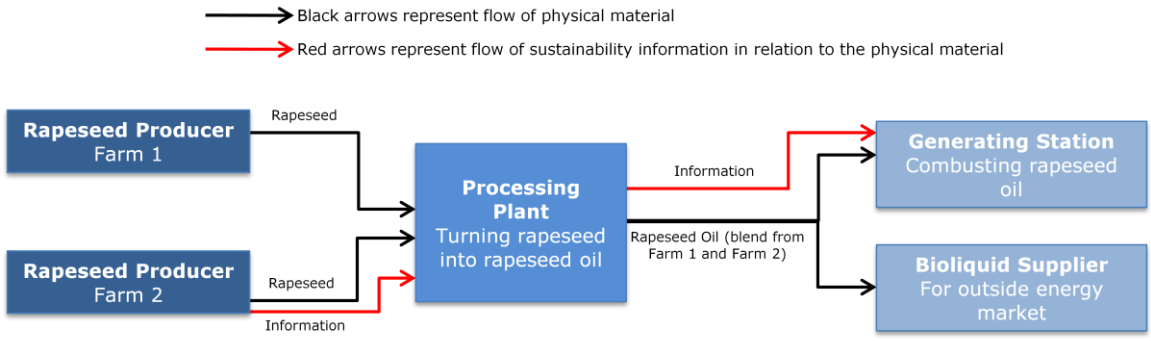
Level and timeframe of the mass balance

6.26. The mass balance should be operated at the level of a site that a company owns/operates[68].

6.27. 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"[69]. A site can include multiple silos or tanks, for example, as long as

[68] The mass balance is also permitted to be operated at a smaller level of granularity – for example a company could operate the mass balance at the level of individual tanks/silos within a site. The mass balance is not however permitted to be operated over multiple physical sites that a company owns.
[69] Communication on voluntary schemes and default values in the EU biofuels and bioliquids sustainability scheme at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:160:0001:0007:EN:PDF

they are at the same physical site. Figure 6 presents an example of the mass balance system at site level.



N.B. In this example the rapeseed oil used at the generating station is a blend of oil from Farm 1 and Farm 2 rapeseed, but the associated sustainability information is based on the rapeseed from Farm 2 only.
Sustainability information not required by Bioliquid Supplier as they are selling the rapeseed oil outside of the energy market.

Figure 6: Example of a mass balance system at site level

6.28. It is recommended that parties in the supply chain undertake a periodic review of site-level sustainability data at least on a monthly basis.

6.29. When a periodic review is undertaken, parties may not have sold more carbon and sustainability data than they have taken in. Additionally, parties should not have more carbon and sustainability data than they have actual physical feedstock/product.

6.30. It is acknowledged that, due to the way the supply chain currently operates, it may be challenging for some parties in the supply chain to conduct a monthly mass balance review, particularly at the agricultural end of the supply chain. Therefore the maximum period over which the mass balance has to be achieved can be longer than one month, but must not exceed one year[70].

Allocating sustainability information

6.31. 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, as long as the "set of sustainability information" remains together. In other words, although consignments with different sustainability information can be physically mixed, sustainability data cannot be exchanged across different administrative consignments (the "set of sustainability information" includes all sustainability information known about a consignment, for example: feedstock, origin, voluntary scheme, GHG value etc.). For example, if a party has two fuel consignments in a single tank, one of "rapeseed oil from protected cropland" and the other of "palm oil from non-protected cropland", the sustainability characteristics

[70] Parties using a voluntary scheme recognised for the mass balance should use the mass balance timeframe of that voluntary scheme.

could not be swapped between the consignments. This means, it would not be permitted to assign outgoing data as "rapeseed oil from non-protected cropland".

6.32. For the parts of the supply chain where commodities are traded as single feedstocks, outgoing consignments of feedstock must be sold with data consistent with that feedstock. For example, if a site contains silos of pure palm oil and pure rapeseed oil, pure palm oil sold as a single feedstock from that site must be sold with palm oil data. Note that *within* a feedstock type, sustainability information can be allocated freely. For example, if the site contains a mixture of rapeseed oils from different sources with different sets of sustainability characteristics, it is permitted to freely allocate the set of sustainability characteristics to outgoing consignments of rapeseed oil.

6.33. Also note that, while free allocation of sustainability information between consignments of the same feedstock is allowed, each set of sustainability information still needs to be kept together. For example, a party could have two consignments of rapeseed oil with different sustainability characteristics: one consignment of rapeseed oil from cropland that doesn't meet the 35% minimum GHG-savings threshold, and one consignment of rapeseed oil from highly biodiverse grassland that is grandfathered for the 35% GHG-savings threshold. In such a situation, it would not be permitted to mix the sustainability information of the two consignments, in order to create a consignment of rapeseed oil from cropland that is grandfathered for the 35% GHG-savings threshold.

6.34. For the part of the supply chain where blended bioliquids are traded, feedstock information can be allocated flexibly to outgoing consignments. However, if an outgoing consignment is sold as a specific feedstock blend (e.g. for technical reasons), the feedstock information assigned should match the stated feedstock information. For example, if a party supplies a consignment of biodiesel specifically consisting of 20% palm methyl ester and 80% of rapeseed methyl ester, the sustainability information supplied with this consignment must also be for 20% palm methyl ester and 80% rapeseed methyl ester.

6.35. We do, however, reserve the right to review our position on flexible feedstock allocation, should evidence emerge of breaches of this data match requirement. We do not intend to allow for sustainability feedstock data to be used for consignments of virgin oils that are not consistent with the actual physical consignment – i.e., soy oil data cannot be used for a physical consignment of rapeseed oil. The rationale behind this decision is that mislabelling of virgin oils appears inconsistent with the intention of the mass balance reporting requirements in RED, and could lead to a large disconnect between the type of feedstock data allocated as being used to meet the RED and the types of feedstock actually used for biofuels in the EU market.

Record keeping

6.36. Each party in the chain of custody should, for at least a period of five years, keep records that should concur with the information on the invoices, to enable bioliquid data claims to be traced back through the supply chain. Table 4 summarises this information.

Table 4: Suggested chain of custody records

Record Type	Description	Information Contained
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.	• 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 must be used (as per default GHG-calculations for the respective pathway). This is only possible if a default GHG-value exists for the pathway.	• 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. Periodic inventories are recommended to be conducted at least on a monthly basis.	• 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 7.

6.38. As part of the record keeping, the following bioliquid data is likely to 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. This information is necessary if one wants 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 applied (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 used (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 29 gCO_2/MJ for cultivation on degraded and heavily contaminated land (see 5.80). 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 5.72);

- 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 5.37);

- Nitrogen use, only to be reported by farm or plantation, necessary if actual GHG-values are used (see sections 5.37).

7. Auditing requirements

Chapter Summary

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

Introduction

7.1. Bioliquid operators are required to demonstrate compliance with the sustainability requirements and the data must be independently verified before operators submit to Ofgem their Annual Bioliquid Sustainability Audit Report.

7.2. The verification is undertaken after the electricity has been generated from bioliquids, and is therefore referred to as "ex-post" or "post-use" verification. 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, but the bigger the sample, the lower the sampling risk[71].

7.3. Verifiers are required to follow the guidance set out in the International Standard on Assurance Engagements (ISAE 3000) standard, or equivalent. This is a standard for non-financial assurance engagements.

7.4. Following verification, an independent auditor will provide the operator of a generating station with a formal assurance opinion (a verification statement) on the data the operator holds. The assurance opinion should be at least to a 'limited assurance level' which is defined in the ISAE 3000. The assurance opinion is submitted by the operator to Ofgem as a key part of the Annual Bioliquid Sustainability Audit Report.

7.5. 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.

[71] Sampling risk is the possibility that auditor's conclusion based on a sample is different from that reached if the entire data was subject to the audit procedure.

Timing

7.6. It is the responsibility of the operators of generating stations, to provide an independent assurance opinion as part of the Annual Bioliquid Sustainability Audit Report to Ofgem by 31st May, immediately 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.

What needs to be verified

Scope of verification

7.7. 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 use, GHG and/or mass balance data, retains the evidence. In verifying the data held 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.

7.8. 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 at the latest (the GHG exemption)
- Mass balance chain of custody records.

7.9. An example of the data flow within a simplified supply chain is shown in Figure 7.

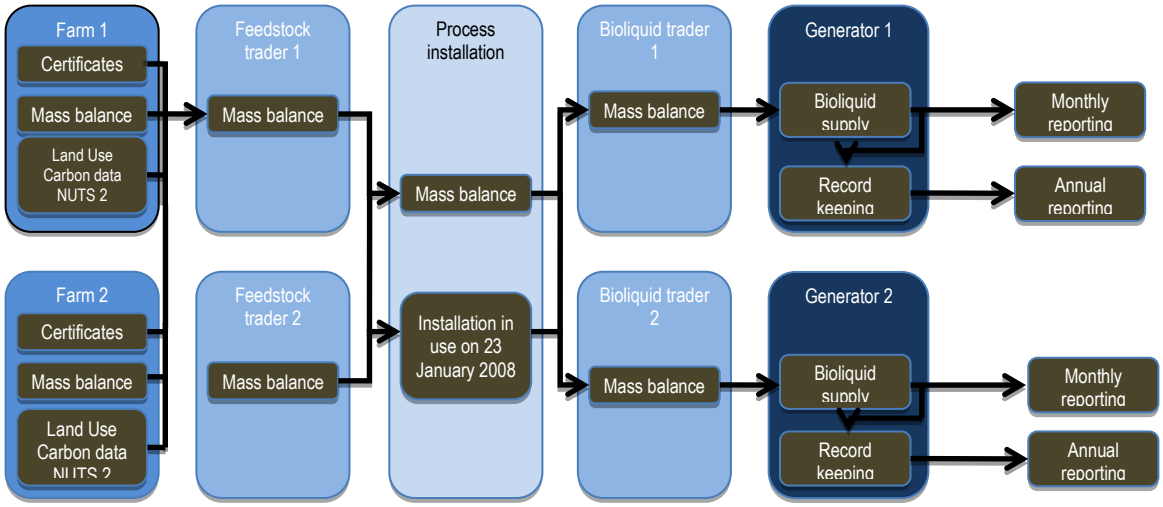


Figure 7: Example of the records kept by each party and data flow within the supply chain

The role of recognised voluntary schemes

7.10. Evidence of compliance with an approved voluntary scheme is 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 separately check that the party has complied with the sustainability requirements for which the voluntary scheme is recognised. The verifier would simply need to verify that the party is actually certified by the relevant voluntary scheme.

7.11. 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 sustainability 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 sustainability requirements for which the voluntary scheme is not recognised: the mass balance in this example.

Setting up a system for reporting bioliquid data

7.12. To be able to produce bioliquid data that is of sufficient quality to demonstrate compliance with the sustainability 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.

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

7.14. 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

7.15. 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.

7.16. 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.

7.17. 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. The verification for the purposes of producing 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 relevant bioliquid carbon and sustainability data 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 as the Annual Bioliquid Sustainability Audit 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 bioliquid sustainability data 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 Audit Report 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 operator's opportunity to learn from the auditor 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 normally be expected to include:

- The compiled bioliquid carbon and sustainability data;
- High-level description of the supply chain (if known);
- Mass balance chain of custody 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

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 Annual Bioliquid Sustainability Audit Report.

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 8.

7.30. Note that where the sustainability criteria have not been met, operators must amend all relevant data submissions on the Renewables and CHP Register. The Annual Bioliquid Sustainability Audit Report 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 bioliquid carbon and sustainability data held by the operator of a generating station. 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 data.

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[72], 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.

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

[72] available from http://www.renewablefuelsagency.gov.uk/

Appendices

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.[73] 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[74].

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

[73] Entitled "Gas Supply" and "Electricity Supply" respectively.
[74] 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.

competition) in which the Authority could carry out those functions which would better protect those interests.

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[75]; 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[76].

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[77] 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

[75] 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.
[76] The Authority may have regard to other descriptions of consumers.
[77] 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[78] 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.

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

Appendix 2 – Products, residues and wastes

1.1. These tables provide guidance on when substances should be considered products, residues or wastes, for the purposes of the RO.

1.2. It is not possible to lay down definitive or absolute rules as to when particular materials will be waste or not. A value judgment has to be made taking into account the circumstances of each case, and applying the case law principles and indicators.

1.3. This is not an exhaustive list. There may be further wastes or residues that are not on the list that still qualify as wastes or residues. Ofgem may periodically review and update this list on the Ofgem website, if sufficient evidence emerges to indicate that a substance should be treated differently.

Table 5: List of products

Material	Description
Virgin oils, including but not limited to: • palm • soy • rape • sunflower	Including, but not limited to, oils derived from palm, soy, rape and sunflower. The treatment of these materials and of the meal produced as part of the same process in the RED GHG calculations makes clear that these are to be treated as products.
High oleic acid rape seed oil	A product if grown as a fuel, or if grown as a product and diverted to use as a fuel. If used as fuel after being used for cooking then it will be a waste (as used cooking oil).
Short rotation coppice (SRC)	Short rotation coppice is grown specifically for use as a fuel and, as such, it is a product.
Short rotation forestry (SRF)	Short rotation forestry grown specifically for use as a fuel is a product.
Virgin wood	Virgin wood is timber from whole trees and the woody parts of trees including branches and bark derived from forestry works, woodland management, tree surgery and other similar operations. It does not include clippings or trimmings that consist primarily of foliage (though these may be forestry residues). Further information on virgin wood can be found in a statement from the Environment Agency: http://www.environment-agency.gov.uk/static/documents/Research/PS_005_Regulation_of_wood_v3.0.pdf

Miscanthus	This is commonly grown as a fuel crop and in these circumstances will be a product. If it is put to another use first, e.g. as animal bedding, before being used as fuel then it will be a waste.
Palm oil olein	The refined liquid fraction of palm oil is a product. If used for cooking before being used as fuel then it will be a waste (as used cooking oil).
Palm kernel oil	Palm kernel oil is a product. If used for cooking before being used as fuel then it will be a waste (as used cooking oil).
Acid ester	Esters are produced intentionally and are therefore a product.
Molasses	This material arises from the processing of sugar cane and sugar beet into sugar. It arises on the basis of a technical decision, and is considered a product.
Glycerol from virgin oils	The treatment of glycerol from virgin oils in the RED GHG calculations makes clear that it is to be treated as a product.
Crude tall oil	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 crude tall oil. Crude tall oil is a product of the pulping process.
Brown liquor	This material arises during the pulping of wood. As for tall oil, it is considered a product.
Meal from virgin oil production	These materials' treatment in the RED GHG calculations makes clear that they are to be treated as products.
Sugar beet sludge	This is the pulp left over following sugar extraction. Its treatment in the RED GHG calculations makes clear that it is to be treated as a product.
Corn or wheat dried distillers grain (DDGS)	This material's treatment in the RED GHG calculations makes clear that it is to be treated as a product.
Palm Stearin	Palm stearin is produced alongside palm olein from the fractionation of crude palm oil. After the fractionation process, the mixture is filtered to separate stearin (solid form) and olein (liquid).
Palm fatty acid distillate	The treatment of PFAD in the RED GHG calculations indicates that it is to be treated as a product.
Tallow – Animal By-Product Category 3	Tallow, also called rendered animal fat, is the hard fat obtained from the whole or part of any dead animal through the process of rendering. It is then used as feedstock for the production of biodiesel or bioliquid as fuels. Annex V, Part D of the RED makes clear that animal oil produced from animal by-product classified as category 3 should be treated as product. A revised Animal By-Products Regulation 1069/2009 takes effect on 4 March 2011. Although the revised regulation does not appear to change this definition, no decisions have yet been made by a court or other panel on

	the basis of the new regulation. There is the possibility that once a decision is made, the status of tallow could change. 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/Biodiesel_QP_NIEA_GEHO0311BTPC-E-E.pdf

Table 6: List of residues from agriculture, aquaculture, forestry and fisheries

Material	**Description**
Forestry residues	Forestry residues are identified explicitly by the RED as residues. Following statements from the EC[79] and the Environment Agency[80], we consider forestry residues to be derived from "virgin wood" and to include all raw materials collected directly from the forest, whether or not as a result of thinning or logging activities. This may include (but is not limited to) materials such as tree tops, branches, brash, clippings, trimmings, leaves, bark, shavings, woodchips and saw dust from felling. Forestry residues do not include any residues from related industries, or residues associated with processing the virgin wood/raw material (for example sawdust from saw mills). These may be classed as processing residues (see below).
Arboricultural residues	Arboricultural residues are biomaterial that is removed as part of tree surgery, management of municipal parks and verges of roads and railways. For the purpose of this guidance, arboricultural residues can be considered to be collected from settlement areas.

[79] European Commission, *Report From The Commission To The Council And The European Parliament on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling,* http://ec.europa.eu/energy/renewables/transparency_platform/doc/2010_report/com_2010_0011_3_report.pdf [accessed 14 December 2011].

[80] Statement from the Environment Agency http://www.environment-agency.gov.uk/static/documents/Research/PS_005_Regulation_of_wood_v3.0.pdf

Straw	Straw is specifically named as an agricultural crop residue in the RED. As an agricultural residue, it must meet the land criteria. Straw is deemed to have zero GHG emissions prior to the process of collection.
Bagasse	Bagasse results from crushing sugarcane or sorghum. Bagasse is specifically named as an agricultural residue in the RED. As an agricultural residue, it must meet the land criteria. Bagasse is deemed to have zero GHG emissions prior to the process of collection.
Nut shells	Nut shells are specifically named as an agricultural residue in the RED. As an agricultural residue, it must meet the land criteria. Nutshells are deemed to have zero GHG emissions prior to the process of collection.
Husks	Husks are specifically named as agricultural residues in the RED. As agricultural residues, they must meet the land criteria. Husks are deemed to have zero GHG emissions up to the point of collection.
Cobs	Cobs are specifically named as agricultural residues in the RED. Cobs are an agricultural residue, so must meet the land criteria. Cobs are deemed to have zero GHG emissions up to the point of collection.

Table 7: List of residues

Material	**Description**
Tall oil pitch	Tall oil pitch is the remaining fraction of the fractional distillation process of crude tall oil. Tall oil pitch cannot be further refined. No matter which technical decisions are made in the fractional distillation, this fraction will remain. Tall oil pitch is therefore a residue of this process.
Manure	Manure is specifically named as a processing residue in the RED.
Crude glycerol from processing of waste oils	Crude glycerol (from processing of waste oils) is specifically named as a residue from processing in the RED. The RED treats of glycerol from processing of virgin oils as a product – see above.
Vinasse	Vinasse results from the processing of sugar cane or sugar beet. The treatment of vinasse in the RED GHG calculations makes clear that it is to be treated as a residue.
Palm processing residues: • empty palm	These materials' treatment in the RED GHG calculations makes clear that they are to be treated as residues.

bunches • fibre and shell from palm oil production • palm oil mill effluent (POME)	
Saw dust from saw mills	This is a processing residue. Note that any deliberate change to the production process to increase the volume of sawdust resulting from processing would make the resulting material a product rather than a residue (see paragraph 2.37.)

Table 8: List of wastes

Material	**Description**
Waste wood	Any waste wood, including "non-virgin" wood, will be considered a waste. Following statements from the Environment Agency, waste wood may include non-virgin timber off-cuts, shavings, chippings and sawdust from the processing of non-virgin timbers (whether clean or treated). The phrase "non-virgin" wood refers to materials such as post consumer waste and construction and demolition waste.
Used cooking oil (UCO)	Commonly called "UCO" or "WCO" (waste cooking oil), this is purified oils and fats of plant and animal origin. These have been used by restaurants, catering facilities and kitchens to cook food for human consumption. They are wastes 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_biodesel_.pdf
Brown grease (ex USA)	Brown grease is the grease that is removed from wastewater sent down a restaurant's sink drain. This is a waste.
Yellow grease (ex USA)	Yellow grease is the US term for used cooking oil in the UK. It is therefore waste.

Tallow – Animal By-Product Category 1	Tallow, also called rendered animal fat, is the hard fat obtained from the whole or part of any dead animal through the process of rendering. It is then used as feedstock for the production of biodiesel or bioliquid as fuels. Annex V, Part D of the RED makes clear that animal oil produced from animal by-product classified as category 1 should be treated as waste. A revised Animal By-Products Regulation 1069/2009 takes effect on 4 March 2011. Although the revised regulation does not appear to change this definition, no decisions have yet been made by a court or other panel on the basis of the new regulation. There is the possibility that once a decision is made, the status of tallow could change. 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/Biodiesel_QP_NIEA_GEHO0311BTPC-E-E.pdf
Municipal Solid Waste (MSW)	This is a waste.
Construction and demolition wastes	For the purposes of generation, this category will be mainly waste wood.
Meat/bone meal	This is a waste.
Food waste	Whether from manufacturers, retailers or consumers, this will be a waste.
Waste pressings from production of vegetable oils	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 are therefore wastes.
Olive pomace	As above.
Acid oils	These appear to be similar to the refinery fatty acids above, arising from the purification of glycerol or vegetable oils so will be wastes.
Gums	From oil degumming; another output from the refining of vegetable oils that will be waste.
Soapstocks	From oil de-acidification; again an output from vegetable oil refining that will be waste.
Distillation residues	Distillation residues are what are left over following the distillation of products such as biodiesel so will be wastes.

Matter organic non-glycerol (MONG)	From the production of distilled glycerol. This is a waste.
Food crops affected by fungi during storage	These are wastes.
Food crops that have been chemically contaminated	These are wastes.

Appendix 3 – Assessment protocol for Voluntary Schemes

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[81] 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:

- Land criteria;
- Audit, certification and accreditation processes.

1.4. All the 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.

[81] 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 to the Orders.

Table 9 Land criteria with RED references.

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 during 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 during 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 [82]	Biofuels and bioliquids shall not be made from raw material obtained from land that was highly biodiverse grassland during or after January 2008, whether or not the land continues to have that status. Highly biodiverse grassland can be: 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

[82] 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
		30%, or trees able to reach those thresholds in situ. 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 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

Table 10: Audit, certificate and accreditation requirements

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[83]
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

[83] 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 classified as recommended ("Minor Must").

Criteria	Norm	Conformance
Accreditation		
7. Accreditation process for Accreditation Bodies	Accreditation Bodies shall 'Commit to comply' with ISO 17011: 2004, or justified equivalent. Commitment to compliance can be demonstrated through independent peer-review by an auditor that is recognised by either ISEAL[84] or the IAF[85].	Mandatory
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

[84] 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/).
[85] IAF (International Accreditation Forum). A full list of IAF Accreditation Body Members is listed on the IAF website (www.iaf.nu).

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

1.1. This section gives further detail and guidance on categories of land that can be used to demonstrate compliance with the land criteria in the absence of a voluntary scheme. 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[86] (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 Schedule A2 to the Orders. Table 11 also refers to the specific Article numbers in the RED.

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

Table 11: Overview of the land categories that can be reported and their compliance with the land criteria (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[87]), and agro-forestry systems where the vegetation structure falls below the thresholds used for the Forest Land categories[88].	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

[87] 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.
[88] 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 4.25).	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 4.25).	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 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 only if 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 the raw material was harvested.	Complies

Land category	Description	Biodiversity (RED Article 17(3))	High carbon stocks (RED Article 17(4))	Peatlands (RED Article 17(5))
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 by water permanently or for a significant part of the year.	Complies only if the wetland in question was not a primary forest, in a designated area, or a highly biodiverse grassland (see 4.32).	Complies only if 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.	Complies only if t the peatland in question was not a primary forest, in a designated area, or a highly biodiverse grassland (see 4.32).	n/a	Complies only 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 4.32).	n/a	Complies only if 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 partially

Land category	Description	Biodiversity (RED Article 17(3))	High carbon stocks (RED Article 17(4))	Peatlands (RED Article 17(5))
				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	All developed land, including transportation infrastructure and human settlements of any size, unless they are already included under other categories. Examples of settlements include land along streets, in residential (rural and urban) and commercial lawns, in public and private gardens, in golf courses and athletic fields,	Complies	Complies	Complies

Land category	Description	Biodiversity (RED Article 17(3))	High carbon stocks (RED Article 17(4))	Peatlands (RED Article 17(5))
	and in parks, provided such land is functionally or administratively associated with particular cities, villages or other settlement types and is not accounted for in another land use category.[89]			

[89] Definition from IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, 2006

Appendix 5 – GHG Default Values

Table 12: 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[90] [%]
		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
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				

[90] 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[90] [%]
		Cultivation	Processing	Transport and distribution	
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 tert-butyl 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
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

Bioliquid production pathway	Default carbon intensity (CI) [gCO_{2eq}/MJ]	Disaggregated default values [gCO_{2eq}/MJ]			GHG saving[90] [%]
		Cultivation	Processing	Transport and distribution	
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

Appendix 6 – Relevant online documents and information for GHG emission saving calculations

Table 13: Useful GHG references

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/2010_bsc_example_land_carbon_calculation.pdf
GHG emission calculation tools	The Carbon Calculator tool	http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/FuelledStations/cc/Pages/cc.aspx
	The Carbon Calculator User Manual	http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/FuelledStations/cc/Pages/cc.aspx
	The BioGrace tool	http://www.biograce.net/content/ghgcalculationtools/excelghgcalculations
	The Dutch tool	http://www.senternovem.nl/gave_english/ghg_tool/index.asp

Appendix 7 – Example templates for Mass Balance chain of custody records

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 14: 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)[91]	Nitrogen fertiliser (kg/ha)91
22001	16-1-2011	C1	Rapeseed	1,000	UK	Y	LEAF	Cropland - non protected	30	180

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

Table 15: 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
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 16: 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 17: 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 18: 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	Voluntary Scheme	Land Use on 1 January 2008	Carbon intensity (g	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 8 – Example template for the Annual Bioliquid Sustainability Audit Report

1.1. Below is an example template for the Annual Bioliquid Sustainability Audit Report. The information in the table must be included in the Annual Bioliquid Sustainability Audit Report. See Chapter 7 for further information.

Table 19: Audit report example template

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 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 3000 statement (or equivalent)	Include a statement that the engagement was performed in accordance with ISAE 3000, or equivalent (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 Bioliquids Sustainability Audit Report.
Criteria	The criteria that the operator's bioliquid data have been assessed against. Verifiers are recommended to make use of the verification guidance issued by the Department for Transport for the Renewable Transport Fuel Obligation (RTFO). This guidance was originally developed for the RTFO but Ofgem considers it relevant and useful for the RO and recommends that operators and verifiers make use of this document for the RO purposes where relevant. 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 bioliquid data? • Completeness: - Has data been provided for each consignment? - Does the available bioliquid data reflect the total volume of bioliquid reported under the RO? • Consistency: - Have consistent methodologies been followed for calculating and reporting actual carbon data? • Accuracy: - Has the bioliquid data 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 Annual Bioliquid Sustainability Audit 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 9 – 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:

$\mathbf{E_B}$ is the total GHG emissions (i.e. carbon intensity and land use change emissions) from the bioliquid, as per Equation 7
$\mathbf{E_F}$ is the total GHG emissions from the fossil fuel comparator, taken from the RED ($91gCO_{2eq}$/MJ)

Appendix 10 – Definitions

GENERAL

Annual Bioliquid Sustainability Audit Report is the final report submitted by an operator to Ofgem. The main component of this report is the verifier opinion (also known as "assurance statement") which will have been prepared 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**", takes place after the bioliquid has been used to generate electricity and is therefore also referred to in this document as "post-use" verification. It relates to an independent verifier assessing the validity of bioliquid 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. The conclusion from the verifier has to be submitted to Ofgem as a key part of the Annual Bioliquid Sustainability Audit Report.

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.

Installation includes any processing installation used in the production process. It should not be understood as including production facilities that might have been intentionally added to the production chain only to qualify for the exemption foreseen in this provision. If at least one of such processing installations used in the production chain was in operation on 23 January 2008 at the latest the criterion of a minimum 35 % greenhouse gas saving starts to apply only from 1 April 2013[92].

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 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.

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.

[92] This definition is taken from the Communication from the Commission on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels (2010/C 160/02), point 3.1.

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.

Settlement means all developed land, including transportation infrastructure and human settlements of any size, unless they are already included under other categories. Examples of settlements include land along streets, in residential (rural and urban) and commercial lawns, in public and private gardens, in golf courses and athletic fields, and in parks, provided such land is functionally or administratively associated with particular cities, villages or other settlement types and is not accounted for in another land use category. This definition is taken from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4. The RED recommends that this source is used by the EC in developing its guidelines on the calculation of land carbon stocks and is thus deemed an appropriate definition for this purpose.

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.

Permitted source has a meaning as per Schedule A2 Article 3 (2) of the ROO 2009.

Appendix 11 – 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
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