UK and Ireland Carbon Calculator: User Manual

For reporting under RTFO in 2020

Moving Britain Ahead

01 January 2020 to 31 December 2020

May 2020

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Executive summary

Introduction

1   This document is the User Manual for version 11.0 of the UK and Ireland Carbon Calculator for reporting under the period of RTFO in 2020. It should be used by suppliers of biofuel for road transport that prepare monthly Carbon and Sustainability reports under the Renewable Transport Fuel Obligation (RTFO) or the Motor Fuel GHG Emissions Reporting Requirements, and other economic operators in the supply chain that wish to perform GHG calculations of their biofuels. The carbon calculator can be used to upload information through the RTFO Operating System (ROS) or the GHG Operating System (GOS).

2   If you are using the UK and Ireland Carbon Calculator to calculate the carbon intensity and greenhouse gas (GHG) emission saving of bioliquids for reporting under the Renewable Obligation (RO) Order, please download the specific User Manual from Ofgem's website.

UK and Ireland reporting schemes in the Carbon Calculator

3   As of December 2014, the original UK Carbon Calculator has been expanded to incorporate a dedicated portal for those users reporting under the Irish Biofuel Obligation Scheme (the BOS). The updated tool is hereby known as the UK and Ireland Carbon Calculator, serving as a shared application for operators under the RTFO or RO in the UK, and the BOS in Ireland. The UK portal of the application remains unchanged - the only new feature for existing users of the tool under the UK systems is the 'Select reporting scheme' splash screen. This is described in section 1.14.

4   The content of this user manual is focussed on the RTFO and RO portal of the tool, intended as guidance for operators reporting under the UK systems. Dedicated guidance for users operating under the Irish BOS is not provided here.

Quick start guide to preparing a monthly report

Step	Procedure
Step 1	Open the UK and Ireland Carbon Calculator and enter the UK portal by selecting 'UK - Renewable Transport Fuel Obligation or Renewables Obligation' on the 'Select reporting scheme' splash screen.
Step 2	Enter company information such as name, address etc. Do not forget to specify whether you are preparing a report for:

- a fossil fuel supplier (i.e. a company who normally submits HO10 reports to HMRC) who is reporting under the RTFO, or

- a biofuel supplier (i.e. a company who normally submits HO930 reports to HMRC) who is reporting under the RTFO[1].

Click 'New year' to move to the next step.

Step 3	Select the year and month for which you want to prepare a report.
	Remember that the year you choose will determine the calculation methodology used by the UK and Ireland Carbon Calculator to estimate the carbon intensity of the biofuel:
	- if the year is 2009 or earlier, calculations will be performed following the RTFO methodology as described in the Carbon and Sustainability Guidance for RTFO year 1 and 2;
	- if the year is 2010, calculations will be performed following the European methodology as described in the European Renewable Energy Directive of 2009 and in the RTFO Carbon and Sustainability Guidance Year Three;
	- if the year is 2011 or after, calculations will be performed following the European methodology for both fuel chain emissions and land use change emissions as described in the RED (including communications and Decisions from the Commission) and in the RTFO Carbon and Sustainability Guidance Year Four to Year Eleven, which cover the period from 2011 to 2019.
	Then click 'Create'.
Step 4	Load data for each of the consignments of fuel you wish to include for this month.
	If you do not have any actual data for a particular consignment, simply add one of the Fuel Chain Modules (highlighted in the toolbar below – the first is for liquid fuels, the second for gaseous fuels). Add the module by clicking once on the module on the toolbar and then clicking where you would like it to appear on the fuel chain screen.

Figure 1 Fuel chain module icons, highlighting liquid and gaseous fuel chain modules

	If you do have actual data, you can load one of the default fuel chains which are defined in the Carbon and Sustainability Guidance. Click the 'import default fuel chain...' button on the toolbar and select the appropriate fuel chain (see Section 2 for further details). This is the recommended approach for fuel chains which have carbon defaults in RED Annex V.
	Alternatively, you can construct your own chain from scratch (see Section 2 for further details). This will be necessary if you are supplying actual data for a fuel chain not included in RED Annex V.
Step 5	Basic information such as quantity of fuel, voluntary scheme met, land use on 1 January 2008 etc, should be entered into the Fuel Chain Module (if you have loaded a default fuel chain, this will be the first module in the chain).

[1] There is an additional option for 'Bioliquids for electricity generation - Reporting under the RO'. Please note that this should not be selected if you intend to report biofuels for road transport under the RTFO.

Double click the module to open it and enter the information you have about this consignment of fuel.

Entering the fuel type, feedstock and process type will enable the software to automatically select the appropriate fuel chain default value.
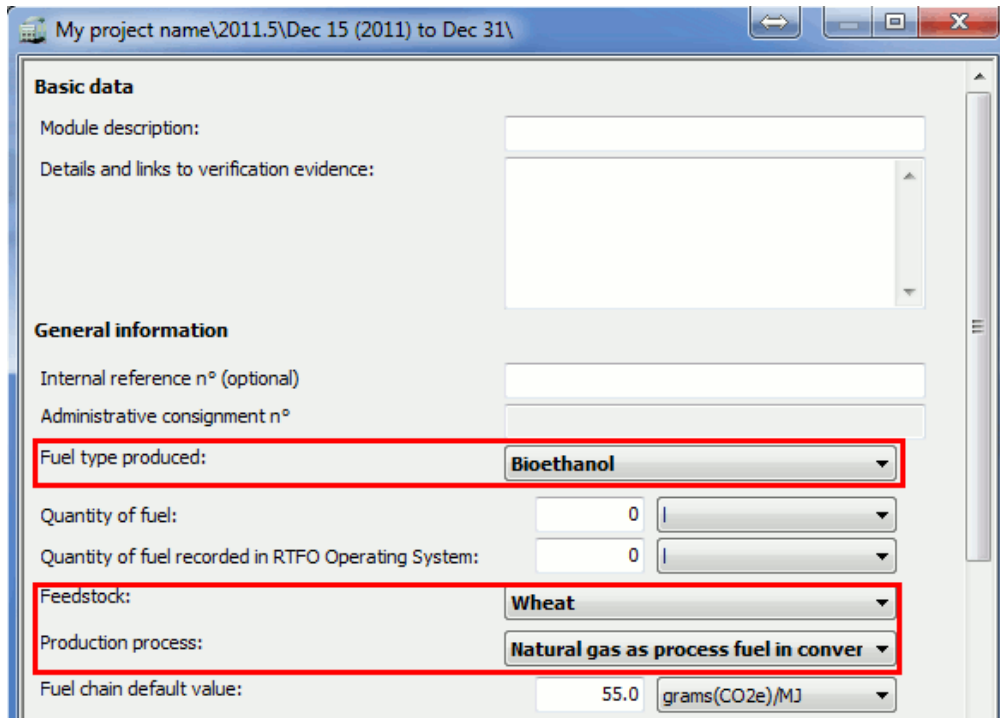
Figure 2 Fuel chain module

Step 6	Any data collected from the actual biofuel supply chain (e.g. natural gas use at the biofuel plant) can be entered in the appropriate modules (see Section 3 for further details).
Step 7	Once you have entered all the consignments of fuel you wish to include in a monthly report, go to the 'Reports' menu and select 'Monthly csv report'.
	Select the correct year and month for which you would like to prepare a monthly csv report and click 'Next'.
	Review the data shown on the next screen to ensure it is the file you intend to upload to ROS (this will not be your last opportunity to review the data before it is submitted to the RTFO Administrator) and click 'Next'.
	Select the location where you would like to save the monthly csv report.
	It is not mandatory to report certain data (e.g. process type). You may see a warning message below the selected storage location informing you that such data has not been provided for all the consignments. This will not prevent you from creating your monthly csv report and this report can still be submitted to the RTFO Administrator – see the RTFO Carbon and Sustainability Guidance for more information.
	It is also not mandatory to report certain 'additional sustainability information' (e.g. voluntary scheme certification, soil carbon accumulation) in order to obtain RTFCs - see the RTFO Carbon and Sustainability Guidance Chapter 3 for more information. You may see a warning message beside these fields in the Fuel Chain Module, informing you that you have not supplied this information. While this information is not required for RTFC applications, there is a legal requirement under the RED to verify this information

	annually, so it is strongly recommended that you include this information where possible. If you choose not to include it in your RTFC applications you will have to verify it separately at the end of the reporting year. Click 'Finish'.
Step 8	You can now upload the file you have created to ROS – please see the ROS Help menu for further instructions on how to do this.
Step 9	If you wish to ensure the final volumes reported to the RTFO Administrator (after adjusting to match the volume returns) are recorded in the UK and Ireland Carbon Calculator as well as on ROS, you can enter these manually into the Fuel Chain Module at the start of the relevant chains. There is a specific field in which they can be entered – 'Quantity of Fuel Recorded in the RTFO Operating System'. Values must be entered in this field before 'Year overview' reports can be generated.

Table 1   Nine key steps for preparing a monthly Carbon and Sustainability report for uploading to ROS

1. Getting started

Introduction

1.1 The UK and Ireland Carbon Calculator software is designed to help companies prepare monthly Carbon and Sustainability reports to the RTFO Administrator for compliance with the requirements of the RTFO or the Motor Fuel GHG Emissions Reporting Requirements.

1.2 The primary aim of the software is to facilitate the use of actual data collected directly from the supply chain. However, the software can also be used when no actual data is available and fuel chain default values are used. It can also be used to prepare monthly Carbon and Sustainability Reports for the RTFO Administrator, which include information about the voluntary schemes met by a consignment of fuel in addition to its carbon intensity.

1.3 The information required for calculating the carbon intensity of a consignment of fuel is entered using a graphical representation of a biofuel supply chain.

Figure 3 Graphical representation of a biofuel supply chain

1.4 These graphical fuel chains are made up of a set of pre-defined modules which contain all of the data needed to assess the GHG emissions from this step of the chain.

1.5 When preparing monthly reports, a fuel chain should be added for every consignment of fuel about which you want to report carbon and sustainability information to the RTFO Administrator.
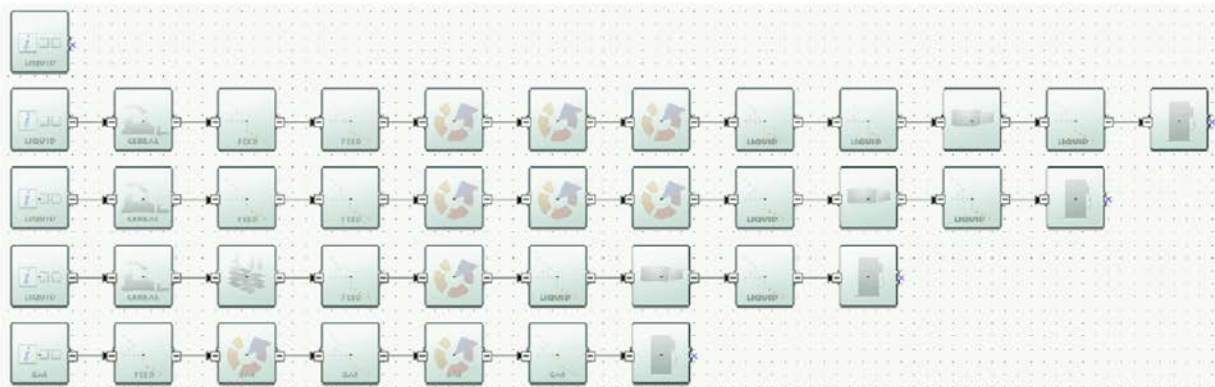
Figure 4 Several biofuel supply chains

1.6 A single UK and Ireland Carbon Calculator project file can be used to prepare reports for different months and years. If that is the case, you will see the list of months and years included in the project file on the left hand side panel. If you click on a month, the fuel chains that were imported to that month are then visible on the main fuel chain screen, as in the screenshot below.
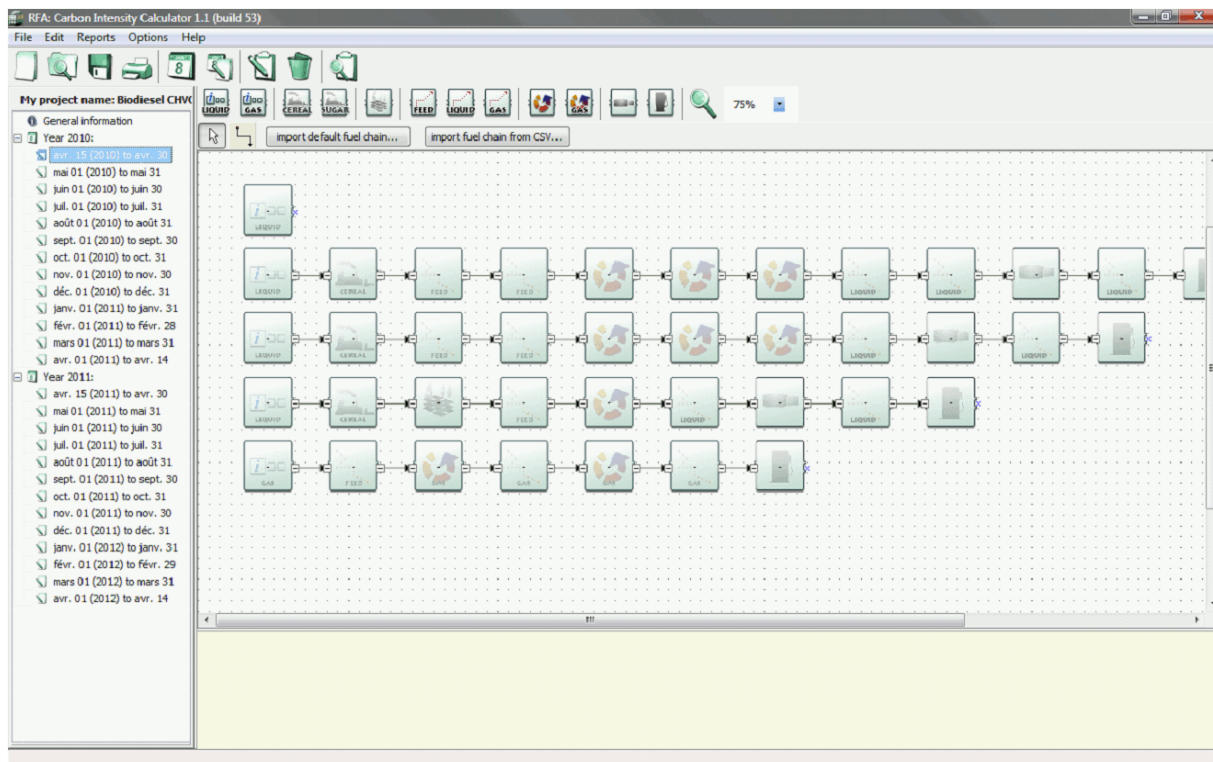
Figure 5 Carbon calculator project file, illustrating different months and years

1.7 The current version of the UK and Ireland Carbon Calculator (version 11.0) has the same functionalities as the previous versions (version 1.0, 1.1, 4.0, 4.5, 6.0, 7.0, 10.0). Carbon intensities calculated for earlier RTFO reporting years will be the same with any of the versions. Furthermore, 'old' files, created with version 1.0 or 1.1 of the software, are compatible with the latest version of the software.

1.8 The LCA methodology used in version 11.0 of the UK and Ireland Carbon Calculator aligns with that set out in the RED and subsequent communications and Decisions. Economic operators using the UK and Ireland Carbon Calculator to report under the RTFO must follow the LCA methodology of the RED and the guidance set out in the RTFO C&S Guidance. Ultimately, the UK and Ireland Carbon Calculator should be able to replicate exactly RED default values and enable calculations with actual data as provided by the reporting parties. However, as very limited information is currently available, the results for the following chains do not fully replicate the RED default values:

• Biodiesel from waste animal[2] and vegetable oil;

• DME from waste wood.

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[2] Includes used cooking oil and tallow categories 1 and 2 but excludes category 3 tallow.

1.9   If a supplier wishes to include some actual data for these two fuel chains, actual data will also need to be provided for all inputs to the modules for which the data is missing.[3]

1.10 The default fuel chains included in the calculator have been replicated as closely as possible to the RED disaggregated default values, however, neither DfT nor the BioGrace project has managed to calculate the same disaggregated default values as that published by the Commission in the RED when using the input data available. Until this issue is resolved, we have included two separate mechanisms for loading fuel chains in the UK and Ireland Carbon Calculator:

   1   Report using RED default values by uploading a single module (called a Fuel Chain Module and which represents an entire fuel chain). The user provides information on biofuel type, feedstock, process type, country of origin, quantity of fuel, voluntary schemes etc, and the UK and Ireland Carbon Calculator automatically selects the default carbon intensity for this fuel chain (see Section 2 for more explanation on how to load a single Fuel Chain module);

   2   Report using actual data by uploading a complete fuel chain, in which actual values for all relevant data are added by the user. The UK and Ireland Carbon Calculator then calculates the carbon intensity based on the supplied information (see Section 2 for more information). For the two chains noted in paragraph 1.8, the carbon intensity shown for the complete fuel chain when it is loaded is not equal to the correct default carbon intensity, as the user must add information.

1.11 Thus if a reporting party wants to report using default values, we recommend reporting the carbon intensity of biofuel consignments using the first of these mechanisms, i.e. by loading only the Fuel Chain Module. On the other hand, if a supplier wants to report using actual values, or a combination of default inputs and actual values, users will need to report the carbon intensity of biofuel consignments using the second of these mechanisms, i.e. by loading a complete fuel chain.

1.12 If a full fuel chain is loaded for the waste wood to DME chain, small warning signs will appear on the modules for which no default input data is provided, as shown on the screenshot below. It will be necessary to input actual data for these modules in order for the fuel chain emissions calculations to be accurate, and for the warning signs to disappear.

Figure 6 Biofuel supply chain with warning signs

1.13 If a biodiesel UCO or a tallow chain is loaded, no such warning signs will appear on the modules; however, a note appears in the second conversion module (biodiesel production plant) as you must add actual data for the amount of natural gas used.

1.14 In 2020 new default fuel chains were added for biohydrogen production (refuelling at 350 bar), liquid biomethane, and pyrolysis oil production from the biogenic fraction of

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[3] For waste animal/vegetable oil biodiesel, the input data that is missing is the data for the conversion module. For waste wood DME, all the input data is missing. The reason why this data is missing is because neither DfT nor the BioGrace project has managed to calculate the same disaggregated default values as that published by the Commission in the RED, when using the input data the Commission has made available. Until this issue is resolved, users will need to provide actual data for all inputs to these modules, if they do not wish to use the aggregated default value for the fuel.

waste tyres[4]. As these fuels do not have default values in the Renewable Energy Directive or Renewable Energy Directive II, the default values in the calculator were put together based on other peer-reviewed literature sources, and may be used as default values for the purpose of reporting under the RTFO or the Motor Fuel GHG Reporting Requirements.

Select reporting scheme splash screen

1.15 The first screen that appears upon opening the UK and Ireland Carbon Calculator is the 'Select reporting scheme' splash screen (see image below). Users operating under the RTFO or RO should select this option and press OK. The reporting scheme can be changed at any time by entering the 'Options' menu and choosing 'select reporting scheme.'
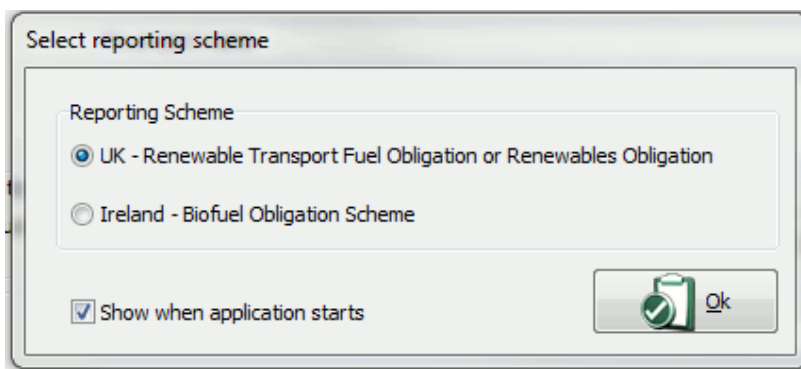
Figure 7 'Select reporting scheme' splash screen

General information screen

1.16 Upon selecting a reporting scheme the user will be directed to the General information screen. Generic information about the company you are preparing reports for can be entered here. Note: you can return to this screen at any time by clicking on 'General information' at the top of the left hand panel. Key information which can be entered on this screen includes:

- Company type – you must choose whether the report you are preparing is intended for reporting under the RTFO (in which case you will also need to choose whether you are reporting as a fossil fuel supplier or a biofuel supplier) or under the Renewable Obligation (RO) Order. This user manual is for reporting under the RTFO only.

- Project name – a short description of the information can be entered in this file.

- Project description – can include more detailed information relating to this file (e.g. the scope of fuel types covered, whether the file is current or no longer being used etc).

- Default fuel type – select the fuel type which you are likely to use most often within the software (you will still be able to prepare reports and analyse the carbon intensity of other fuels).

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[4] Note that the default value included in the calculator for pyrolysis oil (biogenic) provides default values only for the production of pyrolysis oil, and not for the production of a finished transport fuel. Additional data must be added by the user on pyrolysis oil upgrading, and downstream transport, distribution and refuelling.

- Default country of origin – select the country from which most of your biofuel feedstock comes (e.g. the United Kingdom) or, if you receive feedstock from a wide range of countries, select 'Unknown'.

- Company data – general contact details (you can save this data and reload it in other files by clicking the 'Save company data' button. The data will then automatically appear every time you open the UK and Ireland Carbon Calculator. Please note that you can only save one set of company information at a time.).

Protecting files with passwords

1.17 An individual file can be protected with a password, by enabling this option within the General information screen. The following steps will enable password protection of a file. This will mean that anyone who tries to open this file will be forced to enter the password you specify before they can view or change any of the information within it. It also means that the file itself is compressed and encrypted so it cannot be read by any other software.

Step	Procedure
Step 1	Click on 'General information' in the left hand panel.
Step 2	Click on the button 'Protect this file with a password'.
Step 3	Select 'Protect this project with a password'.
Step 4	Enter the same password twice (the format of the password is up to you) and click 'OK'.

Table 2 Protecting files with passwords

Selecting the 'company type' and timeframe for reports (HO10 or HO930)

1.18 The type of company you are preparing a report for will affect the period covered by a monthly report and the number of reports you submit in a year. In the General information screen you can select whether you are a biofuel supplier (and submit HO930 reports to HMRC) or a fossil fuel supplier (and submit HO10 reports to HMRC).

1.19 If you select 'biofuel supplier', the software will allow you to prepare monthly reports which cover calendar months except for the first report of a year (which will cover the period from 15th April to 30th April) and the last report of a year (which will cover the period from 1st April to 14th April).

1.20 If you select 'fossil fuel supplier', the software will allow you to prepare monthly reports which cover the period from the 15th of a month to the 14th of the next month.

1.21 If you are neither a 'biofuel fuel supplier' nor a 'fossil fuel supplier' but you are preparing a report which will ultimately be submitted to the RTFO Administrator by one of these parties then use the option which corresponds to the type of company that will submit the report. Other economic operators may use the tool to calculate GHG emissions of fuel chains, without creating a report which may ultimately be submitted to the Administrator. In this case, either of these two options may be selected.

1.22 The following steps summarise how to select a company type.

Step	Procedure
Step 1	Click on 'General information' in the left hand panel.
Step 2	Click on the company type you wish to select under the 'Company data' heading – Biofuel Supplier or Fossil Fuel Supplier.
Step 3	Click 'Save company data' if you would like this to be the default company type for other files you prepare in the future.

Table 3 How to select a company type

Adding new years and months

Adding a new year

1.23 An individual file can be used to prepare reports for different months and years.

1.24 It is important to use the correct year and month when preparing reports because the default values, methodology and other inputs are periodically updated and are linked to the date of the report. Previous values and methodologies are retained in the calculator so that if you want to check your results from a past calculation you just need to select the appropriate month and year and the result will be exactly the same as when you carried out the calculation at that time. However, if you unintentionally submitted a monthly report for 15 June 2014 that was prepared as 15 June 2013, it may contain the wrong values. You should always select the year relevant to when the biofuel was supplied and reported to the Administrator.

1.25 To add a new year, follow the steps below.

Step	Procedure
Step 1	Click the 'Create a new year' button on the toolbar OR select 'New year' from the File menu OR right click on the left hand panel and select 'New year'.

Figure 8 Location of 'Create a new year button' on toolbar

OR

Step	Procedure

Figure 9 Location of 'New year' in file menu

OR

Figure 10 Illustration of selecting 'New year' by right clicking on left hand panel

Step 2	Select the year for which you would like to prepare reports. Remember that the year you choose will determine the calculation methodology used by the UK and Ireland Carbon Calculator to estimate the carbon intensity of the biofuel.
Step 3	Enter a description for the year if you require it.
Step 4	Select the first month for which you would like to prepare a report within this year and click the 'Create' button.

Table 4 How to add a new year

Adding a new month

1.26 To add a new month within an existing year, follow the steps below.

Step	Procedure
Step 1	Ensure you have the year in which you would like to add a new month selected, then click the 'Create a new month' button on the toolbar OR select 'New month' from the File menu OR right click on the left hand panel and select 'New month'.

Figure 11 Location of 'Create a new month button' on toolbar

Step	Procedure
	OR
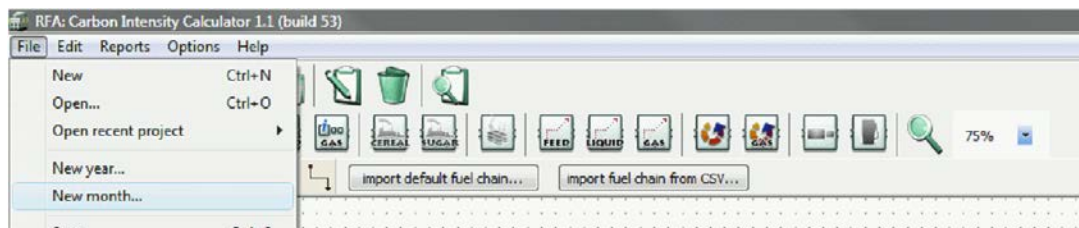
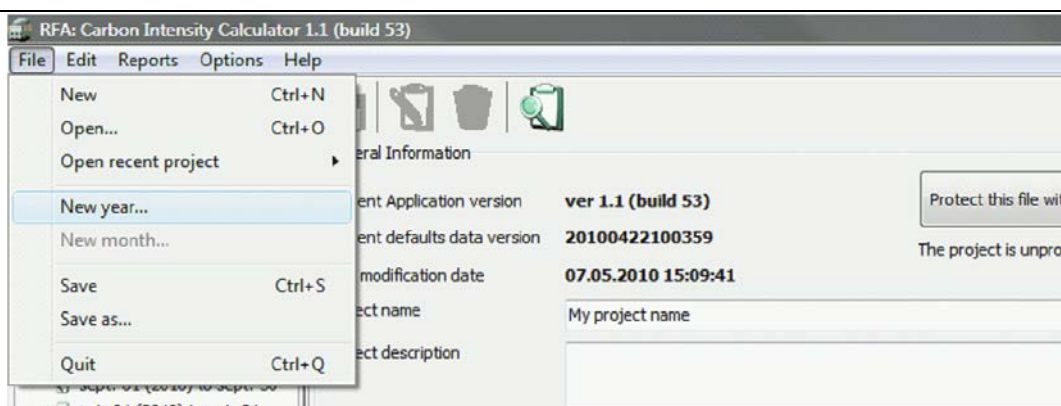**Figure 12 Location of 'New month' in file menu**
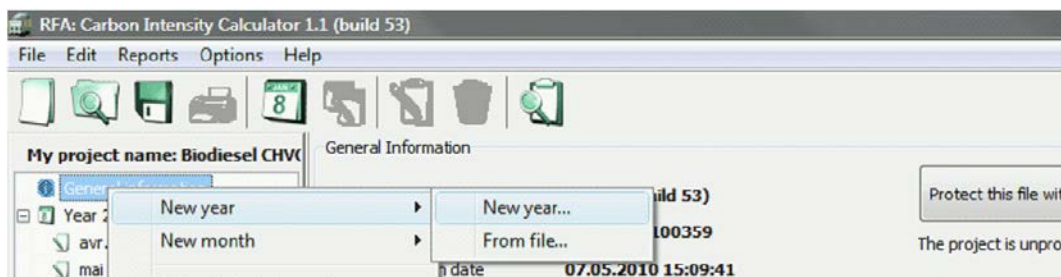
OR
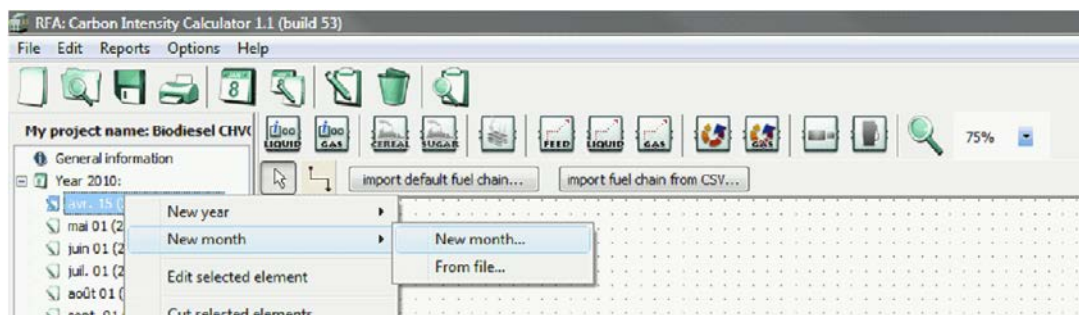
Figure 13 Illustration of selecting 'New month' by right clicking on left hand panel

Step 2	Select the month for which you would like to prepare a report and click the 'Create' button.

Table 5 How to add a new month

2. Adding a new fuel chain

2.1 The information required for reporting to the RTFO Administrator is entered using a graphical representation of a biofuel supply chain.

Figure 14 Graphical representation of a biofuel supply chain

2.2 These graphical fuel chains are made up of a set of pre-defined modules which contain all of the data needed to assess the GHG emissions from this step of the chain. A chain must be added for every consignment of fuel which is to be contained in a report to the RTFO Administrator.
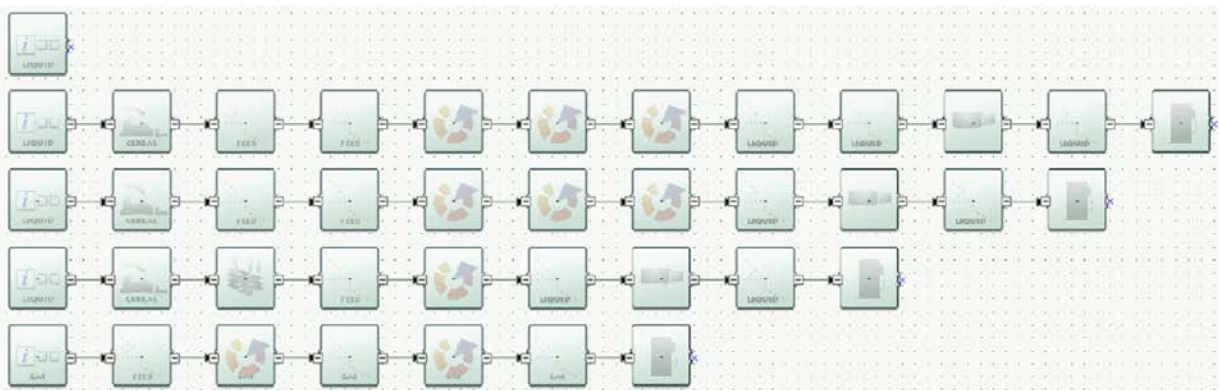
Figure 15 Several biofuel supply chains

2.3 These chains can be expanded and/or reduced by clicking on the '+' / '-' sign as detailed below.

2.4 On the right side of a module in the Carbon Calculator, you can see a small square containing either the sign '-' or '+', as is shown on the picture below.

Figure 16 Chain expansion and reduction signs

2.5 The '-' sign means that the chain is expanded – i.e. you can see all the modules contained in the chain after the specific module.

2.6 The '+' sign means that the chain is reduced – i.e. you cannot see any modules after the specific module. However, these modules have not been deleted – they will reappear if you click on the '+' – they have been condensed into one single module.

Using fuel chain default values (i.e. no actual data)

2.7 If you do not intend to enter detailed actual data relating to the carbon intensity of a particular consignment of biofuel (e.g. natural gas use at the biofuel plant, crop yield, transport distances etc.) but will rely on Fuel Chain Default Values (see the RTFO Carbon and Sustainability Guidance) you can simply add one of the Fuel Chain Modules.

2.8 There are two types of Fuel Chain Module – one for liquid biofuels and one for gaseous biofuels (e.g. gaseous biomethane, biopropane). Fuel Chain Modules can be used to enter all of the information required for monthly reports to the RTFO Administrator.

2.9 To add a new Fuel Chain Module, follow the steps below.

Step	Procedure
Step 1	Click the 'Fuel Chain' module you require on the toolbar (either 'Fuel Chain Liquid' for liquid biofuels or 'Fuel Chain Gas' for gaseous biofuels), then click on the screen where you would like the module to appear. **Figure 17 Calculator icons, highlighting liquid and gaseous fuel chain modules**
Step 2	Double click on the module to enter data on: - Biofuel type, feedstock, process types and country of origin; - Quantity of fuel; - Voluntary schemes met. Once you have entered information about the biofuel type, feedstock and process type, the software will automatically select the appropriate fuel chain default value. See Section 4 for more details on the data which can be entered in a Fuel Chain Module (also refer to the RTFO Carbon and Sustainability Guidance).
Step 3	Click the 'Close' button to return to the main screen.

Table 6 How to add a new fuel chain module

Using a default fuel chain to add actual data

2.10 If you do intend to enter detailed actual data relating to the carbon intensity of a particular consignment of biofuel (e.g. natural gas use at the biofuel plant, crop yield, transport distances etc) the simplest approach is to start from one of the default fuel chains which are defined in the RTFO Carbon and Sustainability Guidance and included in the UK and Ireland Carbon Calculator database. See section 1.8 for

guidance if you wish to use a default fuel chain to add actual data for biodiesel from waste animal and vegetable oil, or DME from waste wood.

2.11 To import such a chain, follow the steps below.

Step	Procedure
Step 1	Click the 'import default fuel chain' button on the toolbar

Figure 18 Location of 'Import default fuel chain' button on the toolbar

Step	Procedure
Step 2	Select the type of biofuel produced, the feedstock from which the biofuel has been produced, the type of production process, and the country of origin, and click 'Load'. If you do not know the type of feedstock or the biofuel production process, you will have to select '-' for that field, or use a 'Fuel Chain Default Value'. If you cannot select the combination of fuel type, feedstock, and production process that you require, it is because there is no default fuel chain currently defined for this supply chain. See the RTFO Carbon and Sustainability Guidance for the procedure if no appropriate default fuel chain exists. If the country of origin is not available, please temporarily use '-' and contact the RTFO Administrator who will be able to add new countries in most cases.

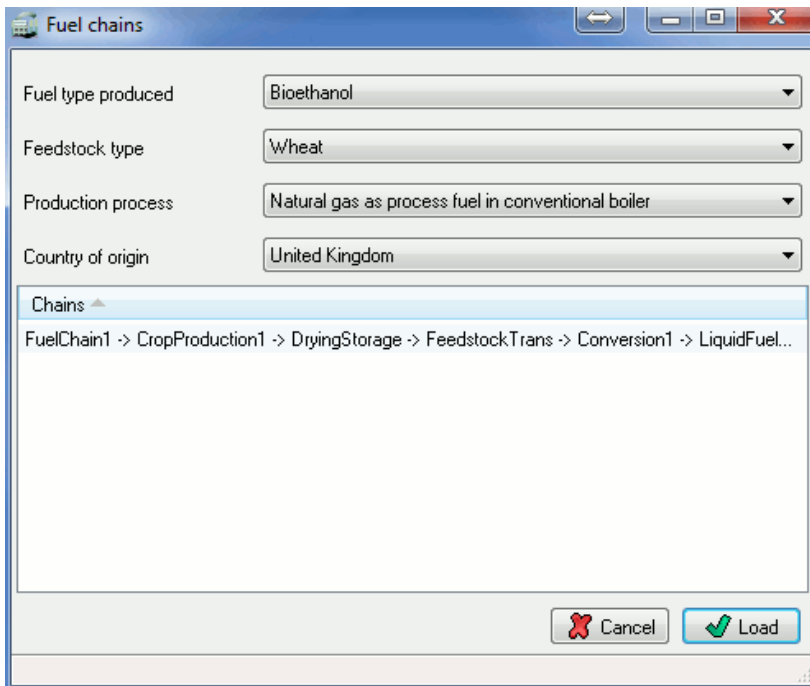**Figure 19 Default fuel chain selection window**

Step	Procedure
Step 3	Select the relevant module and enter the actual data for this supply chain. See Section 3 for more details on entering actual data.

Table 7 How to import a default fuel chain

Adding or removing modules from an existing fuel chain

2.12 In some situations you may wish to add or remove a module from an existing fuel chain, for example:

- A default fuel chain might only include one module for feedstock transport (e.g. by truck); however, your fuel chain might involve two transport steps: firstly a short distance by truck, then a longer distance by rail.

- A default fuel chain might include two separate conversion steps – oil extraction, then transesterification (with an intermediate transport step); however, in your fuel chain these two processes may be carried out in the same plant with no intermediate transport step.

2.13 The following steps present how to add or remove a module from an existing fuel chain.

2.14

Step	Procedure
If you want to delete a module:	
Step 1	Select the module you want to delete by clicking on it once. Delete it either by using the 'Delete' key on the keyboard OR by right clicking on the module and selecting 'Delete selected modules'. Click 'yes' when asked if you really want to delete the selected elements.
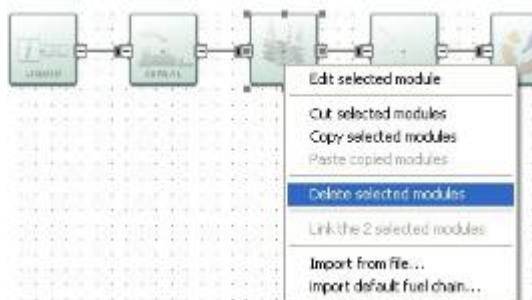
Figure 20 Location of 'delete selected modules' option from right clicking on module

Step 2	The fuel chain will now be broken – i.e. there will be two modules which are not connected by a small black arrow. Reconnect these two modules by clicking on the small X (the 'connector') in the middle of the right hand side of the first module and, holding the mouse button down, drag the arrow to the connector on the second module to which you wish to connect. The line will have an arrowhead if it is correctly formed. If no arrowhead appears, it is either because you have not dragged the line precisely to the connector on the second module, or because these two types of module are not allowed to connect (see Table 9

Step	Procedure
	for connection rules) – check that the fuel chain you are building is accurate and permitted.

Correct:
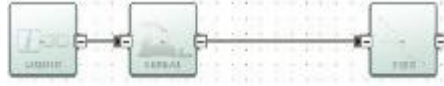
Figure 21 Correct connection between modules

Incorrect:

Figure 22 Incorrect connection between modules

Step 3	Check all downstream modules, particularly those of the same type to ensure that the default values provided are still representative of your chain. For example, transport modes and distances, countries in which conversion steps take place etc.

If you want to add a new module:

Step 1	Create some space for the new module (e.g. by selecting and dragging to the right the modules which will be on the right of the new module).
Step 2	Delete the arrow which connects the two modules in between which you wish to insert a new module.
Step 3	On the toolbar, click once on the type of module you wish to add to the fuel chain (e.g. 'Feedstock transport') then click the main screen where you want the new module to appear.
Step 4	Connect the new module to the remaining parts of the fuel chain. To connect two modules, click the small X (the 'connector') on the right hand side of the first module and, holding the mouse button down, drag the arrow to the connector on the second module to which you wish to connect. The line will have an arrowhead if it is correctly formed. If no arrowhead appears, it is either because you have not dragged the line precisely to the connector on the second module, or because these two types of module are not allowed to connect (see Table 9 for connection rules) – check that the fuel chain you are drawing is accurate.

Correct:

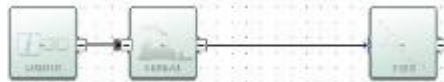**Figure 23 Correct connection between modules**

Incorrect:

Step	Procedure

Figure 24 Incorrect connection between modules

Step 5	Enter the actual data you have for this module.
Step 6	Check all downstream modules, particularly those of the same type to ensure that the default values provided are still representative of your chain. For example, transport modes and distances, countries in which conversion steps take place etc.

Table 8 How to add or remove a module from an existing fuel chain

Copying and pasting fuel chains

2.15 Modules or even whole fuel chains can be duplicated by the 'copy and paste' function. Select the module(s) you wish to copy, then right-click on one of those modules and select 'copy selected modules'. Then right-click in an empty space and click 'paste copied modules'. A copy will appear, with all the information in the module(s) replicated.

2.16 Please note that the 'Administrative consignment no.' (which is automatically generated in ROS) will be removed from a pasted fuel chain.

Constructing a completely new fuel chain

2.17 The software can be used to construct an entirely new fuel chain, although it is almost always easier (and recommended) to edit an existing default fuel chain where one is available for your biofuel. This is because all of the input data is already provided in the default fuel chains, which can be replaced with actual data where available. When constructing a new fuel chain care must be taken that all sources of emissions are included and all of the data in the fuel chain needs to be provided from actual data sources, rather than default values. Emissions factors for fertilisers, fuels, electricity and chemicals are exceptions to this rule, and for these factors the default values should be used, unless there is an exceptional reason to use an alternative.

2.18 From RTFO Year 11 the fuel type 'Hydrogen-RFNBO' can be added under the fuel chain module for gaseous biofuels, so that the user can create a new fuel chain for RFNBO hydrogen. For more information and guidance on RFNBO hydrogen contact the RTFO Administrator.[5] From 2020 the fuel type 'biohydrogen' can be added under the fuel chain module for gaseous biofuels and the fuel type pyrolysis oil (biogenic)[6] can be added under the fuel chain module for gaseous biofuel. From 2020 biomethane can be reported as either a gas, as Biomethane (gaseous), or as a liquid, as Biomethane (liquid).

2.19 There are some rules which must be followed when adding completely new fuel chains:

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[5] rtfo-compliance@dft.gov.uk

[6] Note that the default value included in the calculator for pyrolysis oil (biogenic) provides default values only for the production of pyrolysis oil, and not for the production of a finished transport fuel. Additional data must be added by the user on pyrolysis oil upgrading, and downstream transport, distribution and refuelling.

- Each fuel chain must start with a Fuel Chain Module. A Fuel Chain Liquid module should be used if the chain is producing a liquid fuel (e.g. ethanol). A Fuel Chain Gas module should be used if the chain is producing a gaseous fuel (e.g. gaseous biomethane).

- The modules must be mapped, from left to right in the same sequence as the different processing steps occur – e.g. starting with crop production, followed by drying and storage, then feedstock transport etc.

- All modules must be connected with a small black arrow. If these arrows are not present, the software will not be able to calculate the carbon intensity of the fuel chain.

- It is not possible to have two parallel streams in a fuel chain, you could, however, represent this situation with two separate fuel chains.

Incorrect:

Figure 25 Incorrect representation of parallel streams in a fuel chain

Correct:

Figure 26 Correct representation of parallel streams in a fuel chain

2.20 Not all modules can be connected to each other. This ensures simple errors cannot be made when building new fuel chains. The table below indicates which modules can be connected – when the module in column 1 is the first of two modules (i.e. the first in a sequence when reading from left to right) it can be connected to all of the modules listed in column 2.

First module…	…can be connected to these modules
Fuel chain - liquid	Crop production, Sugarcane production, Feedstock transport, Biofuel plant or oilseed crush / mill
Fuel chain - gas	Feedstock transport
Crop production	Drying and storage, Feedstock transport
Sugarcane production	Feedstock transport
Drying and storage	Feedstock transport, Biofuel plant or oilseed crush / mill, Gaseous biofuel plant

First module…	…can be connected to these modules
Feedstock transport	Drying and storage, Feedstock transport, Biofuel plant or oilseed crush / mill, Gaseous biofuel plant, Biofuel blending depot
Liquid fuel transport	Liquid fuel transport, Biofuel plant or oilseed crush / mill, Biofuel blending depot, Fuel filling station
Gas fuel transport	Gas fuel transport, Gaseous biofuel plant, Fuel filling station
Biofuel plant or oilseed crush / mill	Biofuel plant or oilseed crush / mill, Feedstock transport, Liquid fuel transport
Gaseous biofuel plant	Gas fuel transport, Gaseous biofuel plant, Biofuel plant or oilseed crush / mill
Biofuel blending depot	Drying and storage, Feedstock transport, Liquid fuel transport, Gaseous fuel transport, Biofuel plant or oilseed crush / mill, Gaseous biofuel plant, Biofuel blending depot, Fuel filling station
Fuel filling station	Drying and storage, Feedstock transport, Liquid fuel transport, Gaseous fuel transport, Biofuel plant or oilseed crush / mill, Gaseous biofuel plant, Biofuel blending depot, Fuel filling station

Table 9 Modules which can be connected to each other

2.21 To add a new module to the screen, follow the steps below

Step	Procedure
Step 1	On the toolbar, click once on the type of module you wish to add to the fuel chain (e.g. 'Feedstock transport').
Step 2	Click the main screen where you want the new module to appear.

Table 10 How to add a new module to the screen

2.22 To connect two modules, follow the steps below.

Step	Procedure
Step 1	Click the small X (the 'connector') on the right hand side of the first module and, holding the mouse button down, drag the arrow to the connector on the second module to which you wish to connect.
Step 2	Check to see that the line you have added has an arrowhead. If no arrowhead appears it is either because you have not dragged the line precisely to the connector on the second module (try Step 1 again) or because you have tried to connect two modules which not allowed to be connected (see Table above) – check that the fuel chain you are drawing up is accurate. Correct:

Step	Procedure

Figure 27 Correct connection between modules

Incorrect:

Figure 28 Incorrect connection between modules

Step 3	Once you have defined the whole fuel chain, you can begin entering actual data – see Section 3.

Table 11 How to connect two modules

Importing a fuel chain from a project file

2.23 It is possible to import a fuel chain from a UK and Ireland Carbon Calculator project file (e.g. which has been passed on by an upstream supplier). When you import a file, you import the structure of the chain (i.e. the order of the modules) and any actual data which has been entered into it.

2.24 The default values used in the imported chain will be those valid for the month into which you are importing it. So, for example, if your supplier prepared the file in April 2009, but you are importing it into May 2015, the software will use the default values for May 2015.

2.25 To import a fuel chain from a UK and Ireland Carbon Calculator project file, follow the steps below.

Step	Procedure
Step 1	Right click on the main fuel chain screen and select 'Import from file'.

Step	Procedure
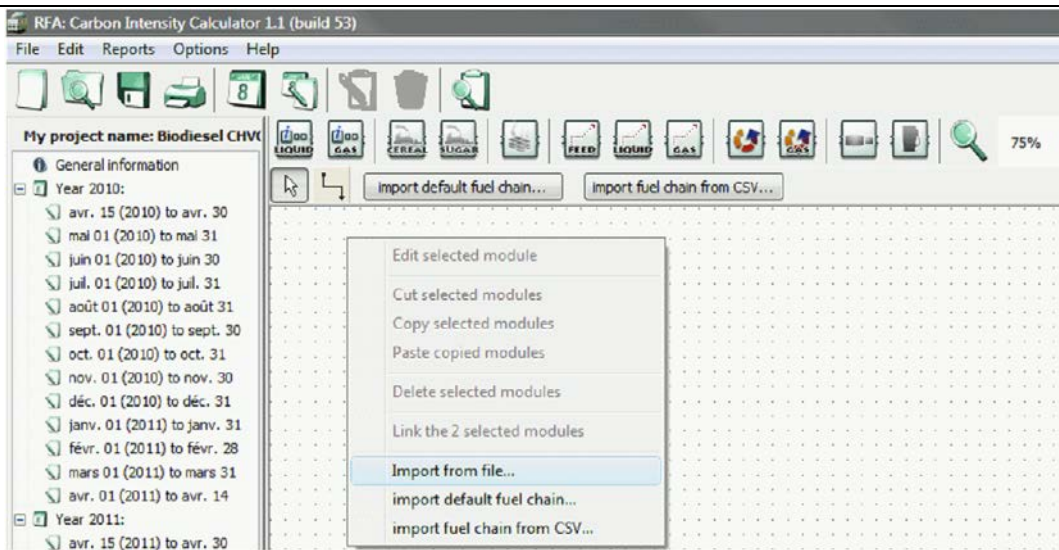
Figure 29 Location of 'import from file' option from right clicking on main screen

Step 2	Find the file from which you wish to import a fuel chain and click 'Open'. If the file you are importing is password protected, you will be prompted to enter the password at this point. If you do not have the password, you will have to obtain it from the supplier who generated the file.
Step 3	In the 'project browser' screen which appears you will see the details of the company who prepared the file and, on the left hand side of the screen you will see a list of the years and months which have fuel chains defined within them. To find the fuel chain you wish to import, click the small plus sign ('+') to the left of a month.
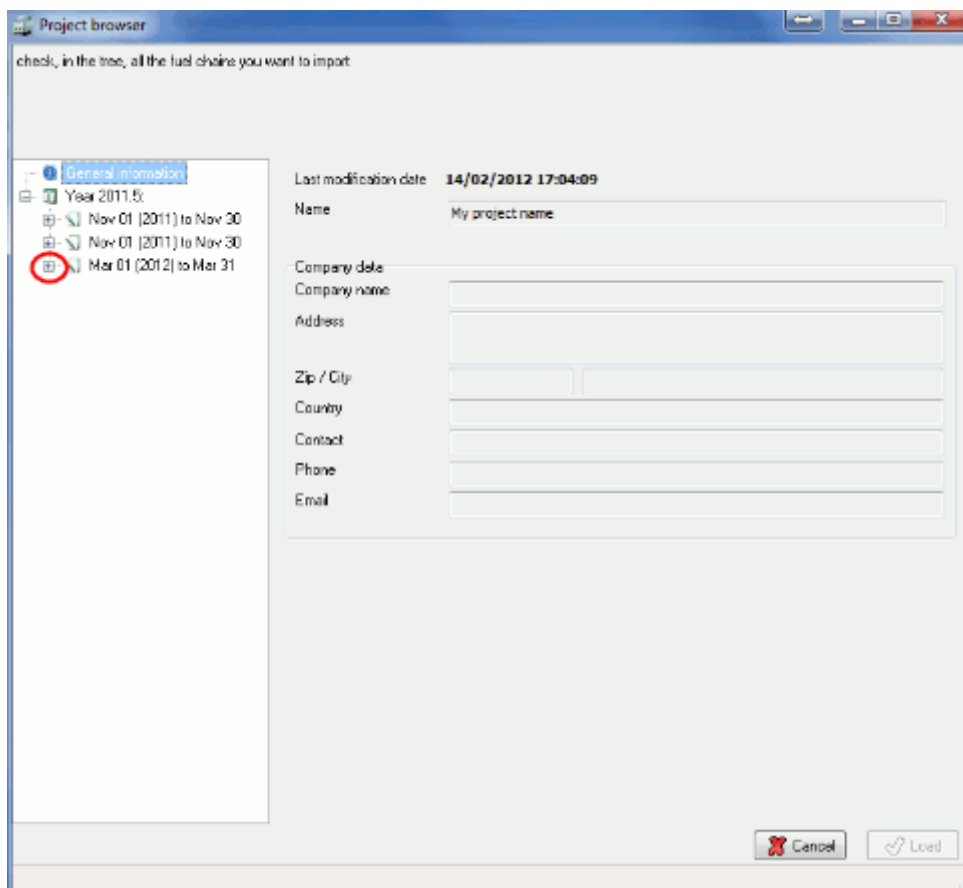
Figure 30 Project browser screen showing location of "+" symbol

A list of the fuel chains available within that month will appear – each chain is described by the fuel type, country of origin and feedstock of the fuel chain, OR by the name which has been given to it by the user who generated the file; further information is available by clicking on this description.

Step	Procedure
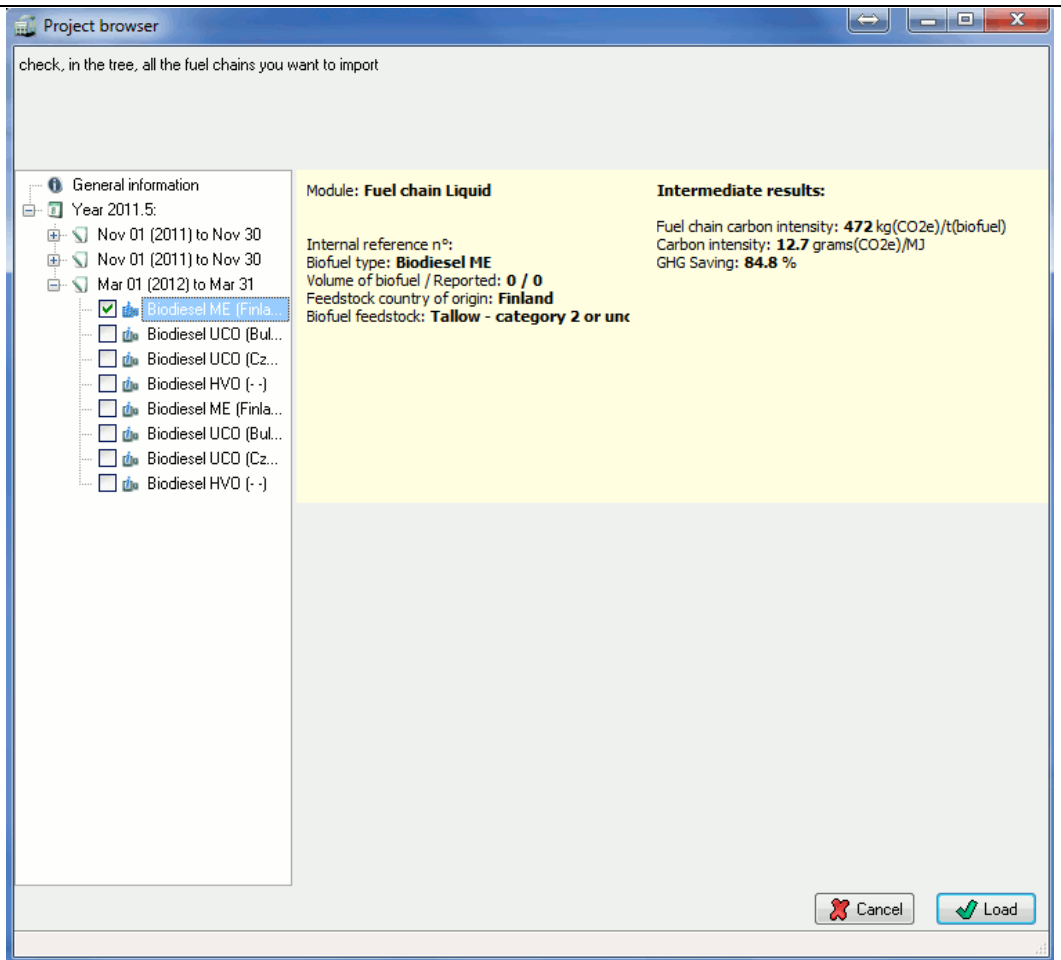
Figure 31 Project browser screen showing chain description

Step 4	Select all of the fuel chains you wish to import by ticking the box which appears to the left of the fuel chain description.
Step 5	Finally, click the 'Load' button.

Table 12 How to import a fuel chain from a UK and Ireland Carbon Calculator project file

Importing a fuel chain from a csv file

2.26 ROS has a feature which enables suppliers to export their data from ROS to a csv file. The UK and Ireland Carbon Calculator version 1.1 and later also has a feature which allows for this csv file to be uploaded to the UK and Ireland Carbon Calculator: the 'import fuel chain from csv...' option.

2.27 However, it is important to note that when you import a csv file created by ROS, you import only the information that is available in ROS. This means that the structure of the chain (i.e. the order of the modules) and any actual data which had been entered in the UK and Ireland Carbon Calculator to calculate the carbon intensity of the chain before upload to ROS will be lost. However, the carbon intensity which has been calculated using both the chain structure and the actual data will still be included.

2.28 When importing a csv file, only the Fuel Chain Modules corresponding to the chains included in ROS will be shown and these will contain all the data included in the csv files.

2.29 To import a csv file to the UK and Ireland Carbon Calculator, follow the steps below.

Step	Procedure
Step 1	Click on the 'import fuel chain from csv...' button on the tool bar OR right click on the main fuel screen and select 'import fuel chain from csv...'.

Figure 32 Location of 'import fuel chain from CSV' button in toolbar

OR
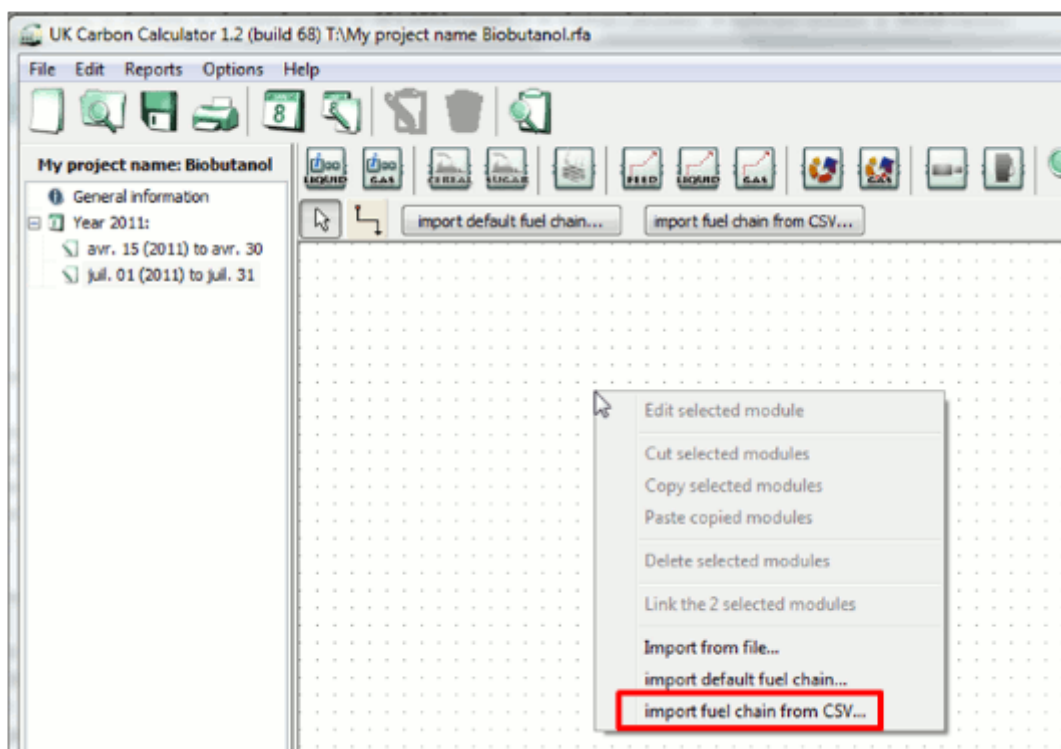
Figure 33 Location of 'Import fuel chain from CSV' option from right clicking on main fuel screen

Step 2	Find the csv file that you wish to import and click 'Open'.

Step	Procedure
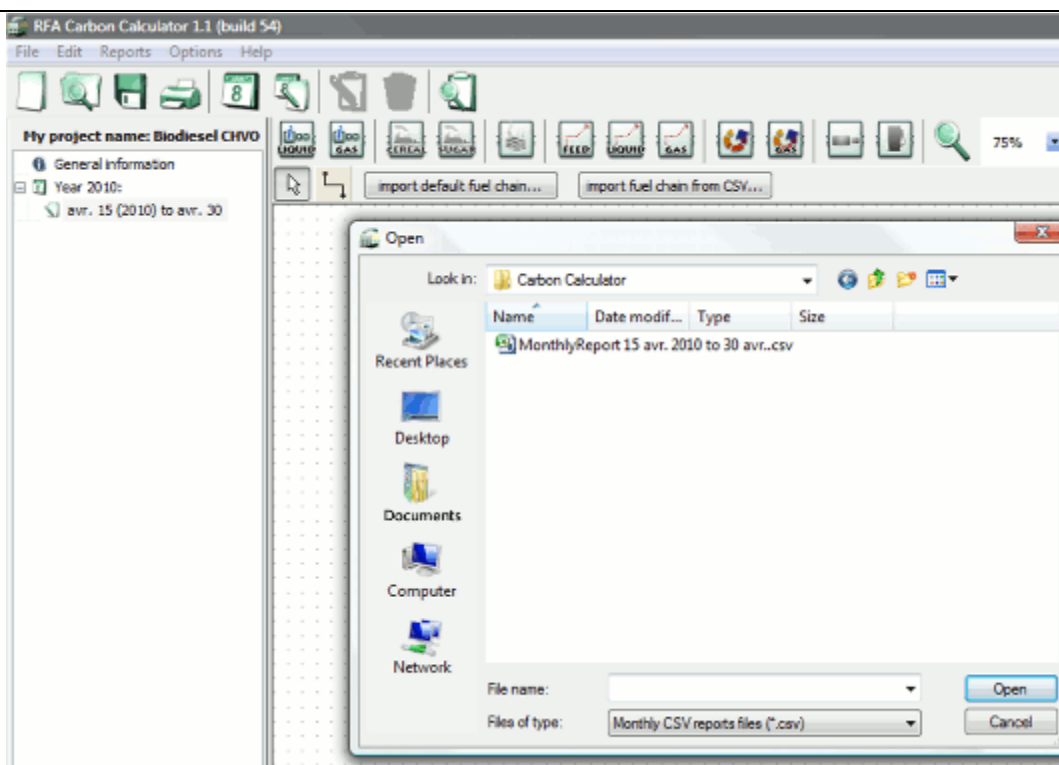
Figure 34 Selection of csv file that you wish to import

The Fuel chain Modules corresponding to the fuel chains that were included in the csv file will now be visible on the main screen.
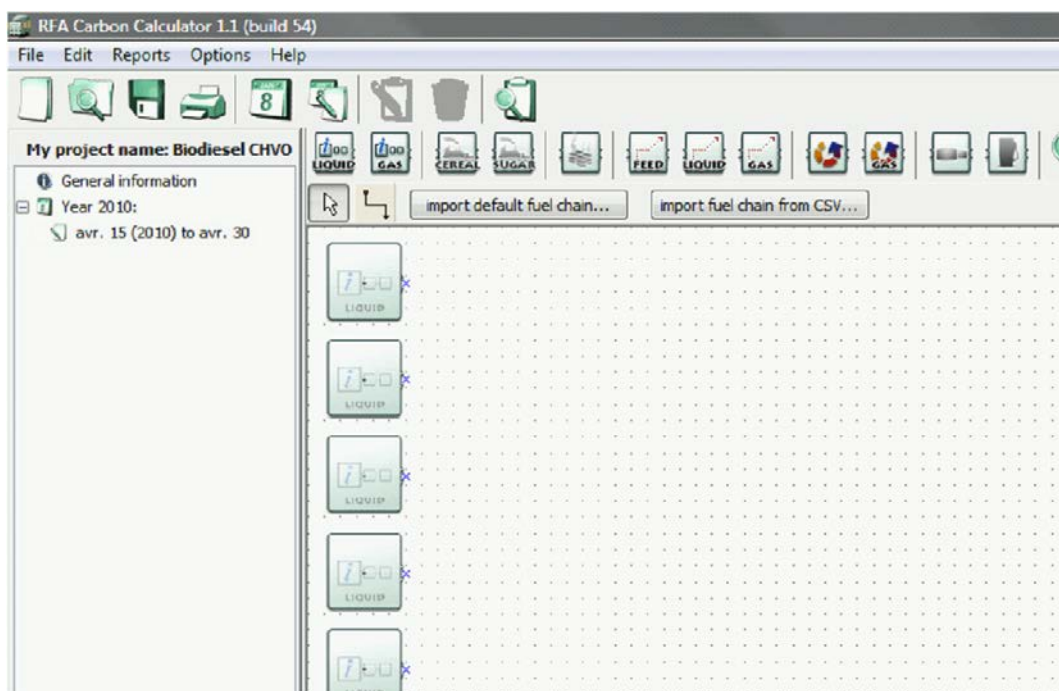
Figure 35 Main screen showing fuel chains from csv file

Table 13 How to import a csv file to the UK and Ireland Carbon Calculator

3. Entering actual data

Introduction

3.1 The intention of this User Manual is not to give a full overview of the calculation methodology used by the tool. The LCA methodology of the RED and guidance set out in the RTFO Carbon and Sustainability Guidance should be followed.

Emissions from cultivation

3.2 Prior to RTFO Year 11 it was stipulated that for biofuels produced from crop-based feedstocks cultivated in the EU the disaggregated default value for cultivation (and therefore the overall fuel chain default value) could only be used if the feedstock was cultivated in a NUTS2[7] region which had cultivation emissions lower or equal to the disaggregated default value. As of RTFO Year 11 (April 2018) this criteria no longer applies. Therefore the default value for cultivation (and the overall fuel chain default value) can now be used regardless of where the feedstock was cultivated.

3.3 Suppliers can still enter actual values for emissions from cultivation if they wish, or if a default value is not available for a particular crop. Suppliers can enter actual data for emissions from cultivation as either actual 'collected' data, or as regional average cultivation data. Regional average cultivation data may come from either the NUTS2 level cultivation emission reports accepted by the European Commission[8], or from another source if approved by the RTFO administrator.

3.4 To manually enter actual cultivation emissions data, follow the steps outlined below.

Step	Procedure
Step 1	Import or create a new fuel chain (see Section 2 for further instructions on how to do this).
Step 2	Double-click on the Crop Production Module of the chain to open it.
Step 3	Scroll down to the section called 'Emissions from cultivation'
Step 4	Select 'Use the RED cultivation GHG emission calculations'. Enter actual data for nitrous oxide emissions and fertiliser use and emissions.

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[7] Nomenclature of territorial units for statistics, level-2: http://ec.europa.eu/eurostat/web/nuts/overview
[8] Member State reports on emissions from cultivation as required by Article 19(2): https://ec.europa.eu/energy/en/topics/renewable-energy/biofuels

Step	Procedure

Figure 36 Crop production module, emissions from cultivation

You can change the units in which you provide the values by selecting the correct unit in the units drop-down list to the right of the value field.

Table 14 How to manually enter actual cultivation emissions data

3.5   To manually enter total regional cultivation emissions and yields, follow the steps outlined below.

Step	Procedure
Step 1	Import or create a new fuel chain (see Section 2 for further instructions on how to do this).
Step 2	Double-click on the Crop Production Module of the chain to open it.
Step 3	Scroll down to the section called 'Emissions from cultivation'
Step 4	If using data from NUTS2 level cultivation emission reports select 'Use NUTS2 cultivation emissions', if using another source select 'Use regional average values'. Include the values you want in the empty fields: - Include the crop yield in the white field called 'Regional average crop yield'

Step	Procedure
	- Include the total cultivation emissions in the white field called 'Regional average cultivation impact'.

Figure 37 Crop production module, emissions from cultivation

You can change the units in which you provide the values by selecting the correct unit in the units drop-down list to the right of the value field.

Table 15 How to manually enter total regional cultivation emissions and yields

Land use change emission calculations

3.6   As a default, the program considers that there is no land use change; however, if your biofuel feedstock comes from land that has undergone a change of use since 2008, you must include the emissions due to that land use change in your carbon intensity calculations.

3.7   This version of the UK and Ireland Carbon Calculator implements the land use change emissions calculations as described in the RED and the European Commission Decision of June 2010 on guidelines for the calculations of land carbon stock. Based on these guidelines certain information is required to determine emissions from land use change. Please refer to the Carbon and Sustainability Guidance for more information on how to calculate emissions from land use change.

3.8   In the UK and Ireland Carbon Calculator version 11.0 you may use two different approaches to calculating emissions from land use change (where land use change has occurred):

- Provide an actual estimate of the annual emissions due to land change;

- Provide the required information under the section 'Emissions from changes in land carbon stocks' in the Crop Production Module for the UK and Ireland Carbon Calculator to determine the carbon stocks of the previous and actual land use and the associated emissions.

3.9 Carbon stocks are estimated as the total of soil organic carbon and above and below ground vegetation carbon stock. These are determined in look-up tables based on information on land management practice, inputs to land, climate region, soil type, domain, land use type, ecological zone and continent from look-up tables provided in the EC Decision and available on the [European Commission's Sustainability Criteria](#) page. Depending on the land use, not all of these information pieces are necessary, and the UK and Ireland Carbon Calculator will take you through the pieces of information you need to provide depending on the previous information selected. See the screen shot below for an example.

Figure 38 Crop production module, emissions from changes in land carbon stocks

Conservative factor for conversion modules

3.10 As set out in the Carbon and Sustainability Guidance the conservative factor should only be removed from those conversion modules for which actual data is provided for all sources of emissions. If there is more than one conversion module, actual data will have to be provided for each conversion modules for the conservative multiplier to be removed from all of these conversion modules.

3.11 Follow the steps outline below to remove the conservative factor from a conversion module.

Step	Procedure
Step 1	Input actual data for all sources of emissions. These should include: - Conversion efficiency, - Electricity consumption, - Fuel consumption, - Chemical inputs, - Co-product yield.
Step 2	At the end of the conversion module, click on 'All data reported in this module are actual data' The conversion factor of 1.4 will then be removed.

Table 16 How to remove conservative factor from a module

Entering values

3.12 Once you have loaded a fuel chain (see Section 2) you can begin entering actual data. See Section 6 for descriptions of the fields in each module. To enter actual data follow the simple steps below.

Step	Procedure
Step 1	Double click on the module in which you want to enter actual data.
Step 2	Click the field in which you want to enter actual data.
Step 3	Replace the default value with your actual data (changing the units, if appropriate, by selecting the new units from the units drop down box).
Step 4	Enter any other actual data for this module and then click 'Close' to return to the main fuel chain screen.

Table 17 How to enter actual data

3.13 Points to note about entering actual data:

- Tables of data such as the fertiliser inputs, fuel inputs, chemical inputs etc can be edited using the same process as outlined above. However, if you wish to add or delete a row, you will need to use the buttons which appear above the table (the green plus symbol adds a new row, and the red cross deletes the selected row).

- If a warning symbol appears after you have entered some actual data, hover the mouse over it to see the warning message. The message may say 'The input you have provided is different from the default value by more than xx%. Please check that your value is correct' (where xx is a number), which is an indication that the value you have entered is smaller or larger than what might normally be expected. This does not lead to any program error – i.e. the program will still perform the usual calculations. However, you may want to double check the value entered is correct.

- The message may also say 'please also provide actual data for [name of another field]' – this is a compulsory linkage, see Table 19.

- You can reset a field to the default value by right clicking on the field and selecting 'Reset to default value'. If you want to reset a table to its original default value, use the circular arrow button above the table. Note that you can only reset the whole table, not an individual row. You can reset all data in a module by clicking on the 'Reset' button which appears at the bottom of each module.

- Actual data stored in a module is shown in bold text.

- If your fuel chain includes a fuel, chemical or co-product that is not included in the appropriate drop-down list, you can select 'other' as the Type or Name. Please ensure that you then enter the necessary data in the other fields. You must check whether the fuel or co-product is classified as a waste/residue, to determine whether you need to include information on land criteria or Lower Heating Value (LHV). See Chapter 8 in the RTFO Carbon and Sustainability Guidance.

Compulsory linkages

3.14 If a warning symbol appears after you have entered some actual data, which says 'please also provide actual data for [name of another field]' then you have entered data for a field which has a 'compulsory linkage'.

3.15 Compulsory linkages are defined between two inputs which are often linked in some way. For example, crop yield is often linked to the rate of nitrogen fertiliser application, so if a higher crop yield is reported then there is a reasonable chance more nitrogen fertiliser has been applied. To prevent 'cherry-picking' (i.e. selective use of actual data and single default values) the software warns the user when they have entered actual data for a field which has a compulsory linkage. When this occurs, make sure that actual data is also entered for the second field. See the following table and the Carbon and Sustainability Guidance.

3.16

Module	Input one	Input two
Crop production	Crop yield	Nitrogen fertiliser application rate
Crop production	Nitrogen fertiliser application rate	N_2O emission rate from agricultural soils
Drying and storage	Moisture removed	Fuel for heating or electricity
Conversion	Efficiency	Any co-product yield
Conversion	Efficiency	Fuel or electricity use
Conversion	Electricity or heat exported	Fuel use

Table 18 Compulsory linkages for all fuel chains

3.17 The compulsory linkage between nitrogen fertiliser application rate and soil N_2O emissions is not signalled by a warning sign but automated in the program. For most default fuel chains (except for chains whose default values were defined in the RED[9]), the N_2O emission rate was calculated using the IPCC Tier 1 methodology based on the nitrogen fertiliser application rate. For all chains, when the fertiliser input table is edited in the UK and Ireland Carbon Calculator, the N_2O emission rate

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[9] For the chains defined in the RED, the rate of N_2O emissions from agricultural soil is based on results from the DNDC model as published by the BioGrace project (www.biograce.net).

is automatically recalculated based on the IPCC Tier 1 approach and the 'new' N fertiliser application rate.

Type of GHG data

3.18 From RED implementation on 15 December 2011, 'Accuracy Levels' have been replaced with a simpler field called 'type of GHG data'. This field is at the bottom of the Fuel Chain module, and should be completed where actual data has been supplied for:

- the cultivation stage, or;
- for the entire fuel chain.

3.19 Actual fuel chain data is necessary to demonstrate compliance with the GHG criteria where a feedstock has been used for which there is no carbon default available in Annex V of the RED.

3.20 This field is not 'compulsory', but note that this information may be needed to demonstrate compliance with the RED GHG criteria. For guidance on establishing the type of GHG data see Chapter 6 of the RTFO Carbon and Sustainability Guidance.

Entering links to verification evidence

3.21 As described in the Carbon and Sustainability Guidance all actual data used must be verifiable. You may wish to record, in the field at the top of the module 'Details and links to verification evidence', cross references to reports or other evidence supporting the claimed actual data.

Moisture content

3.22 In each of the default fuel chains, values that depend on moisture content (e.g. yields, transport fuel use) have been consistently calculated at the traded moisture content of the crop concerned. If you modify the crop yield by entering actual data, check the moisture content of your feedstock and, if it differs from that of the default yield, then check that the amount of energy required for transporting and drying the feedstock are also correct. You can check the moisture content of the default fuel chain by placing the cursor on the Crop Yield field in the Crop Production Module, and looking at the text in the yellow box at the bottom of that module. See the screenshot below.

Figure 39 Crop production module, crop yield

4. Preparing reports

RED-compliant (indicative) status of the loaded fuel chains

4.1 Version 11.0 of the UK and Ireland Carbon Calculator provides an indication of the RED-compliant status of the fuel chains that you have loaded for reporting year 2011/2012 and later. These are called 'indicative RED-compliant flags' and mirror the sustainability criteria for biofuels defined in the RED.

4.2 There are four indicative RED-compliant flags:

- greenhouse gas,
- biodiversity,
- carbon stock, and
- overall RED-compliant.

4.3 The status of these flags depends on many parameters such as voluntary scheme met, previous use of the land in January 2008, carbon intensity of the fuel, type of data used in the GHG emission calculations etc. These also take into account exemptions such as the grandfathering clause for biofuel production installations that were in operation on or before 23 January 2008[10]. Please see the Carbon and Sustainability Guidance for more information on how a fuel can be demonstrated to be RED-compliant.

4.4 The indicative RED-compliant flags can be seen for each fuel in the Fuel Chain Module as shown in the screen shot below. This shows a consignment of biofuel with data which demonstrates indicative compliance with the biodiversity and the carbon stock criteria, but not the GHG criteria. Furthermore, the indicative RED-compliant flags are also included in the monthly csv reports that the UK and Ireland Carbon Calculator can generate and which can be uploaded to ROS.

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[10] Note that this grandfathering provision no longer applies from 1 April 2013. Thus in Year 6 all biofuel will have to achieve at least 35% GHG savings.
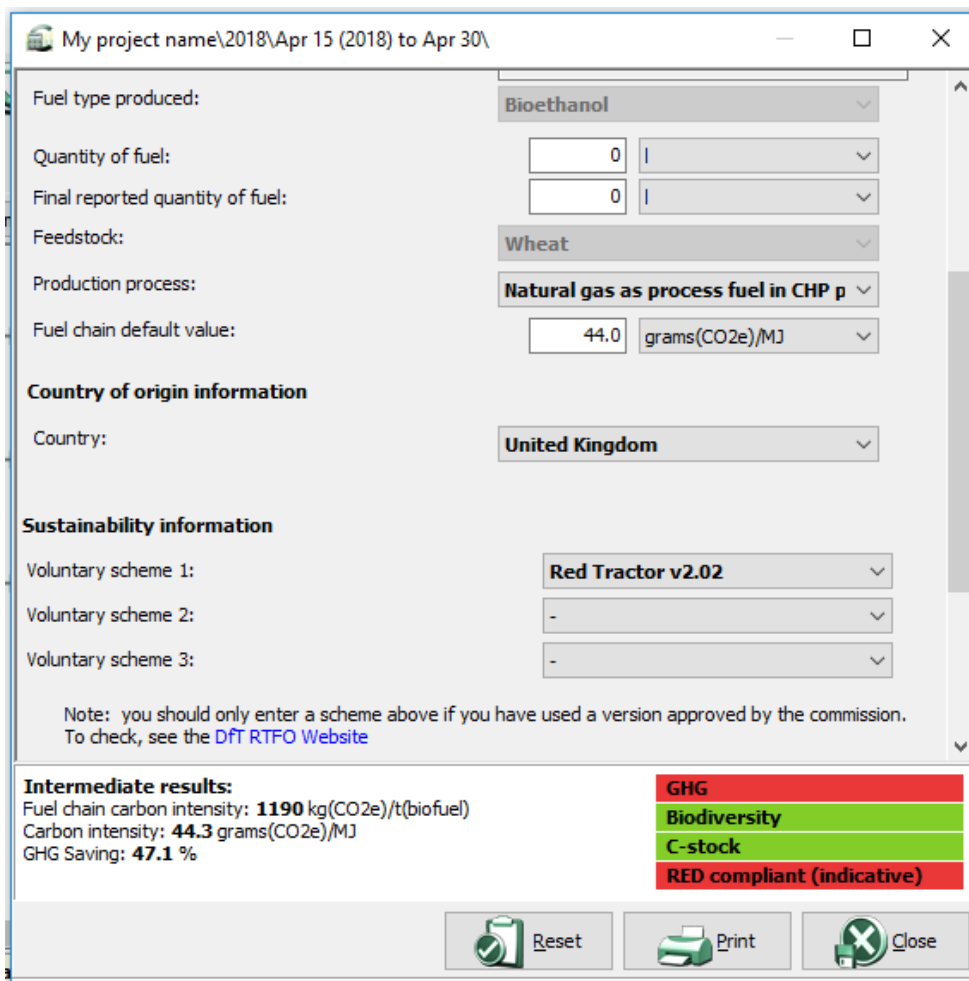
Figure 40 Fuel chain module, RED-compliant flags

Preparing a monthly Carbon and Sustainability report to the RTFO Administrator

4.5   You can use the UK and Ireland Carbon Calculator to generate a file which can be uploaded to ROS as a monthly carbon and sustainability report (note: it is not possible to prepare 'volume returns' using this software).

4.6   Once you have entered all the information you want to include in a monthly report use the following steps to prepare a 'monthly csv report'. Once you have prepared this report, it can be downloaded as a csv file from the Carbon Calculator and manually uploaded to ROS – follow the steps outlined in the Help menus on ROS.

Step	Procedure
Step 1	Select the month for which you want to prepare a report (in the left hand panel) and select 'Monthly csv report' from the 'Reports' menu OR right click on the month for which you wish to prepare the report in the left hand panel and select 'Monthly csv report'.

Step	Procedure
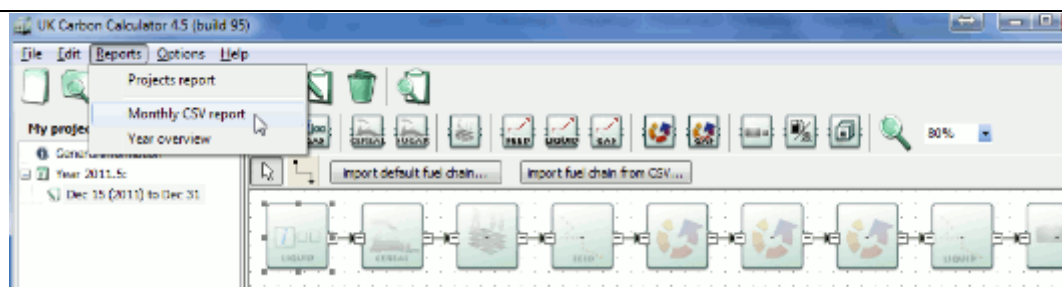
Figure 41 Location of 'Monthly csv report' option in 'Reports' menu

OR
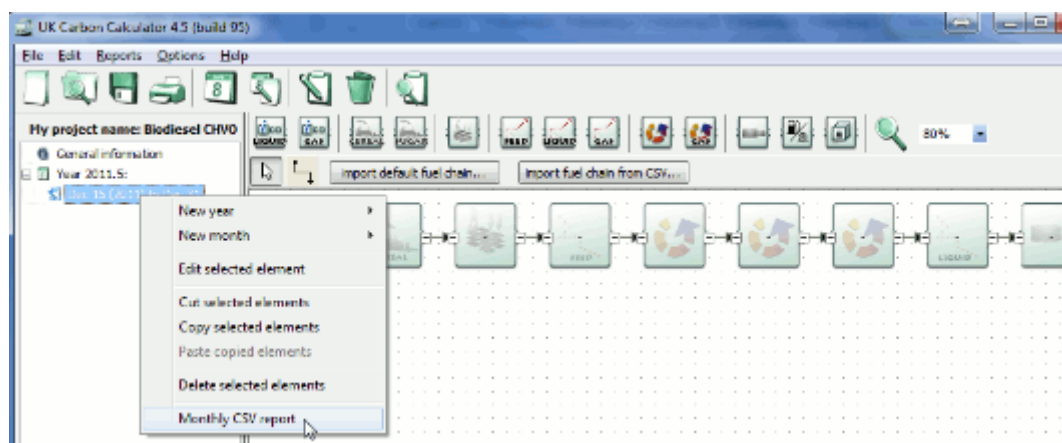
Figure 42 Location of 'Monthly csv report' option from right clicking on month for which you wish to prepare report

Step 2	In the screen which appears, check that the year and month shown are those for which you are preparing a report.
Step 3	If you wish to add any information which is saved in a separate file click the 'Add' button and select the appropriate file (otherwise click the 'Next' button and go to Step 4). Check to make sure 'OK' appears in the valid column, next to the name of the file you just loaded (if not, then the file which you loaded does not have the correct year and month within it, and no data will be added to the report). Add any other files using the same process. When you have added all the files required, click the 'Next' button.
Step 4	This screen shows a preview of the monthly csv file. Several of the columns have been converted to the codes which ROS uses (see the DfT website for details on these codes). If you are happy with the data shown on this screen, click the 'Next' button.
Step 5	This screen allows you to name and select the location of the file you have generated. If you want to change the location of the file, click on the folder icon which appears at the end of the field. If you change the name of the file, make sure the name ends with '.csv' (without the quotation marks). In some cases you may also see a warning message on this screen to the effect that you have not supplied information on 'voluntary scheme' or 'soil carbon accumulation' for some or all of your administrative consignments. This warning does not prevent you from creating your monthly csv report. Although this is not required for applications of RTFCs it is a legal requirement for this additional sustainability information to be verified by 12 August following the obligation period. If you do not verify as part of your application for RTFCs then you will need to verify this information and supply a verifier's statement

Step	Procedure
	covering these consignments by 12 August. Please see the RTFO Carbon and Sustainability Guidance for more information on this issue.
	To generate the monthly csv report, click 'Finish' – this will simply save the file on your computer, it will not automatically upload the file to ROS.
Step 6	Upload the file created to ROS, following the instructions set out in the ROS Help menu.

Table 19 Preparing a monthly carbon and sustainability report

4.7   Note: when uploading reports to ROS, users may adjust the volumes associated with each consignment of biofuel to ensure there is agreement between Carbon and Sustainability Reports and volume returns. To ensure there is consistency between the data reported to the RTFO Administrator and the data contained in the UK and Ireland Carbon Calculator, you will have to manually enter the adjusted volume into the UK and Ireland Carbon Calculator. The adjusted volume can be entered in the Fuel Chain Module at the start of the chain, in the field 'Quantity of fuel recorded in the RTFO Operating System'. Values must be entered in this field before Year Overview reports can be generated.

Preparing Year Overview reports

4.8   The software can generate a report that gives the user a record of all fuel chains recorded in a given reporting year. These reports can only be prepared if users have manually entered values in the 'Quantity of fuel recorded in the RTFO Operating System' field which should be identical to the values recorded in ROS for every consignment of fuel reported in the entire year.

4.9   To create a Year overview report, follow the steps as outlined below.

4.10

Step	Procedure
Step 1	For every consignment of fuel supplied in a year, check that the volume of fuel recorded in the 'Quantity of fuel recorded in the RTFO Operating System' is identical to that recorded in ROS (you may be able to do this by preparing a 'Detailed Report' – see Section below).
Step 2	Select 'Year overview report' from the 'Reports' menu.
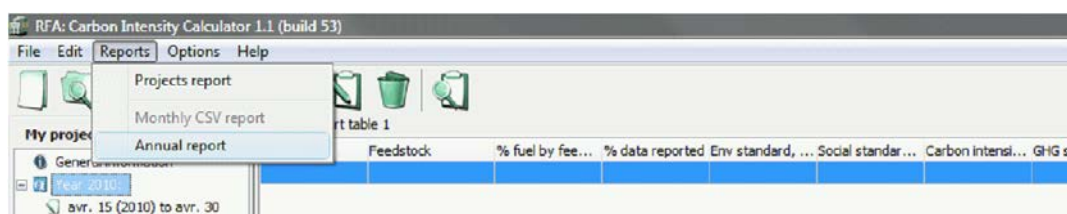
Figure 43 Location of 'Annual report' option in 'Reports' menu

Step	Procedure
Step 3	Select the year for which you would like to prepare a report.
Step 4	If you wish to add any information saved in a separate file click the 'Add' button and select the appropriate file (otherwise click the 'Next' button and go to Step 5).

Step	Procedure
	Check to make sure 'OK' appears in the valid column, next to the name of the file you just loaded (if not, then the file loaded does not have data for the correct year within it, and no data will be added to the report). Add any other files using the same process. When you have added all the files required, click the 'Next' button.
Step 5	The next screen shows you a preview of the data which will appear in the annual report. If you are happy with the data which appears in this screen, click the 'Next' button, otherwise go back and add or remove data as required.
Step 6	Choose the format in which to produce the annual report – Excel (which will allow you to edit the data) or PDF (which will allow you to save a version of the results in a format which cannot be edited) and click the appropriate button.
Generate an excel version of the results	
Step 7	You can now type a name for the file and specify a location for it.
Note	If you open the Year overview report file with Excel 2007, you may receive a warning message stating that the file '…is in a different format than specified by the extension.' This is because the file is exported as an XML spreadsheet, the first time you save the file in Excel you can choose to save it as a standard Excel spreadsheet.
Generate a PDF version of the results	
Step 7	A new screen will open previewing a version of the results as they will appear in the PDF file. If you are happy with the results, you can generate a PDF file by clicking on the Adobe symbol in the toolbar, highlighted below.

Figure 44 Location of 'Adobe' button in toolbar

Step 8	You will now be given the option to change various parameters for the PDF file. If you want to export a standard PDF file simply click 'OK'. You will then be given the option to name the file and specify a location for it.

Table 20 How to create a year overview report

Other reports

4.11 In addition to the Year Overview reports and the monthly reports required for Carbon and Sustainability reporting to the RTFO Administrator, the software can also be used to generate three other types of report. Unlike the monthly and Year Overview reports, these can be generated for any period of time (rather than the fixed RTFO reporting periods).

- Summary report – contains essentially the same data as the Year Overview report;

- Detailed report – contains all the same data included in a monthly csv report for every consignment of fuel in the specified time period (Note: the 'output quantity of fuel' included in this report is the same as the 'Quantity of fuel recorded in the RTFO Operating System ' and can be used to check whether the values recorded in the UK and Ireland Carbon Calculator are the same as those recorded in ROS);

- Data report – summary of all actual data used in the specified time period.

Step	Procedure
Step 1	Click 'Project reports' in the 'Reports' menu
Step 2	Unlike the other reports, you must specify a reporting period before you begin generating Project reports. Tick the box next to 'Specify a period' then select the first year and month you would like to include in the report, and then select the last year and month you would like to include in the report.
Step 3	If you wish to add any information that is saved in a separate file, click the 'Add' button and select the appropriate file (otherwise click the 'Next' button and go to Step 4). Check to make sure 'OK' appears in the valid column, next to the name of the file you just loaded (if not, then the file loaded does not have data for the correct year within it, and no data will be added to the report). Add any other files using the same process. When you have added all the files required, click the 'Next' button.
Step 4	Select which of the reports you would like to prepare (Note: all the reports you select will appear in one PDF document, so if you want separate documents of all three reports it is best to select only one type of report at a time), then press 'Print or export to PDF'
Step 5	If you only want to print the report, then use the print button on the far left of the toolbar in the new screen. If you want to generate a PDF file, click the Adobe symbol in the toolbar. **Figure 45 Location of 'Adobe' and 'print' buttons in toolbar**
Step 6	If you are generating a PDF file, you will now be given the option to change various parameters for this PDF file. If you just want to export a standard PDF file simply click 'OK', you will then be given the option to name the file and specify a location for it.

Table 21 How to generate a summary report, detailed report or data report

5. Updates to software and default values

5.1 The software will regularly check (via the internet) to see whether there are any updates of the program or to default values available. If updates are found, you will receive a message shortly after opening the software asking you whether you would like to download the latest version of the software or default values. You can also manually check to make sure you have the most up-to-date version.

5.2 Follow the steps below to manually check for updates.

5.3

Step	Procedure
Step 1	In the 'Help' menu, select either 'Check for default value updates' or 'Check for software updates'.
Step 2	If your network uses a proxy server to access the internet, you will need to complete the proxy parameters by clicking on the 'Proxy parameters' button. You may need to check this with your system administrator. Once this has been completed, click the 'Next' button.
Step 3	If there are any updates available for the software, a new screen will appear indicating which version it is, click 'Next' and follow the installation instructions.

Table 22 How to manually check for updates

6. Module descriptions

Units used in the UK and Ireland Carbon Calculator

6.1 Beside each quantitative information field in the UK and Ireland Carbon Calculator, the user can select the unit in which the data is provided. The most used units are units of mass (tonne, kilogramme, gram), energy (megajoule) and area (hectares).

6.2 For clarity, the product the units refer to are included in parenthesis. For example, agricultural yields are usually expressed in tonnes (feedstock)/ha, i.e. in tonnes of agricultural feedstock per hectare. The products most often referred to in the UK and Ireland Carbon Calculator are:

- Feedstock – this stands for agricultural feedstock;

- Output – this stands for the product coming out of the module;

- Input – this stands for the product coming in to the module;

- Biofuel – this stands for the final product of the chain;

- CO_2e – this stands for the greenhouse gas emissions expressed in CO_2 equivalents.

Fuel chain – Liquid or Gas

Figure 46 Fuel chain module icons, highlighting liquid and gaseous fuel chain modules

Basic data	
Module description	A brief description of the module.
	This field is optional.
Details and links to verification evidence	Any further details can be added here, including, for example links to any evidence which supports the actual data used within this module.
	This field is optional.
General information	
Internal reference n° (optional)	A reference number for your own reference can be entered here.
	This field is optional.

Administrative consignment n°	A reference number that is automatically generated in ROS. This field will be cleared in a 'pasted' module/chain.
Fuel type produced	The biofuel type of this consignment / fuel chain.
	This field is compulsory. This field can only be changed if no modules follow the Fuel chain – Liquid module.
Quantity of fuel	The quantity of biofuel in this consignment (measured in litres) – this is the quantity of fuel the software enters into the monthly csv report which can be uploaded to the ROS.
Final reported quantity of fuel	If you make any adjustments to fuel quantities recorded on ROS after uploading a monthly csv report, the new quantities can be recorded in this field (measured in litres).
	Year Overview reports can only be prepared if fuel quantities are recorded in this field.
Biofuel feedstock	The type of feedstock from which the biofuel was produced.
	This field is compulsory. This field can only be changed if no modules follow the Fuel chain – Liquid module.
Biofuel production process	The type of process used for the biofuel production.
	This field can be left as '-', but note that for some fuel chains it can affect the carbon number and hence the fuel chain loaded.
Fuel chain default value	This field shows the appropriate fuel chain default value, based on the data you supplied on fuel type, feedstock and process (where relevant).
Country of origin information	
Country	The country in which the feedstock was produced (NOT necessarily the country in which the biofuel was produced).
	This field is compulsory. 'Unknown' is only permitted where this information is unavailable AND the supplier can still demonstrate compliance with the GHG and land criteria e.g. by meeting a voluntary scheme.
Sustainability information	
Voluntary scheme (1,2,3)	The voluntary scheme(s) to which the reported feedstock was produced – see the Carbon and Sustainability Guidance for further details.
Land use on 01 Jan 2008	The land use, on 1st January 2008, for the land on which the biofuel feedstock was grown. Definitions of the previous land use are given in the Carbon and Sustainability Guidance.
Other information	
Plant was in operation	From Year 11 onwards this option can be selected if one of the biofuel production installations was in use on or before 5/10/2015, or after 5/10/2018. For preceding years this option can be selected if one of the biofuel production installations was in use after 01/01/2017, before 23/01/2008 or between 23/01/2008 and 31/12/2016. Note that grandfathering provisions no longer apply from Year 6 onwards (see the Carbon and Sustainability Guidance for more details).
Soil Carbon Accumulation	Note that "N/A" is only an acceptable input if the feedstock is a waste. Otherwise "yes" or "no" must be selected.
Type of GHG data	

Type of GHG data	This field should be completed where actual data has been supplied for:
	- the cultivation stage, or;
	- for the entire fuel chain.
	Actual fuel chain data is necessary to demonstrate compliance where a new feedstock has been used (i.e. there is no carbon default available in Annex V of the RED).
Results	
Fuel chain carbon intensity	The carbon intensity of the consignment / fuel chain, measured in kilograms of CO_2 equivalent released per tonne of biofuel produced.
Carbon intensity	The carbon intensity of the consignment / fuel chain, measured in grams of CO_2 equivalent released per megajoule (unit of energy) of biofuel produced. This is the value used in monthly csv reports.
GHG saving	The percentage saving the biofuel achieves relative to its fossil fuel equivalent.
Indicative RED-compliant flags *These fields are automatically calculated by the UK and Ireland Carbon Calculator and cannot be directly changed by the user.	
GHG*	Indicates whether the consignment of fuel would meet the RED requirements on GHG emissions. The flag can either be a red 'N'– indicating non-compliance with the requirements – or a green 'Y'– indicating compliance.
Biodiversity*	Indicates whether the consignment of fuel would meet the RED requirements on biodiversity. The flag can either be a red 'N' – indicating non-compliance with the requirements – or a green 'Y' – indicating compliance.
C-stock*	Indicates whether the consignment of fuel would meet the RED requirements on land carbon stocks. The flag can either be a red 'N' – indicating non-compliance with the requirements – or a green 'Y' – indicating compliance.
RED-compliant (indicative)*	Indicates whether the consignment of fuel meets meet all the RED sustainability requirements. The flag can either be a red 'N' – indicating non-compliance with at least one of the requirements – or a green 'Y' – indicating compliance.

Table 23 Module description - liquid or gas fuel chain

Crop production (cereal or sugar)

Figure 47 Fuel chain module icons, highlighting crop production modules

Basic data	
Module description	As described in Table 24.

Details and links to verification evidence	As described in Table 24.
Crop yield	The quantity of feedstock produced per unit area. The percentage moisture of crops can vary, and this will affect the yield achieved. The yield reported here should be on the basis of the industry standard moisture content for this crop. To see moisture content assumed in a default chain, hover the cursor over the yield input field and the moisture content is displayed in the yellow box at the bottom of the module.

Emissions from changes in land carbon stocks

[†] These fields are only available if the option 'Use the default methodology to calculate emissions from land use change' is selected, and may only be applicable for certain types of land use. Where applicable they are mandatory.

No change in land carbon stock	This option should be selected if the cultivation of biofuel did not lead to any change in land carbon stocks between the actual land use and land use on 1st January 2008.
Use actual data for land use change emissions	This option should be selected if the user wishes to report land use change emissions based on actual data or another methodology than the default calculation methodology included in the UK and Ireland Carbon Calculator. The actual emissions should be put in the white data field.
Use the default methodology to calculate emissions from land use change	This option should be selected if the user wishes to use the default methodology to calculate emissions from land use change.
Land use[†]	Land use on 1st January 2008 or actual land use.
Land management practice[†]	Land management practice on 1st January 2008 or actual land management practice.
Input to land[†]	Input to land on 1st January 2008 or actual input to land.
Climate region[†]	Climate type of the region where the land used to grow the biofuel feedstock is located.
Soil type[†]	Soil type of the land use to grow the biofuel feedstock.
Domain[†]	Climate domain of the region where the land used to grow the biofuel feedstock is located.
Land use type[†]	Further information on the land use type for the land use in January 2008 or for the actual land use.
Ecological zone[†]	Ecological zone where the land used to grow the biofuel feedstock is located.
Continent[†]	Continent on which the land used to grow the biofuel feedstock is located.
Carbon stock	Carbon stock of the land as used on 1st January 2008 and actual carbon stock. This field cannot be changed by users but is calculated based on the previous information.
Subtotal	Emissions from land use change in kilograms of CO_2 equivalent per tonne of feedstock.

Emissions from cultivation

Use NUTS2 cultivation emissions	This option should be selected if the users want to use the NUTS2 cultivation emissions as defined in European Member States' reports submitted and accepted by the European Commission.
NUTS2 crop yield	Yield of the feedstock for the NUTS2 region selected in the Fuel Chain Module. This field is only available if the option 'Use NUTS2 cultivation emissions' is selected.
NUTS2 cultivation impact	Emissions from feedstock cultivation in the NUTS2 region selected in the Fuel Chain Module. This field is only available if the option 'Use NUTS2 cultivation emissions' is selected.
Use regional average values	This option should be selected if the user wants to use a regional average cultivation emissions and crop yield.
Regional average crop yield	Average yield of the feedstock in the region where the cultivation takes place. This field is only available if the option 'Use regional average values' is selected.
Regional average cultivation impact	Emissions from feedstock cultivation in the region where the cultivation takes place. This field is only available if the option 'Use regional average values' is selected.
Use the RED cultivation GHG emission calculations	This option should be selected if the users want to use the calculation methodology defined in the RED and the default input data. This option should also be selected if users want to use actual input data to calculate the carbon intensity of the biofuel.
Rate of nitrous oxide emissions per hectare	The rate at which nitrous oxide (N_2O) emissions are produced from the soil on which the feedstock was grown. For most default fuel chains (except for chains whose default values were defined in the RED[11]), the N_2O emission rate was calculated using the IPCC Tier 1 methodology based on the nitrogen fertiliser application rate. For all chains, when the fertiliser input table is edited in the UK and Ireland Carbon Calculator, the N_2O emission rate is automatically recalculated based on the IPCC Tier 1 approach and the 'new' N fertiliser application rate. Most users will not enter their own values in this field. However, if an N_2O value has been calculated according to a method consistent with the rules set out in the IPCC Guidelines for National Greenhouse Gas Inventories, then it can be entered here.
Subtotal	Emissions of nitrous oxide in kilograms of CO_2 equivalent per tonne of feedstock.
Farming inputs	
Fertilisers	All information relating to the use of fertilisers during feedstock growth can be entered in this table.
Type	The type of fertiliser used.
Application rate	The rate at which the fertiliser was applied. Note: this is measured in the industry standard kilograms of 'nutrient' per hectare.

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[11] For the chains defined in the RED, the rate of N_2O emissions from agricultural soil is based on results from the DNDC model as published by the BioGrace project (www.biograce.net).

Emissions factor	The emissions which are produced during manufacture and transport of every kilogram of fertiliser (that is kg of nutrient, not of product).
	Most users will not need to manually change this field, as the software will automatically select the correct default emission factor based on the fertiliser 'Type' selected.
Nitrogen content	The nitrogen content of the fertiliser applied.
	Most users will not need to manually change this field, as the software will automatically select the correct value based on the fertiliser 'Type' selected.
	Nitrogen content is measured in units of kilograms of nitrogen per kilogram of the main nutrient. If nitrogen is the main nutrient, then the nitrogen content will be 1. If there is negligible nitrogen in the fertiliser, the nitrogen content will be 0.
Subtotal	Emissions due to fertiliser production and application in kilograms of CO_2 equivalent per tonne of feedstock.
Pesticide application rate	The quantity of all pesticides applied (measured in kilograms of active ingredient, not kilograms of product) per hectare.
Pesticide emissions factor	The emissions which occur during manufacture and transport of every kilogram of pesticide (that is kg of active ingredient, not of product).
	Most users are expected to rely on the default value.
Subtotal	Emissions due to pesticide production and application in kilogram of CO_2 equivalent per tonne of feedstock.
Other input	All information relating to products used during feedstock farming other than fertilisers, pesticides and fuel.
Type	Type of other input – e.g. seeding materials.
Use	The quantity of the other input used.
Emissions factor	The emissions resulting from the production and use of each unit of other input.
	Most users are expected to rely on default values that will be automatically selected by the software based on the 'Type' of other input chosen.
Subtotal	Emissions due to production and input of other materials in kilograms of CO_2 equivalent per tonne of feedstock.
On-farm fuel use	All information relating to the on-farm use of fuels such as diesel. Note: more than one type of fuel can be entered into this table.
Type	Type of fuel used – e.g. diesel for tractors or harvesters, electricity to power pumps for irrigation etc.
Use	The quantity of fuel used (Note: this is the quantity of fuel used in production of this crop, not total on-farm fuel use).
Emissions factor	The emissions resulting from the production and use of each unit of fuel.
	Almost all users will rely on the default value selected by the software.
Subtotal	Emissions due to fuel production and on-farm use in kilograms of CO_2 equivalent per tonne of feedstock.
Intermediate results	
Total for this module	The total GHG emissions of this module (measured in units of kilograms of CO_2e) per tonne of feedstock produced.
Contribution of this module to fuel chain	The total GHG emissions (measured in units of kilograms of CO_2e) produced from this stage of the fuel chain, per tonne of biofuel produced.

Percentage contribution to chain	The percentage contribution this module makes to the total GHG emissions of the fuel chain. This value may be greater than 100% because there may be a very large co-product credit in another step which reduces the total chain GHG emissions to less than the emissions from this step alone.
Total emissions up to this module	The total GHG emissions of this module and all the previous ones (measured in units of kilogram of CO_2e) per tonne of output of this module.

Table 24 Module description - crop production (cereal or sugar)

Drying and storage

Figure 48 Fuel chain module icons, highlighting drying and storage module

Basic data	
Module description	As described in Table 24.
Details and links to verification evidence	As described in Table 24.
Country in which this processing step takes place	The country in which this drying and/or storage occurs. This information is needed for the software to select the appropriate emissions factor for electricity (see below).
Amount of electricity used	The total quantity of electricity used during this drying and storage step.
Electricity emissions factor	The emissions resulting from the production and use of each unit of electricity. Most users are expected to rely on the default value based on information provided in the 'Country in which this processing step takes place' field. However, please be aware that not all countries available have an associated emission factor. If the country you want to use does not have a national electricity emission factor, you will need to use a higher regional level emission factor (e.g. use one of the European level electricity emission factors if your process takes place in Greece). If no regional emission factor is available, then you will need to find an appropriate emission factor. Please see the RTFO Carbon and Sustainability Guidance for more information on appropriate emission factors.
Subtotal	Emissions due to electricity production and consumption in kilograms of CO_2 equivalent per tonne of crop.
Fuel information	
Type	Type of fuel used – e.g. diesel used in burners to provide heat for drying etc.
Use	The quantity of fuel used during this drying and storage step.
Emissions factor	The emissions resulting from the production and use of each unit of fuel. Most users are expected to rely on the default value based on information provided in the 'Type' field.

Subtotal	Emissions due to fuel production and consumption in kilograms of CO_2 equivalent per tonne of crop.
Intermediate results	
Fields as described under 'Intermediate results' in Table 25	

Table 25 Module description - Drying and storage

Feedstock transport

Figure 49 Fuel chain module icons, highlighting feedstock transport module

Basic data	
Module description	As described in Table 24.
Details and links to verification evidence	As described in Table 24.
Country	The country in which this transport step begins. This is an optional field.
Transport mode[12]	The mode of transport used – e.g. truck, rail etc.
Distance transported	The distance over which the product is transported by the selected mode.
Energy intensity of transport	The energy intensity of this transport mode. Most users will rely on the software to select the appropriate default value on the basis of the mode of transport selected.
Module efficiency	Efficiency of the transport step in tonnes of output feedstock per tonne of input feedstock – this is especially to account for grain losses during transport.
Fuel information	
Type	Type of fuel used. If several fuels are entered, it will be necessary to know how much of each fuel is used (see next field).
Use	The quantity of fuel used during this transport step – this value is automatically calculated based on the transport mode and distance specified. If more than one fuel is used you can specify how much of each fuel type is used in this field.
Emissions factor	The emissions resulting from the production and use of each unit of fuel. Most users are expected to rely on the default value based on information provided in the 'Type' field.
Subtotal	Emissions due to fuel production and consumption in kilograms of CO_2 equivalent per tonne of output from this module.
Intermediate results	

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[12] Three different shipping modes are now available in the Carbon Calculator:
- Inland bulk carrier refers to a 8,800 t dry product carrier for coastal navigation or inland waterways. Marine gasoil should be used as fuel, but its emissions have been approximated to those of diesel;
- Product tanker refers to long-distance sea transport for liquid products with a payload of 50,000 t;
- International shipping: general value for shipping if no further details are known.

Fields as described under 'Intermediate results' in Table 25.

Table 26 Module description - feedstock transport

Liquid fuel transport

Figure 50 Fuel chain module icons, highlighting liquid fuel transport module

Basic data	
Module description	As described in Table 24.
Details and links to verification evidence	As described in Table 24.
Country	The country in which the transport step begins. This field is optional.
Transport mode	The mode of transport used – e.g. truck, rail etc.
Distance transported	The distance over which the product is transported (by this mode).
Energy intensity of transport	The energy intensity of this transport mode. Most users will rely on the software to select the appropriate default value on the basis of the mode of transport selected.
Module efficiency	Efficiency of the transport step in tonnes of output liquid per tonne of input liquid – this is especially to account for losses during transport.
Fuel information	
Fields as described under 'Fuel information in Table 27.	
Intermediate results	
Fields as described under 'Intermediate results' in Table 25	

Table 27 Module description - liquid fuel transport

Gas fuel transport

Figure 51 Fuel chain module icons, highlighting gas fuel transport module

Basic data	
Module description	As described in Table 24.
Details and links to verification evidence	As described in Table 24.
Country	The country in which the transport step begins. This field is optional.

Transport mode	The mode of transport used – e.g. truck, rail etc.
Distance transported	The distance over which the product is transported (by this mode).
Energy intensity of transport	The energy intensity of this transport mode. Most users will rely on the software to select the appropriate default value on the basis of the mode of transport selected.
Module efficiency	Efficiency of the transport step in tonnes of output gas per tonne of input gas – this is especially to account for losses during transport.
Fuel information	
Fields as described under 'Fuel information' in Table 27.	
Intermediate results	
Fields as described under 'Intermediate results' in Table 25.	

Table 28 Module description - gas fuel transport

Biofuel plant or oilseed crush / mill

Figure 52 Fuel chain module icons, highlighting biofuel plant or oilseed crush / mill module

Basic data	
Module description	As described in Table 24.
Details and links to verification evidence	As described in Table 24.
Country in which this processing step takes place	The country in which this plant is located. This information is needed by the software to select the appropriate emissions factor for electricity (see below).
Product	Product produced by this module – e.g. Biodiesel ME, palm olein etc.
Plant yield	Quantity of output per quantity of input (measured in units of mass such as tonnes or kilograms), e.g. tonnes biodiesel ME per tonne soya oil.
Plant inputs	
Amount of electricity used	The total quantity of electricity used (per tonne of output) during this conversion step.
Electricity emissions factor	As described in Table 26.
Subtotal	Emissions from the production and consumption of electricity in kilograms of CO_2 equivalent per tonne of output from this module.
Fuel used per tonne of output	
Type	Type of fuel used – e.g. natural gas burnt in a boiler to provide process heat etc.
Use	The quantity of fuel used during this conversion step, per tonne of output.
Emissions factor	The emissions resulting from the production and use of each unit of fuel.

	Most users are expected to rely on the default value based on information provided in the 'Type' field.
Subtotal	Emissions from the production and consumption of fuel in kilograms of CO_2 equivalent per tonne of output from this module.

Chemicals

Type	Type of chemical used – e.g. methanol used to catalyse a trans-esterification reaction in a biodiesel plant etc.
Use	The quantity of chemical used during this conversion step, per tonne of output.
Emissions factor	The emissions resulting from the production and use of each unit of chemical.
	Most users are expected to rely on the default value based on information provided in the 'Type' field.[13]
Subtotal	Emissions from the production and consumption of chemicals in kilograms of CO_2 equivalent per tonne of output from this module.

Co-products

Name	The name of the co-product produced by this conversion process.
Use	The market in which the co-product is used – e.g. for animal feed, for fertiliser etc.
Description	If the 'Name' and/or 'Use' of a particular co-product are not specified in the software, they can be recorded in the description field.
	Note: the Carbon and Sustainability Guidance is prescriptive in its approach to co-products, please check the guidance to ensure you follow the appropriate procedures.
Yield	Quantity of co-product produced per tonne of output from this conversion module.
Co-product credit	The credit attributed to this use of the selected co-product. Note: if the 'Co-product credit' is a value other than zero, then the 'Energy Content' (see below) **must** be zero.
	See the Carbon and Sustainability Guidance to establish the procedures to follow for a new co-product or a new use for an existing co-product.
Energy Content	The energy content of this co-product. The energy content specified in the Excel default carbon intensity data **must** be used.
	Note: if the 'Co-product credit' is zero, then the 'Energy Content' must be a value other than zero.
	See the Carbon and Sustainability Guidance to establish the procedures to follow for a new co-product or a new use for an existing co-product.
Credit or debit for co-products	This value shows the total impact of the co-products. If the value is negative, then the co-products have the effect of reducing the overall carbon intensity of the fuel chain. If the value is positive, then the co-products have increased the carbon intensity of the fuel chain.
Share of emissions allocated to the output product	The value shows the allocation factor for the main output products. If the value is 1 it means that 100% of all GHG emissions up to this point in the chain are allocated to the biofuel. If it is less than 1 it means that only a portion of the emissions are allocated to the biofuel.

Carbon Capture & Replacement / Storage

Carbon Capture & Replacement	This field accounts for any avoided greenhouse gas emissions through carbon capture & replacement where applicable. Units are $kgCO_2e/tonne(output)$.

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[13] The default emissions factor for fossil methanol that is included in the calculator includes both production and combustion emissions. This emissions factor is applicable to all fossil methanol used as a chemical input, including methanol used in the production of FAME.

Carbon Capture & Storage	This field accounts for any avoided greenhouse gas emissions through carbon capture & storage where applicable. Units are kgCO$_2$e/tonne(output).
Conservative factor	
All data reported in this module are actual data	This option should be selected if all the data reported in the module are actual data. If it is selected, the conservative factor (factor by which the 'Total for this module' will be multiplied before the contribution of the module to the entire fuel chain is calculated) will be removed.
Intermediate results	
Fields as described under 'Intermediate results' in Table 25.	

Table 29 Module description - biofuel plant or oilseed crush / mill

Gaseous biofuel plant

Figure 53 Fuel chain module icons, highlighting gaseous biofuel plant module

Basic data	
Module description	As described in Table 24.
Details and links to verification evidence	As described in Table 24.
Country in which this processing step takes place	The country in which this plant is located. This information is needed by the software to select the appropriate emissions factor for electricity (see below).
Plant yield	Quantity of output (measured in MJ) per quantity of input (measured in tonnes).
Plant inputs	
Amount of electricity used	The total quantity of electricity used during this conversion step, per MJ of output from this module.
Electricity emissions factor	As described in Table 26.
Subtotal	Emission from the production and consumption of electricity in kilograms of CO$_2$ equivalent per tonne of output of this module.
Fuel used per MJ of output	
Type	Type of fuel used – e.g. natural gas burnt in a boiler to provide process heat etc.
Use	The quantity of fuel used during this conversion step, per MJ of output from this module.
Emissions factor	The emissions resulting from the production and use of each unit of fuel. Most users are expected to rely on the default value based on information provided in the 'Type' field.
Subtotal	Emissions from the production and consumption of fuel in kilograms of CO$_2$ equivalent per tonne of output from this module.

Chemicals

Type	Type of chemical used during gaseous biofuel production.
Use	The quantity of chemical used during this conversion step, per MJ of output from this module
Emissions factor	The emissions resulting from the production and use of each unit of chemical. Almost all users will rely on the default value selected by the software.
Subtotal	Emissions from the production and consumption of chemicals in kilograms of CO_2 equivalent per tonne of output from this module.

Co-products

Name	The name of the co-product produced by this conversion process.
Use	The market in which the co-product is used – e.g. for animal feed, fertiliser etc.
Description	If the 'Name' and/or 'Use' of a particular co-product are not specified in the software, they can be recorded in the description field.
	Note: the Carbon and Sustainability Guidance is prescriptive in its approach to co-products, please check the Guidance to ensure you follow the appropriate procedures.
Yield	Quantity of co-product produced per MJ of output from this conversion module.
Co-product credit	The credit attributed to this use of the selected co-product.
	Note: if the 'Co-product credit' is a value other than zero, then the 'Energy Content' (see below) **must** be zero.
	See the Carbon and Sustainability Guidance to establish the procedures to follow for a new co-product or a new use for an existing co-product.
Energy Content	The energy content of the co-product. The energy contents specified in the Excel default carbon intensity data **must** be used.
	Note: if the 'Co-product credit' is zero, then the 'Energy Content' must be a value other than zero.
	See the Carbon and Sustainability Guidance to establish the procedures to follow for a new co-product or a new use for an existing co-product.
Credit or debit for co-products	This value shows the total impact of the co-products. If the value is negative, then the co-products have the effect of reducing the overall carbon intensity of the fuel chain. If the value is positive, then the co-products will increase the carbon intensity of the fuel chain.
Share of emissions allocated to the output product	The value shows the allocation factor for the main output products. If the value is 1 it means that 100% of all GHG emissions up to this point in the chain are allocated to the biofuel. If it is less than 1 it means that only a portion of the emissions are allocated to the biofuel.

Carbon Capture & Replacement / Storage

Carbon Capture & Replacement	This field accounts for any avoided greenhouse gas emissions through carbon capture & replacement where applicable. Units are kgCO₂e/tonne(output).
Carbon Capture & Storage	This field accounts for any avoided greenhouse gas emissions through carbon capture & storage where applicable. Units are kgCO₂e/tonne(output).

Other

Methane losses	The quantity of methane which is lost (to the atmosphere) during this conversion process.

Conservative factor

All data reported in this module are actual data	This option should be selected if all the data reported in the module are actual data.
	If it is selected, the conservative factor (factor by which the 'Total for this module' will be multiplied before the contribution of the module to the entire fuel chain is calculated) will be removed.

Intermediate results

Fields as described under 'Intermediate results' in Table 25.

Table 30 Module description - gaseous biofuel plant

Biofuel blending depot

Figure 54 Fuel chain module icons, highlighting biofuel blending depot module

Basic data

Module description	As described in Table 24.
Details and links to verification evidence	As described in Table 24.
Country in which this processing step takes place	The country in which this plant is located. This information is needed by the software to select the appropriate emissions factor for electricity (see below).
Amount of electricity used	The total quantity of electricity used during this step, per tonne of output from this module.
Electricity emissions factor	As described in Table 26.

Fuel used per tonne of output

Type	Type of fuel used – e.g. natural gas burnt in a boiler to provide process heat etc.
Use	The quantity of fuel used during this step, per tonne of output.
Emissions factor	The emissions resulting from the production and use of each unit of fuel.
	Most users are expected to rely on the default value based on information provided in the 'Type' field.
Subtotal	Emissions from the production and consumption of fuel in kilograms of CO_2 equivalent per tonne of output from this module.

Intermediate results

Fields as described under 'Intermediate results' in Table 25.

Table 31 Module description - biofuel blending depot

Fuel filling station

Figure 55 Fuel chain module icons, highlighting fuel filling station module

Basic data
Fields as described under 'Basic data' in Table 32

Fuel used per tonne of output
Fields as described under 'Fuel used per tonne of output' in Table 32

Intermediate results
Fields as described under 'Intermediate results' in Table 25.

Table 32 **Module description - fuel filling station**

Annex 1: Change log

Date	Section	Change
May 2020	Executive summary	Noted that Calculator can also be used with GOS
May 2020	1.14	Noted addition of default values for new fuels
May 2020	Throughout	Added note that the calculator can also be used for the Motor Fuel GHG Emissions Reporting requirement
May 2020	2.8	Clarified 'gaseous' biomethane
May 2020	2.18	Edited to reflect addition of new fuel types
May 2020	2.19	Simplified examples of gaseous and liquid fuels provided
May 2020	Throughout	RTFO Year 11 changed to 2020
May 2020	Table 9	Updated to reflect that now a biofuel plant or oilseed crush / mill can be connected to a gaseous biofuel plant.
May 2020	Throughout	Added Caption Table 33 and added all figure captions

Table 33 Change log