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Renewables Obligation (RO)

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How to complete your advanced conversion technology (ACT) Fuel Measurement and Sampling questionnaire

Introduction

Submitting a fuel measurement and sampling (FMS) questionnaire and getting it approved forms part of the Renewables Obligation (RO) accreditation process for fuelled generating stations. In your questionnaire, you need to explain the procedures used to measure and sample the fuels used to generate your station's gross output. We can't accredit your station unless these FMS procedures are approved.

We can only issue Renewables Obligation Certificates (ROCs) for electricity generated by renewable sources. Your FMS procedures will produce data that will let us work out how much of the fuel used to generate electricity comes from renewables. They will also let you meet sustainability reporting requirements for biomass fuels.

The following guidance will help you better understand the scheme requirements:

- Renewables Obligation: Fuel Measurement and Sampling
- Renewables Obligation: Sustainability Criteria
- Renewables Obligation: Sustainability Reporting
- Renewables Obligation: Guidance for Generators

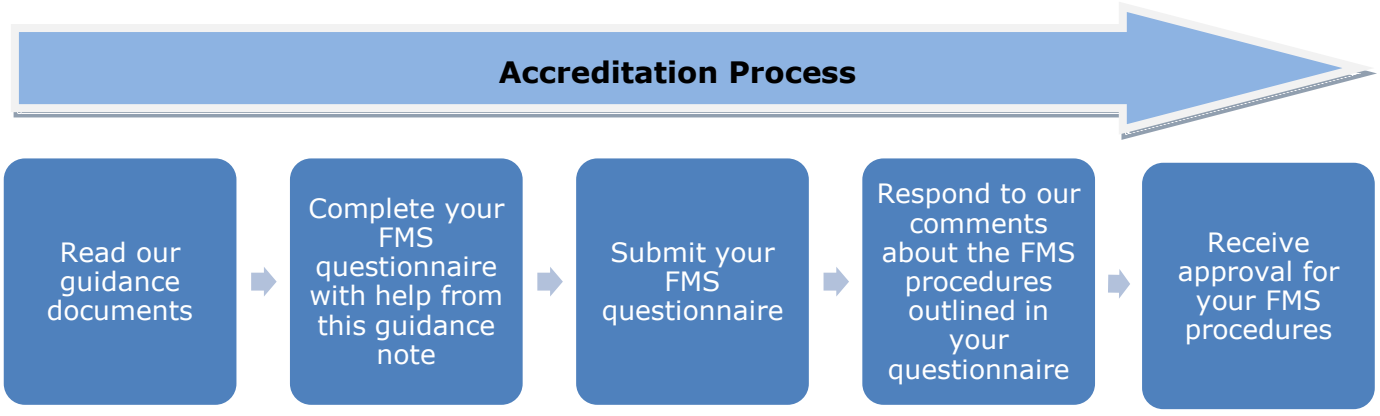
If you have any questions while you're completing your FMS questionnaire, please get in touch on **0207 901 7310** and ask for a member of the Fuelling and Sustainability team.

How will this guidance note help me complete my FMS questionnaire?

Some parts of the questionnaire are simple, but others will need some more consideration. This guidance note tells you what information we need so we can determine whether your procedures meet the scheme requirements.

By reading this note whilst you complete your FMS questionnaire, your submission will be more thorough. This will help reduce the time you spend on the accreditation process.

If you are still considering options for measuring and sampling your fuels, there is further information about this in **appendices 6-10** of the FMS Guidance.



Completing and submitting the questionnaire

When completing the questionnaire, make sure you explain how you will undertake your procedures thoroughly. The larger the response text box, the more detailed we expect your answer to be. There is extra space for your answers in **Section I** if you need it. You can also submit additional documents, as long as you refer to them clearly in the questionnaire.

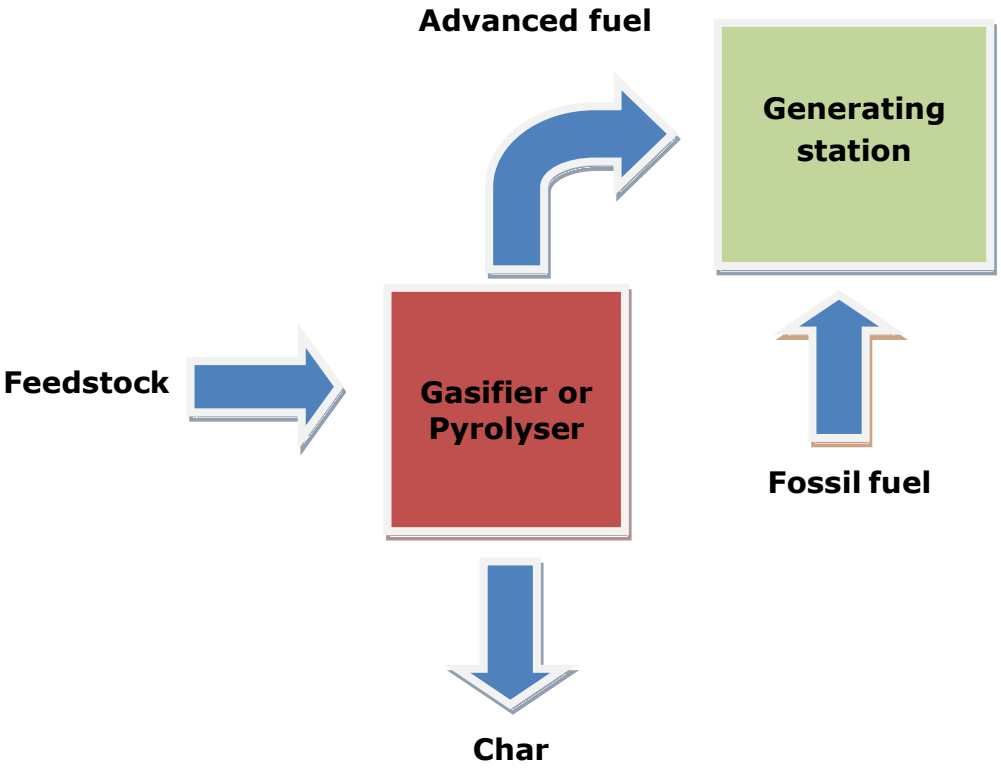
Compulsory questions are marked with a ⚑ symbol. Other questions are only relevant to some generating stations. If a question is not relevant, answer N/A.

You should submit your FMS questionnaire and any supporting information with your application on the Register, and also send it to fuellingandsustainability@ofgem.gov.uk. We will get back to you with initial comments about your procedures when we have reviewed your questionnaire.

From this point forward, you can submit updated versions directly to the member of the Fuelling and Sustainability team dealing with your FMS procedures by email. Although the FMS and accreditation reviews run in parallel, these tend to be dealt with by different members of the team.

Fuelling information needed for ACT stations

The diagram below shows the various inputs and outputs associated with the advanced conversion process.



To determine your station's RO eligible renewable output, we need to know the **quantity** and **Gross Calorific Value (GCV)** of the **advanced fuels** and any **fossil fuel**, used to generate its gross output. We do not need information on any fossil fuel used to gasify/pyrolyse the feedstock to produce the advanced fuel.

We also need to determine the fossil-derived energy content of any contaminated advanced fuels. To do this we will need to know the **quantity, GCV** and **fossil-derived contamination** in your **feedstock**, and the **quantity** and **GCV** of **char** left over after gasification/pyrolysis.

We show you how we use this information to calculate the contamination of the advanced fuel in table 4 of the FMS guidance

Which sections of the questionnaire should I complete?

Depending on the size of station and the type of fuel used, you may only need to complete certain sections in accordance with table 1 below. Please note that this table only applies to gaseous advanced fuels. If you use a liquid advanced fuel, then get in touch with us for further advice.

	FMS questionnaire section									
Station size and fuel type	A	B	C	D	E	F	G	H	I	J
All station sizes with contaminated feedstock that does not meet the definition of biomass	✓	✓	×	×	✓	✓	✓	✓	✓	✓
TIC[1] of ≥1MW stations using contaminated or uncontaminated feedstock that meets the definition of biomass	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
DNC[2] of >50kW and a TIC of <1MW using contaminated or uncontaminated feedstock	✓	✓	×	×	✓	✓	✓	✓	✓	✓
DNC of ≤50kW using contaminated or uncontaminated feedstock	✓	✓	×	×	✓	✓	✓	✓	✓	✓

Table 1 – which sections of the questionnaire should I complete?

[1] Total installed capacity
[2] Declared net capacity

How to complete your ACT FMS questionnaire

The questions in **Sections A** (Applicant Information), **B** (Version History) and **C** (Fuel Classification) are self-explanatory. Information on completing the questionnaire from **Section D** onwards is below:

Section D – Consignment assessment and tracking sustainability information

What does the section do?

The RO Orders require operators of generating stations to report against the sustainability criteria of liquid and gaseous advanced fuels that meet the definition of biomass on a consignment basis. A consignment is a term used in the legislation, which we explain in Chapter 6 of our Sustainability Criteria Guidance. To ensure you report on a consignment basis, **Section D** asks you to:

- Assess the consignments of feedstock that make up your advanced fuel
- Determine whether you are using single or multiple consignments
- Determine whether consignments are mixed

If consignments mix, either offsite or onsite, you will need to work out how much of each consignment is used.

For more information on how to do this, see Chapter 6 of our Sustainability Criteria Guidance.

Tips for completing the section

If you're not yet familiar with what a consignment of biomass is, then Chapter 6 of our Sustainability Criteria Guidance will help you to understand. We need you to group the feedstock that make up your advanced fuel into consignments, by looking at their sustainability characteristics. For gasification or pyrolysis stations, sustainability characteristics are passed from the feedstock to the advanced fuel.

This can be a tricky area and it's important to get right as it forms the basis for your FMS procedures. If you need any help with this whilst you're completing your FMS questionnaire, then please get in touch on **0207 901 7310** and ask for a member of the Fuelling and Sustainability team.

When putting together your answers for **Section D**, please keep in mind these other top tips for certain questions:

D2 – To avoid confusion, make sure you clearly show how any feedstock specified in **Section A** are grouped into consignments, eg waste pallets and demolition timber = waste wood consignment.

D10 - When explaining how you will use a mass-balance system, ensure you have covered the following for each mixed feedstock consignment:

- Where in the supply chain and/or generating station the method will be used
    - For consignments that are mixed in the supply chain, explain what information the supplier can provide to show the proportion of consignments in the mixture, and indicate how this will be presented in the supporting documents (eg spreadsheet or supplier declaration on consignment proportions).
    - For consignments mixed at the generating station, explain where exactly the mixing occurs eg storage silos, feed hoppers etc.
- Which consignments the mass balance will apply to
    - The explanation should only cover the mixed consignments, and does not need to cover consignments that are physically separate and measured just prior to advanced conversion.
- How you will use the system to determine the quantity of each consignment used in the month of claim
    - Clearly explain how a proportionate or non-proportionate system is applied to the data produced by your quantity procedures outlined in **Section HA**. It is useful if you state any calculations you intend to use, including the key input values eg (opening stock X percentage consignment A), plus deliveries of consignment A, minus (closing stock X percentage consignment A).
    - Ensure that your answer builds on, rather than duplicates, the information you will provide about the quantity of feedstock consignments used in **Section HA**.
    - Your supporting information spreadsheet should clearly show the formulae that are used as part of the mass balance system and indicate how input values have been measured.

Section E – Fossil fuel use

What does the section do?

To determine your station's RO eligible renewable output, we need to know the quantity and GCV of fossil fuel used each month. The section asks about the procedures that you will use to measure the quantity and sample the GCV of fossil fuel used to generate electricity.

Tips for completing the section

When answering **Section E**, you do not need to provide any information about the fossil fuel used to gasify/pyrolyse the feedstock, only the fossil fuel used in the generating station.

When putting together your answers for **Section E**, please keep in mind these other top tips for certain questions:

E5 - If you need to explain how you will determine the quantity of fossil fuel used to generate electricity in a month, ensure you have covered the following:

- The equipment you use to measure the fossil fuel, including its accuracy (+/-%).
- How you distinguish between fossil fuel that does/does not generate electricity
- If applicable, how you account for any carryover from one month to the next.
- How you ensure that any fossil fuels used are referenced back to the same temperature and pressure conditions as the advanced fuel.

E6 - If you need to explain how you will determine the GCV of fossil fuel used to generate electricity in a month, ensure you have covered the following:

- An explanation of the sampling regime or information used (eg supplier invoices) to determine the GCV.
- If there is any carryover in a month, an explanation of how you will account for the energy content of this carryover as part of determining the GCV of the fossil fuel used in the month in question. For example, will you use a weighted or arithmetic average, re-sample the fuel, or simply assume that the GCV of deliveries in a month equates to the fuel's GCV?
- If you get multiple sample results from your sampling regime or supplier, an explanation of how you will determine a single value for the fuel's GCV.

Section F – Volume of advanced fuel used

What does the section do?

To determine your station's RO eligible renewable output, we need to know the quantity of advanced fuel used each month. The section asks about the procedures that you will use to measure the quantity of advanced fuel used to generate electricity.

Tips for completing the section

When putting together your answers for **Section F**, please keep in mind that:

- You should refer to the equipment used to determine the volume of advanced fuel, its accuracy (+/- %), and location
- If you are back-calculating the volume of your advanced fuel then lay out the calculation you use, and clearly specify any key input values eg engine efficiency, kWh output, the advanced fuel's GCV, feedstock and char energy content etc.

Section G – Determining the GCV of the advanced fuel

What does the section do?

To determine your station's RO eligible renewable output, we need to know the GCV of the advanced fuel used each month. The GCV of the advanced fuel also affects the banding at which ROCs are awarded. The section asks about the procedures that you will use to sample the GCV of advanced fuel used to generate electricity.

Tips for completing the section

When putting together your answers for **Section G**, please keep in mind that:

- We consider the most accurate method of obtaining an accurate GCV for a gaseous advanced fuel is to use an inline analyser and to sample at regular intervals. An alternative method is to use bag samples supported with a back-calculation.
- You should refer to the equipment used to determine the GCV of the advanced fuel and its accuracy
- If you are back-calculating the GCV of your advanced fuel then lay out the calculation you use, and clearly specify any key input values eg engine efficiency, kWh output, volume of advanced fuel etc.
- You should clearly explain how you will normalise the advanced fuel back to 25°C and 0.1 MPa.

- You should submit a schematic diagram showing the location of the analyser at the inlet to the generating station.

Section H – Determining the qualifying percentage of the advanced fuel

What does the section do?

To determine your station's RO eligible renewable output, we need to know the fossil-derived energy content of any contaminated advanced fuel used each month. The section asks about the procedures that you will use to determine fossil-derived contamination in the advanced fuel used to generate electricity.

We infer the contamination of the advanced fuel from the feedstock and char, because of the difficulties of directly sampling for contamination in the gasifier/pyrolyser. The char remaining at the end of the process does not contribute to the energy content of the advanced fuel, and so needs to be accounted for when we determine its contamination. When we calculate the contamination using the method outlined in table 4 of the FMS guidance, we conservatively assume the char is 100% biomass.

Section H allows you to set out procedures to determine the contamination of the feedstock used in a month, which is one of the input values for the overall contamination calculation.

Tips for completing the section

When putting together your answers for **Section H**, please keep in mind that:

- The answers to this section should provide a complete explanation of how you determine the fossil-derived energy content of any contaminated feedstock used in a month.
- It is critical that you ensure the wording of your answer allows us to understand which feedstock are being sampled, at which locations, and whether any single contamination result is for individual feedstock or a mixture.
- If your contamination result is for a mixture of feedstock, but you know that only one of the feedstock in the mixture is actually contaminated, you should seek to back-calculate the contamination of that specific feedstock. This will allow you to report accurate contamination percentage figures against the contaminated and uncontaminated advanced fuels.
- If you carry over feedstock from one month to the next, you should outline how you take this into account to determine a single contamination percentage for feedstock gasified/pyrolysed in the month in question. This could include, performing a weighted

average calculation, which accounts for both the contamination of the opening stock and deliveries.

HA – Determining the quantity of feedstock used to produce the advanced fuel

What does the section do?

The quantity of feedstock used in a month is one of the input values for the contamination calculation outlined in table 4 of the FMS Guidance. The section asks about the procedures that you will use to measure the quantity of feedstock used to produce the advanced fuel.

Tips for completing the section

When putting together your answers for **Section HA**, please keep in mind that:

- The answers to this section should provide a complete explanation of how you determine the quantity of each feedstock used in a month. This should clearly distinguish if some feedstock are measured differently to others.
- It is critical that you ensure the wording of your answer allows us to understand which feedstock are being measured, by what pieces of equipment, and whether they are measured before or after mixing. If you are using a mass-balance system, this allows us to understand how you have derived its key input values.
- Even if you are measuring the quantity of feedstock just before gasification/pyrolysis with a cumulative measuring device, such as a beltweigher , then you may still need to consider carryover onsite if this information is needed as part of your mass balance system.

HB – Determining the GCV of the feedstock used to produce the advanced fuel

What does the section do?

The GCV of feedstock used in a month is one of the input values for the contamination calculation outlined in table 4 of the FMS Guidance. The section asks about the procedures that you will use to sample the GCV of feedstock used to produce the advanced fuel.

Tips for completing the section

If you use the sampling regime outlined in **Section H** to produce samples for GCV analysis, then please make a simple statement to this effect in the answer spaces, pulling out any differences where necessary.

However, if you are using a separate sampling regime then answer the questions thoroughly.

HC – Determining the quantity and GCV of char produced

What does the section do?

The quantity and GCV of char produced in a month are two of the input values for the contamination calculation outlined in table 4 of the FMS Guidance. The section asks about the procedures that you will use to measure and sample the quantity and GCV of char produced during the gasification/pyrolysis process.

Tips for completing the section

When putting together your answers for **Section HC**, please keep in mind that:

- The answers to this section should provide a complete explanation of how you determine the quantity and GCV of the char used in a month. This should make reference to the location where measurement and sampling takes place, the accuracy of equipment used and the names of any tests conducted.
- Although your process may produce little char, we have set a precedent for using a certain method to determine contamination that we apply consistently across all ACT stations applying for the scheme. If you build up a data set that shows the energy content of char is, negligible we will consider whether it is necessary for you to continue with this aspect of your FMS procedures. We will review these proposals on a case-by-case basis.
- As part of the contamination calculation, we assume that the energy content of char is 100% biomass. If you are able to directly test the char to show its actual contamination percentage, then please feel free to propose this as part of your procedures.

HD – Calculating the contamination percentage of the advanced fuel

What does the section do?

The results obtained from the procedures in **Section H** are used to calculate the contamination percentage which are reported against the advanced fuel on the Register each month. The section confirms that you are going to use our approach to calculating contamination.

Additional documentation

- **Confirmation of 100% uncontaminated biomass –** If a station uses a feedstock that is free from fossil-derived contamination, you must confirm in writing that the fuel is 100% biomass. Please see Appendix 2 of the FMS Guidance for an example of how to provide this evidence.
- **Confirmation of renewable waste –** If a station uses a feedstock that meets the definition of Municipal Waste (MW), you must write us a letter confirming that the feedstock meets this definition (as set out in our FMS Guidance). This assures us that appropriate exemptions to reporting against the sustainability criteria are supported by evidence, and that we can issue the correct type of ROC.

Supporting information

Supporting information submitted alongside your FMS questionnaire helps us get a better understanding of your station's FMS procedures. You should include these documents as part of your initial submission. Some examples of supporting documentation relevant to your FMS procedures are:

- A process flow diagram outlining the proposed FMS procedures, paying particular attention to key measurement and sampling locations
- Technical specifications for equipment, eg gas analyser, weighing device specifications
- Procedure/instruction sheet to illustrate how measurement/sampling is done
- A diagram showing the location where the advanced fuel is measured at the inlet to the generating station

During the FMS review process we also agree whether you should submit supporting information each month to help verify the data submitted on the Register. You should put together an example of the supporting information you will submit as part of the initial submission of your FMS procedures. Some examples of this include:

- Laboratory certificates showing the test results from GCV and/or contamination analysis
- Spreadsheets showing any calculations performed to determine the quantity, GCV and contamination of the feedstock, advanced fuel and any fossil fuel that leads to generation. This should include any calculations undertaken as part of the mass balance system. If you use a contaminated feedstock and need to undertake the contamination calculation, we will provide you with a template spreadsheet that contaims the formulae set up for you to enter data into.

Checklist

Incomplete or contradictory information in the FMS questionnaire and supporting information can delay the review process. Use the following checklist to ensure the review will proceed smoothly:

Before submitting FMS procedures for review, check that you:

- Read the relevant sections of our RO guidance documents ☐
- Decide who will represent the generating station and complete the FMS documents during the review process. Set this individual up as a named user on the Register account ☐
- Read and complete the FMS questionnaire using this guidance document to ensure you have set out the relevant information as thoroughly as possible ☐
- Get in touch with us to discuss any questions ☐

During the review process:

- Ensure all FMS documentation is submitted for review alongside an application for accreditation ☐
- Ensure all comments raised during our review are fully addressed, and the FMS documentation updated accordingly before each re-submission ☐

After FMS approval:

- Read your FMS approval e-mail ☐
- Set-up the relevant fuel(s) on the Register for use in data submissions ☐
- Carry out FMS procedures as per agreement with Ofgem ☐