techUK

**Climate Change Agreement for Data Centres**
**EUETS for Data Centre participants**

# Note 04d: Measuring fuel to your generators

## UPDATED MARCH 2016

## Introduction

*Data Centres use standby generators to provide emergency power in the event of mains grid failure. Generators tend to be test fired on average once a month (for around an hour). Consequently fuel use is low: on-site generated electricity averages 0.14% of total energy use in data centres. However, generator fuel consumption has to be reported by CCA participants and some sites also have to report under EU ETS if the generating capacity is large enough (see our separate guidance).*

*Measuring very small volumes of fuel has proved problematic and time consuming. (Consider filling the bath, letting out a tiny amount of water and then working out how much is left). Meters are not the obvious solution.*

*We held a workshop on 29th January 2016 with the ETS and CCA regulators, with the CCA technical helpdesk, data centre operators and energy consultants to define an approach that would be robust and compliant but not too burdensome. At this workshop it was agreed that, in view of the small volumes concerned, fuel use by standby generators for data centres does not have to be measured: For CCA it can be estimated or calculated provided that the approach is consistent and traceable. For ETS it can also be estimated or calculated depending on the emissions threshold.*

*The following approach for accounting for fuel use by generators has been approved by the Regulator for both CCA and ETS. Once fuel use has been established, however, the reporting procedures diverge because CCA reporting is in KWh and ETS reporting is in tonnes $CO_2$. These are explained below for good measure.*

*A document set from the workshop is available. It includes the agenda, previous approaches, CCA regulator recommendations, meeting notes and points of agreement. A ready reckoner spreadsheet is also available to assist you in your calculations.*

## Basic principles

1. **CCA participants and ETS participants emitting below 1000 tonnes $CO_2$ per annum are not obliged to measure fuel consumption. They can use estimates and calculations based on generator run times, load and capacity.**

2. **ETS participants emitting between 1000 tonnes and 25,000 tonnes $CO_2$ per annum need to add further evidence from fuel invoices.**

3. **Information needs to be logged and auditable. Operators need to explain why they have applied a particular methodology.**

4. **The factor used by ETS participants for converting fuel litres to tonnes can be found in DUKES (See table below) but standard factors may be accepted with adequate justification.**

5. **For ETS participants, data must be independently verified.**

# Measuring fuel consumed by standby generators: detailed guidance

## STEP 1: (ETS only) check your emission threshold

*NB: CCA participants who are NOT in ETS should skip this step.*

Firstly you need to confirm that your emissions threshold is below 1000 tonnes $CO_2$. Most data centre emissions are below 100 tonnes and you would need to have suffered a significant mains outage or do a lot of STOR to be anywhere near this threshold. As a rule of thumb you would have to:

- Run five 4MW generators at 50% load constantly for ten days or
- Consume more than 350,000 litres of gasoil in a year (1000 litres produces about 2.7TCO2)

You can double check with the **Ready reckoner.**

If, as is very likely, your emissions are below 1000 tonnes then the following approach will allow you to be compliant with both ETS and CCA. If you are in ETS and your emissions are above 1000 tonnes but below 25,000 tonnes $CO_2$ then fuel invoices would be required as the primary method for deriving fuel use. The calculation could be used as a sense check.

## STEP 2: Calculate or estimate your emissions

Emissions are a factor of the type and quantity of fuel, the calorific value of the fuel, a conversion factor and an oxidation factor. A series of calculations turns the fuel into $CO_2$ emissions. For CCAs you only need to report in KWh so you don't need to do the full set of calculations. For ETS you need to go the whole hog and report in tonnes $CO_2$.

For most operators the trickiest thing is working out how many litres of fuel have been consumed. To get the quantity of fuel you need to know the run time of the generator, the load and the capacity. Alternatively you can use a fuel meter but you will need to ensure that it is calibrated and correctly positioned. Our **Ready Reckoner**, kindly prepared by Prof. Ian Bitterlin, estimates your fuel consumption based on run time, load and capacity.

The subsequent calculations are more straightforward and the steps you need to take to report emissions in line with EUETS are set out in **Table 1** below, and in the **Annexe**, which guides you through the ETSWAP pages. The **Ready Reckoner** does these calculations too but is calculated using factors valid in 2016 which might not remain the same in future years.

## STEP 3: Ensure you have

a) A clear justification for the route you have taken, for example if you have calculated rather than measured your consumption of generator fuel because emissions from burning generator fuel are minimal (well under the 1000t threshold) and calculating from generator characteristics will provide a more consistent approach to measuring consumption than readings from tank fuel gauges.

b) An audit trail (ie you have retained documentation providing a record of:
   - Generator specifications (manuals and /or photographs of the plates)
   - Load
   - Run time
     - dates,
     - times and
     - duration

## STEP 4: Validate if necessary and submit

For CCA you just need to submit the data on your reporting template.
For ETS participants you need to have your data externally verified.

# Table 1

| Factor | Value | What is it | Example |
|---|---|---|---|
| Litres of fuel | Use the Ready reckoner | This is a function of run time, generator capacity and load | 1000 litres |
| Calorific Value (CV) | 10.9 (CV for gasoil) | This is the factor that converts the fuel into kWh. | **10900 kWh This is the figure you report for CCA** |
| Tonnes of Fuel | Varies each year, currently 1172 (litres per tonne) NB for low emissions the EA would consider accepting a standard factor if an acceptable one were proposed. | This factor converts litres of fuel into tonnes of fuel. It is published in the Digest of UK Energy Statistics (DUKES) https://www.gov.uk/government/statistics/digest-of-united-kingdom-energy-statistics-dukes-2015-printed-version (pg. 233 in this version) | **1000 litres / 1172 = 0.85 tonnes** |
| **In reality you can stop at this point for ETS as well as ETSWAP* will do the rest of the calculations. However, these are included below for good measure.** | | | |
| Net Calorific Value (NCV) NB: This factor is pre-populated in ETSWAP, just select the correct fuel from the drop down lists. | Varies each year, currently 43 GJ/tonne | This is taken from the national inventory data available here: https://www.gov.uk/guidance/participating-in-the-eu-ets under the heading: *Using UK greenhouse gas inventory data in EU ETS monitoring and reporting: the country-specific factor list* | 0.85 Tonnes * 43 = 36.55 GJ |
| Emissions Factor (EF) | Varies each year, currently 74.1 TJ / tonne NB This factor is pre-populated in ETSWAP, just select the correct fuel from the drop down lists. | This is taken from the national inventory data available here: https://www.gov.uk/guidance/participating-in-the-eu-ets under the heading: *Using UK greenhouse gas inventory data in EU ETS monitoring and reporting: the country-specific factor list* | 36.55 GJ *74.1 /1000 (GJ/TJ) = 2.7 Tonnes $CO_2$ |
| Oxidation factor (EU ETS) or Primary energy factor (CCA) | 1 | EU ETS uses an oxidation factor that measures the % of carbon oxidised during combustion. CCAs use calculations based on primary energy. Both gas oil and fuel oil have oxidation and primary energy factors of 1 | 2.7*1 = 2.7 Tonnes $CO_2$ |
| Full Calculation | | Tonnes $CO_2$ * NCV * EF * OxF | **2.7 $TCO_2$ This is what you report for ETS** |

***See Annexe for ETSWAP process.**

## Contacts and Links

**For CCA queries:**
techUK CCA helpdesk:
Email: techUK@slrconsulting.com
Tel: +44 (0)844 800 1880
Don't forget that there is a directory of CCA related guidance materials freely available on the techUK website (scroll down below the main description to the links)

**For ETS queries**
We have a number of basic guidance materials on EUETS, but these are not intended to be a substitute for the formal guidance provided by government and the EA's ETS helpdesk should be your first port of call for technical enquiries.

techUK Data Centres Council Communication on ETS
techUK guidance note on CCA, ETS and CRC
techUK briefing on ETS – inclusion criteria
techUK ETS Group
Compliance Roadmap: understanding regulatory obligations for data centre combustion plant

Environment Agency ETS helpdesk: ethelp@environment-agency.gov.uk
Either visit the ETS website: https://euets.environment-agency.gov.uk (predicated around registering a new facility)
Or visit gov.uk website: https://www.gov.uk/guidance/participating-in-the-eu-ets (generic information about the scheme)

**For general or policy related queries regarding data centres**
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# Annexe: How to report emissions in ETSWAP