NZETS Reporting requirements

Used and Waste Oil, Used Tyres, and Waste

Ministry for the Environment
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Agenda

Session 1

- Prescribed documents
- Emissions returns format
- Overview of draft regulations
- Worked examples - combusting wood waste and used oil
- Verification

Session 2

- Overview of draft unique emissions factor regulations
- Worked examples – mass balance (used tyres) and CEM (wood waste)
- Verification
- Work ahead

Prescribed documents

- Climate Change Response Act 2002
- Climate Change (…) Regulations 2009
- Participant Registration Forms
- Emissions Return Forms
- Standards (incorporated by reference)

Non prescribed documents

- ETS Bulletin 10
- Workshop documents: emissions calculation forms
- Draft guidance materials (BECA)
- Consultant's report

Emissions returns format

Interim

- Based on calculation formulas as set out in regulations
- Reporting templates by activity – MS Excel based
- Signature

Long term

- On line registry reporting tool

Draft regulations: overview

- Measurement at point of combustion
- By total mass, energy content and default (or unique if exists) emissions factors
- Adjustment for obligation fuel component for used and waste oil

Draft regulations: overview

Used oil: $E = ((A \times CVa) - (B \times CVb)) \times EF \times 0.001$

Used tyres: $E = F \times CVf \times EF \times 0.001$

Waste $E = I \times CVi \times EF \times 0.001$

Worked example
Combusting wood waste

Regulations 20 – 22

E = I x CVi x EF x 0.001

emissions = tonnes of waste x calorific value x emission factor

Assumptions:

I = 200,000 tonnes of wood waste

CVi = 12 MJ/kg

EF = 1.87tCO_2e/TJ

200,000 x 12 x 1.87 x 0.001 = 4448tCO_2e

Worked example
Combusting used oil

Regulations 20 – 22

E = ((A x CVa) – (B x CVb)) x EF x 0.001

emissions = ((tonnes of used oil x calorific value) less (tonnes of obligation fuel component x calorific value)) x emission factor

Assumptions

A = 25000 tonnes, CVa = 40MJ/kg, B = 10000 tonnes

CVb = 43MJ/kg, EF = 71.47tCO2e/TJ

((25000 x 40) – (10000 x 43)) x 71.47 x 0.001 = 40738tCO_2e

Verification

- Currently no third party verification required, unlike UEF regulations

Questions

- Are there problems obtaining necessary detail for the energy content and amount of the proportion of obligation oil? Possible solutions?
- Regularity of sampling of fuel for CV value? E.g. Municipal waste
- May need to amend to include biogas and bio-liquids e.g. black liquor. Thresholds and units?

Session 2
Unique emission factors

- Eligibility test: the unique emission factor applied for must be below the threshold in Table 3
- Two approaches:
  - Mass balance (regulation 17) for where any non-biomass fuels are combusted in the class
  - Continuous emissions monitoring (regulation 18) for all classes

I.e. biomass combustion cannot use the mass balance approach to develop an UEF

UEF process overview
Mass balance approach

- For use where no or some biomass is combusted
- Sampling of fuels: at least monthly for six months and in accordance with prescribed standards
- Testing of samples for carbon and energy content

UEF = EFC + X + Y

Where EFC = (C x 3.67 x F) / H

Carbon content x non-biomass fraction x gross calorific value

Worked Example
UEF for used tyres

UEF = EFC + 0.03 + 0.004

Where EFC = (C x 3.67 x F) / H

(Carbon content x non-biomass fraction) / calorific value

Assuming weighted means of ten samples:
C = 90%, F = 85%, H = 0.030 TJ/t

EFC = (0.9 x 3.67 x 0.85) / 0.030 = 93.585

UEF = 93.585 + 0.03 + 0.004 = 93.619 tCO_2e/TJ

Meets eligibility threshold in Table 3

UEF process overview
CEM approach

- For all fuels
- Sampling of fuels: at least monthly for six months and in accordance with prescribed standards
- Testing of samples for energy content
- Measurement of volumetric flow rate from stacks
- Testing of gas streams for CO_2, N_2O and CH_4 concentrations

UEF process overview
CEM approach continued

Calculate rate of emissions

$mr_{gas\ type} = (mw_{gas\ type} \times P \times F \times C) / (8.314 \times T)$

Where $mw_{gas\ type}$ = 0.044 t/kmole (CO_2, N_2O) and 0.016 t/kmole (CH_4)

P = gas stream pressure at time of concentration measurement (kPa)
F = gas stream flow rate (m^3/second)
C = concentration of CO_2, N_2O or CH_4 in the gas stream
T = temperature (degrees Kelvin)
mr = rate of emissions of CO_2, N_2O or CH_4 (t/second)

UEF process overview
CEM approach continued

Calculate UEF – formula in regulation 18(1)(f) is incorrect

$$UEF = \frac{((mr_{CO2} \times t) / TJ) + ((mr_{CH4} \times t) / TJ \times 21) + ((mr_{N2O} \times t) / TJ \times 310)}{H}$$

But this formula is incorrect, should have been:

$$UEF = \frac{((mr_{CO2} \times t) + (mr_{CH4} \times t \times 21) + (mr_{N2O} \times t \times 310)}{TJ}$$

Where mrCO2 is rate of CO2 emitted (t/second) or zero if fuel is biomass
t is 31,536,000 (seconds/year)
H is mean calorific value of fuel samples (TJ/t)

UEF process overview
CEM example – combusting solid biomass

$mr_{gas\ type} = (mw_{gas\ type} \times P \times F \times C) / (8.314 \times T)$

Assume P = 1 atm (101.3 kPa)
F = 0.283 m^3/min^{-1}
CH4 C = 49 ppmv = 49/1000000
N2O C = 20 ppmv = 20/1000000
T = 15°C (273 K)

mr_{CO2} = 0

mr_{CH4} = $(0.016 \times 101.3 \times (0.283/60) \times 49 \times 10^{-6}) / (8.314 \times 273)$
= 1.650×10^{-10} tCH_4/second

mr_{N2O} = $(0.044 \times 101.3 \times (0.283/60) \times 20 \times 10^{-6}) / (8.314 \times 273)$
= 1.853×10^{-10} tN_2O/second

UEF process overview
CEM example continued

$$UEF = \frac{((mr_{CO2} \times t) + (mr_{CH4} \times t \times 21) + (mr_{N2O} \times t \times 310)}{TJ}$$

Assume 21 MJ/kg = 0.021 TJ/t
total waste wood tonnes = 3600
TJ = 3600 x 0.021 = 75.6

UEF = ((1.650 x 10^{-10} x 31,536,000 x 21) + (1.853 x 10^{-10} x 31,536,000 x 310)) / 75.6
= (0.109 + 1.811) / 75.6
= 0.025 tCO2e/TJ

Considerably below threshold (0.83tCO_2e/TJ). Verification attention needed.

Verification

Matters to be verified (s18(1)(g)) include:

- Sampling regime information
- Stack gas measurement regime information (note requirements under s18(2))
- Confirmation of accreditation of tester
- Calculations developing $mr_{gas\ type}$ and UEF

Questions

- Threshold for determining only biomass is being combusted so forced to use CEM? (3% in EU)
- Use of CEM to derive emissions estimates instead of emission factors?
- Familiarity and use of prescribed standards?

So what's next?

- Submissions close 13 July
- Further engagement

- Questions?