Applications

Increasing accuracy of Standard methodology

PmCTrace measures BF biomass fraction, 8000 h/year

Where biomass is involved, the emission factor must be determined from the preliminary emission factor and the biomass fraction of the fuel:

\[
EF = EF_{pre} \times (1 - BF)
\]

Where:
- \( EF \) ... Emission factor;
- \( EF_{pre} \) ... Preliminary emission factor (i.e. according to Article 3(35), "the assumed total emission factor of a mixed fuel or material based on the total carbon content composed of biomass fraction and fossil fraction before multiplying it with the fossil fraction to result in the emission factor");
- \( BF \) ... biomass fraction (dimensionless).

Furthermore it should be noted that sampling of CO2 from the flue gas for the purpose of a 14C analysis seems a useful approach. In the case the biomass fraction determined would represent an average for the whole fuel mix. This approach would be in particular beneficial where highly heterogeneous materials such as municipal waste are combusted. Member States are encouraged to gain experience with the ISO/DIS 13833 standard currently under development.

EN ISO 13833 was published in April 2013

Demonstration that biogenic > 97%, PmCTrace measures BF (biomass fraction), 8000 hours a year

Where the fossil fraction of the emissions allows the source stream to qualify as a de-minims source stream, or where 97% or more of the carbon stems from biomass (taking into account sustainability criteria, where applicable), the same approach regarding use of no-tier methodologies including estimations may be applied. However, evidence must be provided regarding the fossil fraction in this case (see section 4 of this document).


Note: Applications can also be considered to increase accuracy for measurement based as well as calculation based approach.

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How pmCTrace® take samples at the stack

The system takes a very small gas sample proportional to the velocity in the stack with EN/ISO 13833. Sample size varies from 0.2 to 30 ml/min. The velocity in the stack is measured using the Genius5-pitotsensor.

The gas is sucked over a cartridge, filled with absorbent, which samples humidity and CO₂ in a quantitative way. Long term sampling is done over a period of 2 weeks to 1 month. In 1 month, the CO₂ content of 0.5 ml/min x 60 min x 24 hours x 30 days = 21.6 liters of flue gas is extracted. With 10% CO₂ and 20% H₂O, 4.4 g of CO₂, dependent on proportional factor, is sampled in 1 cartridge.

While the sampling period the operator registers alternative and biomass fuels with amount and specification, to calculate the reference pmC value for 100% biomass.

Technical data:

<table>
<thead>
<tr>
<th>Extraction unit</th>
<th>Controller unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange size</td>
<td>Power supply 230 VAC</td>
</tr>
<tr>
<td>Box</td>
<td>Cartridges CO₂ absorber</td>
</tr>
<tr>
<td>Size mm</td>
<td>CO₂ analyzer backup</td>
</tr>
<tr>
<td>Stainless steel 316</td>
<td>Massflow 0.2 to 10 ml/min</td>
</tr>
<tr>
<td>100 to 5000 mm</td>
<td>Temperature -10 to 60°C</td>
</tr>
<tr>
<td>10 to 70°C outside</td>
<td>Humidity not condensing</td>
</tr>
<tr>
<td>1 - 40 m/sec</td>
<td>Not condensing</td>
</tr>
</tbody>
</table>

Measurement of the biomass fraction (BF)

After the measurement period, the cartridges are sent to Genius5-Instruments, where the cartridge is weighted and the absorbent is removed and packed in a sealed bottle. New absorbent mixture is inserted to the cartridge. All of these processes are done in a glovebox with very low CO₂ levels to ensure low blanks.

The 14C laboratory evaluates the sample with high acceleration mass spectrometry and calculates the biogenic fraction, based on the 105 pmC = 100% biogenic. Typical accuracy of the pmC result is within 0.3%.

Based on the fuel specifications and measured fuel amounts from the standard methodology, the reference pmC (100% biogenic = pmC) is calculated summing up all of the fuels with their portion and individual pmC value, based on age and year of harvest.

Providing the accurate value of the biomass fraction (BF)