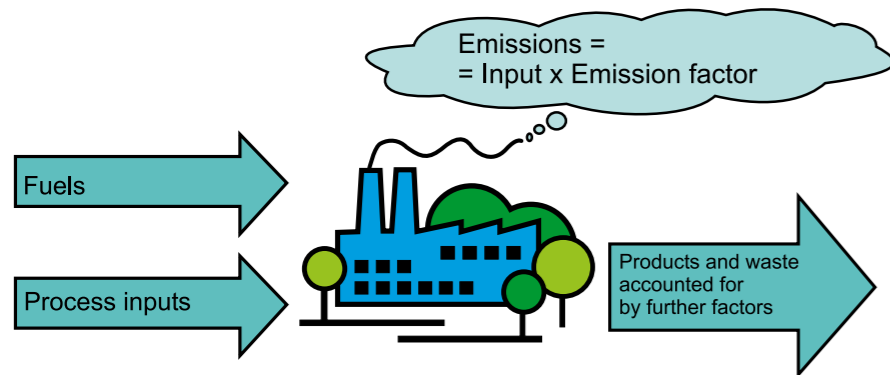


Applications

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:

New!

$$EF = EF_{pre} \cdot (1-BF) \quad (3)$$

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).

Source: MRR Guidance document No. 1, Version 16.7.2012



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.

Source: MRR Guidance document No. 3, Version 17.10.2012

➔ 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-minimis source stream³³, or where 97% or more of the carbon³⁴ 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).

Source: MRR Guidance document No. 3, Version 17.10.2012

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

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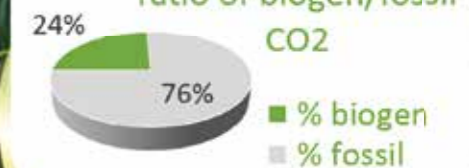
www.genius5-instruments.com



Yearly determination of Biogen CO₂

ISO 13833

ratio of biogen/fossil CO₂

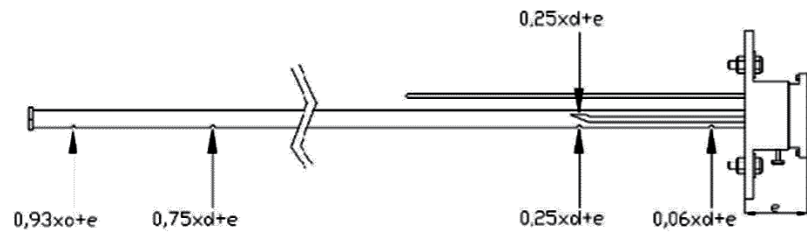


Sampling System
Genius5 pmCTrace
to quantify the use of biomass

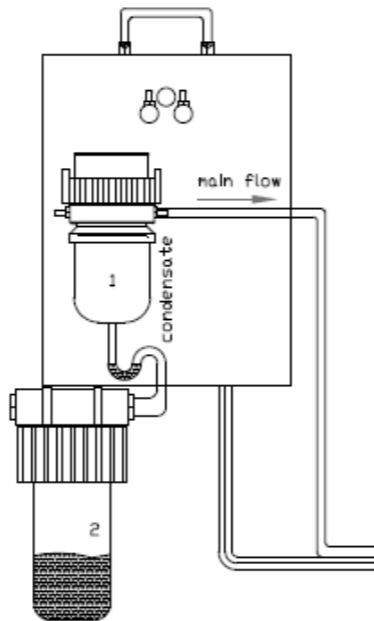
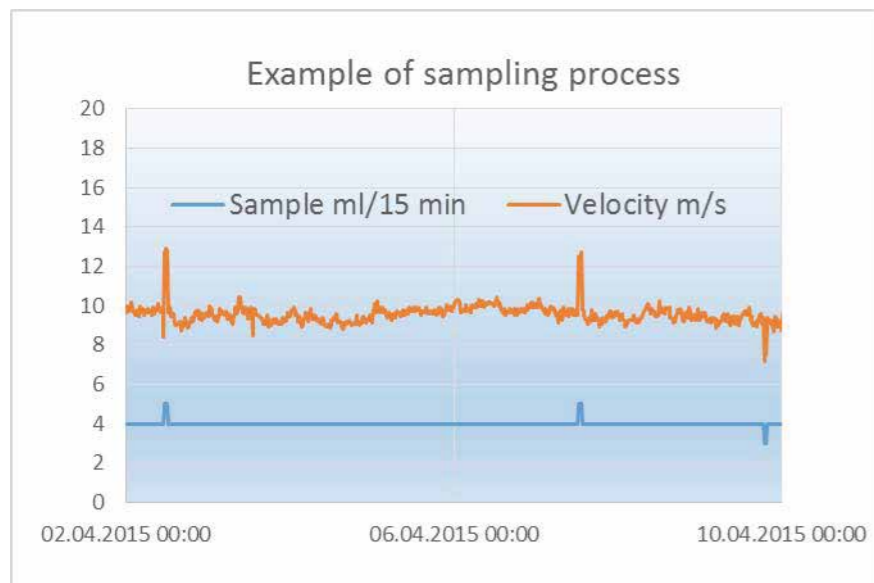
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How pmCTrace® take samples at the stack

The system take 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 periode of 2 weeks up 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 periode the operator registers alternative and biomass fuels with amount and specification, to calculate the reference pmC value for 100% biomass.



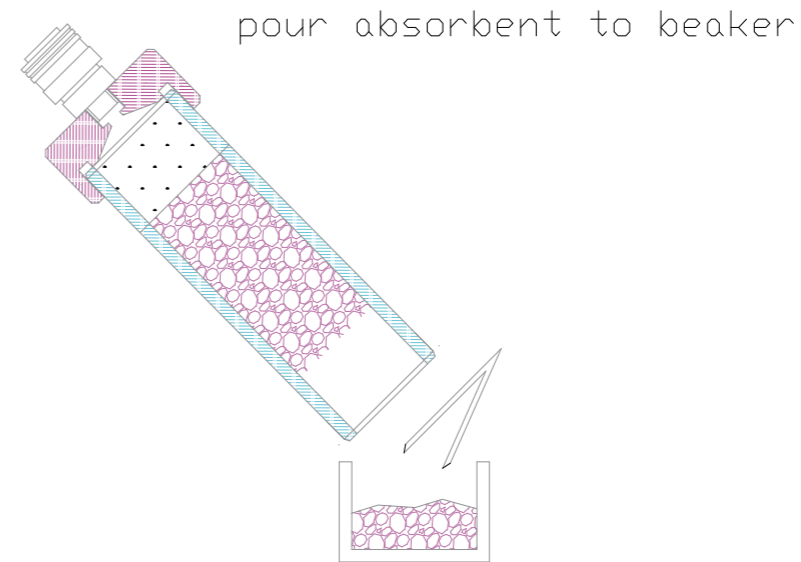
Technical data:

Extraction unit		Controller unit	
Flange size	min 3"	Power supply	230 VAC
Box	stainless steel 316	Cartridges	CO ₂ absorber
Stack diameter	100 to 5000 mm		backup
Temperature	up to 400°C in stack	Massflow	0,2 to 10 ml/min
	-10 to 70°C outside	Temperature	-10 to 60°C
Velocity	3 - 40 m/sec	Humidity	not condensing

Features	
Usage	support regulation 601/2012 to measure exactly the biogenic fraction
Standard	EN ISO 13833:2013
Representativeness	samples at 4 stack positions
Sample aliquot	prop. to velocity
	ppb range
Documentation	every 15 min
	csv and jpg format
Report media	USB memory stick

Measurement of the biomass fraction (BF)

After the measurement periode, 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 glove box with very low CO₂ levels to ensure low blanks.



select white absorbent

The ¹⁴C laboratory evaluates the sample with high acceleration mass spectrometry and calculates the biogenic fraction, based on the the reference 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.

Biogenic Fuel	Humidity [M.-%]	Mass stream wet [t/month]	Analysis [% C]	CO ₂ dry, net [t/month]	Individual CO ₂ of fuel [%]	Individual reference [pmC]	Input to reference [pmC]
biogas	0,0	100	79,9	293	2,2	102	2,2
sewage sludge	50	1.900	27,0	941	6,9	104	7,2
wood	12	8.000	48,0	12.390	90,9	108	98,2
pmC reference							107,6
resultat ¹⁴ C lab							105,7

BF = 0,982, % biogenic = 98,2 %

$$pmC_{reference}^* = \sum pmC_{individual} * individual_CO_2$$

$$BF(biomassfraction) = resultat^{14}C_{lab} / pmC_{reference}$$

Total CO₂ emissions (biogenic + fossil) 13.624 t CO₂/month

Fossil CO₂ emissions 240 t CO₂/month

* as a function of of harvest year and mean age of harvested biomass

➔ Providing the accurate value of the biomass fraction (BF)

