Emission measurement methods for LSH

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Energy

Existing methods and standards

prEN 12815:2011	Residential cookers fired by solid fuel – Requirements and test methods.
prEN 13229:2011.	Inset appliances including open fires fired by solid fuels – Requirements and test methods.
prEN 13240:2011	Room heaters fired by solid fuel – Requirements and test methods.

Where national legislation requires the measurement of particulate emissions then one of the methods of measurement given in Annex A of CEN/TS 15883:2009 shall be chosen and used.

CEN/TS 15883	Residential solid fuel burning appliances – Emission test methods
A.1	Sampling of PM emissions using a heated filter
A.2	Diluted flue gas at ambient temperature
A.3	Full chimney flow through electristatic precipitator

Existing methods and standards

European Commission

Working Documents limit values based on heated filter method

- Can the results of the heated filter and dilution tunnel methods be compared?
- Can minimum requirements be set based on both methods?
- If equivalent requirements are set based on both methods what would be the effect in terms of uncertainty and administrative burden for market actors (industry, consumers and market surveillance authorities)?
- Are the results of tests consistent enough (repetitivility between tests and discrepancies between test centres)?

Comparison of test results

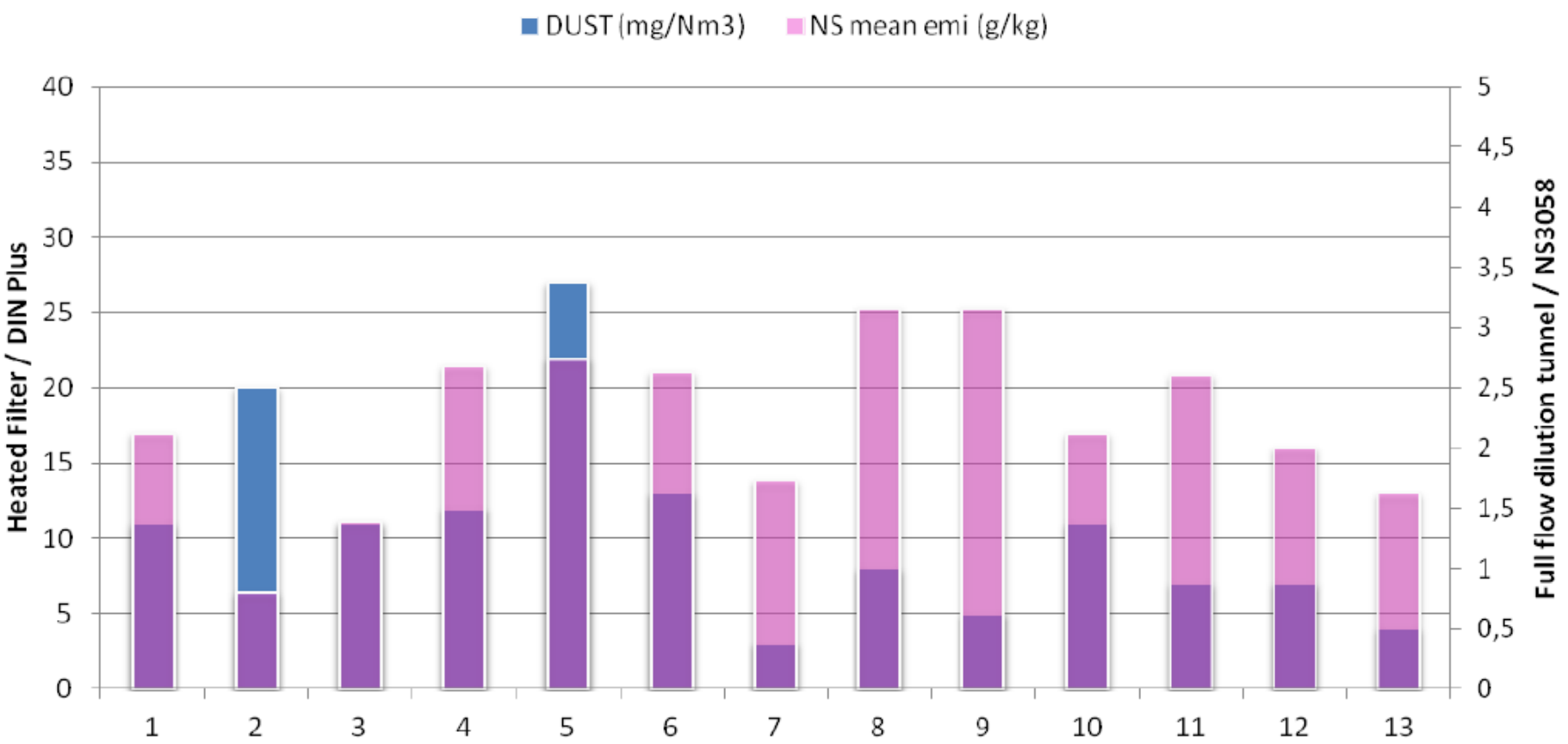


Fig. 1: Comparaison of dust test (heated filter during EN132XX typetest) vs particle test to Nordic ecolabel (NS3058 FFDT)

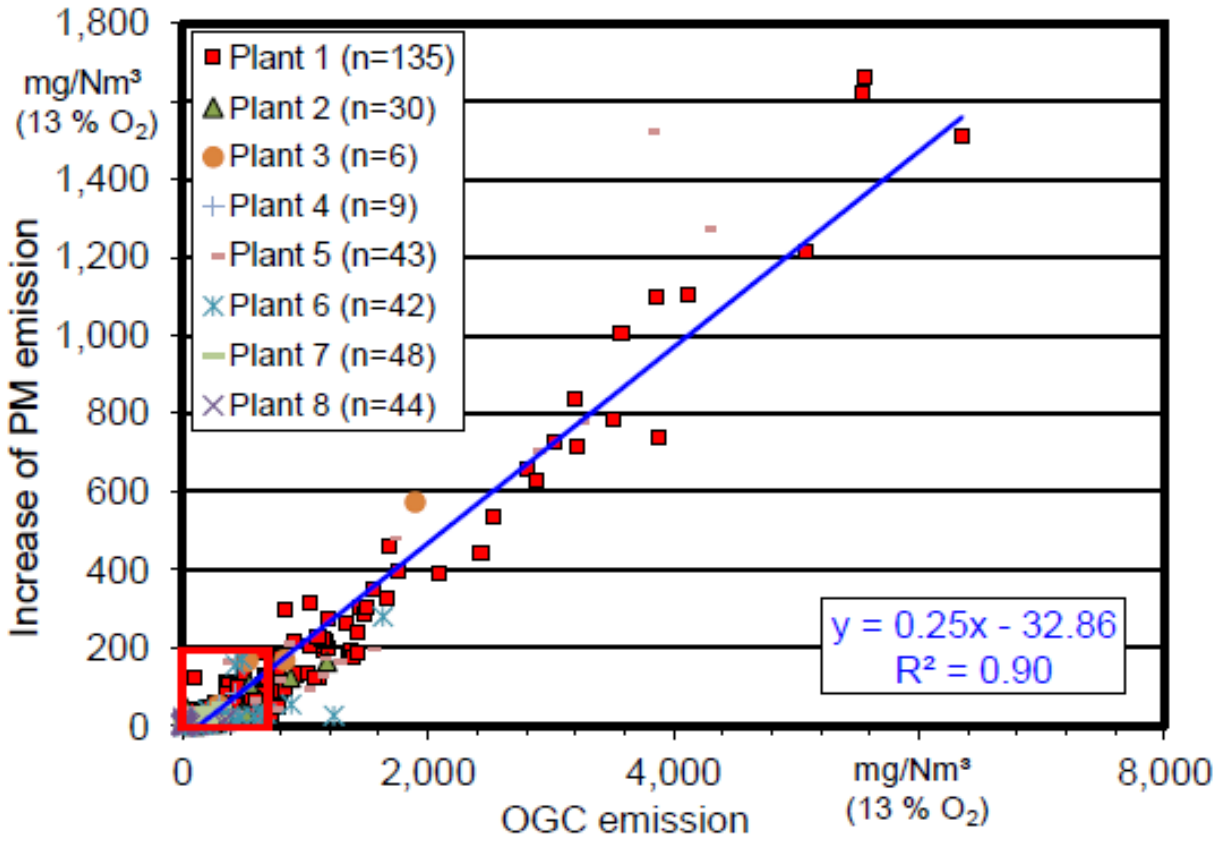
Source: Danish comments to WD on LSH. Test results from the Danish Technological Institute

Flue gas dilution: Increase of measured total PM as a function of OGC-concentration

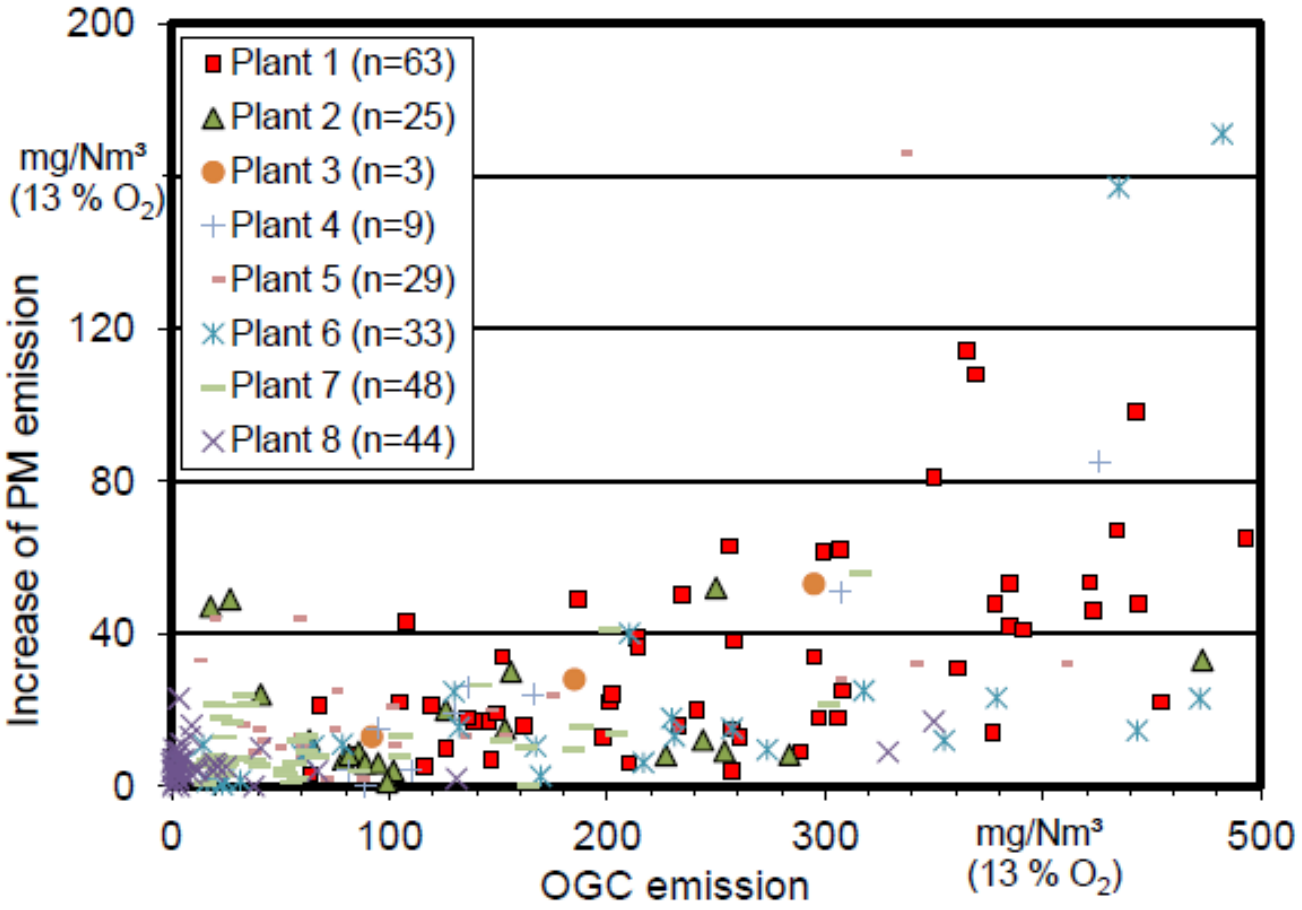
- Data from 8 different furnace plant types (stoves/boilers)
- In total 357 data sets
- Filter treated at 120°C
- Full stream dilution
- Mean T diluted: 48°C (36 – 80°C)
- Mean dilution ratio: 4.2

Furnaces:

- Chimney stoves: No.1-5
- Tiled stove inserts: No. 6,7
- Log wood boiler: No. 8



Flue gas dilution: Increase of measured total PM as a function of OGC – low concentrations



Future standardisation needs

- What is the state of the art concerning the development of an European common methodology?
- What aspects should the update to the mandate cover? (fuel load, low heat output conditions, forced flue draft, fuel characteristics, real life operation…).
- Relationship between test quality and cost of testing
- When could such standard be ready?

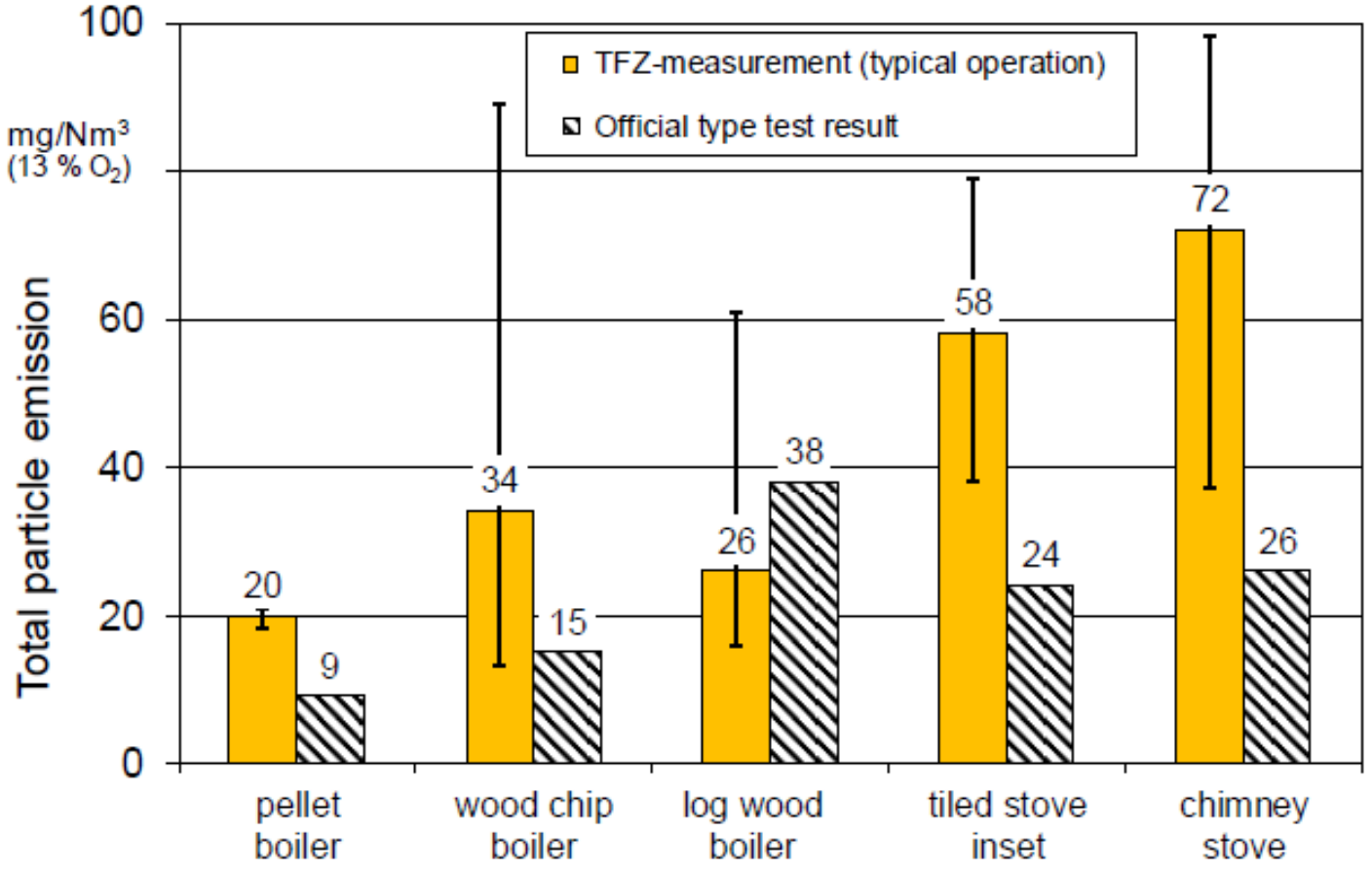
Mandate M/495 already includes a provision regarding test standards for emissions from LSH.

"In view of the adoption of an Ecodesign implementing Regulation, ESOs are expected to develop harmonised standards covering:

Emissions of NOx, CO, Organic Gaseous Compounds

Emissions of Particulate Matter, and its particle size and distribution (subdivided in relevant size classes.

Particle emissions from various furnace types: differences of type tests vs. “typical” operation



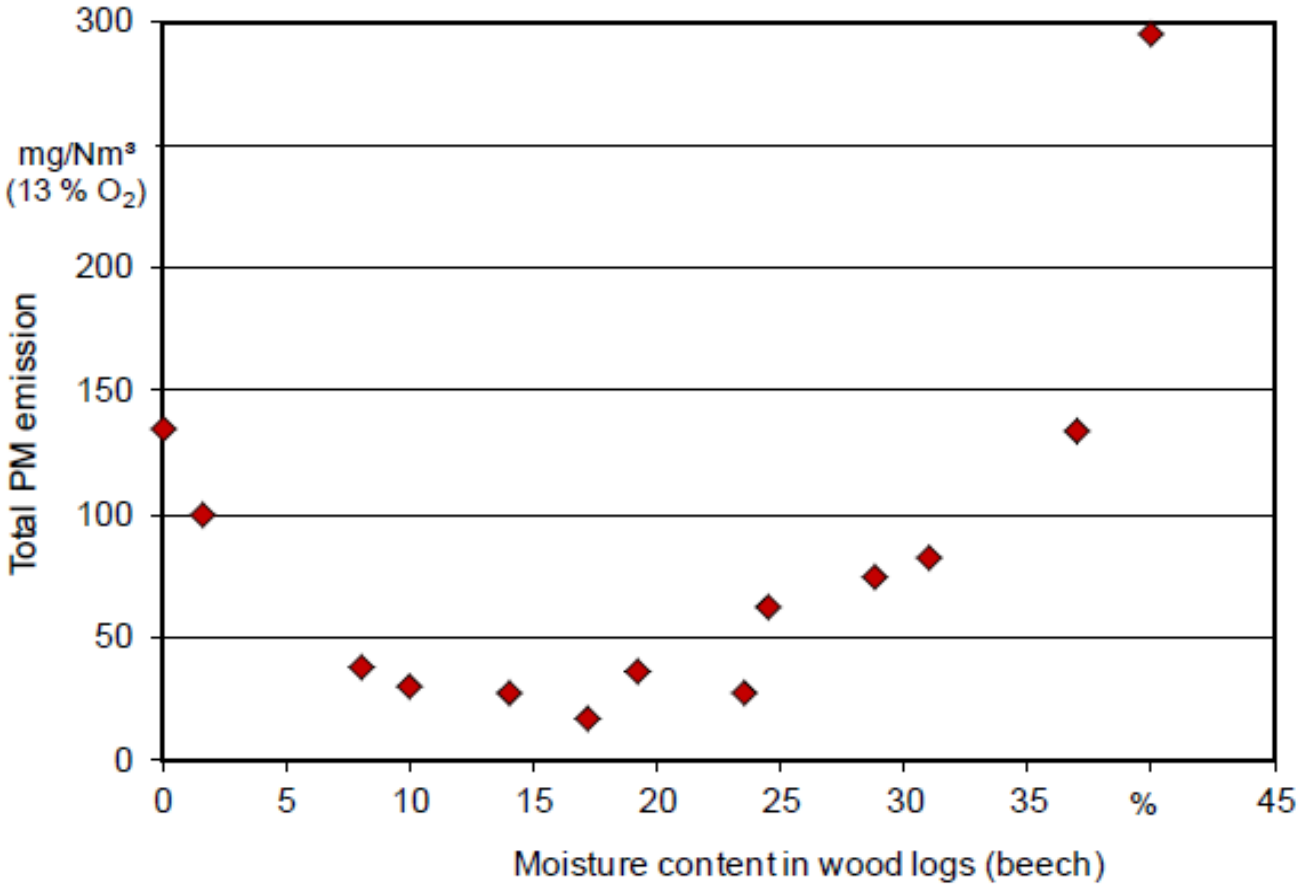
Number of replications per appliance: 10-12
(Source: TFZ)

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Fuel moisture impact on PM emissions from a chimney stove



Chimney stove, 8 kW



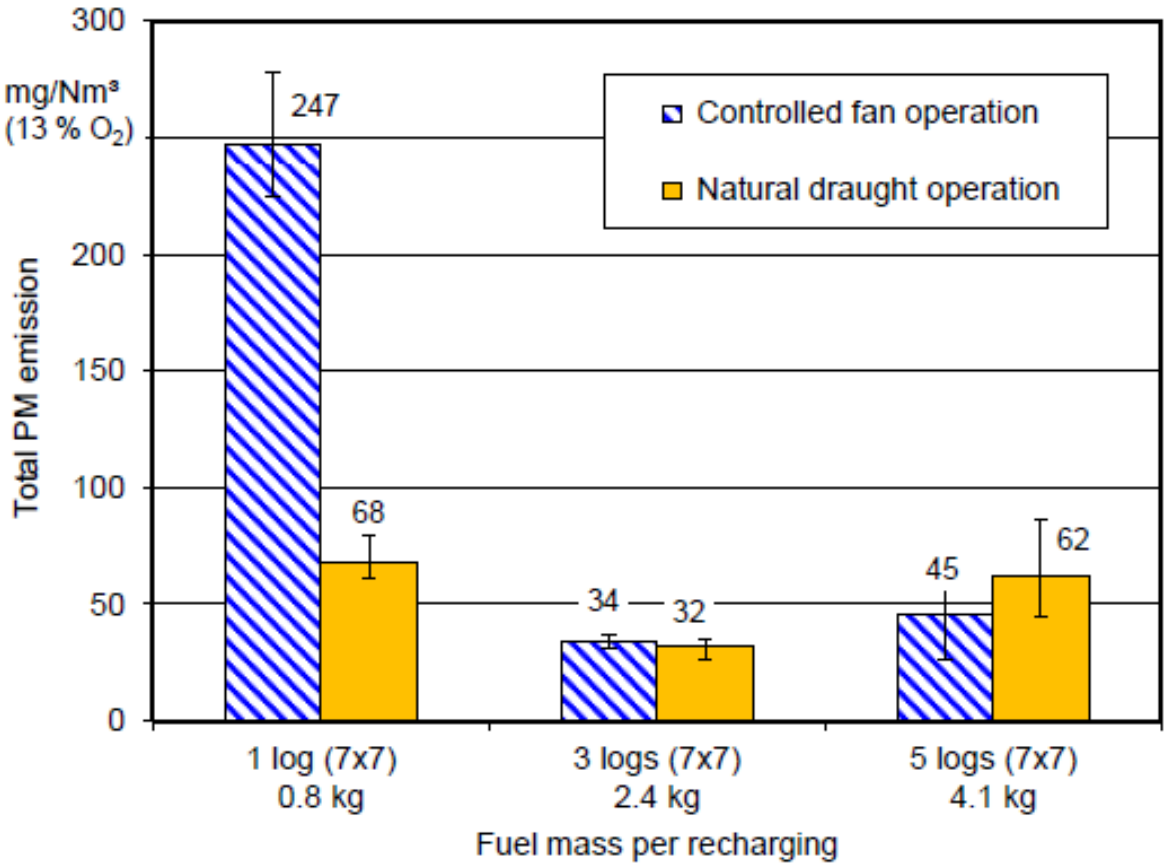
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Stove operation with 3 sawn wood logs (7x7x17 cm) using constant volumes, each moisture stage represents a mean value of three measurements (batches). Source: TFZ (yet unpublished)

Influence of flue gas draught on measured PM emission of a chimney stove



Chimney stove, 8 kW









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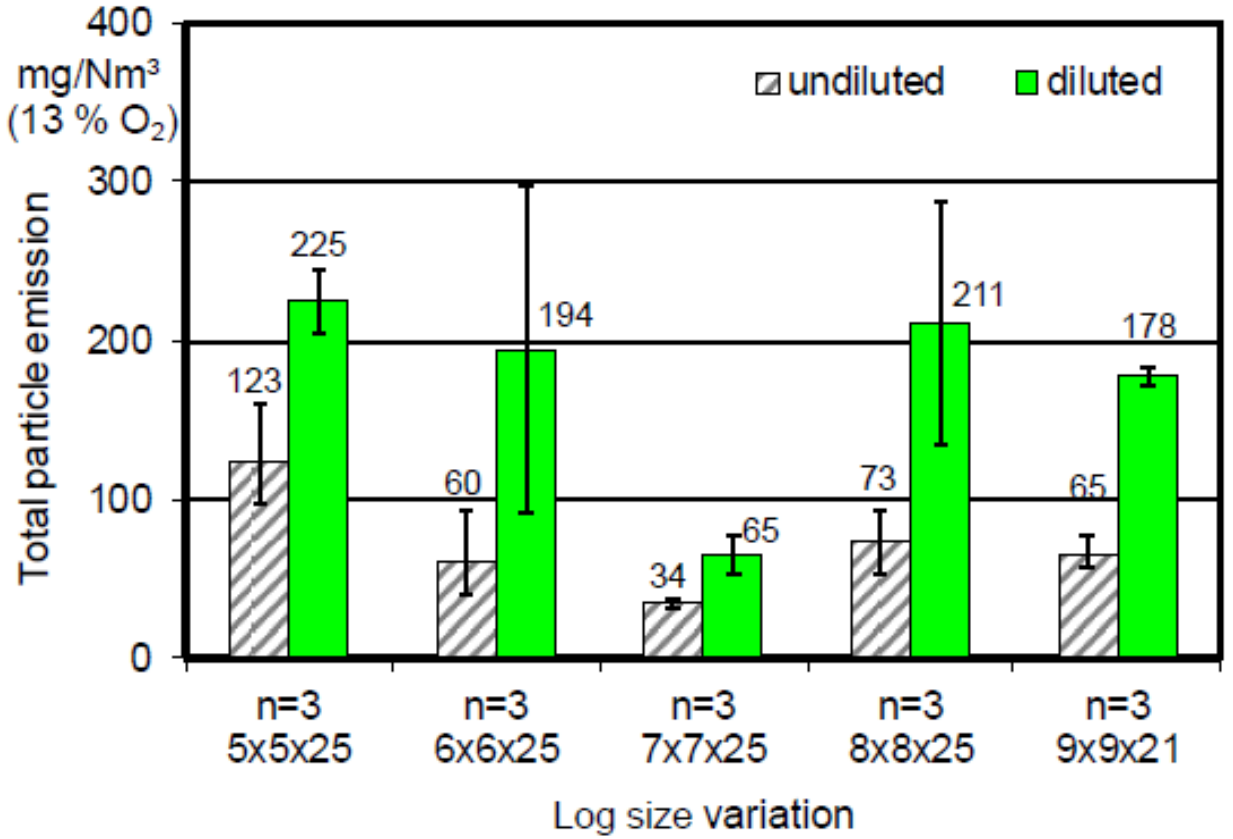
Source: TFZ (yet unpublished)

PM emission of a stove as a function of log sizes



Chimney stove, 8 kW

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Dilution tunnel: mean dilution ratio 1:6;
diluted temperature: <50 °C
Filter post treatment: 120°C
Source: TFZ (yet unpublished)