

New standard for particle measurements in small scale biomass combustion

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Introduction

Emissions from small scale wood and pellets combustion has a large impact on air quality at different scales. Emission factors for both the solid primary particle emissions and the SVOC that will condense during cooling of the exhaust plume needs to be updated and to be used in a similar manner in all different European countries to improve the understanding of how to improve particle abatement strategies in the EU (Denier van der Gon et al, 2015) This study is the first step to suggest a new standard method of measuring emissions from different stoves, emphasizing the relation between emission data and air quality. Thus, the focus of this study is to choose an appropriate standard method including semivolatile compounds and other compounds that are important for secondary particle production. This project, IMPRESS 2, is a collaboration between a number of well known laboratories around Europe and the task presented here is the collection of knowledge on measurements of emissions of particles and particle precursors, including present standards from both Europe and US, scientific literature and a questionnaire to gather practical knowledge from several laboratories around Europe.

A standard method for measurements of PM and SVOC (Fraboulet et al, 2015) is proposed and Round Robins are performed for the method. Next generation standards are included in the study and tests will be performed during the year. Two stoves are to be used for studies during spring, and ten tests for each stove. In this test the suggested standard will be used measuring PM, both as filter deposits on a heated filter and as filter deposits.

Methods

A questionnaire is sent out to several laboratories in different countries within Europe, gathering information of used methods and experience from the different methods proposed. The questionnaire gathers information on usage of several of the different standards within the area of emissions of PM and SVOC from residential combustion.

Standard methods for emission measurements from both small-scale biomass combustion facilities and other sources of particles and organic compounds is included and compared to the suggested standard that is tested within the project.

The scientific literature review includes several different methods used to measure emissions from biomass combustion but focus during the review is on

the possibility of simplifying and standardize the methods losing as little information as possible and giving the possibility to easily develop the standard further if the need of including more parameters will be detected.

Conclusions

The different laboratories answering the questionnaire has shown what standards are most frequently used and given good insight to improvements needed.

The suggested standard of measuring particle emissions from biomass combustion is found to be an important step towards quantifying emissions in a way that improve the understanding of the actual particle load at some distance from the source, giving insight to the quantification of e.g. health effects of biomass combustion emissions.

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Fraboulet, Gaeggau, Alexander, F. R., & Nathan, J. O. (1986). *Determination of particulate matter emissions from solid biomass fuel burning appliances and boilers – Proposal for a common European test method*, U.K.: Cambridge University Press.

Denier van der Gon, Bergström, Fountoukis, Johansson, Pandis, Simpson, & Visschedijk (2015). Particulate emissions from residential wood combustion in Europe – revised estimate and an evaluation Atmos. Chem. Phys., 15, 6503-6519.