



bioenergy2020+

CleanAir  by biomass

Real life emission factor assessment for biomass heating appliances at a field measurement campaign in Styria, Austria

Rita Sturmlechner, Christoph Schmidl, Elisa Carlon, Gabriel Reichert, Harald Stressler, Franziska Klauser, Joachim Kelz, Manuel Schwabl, Bernadette Kirchsteiger, Anne Kasper-Giebl, Ernst Höftberger, Walter Haslinger

Air Pollution 2019, June 26th-28th, Aveiro

COMET

Competence Centers for
Excellent Technologies



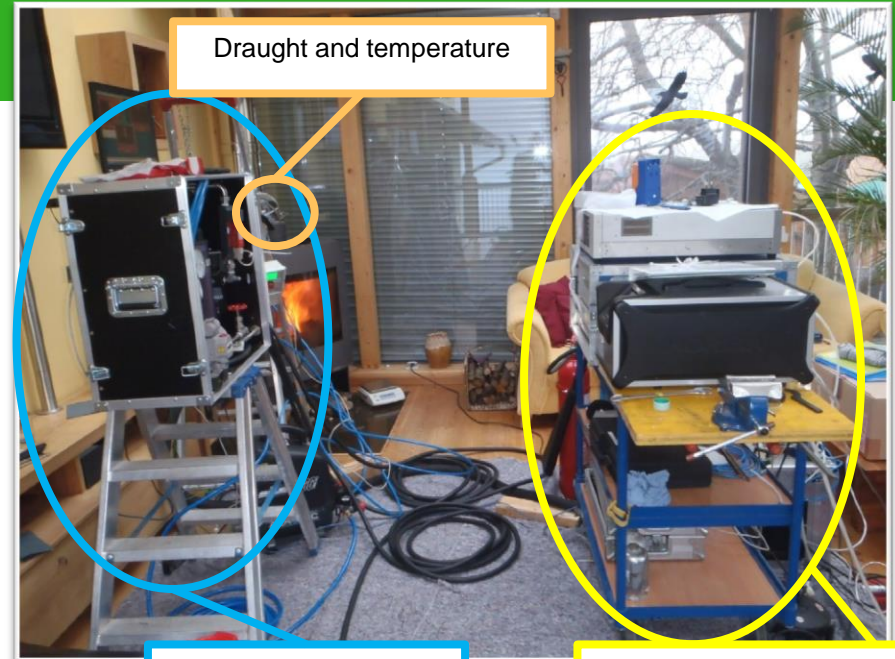
Introduction

- Biomass heating appliances are widespread in Austria and Europe
- Knowing their emission factors is important, regarding air quality
- Emission factors are used for emission inventory calculations, air quality modeling, prediction of air pollution impact on human health
- Within the Clean Air by biomass project 15 appliances were tested in the field at end users
- **Objectives:**
 - Emission factor assessment in the field of biomass heating appliances
 - Comparison to current proposed emission factors in Europe and Austria

Material and Methods

- 15 biomass heating appliances
 - 6 room heaters (RH)
 - 6 biomass boilers (BB)
 - 3 tiled stoves (TS)

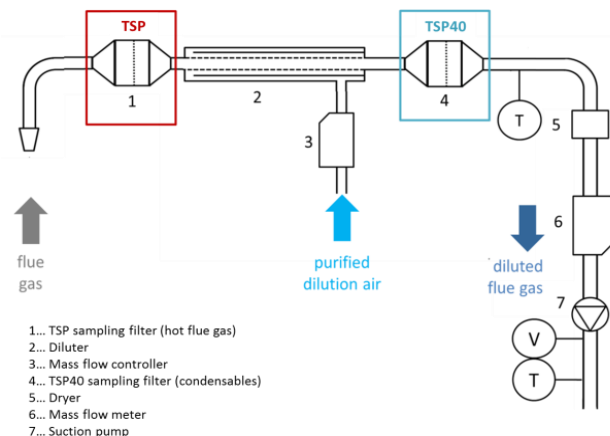
- 2 field measurement equipment sets
 - Extended: T, p, O₂, CO₂, CO, OGC, TSP, TSP40, BaP
 - Standard: T, p, O₂, CO₂, CO, TSP



Draught and temperature

Particulate emissions (TSP, TSP40)

Gaseous emissions (O₂, CO₂, CO, OGC, NO_x)



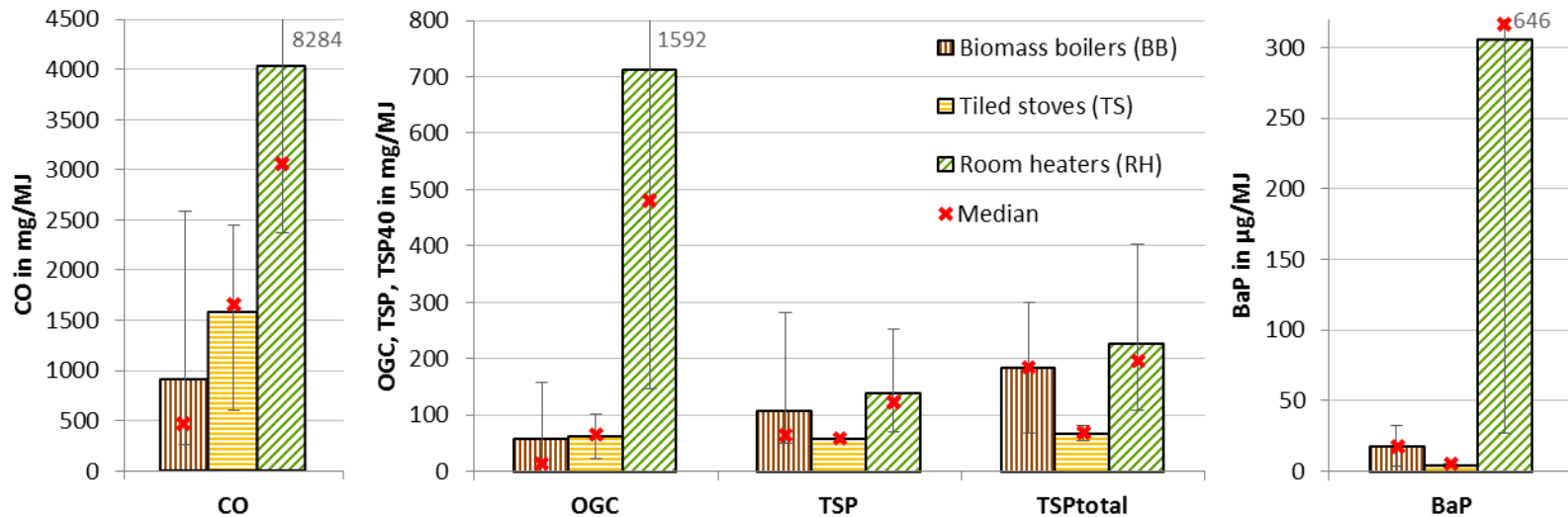
COMET

Material and Methods

- Testing procedure
 - Usual procedure of end user
 - Fuel was provided by end user
 - End of a heating cycle (max. 3 batches, 4 phases)
- Data evaluation
 - Results of whole heating cycle in mg/MJ



Results of field measurements

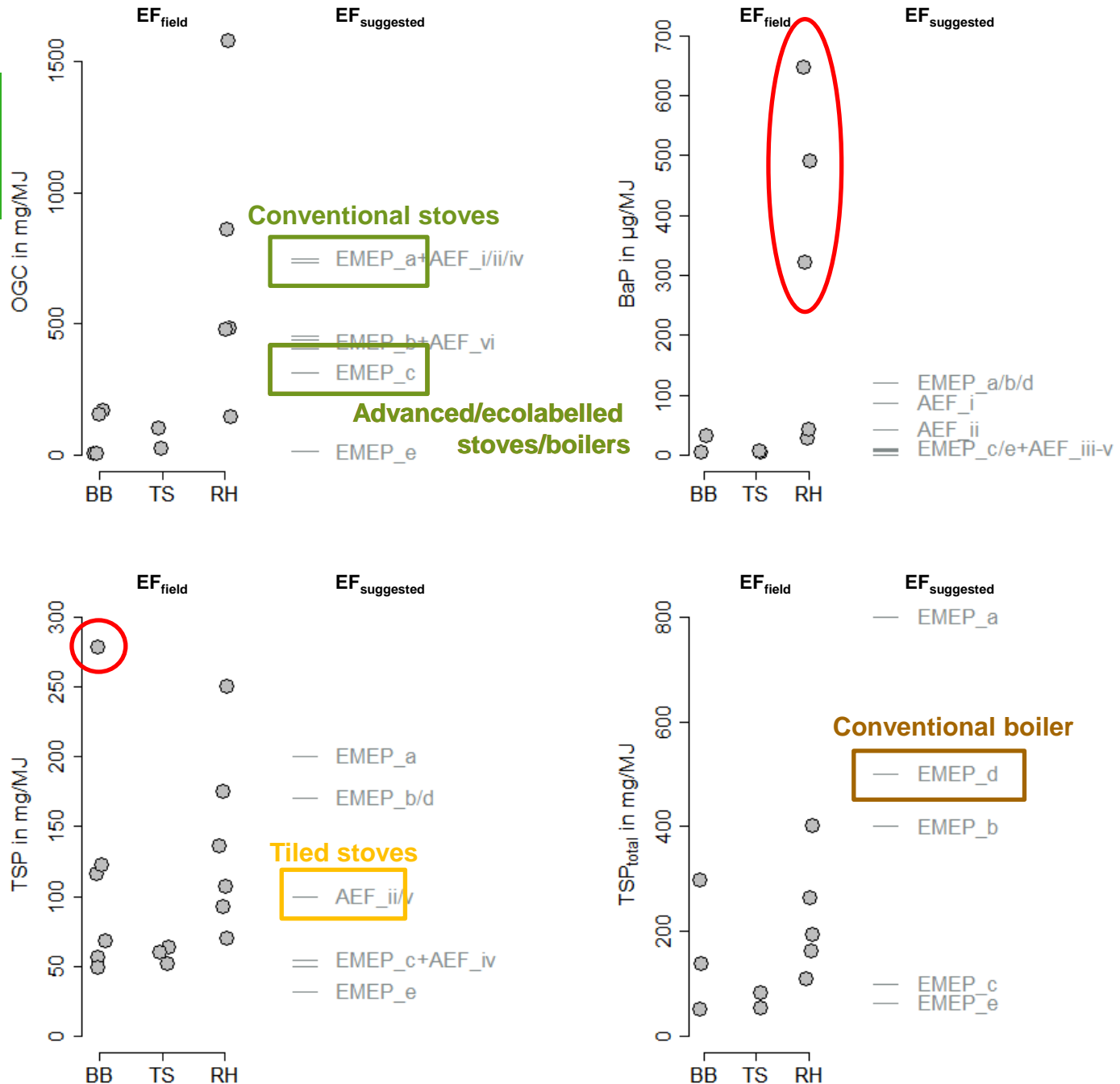


- High variability in all results
- Highest emissions for room heaters (esp. OGC and BaP)
- Lowest gaseous emissions for boilers
- Lowest particulate emissions for tiled stoves
- Medians indicate when a few higher values increase mean value
 - Unfavourable user operation (RH) and saw dust as fuel (BB)



Comparison of emission factors

- Proposed European (EMEP) and Austrian (AEF) emission factors
- Examples highlighted





Summary and Conclusion I

- Emission factors of a **field measurement campaign** including 15 biomass heating appliances
 - **High variability**, especially for room heaters
 - Hard to define EF
 - Taken confidence interval into account for air quality modelling

- Comparison to current **proposed emission factors** of Europe and Austria
 - Lower emission factors in the field for boilers and tiled stoves
 - Room heaters in the range of proposed emission factors
 - **Regular update necessary**
 - Chance by close to real life lab testing



Summary and Conclusion II

- Comparison to Austrian study of Spitzer et al. (1998)
 - Progress of **technological development** at biomass boilers
 - Not observable for room heaters
 - More **influence by framework** conditions (especially end user)
 - End user training and optimization of real life conditions have potential for emission reduction
- Follow up project on end user training and awareness raising, including citizen science

- Results of emission inventories have impact on policy decision makers and regulations
- Real life emission factor assessment should be fostered



bioenergy2020+

CleanAir  by biomass

Thank you for your attention!

Rita Sturmlechner

BIOENERGY2020+ GmbH

Unit Emission Technology and
Research

rita.sturmlechner@bioenergy2020.eu

Acknowledgement

The project was supported by the project partners Styrian Energy Agency, Technical University of Vienna, Schröder Abgas-technologie, Austroflamm, Haas+Sohn, Lohber, Rika and Austrian Kachelofen Association and received funding from the Austrian Research Promo-tion Agency under the COMET program.

Air Pollution 2019, June 26th-28th, Aveiro



Competence Centers for
Excellent Technologies

Material and Methods

- Short insight into the field measurement equipment installation and deinstallation

» Video ([Aufbau_Abbau.avi](#))



- National Biomass K1 Centre of Competence for
Biomass to Energy
- In Austria: 3 locations (Graz, Güssing, **Wieselburg**)
1 research sites (Tulln)
- R&D focus of Area Fixed Bed Conversion Systems (Wieselburg):
 - **Emission technology and research**
 - Direct heating systems
 - Technical energy systems
 - Solid biomass fuels
 - Hydronic heating systems

