AFTER-LIFE PLAN

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PROJECT: HARMONIZING RELIABLE TEST PROCEDURES REPRESENTING REAL-LIFE AIR POLLUTION FROM SOLID FUEL HEATING APPLIANCES

Real-LIFE emissions, Life preparatory project 2020

Project Number: LIFE20 PRE/FI/000006

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After-LIFE activities

1. The project website

The most important theme that continues after the project is the dissemination of the project's outputs. The various reports, studies and presentations completed in the project were widely disseminated via events, workshops as well as networking efforts. They will of course remain to be available via the project website. The project's partner organizations and key stakeholders will promote continuity, each in their own sector. The Project website, which is available at https://sites.uef.fi/real-life-emissions/ will be online for five (5) years after the end of the project. Data will be stored for later use also on the TFZ website, https://www.tfz.bayern.de/biogenefestbrennstoffe/projekte/283863/index.php. All the important material has been added to the websites. After the project the websites will not be actively updated, but the links for the project related materials formed after the project will be added to the page. Experimental data will also be available on request.

2. Work in working groups

The purpose of this special topic in the project was to support the working groups and create new knowledge at a point where, for example, the future emission measurement methods, testing protocols and emission limits are under discussion. The beneficiaries have worked in the areas of this project for several years, but not in such a wholeness as in this project. Thus, the work of this project formed a continuation of work being done by each beneficiary. This project was strongly linked to the work that is being done, for example, in CEN working groups, which will also continue after the end of this project. Several of the project beneficiaries will continue participating in the standardization work at European and national level. With this engagement they will guarantee an adequate perception of the project's output in the future. During the project the new EN 16510:2022 standard was accepted and thus the proposed short-term method was applied as an extended version of the standard method. Thus, the new idea of taking into account condensable matter too while implementing the newly accepted standard method is possible in future and will then influence the work for the next decade. The main output of this project was the report "Suggestion for near-term and long-term sampling methods, testing protocols and restricted emission pollutants for residential solid fuel combustion" that concludes the project main results.

In addition, several other organizations have been in connection with the project, e.g. through the steering group, including environmental agencies, authorities and representatives of appliance manufacturers. The steering group will help in the dissemination of the project's work also afterwards. Beneficiaries will disseminate the project output to the related stakeholders and act as experts for the working groups, e.g. in the EMEP program of the the Convention on Long-Range Transboundary Air Pollution (CLRTAP) in the taskforce on emissions inventories and projections (TFEIP). During the project, updated EMEP/EAA 2023 Technical Guidebook and the Emission Factor database were published (https://www.eea.europa.eu/publications/emep-eea-guidebook-2023). Project participated in the forming of Annex for residential combustion (https://www.eea.europa.eu/publications/emep-eea-guidebook-2023/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-bi-annex/view). Activities are connected to the EU legislation via Ecodesign, Construction Product (CPR) and National Emission Ceiling (NEC) Directives. Via NEC, the project results will be implemented e.g. formulation and updating of the National Air Pollution Control Programs 2030. Related to this work, a survey of wood combustion practices was performed in Finland in 2024 (https://julkaisut.valtioneuvosto.fi/handle/10024/165891). This publication introduces the work carried out to develop a method for studying by means of a survey on how combustion appliances are used, to conduct the survey, and to aggregate and present the results and conclusions. As a part of evaluation of NEC Directive, below Targeted Consultation, project partners have been given effort related to the solid fuel

combustion emissions. Previously (2022), inventory of national strategies for reducing the impact on air quality from residential wood combustion was published as an IEA Bioenergy, Task 32 Biomass Combustion report (https://task32.ieabioenergy.com/wp-content/uploads/sites/24/2022/10/NationalStrategies_Report-final.pdf). The work will continue below IEA also after this LIFE -project.

3. Events, meetings, conferences

The project beneficiaries will continue participating in different events, meetings and conferences, in which project material will be presented, discussed and processed with the different contacts. The project results will remain to be presented in conferences, mainly under new projects continuing the same topic. This will ensure a larger uptake on the project results in the years to come.

4. Continuation of experiments

The development of combustion appliances continues due to tightening regulations at EU level. The project beneficiaries will continue the discussion and contribution to development of combustion appliances with the manufacturers. At least just after the project, the development work of proposed sampling system will continue in a testing phase since some of beneficiaries will test the new system also after the project. Strategically, the topic of small-scale combustion emissions will remain on the agenda of all project partners, and this will ensure that the project results will be disseminated and integrated in the future work in the After-LIFE stage.

5. Scientific papers

The project produced also original data that is scientifically available for publication. One paper was published during the project (https://www.mdpi.com/2073-4433/15/7/839), and at least four papers are under preparation. Manuscripts are: Schön et al. “Round robin with two wood log stoves applying a novel Real-LIFE test protocol “, Schön et al. “Emissions from eleven appliances while using the Real-LIFE test protocol”, Rinta-Kiikka et al. “The effect of dilution ration on particulate and gaseous emissions from a modern wood stove” and Louhisalmi et al. “Novel method to measure solid and condensable particulate phases separately from wood stove emissions”.

6. Exchange with EU commission

Due to the current discussion on the Ecodesign regulation many questions were sent to TFZ regarding the published data from the 11 appliances which were presented during the 3rd international workshop in Ostrava. Boundary conditions were an issue, but also the interpretation of data e.g. why some stoves released lower emissions during partial load compared to nominal load and under which testing conditions.

This exchange is still going on and TFZ is willing to give further input in the discussion. This project has been recognized widely.

7. New project topics

Several aspects related to the emission measurements were raised during the project for further research. The important topics are

- Studying the importance of secondary organic aerosols, comparison of SOA with other emission data, definition of SOA potential via VOC measurements and finally, including SOA in future emission inventories.
- Formulation of real-life operational protocols for each combustion appliance types e.g. kitchen stoves, masonry heaters and sauna stoves.
- In-depth review of processing and calculation of emission data.
- More performance data for the new test protocol and PM method and a broader round robin with more participants shall be undertaken.

Still open is the final definition of the extended ENPME methods ENPME+PTD system. This needs a separate project where the new method is defined and validated precisely. Especially modeling of nucleation of organic vapor in porous tube in the situation where there are almost no seed particles in the sample, should be studied in more detail with modelling tools and experiments. This is important because as the solid fuel combustion emission concentrations decrease, more precise methods should be made available.

Limit values, operational protocol, and measurement method are connected to each other. Thus, they need to be defined at the same time. Next steps could be firstly decide the measurement method, secondly to define operational protocol, and thirdly it is required to organize validation project to define precise emission factors and limit values. It has to also to note that operational protocols and limit values might be different with different combustion appliances.

A new project consortium was created during the project called “Next generation particle emissions measurement method” (NGPEMM-consortium), but funding for the project has not been found and is still open. Consortium consist of 13 partner organizations (DTI, Danish Technological Institute, Denmark; SINTEF Energy Research, Norway; TFZ Technology and Support Centre in the Centre of Excellence for Renewable Resources, Germany; INERIS, France; INNOVHUB Stazioni Sperimentali per l’Industria S.r.l., Italy; Université de Haute Alsace, France; VSB - Technical University of Ostrava, Czech Republic; UEF University of Eastern Finland, Finland; RISE Research Institute of Sweden, Sweden; University of Applied Sciences Northwestern Switzerland, Switzerland; DBFZ Deutsches Biomasseforschungszentrum, Germany; VITO Vlaamse Instelling voor Technologisch Onderzoek, Belgium and HKI Industrieverband e.V., Germany).

It is very important that calls related to small-scale solid fuel combustion are added to the EU research funding programs. At the moment, there are none of these, and small-scale combustion research at the EU level is minimal, even though it is a very important matter in terms of air quality in the EU region.

UNIVERSITY OF EASTERN FINLAND

Harmonizing reliable test procedures representing real-LIFE air pollution from solid fuel heating appliances - **Real-LIFE Emissions** project.

Project Partners

- University of Eastern Finland (UEF)
- Technical University in Ostrava (VSB)
- The French National Institute for Industrial Environment and Risks (INERIS)
- Technology and Support Centre in the Centre of Excellence for Renewable Resources (TFZ)

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