



STRATEGIC TOOLS TOWARDS A SUSTAINABLE USE OF BIOMASS FOR LOW CARBON DOMESTIC HEATING

Dear reader,

Welcome to the fifth edition of our BB-CLEAN newsletter!

BB-CLEAN is getting closer to the finish line. As project will end in april 2021, partners are working full speed. Our meetings, conferences, workshops have largely been implemented online as this appears to be our new reality. Nevertheless we have managed to organize a very succesfull international conference "The wood and pellet challenge toward environmental sustainability". In the past years BB-Clean project was focused on the challenge of developing a transnational policies for a sustainable use of biomass for domestic heating to minimize the environmental impacts and improve a smart use of this resource and this conference summarized our findings and work this far. You can read about it below. In this newsletter edition you can also find more about our open innovation challenges, sociological study in France and about BB-CLEAN mobile app, that has finally seen the light of day.

Enjoy the latest edition of BB-Clean newsletter.

*If you'd like to keep up with our latest activities and developments, please follow us on our website:
<http://www.alpine-space.eu/projects/bb-clean/>*



BB-CLEAN INTERNATIONAL CONFERENCE "The wood and pellet challenge toward environmental sustainability"

And the related public evening event "Biomass burning among climate change and air quality issue: how much do we know?"

The BB-CLEAN project was born with the aim of developing innovative solutions for promoting the sustainable use of local wood in Alpine regions, spreading, in the meanwhile, a greater awareness of citizens on the potential negative effects on health and environment of biomass burning in domestic heating. In the first years of the project partners (Italy-UCSC and ARPA VdA, France-ATMO AuRA and CCPMB, Germany-Econcept, Austria-FH Joanneum, Slovenia-KSSENA and Ezavod) have deepened the knowledge on wood combustion topic (Biomass Burning), with particular reference to the effects on air quality. In order to illustrate



the mid-term results achieved by the project, that will end on April 2021, ARPA Valle d'Aosta organized, in collaboration with the lead partner Università Cattolica del Sacro Cuore, the international conference **"The wood and pellet challenge toward environmental sustainability"**, which was held in Aosta on 15 October 2020. The event took place both in live and in webinar mode. During the morning sessions the results of the air quality monitoring activities and the public awareness campaigns realized in different areas of the Alps and centered on the effects of biomass burning in domestic heating were presented. A particular focus was dedicated to the activities carried out in the pilot area of Saint-Marcel, case study of the project for the Aosta Valley Region. During the afternoon session the regulatory and economic aspects related to regional, national and European incentive schemes supporting the technological renewal of domestic heating systems and promoting the use of wood and pellets as local and sustainable energy source in the Alpine regions were analyzed.



At the end of the conference a public event titled **"Biomass burning among climate change and air quality issue: how much do we know?"** was held. The evening event was moderated by Luca Mercalli, president of the Italian Meteorological Society, climatologist, and science popularizer, known to the Italian television audience for his participation in the popular tv show "Che tempo che fa". The purpose of the evening event was to raise awareness among the population on the critical aspects of using biomass as energy source for domestic heating. The negative impact that biomass combustion has on the air quality in terms of emissions (particulate matter, hydrocarbons, etc.) is, in fact, still often unknown to population and local administrators. During the evening, Prof. Giacomo Gerosa illustrated the mobile App, developed on BB-CLEAN by the team of Università Cattolica del Sacro Cuore, capable to indicate to citizens which times are more and which are less suitable for biomass burning in a certain area. The results obtained during two specific Citizen Science trials promoted by Arpa Valle d'Aosta with the use of Airbeam 2 fine dust personal microsensors were then illustrated. The first

campaign named "Find out what air you breathe!" was addressed to health and environment protection associations operating in Aosta Valley Region. Some representatives of Legambiente, Soroptimist and Codacons associations joined the experience and realized different interesting measurements with the Airbeam 2 fine dust micro-sensors. Thanks to the use of microcapteurs, the volunteers were able to verify their personal exposure to pollution in real life conditions, understanding how daily habits and behaviors may be more polluting than we may think. Finally, the experience carried out by the students of "I. Manzetti" technical Institute (Aosta) who engineered a prototype system for the monitoring of atmospheric particulate matter at high altitude using a drone was presented. The entire evening was enriched by the interventions of Luca Mercalli, who was able to enhance the contents with additional information and underlining the relevance of the presented topics for the challenges of climate change and sustainable development.

All conference materials, videos and presentations can be found on BB-Clean website.

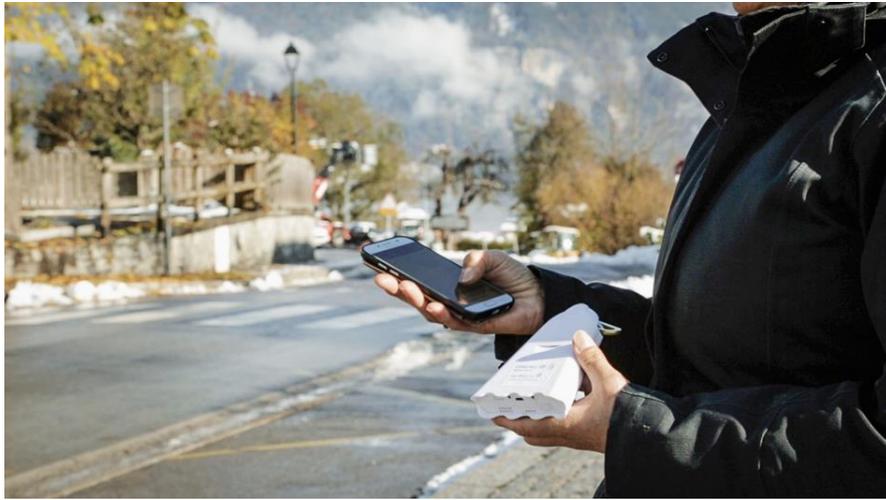


SOCIOLOGICAL STUDY IN FRANCE

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During four months of winter 2019, more than 150 people (out of more than 400 candidates) were able to participate in the BB-Clean experiment on the CCPMB territory. With 30 microsensors at their disposal, six groups of 30 people were trained during the winter, each member having fifteen days to use the microsensor and carry out his or her own measurements. Their profiles covered all CCPMB municipalities, their age ranging from 18 to 78 years old, women and men, from people with low knowledge to people engaged in environmental organizations, from politics to journalists.

The sociological accompaniment was involved in the selection of candidates, in the construction of workshops but most particularly in **evaluation questionnaires** of the experiment coupled with some individual interviews. The study helped to define pollution knowledge before experimentation and to study the impact of microsensors and support on experimenters. The approach allowed a real rise in competence. The assessment of pollution sources has changed, and the impact of wood heating was better understood by most of the people.



The observed behavioural changes are primarily focused on indoor air quality and simple behaviours. Outdoor air actions are more about reducing **exposure**.

The experiment was highly appreciated by citizens. The methodology was constructed in a way to allow a **real appropriation** of the subject and a commitment to the participatory approach.

The sociological study was extended with a questionnaire one year later. The main results of the questionnaire were:

- 80% would be willing to try again.
- 64% took a different view of municipal elections.
- 30% began to follow general ATMO and CCPMB news.
- Of the 44 people who responded before the project and one year later, 52% used wood heating as the primary source of particulate pollution. A year later it went up to 86%.
- A highly polluted view of the land has diminished.
- Since experimentation 70% say they have implemented actions to improve the environmental impact of everyday life.

The benefit of a loan of micro-sensors coupled with an expert support is evident in reduced pollution due to wood heating and in changed behaviours.



RESULTS OF THE INNOVATION CHALLENGES AND THE BEST IDEAS OF BB-CLEAN CROWDSOURCING ACTIVITIES

Out of more than 40 innovative solutions we ranked the best ideas.

In the framework of WPT2 BB-Clean partner Econcept used the crowdsourcing platform www.innonatives.com to identify interesting ideas and solutions on two innovation challenges. The idea of the work package was to use crowdsourcing as an open innovation and awareness raising tool to promote cleaner biomass burning in the Alpine region. In the context of the activities we gathered the following experiences:

- 1) Crowdsourcing is a very interesting tool to interact with lead users and innovators.
- 2) We had around 5000 persons that visited the platform and interacted with it. We received more than 40 ideas from around 100 new users on the platform. This group is an interesting lead-user group.
- 3) However, the activation of the crowd was very difficult. It took a lot of effort to generate interest for this topic, which could be due to timing not being suitable (we started the challenge in summer) and the difficulty of getting answers for such broad topics.
- 4) It would be better to ask either very specific questions or more visionary questions.
- 5) Nevertheless, we received a large number of interesting ideas. The ideas came from various countries, although in countries, where BB-Clean partners also supported this activity with additional communication actions (e.g. in France, where BB-Clean implemented awareness campaign in the context of individual emission analysis) the response was higher.
- 6) Further we understood that a communication strategy based solely on digital instruments, was not sufficient. The personal invitation (e.g. to working groups, university courses, research activities, etc.) played an important role.

Regarding the first challenge on *“Innovative ideas and technologies for a cleaner use of domestic biomass heating systems”* the top 4 best rated ideas were:

1) **Transparent real-time automatization of heating**

Automation can ensure burning control and thus increase efficiency. It should always be important to maintain and control combustion temperature by e.g. by automatic ventilation of the fire, so that predefined room temperature is not exceeded. Only 1°C higher room temperature can result in up to 6% more energy consumption.

2) **Smart Fire Management in the furnace / Automated Coordination of heating temperature in the furnace**

Faulty fire control and incorrect fuel are few of the main sources of fine dust. Firing temperatures that are too low result in more CO₂ and soot and therefore fine dust an excessively high combustion temperatures result in the formation of nitrogen oxide and can lead to inefficient use of fuel. The solution would be a digital automated coordination support (mobile app) to reach the optimal temperature in the furnace.

3) Online smoke gas monitoring

Experience shows that too often materials not suitable for burning are used - often residual materials are burned, e.g. wood with paint, etc. In order to prevent such illegal burning, an on-line smoke gas monitoring would be helpful. An algorithm could then help to evaluate the exhaust gas measurement and inform the authorities about possible incidents.

4) Water piping, twinfire

In order to increase the efficiency of the firing systems, a purchase of a wood stove with an integrated wood gasifier would be the option, such as Xeoos' TwinFire technology:

<https://www.xeoos.de/technik.html>

The afterburning of the wood gases enables a very high temperature and low fine dust emissions. If the technology is also combined with accumulation and detailed piping/guiding of the water in the rooms, up to 90% of the energy used can be converted into heat for the building. A buffer storage can also ensure that the living room temperature does not rise above a comfortable temperature of 21°C, even at high output. This also reduces heat loss from the building into the environment.

Regarding the second challenge on *“Optimization of Biomass Heating in the Alpine Region – Awareness Raising, Information Needs and Barriers”* the top 2 best rated ideas were:

1) Website – Weather linked heating information

On a website, the Federal Office could adjust the amount of fuel per fuel type annually to the average temperatures of the year. In this way, the user can get current information conveniently. Tips and contact persons could also be found on the website, e.g. in the form of videos.

2) The wood transport network

A "Wood" Network Manager could be created in the same way as for Gas or Electricity. Its action, like ENEDIS or GRDF: Manage inventory; Quality control; Manage new "connections" (logistics of wood delivery on site).

PM FORECAST APP AVAILABLE ON PLAY STORE



The app that provides meteorological and airborne particulate concentration (PM) forecasts developed as part of "BB-Clean" is now available for download in the Google Play Store.

The app was developed for Android devices. A web version for Apple and Windows users will soon be available. This app forecasts PM10 and PM2.5 three-hourly concentrations on a 48-h period (thanks to the values calculated by an integrated WRF-CHEM / Calpuff model calibrated with local experimental data) and provides information on a more sustainable use of wood-burning systems by providing an indication via a traffic light index (red-yellow-green). In the hours when the APP indicates a red traffic light, the use of wood combustion appliances is not recommended. Whenever the traffic light shows a green colour, a good dispersion of

pollutants is expected and therefore the use of wood-burning systems is allowed. A yellow traffic light suggests not to burn biomass if an alternative system (i.e. natural gas boiler) or a heat storage system is coupled to the biomass appliance .



The data shown by the web app are based on a meteorological weather forecast model coupled to a dispersion model at local level (200 m spatial resolution) running over two Northern Italian regions (Storo and Vezza d'Oglio territorial domains). The integrated model whose data are feeding the APP was calibrated with experimental data coming from monitoring campaigns developed in the two case studies investigated in January and February 2020.

Enjoy our new app and find it here:

<https://play.google.com/store/apps/details?id=at.fhj.ims.bbclean>

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Contact us for more information:

Energy agency of Savinjska, Šaleška and Koroška Region - KSSENA

ziva.vovk@kssena.velenje.eu