

# Modern logwood stoves – requirements, development and evaluation

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## Abstract:

Logwood is the oldest and still by far the most popular form of woody biomass. Framework numbers such as: 80% share of wooden biofuels in Europe, an overall stock of 65 million or annual sales of 3.5 million appliances impressively emphasise the importance of logwood fired direct heating appliances. Available technologies on the market widely range from very basic – practically the same technology as was used a century ago – to highly-developed for instance including electronic combustion control systems. This paper aims at giving a comprehensive overview about latest technology developments as well as estimating future market needs and resulting development goals for logwood combustion appliances based on recent and on-going RTD projects.

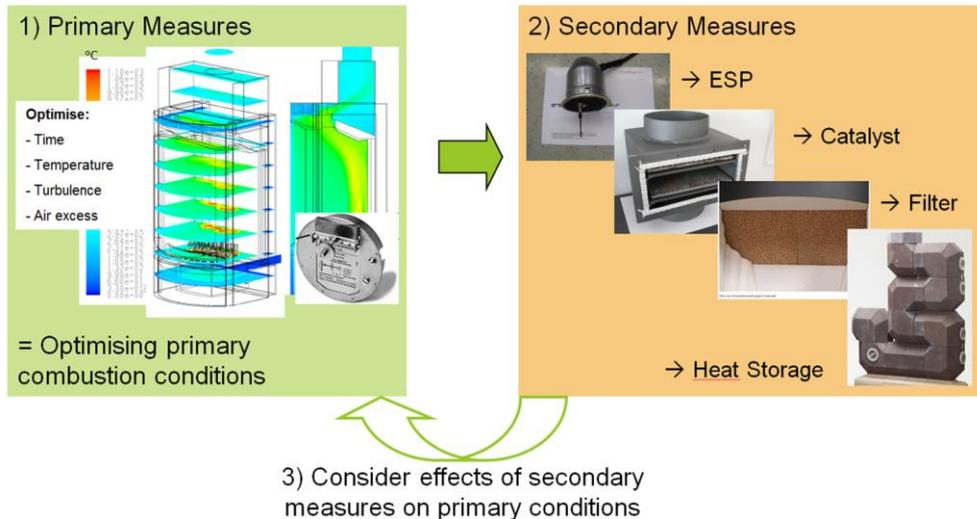
Framework conditions for direct heating appliances have been and still are changing with respect to market and legal requirements. On the regulatory side thresholds for emissions of gaseous and particulate compounds are continuously tightened. In addition the efficiency requirements are increased for all kind of energy relevant products including biomass based heating appliances.

Beside the legal situation also market needs and requirements are changing significantly since energy-saving has become a major topic in climate protection policy. European regulations and their implementations on national levels have led to a significant improvement of the energy performance of new and thermally renovated buildings. This results in a decrease of the total heat loads (space heating + hot water) to usually less than 10kW for single-dwelling buildings [1]. Therefore typical power outputs of logwood stoves of around 6-10 kW to one single room are by far too high. A reduction in the direct power output is required. Potential solutions based on heat storage concepts and parallel hot-water production are presented.

Another aspect of new building and renovation market that has to be considered in the development of direct heating appliances is the air tightness of buildings. Due to sealed outer shells of buildings a combustion air supply from outside of the building is crucial to ensure smooth and safe operation. Technical solutions for this issue have been worked out and investigated recently. Results of this project, which was dedicated to developing biomass-based heating solutions for lowest energy buildings, will be presented.

Combustion technology development of direct heating appliances currently mainly focuses on reduction of emissions and increase of efficiency. For both aims the implementation of primary measures as well as secondary measures is suitable. In an on-going European RTD project (FP7) four different direct heating appliances are developed by implementation of tailored primary measures in a first step and integration of a secondary emission abatement technology, in this case an oxidation catalyst, in a second step. As basis

of the integration step of the secondary technology extensive pre-testing has been performed with the catalytic material. In a third step the effects of the implementation of secondary measures on primary combustion conditions have to be evaluated. Results from this project as well as from other national RTD projects based on the same development concept (see Fig. 1) are presented to highlight the current state-of-the-art and the best available technologies respectively.



**Fig.1: Development procedure of modern logwood stoves**

## 1. Acknowledgements

Presented results have been or are still derived under three different support schemes. The financial supports from (I) the Austrian *Klima- und Energiefonds* under the program *Neue Energien 2020* coordinated by the Austrian Research Promotion Agency (FFG); (II) bmvit, bmwa, the Federal Provinces of Burgenland, Lower Austria, and Styria under the COMET program coordinated by the Austrian Research Promotion Agency (FFG); and (III) and of the European Union in the framework of the FP7 are highly acknowledged.

## 2. References

[1] G. Benke et al., Bericht: Umfeldstudie zu Trends im Einfamilienhausbau, FFG 820502 (2011)