

Dear reader,

On 23 April, the first training module of WOTIM was arranged by FCBA in Grenoble. The purpose of this one-day workshop was to review the requirements for insulating materials in general, to explore the potential markets and to review the wood materials possible to use in these insulation products as well as current production methods of insulation products. The special requirements regarding resistance to fungi, water and fire were also covered. Discussions within the training module were lively and mainly focused on potential additives for better protecting the cellulose insulation materials for different situations. With this newsletter we will give you a summary of the workshop. The presentations at the training module are available at the website [www.wotim.eu](http://www.wotim.eu).

*Petri Jetsu, VTT  
Project Coordinator*

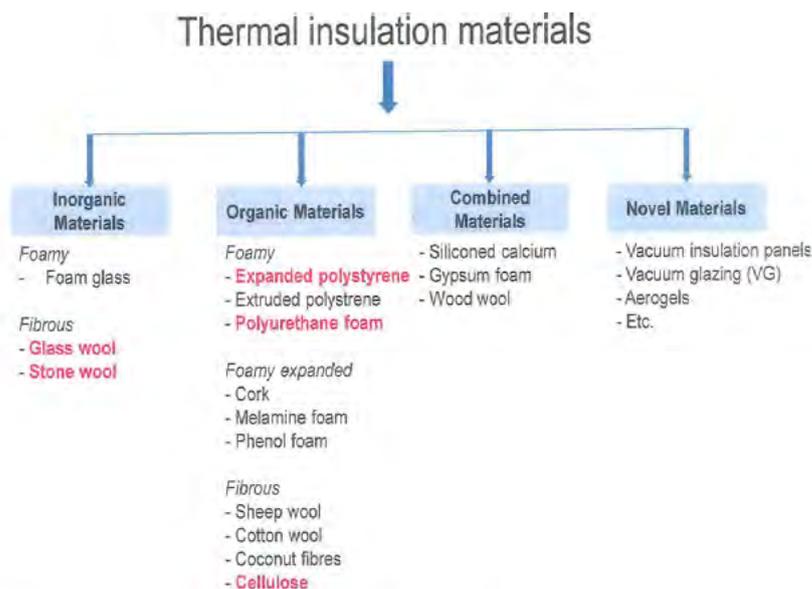
## Summary of presentations

### Basics for thermal insulation materials

The presentation clarifies the basic phenomena related to thermal insulation. The presentation answered to the questions What is thermal conductivity?, How the thermal conductivity is measured? and How to certify a lambda value?. The most important variables like thermal conductivity, thermal resistance and thermal transmittance as well as the difference between the closed and open cell insulations was explained by equations, figures and examples.

### The different types of insulation materials

The “Market survey” clearly indicated that the present market is extremely small with regard to cellulosic materials, dominated by stone and glass wool.



The five most common types of insulation materials are marked in red.

Thermal insulation properties of insulation materials are in the range possible to reach with the cellulosic materials.

### Thermal conductivity of thermal insulation materials

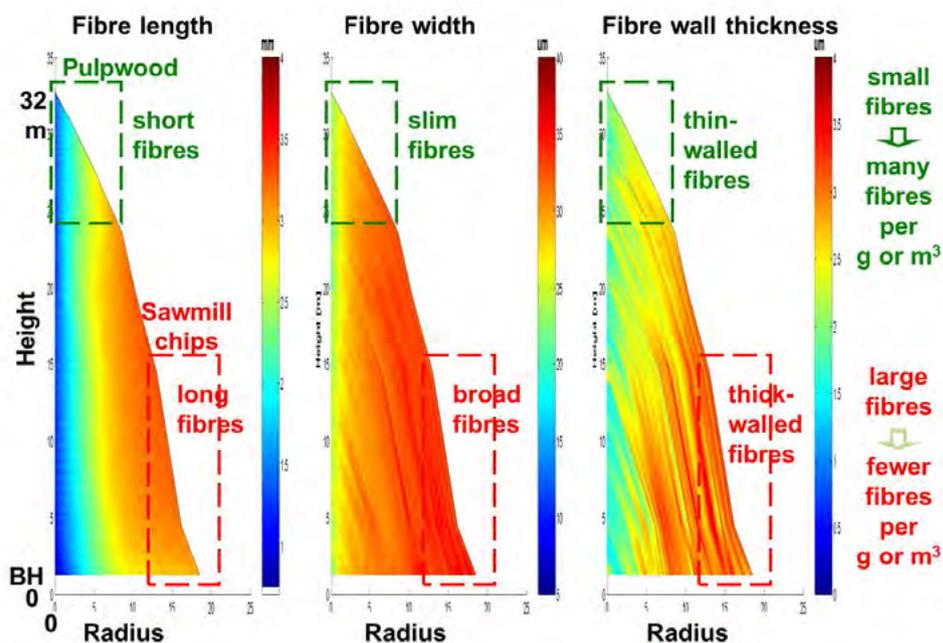
Insulation product	Chemical composition	$\lambda$ (W/m K)
Mineral wool	Inorganic oxides	0.034–0.045
Glass wool	Silicon dioxide	0.031–0.043
Foam glass	Silicon dioxide	0.038–0.050
Expanded polystyrene (EPS)	Oil-based polymer foam	0.029–0.055
Extruded polystyrene (XPS)	Oil-based polymer foam	0.029–0.048
Phenolic resin foam	Oil-based polymer foam	0.021–0.025
Polyurethane foam	Oil-based polymer foam	0.020–0.029
Silica aerogels	SiO <sub>2</sub> based aerogel	0.012–0.020
Organic aerogels	Aerogels derived from organic compounds, e.g. cellulose	0.012–0.020
Vacuum insulation panels (VIP)	Silica core sealed and evacuated in laminate foil	0.003–0.011
Vacuum glazing (VG)	Double glazing unit with evacuated space and pillars	0.003–0.008

Aegerter M A, Leventis N, Koebel M M, Aerogels handbook, USA: Springer; 2011.

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### Wood and wood fibres

The presentation demonstrated the large variability of the wood raw material – a fact to consider when factors as fibre length and fibre coarseness play a role.



### **Focus on fibre based insulation materials**

The presentation described the different raw materials used and the processes for producing insulation materials thereof recycled fibres, textile-cotton, annual plants and virgin fibres with with processes such as wet or dry.

Recycle fibres: Recycled newsprint post-consumer collected, Sorted to remove plastic, wood and other contaminants, Mixed with post-industrial; recycling which consists of unsold newspapers

Textile-cotton: recycled blue jean manufacturing trim waste

Annual plants: Hemp, Jute, Miscanthus, Straw

Virgin fibres: wood fibres

Issues regarding moisture, fire and insects proof additions were also discussed.

### **Current wood fibre based thermal insulation materials – Comparison with other materials**

The presentation pointed out the increasing use of loose wood fibre as an insulation product and described its areas of use. Compared to more traditional insulation materials the cellulose products are comparable. There are, however, challenges to overcome:

- thermal properties – cellulose needs thicker layers
- mechanical properties – compression strength limited, dimensional stability
- resistance- fire, biological growth

Discussions within the training module were lively and mainly focused on potential additives for better protecting the cellulose insulation materials for different situations. In the exhibition, different kinds of commercial insulation and WOTIM materials were presented as well as different kinds of wood fibres.



*Delegates of the WOTIM first training module in Grenoble.*