

## **IEA-EBC Annex 65**

# **Long-Term Performance of Super-Insulating Materials (SIM) in Building Components & Systems**

*IEA Energy in Building & Communities*

*Achieving near zero energy use through open innovation*

18 February 2014

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CSTB

- Energy Saving in the Building Sector
  - Space Heating + Domestic Hot Water + Refrigeration
  - = more than 80 % of energy consumption
  
- Most of the Energy is wasted and not used on purpose – Heat Leaks is the first energy user !
  
- Thermal Insulation is among the most cost-effective carbon abatement measures
  
- Thermal Performance of the Building Envelope is a top priority

## ■ New Buildings

- NZEB (Net Zero Energy Building)
- 10 % to 20 % of additional energy consumption (2050)

## ■ Renovation/Retrofitting

- Building stock : more than 80% of energy consumption
- 75% of current buildings will still be standing in 2050

- Super-Insulating Materials
  - Vacuum Insulation Panel
  - Nano-Porous Materials such as Aerogel
  
- Performance & Durability
  
- Implementation Techniques
  
- Sustainability
  - LCA, LCC, Embodied Energy (Annex 57)

# Super Insulating Materials

**Nano-Porous Materials  
 Aerogel**



**Gas Filled Panel  
 GFP**



**Vacuum Insulation Panel  
 VIP**



$$U = \lambda / e \text{ W/m}^2\text{K}$$

$\lambda$  : thermal conductivity  
 e : thickness

$$\lambda_g = \frac{\lambda_{g0}}{1 + C \cdot \frac{T}{\delta \cdot P}}$$

Pore size      Pressure



- AEROCOIN : Aerogel
  - <http://aerocoins.eu/>
  
- HIPIN : Aerogel
  - [www.hipin.eu](http://www.hipin.eu)
  
- NANOINSULATE : VIP
  - [www.nanoinsulate.eu](http://www.nanoinsulate.eu)
  
- FOAMBUILD : Nanofoam
  - [www.foambuild.eu](http://www.foambuild.eu)
  
- BUILD UP Web Seminar : Superinsulating materials: State of the art applications and long term performance -  
<http://www.buildup.eu/news/38814>

- State of the Art of one decade of:
  - SIM development by industry
  - SIM applications in the building sector
- Experimental & Numerical Tools to provide reliable data (properties & durability)
  - Standards & Assessment
- Guideline for Secure Implementation
- Information about Sustainability of SIM
  - LCA, LCC
  - Embodied Energy (in agreement with Annex 57)

- To improve knowledge and confidence of end-users regarding SIM, mainly VIP & Nano-Porous materials such as Aerogel
- To foster a wider public acceptance of SIM in the future



## ■ **SUBTASK 1: State of the Art on Materials & Components - Case Studies**

- **SubTask Leader: ZAE Bayern (co-leader EMPA)**
  - Action 1A : Materials & Characterization Methods
  - Action 1B : Components & Systems
  - Action 1C : Case Studies at the Building Scale

## ■ **SUBTASK 2: Characterization of materials & components - Laboratory Scale**

- **SubTask Leader: FIW Munich (Chalmers)**
  - Action 2A : Materials Testing & Ageing Procedures (Experiments & Simulation)
  - Action 2B : Components & Systems Testing (Experiments & Simulation)

- **SUBTASK 3: Practical Applications – Retrofitting at the Building Scale - Field scale**
  - **SubTask Leader: Chalmers University**
    - Action 3A : Mapping of the Use Conditions (Components & Systems)
    - Action 3B : Performance at the Building Scale (Experiments & Simulation)
    - Action 3C : Practical Applications focused on Retrofitting

## ■ SUBTASK 4: Sustainability – LCC, LCA, EE – Risk & Benefit

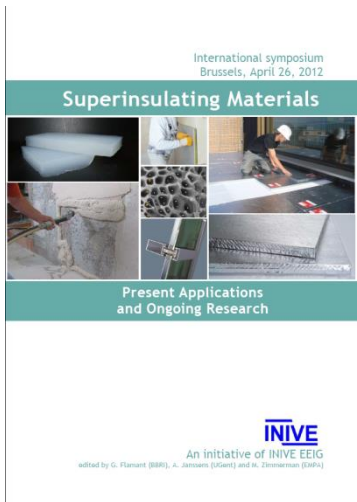
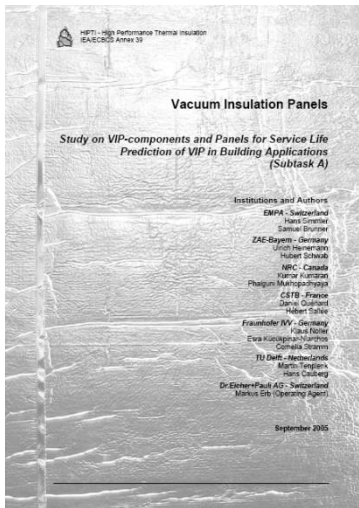
- **SubTask Leader : Quantis**
  - Action 4A: Life Cycle Assessment (LCA), including Embodied Energy (EE) –Annex 57
  - Action 4B: Life Cycle Cost Analysis (LCC)

- State of the Art on SIM (products & applications)
- Recommendations on methods and procedure to characterize SIM in lab. - Standards
- Recommendations on how to perform reliable testing of components and building integration
- Guideline of appropriate applications and implementation methods
- Sustainability Analysis

- ISO, CEN, UEATc, EOTA
- The Building Research Community
- Material, Component and System :
  - Manufacturers, Suppliers
- Engineering offices and consultants
- Building designers & Software developers
- Building contractors with an interest in high performance systems
- Energy providers

## Participating Countries

- **Strong interest and high probability of funding:**  
France, China, Germany, Italy, Korea, Norway, Spain, Sweden, Switzerland, Turkey, UK, Japan, Greece
- **Interested and in process to obtain funding:**  
Canada, Belgium
- **Potential observer:**  
Israel
- **Participation at the expert-meeting**  
Netherlands



## Preparation Phase

**1<sup>st</sup> Expert Meeting**  
 Paris/ April 2013  
 1<sup>st</sup> Annex Text

**ExCo Meeting**  
 Rome/June 2013  
 Annex65 – Text to be revised

**2<sup>nd</sup> Expert Meeting**  
 Zurich/Nov. 2013

**ExCo Meeting**  
 Dublin/Nov. 2013  
 Annex65 – Revised Text

**From mid-2014**  
**Working Phase**  
**To mid-2017**

**IEA Annex 39**  
**HIPTI : 2001-2005**

**INIVE-BBRI-EMPA**  
**2012**

2005    2007    2009    2011    2012       2013       2014    2017

Zurich    Wurzburg    London    Ottawa       Zurich       Nanjing

**IVIS : International Vacuum Insulation Symposium**

- You are welcome to contribute to the Annex

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