Introduction

Why SIM ?

What are SIM ?

Technical Assessment – Certification – Normalization

European Projects
Heat, the largest energy end-use

50% of total energy consumption: to provide heating for homes, industrial purposes and other applications.

- 50%: industry, process heat, drying and industrial hot water uses.
- 46%: space and water heating (60 to 80%) and cooking in the buildings sector.
- The remainder was used in agriculture.

In 2017, only 10% of heat was produced from renewables.

Source: https://www.iea.org/renewables2018/heat/#summary
2050: Challenges in the building sector

New Buildings
- NZEB: a well insulated building first
- only 10% to 20% of additional energy consumption (2050)

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

Why new insulating materials?
1: still, too much thermal bridges, even for ETICS
2: Space savings
3: Fire risks for ETICS
4: Low room temperature & diseases

Source: POUGET consultant
What are Super Insulating Materials?

**Advanced Porous Materials (APM)**

**Vacuum Insulation Panel (VIP)**

Thermal conductivity of embedded gas

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

25 mW/mK for still AIR

SIM: from mature products

Packaging
Seams & fringes

Protection
Insulating layer

Source: Annex39 – HIPTI - 2004
Source: BPIE – PROMAT - MORGAN Plc
To system solutions with important innovation potential

VIP with protection layers for Handling & Transportation, Installation & Service Life (T&RH)

Fixing & Fastening

Sources: va-Q-tec – Recticel – IQ panel


Aerogel

Aerogel Blanket for Thermal Bridges Treatment of Window Reveals

Aerogel Insulating Plaster
- λ = 0.028 W/mK
- Commercially sold since 2013
- Water repellent & diffusion open
- Swiss environmental award at Swissbau 2014
- Innovation Award „Pauli Allbau” at BAM 2015

Source: Enviroform
EOTA – EAD for VIP & AEROGEL

Certification & Technical Assessment

EOTA EUROPEAN ASSESSMENT DOCUMENT

EOTA EUROPEAN ASSESSMENT DOCUMENT

EOTA EUROPEAN ASSESSMENT DOCUMENT

CSTB / CSTB

Avis Technique 20/15-360

Optima VIP application en mur
**CEN/TC 88/WG 11 N 148**

**Thermal insulation products for buildings — Factory made Vacuum Insulation Panels (VIP) — Specification**

*Produits isolants thermiques pour le bâtiment — Produits manufacturés en laine vacuum isolation panel (VIP) — Spécification*

Source: Ulrich PASSON – Saint Gobain

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**European Projects:** [http://amanac.eu/](http://amanac.eu/)

**AEROCOINS**: Aerogel-based composite/hybrid nanomaterials for cost-effective building superinsulation systems

**HIPIN**: High Performance Insulation based on Nanostructure Encapsulation of Air

**NANOINSULATE**: Robust, cost-effective opaque and transparent vacuum insulation panels (VIPs) incorporating new nanotechnology-based core materials.

**VIP4ALL**: Highly Sustainable and Effective Production of Innovative Low Cost Vacuum Insulation Panels for Zero Carbon Building Construction

**HOMESKIN**: The HOMESKIN project aims at developing a new silica Advanced Aerogel-Based Composite

**GELCLAD**: Highly efficient cladding eco-panels with improved nano-insulation properties

**INNOVIP**: Innovative multi-functional Vacuum-Insulation-Panels (VIPs) for use in the building sector

**WALL IN ONE**: WALL Insulation NOvel Nanomaterials Efficient systems

**EENSULATE**: Development of innovative lightweight and highly insulating energy efficient components and associated enabling materials for cost-effective retrofitting and new construction of curtain wall facades.
Two Associations to promote VIP & APM

VACUUM INSULATION PANEL

VIPA
GLOBAL ASSOCIATION

Advanced Porous Materials

https://vipa-international.org/   http://advapor.org/

IVIS

IVIS Paris 2017
13th International Vacuum Insulation Symposium
September 20-21, 2017

http://ivisparis2017.org/

IVIS KYOTO 2019
14th International Vacuum Insulation Symposium
September 19 - 20, 2019, Kyoto, Japan

http://ivis2019.jp/
Conclusions

• **SIM are mature materials**, even if there is further room for improvement to expand their application areas.

• The development and uses of SIM are spreading around the world. **Market growth remains slow** but is expected to rise within the next decade, especially in Asia.

• Recommendations on how to perform reliable testing of components and buildings integrating SIM are now available and are shared among the actors, while a first standard is expected to be published imminently.

Conclusions

• The SIM sector must now evolve **from a single material or product to a system solution**, rather as the windows sector did by shifting from separate frames and glazing elements to integrated windows. In other words, a Vacuum Insulation Panel can be considered as an “opaque glazing” element with similar handling & installation constraints to a window system. Therefore, insulation installers should acquire new skills.
Conclusions

- **Good design is important**, and coupling with traditional insulation materials is recommended in order to improve SIM service life.

- Application guidelines would be very useful for installers.

- In the future, Life Cycle Assessment of SIM needs to be improved; the methodology is ready but reliable data are expected from industry.

Thank you