Energy Efficient Ventilated Façades for Optimal Adaptability and Heat Exchange enabling low energy architectural concepts for the refurbishment of existing buildings.

E2VENT WORKSHOP

„Horizon 2020 in practice“

E2VENT Business opportunity

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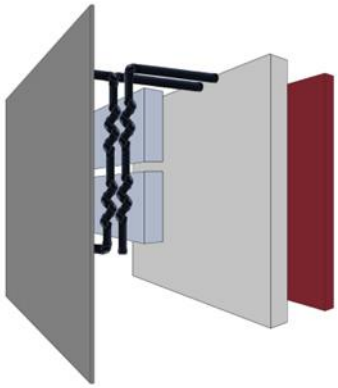
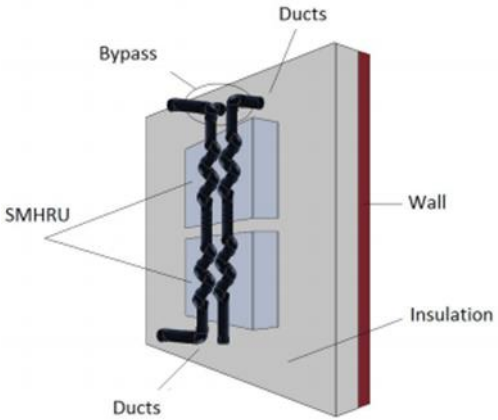
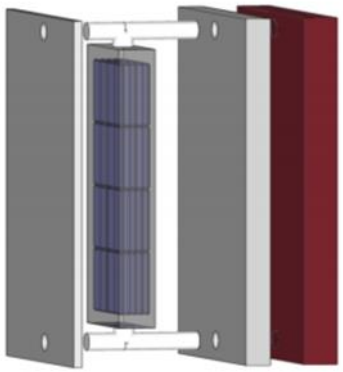
The E2VENT system

- The E2VENT system consists of an external solution for the building refurbishment





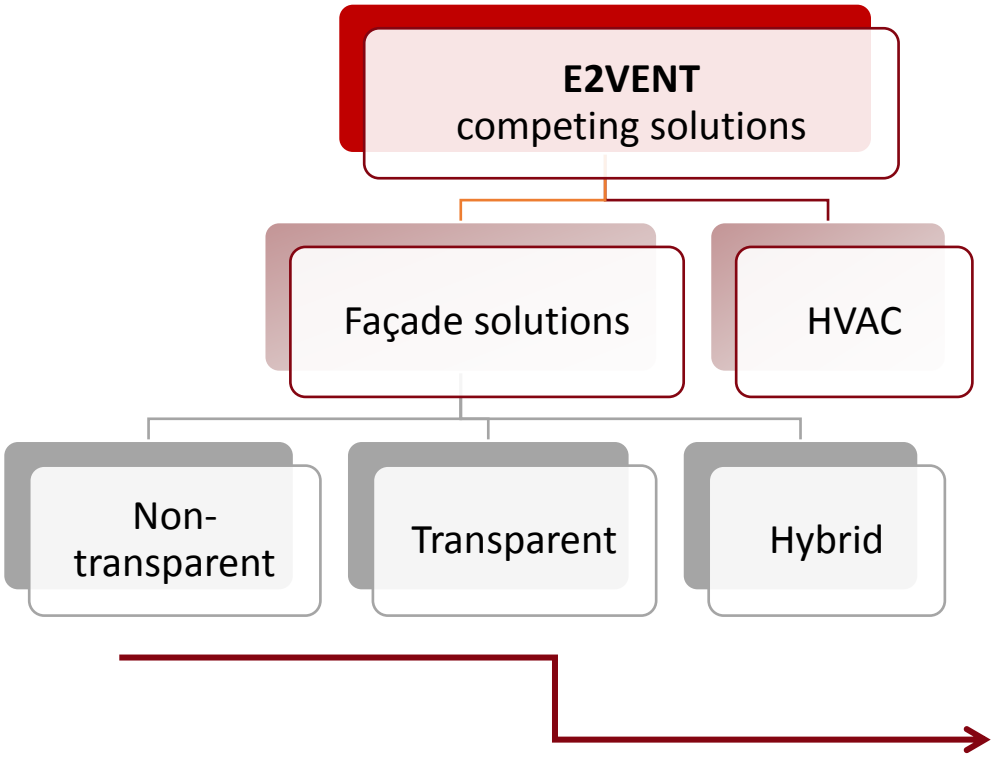


E2VENT System
the unique selling point is the integration of different breakthrough technologies, which offer both ventilation and insulation functions

SMHRU
It allows the heat recovery from the extracted air using a double flux heat exchanger performing the air renewal

LHTES
It is based on phase change materials and will provide a heat storage system for heating and cooling peak saving

Competitive scenario



- Technological solutions competing with E2VENT system can be divided in two main categories:
  - Façade solutions
  - Heating Ventilation & Air Conditioning (HVAC) solutions
- Among façade solutions, a distinction should be made between non-transparent, transparent and hybrid ones

Industry and competition/1

Non-transparent solutions

These solutions are applied to blind walls

- Cladding, some providing a rain screen function only, i.e. not always providing insulation
- Ventilated cladding systems, most of them including insulation
- External Thermal Insulation Composite Systems (ETICS)
- External thermal insulation panel systems (sandwich panels)

The E2vent solution is directly competing as it belongs to a «ventilated cladding system»

Transparent solutions

Curtain walls, dealing with perimeter enclosing being a self-supporting structure

The E2vent solution is indirectly competing with these solutions regarding the ventilation function mainly

Industry and competition/2

Hybrid facade solution

In between the transparent/non transparent solution. Transparent materials can be used to clad blind walls allowing to collect solar heat gains but with no daylight provision to the building interior

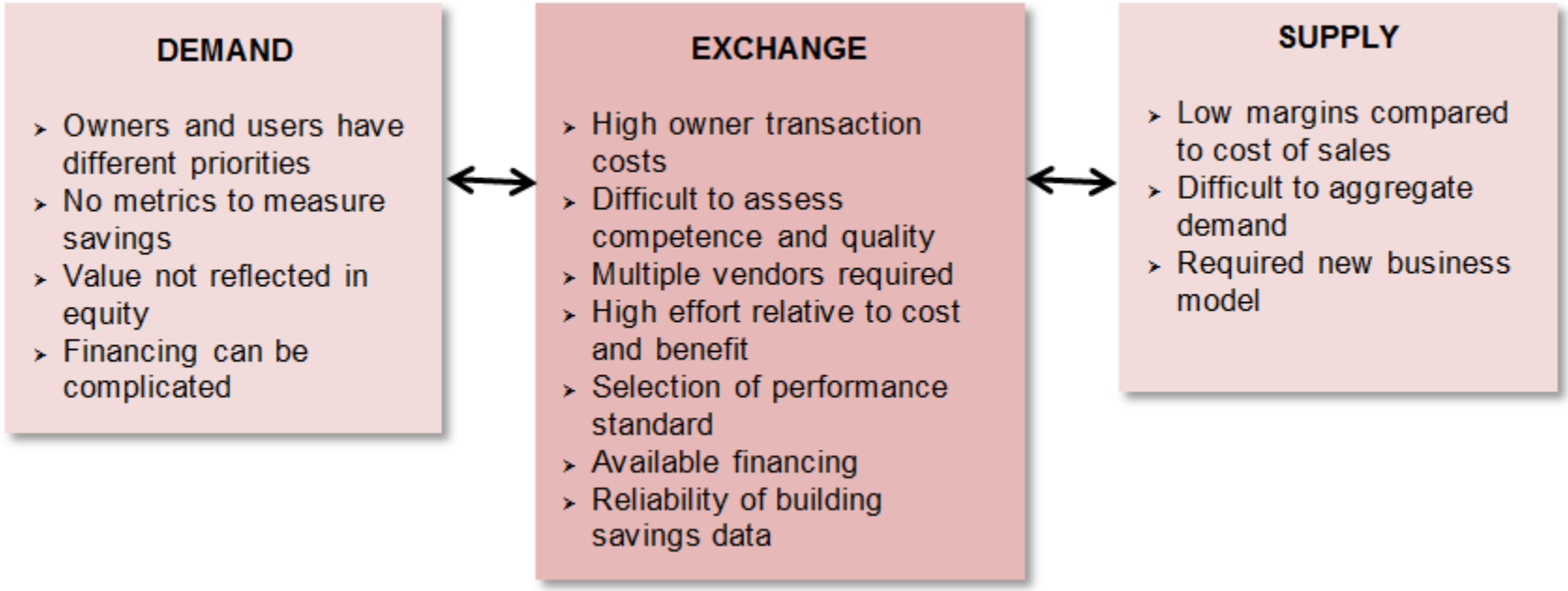
The E2vent solution is <u>indirectly competing</u> with these solutions as well

Heating, ventilation and air conditioning solutions

<u>The E2vent solutions does not belong to this category but is in indirect competition</u> regarding the ventilation function and HR particularly for decentralized HVAC systems

Market entry barriers

- The retrofitting market has been facing some relevant barriers both on the demand side and on the supply one



Market opportunities

The assessment of the market opportunities for E2VENT system took into account several factors:

1. **Variable 1:** Number of target buildings
   → % of buildings built in the period 1949-1975
2. **Variable 2**: Household's income
   → % of people at risk of poverty
3. **Variable 3**: Ownership structure
   → % of owner occupancy
4. **Variable 4** Energy prices
   → % of the energy expenditure
5. **Variable 5**: Suitable buildings
   → % of the Multi Family Buildings (MFB)

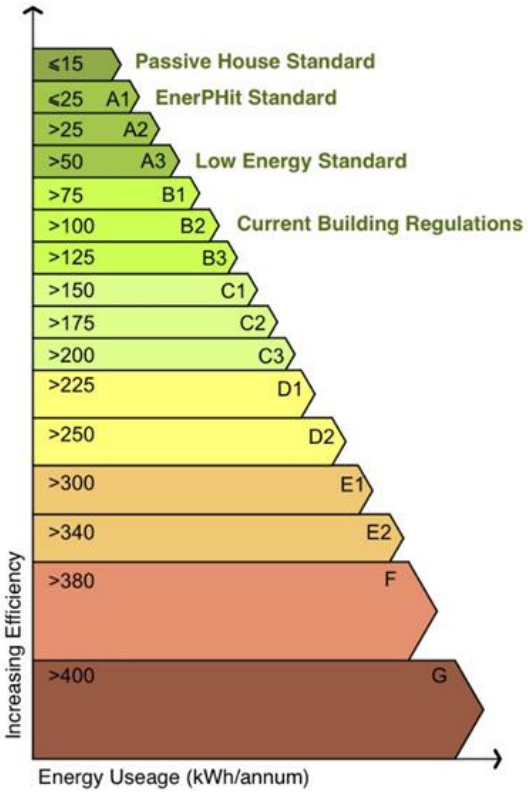
Main EU target countries

- The main EU countries identified as the most profitable ones for the deployment of E2VENT system are:
  - Germany
  - Italy
  - Spain

- Positive market perspectives driven also by trend in NZEB market and PassivHouse, besides EE driven initiatives

Important driver: PassivHouse

The results have been then crossed with the info related to the passive house market



The Passive Houses are as such NZEB in accordance with the European Directive 2010/31/UE, which starting from 2020 requires every new construction and major renovation to reach the standard of passive building

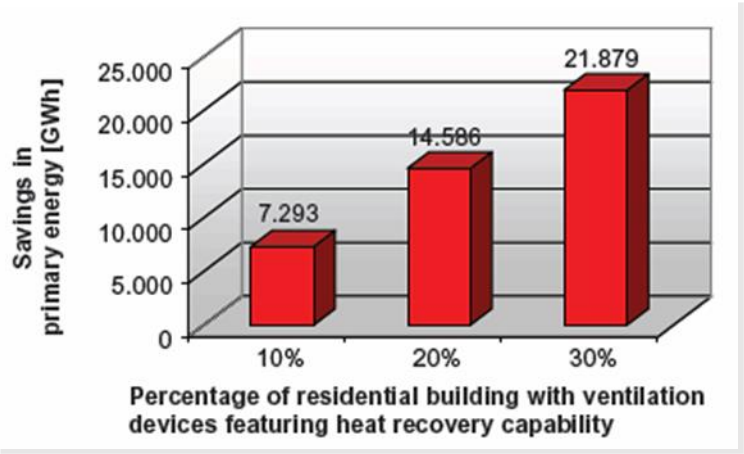
- **By 2021** – the first year when the EU Buildings Directive will take effect for all buildings throughout Europe – the **passive house will be the dominating construction standard for new buildings**
- In the passive houses, at least 50% of the thermal heat is caused by the ventilation → thermal heat requirement can only be significantly reduced by using heat recovery in ventilation systems as the E2VENT solution

EE Legislations

- The main driver for the construction of Passive House buildings is and is expected to be European legislation which states that:
  - All new buildings must be nearly zero energy buildings by 31 December 2020 (public buildings by 31 December 2018)
  - EU countries must set minimum energy performance requirements for new buildings, for buildings that undergo major renovations and for the replacement or retrofit of building elements (heating and cooling systems, roofs, walls, etc.)

German market

- Germany is the most promising European market for the commercial exploitation of E2VENT system
- In Germany, the energy transition strategy (*Energiewende*) adopted by the Federal Government in 2011 proposed the elaboration of a long-term renovation plan for the existing building stock :
  - Doubling of the building energy modernization rate from 1% to 2% per year
  - 20% reduction in the heating energy demand by 2020
  - 80% reduction in the primary energy requirement in the building sector by 2050
- Estimates for residential ventilation scenario in Germany show the potential of energy savings based on forecasts which expect that, up to 2020, HRU will be present in 10, 20 or 30% of the building stock



Estimates of residential HRU by 2020 in Germany and related energy savings

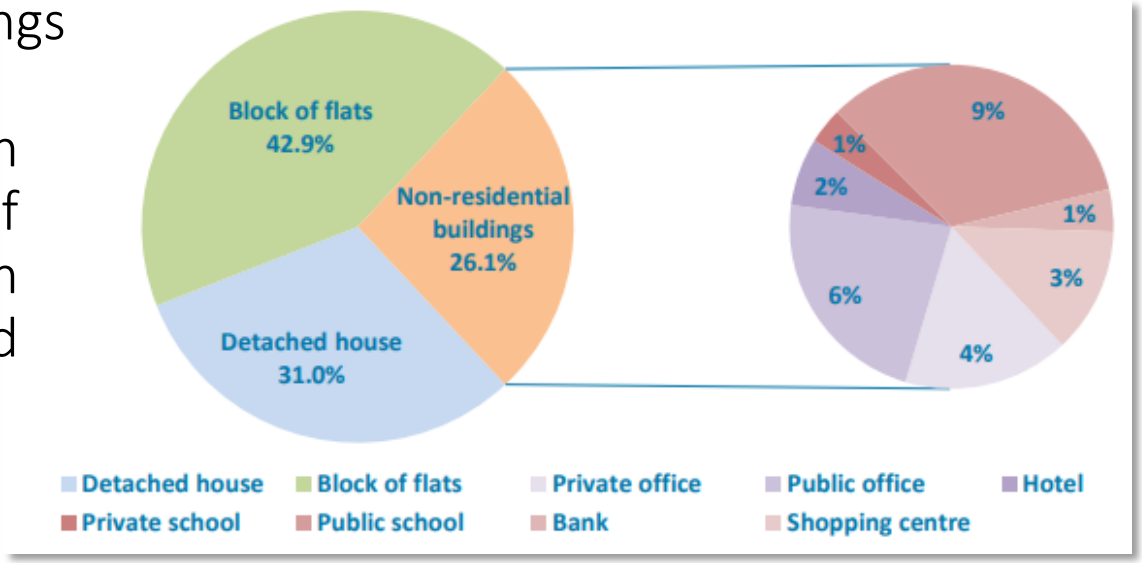
Spanish market

- Spain is a large market with **important refurbishment necessities of the Building Stock** because of the low levels of energy efficiency and indoor air quality requirements
- Some important **market trends** and conclusions for the sector are:
  - New smart materials for the façades have been increasingly using
  - The façades are increasingly taking importance for their roles in improving also acoustic performance and indoor air quality
  - Façade smart systems are creating new tendencies and opportunities such as the integration, collection and distribution of the thermal energy on the new façades

Italian market

- Energy efficiency renovation of buildings is a priority for Italy:
  - more than two thirds of the Italian stock was built before 1976
  - the energy saving potential is wide
  - the level of investments in the residential sector is about 13.6 billion euros per year for interventions aimed at the overall renovation of buildings

- Italy has assessed an immediate application of NZEB parameters both to new buildings and deep renovations



Italian building renovation strategy: expected energy saving for 2020 (%)

Exploitation strategy

- Commercialization of the **stand-alone modules** – the SMHRU and the LHTES
  - The LHTES could be sold as a stand-alone system for renovation of tertiary buildings (internal side of the building)
- Exploitation of the **E2VENT integrated solution** comprising:
  - Ventilated façade → insulation layer, anchoring and profiles, and aluminum cladding
  - SMHRU → for the air renewal
  - LHTES → for pre heating and pre cooling
  - BEMS → for the piloting of the HVAC systems, and for the occupant's use

SMHRU Business Model

Business Model Canvas for SMHRU

KEY PARTNERS

- Raw material suppliers
- Architects
- Contractors
- Public institutions (also as channel)
- Façade engineers
- BMS integration specialists

KEY ACTIVITIES

- Manufacturing
- Dimensioning
- Marketing

KEY RESOURCES

- Personnel expert and skilled
- Raw materials
- Technology
- Partnerships
- Adapted production line

VALUE PROPOSITION

- Technology of cladding system for external
- Interior esthetic preserved
- No reduction of internal space
- No large duct system
- HRU dimensionally adaptable
- Double flux exchanger
- Heat recovery of ventilation air
- High air indoor quality and low energy losses

CUSTOMER RELATIONSHIP

- Market-pull to customers
- Market-push to partners

CHANNELS

- Housing ass.
- Architects
- Contractors
- Environmental Ag.
- Visual media
- Training
- Technology centers

CUSTOMER SEGMENTS

- Building owners
- Social housing owners (SHO)

COST STRUCTURE

- Manufacturing
- Materials
- Shipment

REVENUE STREAMS

- Selling
- Maintenance and controlling
- Possible integration with LHTES and BEMS

LHTES Business Model

Business Model Canvas for LHTES

KEY PARTNERS

- Raw material suppliers
- Architects
- Contractors
- Public institutions (also as channel)
- Façade engineers
- BMS integration specialists
- **PCM suppliers**

KEY ACTIVITIES

- Manufacturing
- Dimensioning
- Marketing

KEY RESOURCES

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- Raw materials
- Technology
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- Adapted production line

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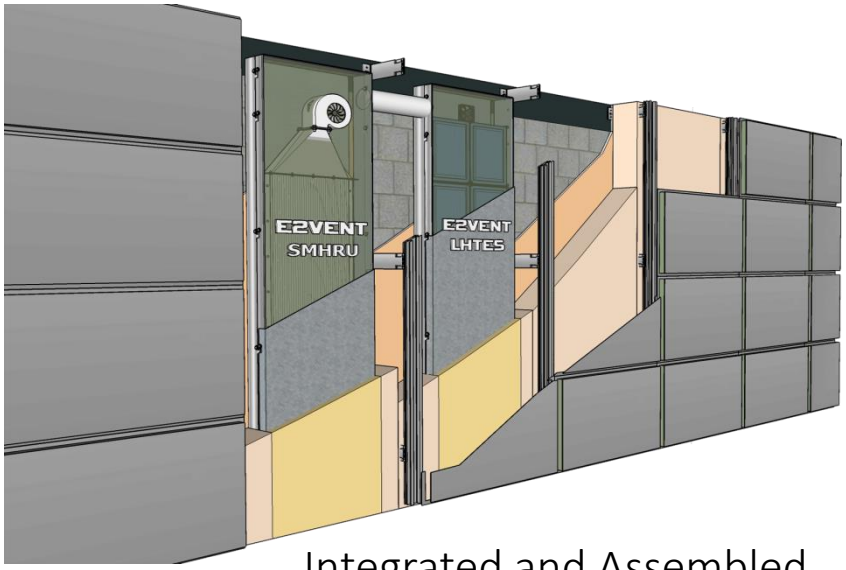
REVENUE STREAMS

- Selling
- Maintenance and controlling
- Integration with BEMS

Integrated E2VENT Business Model

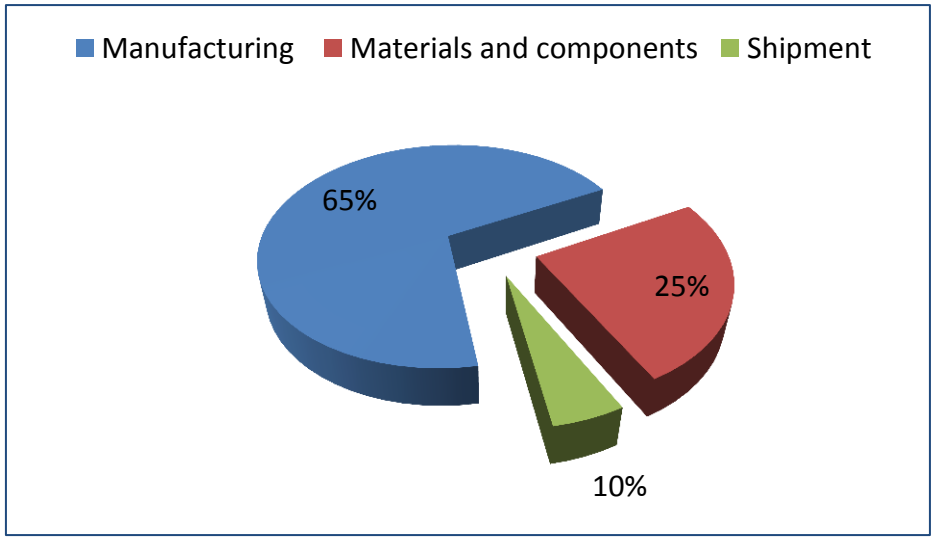
- The Business Model for the integrated E2VENT solution will be similar to the other two models for the stand-alone products (SMHRU and LHTES)
- There are additional elements:
  - the **anchoring design support tool**, aiming at supporting the design and optimization of the E2VENT anchoring system
  - the **BEMS**, namely a smart management that, using various sensors, will control the system functioning on a real time basis



Integrated and Assembled E2VENT Solution

Costs estimation

- The cost structure for both SMHRU and LHTES – and consequently for the E2VENT integrated solution – is characterized by the following percentages



Conclusions

- Fragmented and competitive market for ventilated façades
- Growth trends for ventilated façades and retrofitting markets
- Need of energy efficiency solutions for buildings
- E2VENT results to be a very competitive and innovative solution which cross-cuts different markets (ETICS/HVAC solutions)
- E2VENT can overtake main barriers and find opportunities in the market of façades interventions
- Various markets might be addressed (first target markets will be Germany, Spain and Italy)

Thank you for your attention.

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