

Multi-source Energy Storage System Integrated in Buildings (MESSIB)

■ Possible application in existing homes

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European Funded Research Project

- FP7 work programme topic addressed:
NMP: 4.4.0.5. Resource Efficient
and Clean Buildings
- Type of funding scheme: Collaborative Project –
ii). Large-scale integrating project
- MESSIB project idea and related research plan have
been selected in the evaluation process as one of many
competing proposals



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The Chemical Company BASF SE, Germany

 Slovenski gradbeni grozd - GIZ
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 **KNAUF**
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Scope and technologies involved in MESSIB

- The objective of the project is to develop and integrate a **new energy storage capacity in buildings** able to reduce the energy consumption by thermal storage, and active management of the energy demand by electrical storage.

- Main technologies to develop under the project are:
 - Thermal storage (heat absorbing slurries and geothermal energy)
 - Electrical storage (flywheels and vanadium red-ox flow batteries)

Objectives

Research includes:

- obtaining Microencapsulated hydrated salts
- new phase change materials (PCM)
- advance ground storage (GS) technology
- composite materials (with nanomaterials) for flywheels (FW) to increase the storage capacity
- more durable vanadium-red ox flow batteries (VRB)

Objectives

Knowledge and technologies generated will:

- **Reduce the energy demand** of buildings from the grid
- **Reduce the total energy costs** by shifting energy from where and when it is not needed to moments and regions of the building where it can be of most value.
- Reduce the energy peaks creating a non saturated grid reducing the overload times which will **increase the security and efficiency of the network.**
- **Reduce emissions** with renewable sources, storing renewable energy during low load times and allowing storage of 'Off-grid' PV & Wind energy.



Possible application in existing homes

- For residential application importance is thermal storage
- The principal benefit of MESSIB thermal storage capacity is the increase of the **energy efficiency** and **indoor comfort** in buildings by the reduction of the energy demand and the decrease of thermal gradients and temperature variations. Thermal energy will be moved within the building through space and time to take advantage of this energy that otherwise would be wasted.

Main Expected Results

- Reduction of the energy consumption from the grid, outage avoidance, improvement of grid reliability.
- Improvement of the energy management of building and district with an associated cost reduction for end users.
- Savings on household energy bills.
- Promotion and sale of new and renovated energy efficient buildings based on energy storage technologies.
- New Services for the applicability of MESSIB at district level and cultural heritage buildings. Favouring the creation of micro-grids at district level and also the increase of cost effective RES in buildings.
- New services based on new business models for energy storage.
- Improve the competitiveness of both the European Building and Energy sectors in key energy efficient technologies.
- Increase of the indoor comfort.
- GHG emissions reduction (associated to energy consumption reduction).



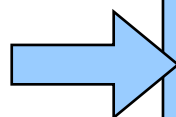
Impact on existing homes

- Energy consumption will be reduced using the thermal energy from the sun and storage in MESSIB thermal components to use in space and water heating.
- With PCM Materials the overheating hours can be reduced in summer by more than 80 %, this will save energy because no chiller is installed.

Savings on household energy bills

In a conventional residential building with conventional technologies, the consumption is:

heat 200 kWh/m²/yr,
electricity 30 kWh/m²/yr
air conditioning 50 kWh/m²/yr,



end user energy cost
30.21 €/m²/yr
(EU-25 prices: 0.1416 €/kWh and
gas for heating 0.0944 €/kWh)

With MESSIB implementation in the market a 25% reduction in energy demand will be achieved; the cost of the electricity will be reduced at least 40%. With this assumptions the calculated cost of the energy beyond MESSIB will be **19.26 €/m²/yr.**

Timeline

- Project duration: 4 years
- Start date: January 2009
- Already accomplished:

WP1 Meeting customers and value chain requirements, driving forces and trends

- In progress:

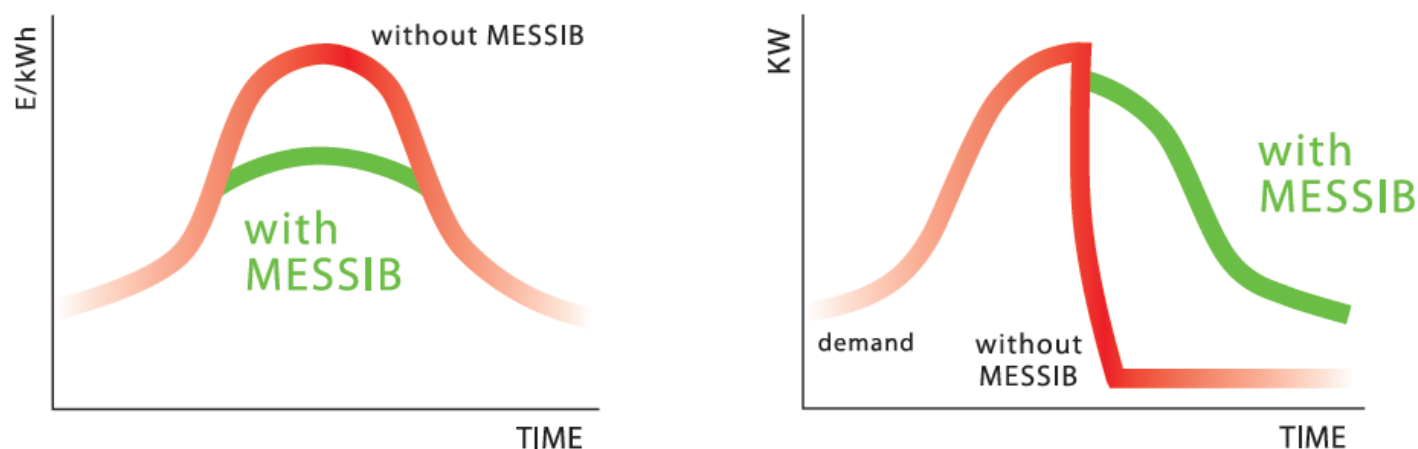
WP2 Thermal Energy Storage Technologies for buildings: PCMs and ground storage,

WP3 Electrical Energy Storage Technologies for buildings: Flywheels and Batteries

WP	1 st Year				2 nd Year				3 rd Year				4 th Year			
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Conclusions

Energy Storage systems are a key point in refurbishing existing homes and enabling the creation of Energy Efficient Districts.



Thank you for your kind attention