

Session 1: EU-India Smart Grid Projects - Building Energy Communities and Social Innovation

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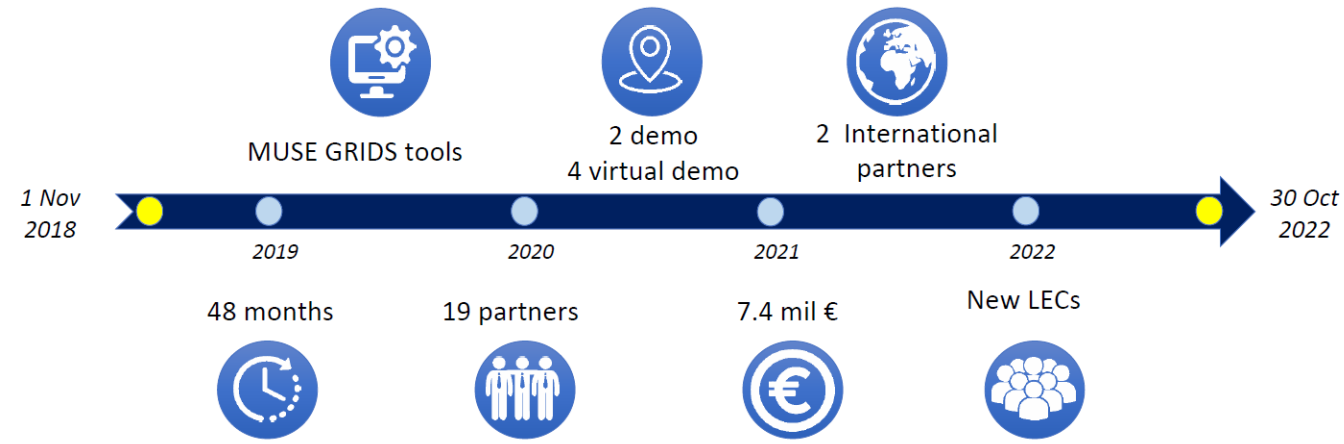
MUSE GRIDS Project



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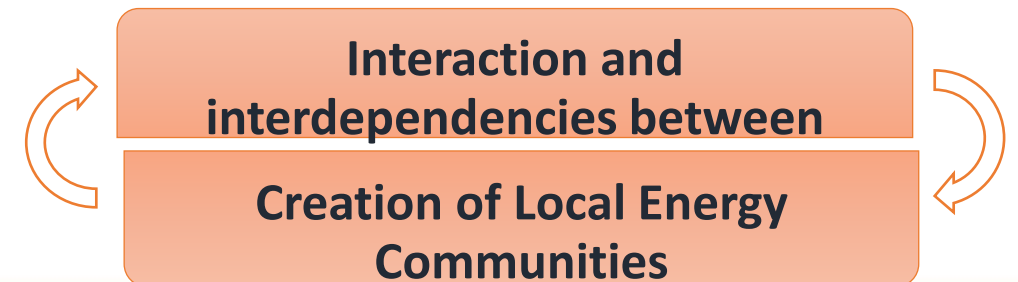
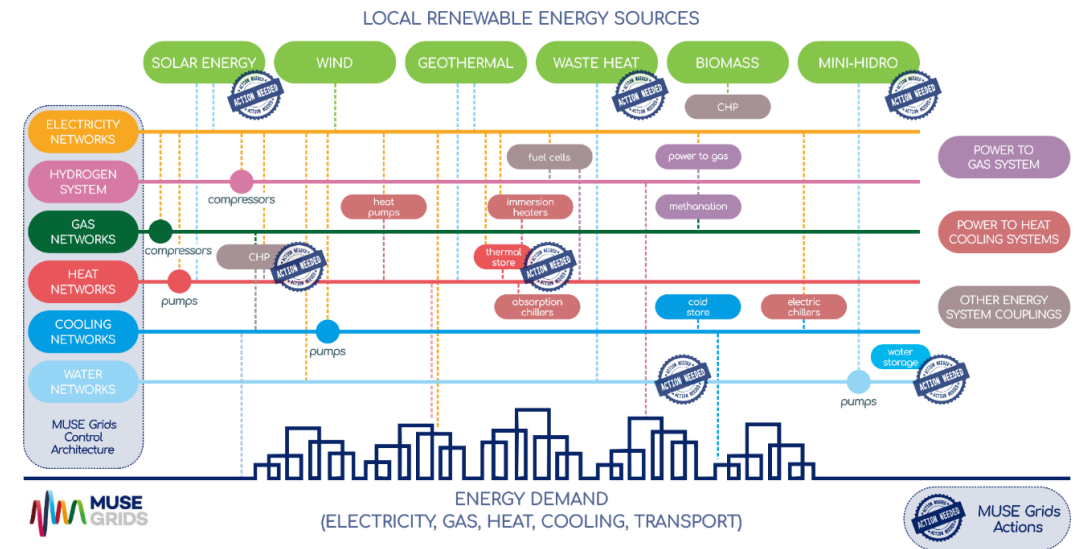


MUSE GRIDS Project in a nutshell

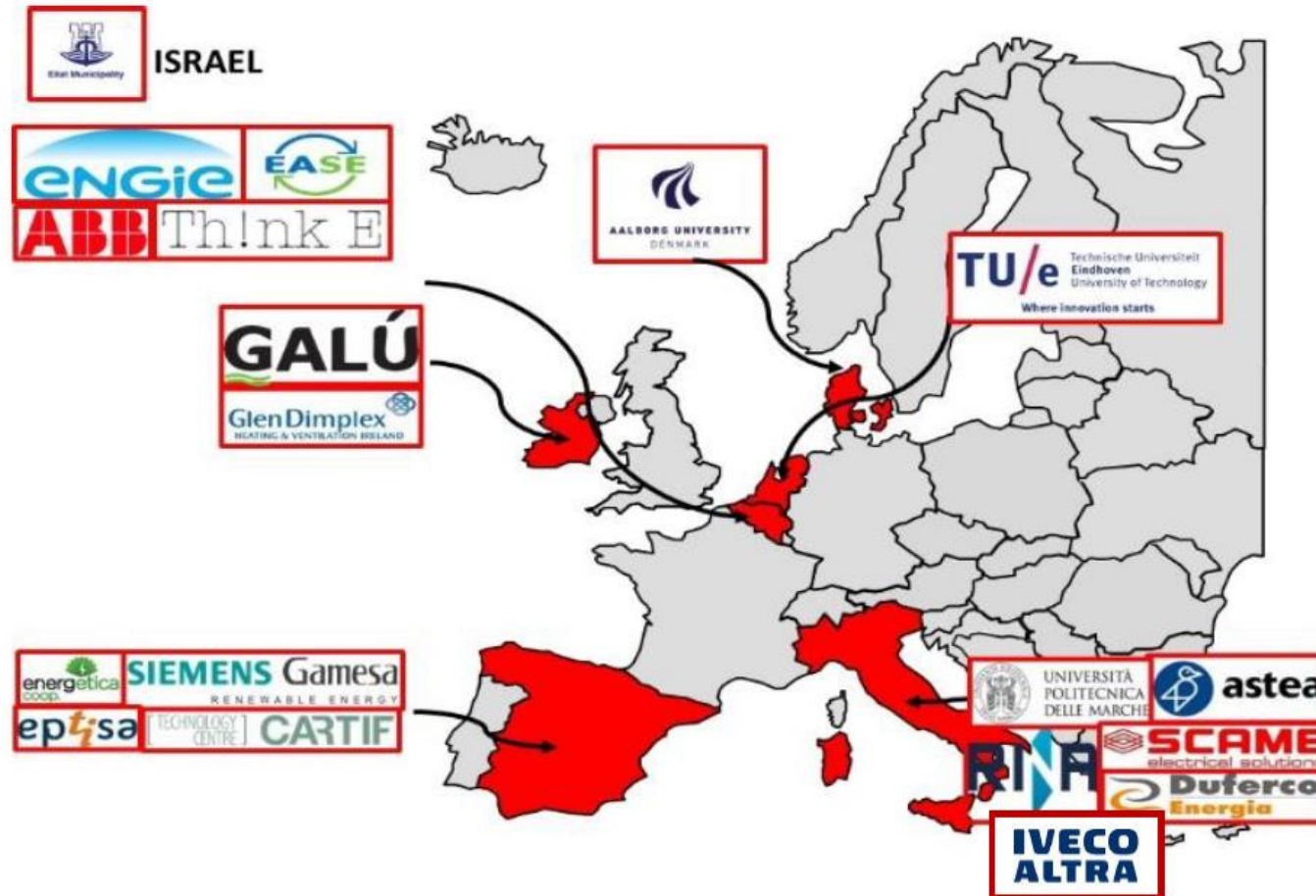


Demonstrate in two **INSPIRING DEMOSITES** a set of both technological and non-technological solutions towards local energy independency via the promotion of **SMART ENERGY SYSTEM**

MUSE Grids aims to be a lighthouse/ inspiration project for EU

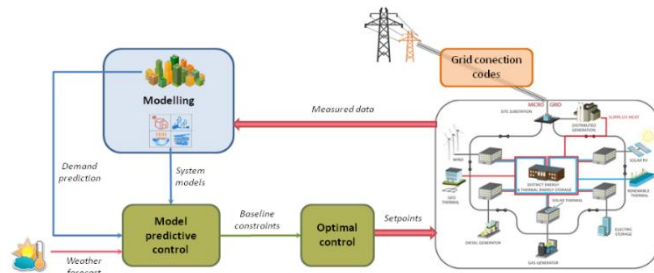


MUSE GRIDS Project Team

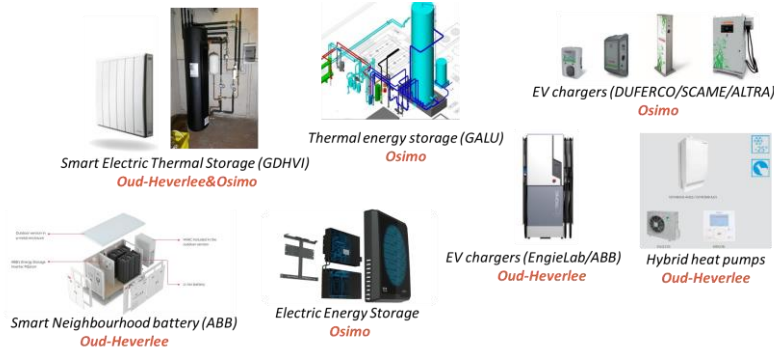


- An industry driven consortium
- 3 demonstration oriented local clusters (Spain, Belgium, Italy) to be properly directed to maximise sharing of best practices

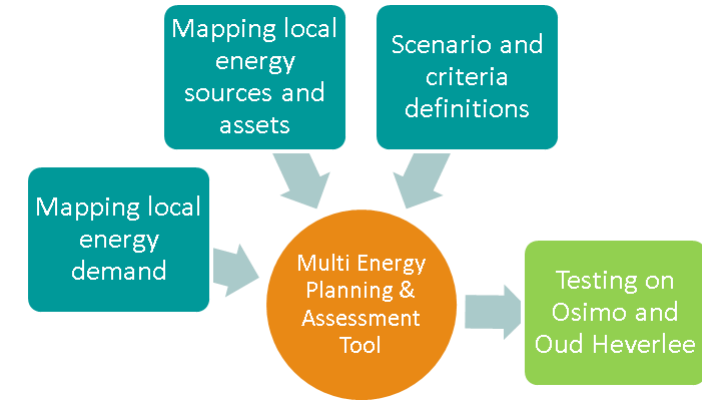
PILLAR 1: OPTIMIZE AND AGGREGATE ENERGY GRID MANAGEMENT SYSTEMS IN A MULTI ENERGY DSM



PILLAR 3: KPI DRIVEN DEMONSTRATION AND REPLICATION



PILLAR 2: MULTI ENERGY PLANNING FOR EU CITIES



PILLAR 4: ENGAGEMENT OF END USER IN POLYGENERATIVE ENERGY GRIDS AND CREATION OF ENERGY COMMUNITIES



Project pilot sites

Real Demonstration

Osimo (Italy)



A municipal microgrid in a historical town on a top of a hill with a DHN, a smart water pumping system with a large PV presence aiming to optimize supply management making it more reliable thanks to EV

Oud-Heverlee (Belgium)



A rural area with houses equipped with RES generators where to further promote flexibility assets and the engagement of local energy communities moving to the effective integration of an enlarged local energy community

Virtual Demonstration

District of Belen, Valladolid (Spain)



San Cebrià de Campos (Spain)



Eilat (Israel)



Sundarbans, Bali Island (India)



Replication Cities

RIGA
(Latvia)



PESARO
(Italy)



CONSTANTA
(Romania)



PORTO
(Portugal)



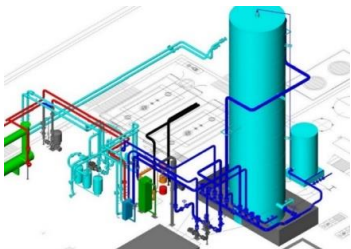
COLOGNE
(Germany)



MUSE GRIDS demonstration - Osimo

A municipal microgrid in a historical town on a top of a hill with a DHN, a smart water pumping system with a large PV presence aiming to optimize supply management making it more reliable thanks to EV

- Data monitoring system installation
- Tailored grid system architecture
- Installation of different flexibility assets
- Preparation of CHP plant
- Launching event and several public presentations
- First on-line survey completed for the socio-economic impact



A rural area (OUD-HEVERLEE, Belgium) with houses often equipped with RES generators where to further promote flexibility assets and the engagement of local energy communities moving to the effective integration of an enlarged local energy community

- Installation of different flexibility assets
- Tailored grid system architecture
- Active engagement of the energy communities via door-to-door visits
- Discussion for energy pricing for the end consumers in place
- Tariffing scheme preparation
- A user interface to show the participants their consumption and their contribution to the consumption of the energy community
- Three public events organization (launching event + 2 end-users engagement)



MUSE GRIDS – Sundarbans, Bali Island

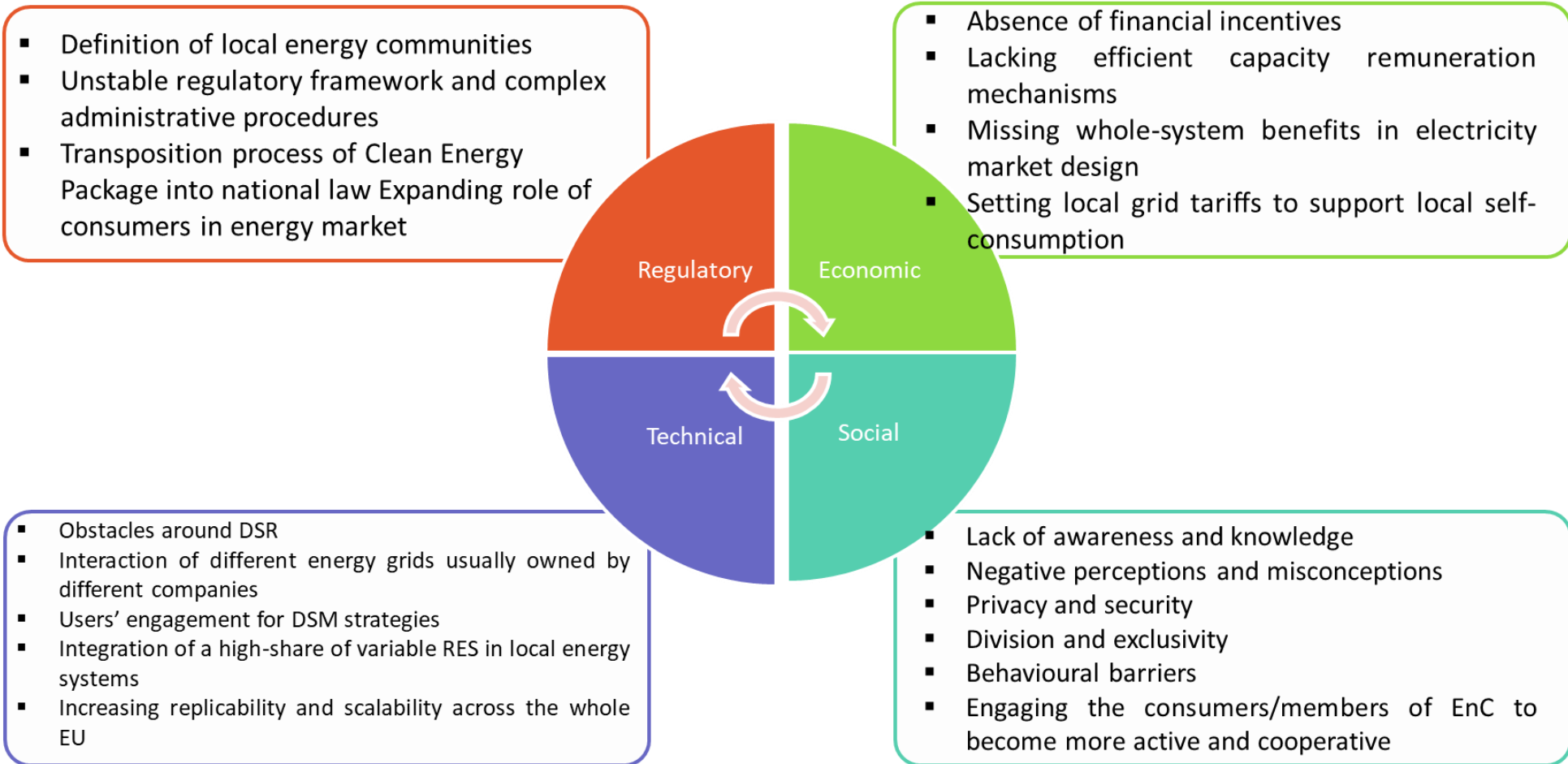
Island village located at rural parts of West Bengal (Sundarbans) in an area of 110 km² where a population of 32000 live there in around 20000 buildings

- No power connectivity and the village was completely dependent on Solar power and diesel generators.
- Installation of meter is under progress.
- Several individual houses have their own solar systems (400 W PV + 1 to 3 kWh battery).
- State Electricity company has started electrification and it is in the process of connecting all the households & other establishments through grid connectivity.



MUSE GRIDS will monitor local energy consumption/production and will simulate some part of the village in order to develop a local smart grid stimulating energy exchanges among different solar systems, taking into account industrial load and potential installation of a neighbourhood battery.

Key Challenges



Qualitative analysis and evaluation has performed so far

Environmental impact

- avoided GHG emissions
- primary energy savings
- reduction of electricity purchase from national grid
- reduction of the overall energy bill
- Electricity self-consumption of local RES production in both demo sites

Social impact

- The creation of awareness and better understanding of energy system transformation by end users
- Increased quality of life of citizens
- Empowerment and engagement of consumers
- Get consumers involved in fight against climate change
- Increase social or public acceptance
- Activate consumers through technologies
- Include different types of consumers to go against poverty and exclusion

Economic impact

- Energy savings
- Peak reduction
- Increase energy production
- Energy system more secure and stable:
- Moderate energy demand
- Demand shifting
- Energy arbitrage

MUSE GRIDS Progress

Osimo main results

- **Reducing the supply water temperature:** in a typical winter week a reduction of the fuel consumption of about 1% (1870 kg of CO₂eq emissions).
- **Introduction of the thermal energy storage:** allows a longer operation of the CHP (PES 25%).
- **DSM in the energy flexible building:** SETS used to shift between energy vectors and to increase the electricity demand during weekends store it and supply thermal energy to the building during the working days
- **A beneficial use of electric vehicles in the Astea's building** can be effectively programmed to increase the PV electricity produced locally avoid electricity re-injection into the national grid
- **DSM strategy for the water pumping station:** better management of the electricity use by water pumps and electricity production avoiding surplus of renewable electricity

Oud-Heverlee main results

- Main goal was to qualify ***the impact the demand side management on the voltage of the street***
- Improving the voltage on the feeder also to decreasing grid dependence and LCOE.
- for a clouded day,
 - the battery is not needed to improve the power quality
 - DSM has a huge influence to decrease the overvoltage during the evening peak
- during sunny days
 - the battery is needed to keep the voltage within acceptable limits having a positive effect on the maximum and the minimum voltage.
 - It increases the auto-consumption

LEC can be more easily engaged in the real-life testing of solutions aimed at solving important challenges impacting daily life and therefore constitute ideal candidates for demonstration activities requiring societal engagement and active residents' commitment.

- ❑ Active involvement of end-users specially in Oud Heverlee to provide useful feedback on social acceptance.
- ❑ Potential impact in terms of replicability since each case study is representative of an important energy challenge common to several locations in Europe
 - *Osimo*, managed by a multi-energy utility will represent an interesting example on how the sector integration is fundamental for a more safe and secure energy system
 - *Oud Heverlee* represents the perfect case of a microgrid at the end of the distribution line acting as a real energy island being more autonomous and independent in weak connection situation.
 - Involvement of *four virtual demo* site will enhance MUSE GRIDS potential in other EU and extra-EU countries.
 - *ECOOP* is encouraging the creation of local energy communities as a new model of energy production and consumption.

Thank You

For discussions/suggestions/queries email: www.indiasmartgrid.org
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