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ETIP SNET
EUROPEAN TECHNOLOGY AND INNOVATION PLATFORM
SMART NETWORKS FOR ENERGY TRANSITION

Storage technologies and sector interfaces

SENSIBLE Project

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SENSIBLE focused on the demonstration of distributed energy storage

Scope
- Demonstration of distributed small scale energy storage and energy management
- Lab validation and demonstration in real operation scenarios

Budget
- 15 M€

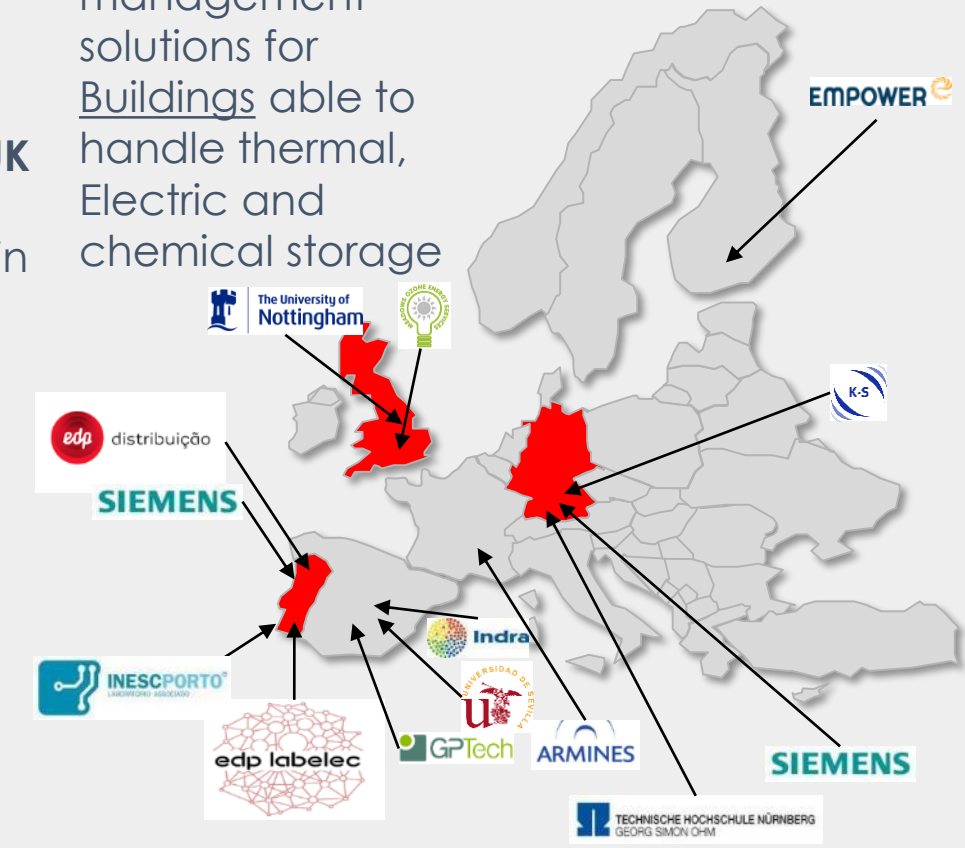
Duration
- January 2015 – December 2018

Consortium
- 14 partners from 6 EU countries, led by Siemens A.G
- Strong involvement of EDP Distribuição (DSO)

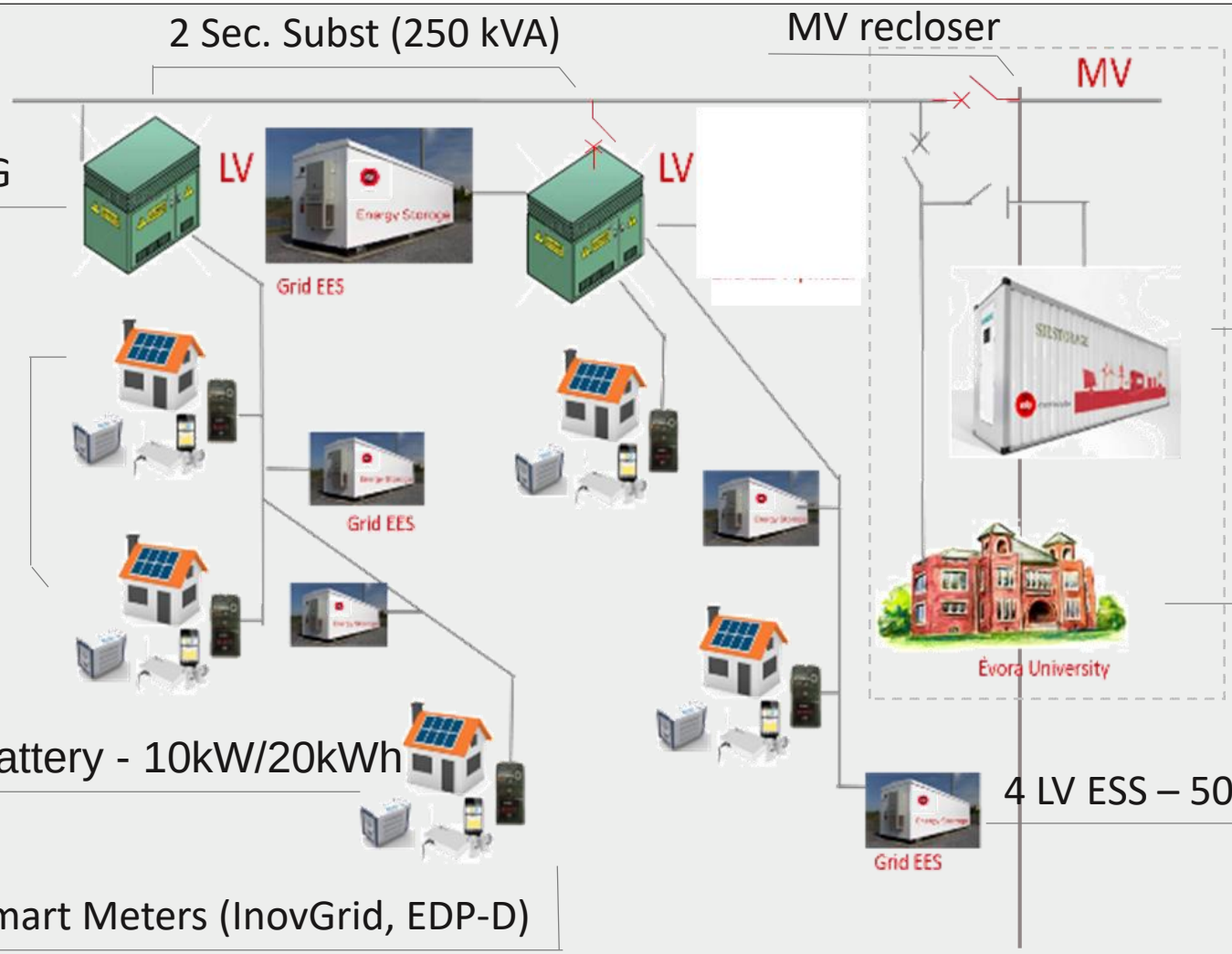
Nottingham – UK
Energy management in Communities

Évora - Portugal
i) Grid operation in LV and MV; ii) New energy services for customers

Nuremberg – Germany
Advanced energy management solutions for Buildings able to handle thermal, Electric and chemical storage



Focus on the Portuguese demonstrator



25 HEMS
25 PV – 1,5 kWp
15 Batteries – 3 kW
15 Elec. Water heaters - 2kW

MV ESS - 480 kW/360 kWh (already installed by EDP-D)

1 MV Client (870 kVA)

1 Residential Prototype Battery - 10kW/20kWh

4 LV ESS – 50/2x30/10 kW total of 160 kWh

240 GPRS Smart Meters (InovGrid, EDP-D)

Key exploitable results addressing energy system integration

- The DSO (EDP Distribuição) has now the **capability to monitor and optimally control** ESS through its already **pre-existing smart grid architecture**
- An **architecture was developed where an aggregator can explore the flexibility** of residential clients (from PV, batteries and water heaters) and provide services to a retailer (optimizing bidding results in day ahead and intraday markets) or to the DSO (optimizing grid operation by minimizing voltage constraints or extend operation in islanded mode).

Quantifiable results and benefits available

- Network Operation
  - 11% of energy losses reduction both in LV and MV networks through the optimal dispatch of LV and MV Storage Systems respectively)
  - Islanding operation of LV and MV networks up to 1 hour
  - Energy Not Supplied reduced 98,8%
- Consumers
  - Increased self-consumption up to 67% (from which, 26% due to storage technologies)
  - Average monthly savings of 25€ (cost reduction between 30% and 50%)

Lessons learned

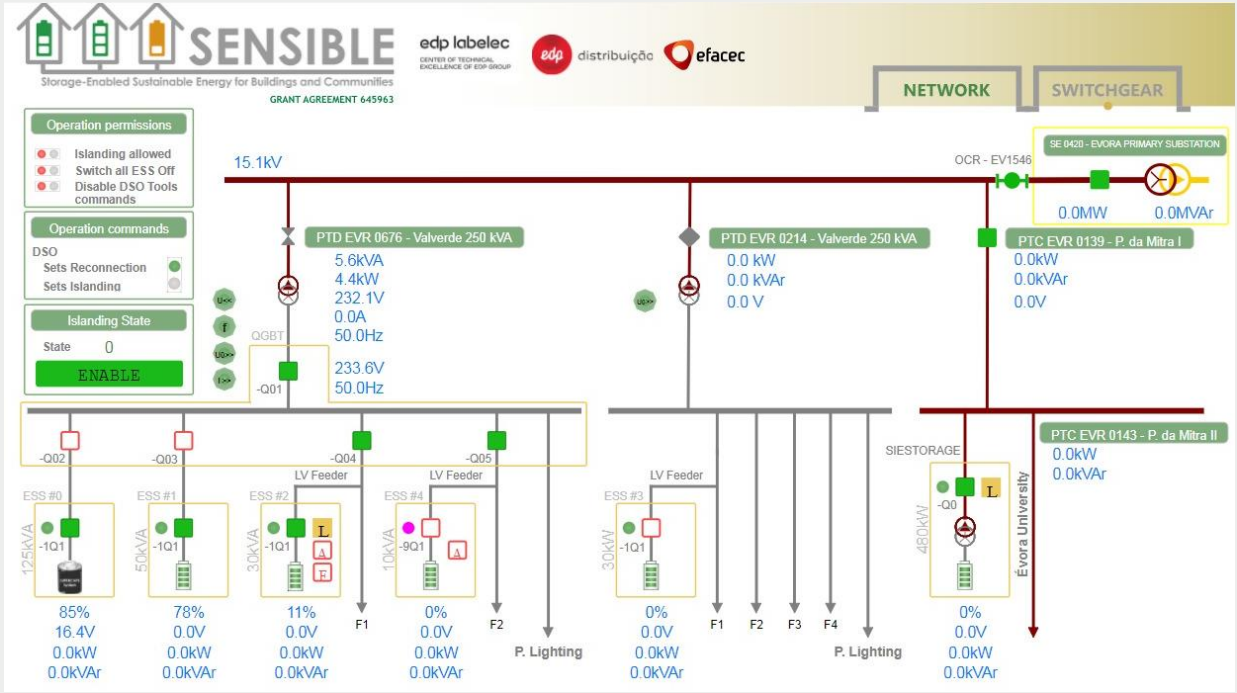
- The integration of **ESS** in the operation of distribution networks **requires an optimization approach, accurate load, generation and flexibility forecasts** (and optimally, real time data) and a **reliable Smart Grid infrastructure**
- The **operation of ESS is very flexible** and some solutions are **easy to transport and install** for emergency solutions
- SENSIBLE proved the potential of **ESS** integrated in **smart grid** paradigm (smartmetering, automation, DSM, ...) as well as **high-level tools improving the observability, reliability and resilience of distribution networks** during normal and operation

Barriers to innovation deployment

- **The high cost of Energy Storage Systems (CAPEX&OPEX)** when compared with other solutions (voltage regulators, emergency generators, …) is still a constraint for the large deployment of the Technology
- The ownership of storage by DSOs is still limited, so for now DSOs are not deploying these technologies for operation of the grids
- **Residential flexibility is a valuable asset also for the DSO**, namely during grid emergency operation, yet there are still **no incentives / regulation in place**.

Deployment prospects of the most promising solutions

- MV Storage is installed and can be used for islanding situations and to provide backup to the MV client
- Control interface is in place and allows to monitor the status of the grid and the storage and to control it



Needs for future R&I activities coming out of the project

- Need for standardization on the specification, testing, commissioning, and data models of ESS
- The most promising solutions are currently being used in other H2020 projects
  - Deeper data integration, with a Data Hub being managed by the DSO (INTEGRID)
  - Additional services being provided to the grid by ESS (INTEGRID)
  - Integration of flexibility in local energy markets and wholesale and reserves markets (DOMINOES)
  - P2P transactions using prosumers' flexibility (DOMINOES)

Thank you!

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