[inteGRIDy] San Severino Pilot
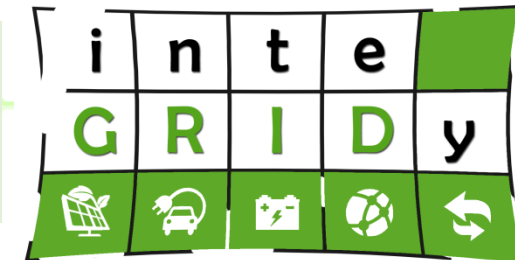
SUSTAINABLE
PLACES 2020
October 27-30, 2020
Digital Event

Giuseppe Mastandrea (Energy@Work)

Lorenzo Corghi (UNE)

Workshop on Integrated Storage systems for Residential buildings, 29th October 2020

Project Identity Card

❑ **Title:** inteGRIDy - integrated Smart GRID Cross-Functional Solutions for Optimized Synergetic Energy Distribution, Utilization Storage Technologies

❑ **H2020 Call:** 2020-LCE-02-2016 - Demonstration of smart grid, storage and system integration technologies with increasing share of renewables: distribution system (IA)

❑ **Duration:** 48 months (Jan 2017 to Dec 2020)

❑ **EU Contribution and Total Costs:** € 12.329.013 (Overall Budget € 15.644.559,19)

❑ **Coordinator:** ATOS SPAIN SA

❑ **Country Coverage:** 30 Partners from Italy, Greece, Romania, Spain, UK, France, Cyprus, Portugal

❑ **Website:** http://www.integridy.eu/

❑ **Pilots:** 10 Pilots (Isle of Wight (UK), San Severino Marche (IT), Terni (IT), Ploiesti (RO), Xanthi (GR), Thessaloniki (GR), Nicosia (CY), Barcellona (ES), Lisbona (PT), Saint-Jean de Maurienne (FR)
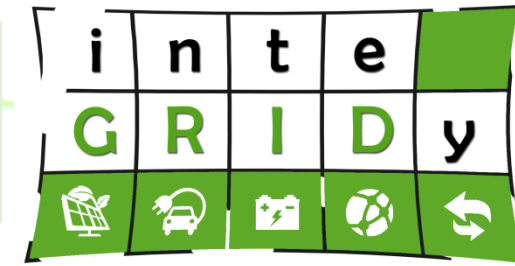
San Severino Marche Pilot – Brief Description

☐ **Objectives:** Performing an optimized reconfiguration of the medium voltage distribution network and at exploiting distributed Energy Storage Systems (ESSs) for the provision of ancillary services to the electricity market

☐ **Partners Involved:** ASSEM (DSO), Polytechnic University of Milan (University), E@W (IT Company), UNE (ESSs manufacturer)
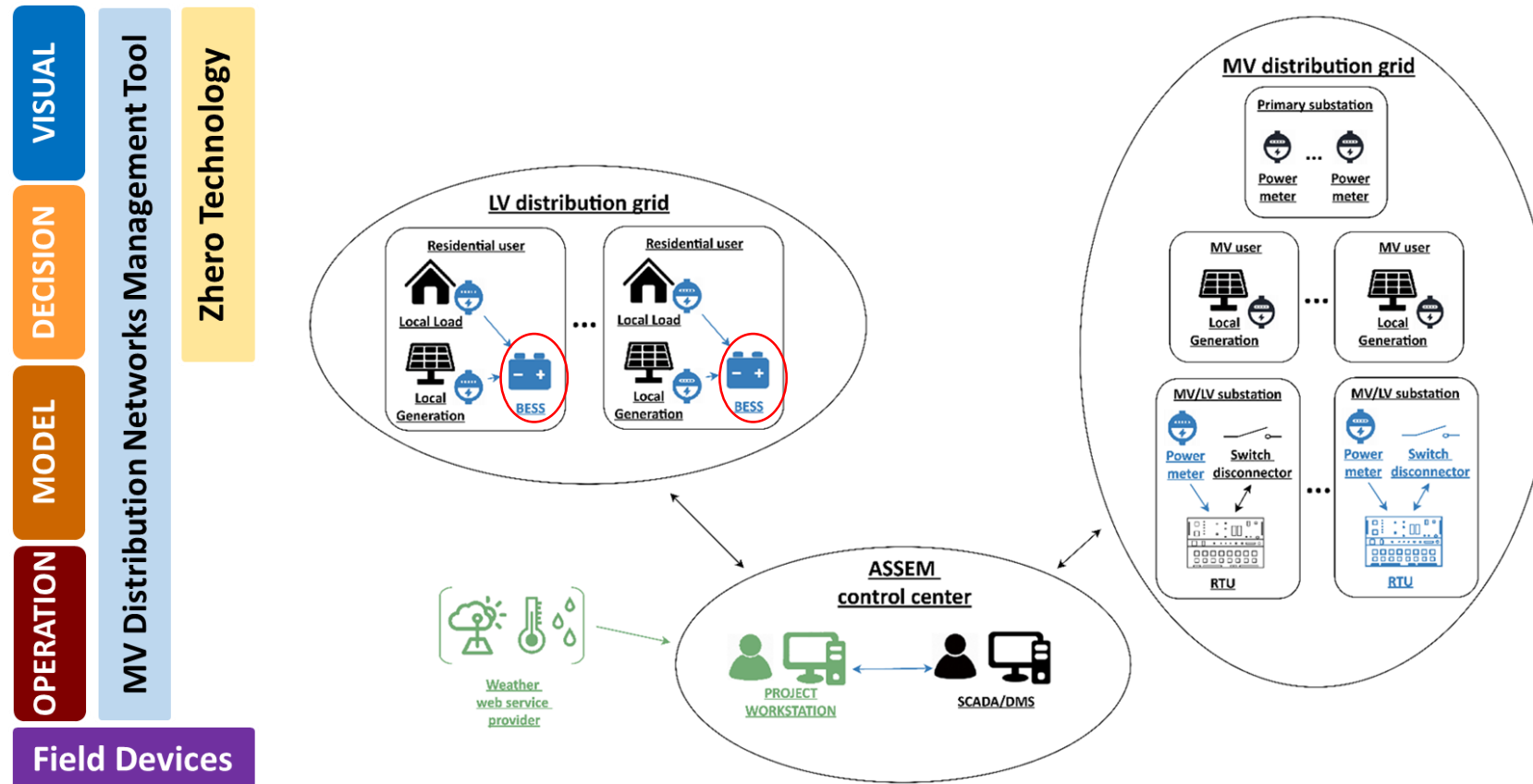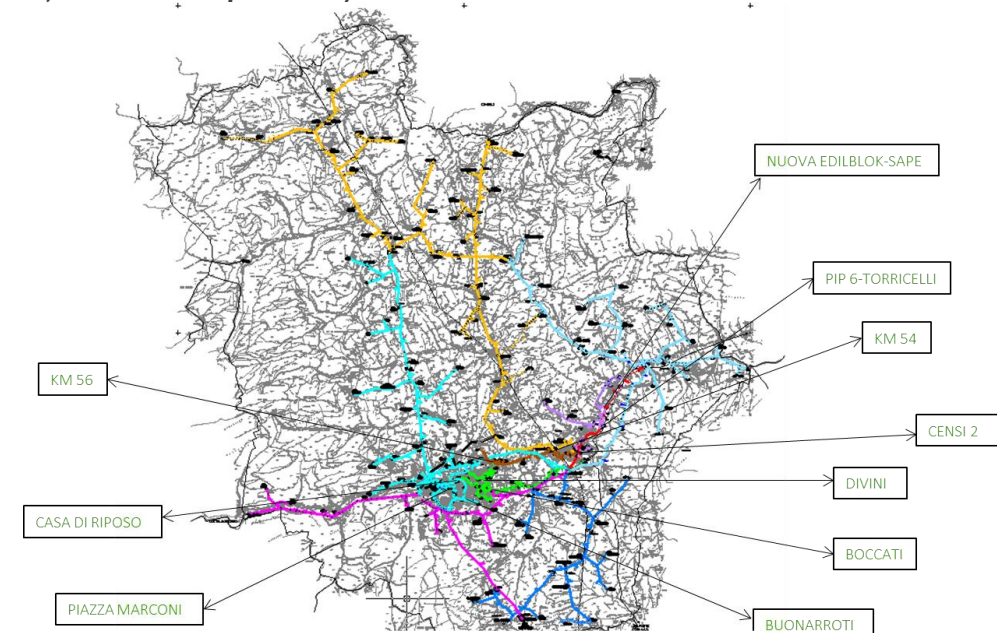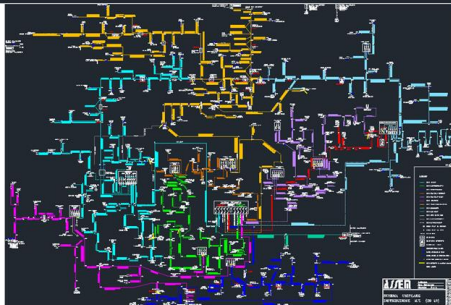
San Severino Marche Pilot – ASSEM Role (1)

- **General Activities of ASSEM:** electricity distribution, methane gas distribution, management of the integrated water service, public lighting management

- **Territory:** 193 Square kilometers

- **Users of Electrical Service:** ≈ 7900

- **Power:** ≈ 49 MW

- **GD (Photovoltaic, Hydroelectric, Wind power):** 417 units (28,8 MW of power)

ASSEM MV distribution network

ASSEM Secondary substations deployment

San Severino Marche Pilot – ASSEM Role (2)

❑ **Specific Equipment has been installed in each substation**
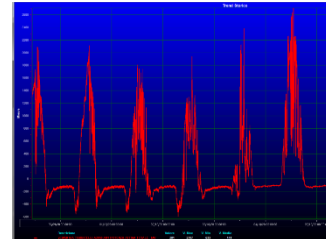

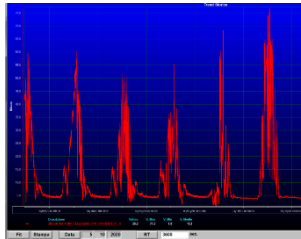
Remote Terminal Unit

Router
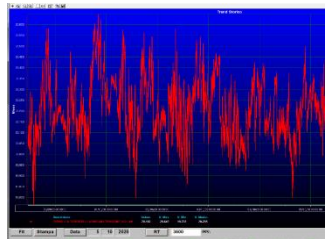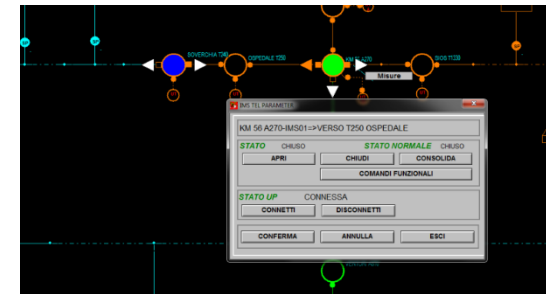
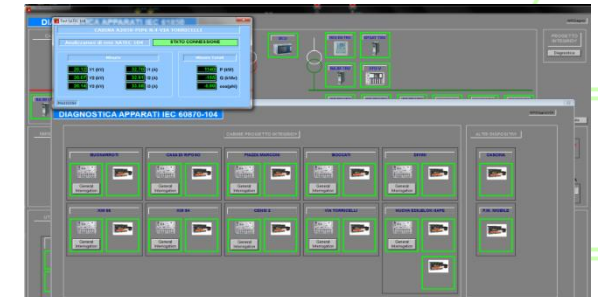Electrical Switch

Meter

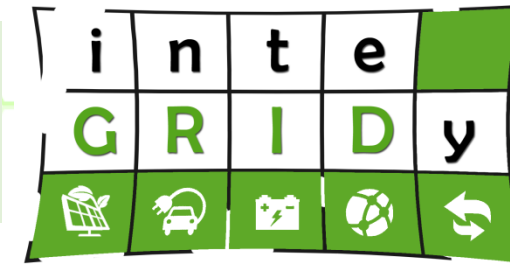❑ **SCADA is used to remotely monitor and control MV switches and inteGRIDy equipment**

Graphic representation of voltage, current and power data

SCADA page for the remote control of MV switches and inteGRIDy equipment

San Severino Marche Pilot – POLIMI Role (1)

❑ **MV distribution network management tool (MV-DNMT)**

➤ **High quality RES production forecasts**

The use of machine learning techniques allows to obtain accurate up-to-72-hours forecasts. The power production is directly forecasted for 9 PV plants, for which measurements are available in real-time.
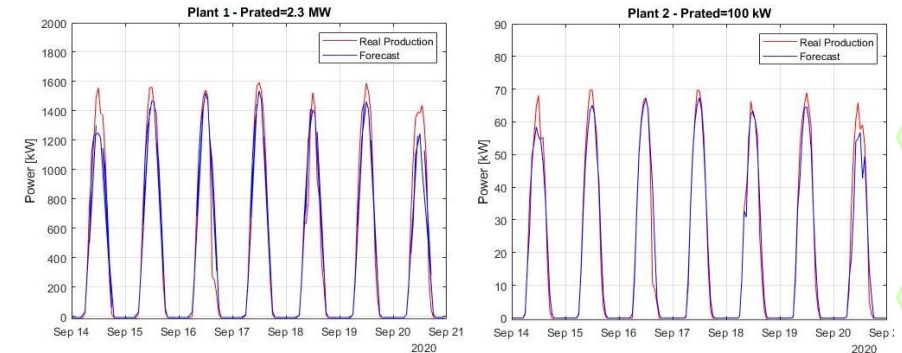
➤ **MV grid optimization**

A detailed network model receives as input short-term and long-term forecasts to estimate the grid behaviour and return the optimal grid topology for the whole year. In total:
- 457 manual switches
- 79 remote controlled/monitored switches
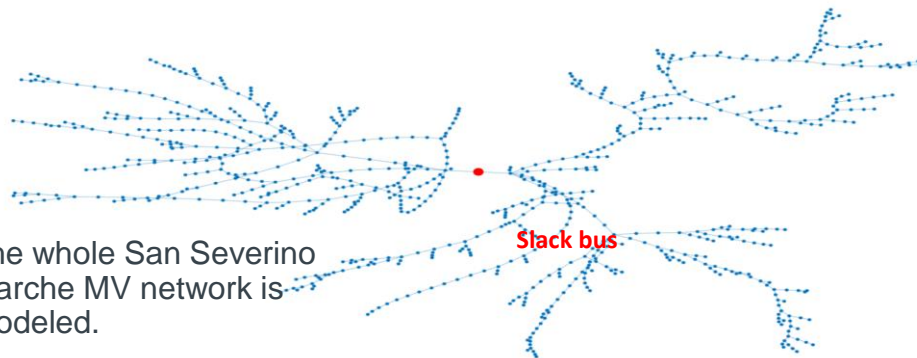
The whole San Severino Marche MV network is modeled.

Stack bus

➤ **Balancing Market simulation**

A multi-year statistical analysis has been performed to return a technical and economical model of the Italian «Mercato per il Servizio di Dispacciamento». It includes:
- The regulating signal for secondary frequency regulation («Segnale di Livello»)
- The hourly maximum downward reserve prices and minimum downward reserve prices for both secondary and tertiary frequency regulation.

Market prices for Frequency Regulation

❑ **MV distribution network management tool (MV-DNMT)**

➤ **Energy storage system scheduling for service stacking**

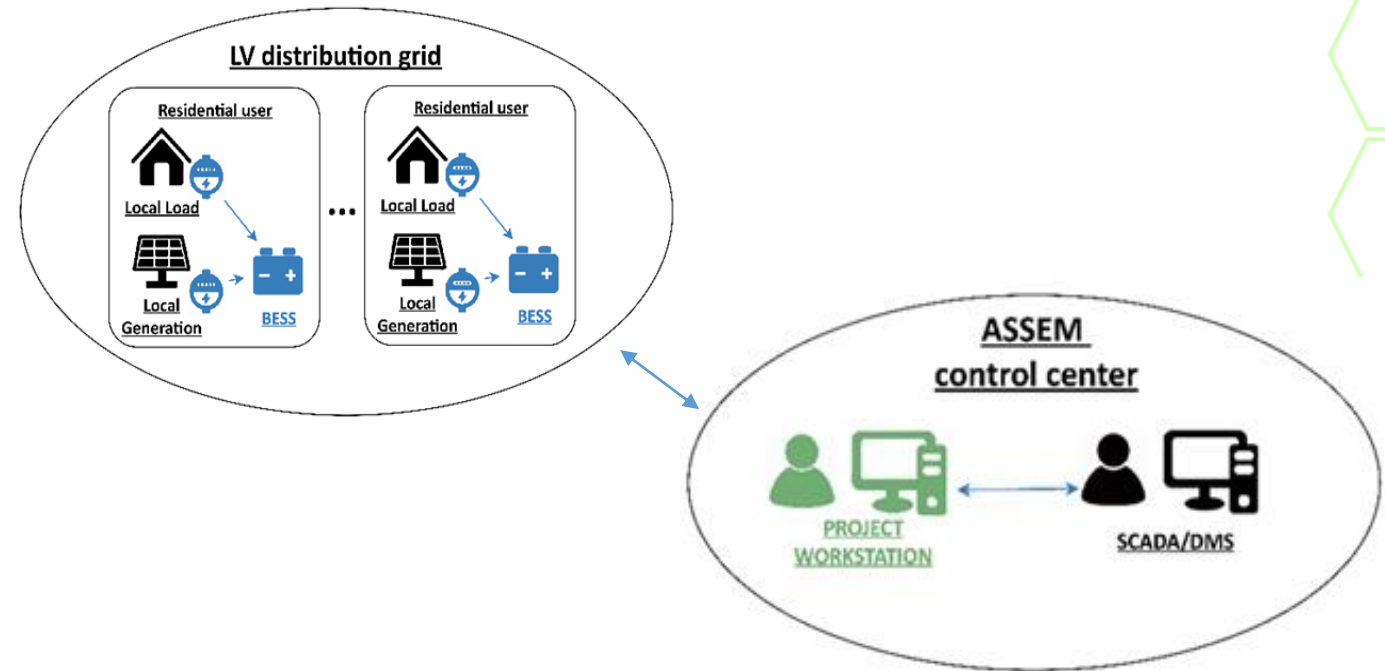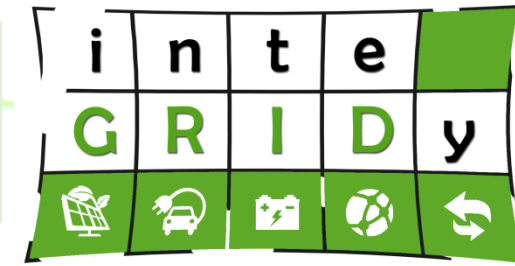A set of routines gathers field data, forecasts and market data to return the scheduling of domestic batteries able to provide:

❑ **Self-consumption maximisation**

❑ **Frequency regulation**

❑ **Local services for DSO**

San Severino Marche Pilot – E@W Role

☐ Development and deployment on the ASSEM Central Workstation of specific **software able to get/set Zhero ESSs** data using their Web Services to **collect and store data from the Zhero ESSs** in the Oracle DB and **control them on the base of MV-DNMT control outputs by sending setpoint signals**

☐ Development and deployment on the ASSEM Central Workstation of specific **Web Services able to externally expose the data** in the Oracle DB **for the integration with the inteGRIDy platform**
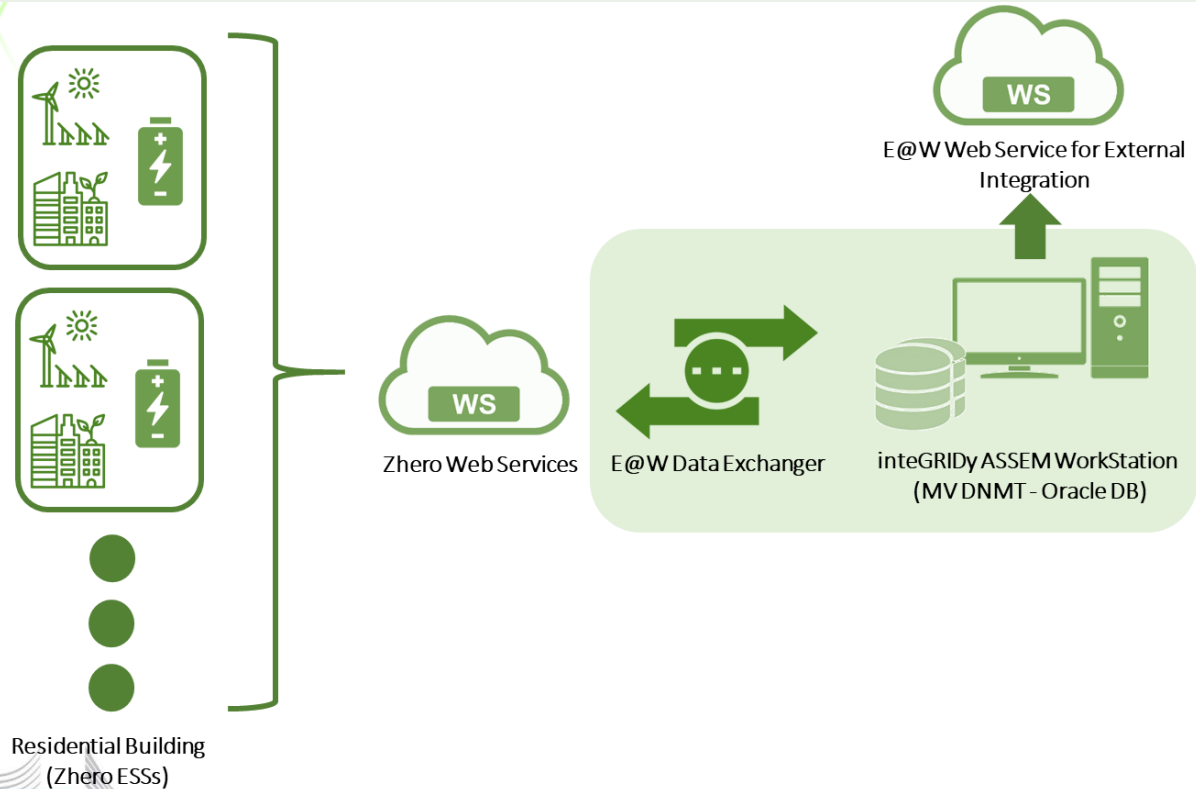
inteGRIDy Web Services API Catalog

API description for inteGRIDy Web Services

	Show/Hide	List Operations	Expand Operations
Dsosignal	Show/Hide	List Operations	Expand Operations
EssBand	Show/Hide	List Operations	Expand Operations
EssParam	Show/Hide	List Operations	Expand Operations
EssProfile	Show/Hide	List Operations	Expand Operations
EssSetpoint	Show/Hide	List Operations	Expand Operations
GenParam	Show/Hide	List Operations	Expand Operations
H0Datum	Show/Hide	List Operations	Expand Operations
LoadForecastProfile	Show/Hide	List Operations	Expand Operations
LoadParam	Show/Hide	List Operations	Expand Operations
LongTermPowerProfile	Show/Hide	List Operations	Expand Operations
MarketProfile	Show/Hide	List Operations	Expand Operations
Marketstrategy	Show/Hide	List Operations	Expand Operations
SrProfile	Show/Hide	List Operations	Expand Operations
ValoriMisure	Show/Hide	List Operations	Expand Operations
WeatherForecastProfile	Show/Hide	List Operations	Expand Operations

[BASE URL: /api/v1 , API VERSION: 1.1.0]
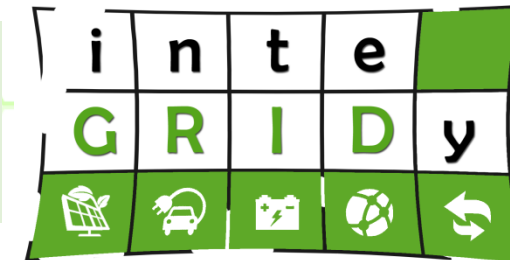
ZHERO
1 MISSION · 0 EMISSION

ZHERO SYSTEM
The Evolution of Energy Revolution

- 100% Green
- Salt Battery
- No toxic gas emission, No fire, No explosion = Safety
- All-in-one system
- On-grid and Off-grid applications
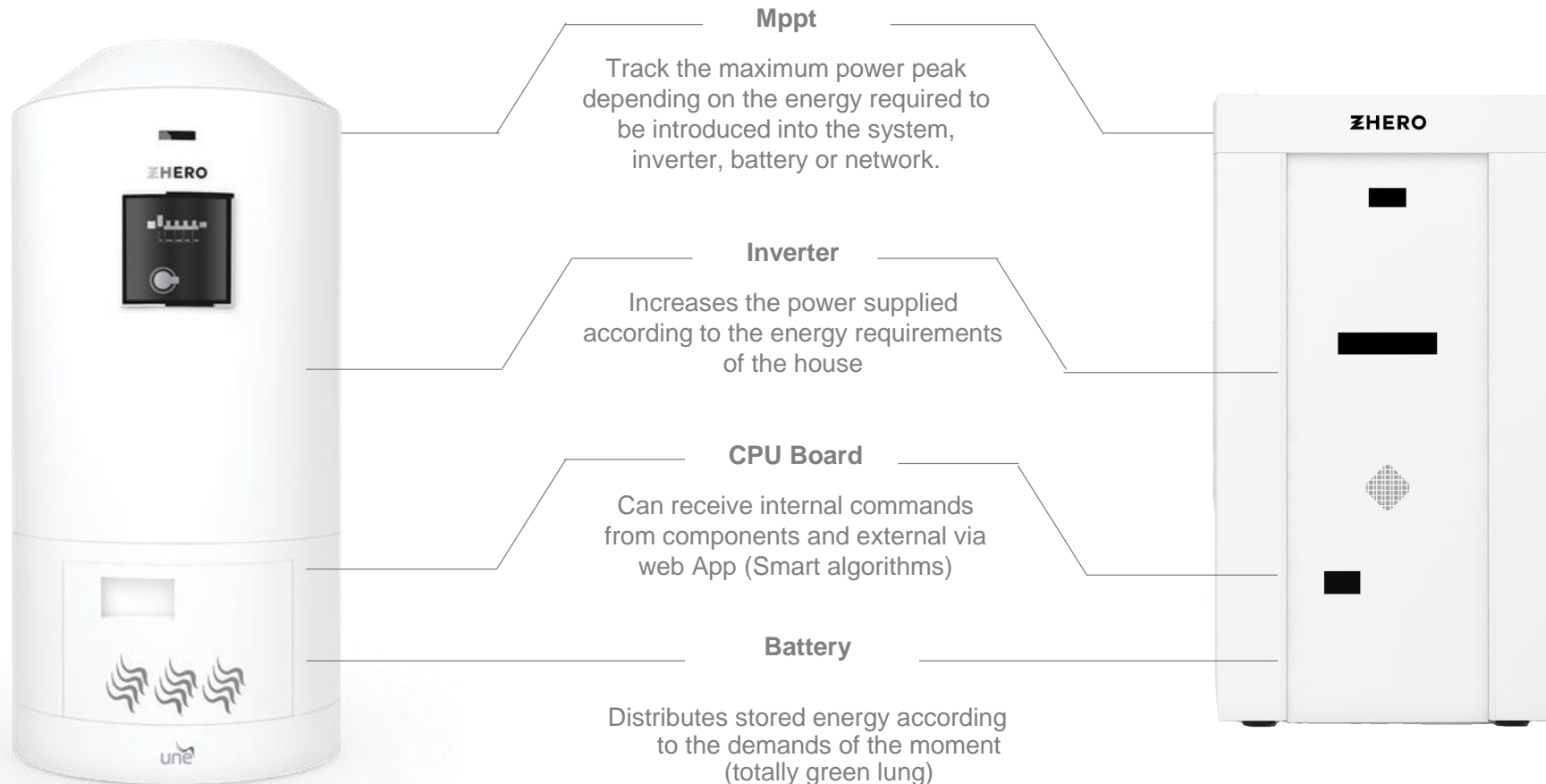- Backup during blackout

une
Universal Nature Energy

□ **All in one System**

Mppt

Track the maximum power peak depending on the energy required to be introduced into the system, inverter, battery or network.

Inverter

Increases the power supplied according to the energy requirements of the house

CPU Board

Can receive internal commands from components and external via web App (Smart algorithms)

Battery

Distributes stored energy according to the demands of the moment (totally green lung)

☐ **New Energy Management for Residential buildings**

Thanks to these innovative technologies, ZHERO is able to independently manage the flow and destination of the energy produced, without any waste and optimizing consumption.

MAIN TECHNICAL DATA

N° string: from 1 to 18 (each 1 kWp)

N° MPPT: da 1 a 3 (each 3,3 kW power)

Power inverter: 6 kW

Output: 2 (user and Owner grid)

Efficiency of the components over 97%

Scalable storage capacity 10 – 20 kWh

Cylindric model Size: d.790mm x h.1620mm x 300kg

Square model Size: 730mm x 600mm x 1445mm x 200kg

DOD: up to 90%

Temperature range -10°C/+40°C

Battery life expected: : 20 years

Warranty: Battery 10 years , Inverter components 5 years,
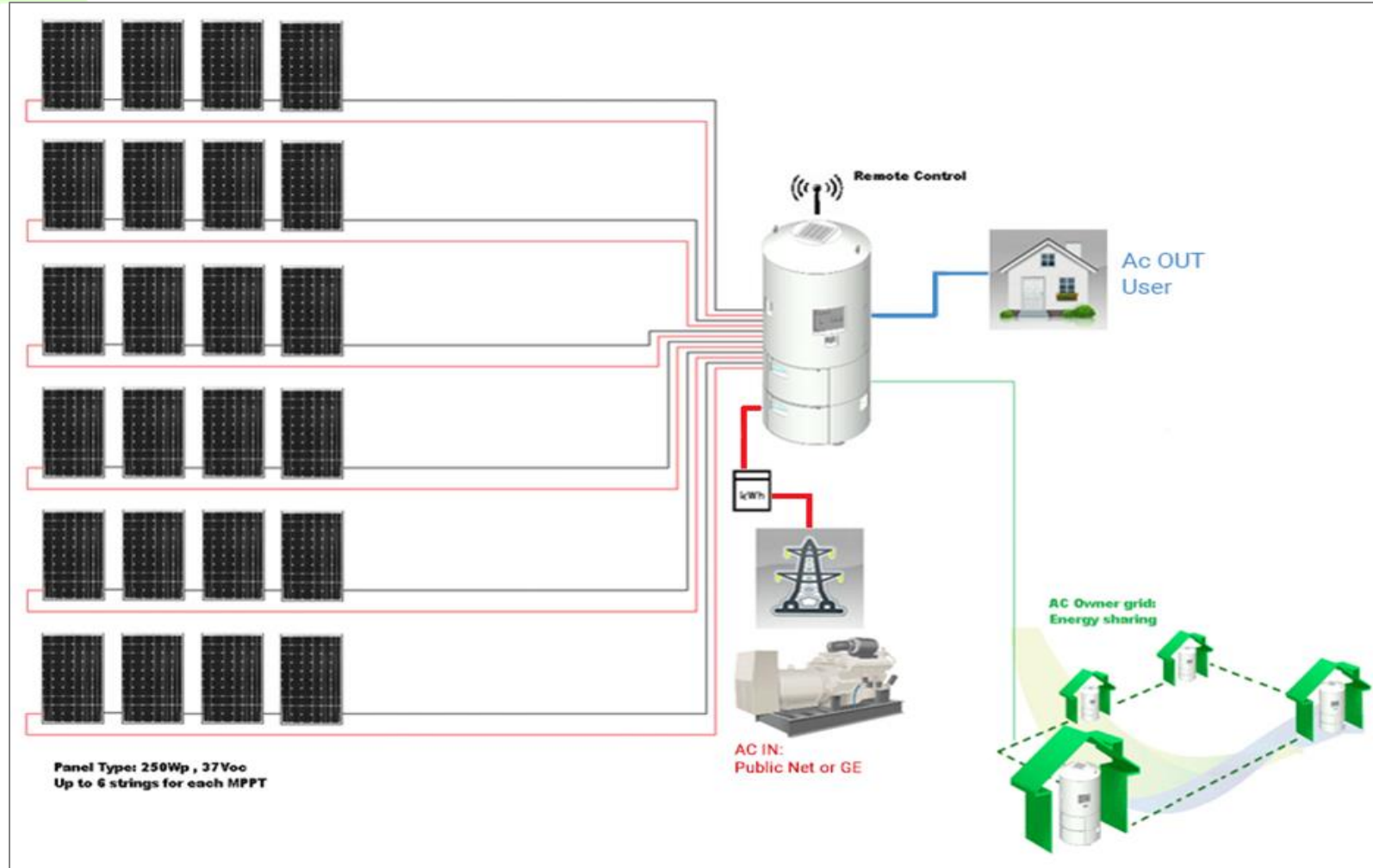
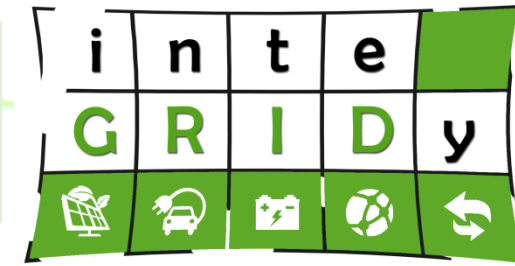Other components 2 years

Certificate: CEI-021

❑ **Quick and Simple Wiring Installation**

Panel Type: 250Wp , 37Voc
Up to 6 strings for each MPPT

Remote Control

Ac OUT User

AC IN: Public Net or GE

AC Owner grid: Energy sharing

San Severino Marche Pilot – Zhero Energy Storage System

❑ **Zhero Software**

Disponibilità Batteria
85.00 %
170 Ah   8.2 kWh

Produzione Energia
17.09 %
1.03 kW   (0.00 kW)

Rete
0.00 %
0.00 kW

Consumo Utenza
7.00 %
0.42 kW

Thanks to its innovative software accessible from any PC or mobile device device connected WiFi or 4G, allows Zhero to:

➢ **manage consumption in an efficient way**

➢ **define when to dispense energy according to the balanced ratio between the amount of energy required and the amount of energy available.**

➢ **check in real time the system energy data to plan the timing of household appliances to your liking.**

And include:

➢ **a Monitoring Interface for installers and users**

➢ **an Alert system for system anomalies**

➢ **a system that can be updated remotely by the manufacturer**

une
Universal Nature Energy

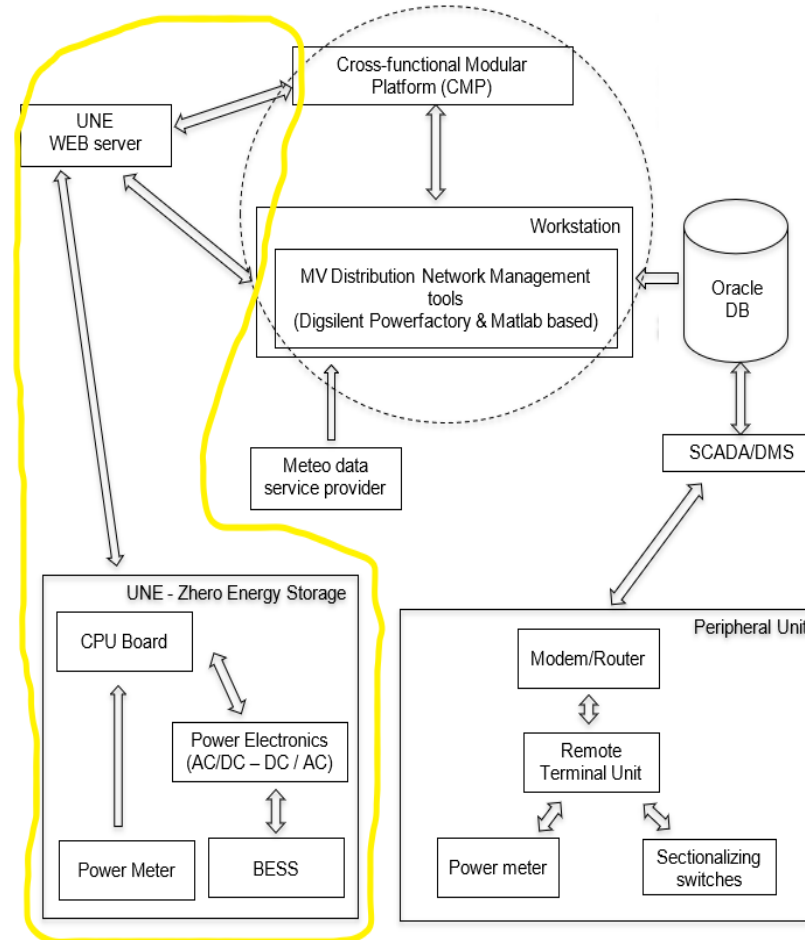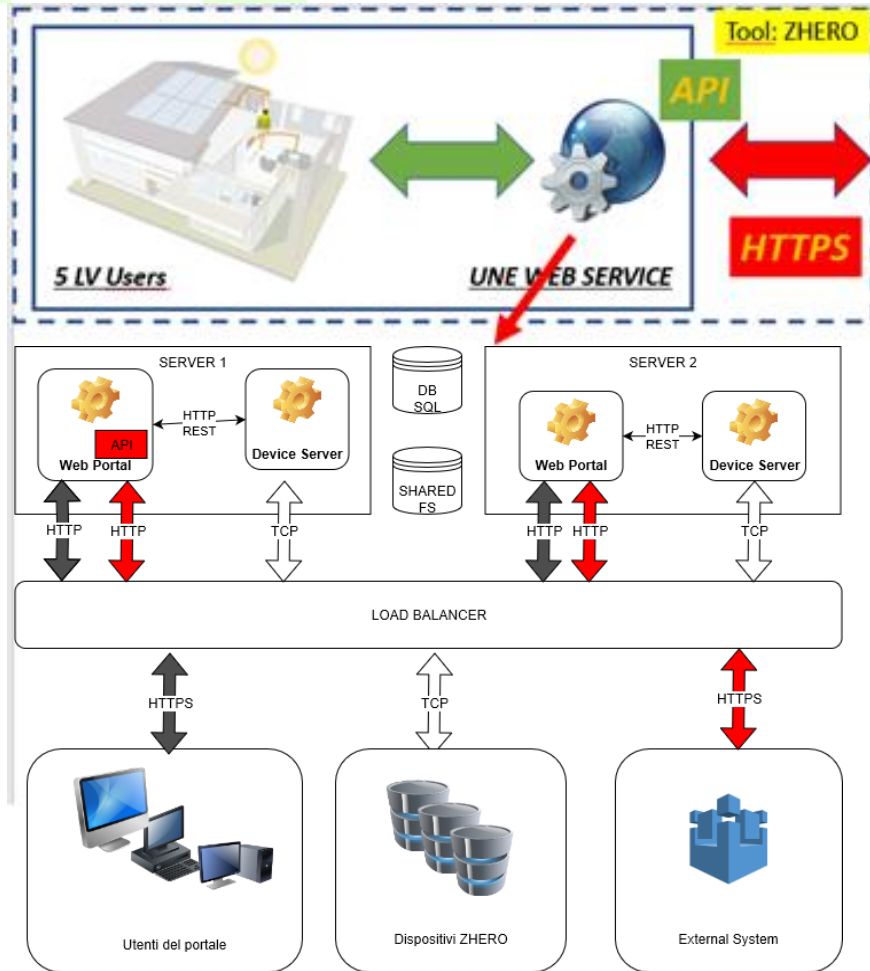# San Severino Marche Pilot – Zhero Energy Storage System

□ **Utilization in the activities of San Severino Pilot of inteGRIDy project (1)**

➢ **Provision of 6 Zhero Energy Storage Systems for on-field application (installation on private residential buildings and in labs for test and validation);**

➢ **Development of the functionalities for power exchange by DSO (active and reactive power, frequency regulation);**

➢ **Development of webserver for remote management (reading and store data, writing setpoints, upgrade firmware, download logs, webapp for user interface, etc…);**

➢ **Development of API catalog for external management (ASSEM, PoliMI, E@W).**

San Severino Marche Pilot – Zhero Energy Storage System

☐ **Utilization in the activities of San Severino Pilot of inteGRIDy project (2)**

Thank you!

Questions?

www.integridy.eu / @integridy