

EU-China Cooperation on Innovative and Smart Cities Topic of interest: **Sustainable Districts and Smart Energy Park**

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Smart Energy District - Roadmap

1. Renewable Energy Sources → Technology Design
2. Energy Efficiency → Building retrofitting
3. Connecting Building to share Energy → **Smart Grid**
4. District Information Modelling → GIS / BIM integration
5. Energy Management System → **District Control Room**
6. Energy Communities → Users Engagement
7. Grid Flexibility → Demand Side Management

1. Renewable Energy Sources → Technology Design

Smart Energy District is based on

Renewable Energy Sources

**Solar Thermal &
Photovoltaic,
Geothermal
Mini-Hydro**

toward Positive Energy Districts (PED)



1. Renewable Energy Sources → Technology Design

A **Positive Energy Block (PEB)** is a group of at least 3 connected neighbouring buildings that annually produce more energy than required

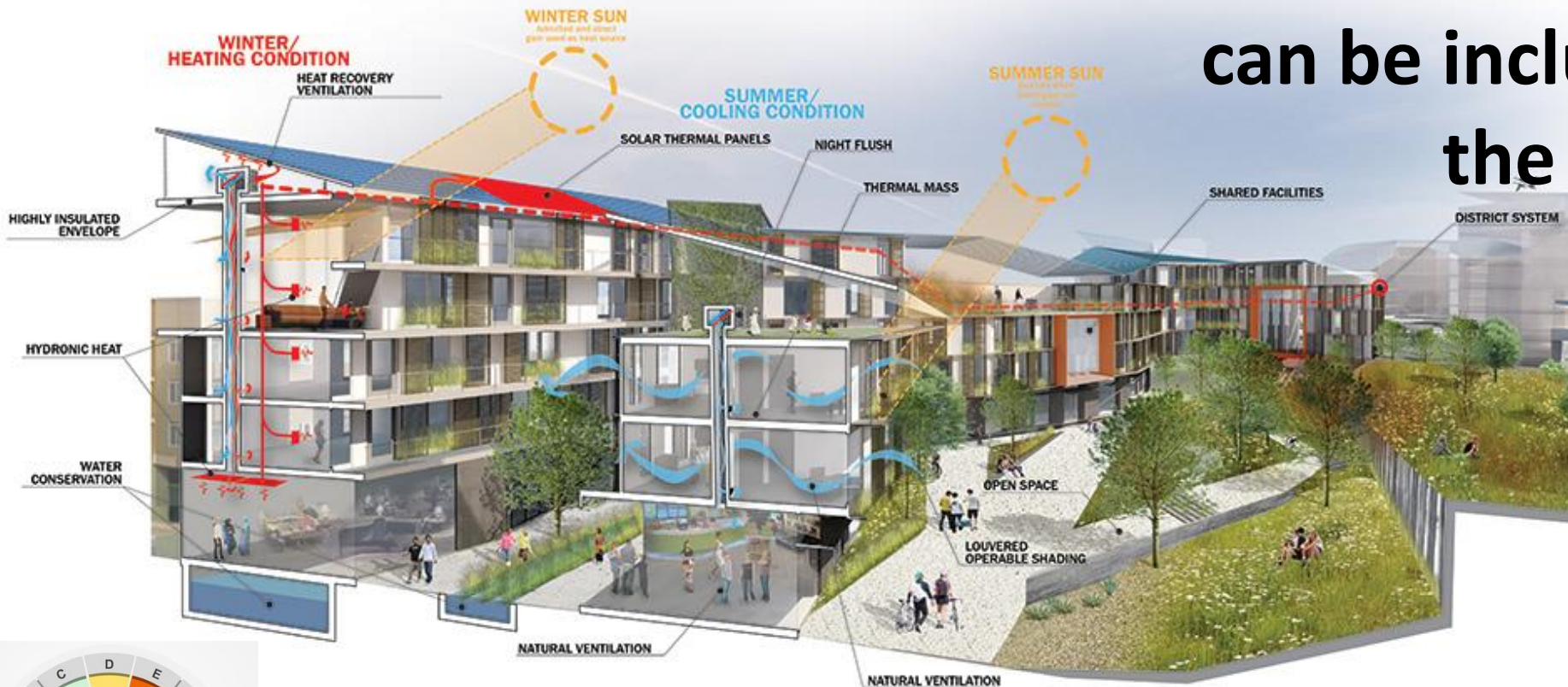


in terms of lighting, heating,
cooling and ventilation.

2. Energy Efficiency → Building retrofitting

**Energy savings in Existing building
can be included in
the District**

Smart
Energy
Districts

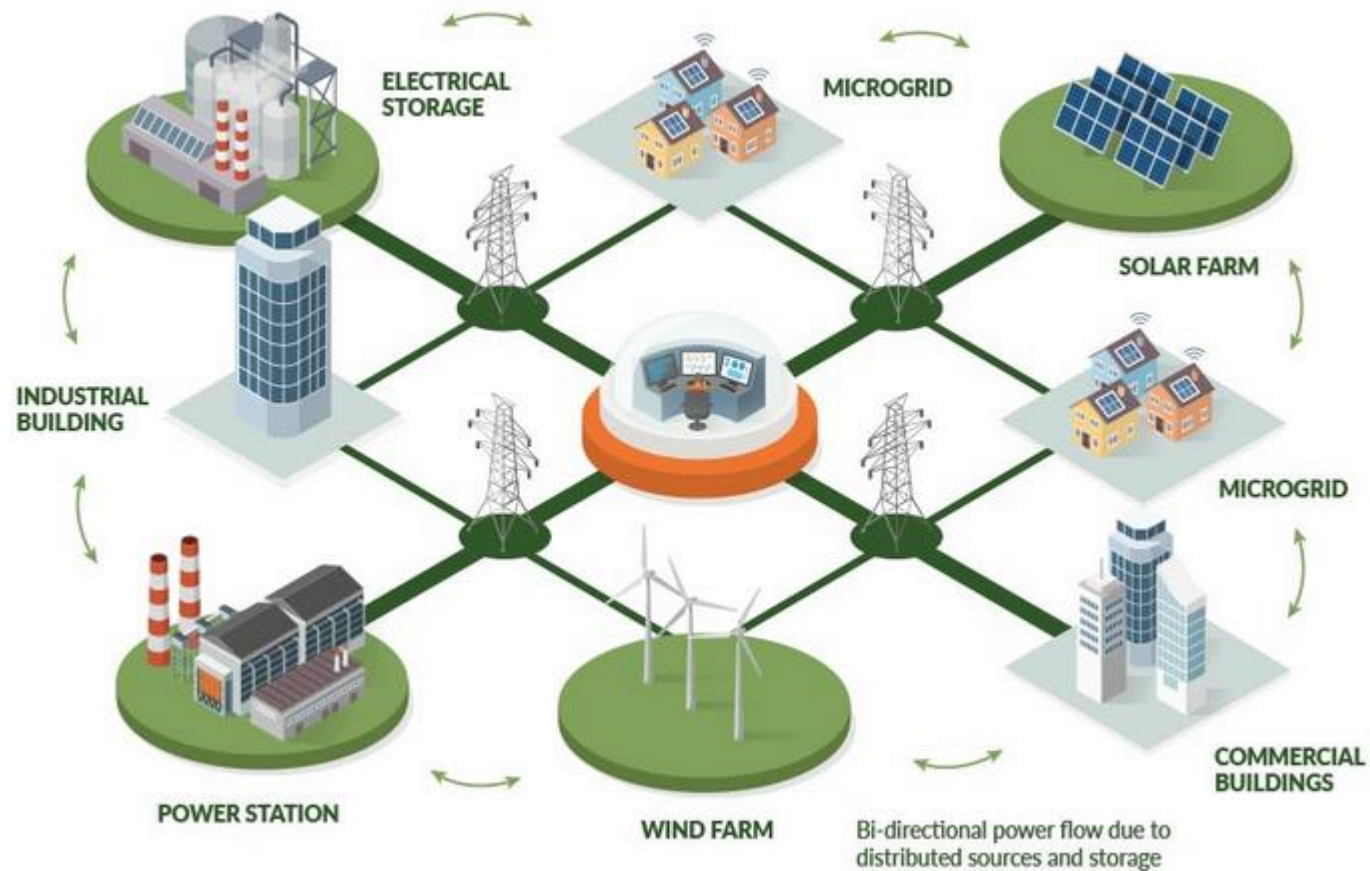
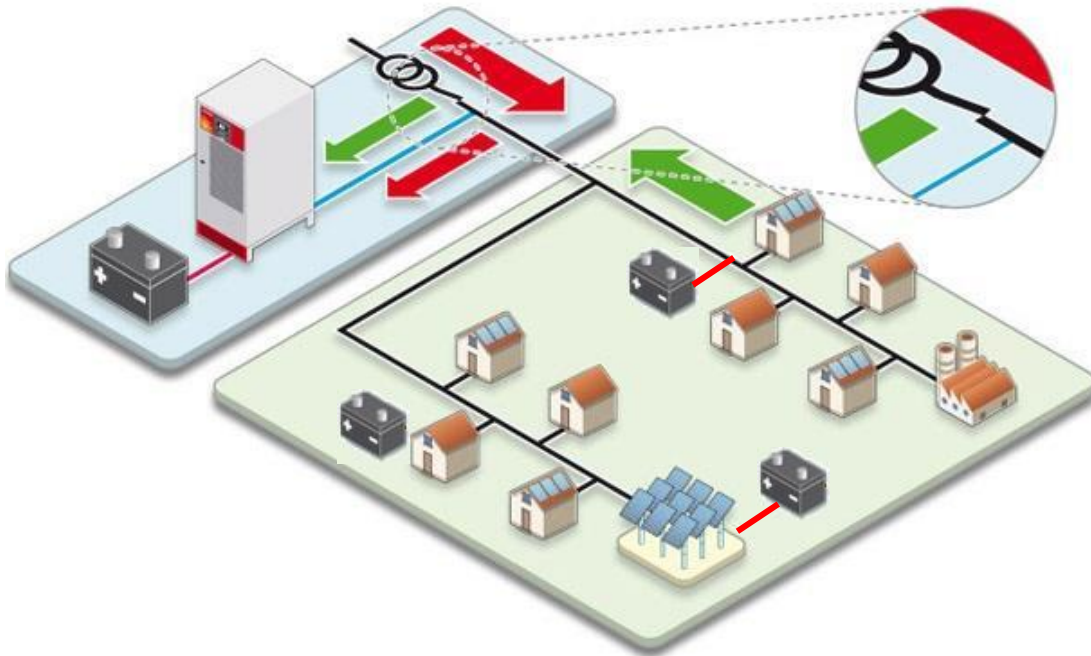


to realize mixed-use zero-energy city districts



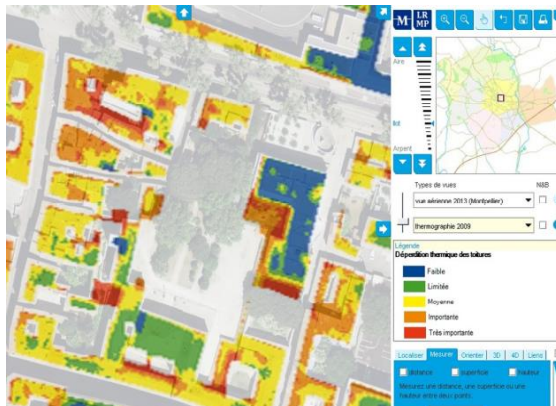
3. Connecting Building to share Energy → **Smart Grid**

storage and converter installed
close to a MV/LV transformer station to regulate
photovoltaic production on the grid



4. District Information Modelling

City Information Modelling



GIS/BIM integration



BIG DATA management



Digitalisation of the Smart Energy Park or District

5. Energy Management System → District Control Room

IOT & Platform

IOT & Platform will be devoted to the IOT and web-based Platform systems for monitoring, control and interaction purposes, for all public and private plants and services in the PEBs/PED (ZEED).

- System Integration Specification, Design and Definition.
- **Hardware Design - Energy monitoring and smart control IOT network** - Definition and development of a reliable and secure IoT communication infrastructure and IoT enabled device.
- **Software design – energy management and user interaction integrated platform –**
BIM/GIS based management for PEBs, PED
assets and smart grids

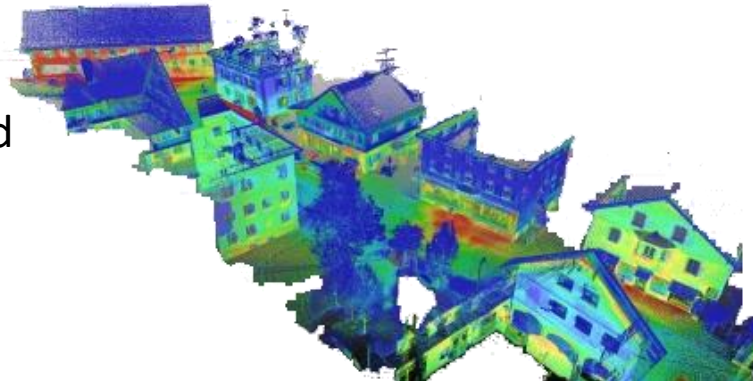


Smart Energy District – IOT & Platform

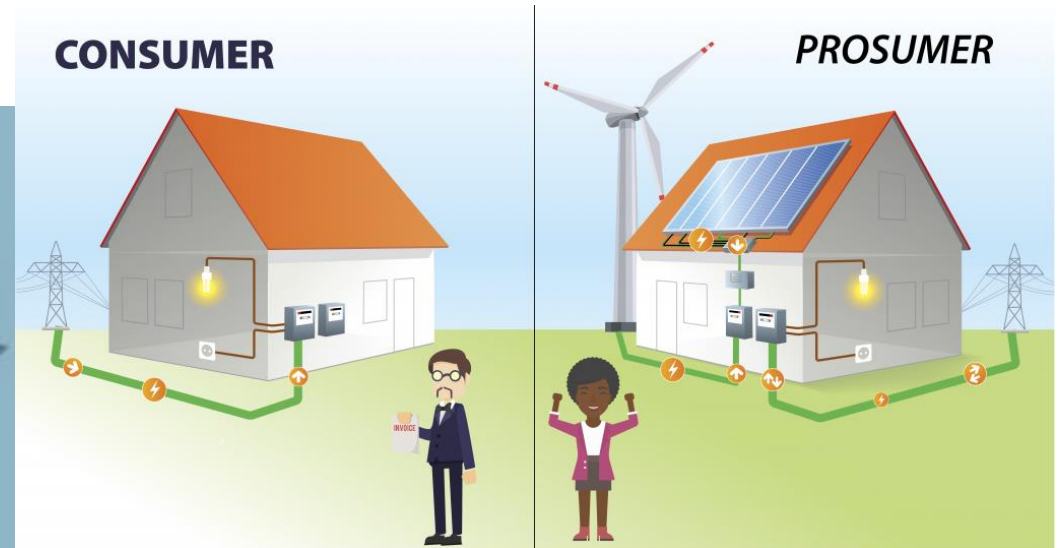
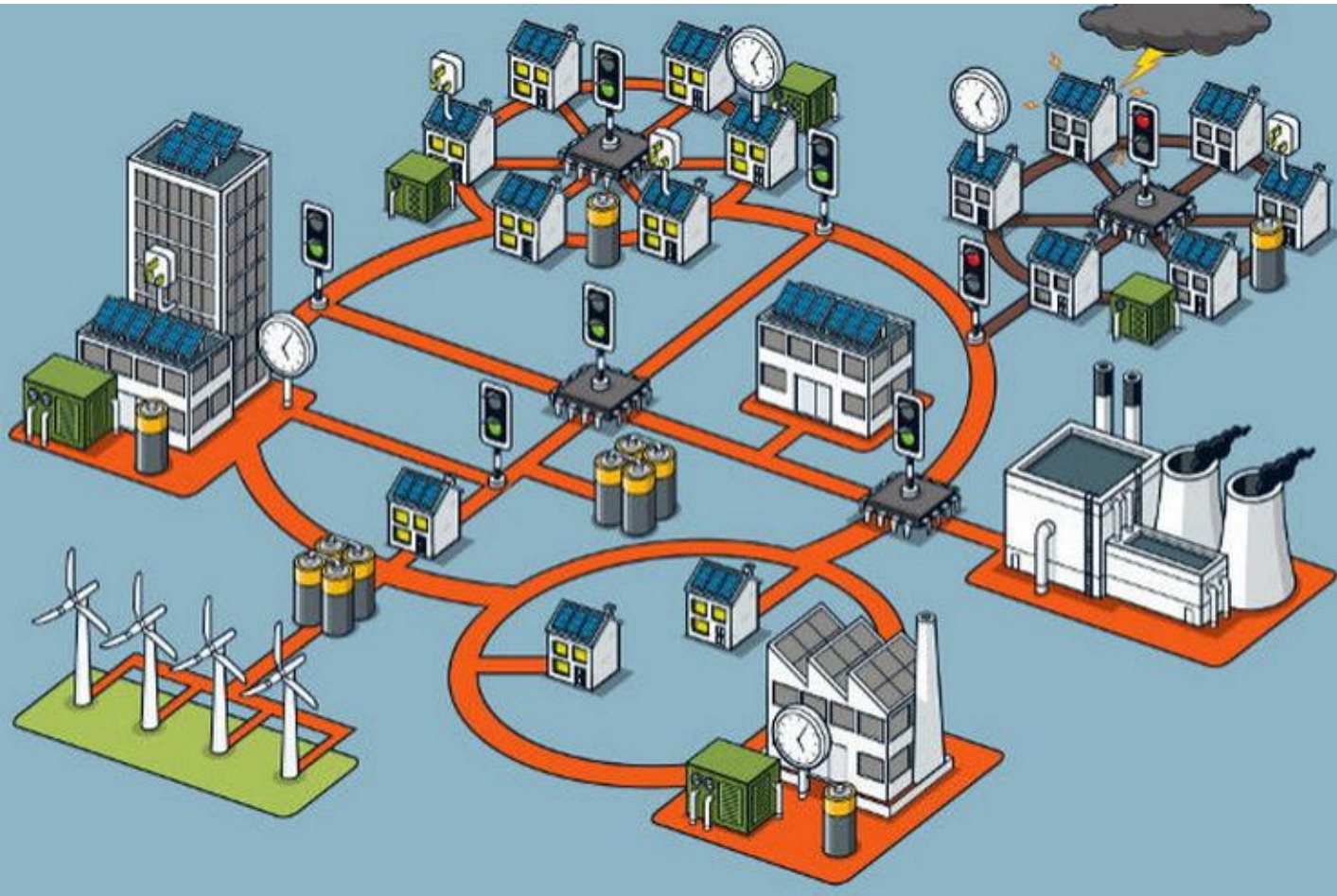
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(...)

- “**BOLLINO BLU 2.0**” Service Design & Pilot -
air pollution and small residential heat plants
monitoring IOT Kit*
- Design of the **Public Participation GIS/BIM**
Tools for the Diffuse Energy Diagnose based
on **Aerial Termography as-a-service** and
on a Drone-IOT system.
- Impacts analysis of the IOT&Platform
initiatives

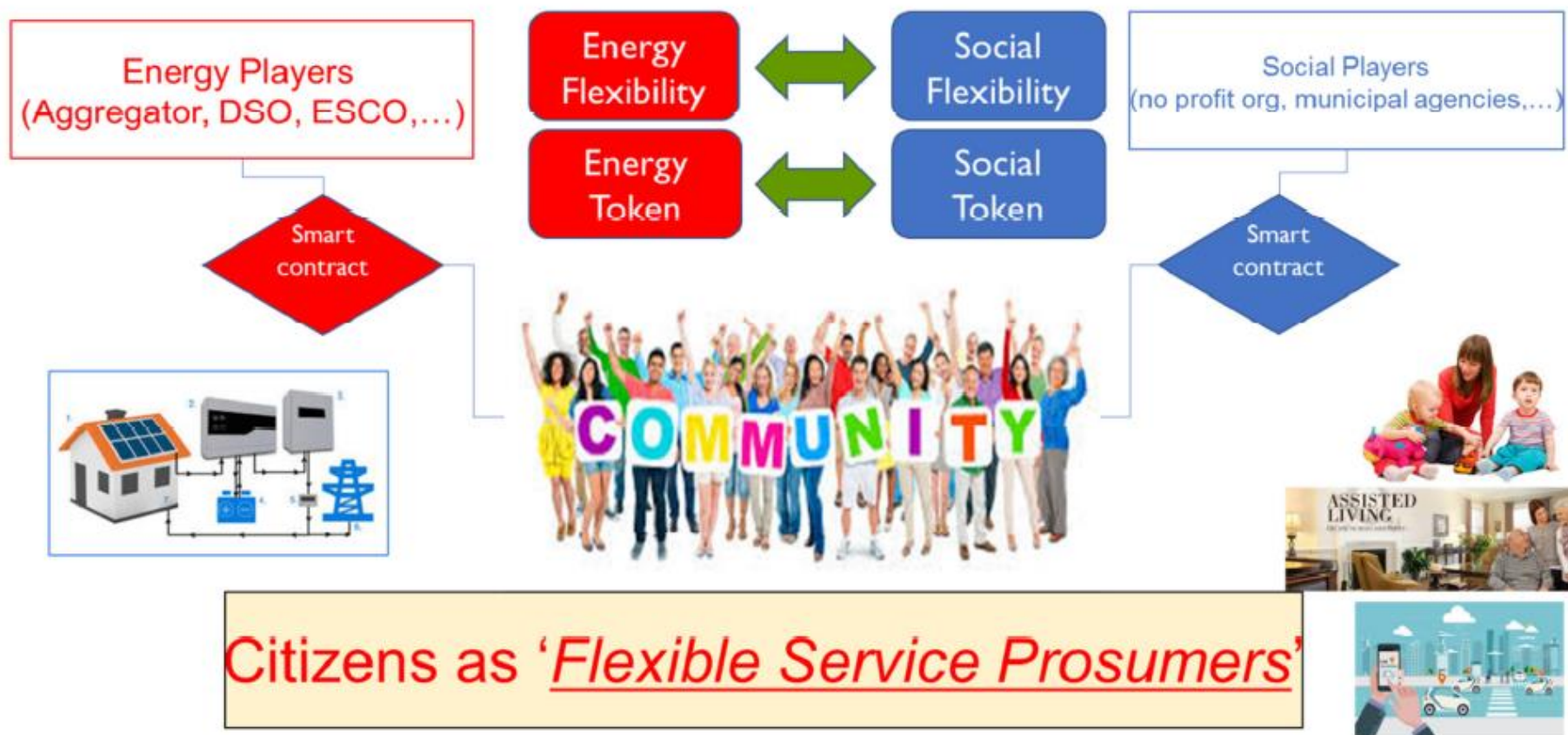
***BB2.0** is the Innovative evolution of the mandatory public supervision and control service on all thermal plants.



6. Energy Communities → users engagement

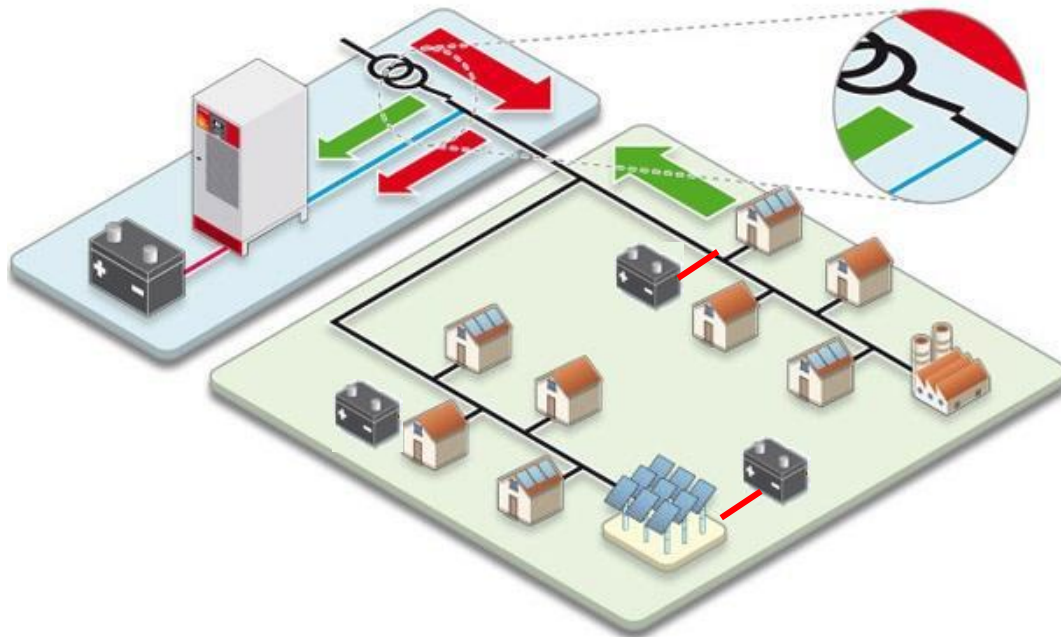


Citizens Energy Community (CEC)



7. Grid Flexibility → Demand Side Management

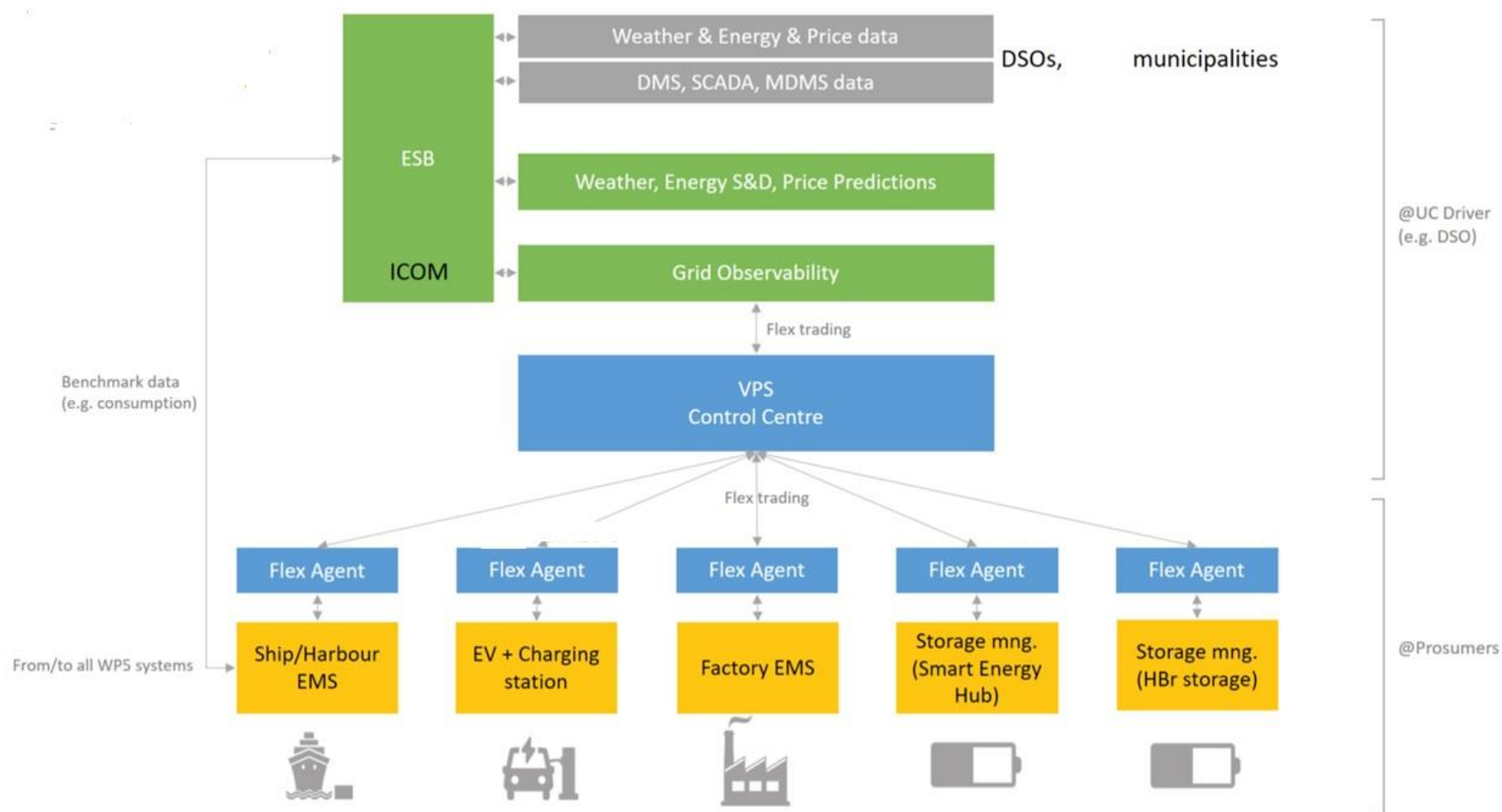
storage and converter installed
close to a MV/LV transformer station to regulate
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One of the main service of the PEBs/PED Energy Platform will be the **demand-side management (DSM)**.

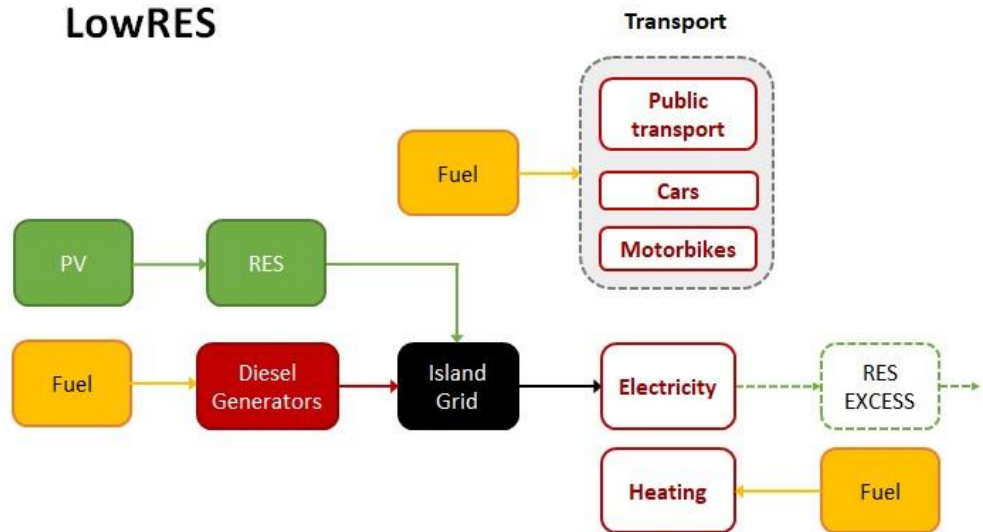
DSM is the strategic mechanism for improving the reliability of the smart grid via **Flexible Models** by dynamically changing or shifting electricity consumption, for optimising the use of the energy storages at different levels.

7. Grid Flexibility → Demand Side Management

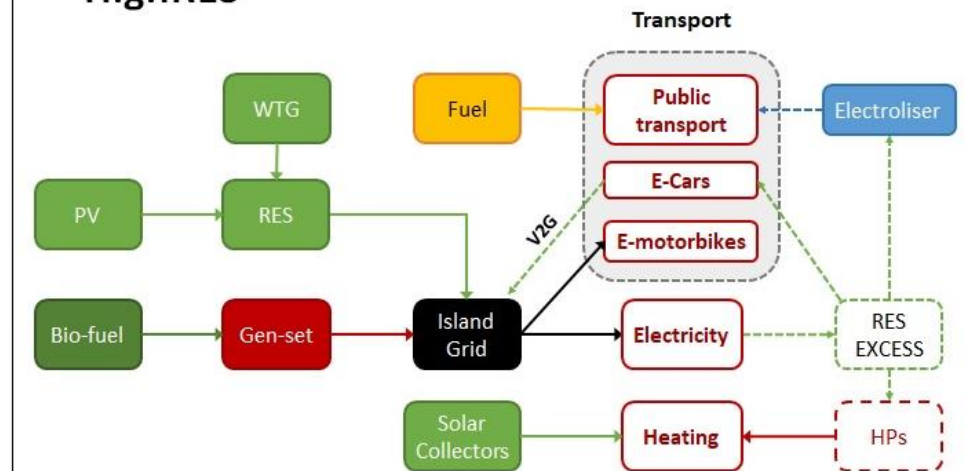


Demand Side Management

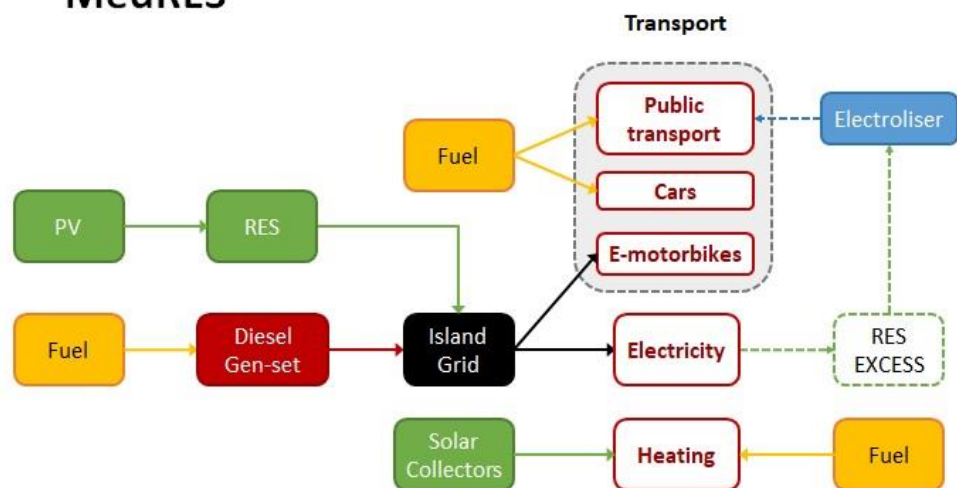
LowRES



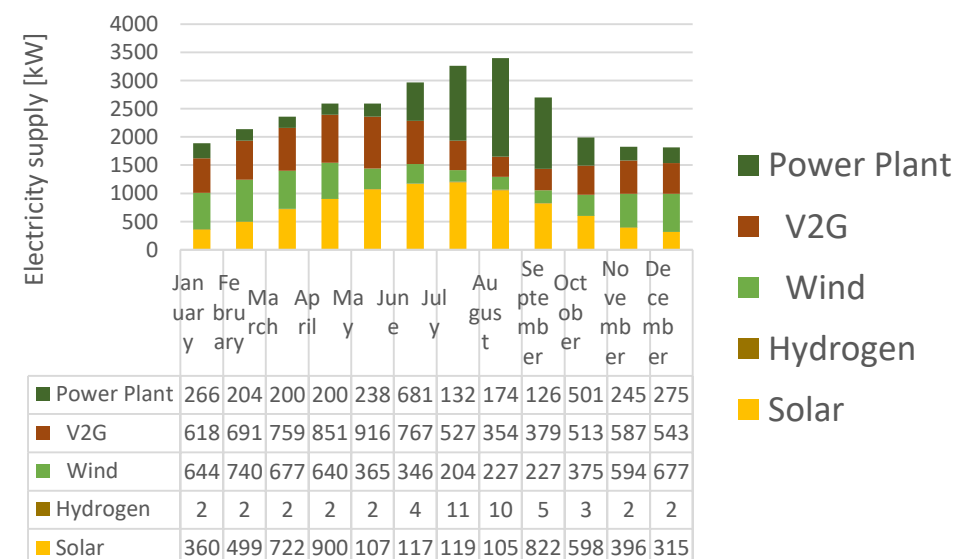
HighRES



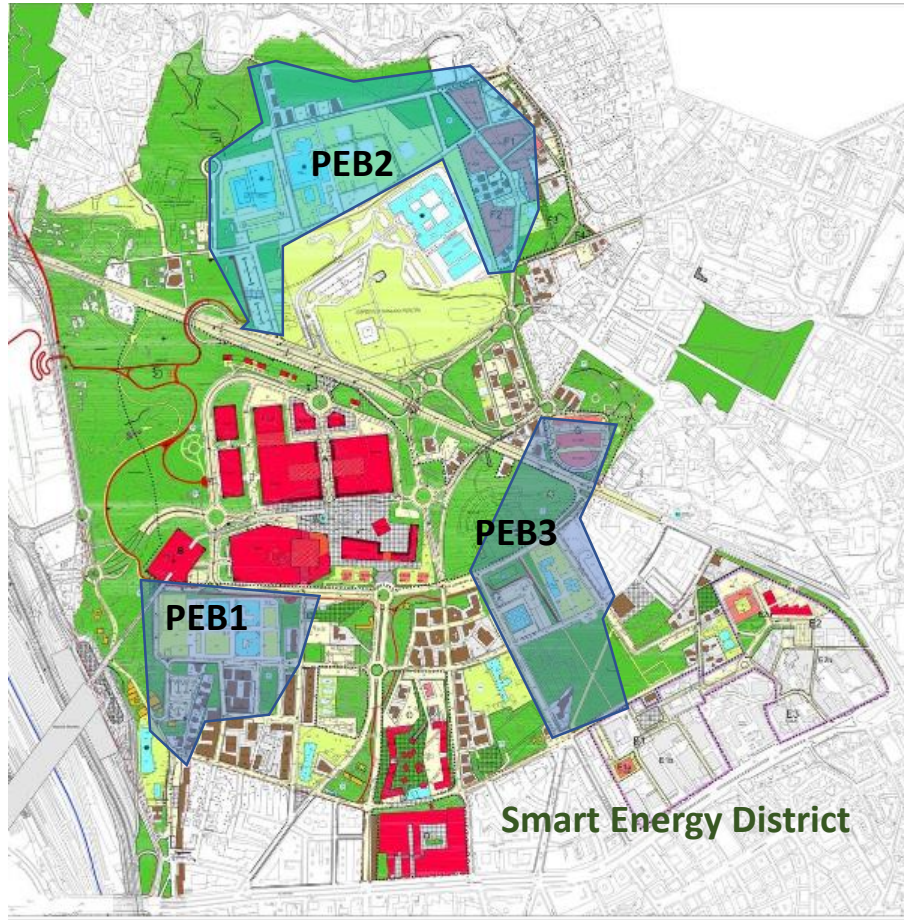
MedRES



HighRES scenario



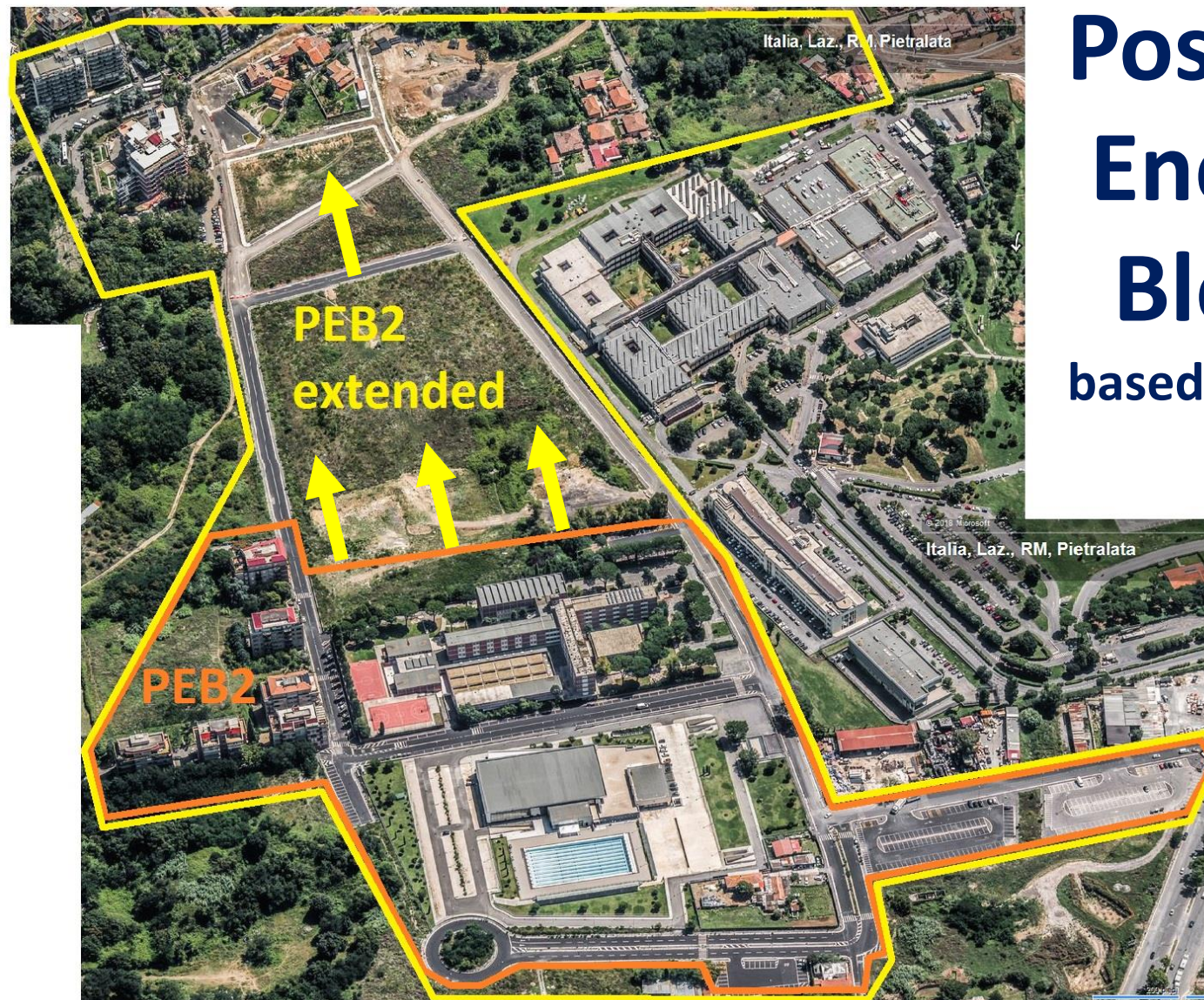
District and PEBs Living labs



The area of Pietralata (14000 energy users) in Rome is already interested by an Urban Development & Regeneration Plan to be integrated with the **flexible ZEED / PED vision and Smart City Living Labs (PEBs)**:

- Residential buildings, smart homes → (retrofitting & NEW) PEB
 - Swimming pool and sport facilities → (retrofitting) Geothermal & FV
 - University facilities and ISTAT seat (NEW)
 - School buildings → (retrofitting) PEB
 - Hospital & MIT → out of the PEB (energy supply)
 - Shops & Markets → (retrofitting) PEB
 - RES + Geothermal Plant (for NEW buildings)
 - Smart Grid (electrical/thermal) & Storage → B2G → V2G → starting from PEB1 and PEB2
- {

 - ☐ Electro-mobility investments
 - ☐ Electrical Reverse Logistic
 - ☐ IoT / ICT integration → open platforms
 - ☐ Smart Energy Community (citizen engagement)
 - ☐ DSOs, Vendors & ESCOs engagement (business models)



Positive Energy Blocks

based on **smart grids** will
expand within the

**Smart Energy
District**
through Deep
Retrofitting for
Energy Efficiency
of existing
buildings



Sustainable Smart Energy Park

Cooperation between Rome and Liuzhou aims to:

Engage both Cities Administrations and Research Institutions to design and create a **Smart Energy Park**.

Build an Action Plan also involving a Companies Cluster

- (1) To identify early-stage Eco-Districts projects,
- (2) To cooperate on R&D level to introduce **Sustainable Smart Energy Park** design criteria
- (3) To integrate **GIS/BIM platforms** and **BIG DATA** models
- (4) To set up **funding schemes**: ESCo & EPC models, Public funds.

Many thanks for your attention!!!

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