



Capacity building in Smart and Innovative eENERGY management

 **PowerTech**
Belgrade 2023

LEADING INNOVATIONS FOR RESILIENT
& CARBON-NEUTRAL POWER SYSTEMS
25-29 JUNE, 2023, BELGRADE, SERBIA

Institute Mihajlo Pupin
Austrian Institute of Technology
University of Ireland

The SINERGY Project

Project lifetime: Jan. 2021 – Dec. 2023



Sinergy

- **Partners**

- IMP Institute Mihajlo Pupin, Serbia (**Coordinator**)
- AIT Austrian Institute of Technology GMBH
- NUIG University of Galway

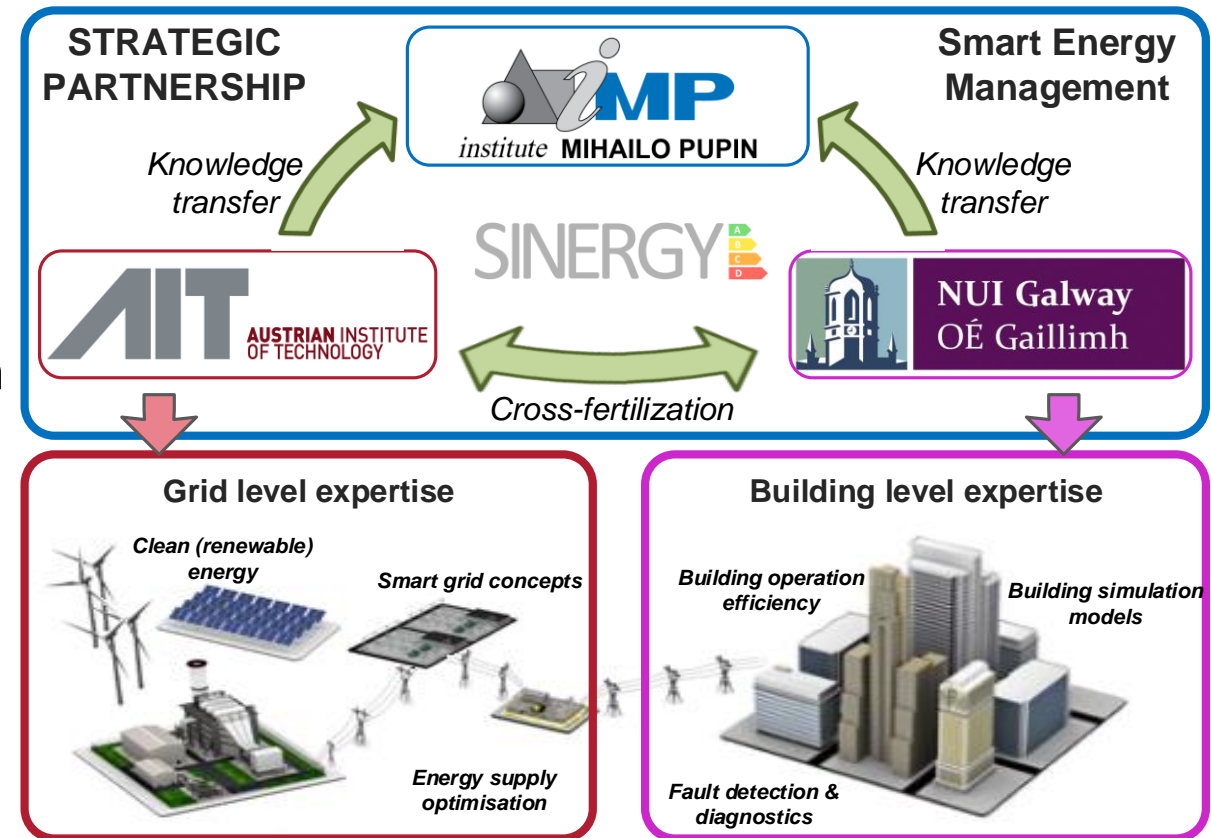


- **Long-term mission**

- **Position the Institute Mihajlo Pupin (IMP) as one of the leading institutions in smart energy management** in Southeast Europe, capable of driving the region towards meeting the 21st century challenges in the Energy sector
- **Unlock IMP's research potential** in domain of smart energy management and **integrate into European Research Area (ERA)**

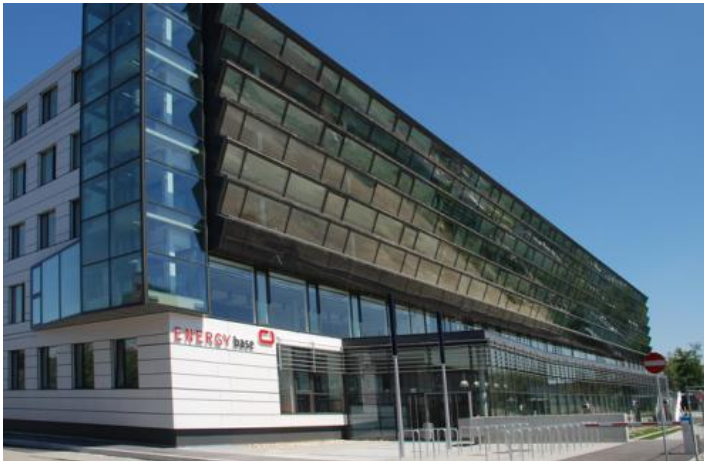
Motivation & Vision

- **Strategic partnership and transfer of multidisciplinary “know-how”** from leading EU research institutions
- **Building research potential through the collaboration with the AIT and NUIG** in domain of advanced smart grids and building operation efficiency, covering both energy supply and demand side
- **Strengthen IMP’s human resources, engage young researchers and enhance the networking channels** with eminent researchers from abroad
- **Establish knowledge and technology transfer platform** with necessary infrastructure and equipment



Knowledge & technology transfer platform

EnergyBase, TechBase
(Vienna)



Alice Perry Engineering
Building (Galway)

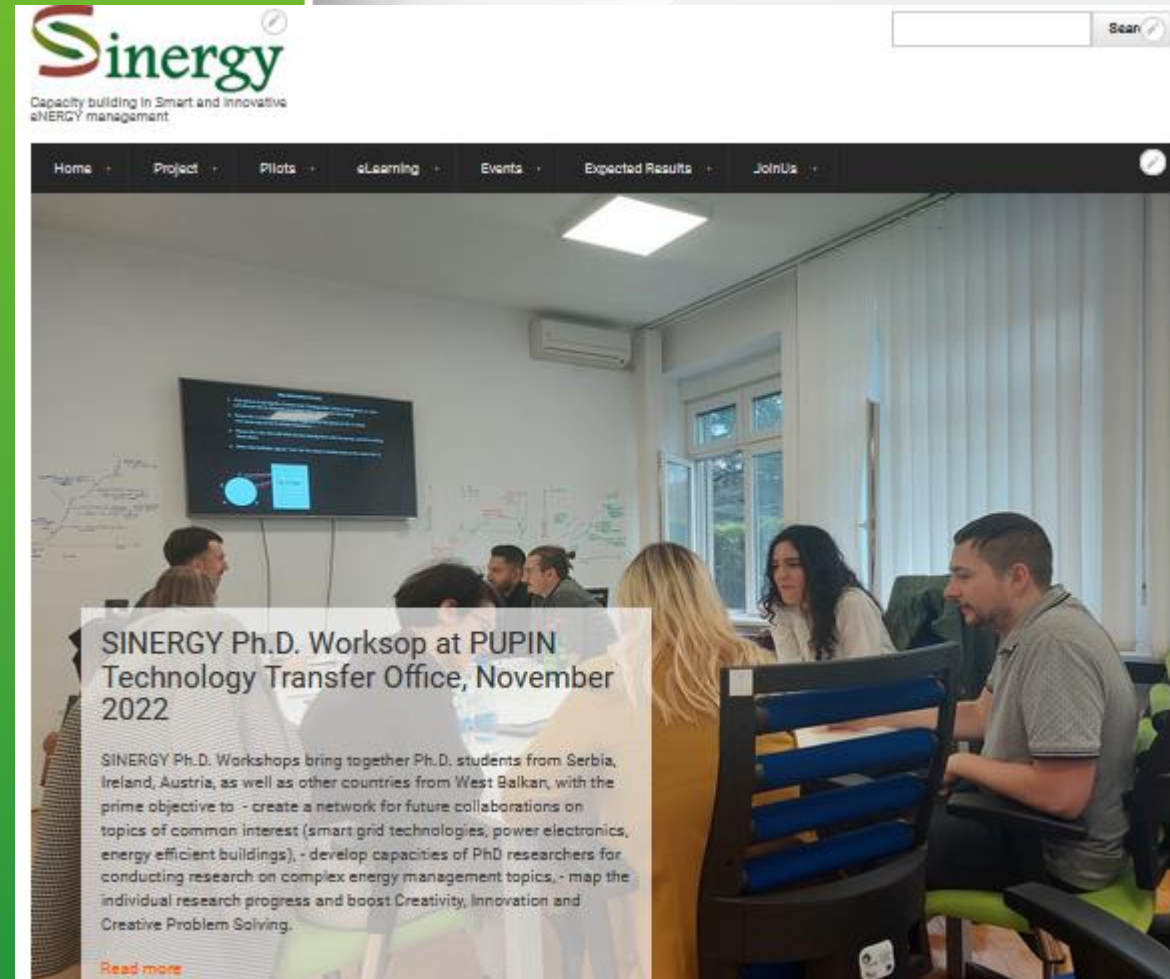


Institute Mihajlo Pupin
(Belgrade)



Research on Emerging ICT Trends

- [Publications](#)
- [Ph.D. Workshops](#)
- [International SINERGY Conference on Smart and Innovative eENERGY management, September 2023](#)



Sinergy
Capacity building in Smart and Innovative eENERGY management

Home · Project · Pilots · eLearning · Events · Expected Results · Join Us

SINERGY Ph.D. Workshp at PUPIN Technology Transfer Office, November 2022

SINERGY Ph.D. Workshops bring together Ph.D. students from Serbia, Ireland, Austria, as well as other countries from West Balkan, with the prime objective to - create a network for future collaborations on topics of common interest (smart grid technologies, power electronics, energy efficient buildings), - develop capacities of PhD researchers for conducting research on complex energy management topics, - map the individual research progress and boost Creativity, Innovation and Creative Problem Solving.

[Read more](#)

Research on Emerging ICT Trends

- **Smart grid technologies** (Energy conversion and storage devices; Smart grid communication and information technologies; Distributed generation and micro-grid; Physical, cyber and system security for smart grid; Multi-agent distributed energy optimization; Demand response management; Energy Efficiency User Benchmarking;
- **Renewable Energy** (wind power, hydropower, solar energy, biomass, biofuel, geothermal energy, wave energy, tidal energy, hydrogen and fuel cells, energy storage); Energy-related forecasting;
- **Energy-efficient operations** (modeling and simulation, learning, optimization, and control) in buildings environments; Applications in smart and connected communities; Emerging standards for data collection, energy control, or interoperability of disparate devices or systems; Building automation system metadata models and inference techniques; Improved user interfaces to built infrastructure; Human in the loop sensing and control for efficient building energy systems; Enhancing energy efficiency, energy reliability, durability and comfort via Cyber-Physical Systems and Internet of Things;
- **Big Data, Artificial intelligence and machine learning algorithms** for digital ecosystems (energy data spaces, governance mechanisms).





Capacity building in Smart and Innovative eENERGY management

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Institute Mihajlo Pupin



IMP Motivation & Vision

Regional Centre of Excellence in smart energy management

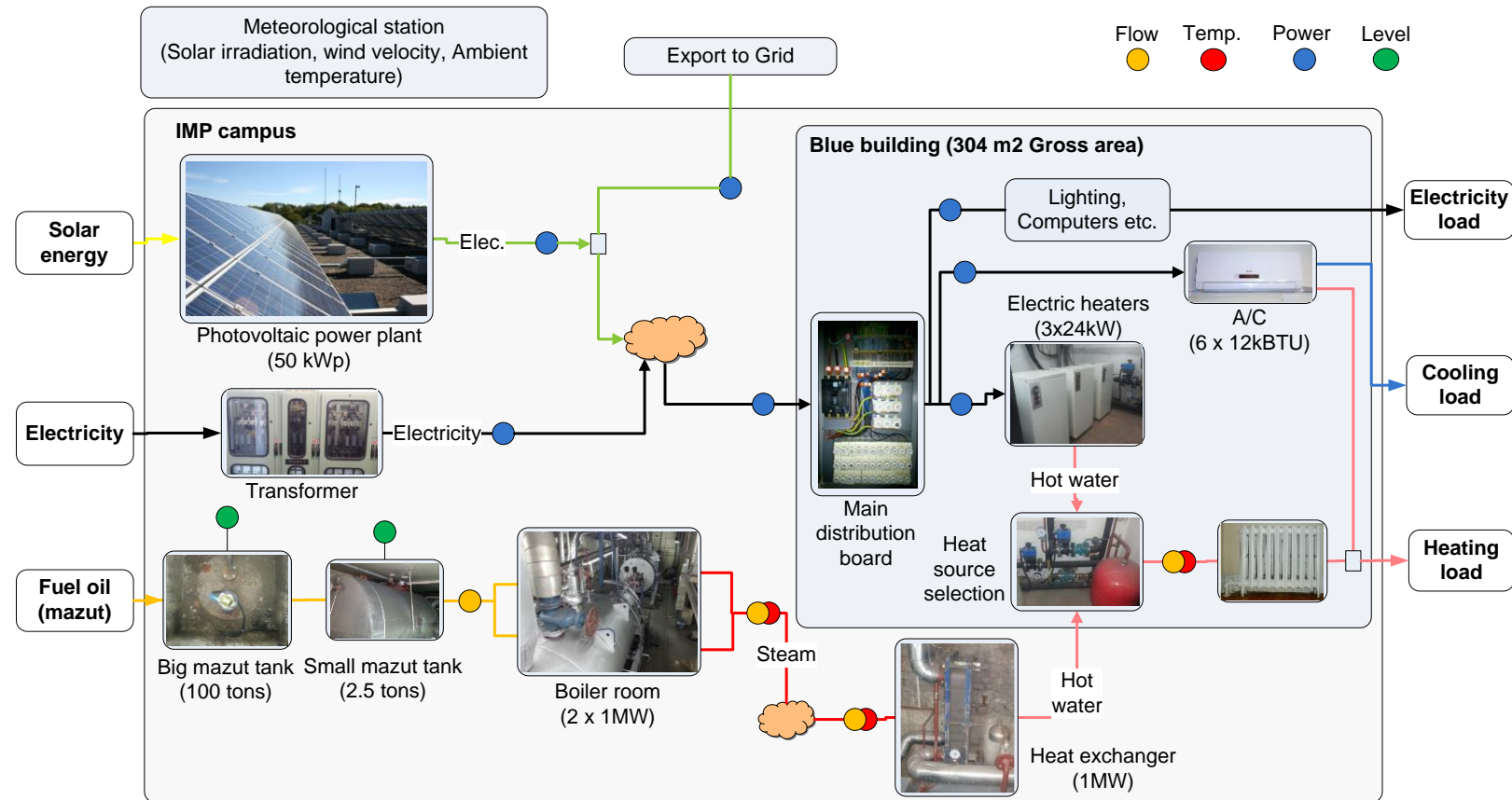


- ▣ Dispatching centers in Serbia
- ▣ Supervision of transmission network
- ▣ Supervision of entire distribution network
- ▣ Integrated monitoring and balancing the SMM block



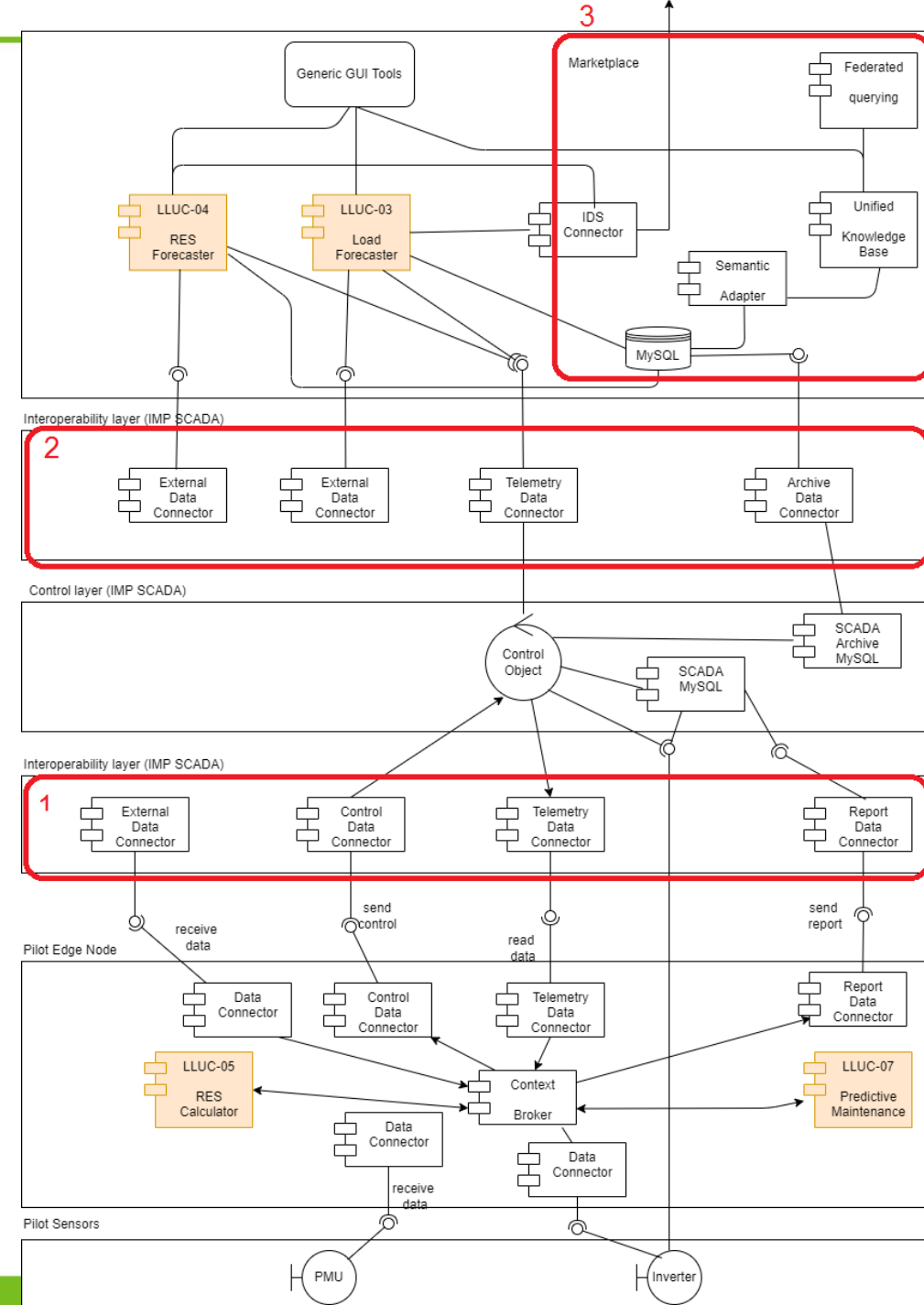
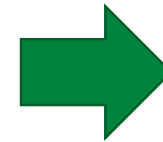
IMP campus as a Testbed

- Building, with offices, meeting room and a testing facility
- Three heating alternatives
 - Heating plant – using radiators running on hot water
 - Electric boilers – using radiators running on hot water
 - A/C – using electricity to heat the surrounding air
- Heat and electricity dispatching infrastructure
- Manual or automated control (SCADA)

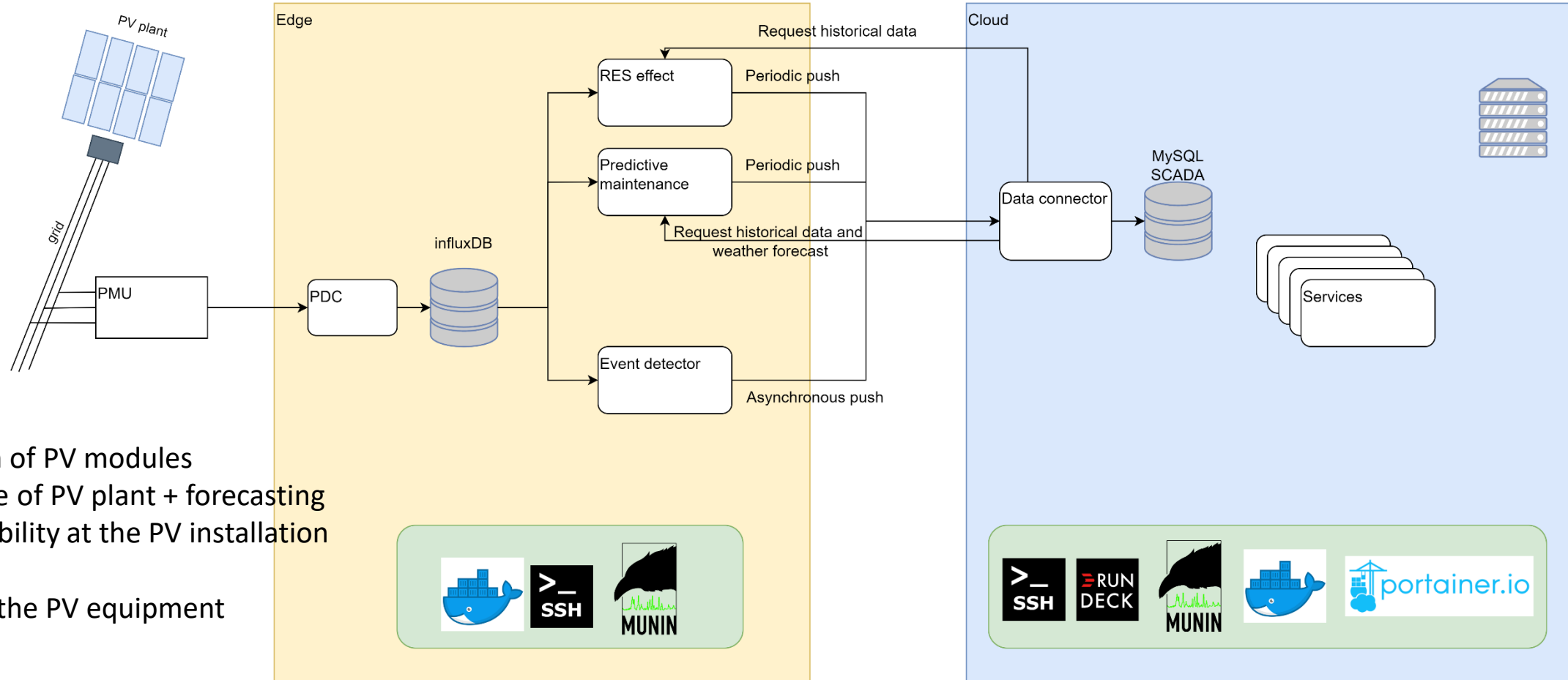


Edge vs Cloud Analytics

PV plant – modules $P_n = 50\text{kWp}$



Edge Analytics

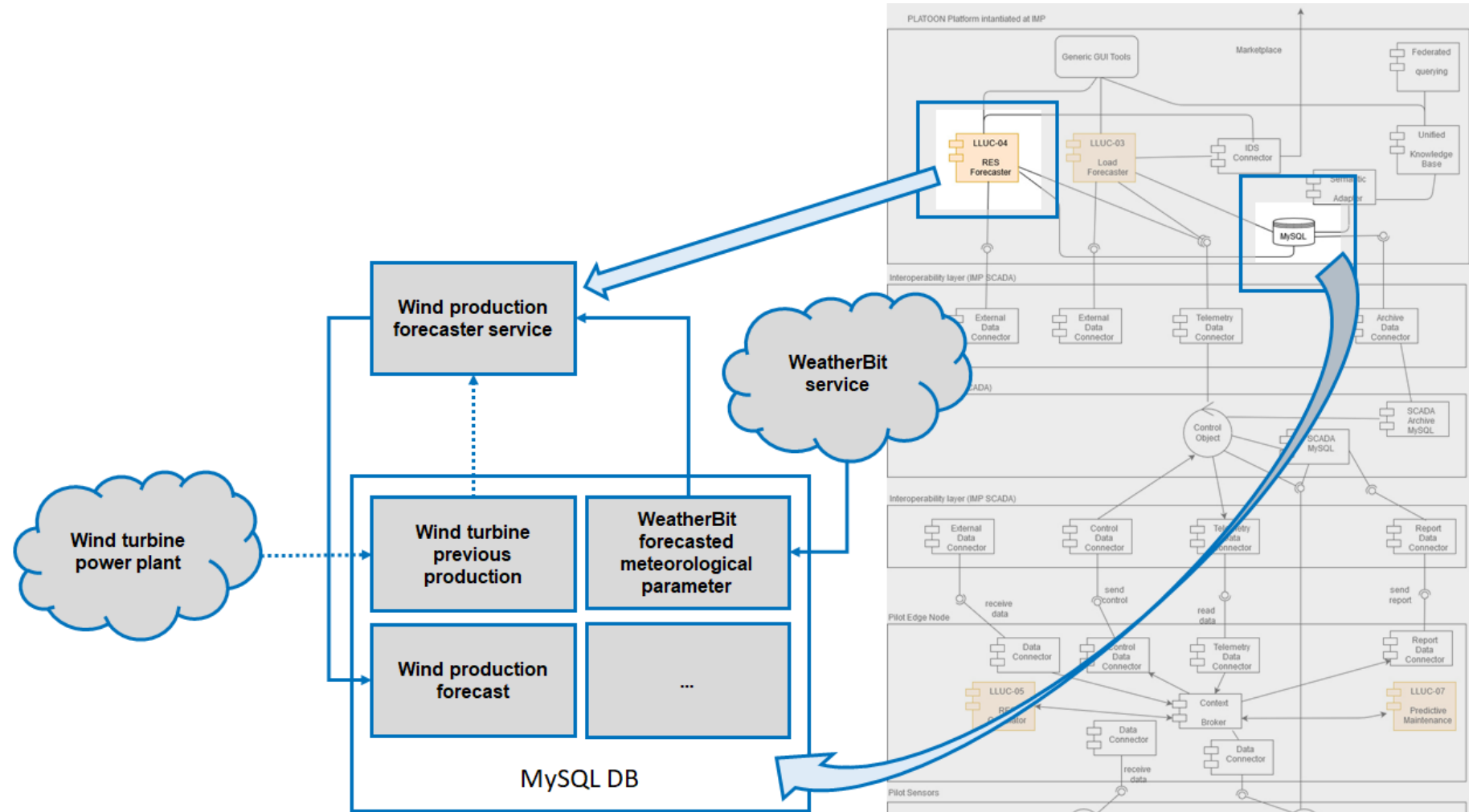


- Degradation of PV modules
- Performance of PV plant + forecasting
- LV grid capability at the PV installation point
- Monitoring the PV equipment

Security, VPN, SSH keys

Cloud Analytics

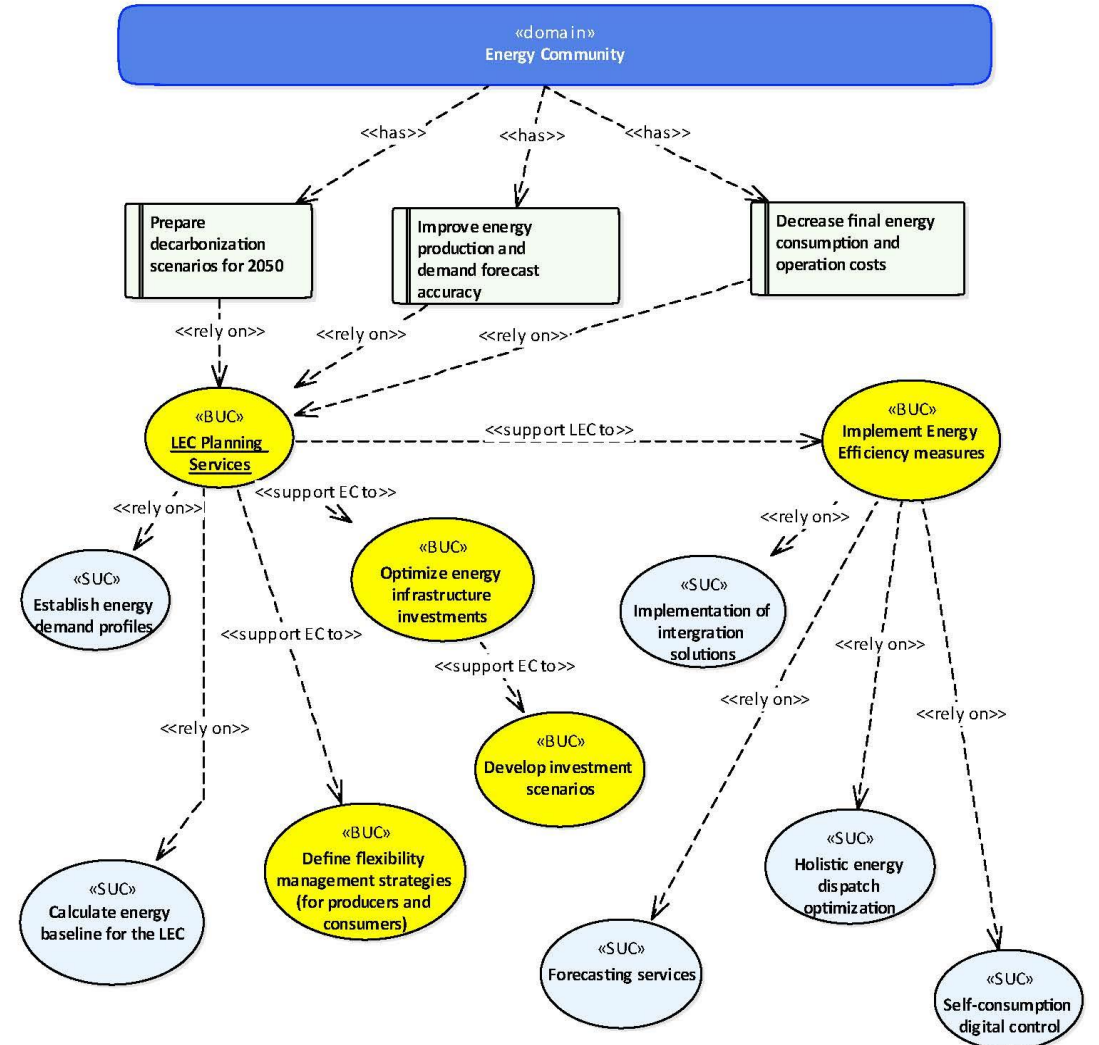
Forecasting

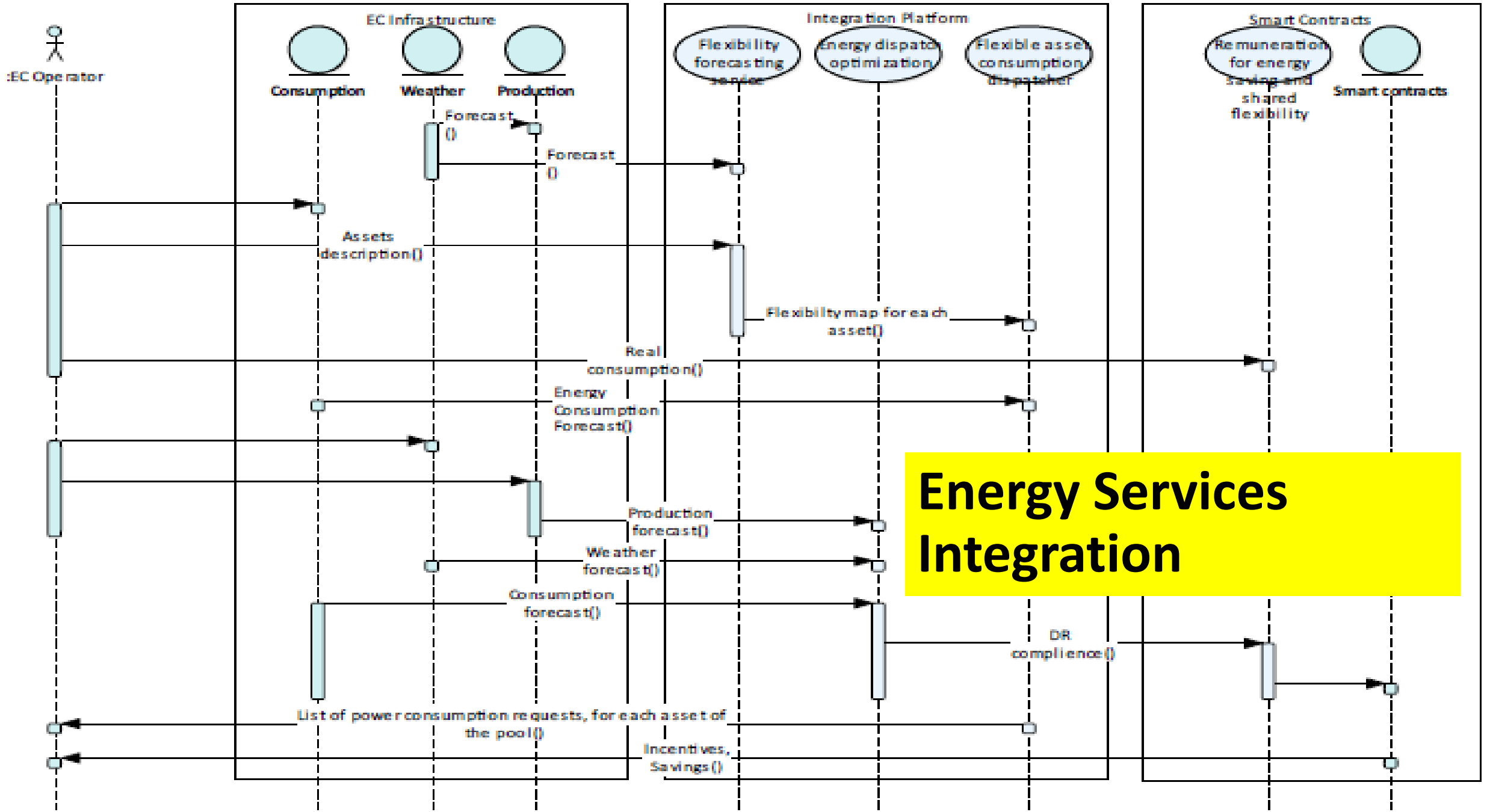


Energy Services Integration

IEC 62559-2

- Planning services (self-consumption)
- Non-intrusive load monitoring
- Local and aggregated energy demand/consumption prediction
- Renewable energy sources (RES) generation forecasting
- Energy dispatch optimisation
- Energy performance evaluation and benchmarking

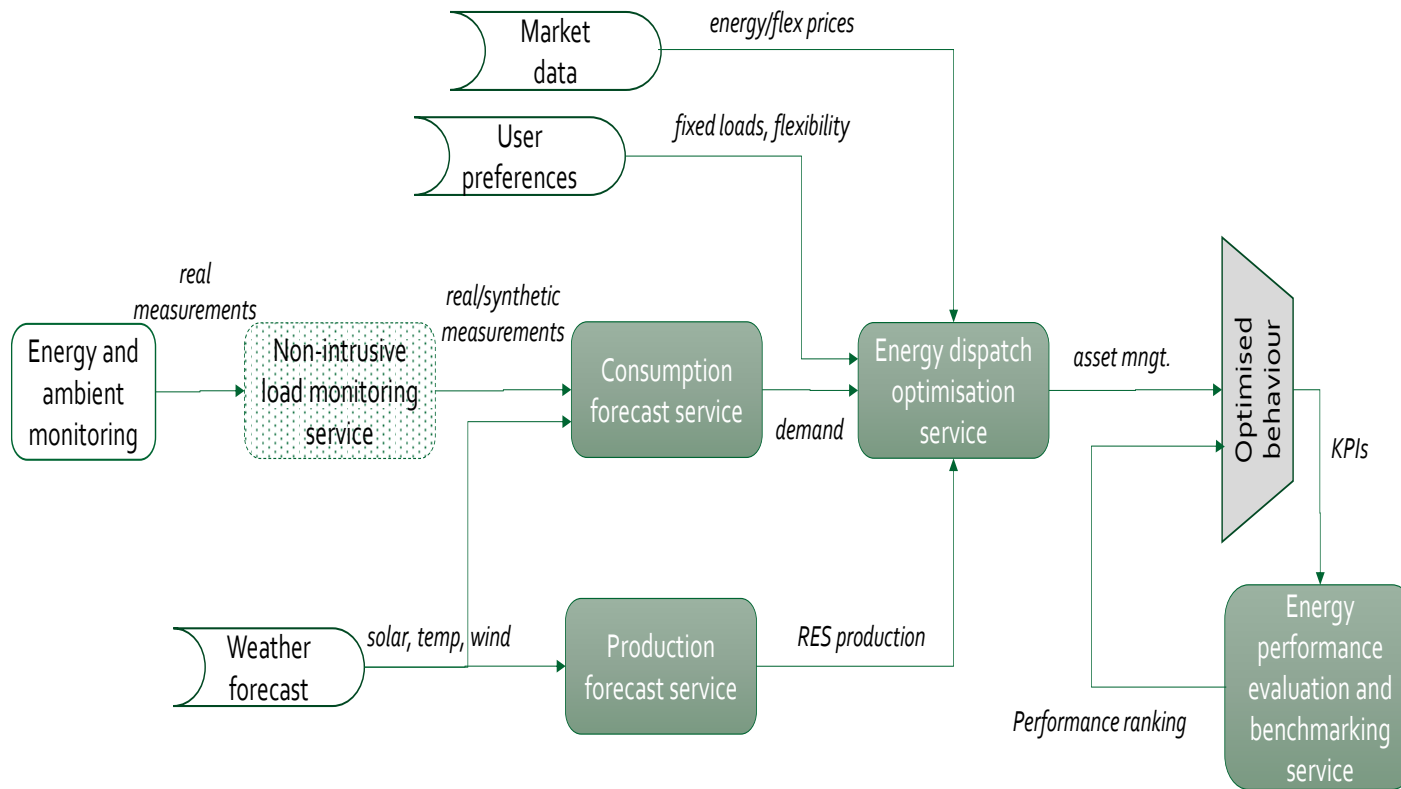




Energy Services Integration

Energy services

Key Exploitable Results



› Stakeholders



EU Projects

- [HESTIA: Holistic dEmand response Services for European residenTIAI communities, GA No. 957823](#)
- [NEON: Next-Generation Integrated Energy Services fOr Citizen Energy CommuNities, GA No. 101033700](#)
- [OMEGA-X: Orchestrating an interoperable sovereign federated Multi-vector Energy Data Space built on open standards and ready for GAia-X, GA No. 101069287](#)
- [FEDECOM: FEDERated -system of systems- approach for flexible and interoperable energy COMMunities](#)
- [R2D2: Reliability, Resilience and Defense technology for the grid](#)
- [REACT: Renewable Energy for self-sustAinable island CommuniTies, GA No. 824395](#)
- [PLATOON: Digital PLATform and analytical TOOlS for eNergy, GA No. 872592](#)
- [TRINITY: TRansmission system enhancement of regioNal borders by means of IntelligenT market technologY, GA No. 863874](#)

Submitted by valentina.janev on Mon, 06/13/2022 - 13:42

International SINERGY Conference on Smart and Innovative eENERGY management, 26-28 September 2023

The European electricity system undergoes significant changes driven by the EU common rules for the internal market for electricity, as well as by the climate action agenda. With solar and wind power on the rise, grid operators need new equipment to make the whole power system operate flexibly. Hence novel sensors, advanced data exchange infrastructures, and data handling capabilities that make use of Big Data, Artificial Intelligence, 5G and distributed ledger technologies are needed to enhance forecasting, allow the remote monitoring and management of distributed generation and improve asset optimisation. Smart Energy Management refers to a variety of novel concepts and technologies, serving at both energy generation and consumption side, such as energy efficiency, demand management, Smart Grid, micro-grids, renewable energy sources (RES), and other emerging solutions. It represents one of the fastest developing fields, according to the EU priorities, while, at the same time, it remains somewhat neglected in the South-eastern Europe countries.

The SINERGY International Conference on Smart Energy Management technologies will be held in Belgrade, Serbia end of September 2023.

Specific topics covered by the conference program include, but are not limited to:

Thank You for Your Attention !

