



ENERGENIUS

SMART ENERGY SOLUTIONS

GEM-GRID: ENERGY SOURCES OPTIMIZATION

REACH - Technical Pitch
Matteo Gerola

OUTLINE

- Company
- Team
- Business pain
- Technical specification
- Datasets and stakeholders
- Technologies
- Solution
- Scalability and data governance
- Experiment workplan
- Demo

COMPANY

8
PARTNERS

11
EMPLOYEES

96
CUSTOMERS

8.5
BILLION DATA/YEAR

Building **commissioning, energy diagnosis, monitoring and analysis** for industries and buildings



TEAM



Claudio Peroni (*CEO*)

Former head of energy delivery team @ Zucchetti Spa
15 years of experience in energy monitoring



Renato Ornaghi (*Energy Manager*)

25 years of experience in energy analysis
Certifications (UNI 11339 - TUV HESSEN EN ISO 50001)



Alessio Frigerio (*CCO*)

Top client commercial agent @ Energy Saving Spa
Energy Manager (UNI 11339)



Giuseppe Grigis (*Energy Manager*)

15 years of experience in energy analysis and building commissioning
Certifications (UNI 11339 - LEED)



Paolo Pelizzari (*CFO*)

25 years of experience in the economic field
Owner of his own office as a Chartered Accountant



Michele Colombo (*Energy Auditor*)

15 years of experience in energy analysis
Energy consultancy for energy-intensive companies



Matteo Gerola (*R&S Head*)

Senior developer @ FBK research center
15 years of experience in commercial and EU research projects



Daniele Saviola (*Project Manager*)

25 years of experience in project management
Former general manager of an industrial company

BUSINESS PAIN

Theme proposed by CERTH: «ENERGY SOURCES OPTIMIZATION»

- Optimize the use of energy sources, i.e. Renewable Energy Sources, storage, and load, of a building towards energy efficiency
- Hundreds of thousands of buildings have energy from renewable sources, but practically no one manages it optimally, wasting clean energy and money

OPTIMIZE

SUGGEST

- Extendable to **Renewable Energy Communities** (REC - European REDII directive): set of **citizens, public bodies, companies** and **cooperatives** that collaborate to self-produce and self-consume energy "on site and with each other" from renewable sources

TECHNICAL SPECIFICATION

Hardware

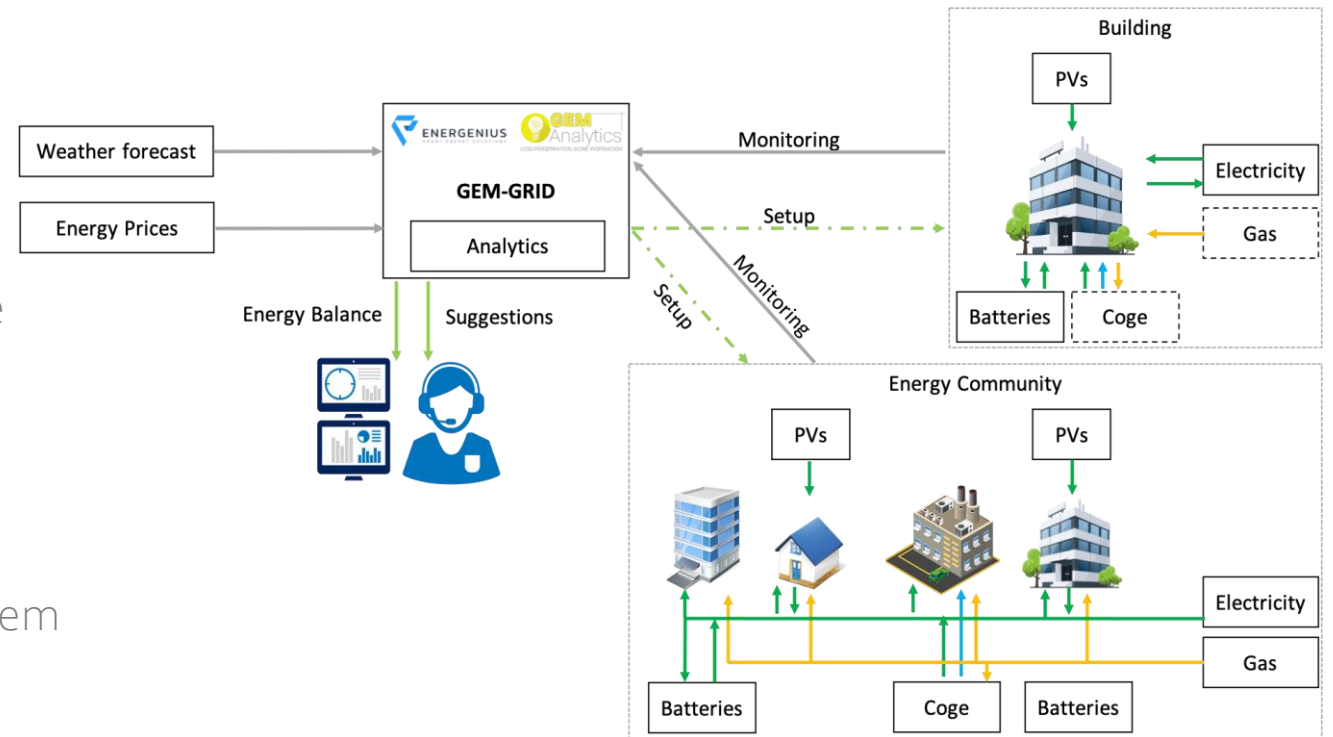
- Commercial smart meters
- Linux-based gateways at the edge

Software

- Data collection and actuation at the edge
- Analytics and GUI in the cloud
- Secure protocols for data sharing

Algorithm

- Find the optimal working point of the system
- Analyse the current setup and suggest hardware improvements



DATASETS AND STAKEHOLDERS

Energy and power from smart-meters (CERTH + WORLD JOIN CENTER)

- Imported and exported from the national grid
- Produced by RES (PV, cogeneration plant, wind power plant, geothermal system, ...)
- Imported and exported from storage systems

Energy market prices (REUTERS)

- Electricity and natural gas market prices (past, present, future)

Weather data (OPENWEATHER)

- Temperature, humidity, solar irradiance (past, present, future)

Building managers, building owners, energy utilities,
public bodies, companies, energy managers

TECHNOLOGIES

OPEN-SOURCE TOOLS

- **Analytics:** Stack of analytic libraries (prophet, scikit-learn, tensorflow, keras, Light-GBM, Xgboost)
- **Architecture:** microservices (Kubernetes) over a geo-distributed infrastructure (Fog Computing)
- **Databases:** Relational database (MariaDB) and time-series database (InfluxDB)
- **Northbound API:** fully compliant OpenApi 3.0 HTTPS/SSL RestFul API
- **Southbound API:** set of standard libraries (Modbus, Bacnet, OPC, CSV, XML, etc.) to interact with meters, Openwether Plugin, Reuters plugin
- **User Experience:** Graphical User Interface based on Grafana, dedicated PDF reports sent via mail

SCALABILITY AND DATA GOVERNANCE

- GEM-Analytics modules are state-less microservices running as **Docker** containers
- Deployment, balancing and execution of containers is **orchestrated** by **Kubernetes**

-> easy to **scale** horizontally and **deploy** new features

- Infrastructure designed to handle **high volume of data** from many concurrent customers:

- ~ 1000 avg distinct time-series per customer with 15min frequency
- ~ 200 expected customers



~15 billions data point each year

- Data transferred using HTTPS/SSL
- No specific GDPR related action except user's login data (encrypted)

EXPERIMENT WORKPLAN



COLLECT

ANALYZE & IMPLEMENT

EXPOSE

DEMO

<https://demo.energenius.it/>



ENERGENIUS
SMART ENERGY SOLUTIONS

Thanks

Energenius Srl
Piazza Manifattura 1
38068 Rovereto (TN)

www.energenius.it
info@energenius.it

SOLUTION

