EnerHarv 2024

PSMA International Workshop | 26-28 June, 2024 | Perugia, Italy

COMMERCIAL SPONSORS

EnerHarv 2024 Workshop:

IOT APPLICATIONS FOR SMART CITIES

Presented By –

Elisabetta Boco, PhD

EagleProjects SpA

eboco@eagleprojects.it

Friday, June 28, 2024

ORGANIZER PSMA

HOST unipg

MEDIA SPONSORS

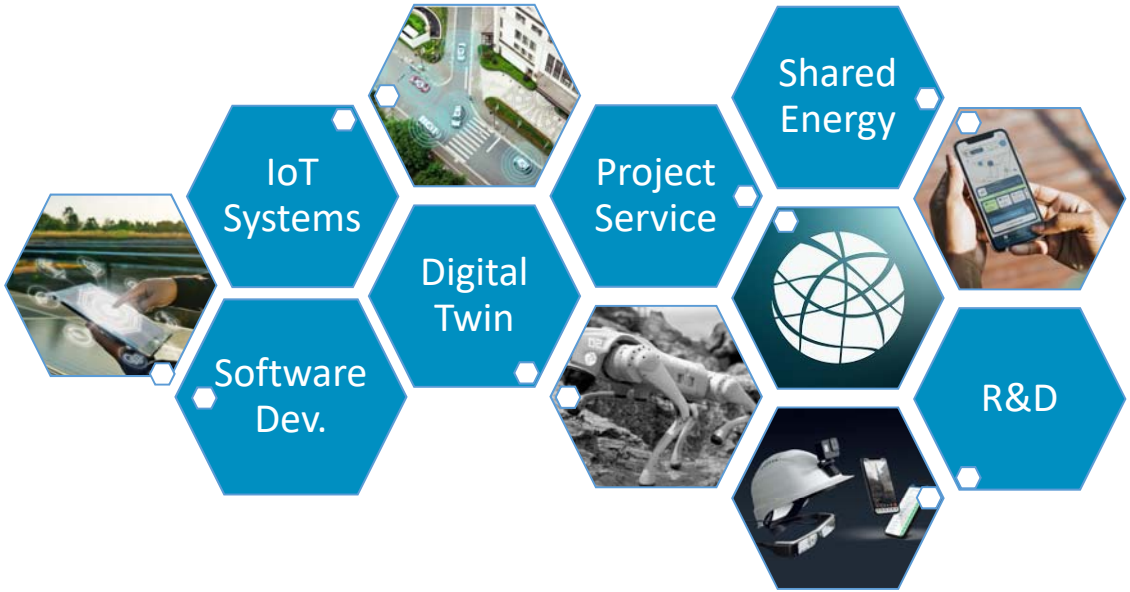
TECHNICAL SPONSORS

OVERVIEW

- Who we are
- Smart Cities
- IoT Sensors
- Traffic Monitoring Application
- EagleFlow: Energy Monitoring Application

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.

EAGLEPROJECTS SPA



ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.

SMART CITIES

> A SMART CITY IS A PLACE WHERE **TRADITIONAL NETWORKS AND SERVICES** ARE MADE **MORE EFFICIENT** WITH THE USE OF **DIGITAL SOLUTIONS** FOR THE BENEFIT OF ITS INHABITANTS AND BUSINESS
>
> European Commission

MONITOR

- **IoT sensors**
  - Temperature
  - Acceleration
  - Energy
  - Traffic
  - Environment

REAL-TIME ANALYSIS

- **Edge/Cloud Computation**
  - Ingestion and parsing
  - Historicization
  - Threshold analysis
  - Trends analysis
  - AI

ACTUATION

- **Automatic / Manned**
  - Optimization
  - Risk avoidance
  - Service provider

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.

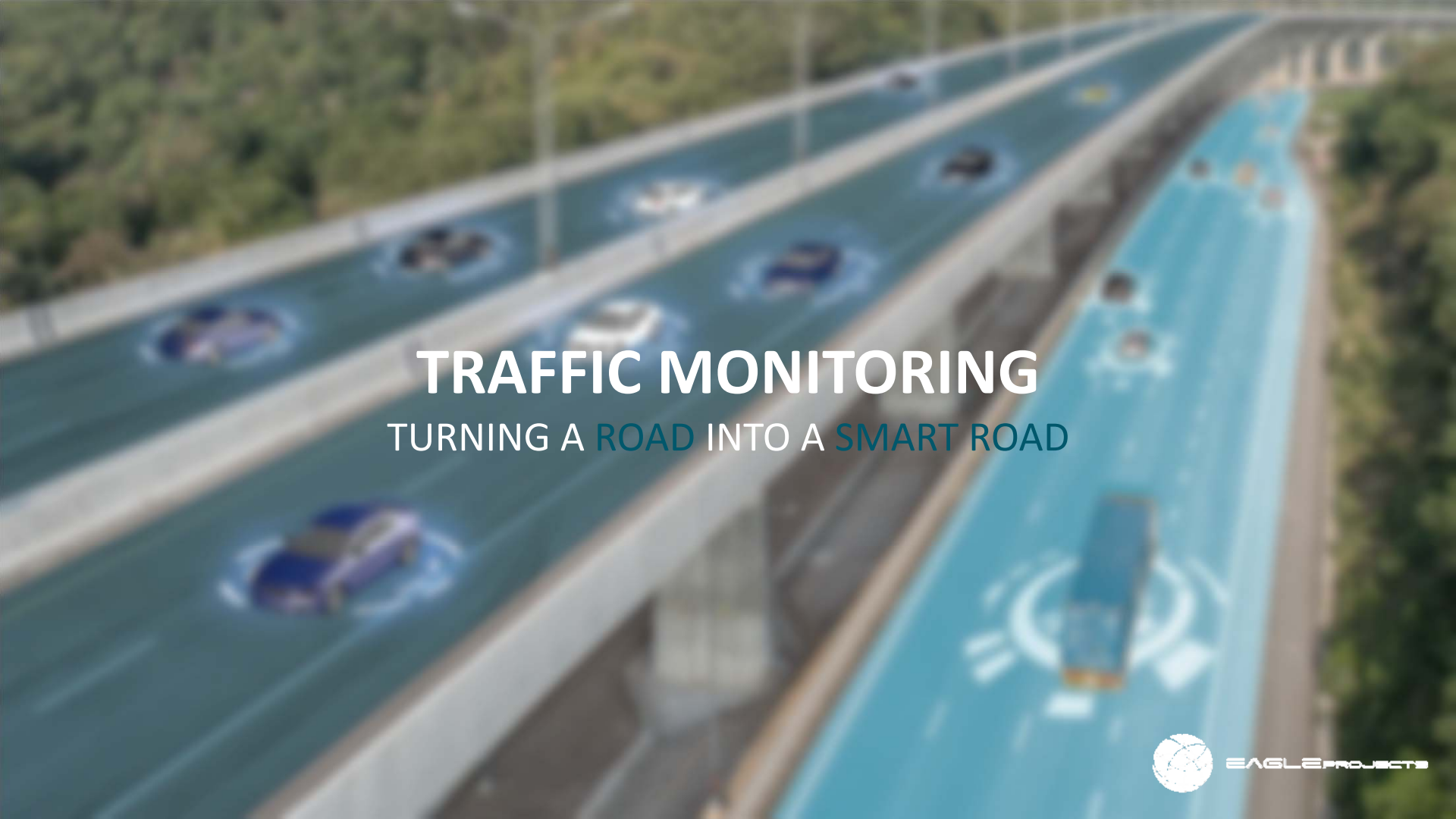
IOT SENSORS

IT IS AN **ELECTRONIC MODULE** BUILT TO **MEASURE** AMBIENT OR SYSTEM CONDITION AND **TRASMIT** THE DATA TO THE USER THROUGH THE NETWORK. IT MAY USE A **GATEWAY**.

- Real IoT sensor

- Traditional sensors with gateway

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.



TRAFFIC MONITORING

TURNING A ROAD INTO A SMART ROAD

EAGLE PROJECTS

TRAFFIC SENSORS AND DETECTOR

- The traffic sensor is built of 2 coils embedded in each lane of the road
- The sensor is powered, and an oscillating magnetic field is created
- Whenever a vehicle go through a coil, the frequency of oscillation changes and the change is detected by the detector
- Based on the metal surface area, the type of vehicle is determined

Max power consumption: 700mW with 24VADC
Avg power consumption: 600mW with 24VADC

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.

DISTRIBUTED COMPUTING: APPLIANCE

- RS485 to UART
- Ethernet connection
- Integrated software
  - Connection to MQTT Broker
  - Parsing of sensor messages
  - Local Storage
  - Data transmission in cloud for storage
  - Analysis of status of local installation
  - Alerting services

Idle power consumption: 3W
Stress power consumption: 6W

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.

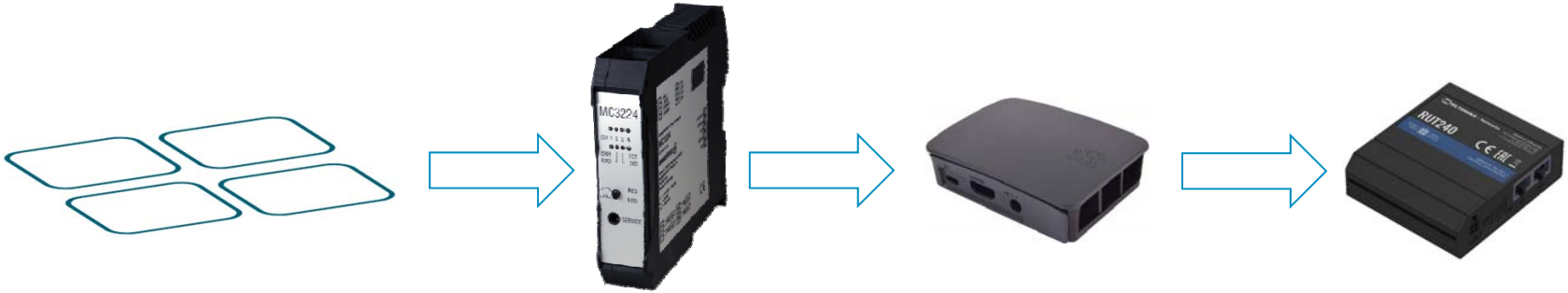
GATEWAY

- Mobile connection 3G / 4G
- WiFi Connection IEEE 802.11b/g/n
- LAN Port
- Modbus master/slave modes
- 64MB Ram
- Flash storage 16MB

Idle Power consumption: 0.9W
Mobile data with no traffic: 1.5W
Avg mobile traffic consumption: 4.2W

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.

ENERGY REQUIREMENTS



Maximum power consumption expected: 11W
…Of which **continuous** > 7.1W

Typically 1 installation per monitored road

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.

SOLAR SELF-POWERED ACQUISITION

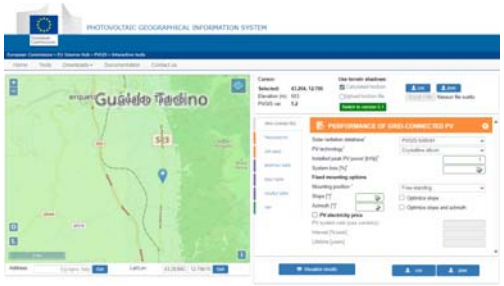
- Expected traffic estimated as cars/hour and its effect
- Expected charge/discharge battery rate
- In winter season lower charging capability
  - Limit case: up to 4 months with no charge

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.

FEASIBILTY STUDY: AN EXAMPLE

	transits/week	cars/hour	%transmission min	%transmission max	%elaboration
SR220	65100	387,5	0,021527778	0,107638889	0,043055556
SR316	70000	416,6666667	0,023148148	0,115740741	0,046296296
SR599	54000	321,4285714	0,017857143	0,089285714	0,035714286
SS3_FV	27000	160,7142857	0,008928571	0,044642857	0,017857143
SS3_GU	25000	148,8095238	0,008267196	0,041335979	0,016534392
high traffic road	302400	1800	0,1	0,5	0,2

We can use the **average consumption**.
The change in consumption is small enough varying the number of cars



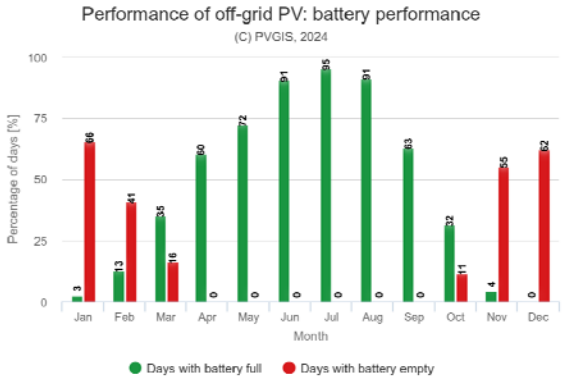
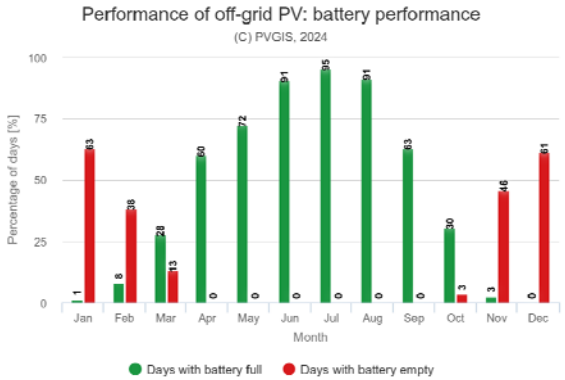
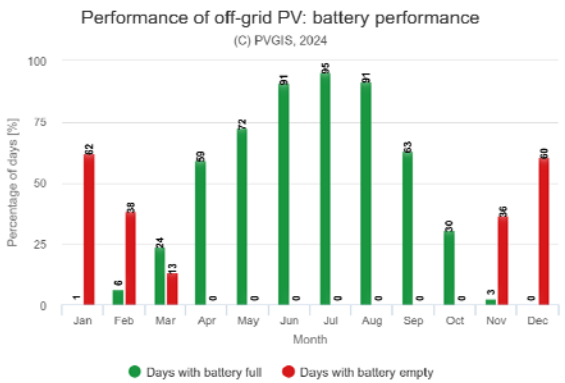
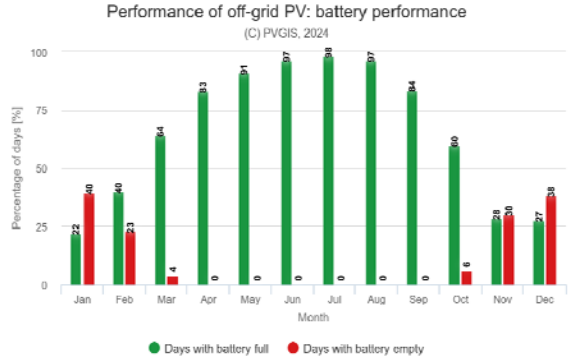
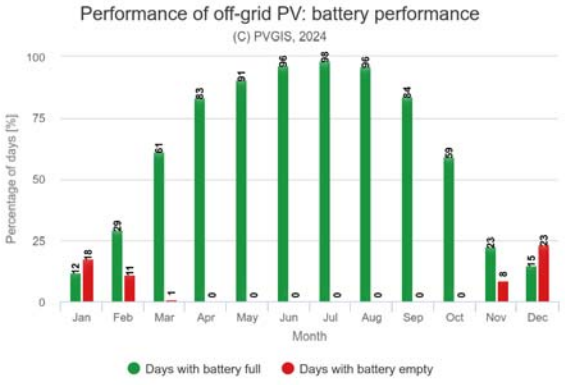
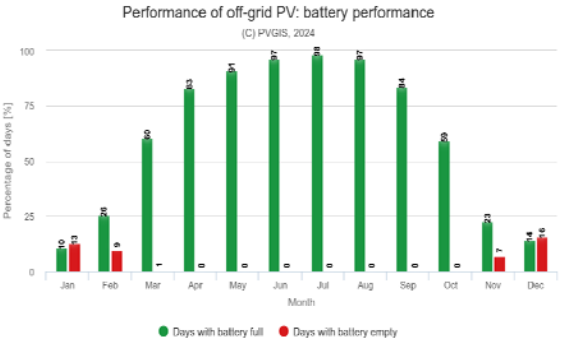
100W installed	Consumed	Produced	Battery eff.	Av. storage	Worst case
March to October	37000 W	97250	90%	50525	50525
November to February	21300 W	24370	90%	633	-21300

70W installed	Consumed	Produced	Battery eff.	Av. storage	Worst case
March to October	37000	68700	90%	24830	24830
November to February	21300	19500	90%	-3750	-21300

50W installed	Consumed	Produced	Battery eff.	Av. storage	Worst case
March to October	37000	48620	90%	6758	6758
November to February	21300	12180	90%	-10338	-21300

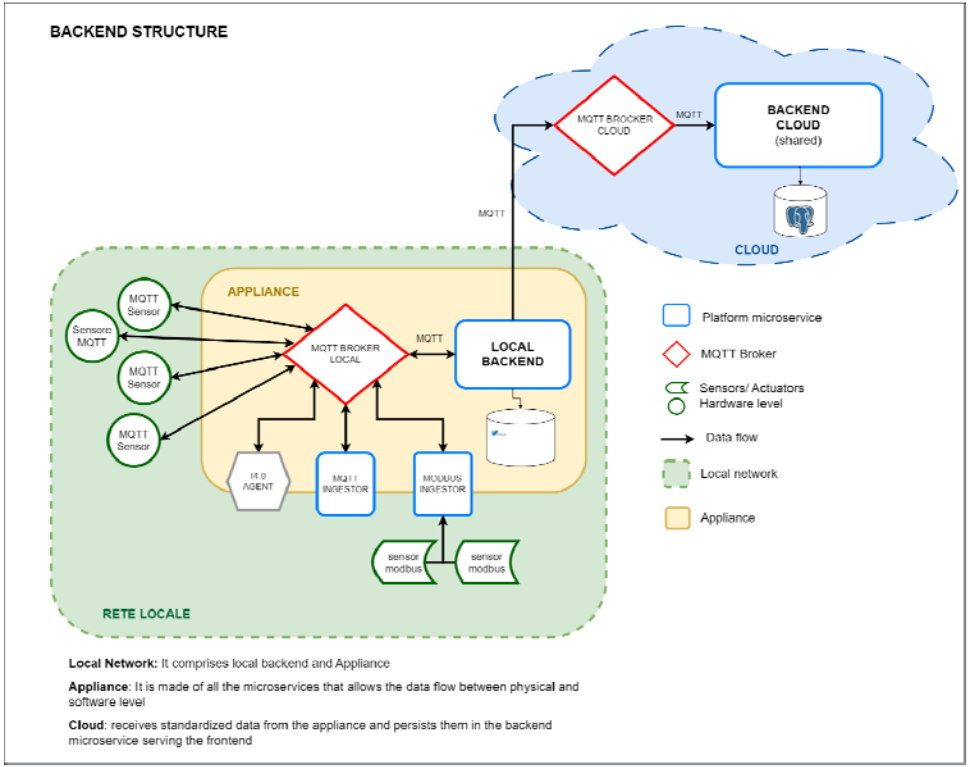
ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.

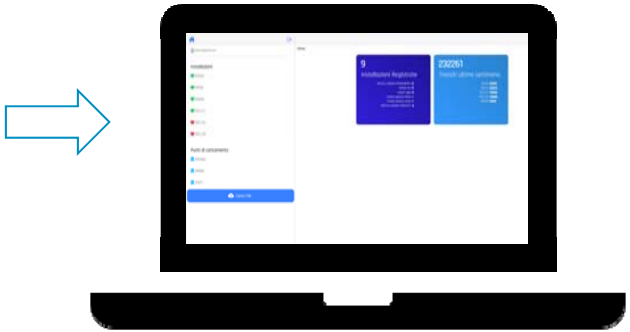
BATTERY CHARGE – DISCHARGE

	50Ah 12V	80Ah 12V	100Ah 12V
70Wp			
100Wp			

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.
EAGLE PROJECTS Technology Factory

IOT PLATFORM STRUCTURE





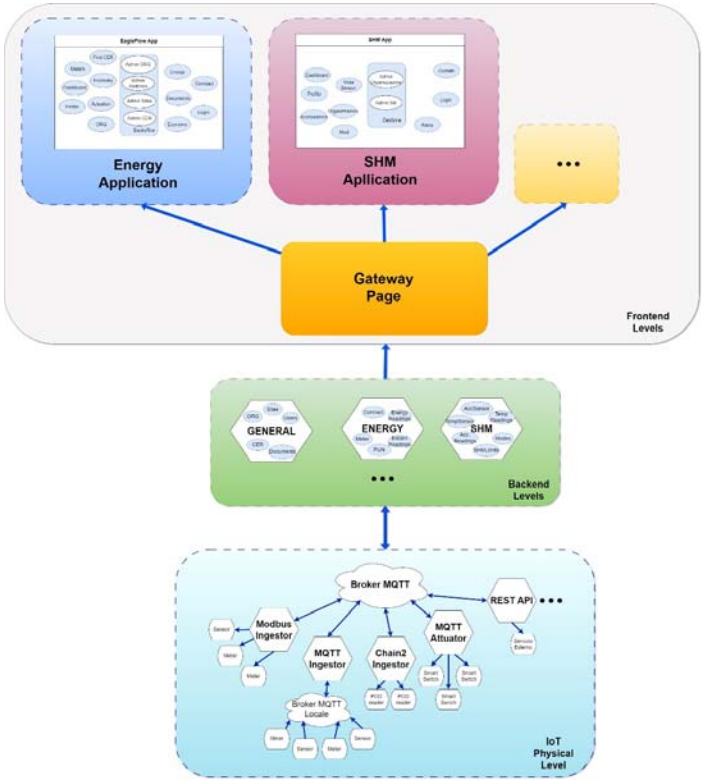
ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.

TRAFFIC MONITORING

DEMO


ENERGY PLATFORM
ENERGY MONITORING AND ENERGY COMMUNITIES

IOT PLATFORM STRUCTURE: APPLICATIONS



- The IoT platform structure is general and allows the construction of multiple frontend levels by application
- EagleFlow is the «Energy Application» side of this generic platform
- It allows a range of sensors, from intrinsically IoT to classic MODBUS + gateway
- It handles a heavy load of transmission in local backends, with sensors communicating up to 1measure/3s

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.


ENERGY PLATFORM
DEMO
EAGLEPROJECTS

Q & A

EnerHarv 2024

PSMA International Workshop | 26-28 June, 2024 | Perugia, Italy

Thanks very much for your time and attention!

Questions/comments???

TECHNICAL SPONSORS

ORGANIZER

HOST

COMMERCIAL SPONSORS

MEDIA SPONSORS

ALL INFORMATION SHALL BE CONSIDERED SPEAKER PROPERTY UNLESS OTHERWISE SUPERSEDED BY ANOTHER DOCUMENT.