La blockchain per le comunità energetiche, demand-response e vehicle-to-grid

Linux Day 2024
Palermo

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SEEDS

Overview:
SEEDS S.r.l.

SEEDS è specializzata nell'utilizzo di tecnologie **BLOCKCHAIN** e **SMART CONTRACT**, viste come strumenti per consentire ai cittadini una **solida comprensione** di ciò che mangiano, indossano, leggono, guardano e ascoltano.

Spin-off accademico dell'Università di Palermo

Start-up Innovativa

Data di nascita gennaio 2020

Dati di qualità per prodotti di qualità

Beyond Information Traceability

Protezione dei dati forniti a imprese e cittadini

Overview:
SEEDS S.r.l. - Mission aziendale

1

Realizzare **soluzioni** nell'ambito del **tracciamento agroalimentare e tessile**, e della **gestione documentale**

2

Aiutare i clienti a **gestire dati, estrarre informazioni e costruire conoscenza** in modo sicuro e innovativo

1

I nostri valori chiave

- tracciabilità
- fiducia
- trasparenza

2

I nostri punti di forza

- smart contract per validare i dati
- consolidamento del dato
- definizione della filiera
- formazione del cliente

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BLOCKCHAIN

Struttura di dati contenente i log autorevoli di **transazioni validate** senza un intermediario fidato

La blockchain è una **catena** in quanto i **dati**:

- sono collegati l'un l'altro,
- sono distribuiti tra tutti partecipanti,
- non possono essere modificati,
- possono essere solo aggiunti in coda.

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SMART CONTRACT

Codice che viene eseguito in modo distribuito:

- Gli smart contract eseguono automaticamente una logica del tipo if-then-else.
- Tramite analisi di coerenza dei dati, gli smart contract verificano che i dati del mondo digitale - registrati sulla blockchain - corrispondano al mondo fisico.
- Il codice e la logica degli accordi risiedono sulla blockchain.

Smart Contract

01
Autonomy

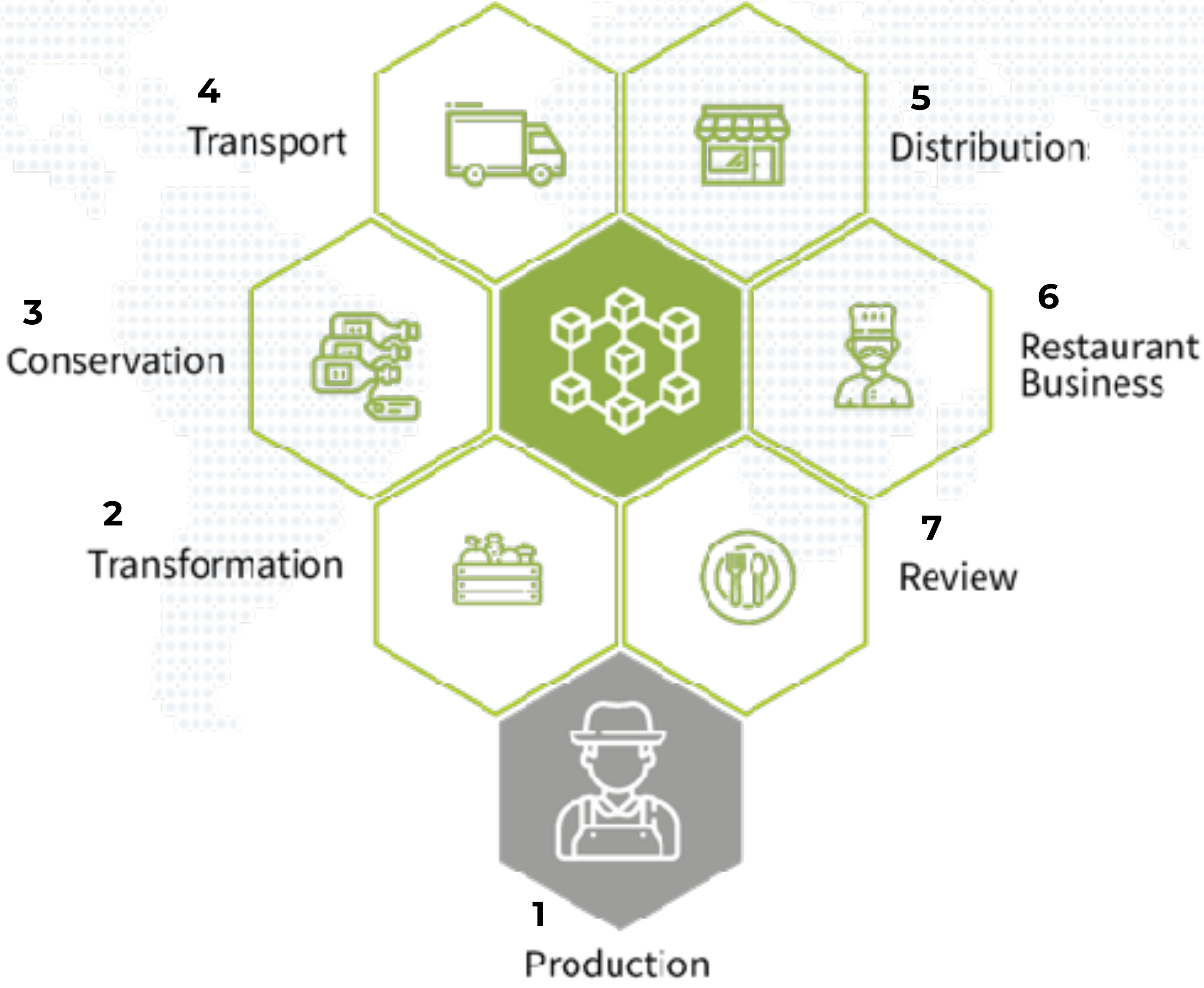
02
Trust

03
Backup

04
Saving

05
Accuracy

La filiera circolare:
catena di valore, responsabilità e consapevolezza

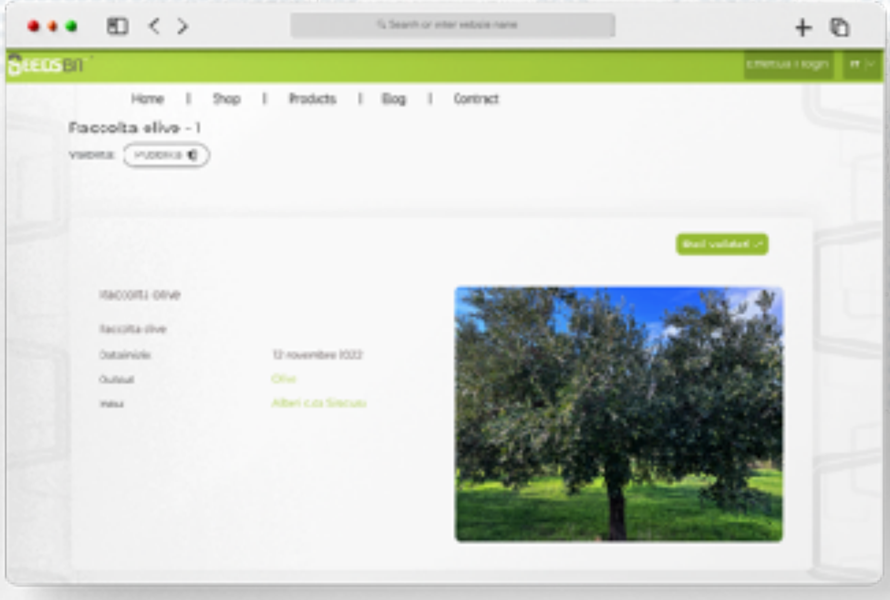


SEEDSBIT
blockchain for information traceability

Piattaforma SeedsBit

WEB APP

Piattaforma completa che offre alle aziende un set di funzionalità specifiche e personalizzabili in base al settore di appartenenza e agli obiettivi.



La soluzione include dei servizi accessori:

- **SeedsBit Marketplace**
- **SeedsBit Document**

Piattaforma web app

Tramite **SeedsBit** l'azienda ha la visione completa della propria filiera.
I consumatori hanno l'accesso solo ai dati che riguardano il prodotto acquistato che permette mantenere un equilibrio tra trasparenza e privacy aziendale.

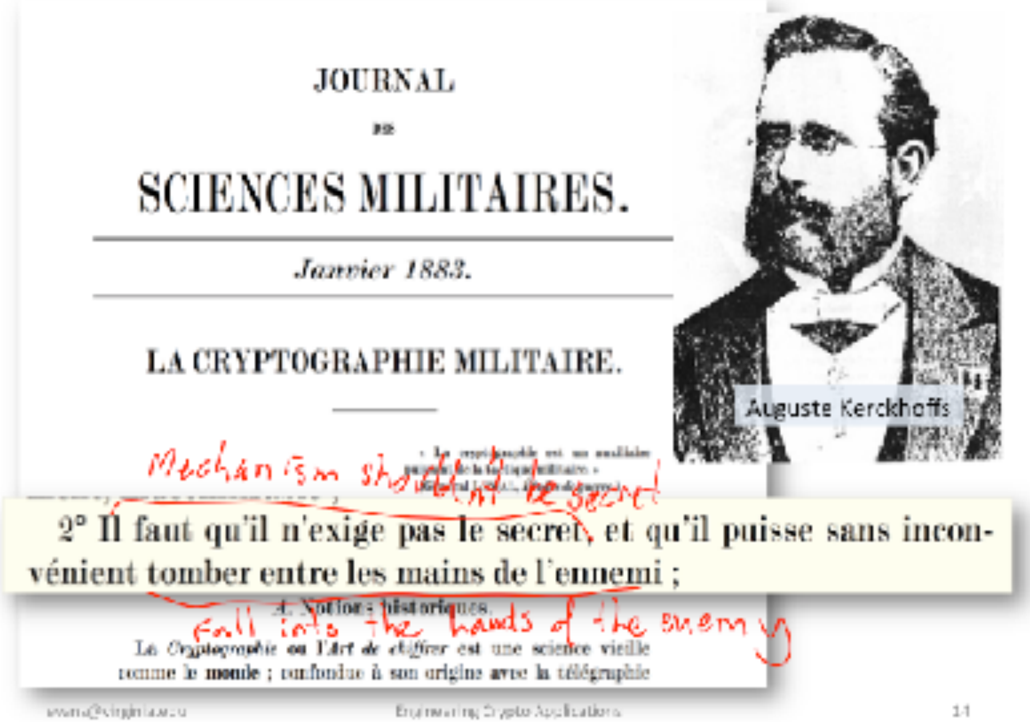
GEOGRAFICO

LOGICO

INFORMATIVO

tre aspetti della visualizzazione dati per i clienti: geografico, logico e informativo.

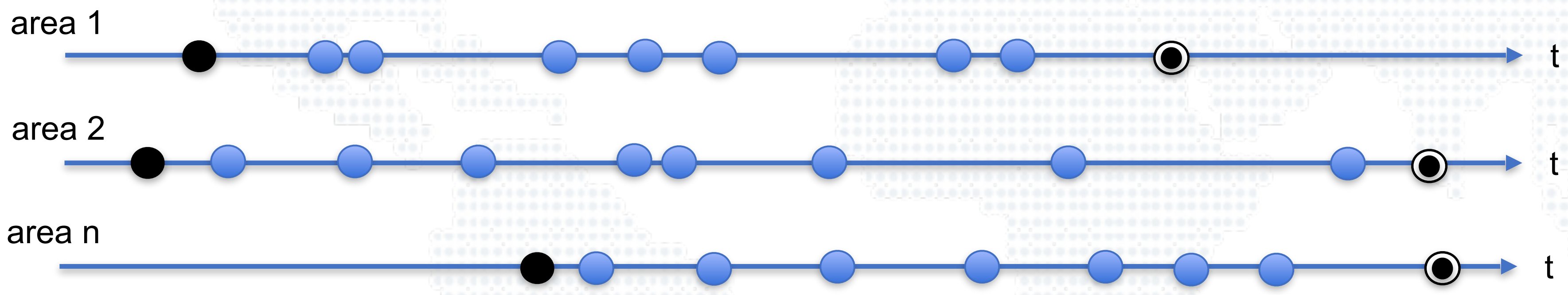
Open source, dati e sicurezza



Kerckhoffs' principle remains as relevant today as it was more than a century ago. Open source systems are inherently aligned with it, prioritizing transparency over obscurity.

Creazione di comunità energetiche

The smart contract relies only on data that are already on the blockchain (the requests to join the energy community



- Identity of the prosumers are known
- Transactions contain the requests to join the e-fair
  - request to join is signed by the prosumer
  - request to join is added on the blockchain
  - prosumer is committed to participate to the energy community (transparency)
  - chronological order is fundamental, buyers are rewarded for their waiting time
- Buyers have contrasting goals, but they all want to maximize the number of participants to the energy community
- Prosumers are not trusted

Comunità energetiche: stati ed evoluzione

Ruolo degli smart contract
- regole di partecipazione
- diritti e i doveri dei membri
- criteri di remunerazione
- criteri di distribuzione dell'energia.

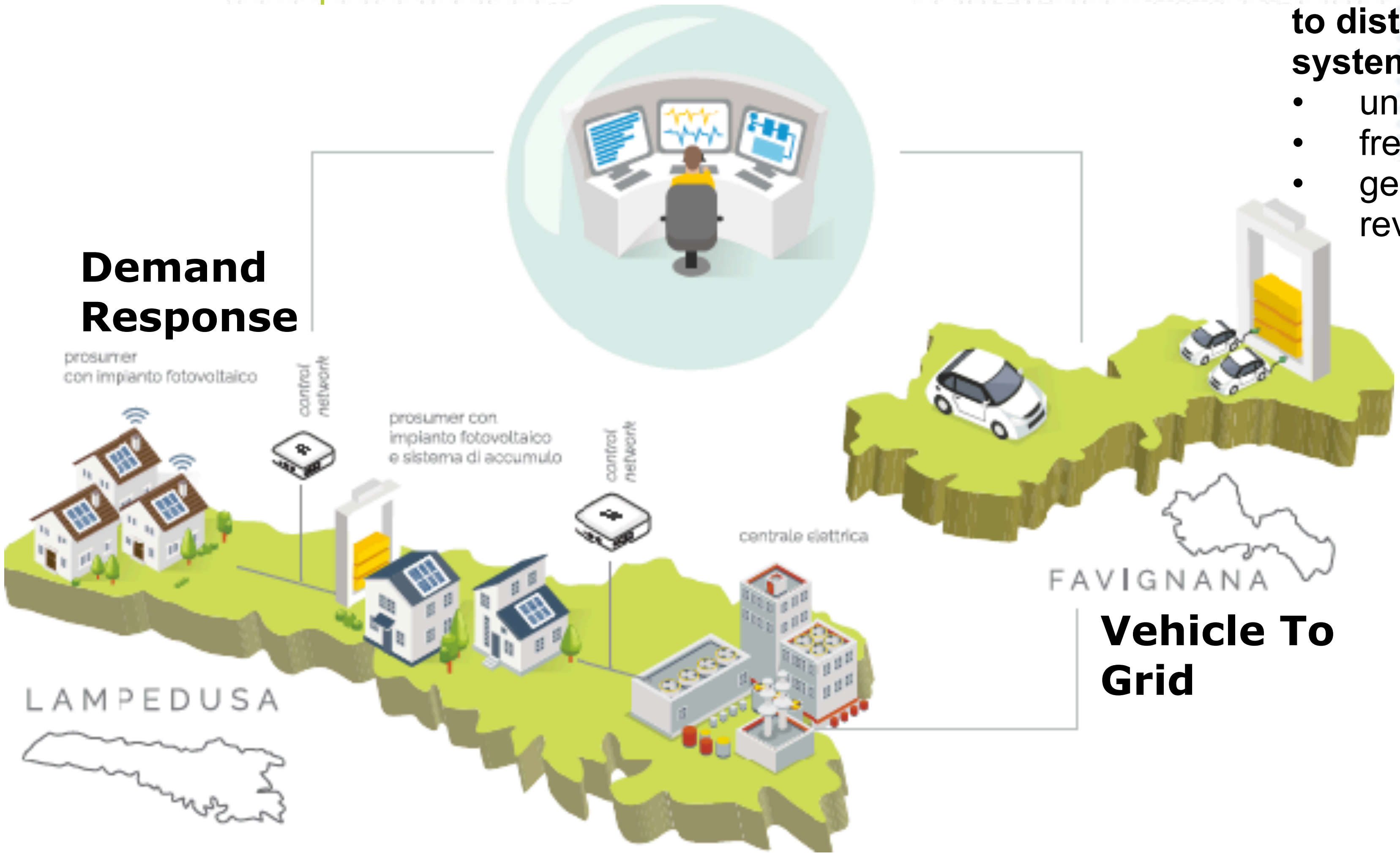
BLORIN motivation: why use blockchain?

- create and coordinate **aggregation of prosumers for DR events**
- create **energy communities** with a bottom-up approach, the opportunistic way
- add **transparency** in attributing losses, charging profiles, DR, V2G programs, battery management
- Use smart contract, channels and secure multiparty computation enable a **perfect tradeoff between transparency, accountability and privacy**
- introduce **new business models** (tokenization)

HLF in BLORIN: Why islands?

Islands power systems are more exposed to disturbances from renewable energy systems

- unbalances
- frequency disturbance
- generation systems inefficiencies
  reverse flows



Why small islands

Features

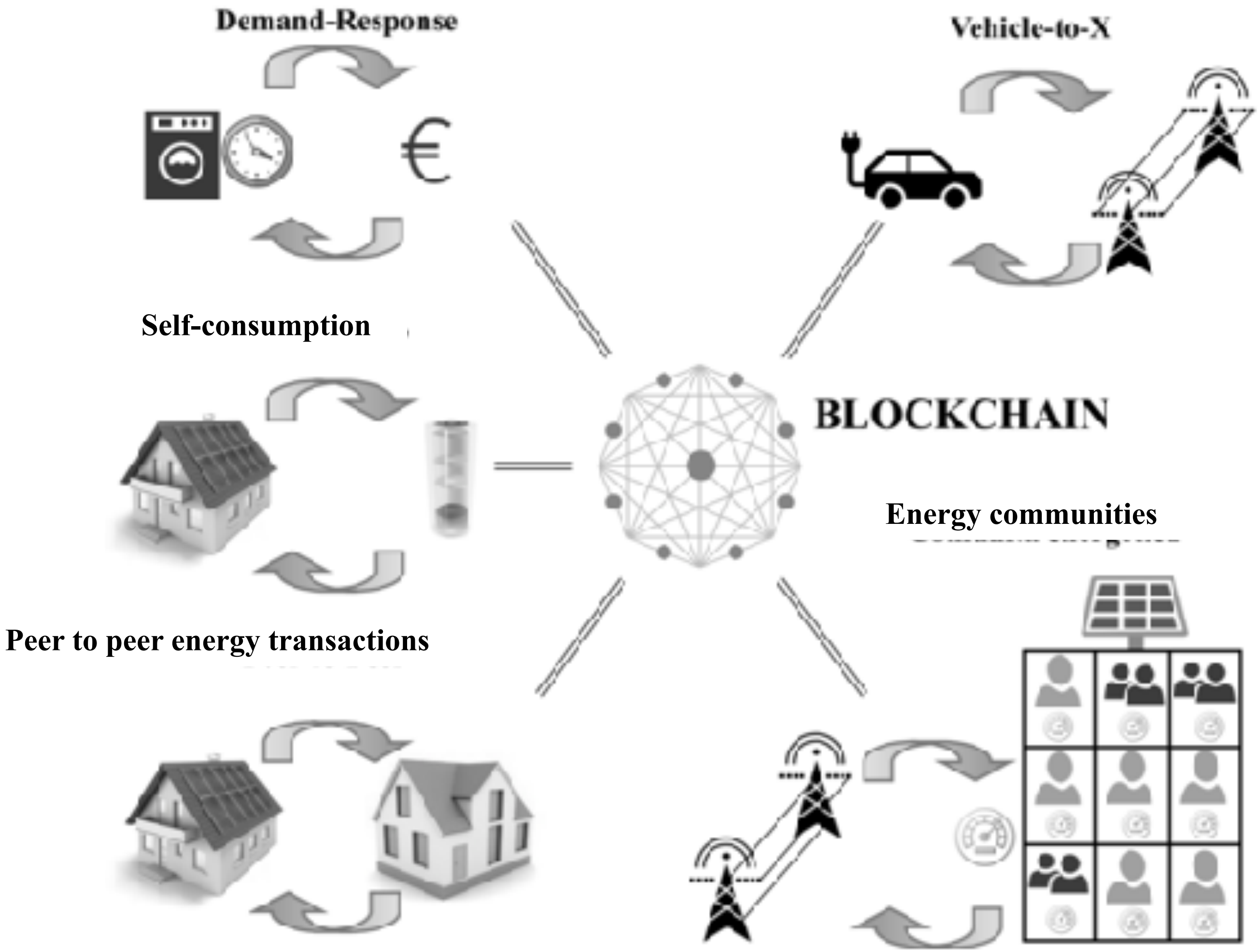
- High seasonality of the electric load
- Diesel power
- limited inertia of the generation system
- Strong interaction of the energy system with the mobility/water and waste system

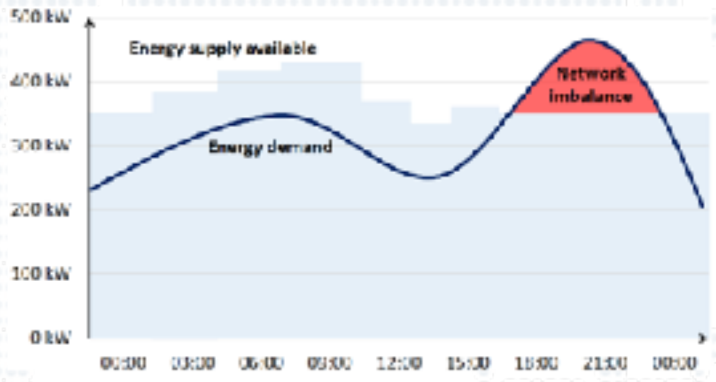
Challenges

- Flexibility needed on all time scales
- Primary adjustment required
- Possibility of using DR on electrical loads (thermal type), electric mobility, desalination
- Production of energy from waste

MISE Ministerial Decree of 14.2.2017: Coverage of the needs of non-interconnected smaller islands through energy from renewable sources

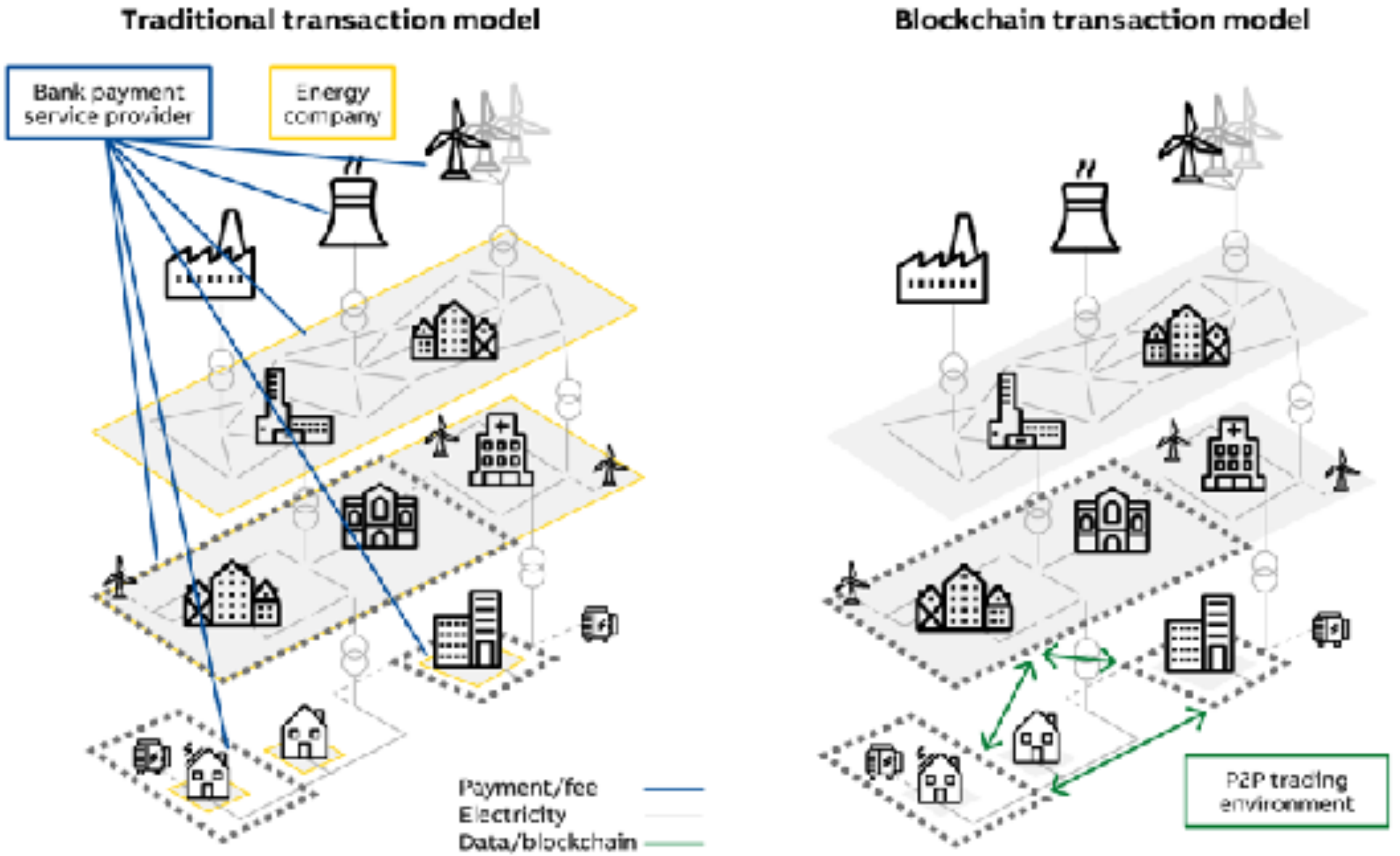
Blockchain applications for the electric energy sector





Transactive energy

DSO Distribution System Operator
TSO Transmission System Operator



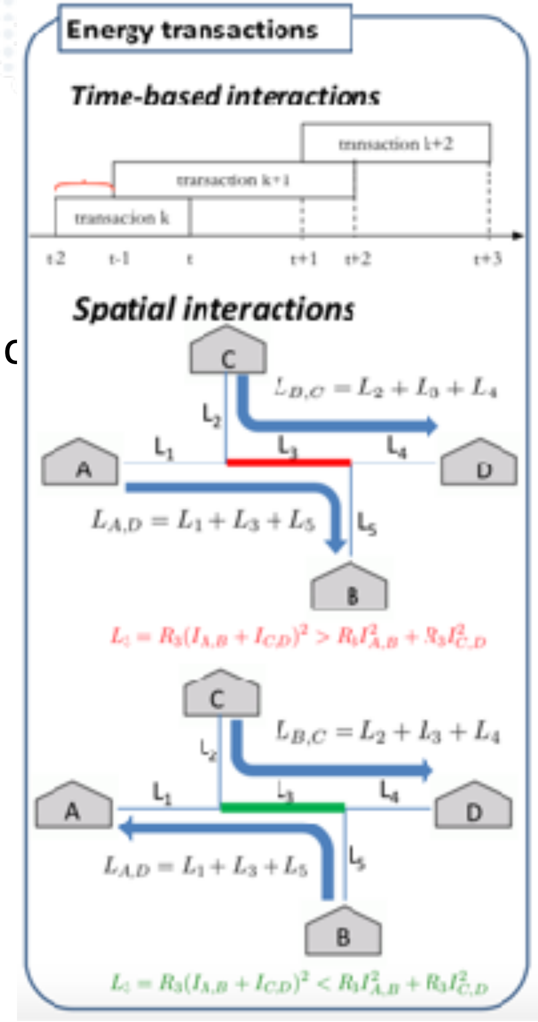
Centralized

Distributed

Energy transactions

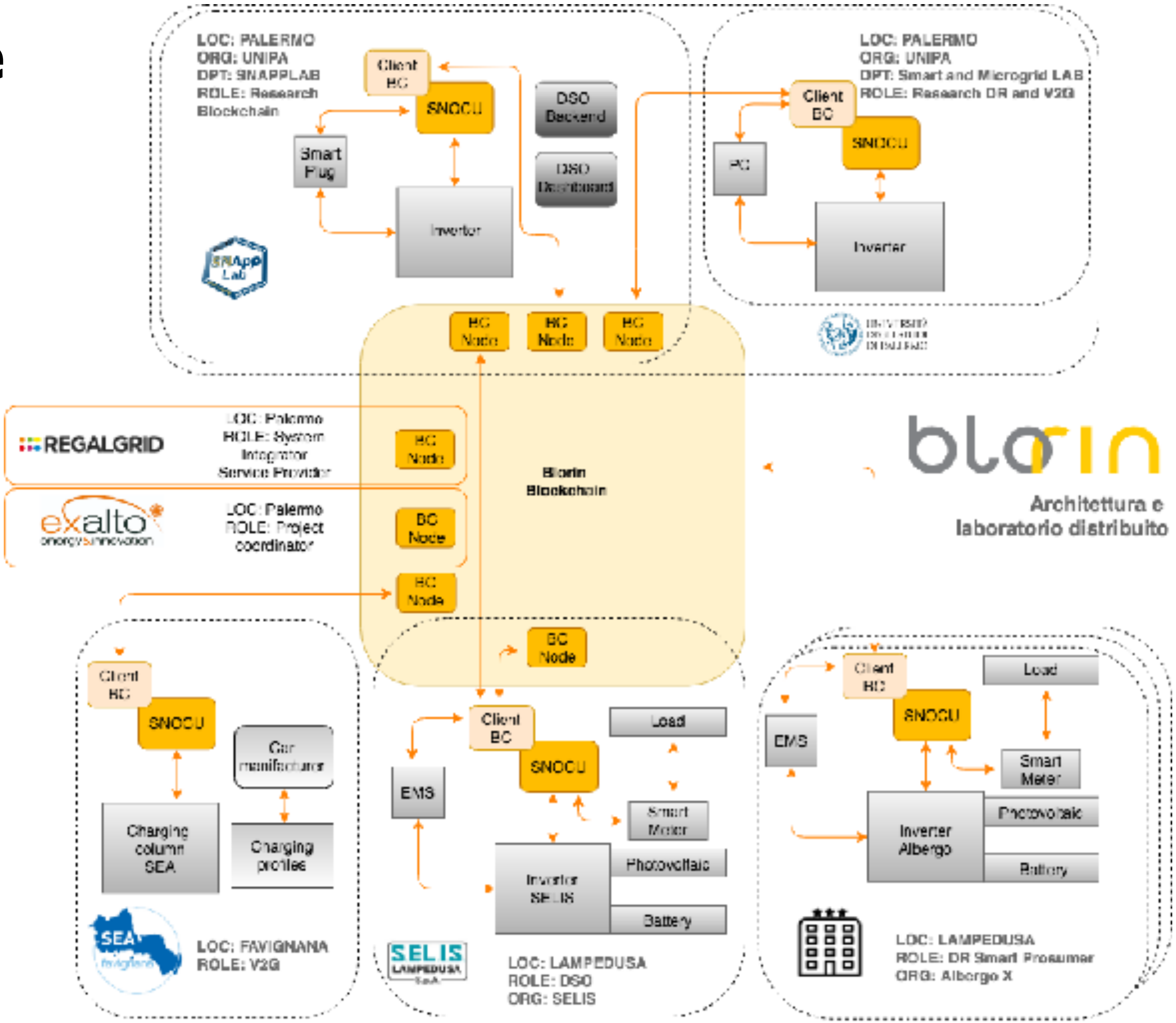
- Are energy transactions yet another 'value' to be transacted?
  - Which energy?
    - Active energy (the one that is intended
    - Reactive energy
    - Energy losses on the distribution network
  - The transactions and the blockchain requirements depend on the physics c the (energy) sector
    - What to add on the blockchain
    - When to add it
    - Where it is meaningful to analyze the distributed interactions
  - A blockchain for energy transaction has to be energy-preserving

How to attribute energy losses to users?



BLORIN architecture

- Blockchain peers
- MSP
- Channels
- Orderer
- Blockchain clients (SNOCU, EMS, BMS, …)
- BLORIN API
- Involved actors
- **Monitoring and control functionalities**

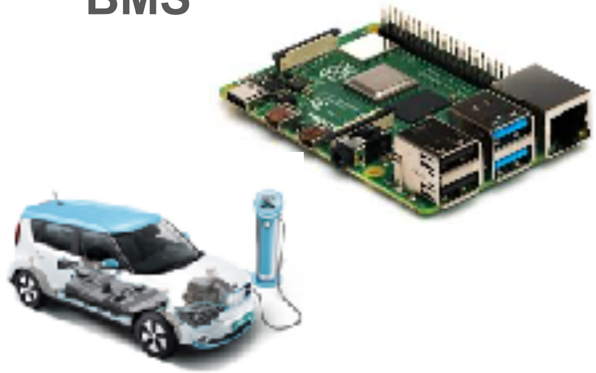


BLORIN Sensing, metering, labs

SNOCU

Blorin blockchain-ready EMS

Blorin blockchain-ready BMS



Blorin prototype at SMG lab

Blorin prototype at SNAPP lab

Pilot site: Lampedusa

Residential/commercial end users (CONSUMERS):

n.3 EMS BLORIN (Energy Management Systems), 2 at commercial buildings and one at residential site.

Phtovoltaic and storage systems:

n. 3 PhotoVoltaic systems, size 5,28 kWp, 9,9 kWp, 10,88 kWp. These systems are all equipped with Li-Ion storage of 7,2 kWh. All systems are monitored and connected to the BLORIN platform.

Pilot site: Favignana

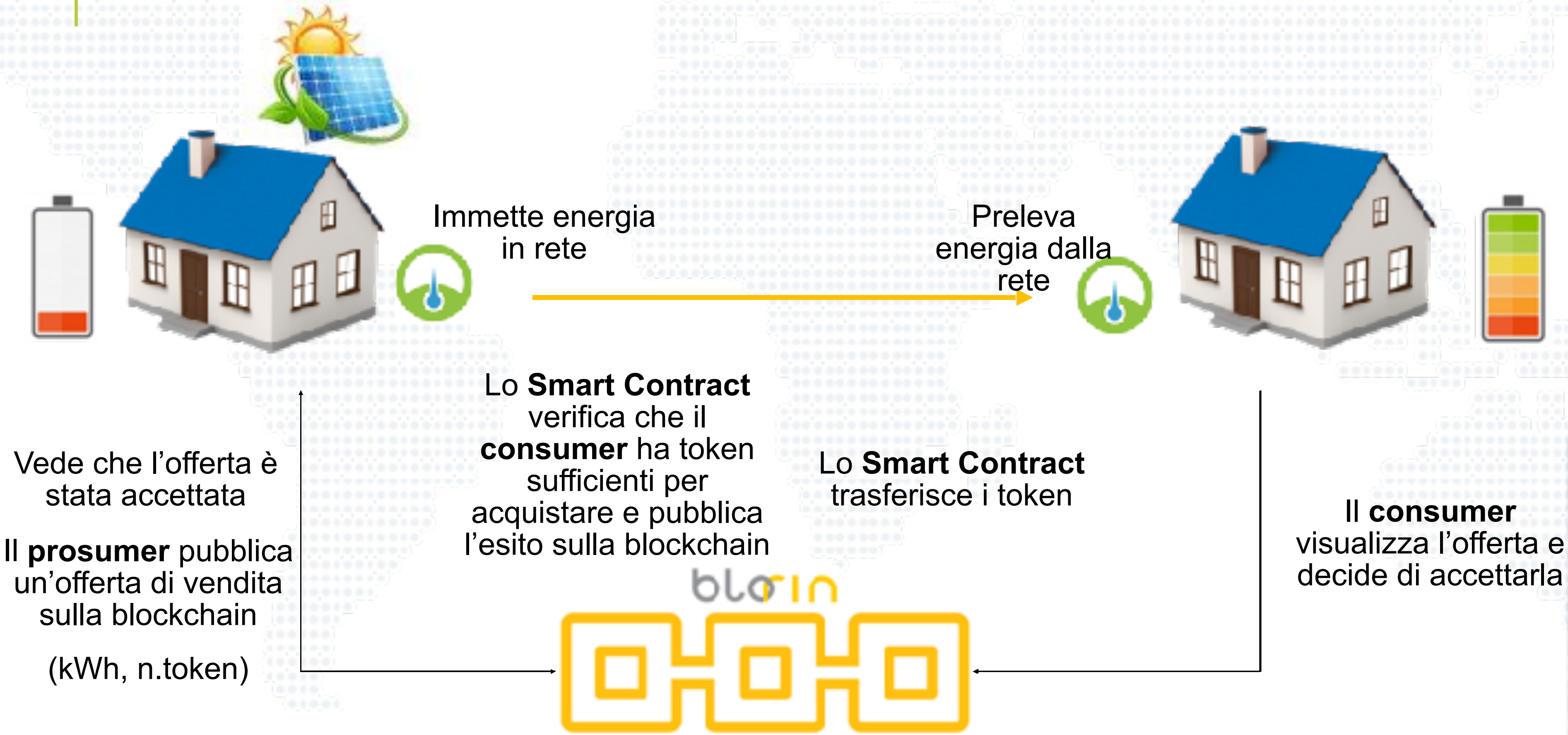
Residential end users:

n.4 EMS BLORIN (Emergy Management Systems) in a residential building.

V2G recharger:

n.1 bidirectional recharge station V2G rated power 10 kW. The recharge infrastructure will be used as recharge station for vehicles used in the experimentation, (e-NV200 Nissan, bought by SEA S.p.A. - Società Elettrica di Favignana).

Blorin SC for trasactive energy



Blockchain energy footprint

- Mining
  - Creating value by wasting energy resources
  - Ethically questionable, technically necessary
- Investments impact the probability of success

GPU

FPGA

ASIC

Mining farms

Permissionless vs Permissioned

Public blockchains
Sybille attacks

Energy for blockchain

Permissioned blockchains
no Sybille attacks

Blockchain for energy

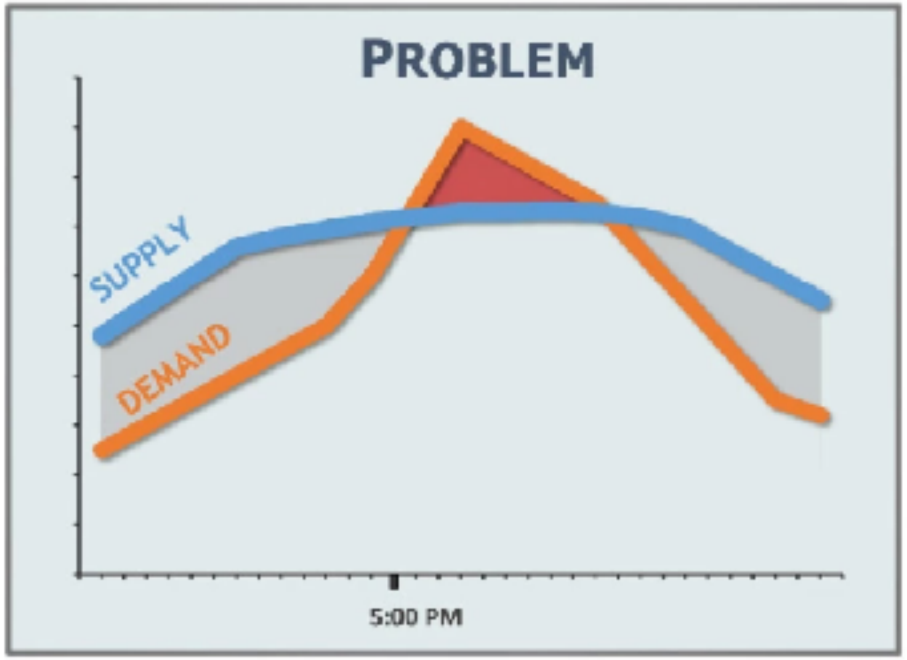
DR in a nutshell

Q: How is possible to reduce the demand of electricity at certain times of the day?

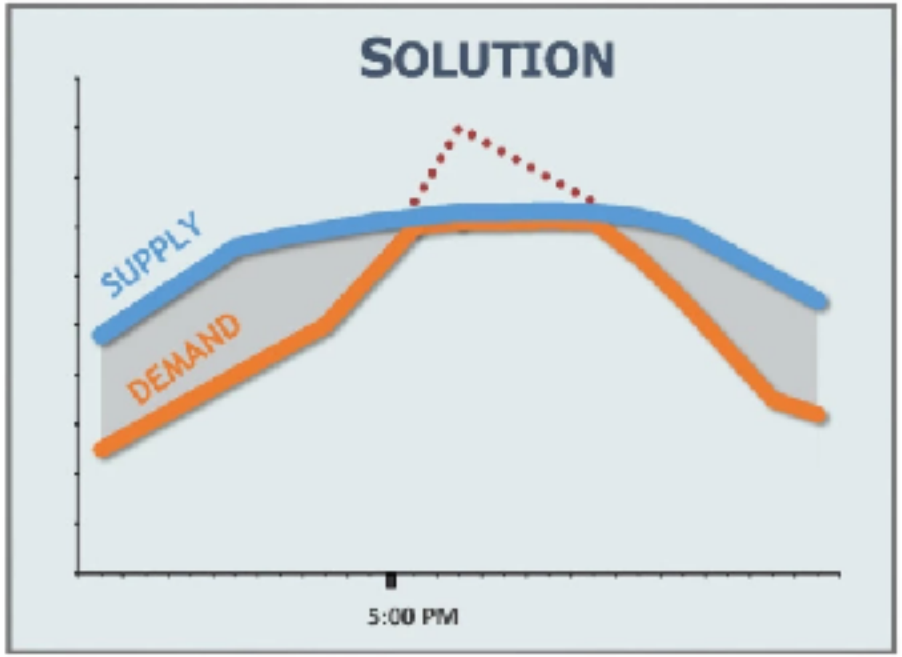
A: Using a Demand Response service!

Demand Response is defined as:
"the ability of customers to respond to either a reliability trigger or a price trigger from their utility System operator, load-serving entity, regional transmission organization/independent system operator (RTO/ISO), by modifying their power consumption."

What's Demand-Response?



Sometimes it happens!
Not enough generating

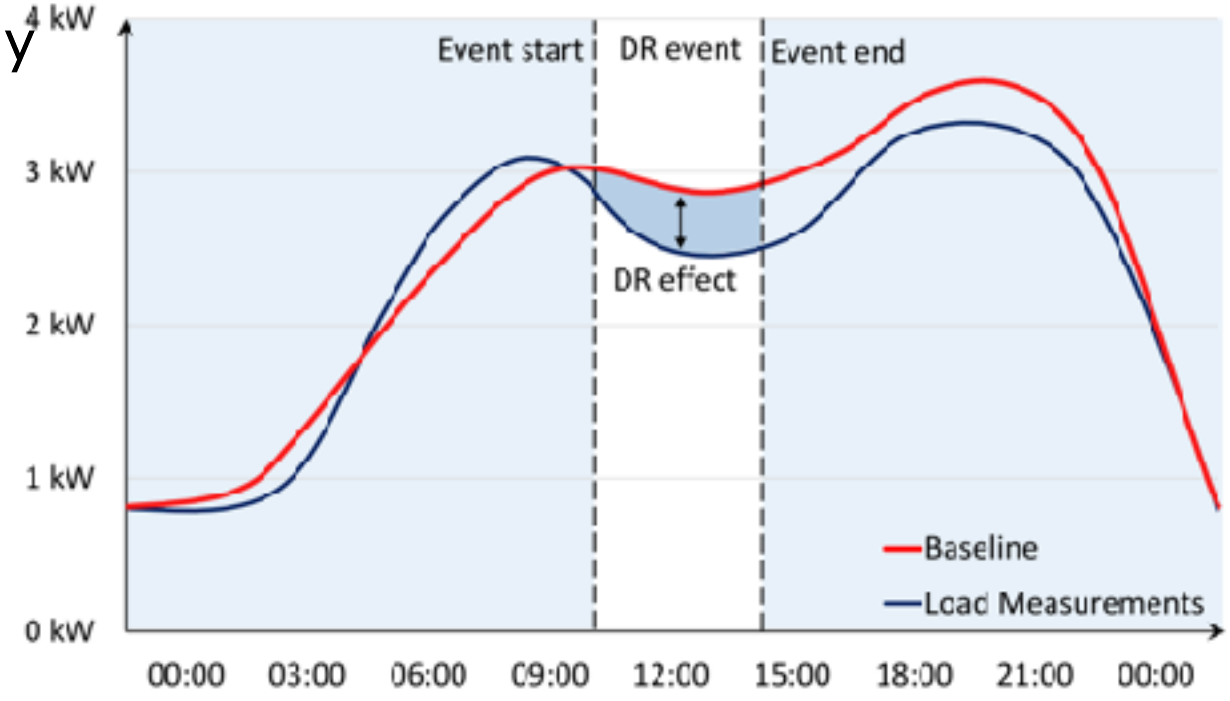


Demand reduction can be
a solution!

What is Demand Response?

It is a measure for **modifying energy load** in response to supply constraints, generally during periods of peak demand (**peak shaving&load shifting**). **Blockchain** is needed to:

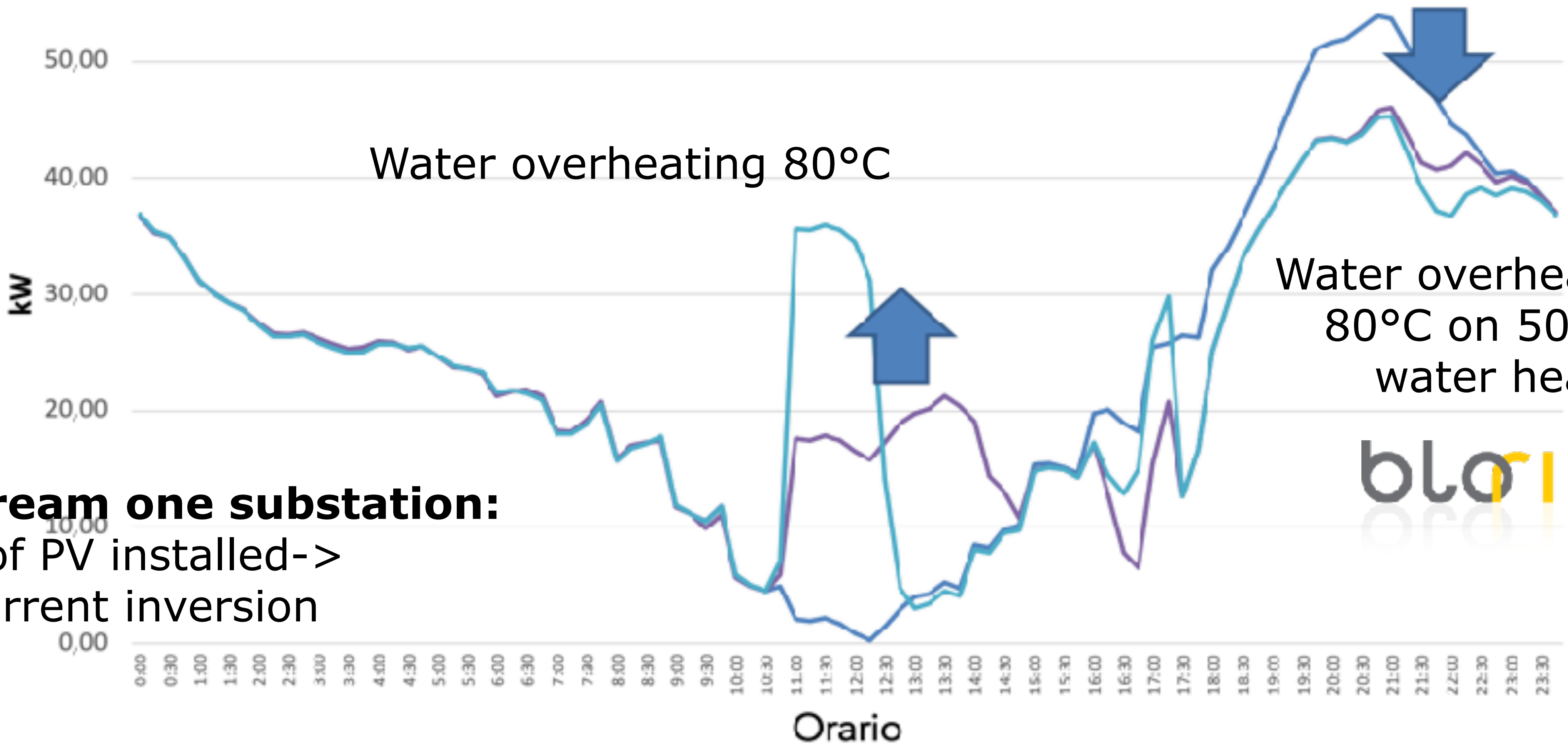
- Publish the demand of service
- Certify the contribution from end users
- Remunerate the service



PROs: Greater efficiency of fuel based generation, greater integration of RES

Demand Response

On the island of Lampedusa the management of temperature on electric water heaters (smart heating) allows balancing of loads as needed.

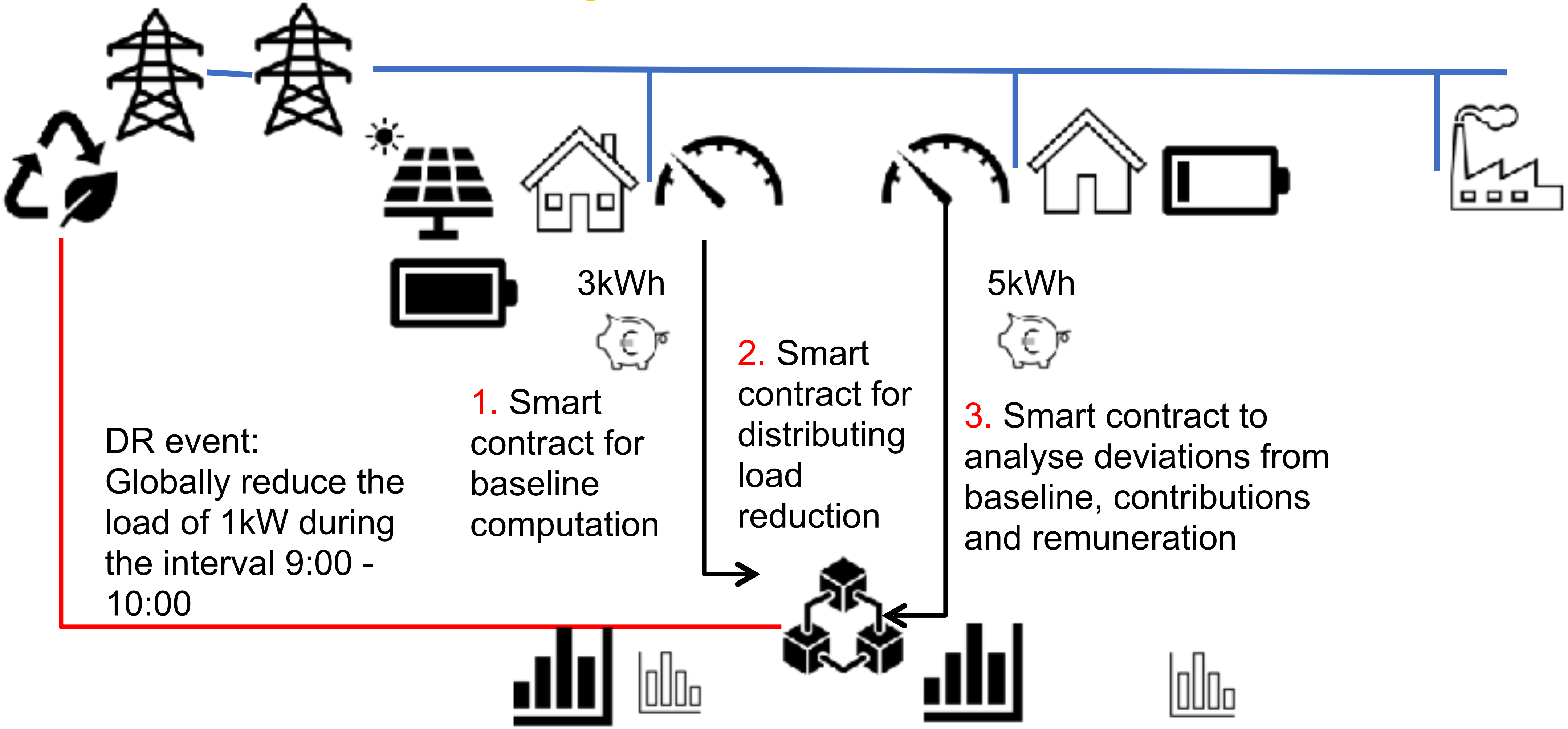


Water overheating 80°C

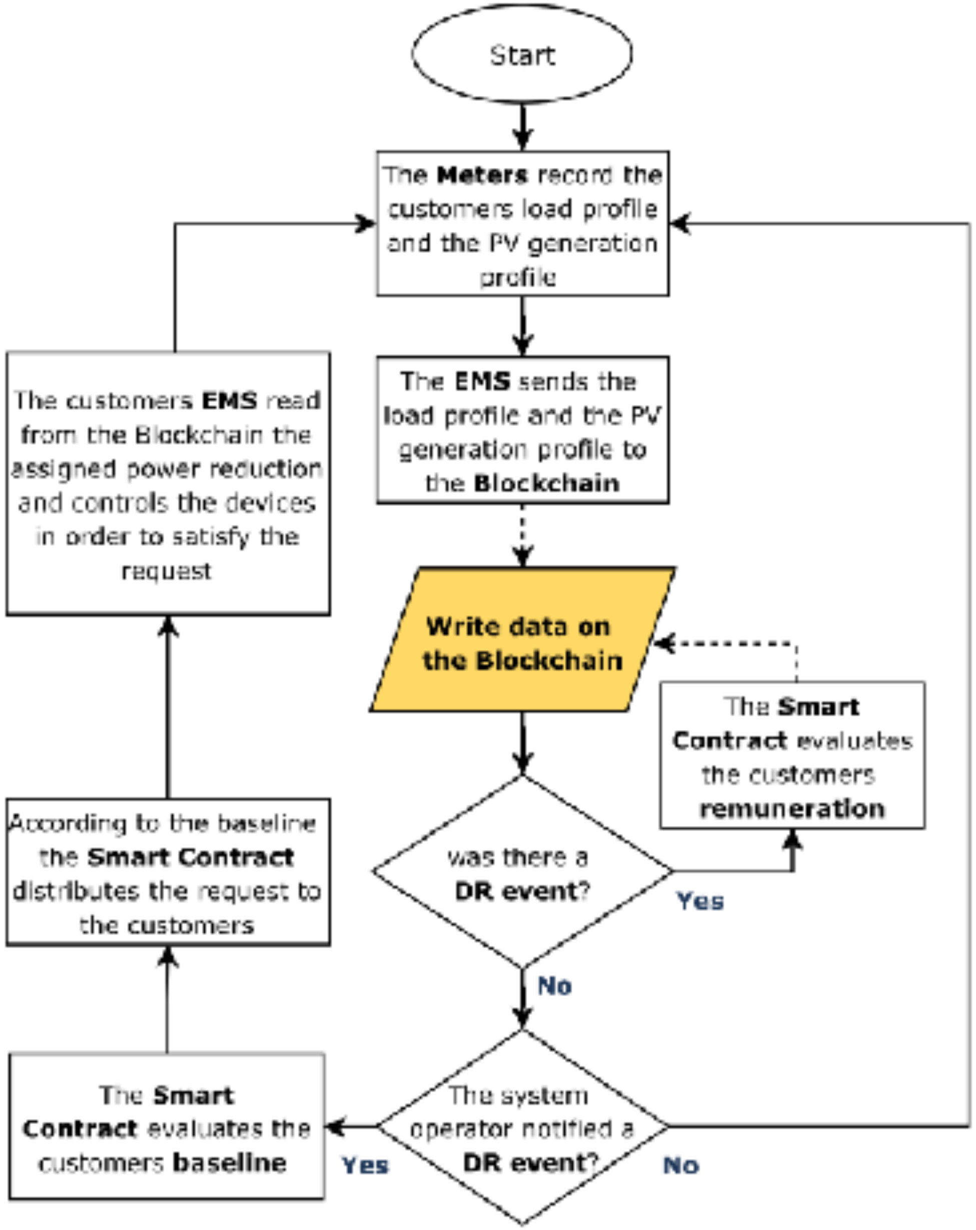
Water overheating 80°C on 50% of water heaters

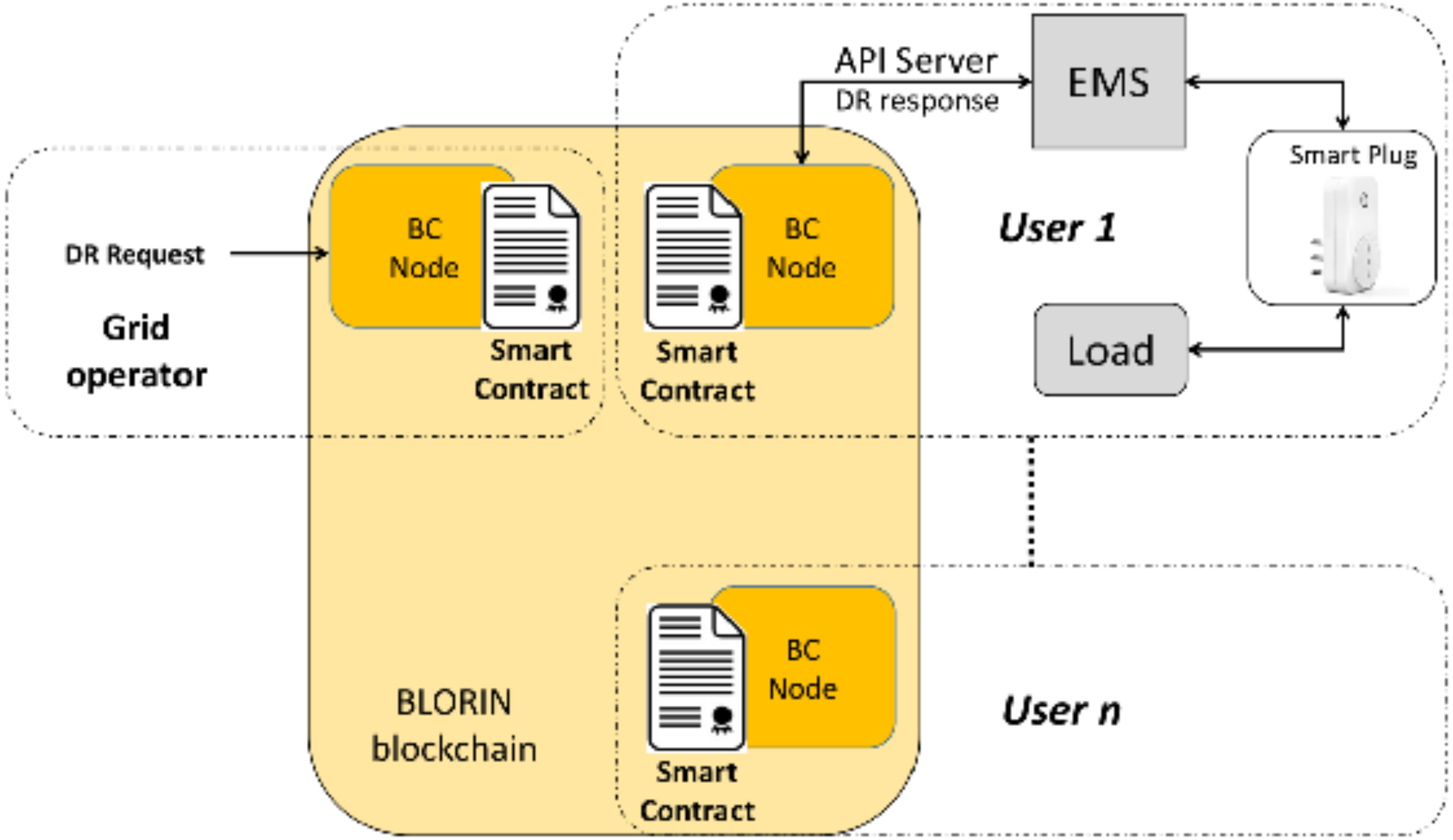
Downstream one substation:
29 kWp of PV installed->
risk of current inversion

Demand Response with a smart contract



Scenario DR (Lampedusa)





Demand Response: CBL

The **Load Baseline** of a customer *c* consists of a vector of typical power consumption in 24 hours:

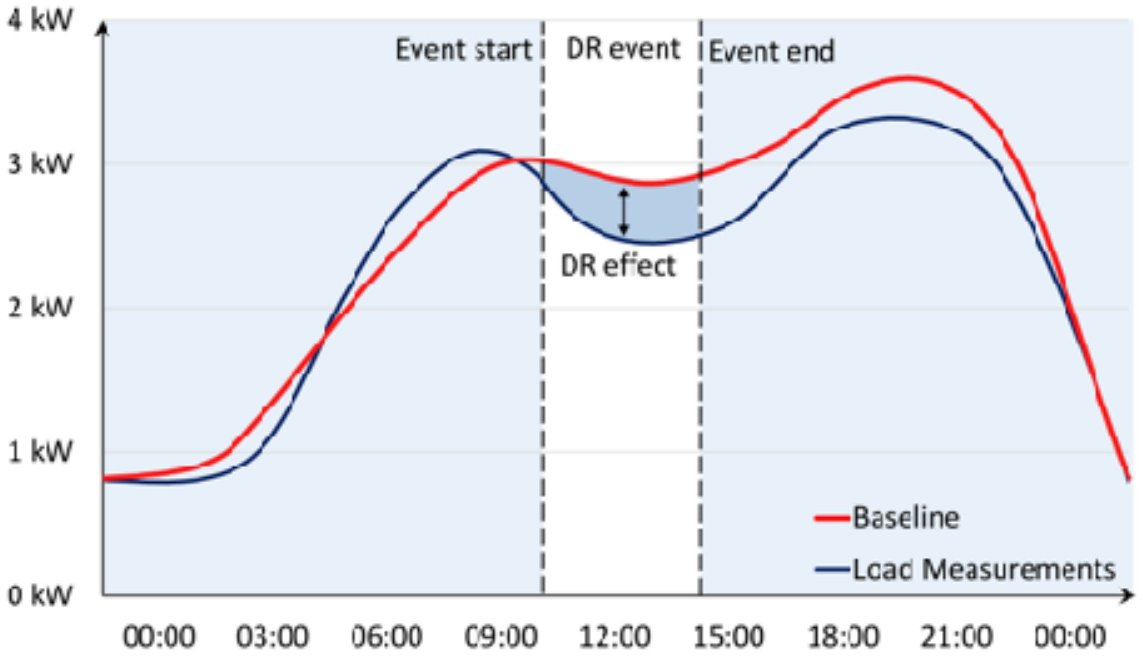
$$\mathbf{B}^{(c)} = \left[\bar{P}^{(c)}_{B,1}, \bar{P}^{(c)}_{B,2}, \dots, \bar{P}^{(c)}_{B,h}, \dots, \bar{P}^{(c)}_{B,24}\right]$$

- **Weekdays Baseline: *High X of Y Method***

$$\bar{P}^{(c)}_{B,h} = \frac{1}{X} \sum_{j \in \mathrm{High}(X,Y,d)} P^{(c)}_{B,h,j} \quad \forall\, h \in \{1, 2 \dots, 24\}$$

- **Weekend Baseline: *Low X of Y Method***

$$\bar{P}^{(c)}_{B,h} = \frac{1}{X} \sum_{j \in \mathrm{Low}(X,Y,d)} P^{(c)}_{B,h,j} \quad \forall\, h \in \{1, 2 \dots, 24\}$$



Demand Response: Remuneration algorithm

In a small non-interconnected island like Lampedusa or Favignana, DR remuneration is linked to the fuel savings generated by more efficient operation of diesel units; this is the principle on which DR remuneration is based in the BloRin project.

The assessment on the impact of DR (how much and what is the value) is done by applying the following steps:

1. Determination of the average load profile of the island in a typical summer week.
2. Determination of which production generators are active and therefore should be considered in the simulation;
3. Simulation to determine the optimal dispatch with the average load chosen in step 1;
4. Repeat the simulation considering a certain amount of flexible power, **which represents the power that can be modulated during a DR event**.
5. Calculate the difference between the fuel used in the simulation in step 3 and the fuel used by applying DR (step 4). The difference in fuel translates into a difference in production cost.
6. Determine the value of the DR as the difference between the production cost without DR and the cost with DR.

Demand Response: Remuneration algorithm

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The difference between the fuel used in the two simulations is calculated, it is estimated the difference in the cost of production of the two scenarios and it is determined the value of the DR (**C_{DR}**) as the difference between the production cost without DR and the cost with DR.

$$r = C_{DR} \cdot \sum_{h=1}^{n} |(P_{b,h} - P_h)|$$

Where:

- ***n*** is the total number of time intervals into which the DR event is divided;
- ***r*** is the total **user** remuneration [€];
- ***$P_{b,h}$*** is the user's baseline value in the interval h [kW];
- ***P_h*** is the user's power value measured in the interval h [kW].

blorin

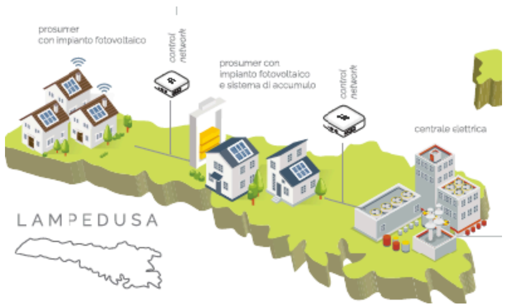
Domestic applications

Flexible devices

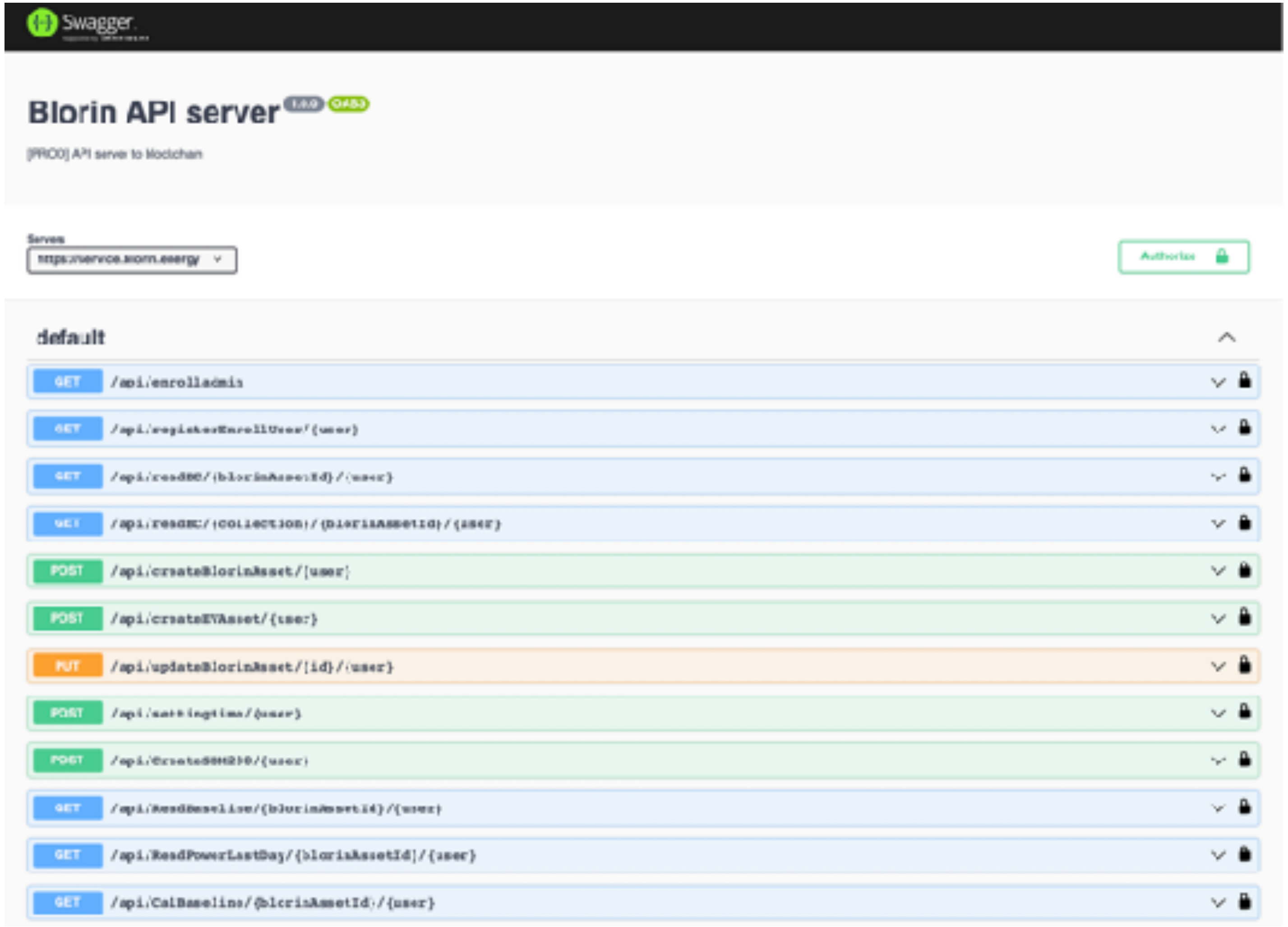
Demand-response in Lampedusa

1000 electric water heaters allow full installation of **2 MWp of photovoltaic generation in Lampedusa (Ministerial decree Isole Minori 2017).**

It is possible to cut supplies for 1 mln of liters/ year of diesel. The latter according to the data provided by SELIS Lampedusa, translates into an economic return of **1 mln euros/year and 2500 tons of CO_2 avoided per year.**



BLORIN API for the data gateway



- Guarantees openness
- OpenAPI 3.0 – OAS3
- Blockchain-ready client
- Eventually one for each trust environment (one for each actor)

OpenAPI

Blockchain node

Sensor/ actuator

MQTT

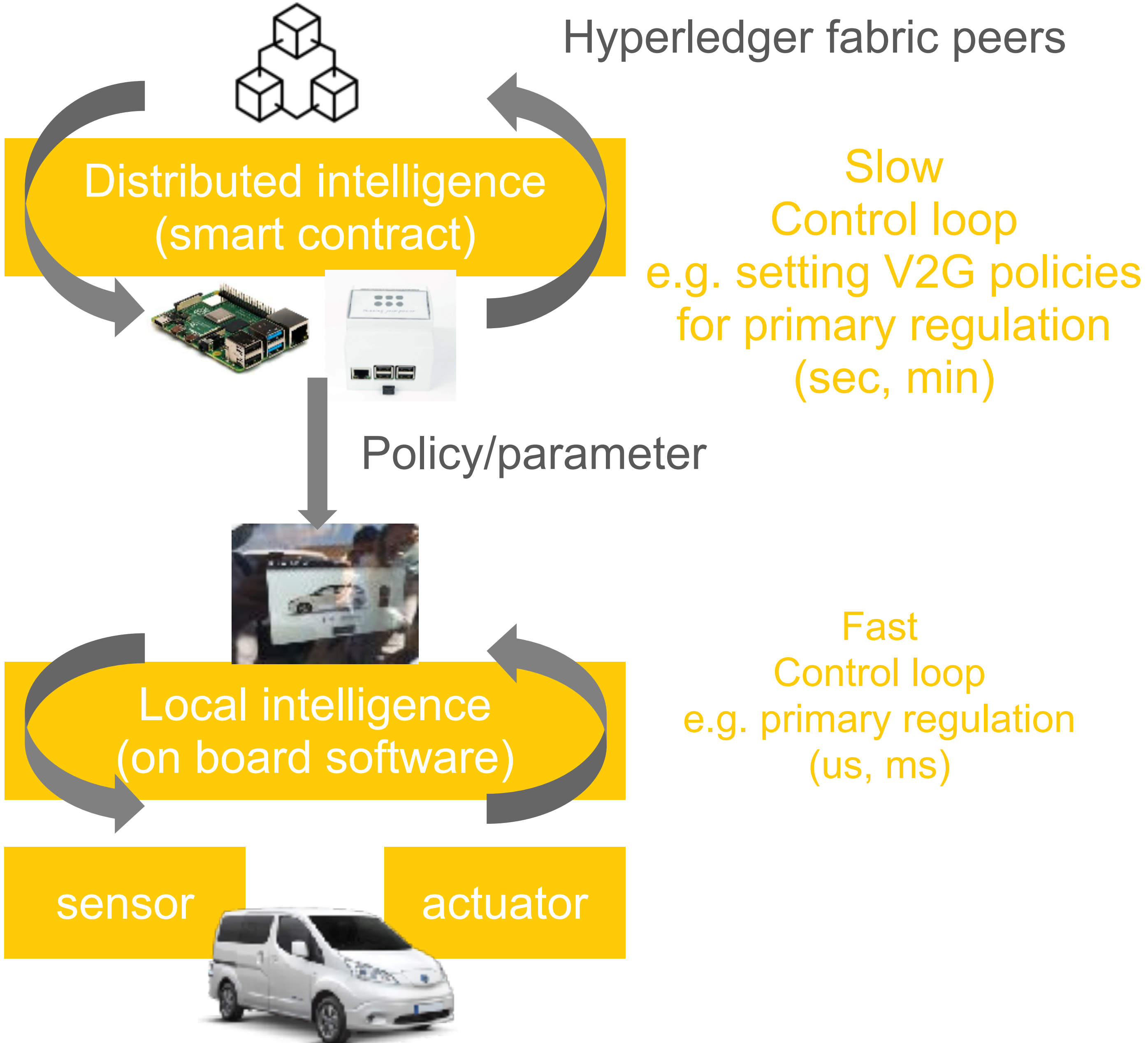
IoT broker

Lightweight client

Data GW

BLORIN logic: local and distributed algorithms

- Multiple control loops
- Fast and slow actions
- Sharing policies through blockchain (traceability of applied policies)



BLORIN ICT technologies, protocols, devices

Blockchain, virtualization and operation

- ansible
- docker
- kubernetes
- kubectl
- helm
- istio
- flannel
- jq
- yq
- krew
- Hyperledge
- hlf operato

V2G

- Google home assistant
- OBD II
- OCPP
- Steve
- SMET II

Smart meters / clients

- Blorin EMS
- Blorin BMS
- SNOCU
- SONOFF (smart plug)

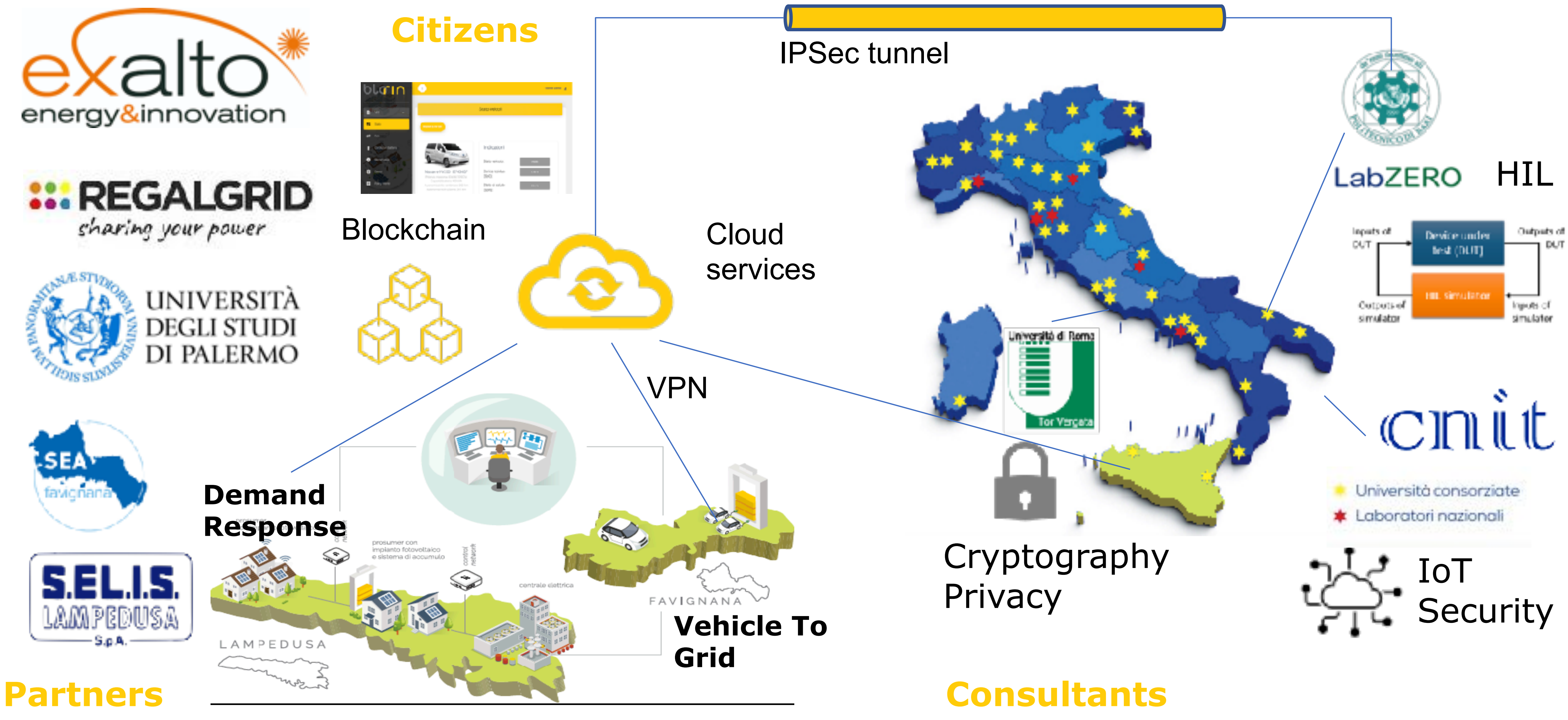
Sensing and communication

- Wireguard
- MQTT
- SCADA
- IoT
- OpenAPI
- Swagger

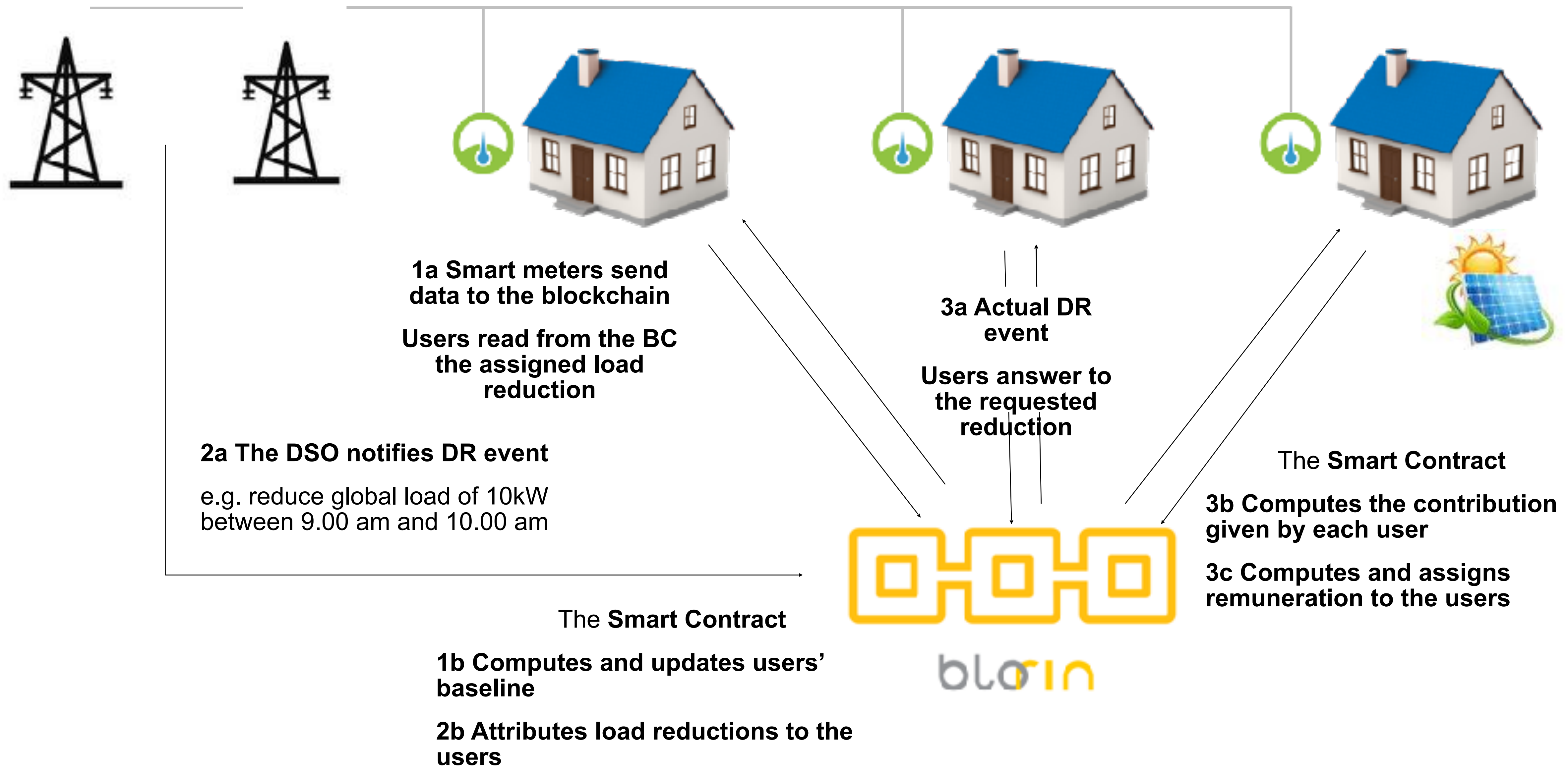
Programming Languages and DB

- NodeJS
- Javascript
- Python
- React
- Mongo
- CouchDB (fabric)

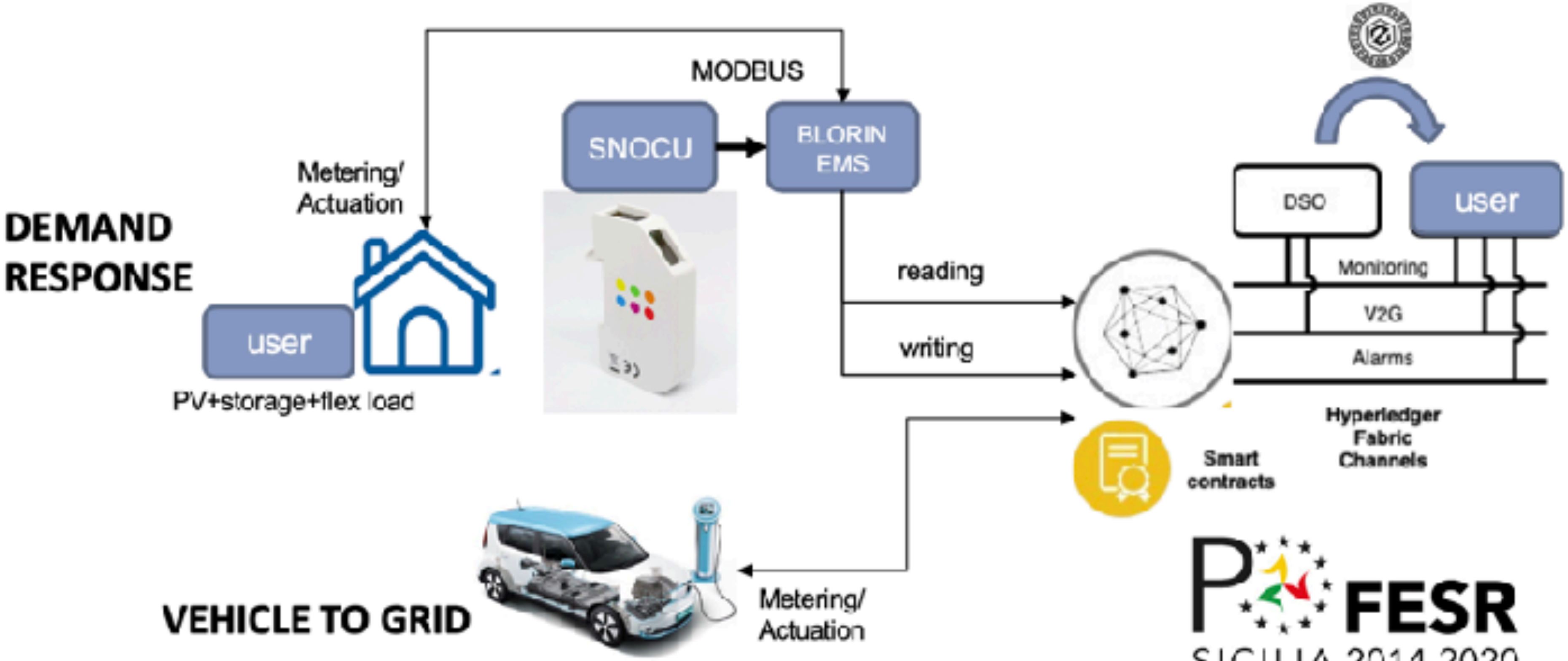
BLORIN distributed experimental ecosystem



Demand-Response (DR)



Blorin: DR and V2G



FESR
SICILIA 2014-2020

What is Vehicle To GRID?

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It is a measure for **modifying energy load** in response to supply constraints, generally during periods of peak demand (**peak shaving&load shifting**).

Blockchain is needed to:

- Publish the demand of service
- Certify the contribution from EVs
- Remunerate the service

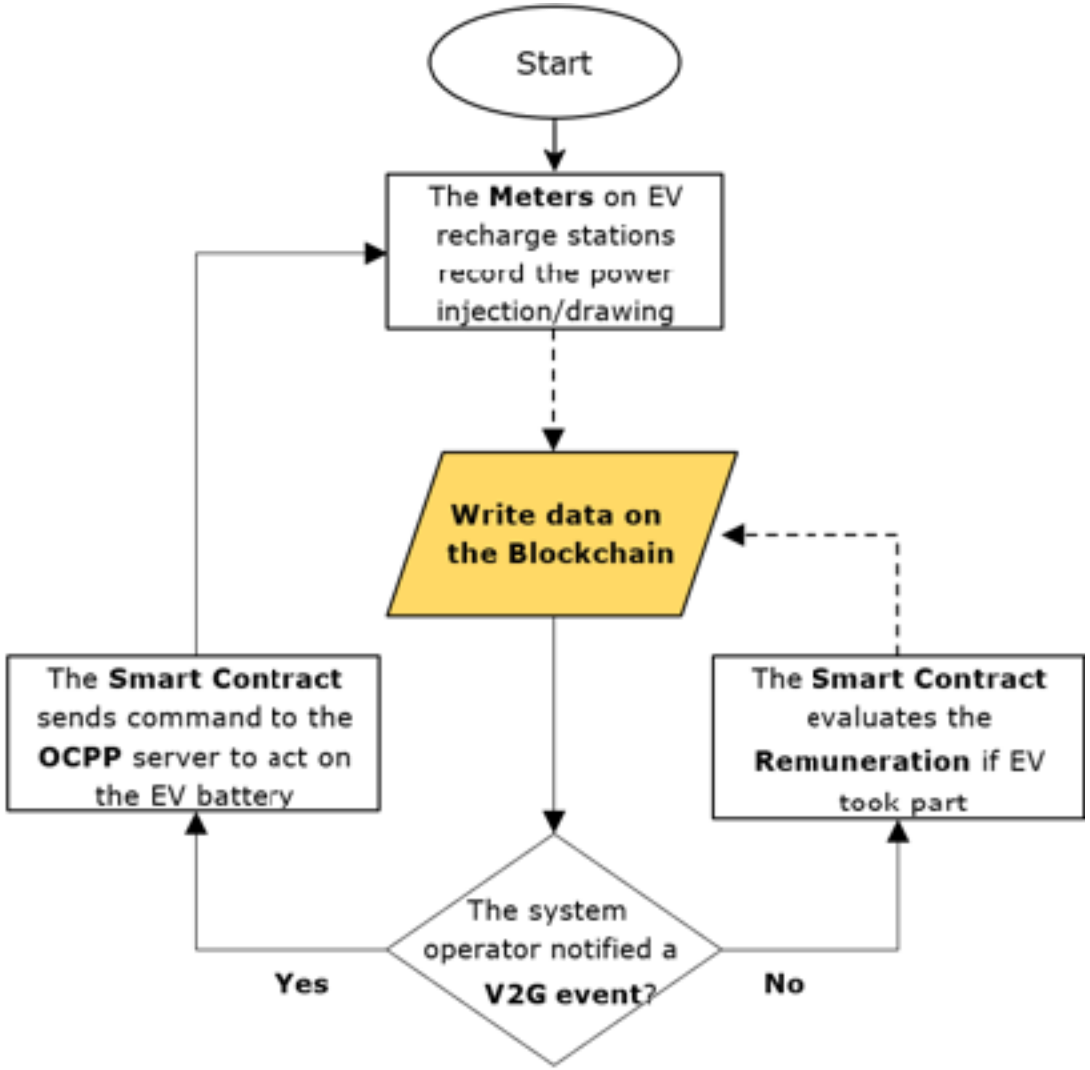
It is a measure for **delivering primary regulation** in response to frequency disturbance, generally during unbalance (**primary regulation**).

Blockchain is needed to:

- Certify the contribution from EVs
- Remunerate the service

PROs: Greater efficiency of fuel based generation, greater integration of RES

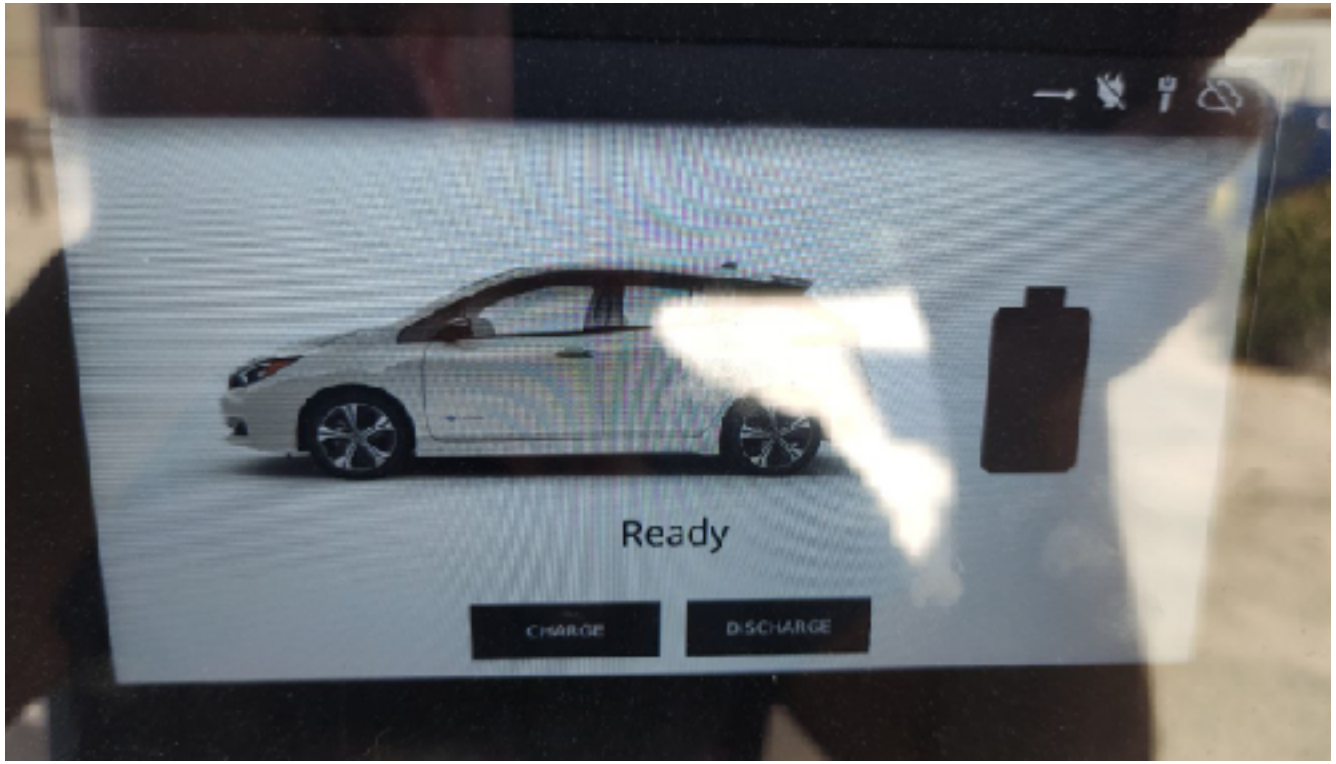
Scenario V2G (Favignana)



For 'primary regulation' or FFR only tracing&certification is needed.

Scenario V2G (Favignana)

What parameters can we control remotely of the charger?



AME V2G charger 10 kW
https://www.chademo.com/products/v2g/ame
https://www.ame.nu/#contact

Key	Value
HeartbeatInterval	14400
MeterValueSampleInterval	5
FFRPowerPositive	10000
FFRPowerNegative	10000
Pbaseline	0
FrequencyDeviationHi	500
FrequencyDeviationLow	500
DeadBandHi	15
DeadBandLow	15
Frequency	0
DataTransferPacketSize	86400
SafeTimeout	300
PbaselineOffline	0
PowerLossPeriod	60
ResumeOnPowerFailure	false
SiteChargerCount	0
SiteImportLimit	10000
SiteExportLimit	10000
AuthorizeRemoteTxRequests	false
ClockAlignedDataInterval	0
ConnectionTimeOut	0
GetConfigurationMaxKeys	100
LocalAuthorizeOffline	true

Scenario V2G (Favignana)

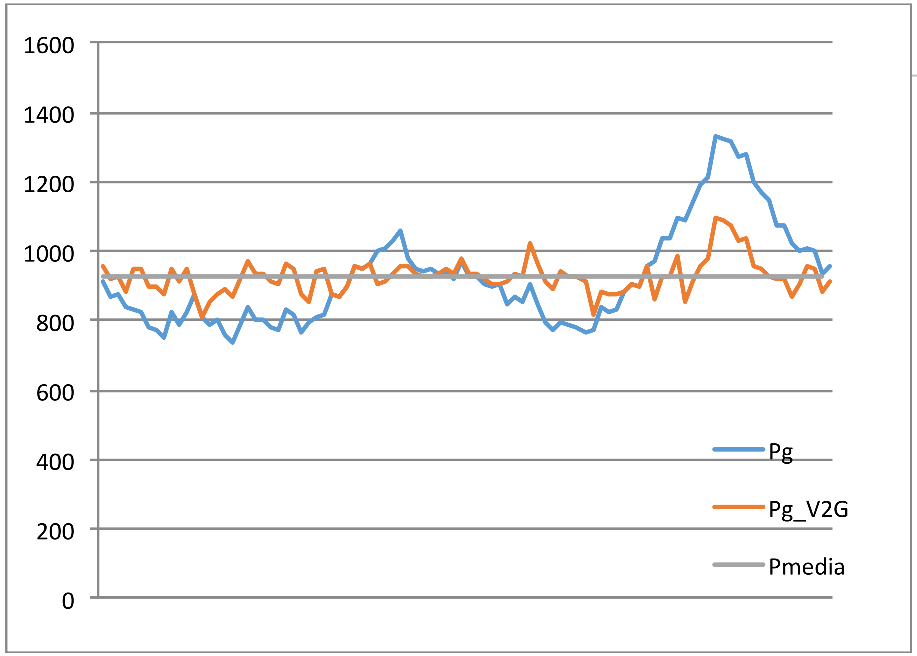
Peak shaving, load shifting

Effect on overall load of power station SEA

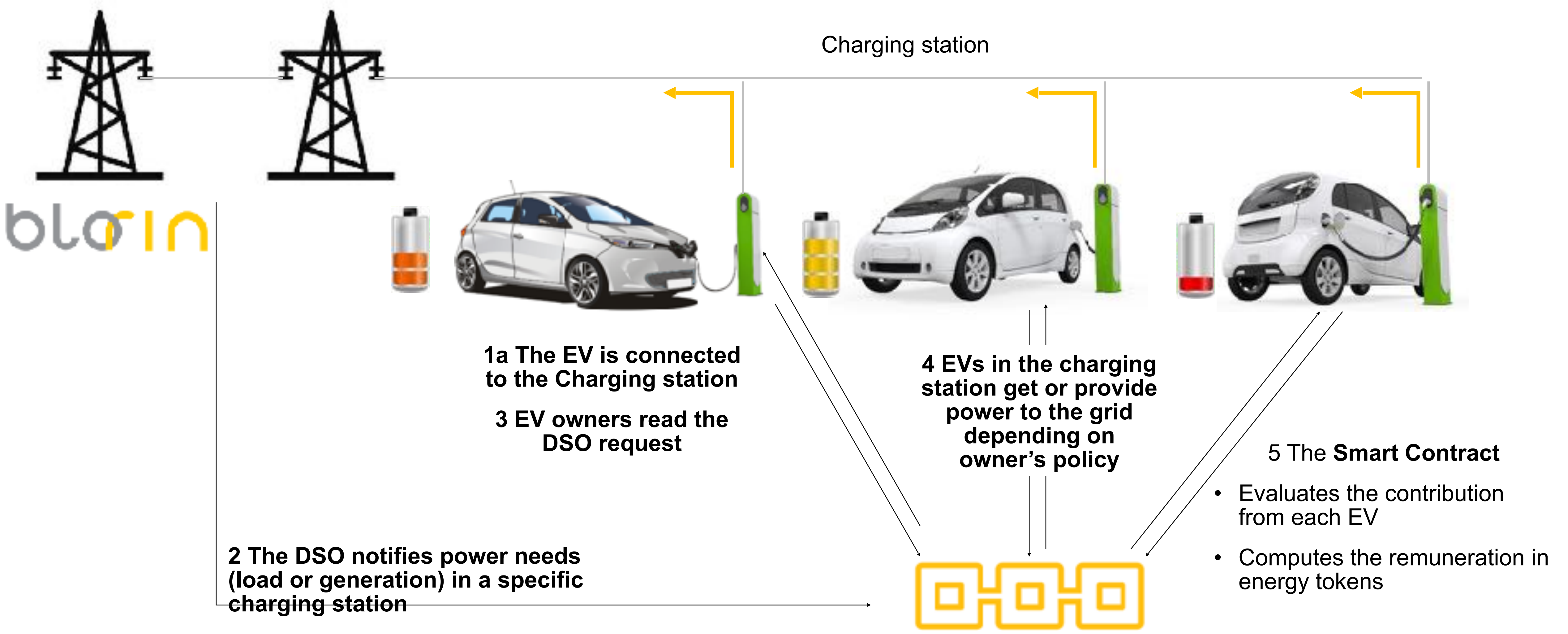
__Time__: April 2020

Scenario: SMART recharge of 100 chargers and 316 EVs

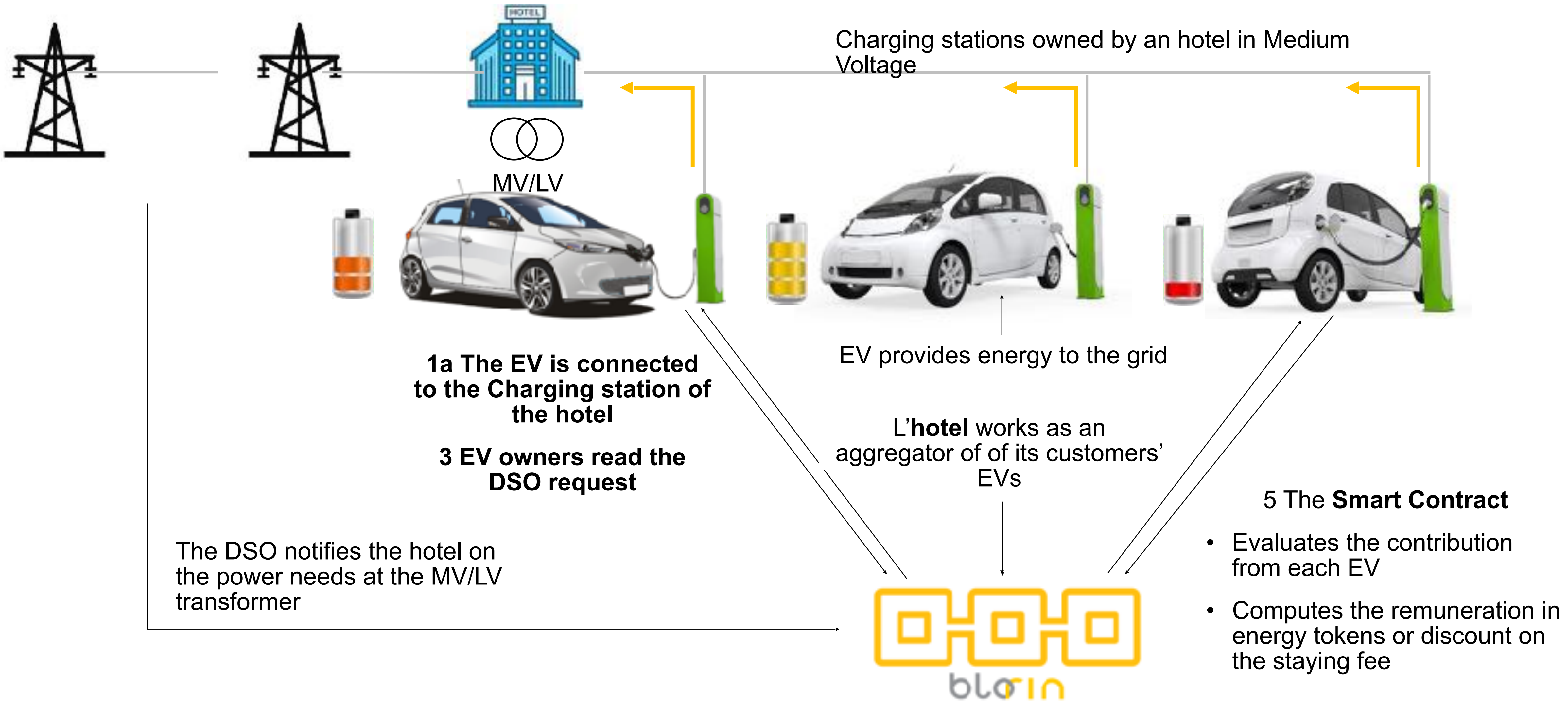
	No V2G	With V2G
MAX	1334	1094
MIN	736	807
DP	598	287



Blorin V2G simple SC



Blorin V2G SC with hotel



Blorin @ Favignana

- V2G data validated and loaded on the blockchain
- Comsumption data validated and loaded on the blockchain
- Bidirectional charging station for electric vehicles

JSON data format

http://10.147.18.148:8081/api/readBC/S-Lampedusa-Di-Malta-448d85bf74594cfb5e48bba82c87e52b/SDM230

http://10.147.18.148:8081/api/readBlorinAsset/S-Lampedusa-Di-Malta-448d85bf74594cfb5e48bba82c87e52b/SDM230

http://10.147.18.148:8081/api/readBlorinAsset/S-Lampedusa-Di-Malta-448d85bf74594cfb5e48bba82c87e52b_p_day/SDM230

http://10.147.18.148:8081/api/readBlorinAsset/S-Lampedusa-Di-Malta-448d85bf74594cfb5e48bba82c87e52b_p_day_baseline/SDM230


```
{
"ID": "S-Lampedusa-Di-Malta-448d85bf74594cfb5e48bba82c87e52b",
"Time": "Sun Sep 19 2021 03:40:00",
"L1_V": "238.0210135253906",
"L1_A": "0.2949707210063934 3",
"L1_W": "41.60000000000001",
"L1_cos_phi": "0.9411404132843018",
"L1_VA": "64.82311248779297",
"Tot_W": "0",
"Tot_VA": "0",
"Tot_kWh": "554.7239990234375",
"LineFrequency_Hz": "50.04887771606445",
"EnergyImported_kWh": "554.7239990234375",
"EnergyExported_kWh": "0",
"N_MAX_A": "61.18598556518555",
"L1_MAX_A": "13.15531921386718 8"
}
```

Baseline evaluation - DR

The baseline of a customer c consists of a vector of typical power consumption in 24 hours:

$$\mathbf{B}^{(c)} = \left[\bar{P}^{(c)}_{B,1}, \bar{P}^{(c)}_{B,2}, \ldots, \bar{P}^{(c)}_{B,h}, \ldots, \bar{P}^{(c)}_{B,24}\right]$$

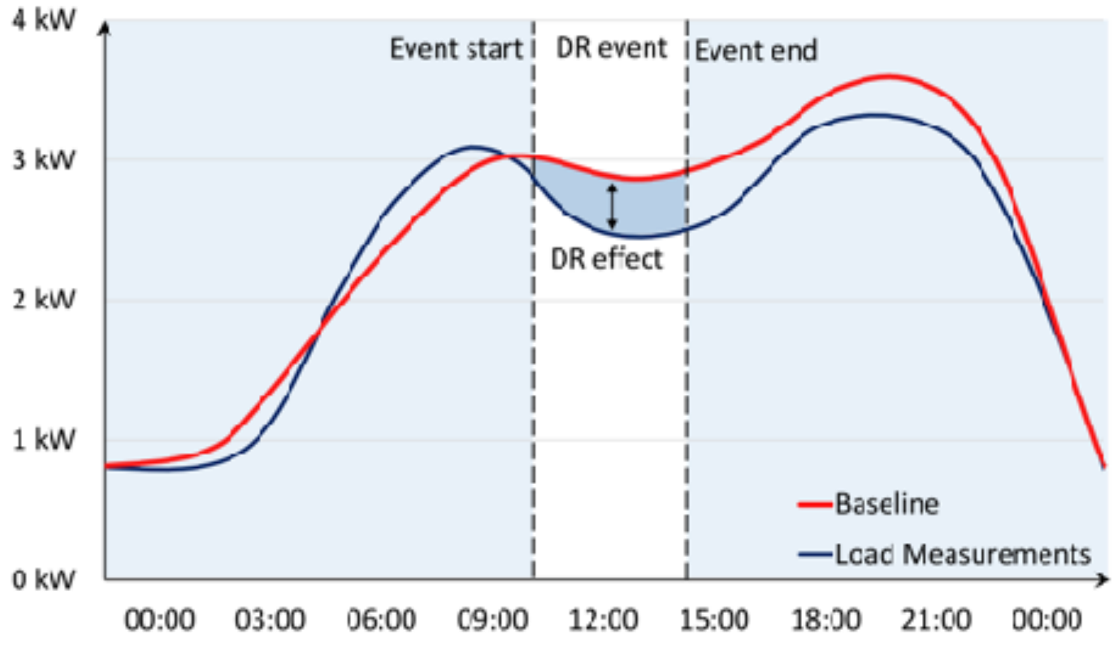
- Weekdays Baseline: *High X of Y Method*

$$\bar{P}^{(c)}_{B,h} = \frac{1}{X} \sum_{j \in \mathrm{High}(X,Y,d)} P^{(c)}_{B,h,j} \quad \forall\, h \in \{1, 2 \ldots, 24\}$$

- Weekend Baseline: *Low X of Y Method*

$$\bar{P}^{(c)}_{B,h} = \frac{1}{X} \sum_{j \in \mathrm{Low}(X,Y,d)} P^{(c)}_{B,h,j} \quad \forall\, h \in \{1, 2 \ldots, 24\}$$

.



Compute user's baseline

http://10.147.18.148:8081/api/readBlorinAsset/S-Lampedusa-Di-Malta-448d85bf74594cfb5e48bba82c87e52b_p_day_baseline/SDM230

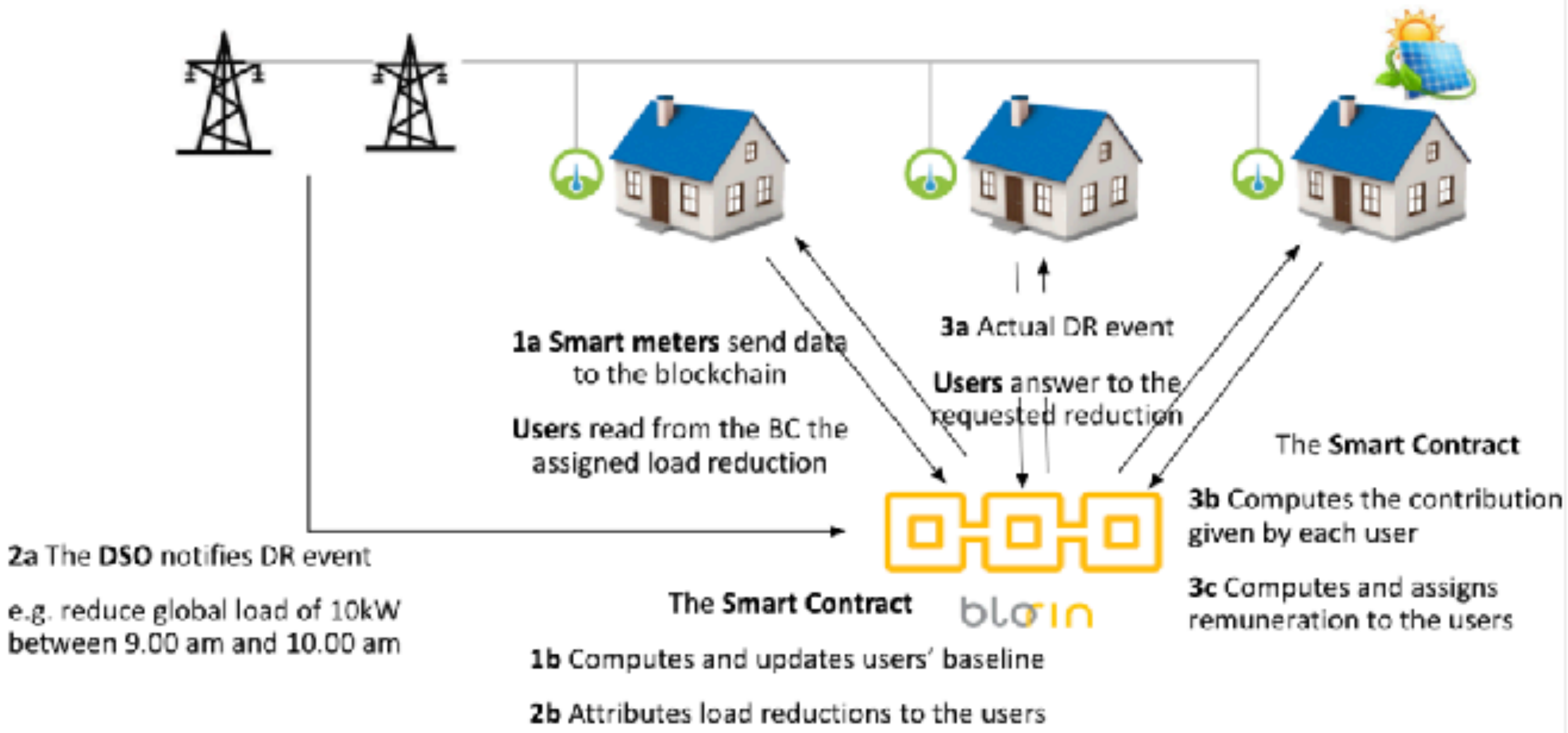

```
{
"ID": "S-Lampedusa-Di-
Malta-448d85bf74594cfb5e48bba82c87e52b_p_day
_baseline",
"Time": "Sep 08 2021",
"Baseline": [
308.41818181818184,
281.1454545454545,
...
211.45454545454547,
148.72727272727275
]
}
```

enV200

http://10.147.18.148:8081/api/readBlorinAsset/VSKHAAME0U0616423/env200sea
http://10.147.18.148:8081/api/readBC/VSKHAAME0U0616423/env200sea


```
{
"ID": "VSKHAAME0U0616423",
"DataBC": "Thu, 07 Oct 2021 21:31:12 CEST",
"Data_log": "05/05/2021 12:26:10",
"Lat": "37 54.6199",
"Long": "12 20.9652",
"Speed": "0.0",
"Gids": "442",
"SOC": "7274509",
"Pack_Volts": "391.01",
"Pack_Amps": "0.793",
"Avg_CP_mV": "4073",
"Pack_T1_C": "18.8",
"Pack_T2_C": "19.0",
"Pack_T3_C": "20.5",
"Pack_T4_C": "18.8",
"Odo": "1170",
"QC": "3",
"L1_L2": "9",
"Ambient": "18.5",
"SOH": "99.11",
"Plug_State": "0",
"Charge_Mode": "0",
"Gear": "1",
"Motor_Temp": "63",
"Inverter_2_Temp": "40",
"Inverter_4_Temp": "40",
"I_time_stamp_state0": "0:0:0:0",
"I_time_stamp_state1": "0:0:0:0",
"I_time_stamp_state2": "0:0:0:0"
}
```


Blorin DR: actors and interactions



$$\mathbf{B}^i = [\bar{p}^i_{B,1}, \bar{p}^i_{B,2}, ..., \bar{p}^i_{B,h}, ..., \bar{p}^i_{B,96}]$$

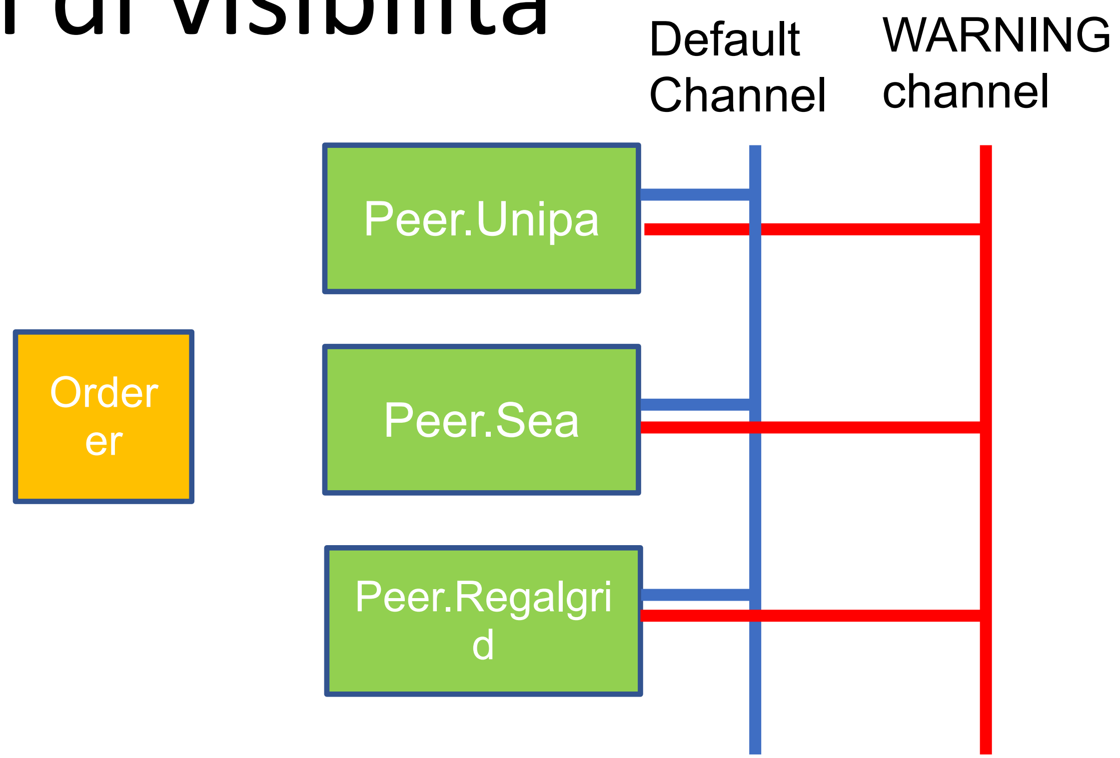
$$\bar{p}^i_{B,h} = \frac{1}{X} \sum_{j \in High(X,Y)} p^i_{B,h,j} \quad \forall h \in \{1, ..., 96\}$$

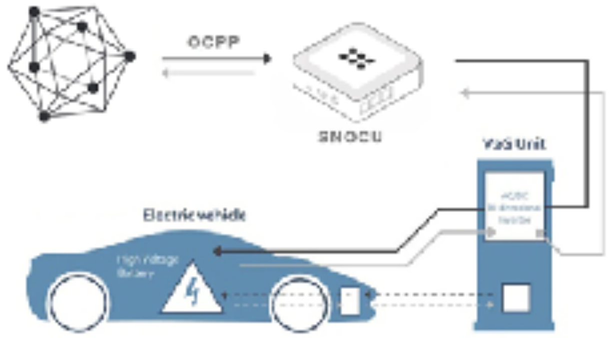
Canali, privacy e ambiti di visibilità

- Gestione multi-channel dei dati Blorin su blockchain
- Smart Contracts Blorin

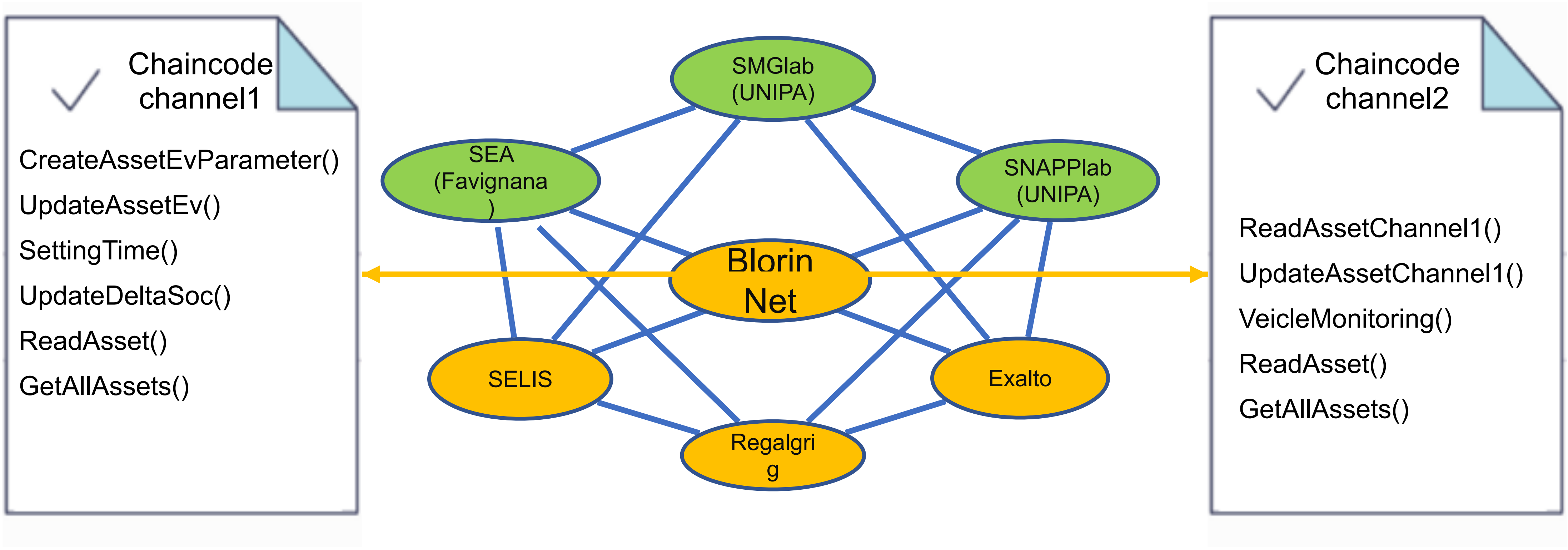
•EMS – supporto smartplug

•OCPP Manager

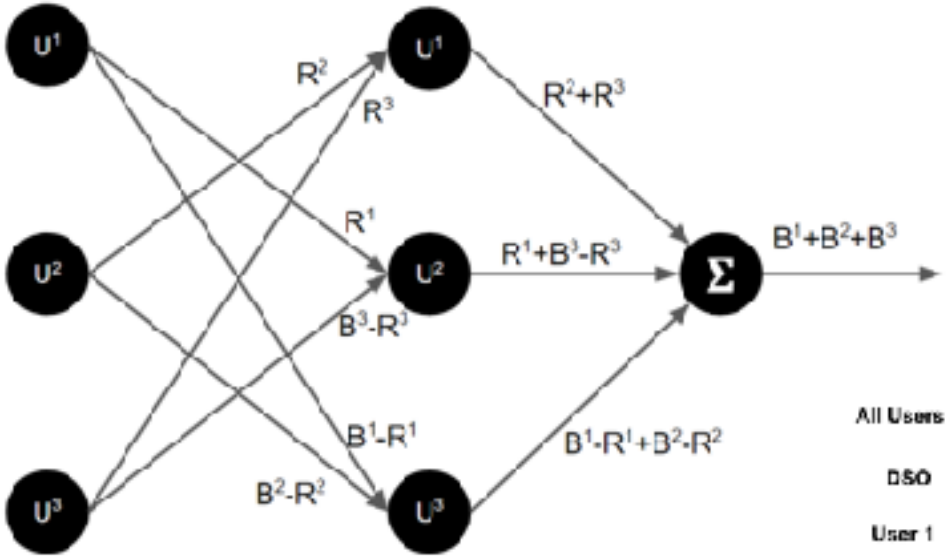


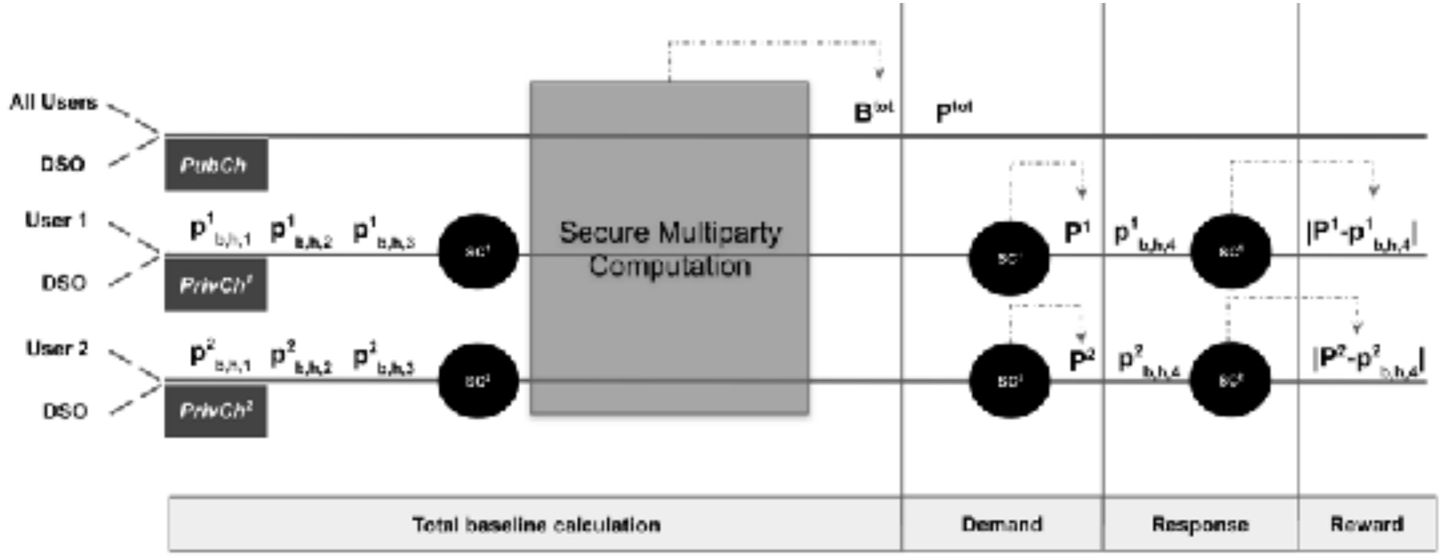


Smart Contracts Multi-Channel

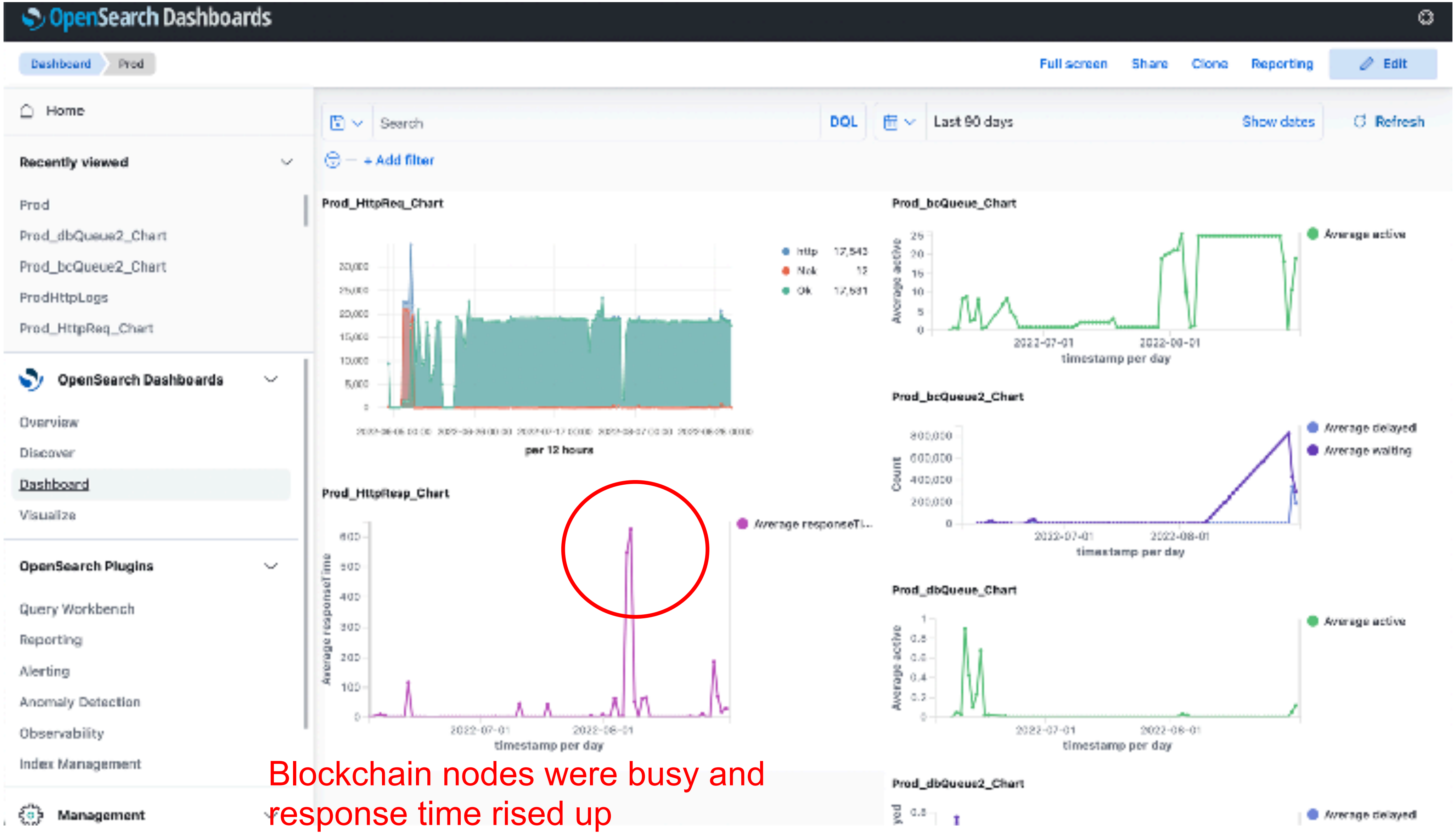


Blockchain and SMC for transparency, accountability and privacy

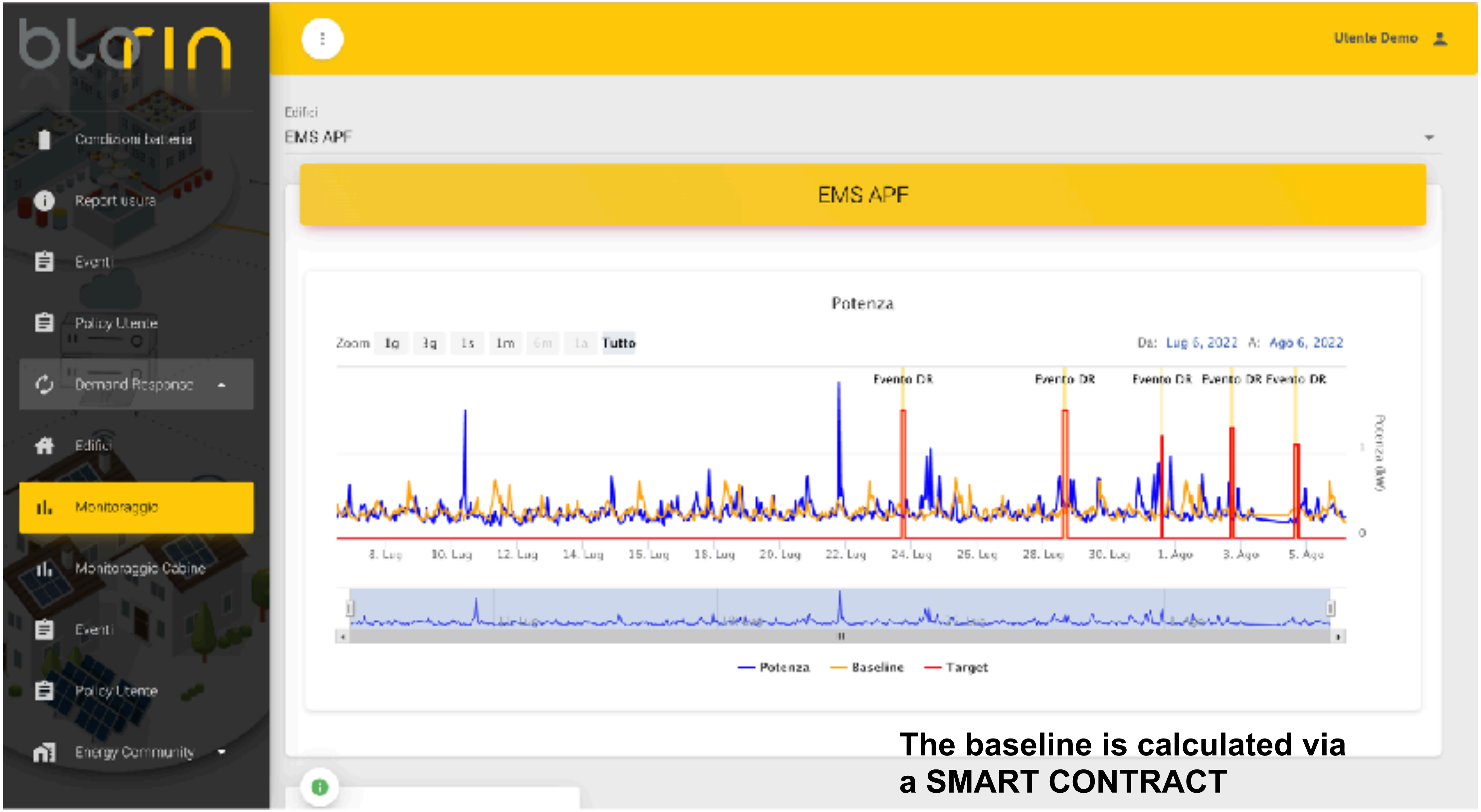




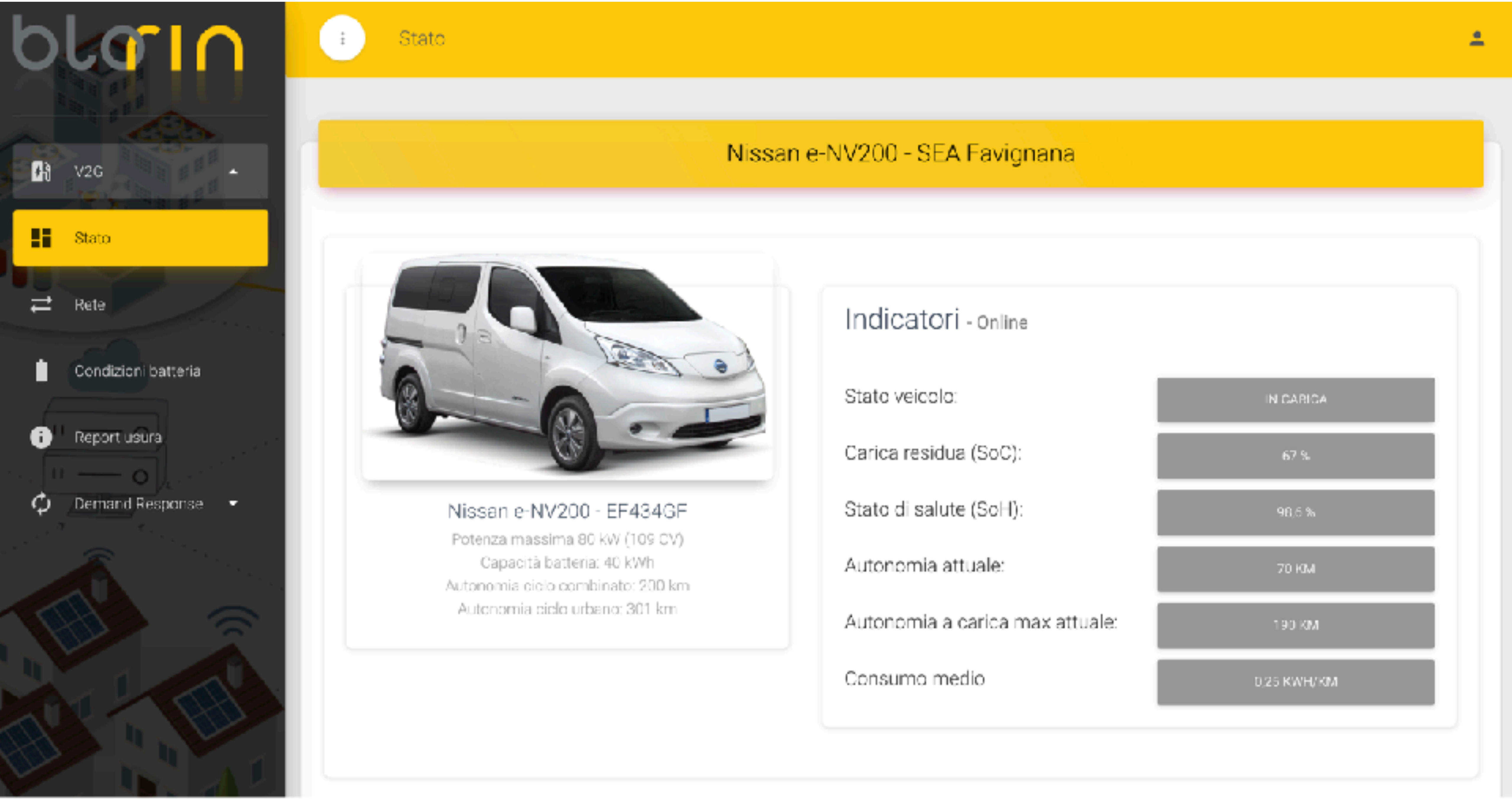
Reporting dashboard



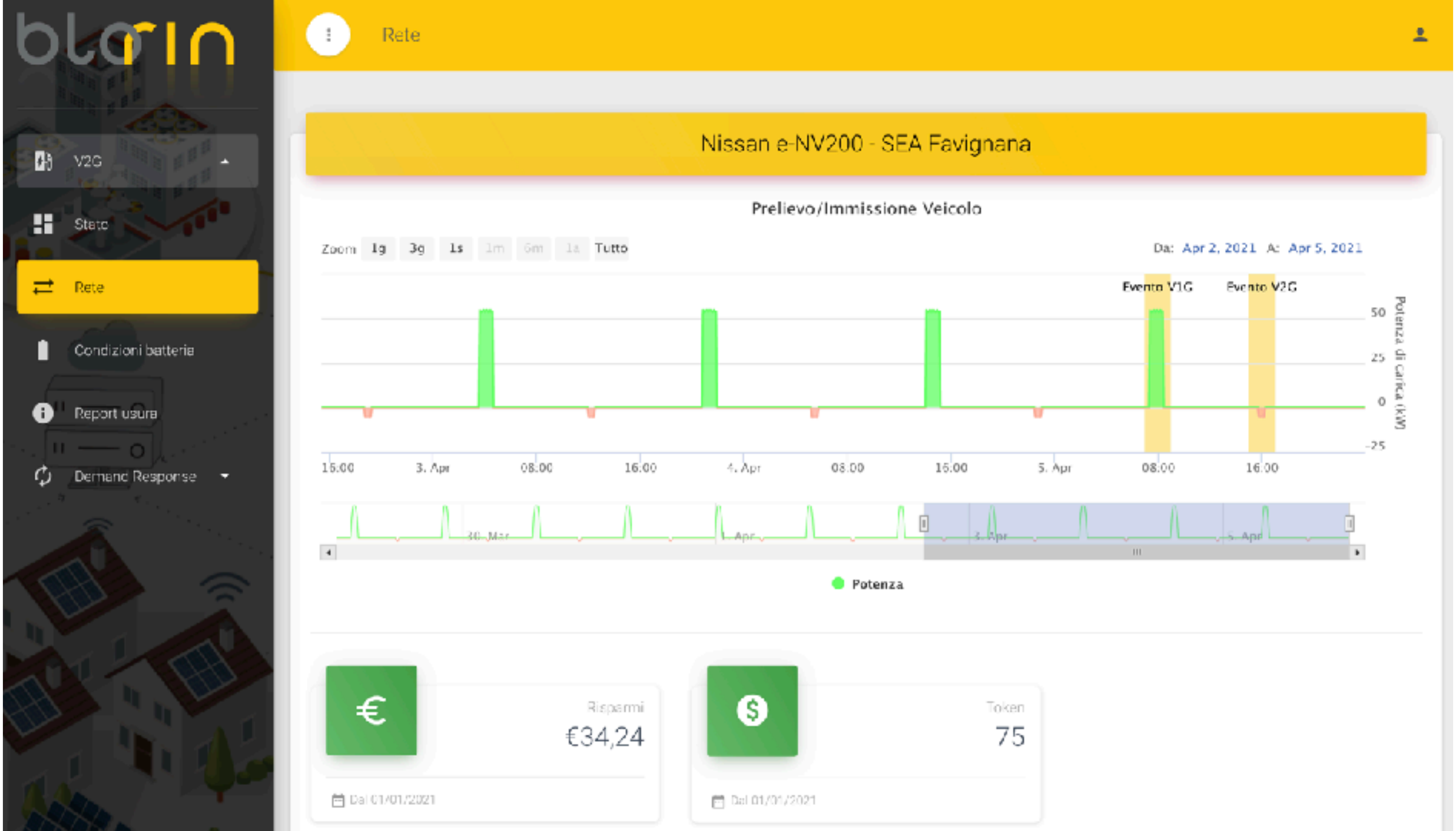
Blockchain nodes were busy and response time rised up



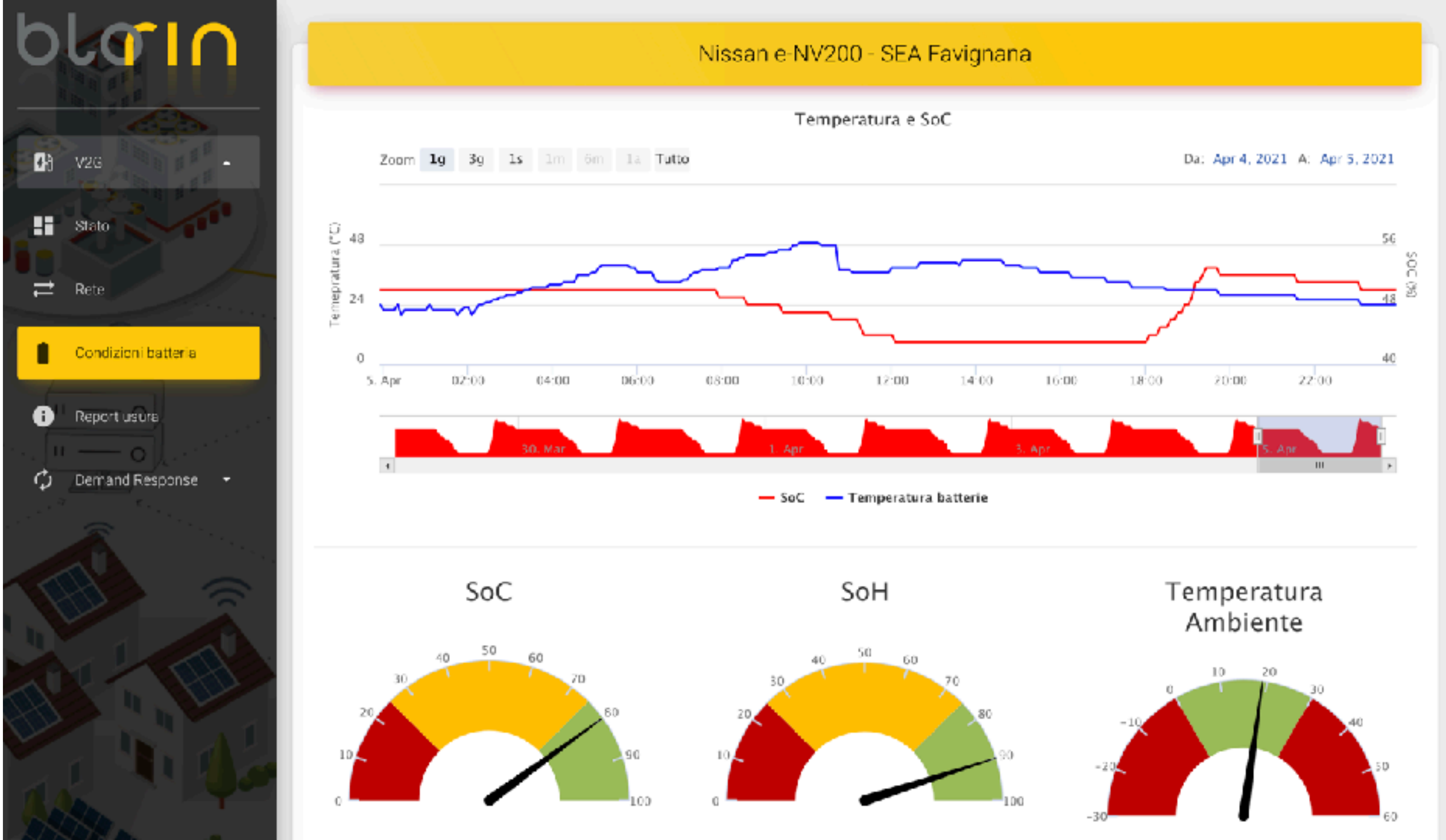
The baseline is calculated via a SMART CONTRACT



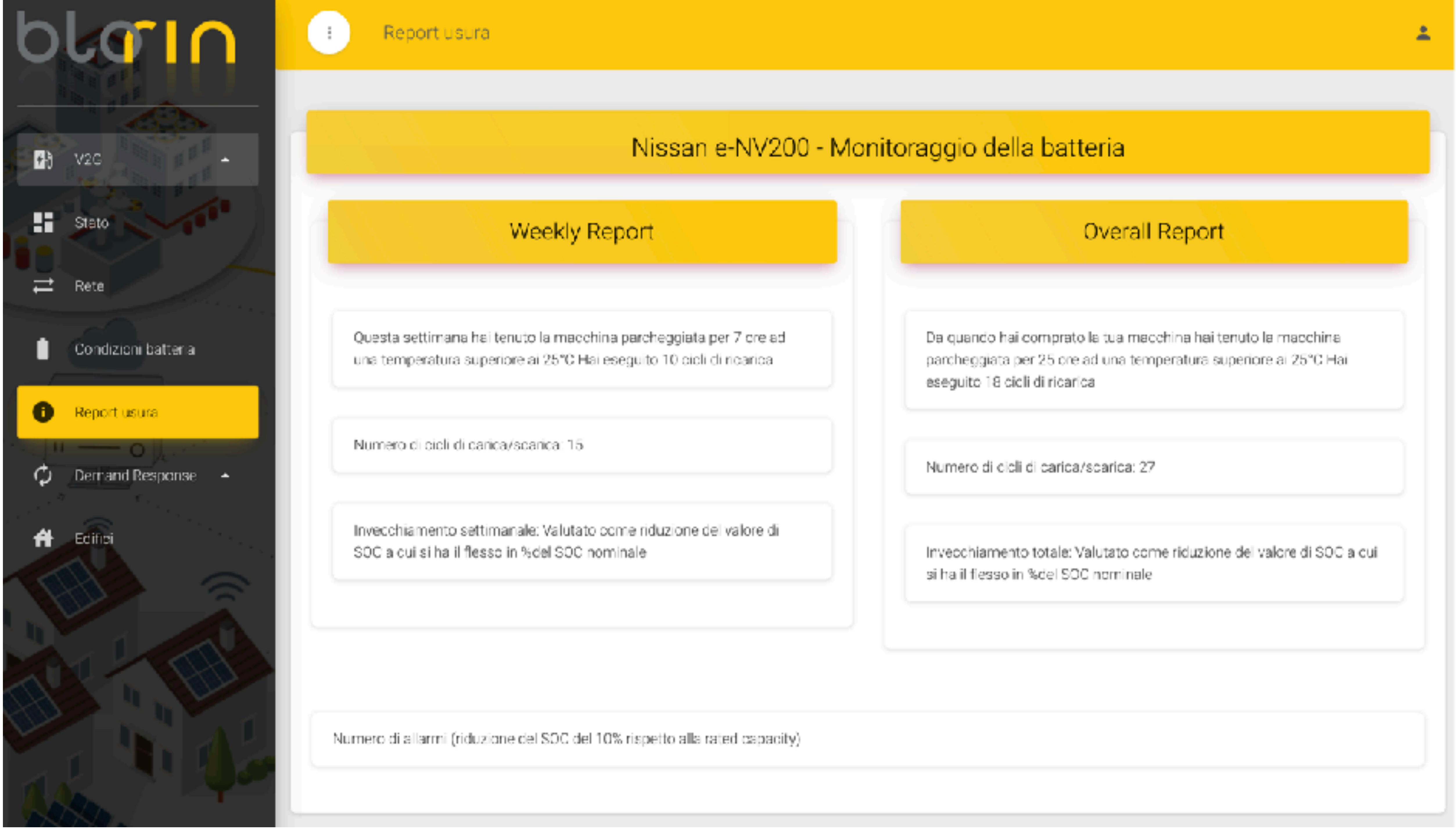
Stato
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Nissan e-NV200 - SEA Favignana
Nissan e-NV200 - EF434GF
Potenza massima 80 kW (109 CV)
Capacità batteria: 40 kWh
Autonomia ciclo combinato: 200 km
Autonomia ciclo urbano: 301 km
Indicatori - Online
Stato veicolo:
IN CARICA
Carica residua (SoC):
67 %
Stato di salute (SoH):
90,5 %
Autonomia attuale:
70 KM
Autonomia a carica max attuale:
190 KM
Consumo medio
0,25 KWH/KM

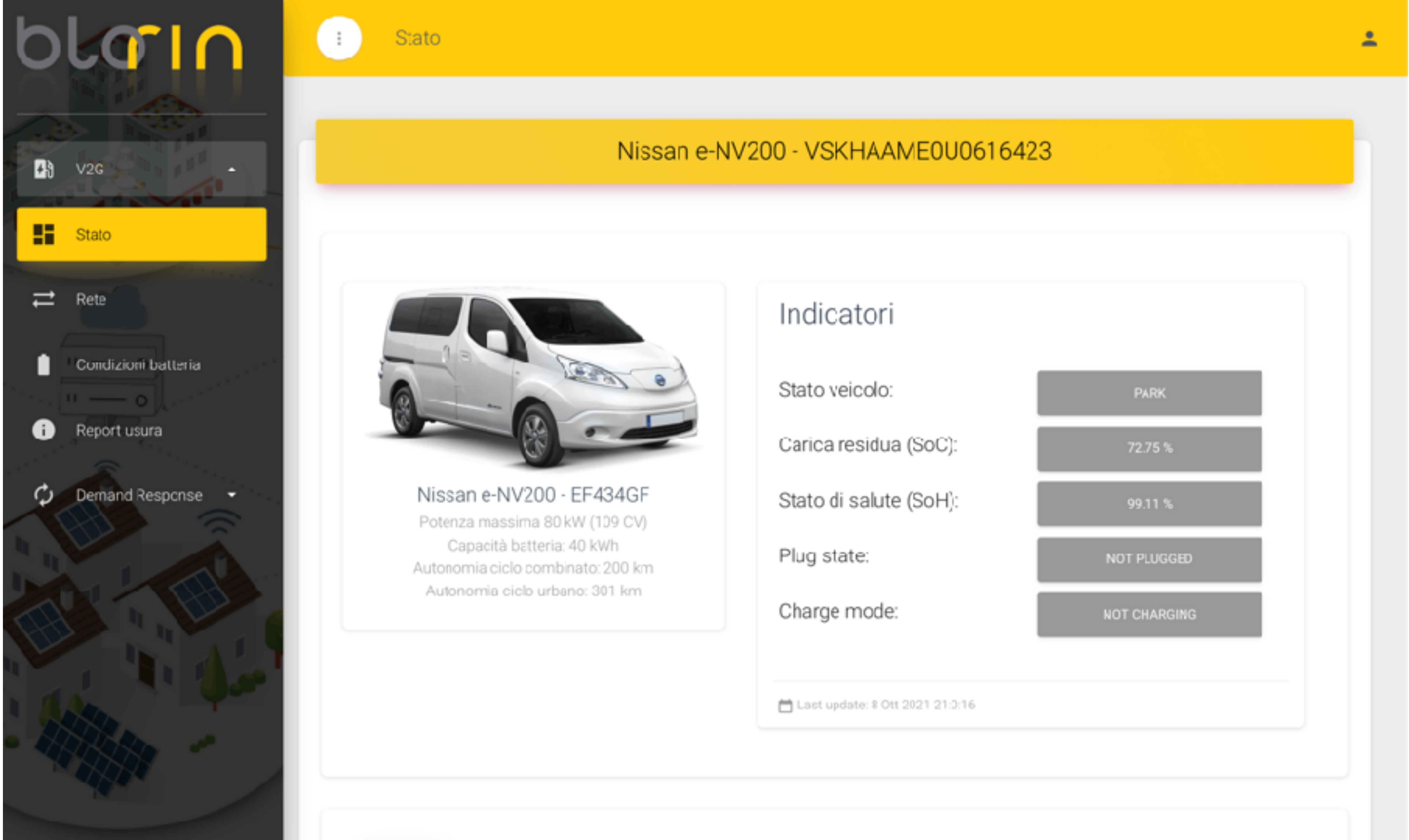


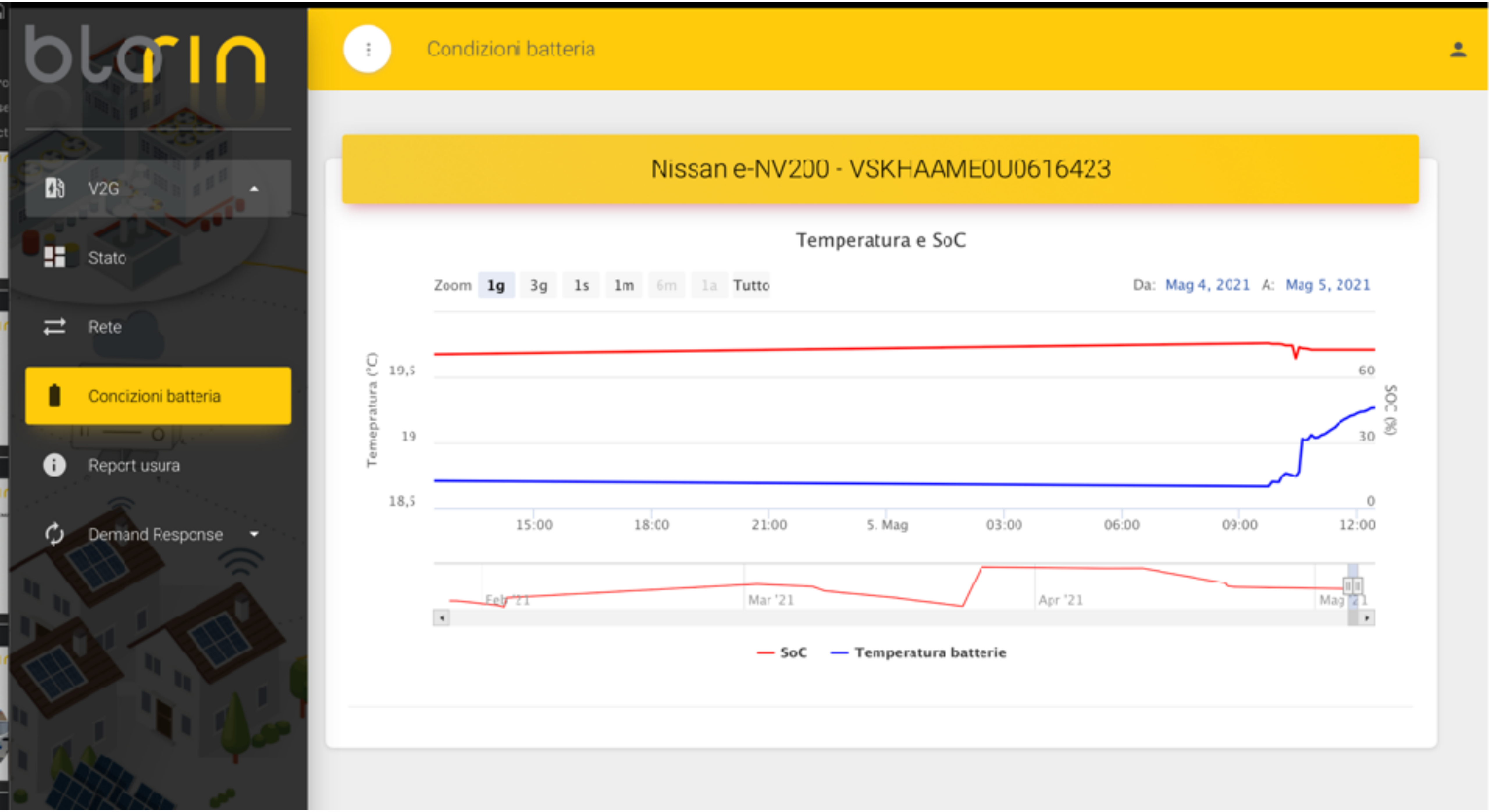
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Rete
Nissan e-NV200 - SEA Favignana
Prelievo/Immissione Veicolo
Zoom 1g 3g 1s 1m 6m 1a Tutto
Da: Apr 2, 2021 A: Apr 5, 2021
Evento V1G
Evento V2G
Potenza di carica (kW)
50
25
0
-25
16:00
3. Apr
08:00
16:00
4. Apr
08:00
16:00
5. Apr
08:00
16:00
Potenza
Risparmi
€34,24
Dal 01/01/2021
Token
75
Dal 01/01/2021



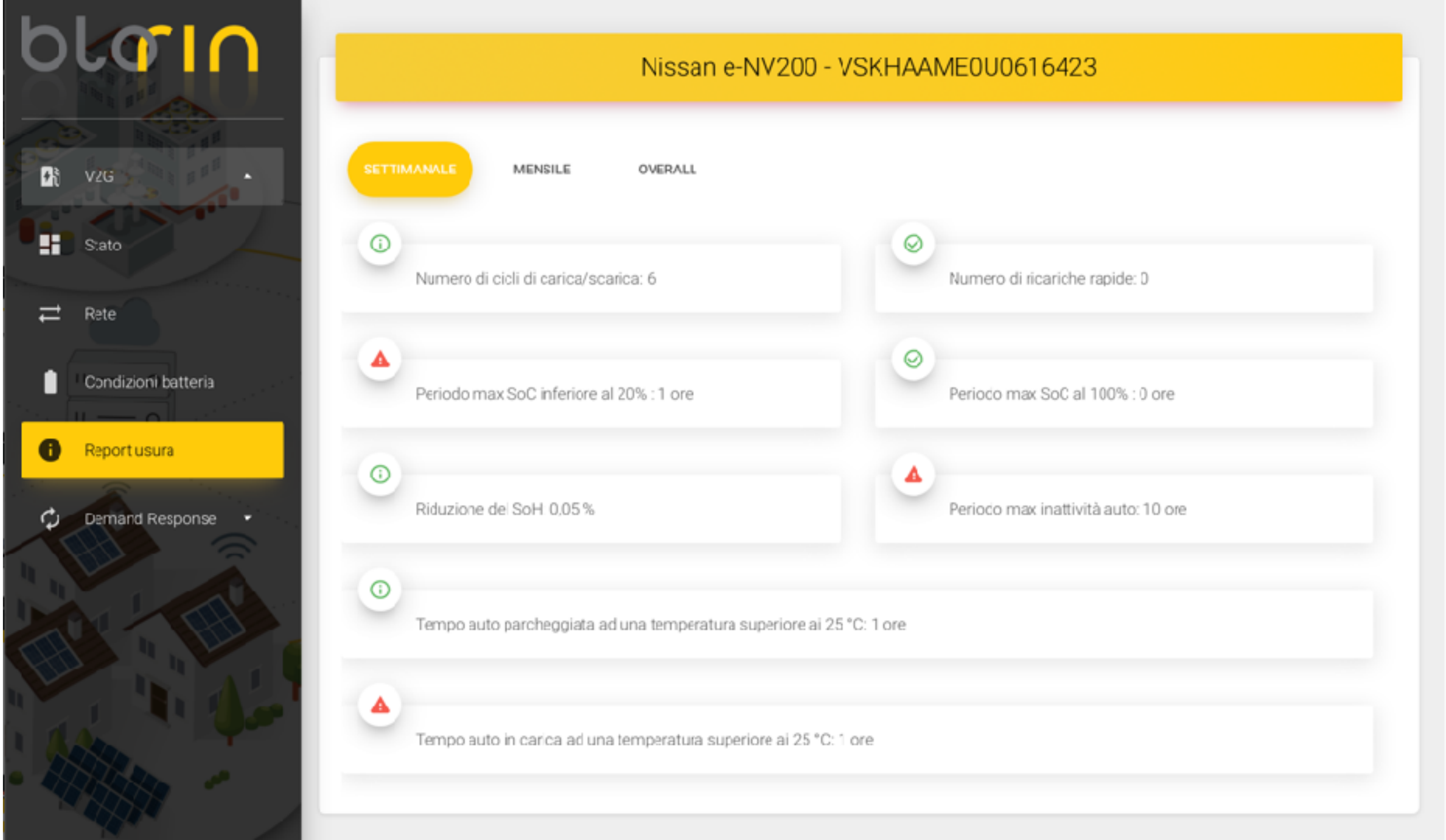
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Nissan e-NV200 - SEA Favignana
Temperatura e SoC
Zoom 1g 3g 1s 1m 6m 1a Tutto
Da: Apr 4, 2021 A: Apr 5, 2021
Temperatura (°C)
SOC (%)
5. Apr 02:00 04:00 06:00 08:00 10:00 12:00 14:00 16:00 18:00 20:00 22:00
30. Mar
1. Apr
3. Apr
5. Apr
SoC
Temperatura batterie
SoC
SoH
Temperatura Ambiente

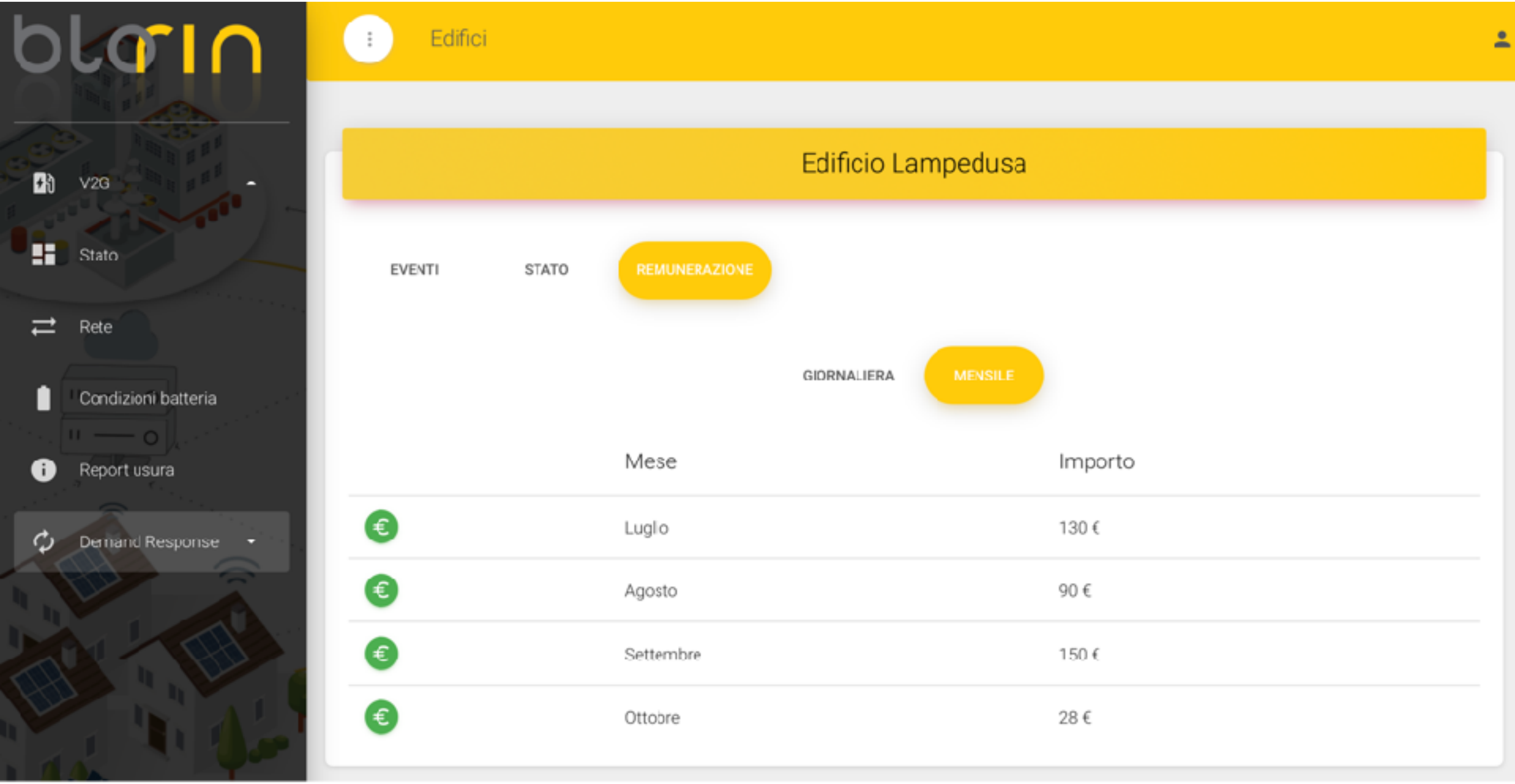

blorin
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Edifici
Report usura
Nissan e-NV200 - Monitoraggio della batteria
Weekly Report
Questa settimana hai tenuto la macchina parcheggiata per 7 ore ad una temperatura superiore ai 25°C Hai eseguito 10 cicli di ricarica
Numero di cicli di carica/scarica: 15
Invecchiamento settimanale: Valutato come riduzione del valore di SOC a cui si ha il flesso in %del SOC nominale
Overall Report
Da quando hai comprato la tua macchina hai tenuto la macchina parcheggiata per 25 ore ad una temperatura superiore ai 25°C Hai eseguito 18 cicli di ricarica
Numero di cicli di carica/scarica: 27
Invecchiamento totale: Valutato come riduzione del valore di SOC a cui si ha il flesso in %del SOC nominale
Numero di allarmi (riduzione del SOC del 10% rispetto alla rated capacity)

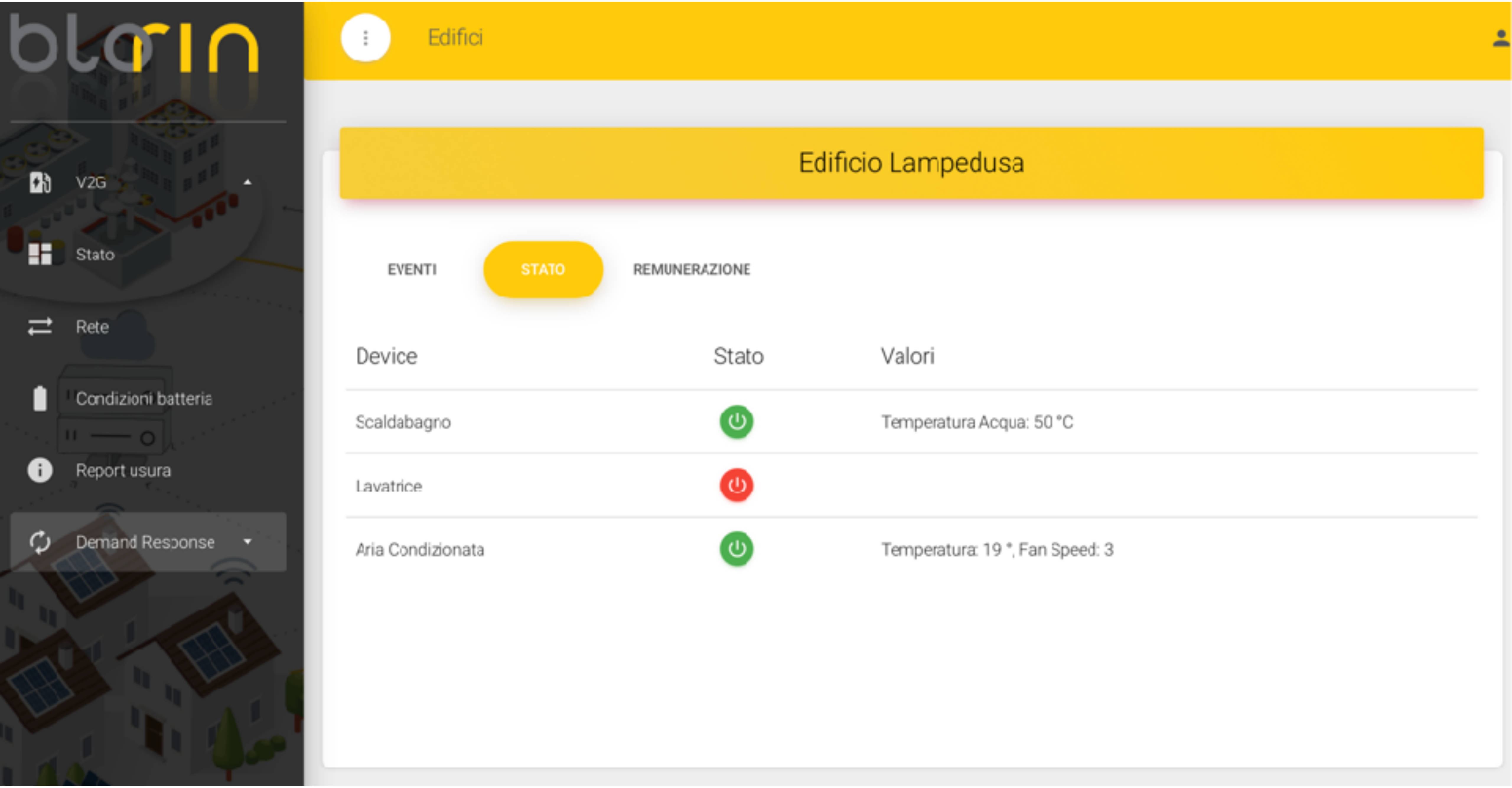

Stato
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Nissan e-NV200 - VSKHAAME0U0616423
Nissan e-NV200 - EF434GF
Potenza massima 80 kW (109 CV)
Capacità batteria: 40 kWh
Autonomia ciclo combinato: 200 km
Autonomia ciclo urbano: 301 km
Indicatori
Stato veicolo:
PARK
Carica residua (SoC):
72.75 %
Stato di salute (SoH):
99.11 %
Plug state:
NOT PLUGGED
Charge mode:
NOT CHARGING



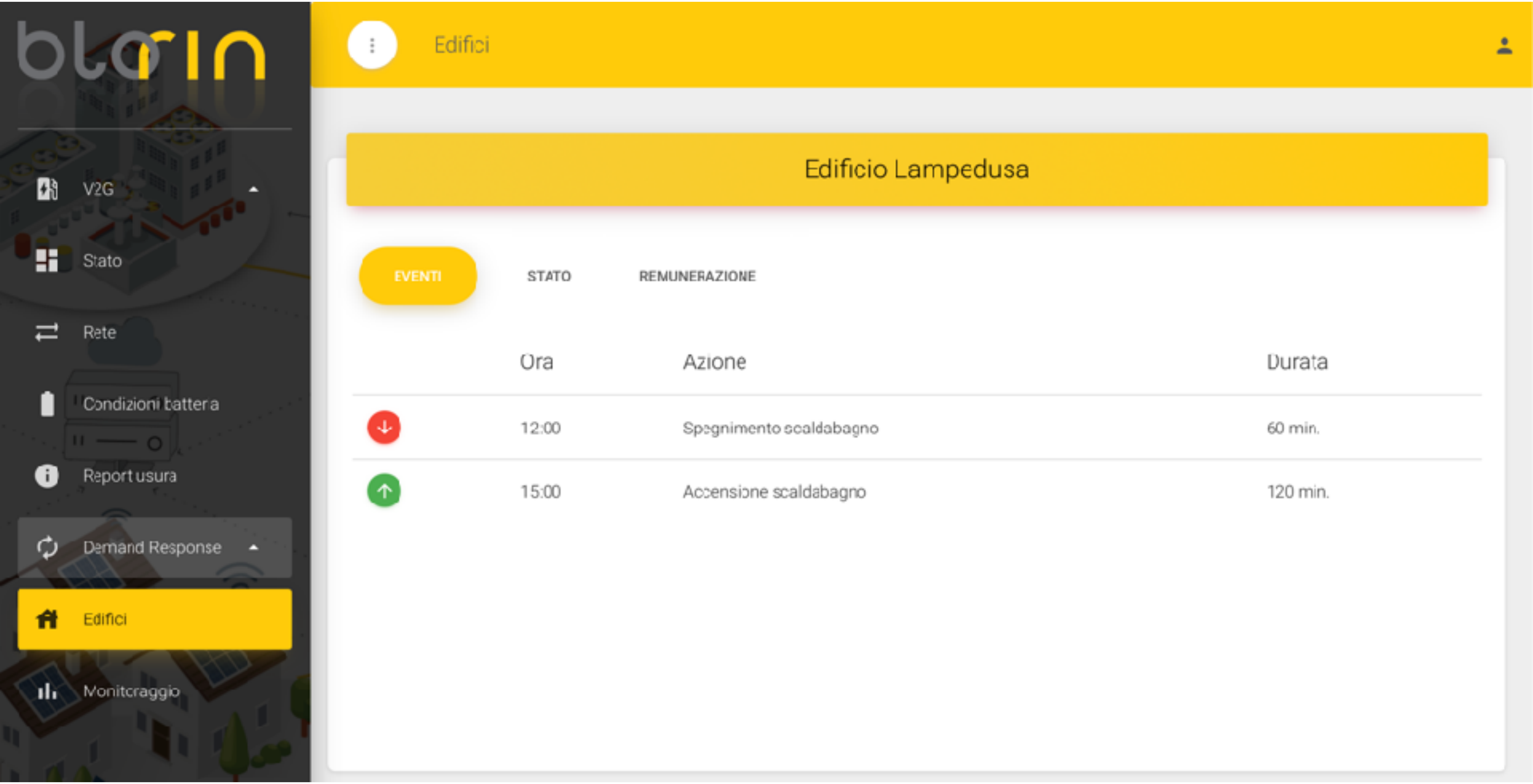
Condizioni batteria
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Nissan e-NV200 - VSKHAAME0U0616423
Temperatura e SoC
Zoom 1g 3g 1s 1m 6m 1a Tutto
Da: Mag 4, 2021 A: Mag 5, 2021
Temperatura (°C)
SOC (%)
19,5
19
18,5
60
30
0
15:00
18:00
21:00
5. Mag
03:00
06:00
09:00
12:00
Feb '21
Mar '21
Apr '21
Mag '21
SoC
Temperatura batterie

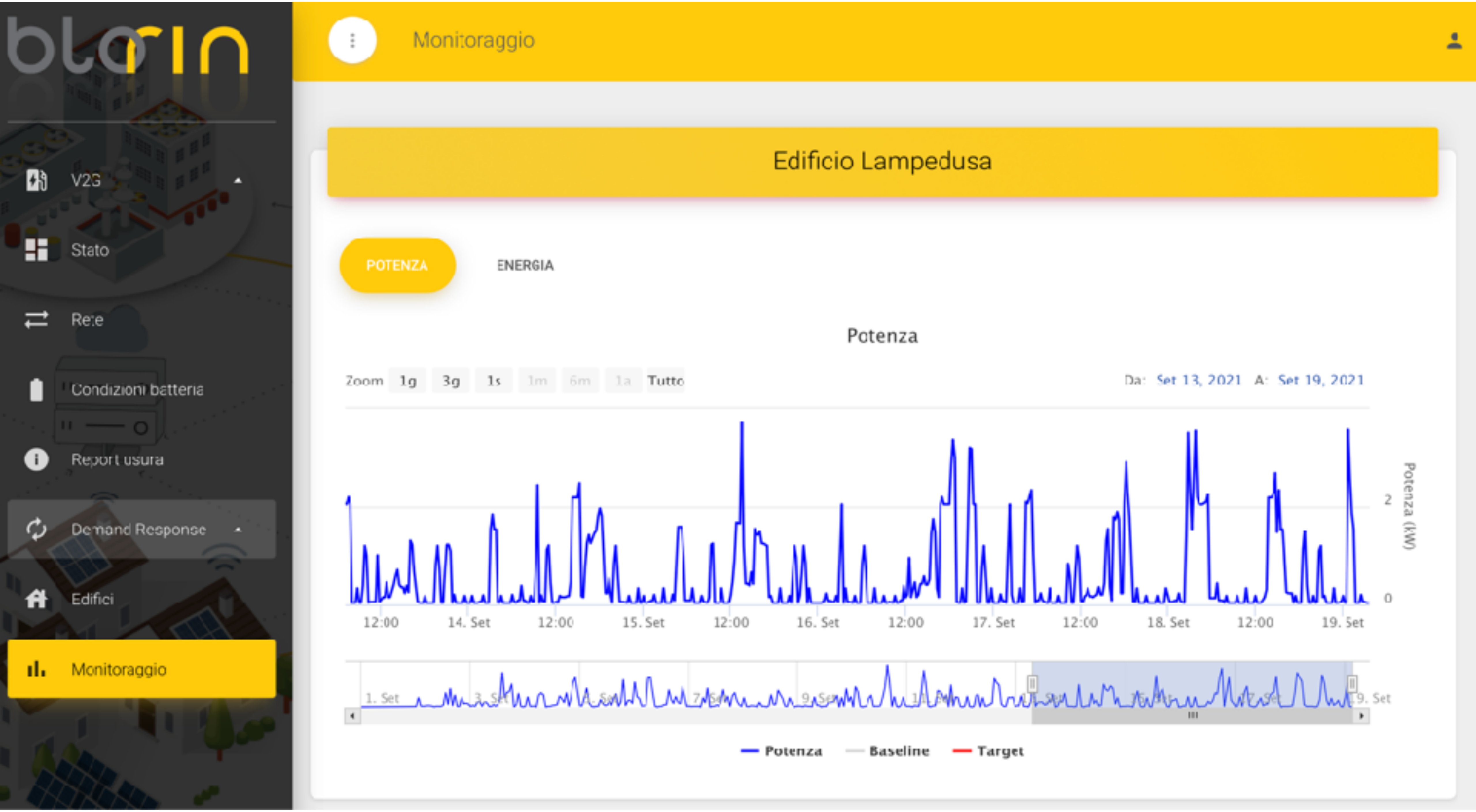

blorin
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Nissan e-NV200 - VSKHAAME0U0616423
SETTIMANALE
MENSILE
OVERALL
Numero di cicli di carica/scarica: 6
Numero di ricariche rapide: 0
Periodo max SoC inferiore al 20% : 1 ore
Periodo max SoC al 100% : 0 ore
Riduzione del SoH 0,05 %
Periodo max inattività auto: 10 ore
Tempo auto parcheggiata ad una temperatura superiore ai 25 °C: 1 ore
Tempo auto in carica ad una temperatura superiore ai 25 °C: 1 ore


Edifici
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Edificio Lampedusa
EVENTI
STATO
REMUNERAZIONE
GIORNALIERA
MENSILE
Mese
Importo
Luglio
130 €
Agosto
90 €
Settembre
150 €
Ottobre
28 €

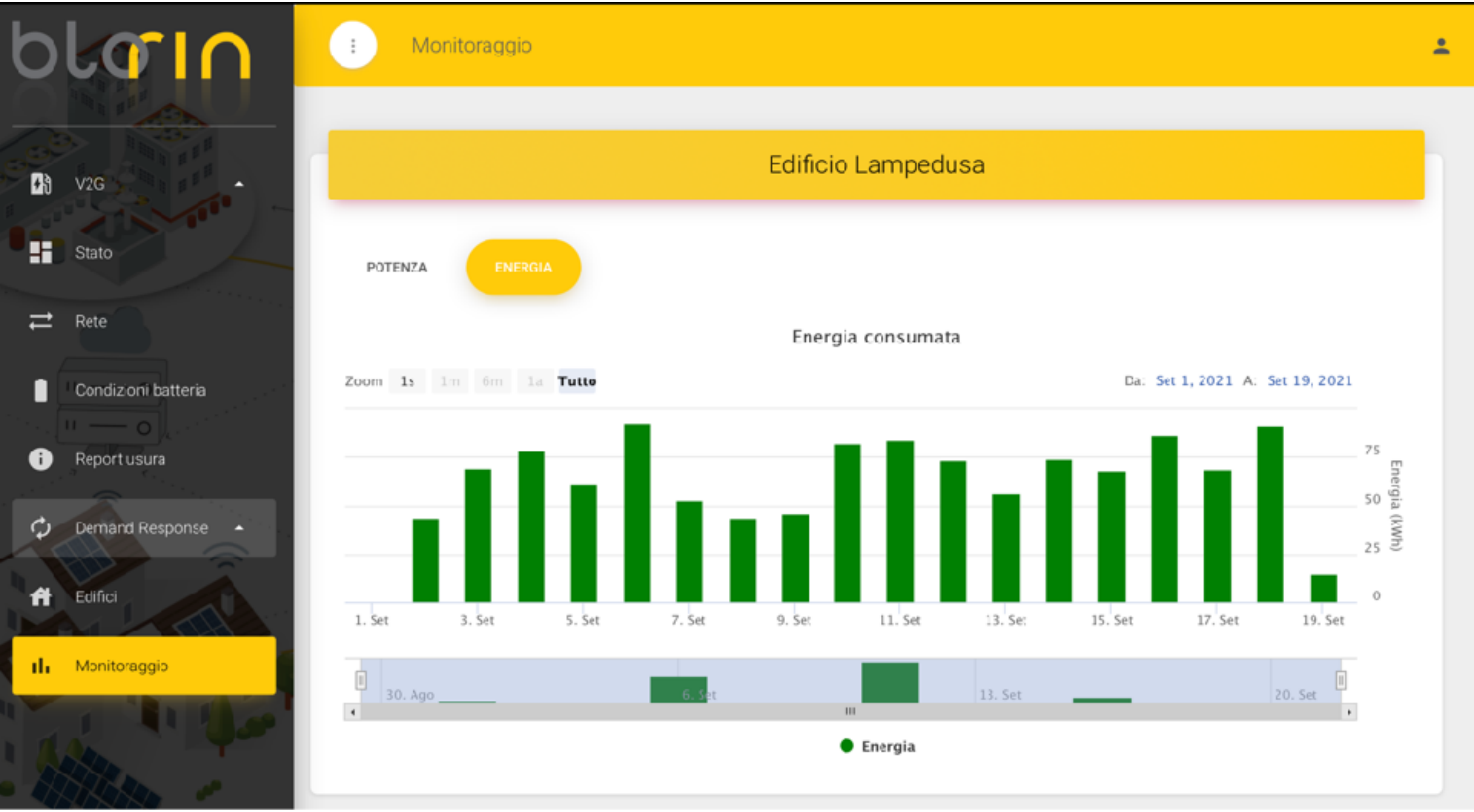


blorin
Edifici
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Edificio Lampedusa
EVENTI
STATO
REMUNERAZIONE
Device
Stato
Valori
Scaldabagno
Temperatura Acqua: 50 °C
Lavatrice
Aria Condizionata
Temperatura: 19 °, Fan Speed: 3


Edifici
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Edifici
Monitoraggio
Edificio Lampedusa
EVENTI
STATO
REMUNERAZIONE
Ora
Azione
Durata
12:00
Spegnimento scaldabagno
60 min.
15:00
Accensione scaldabagno
120 min.

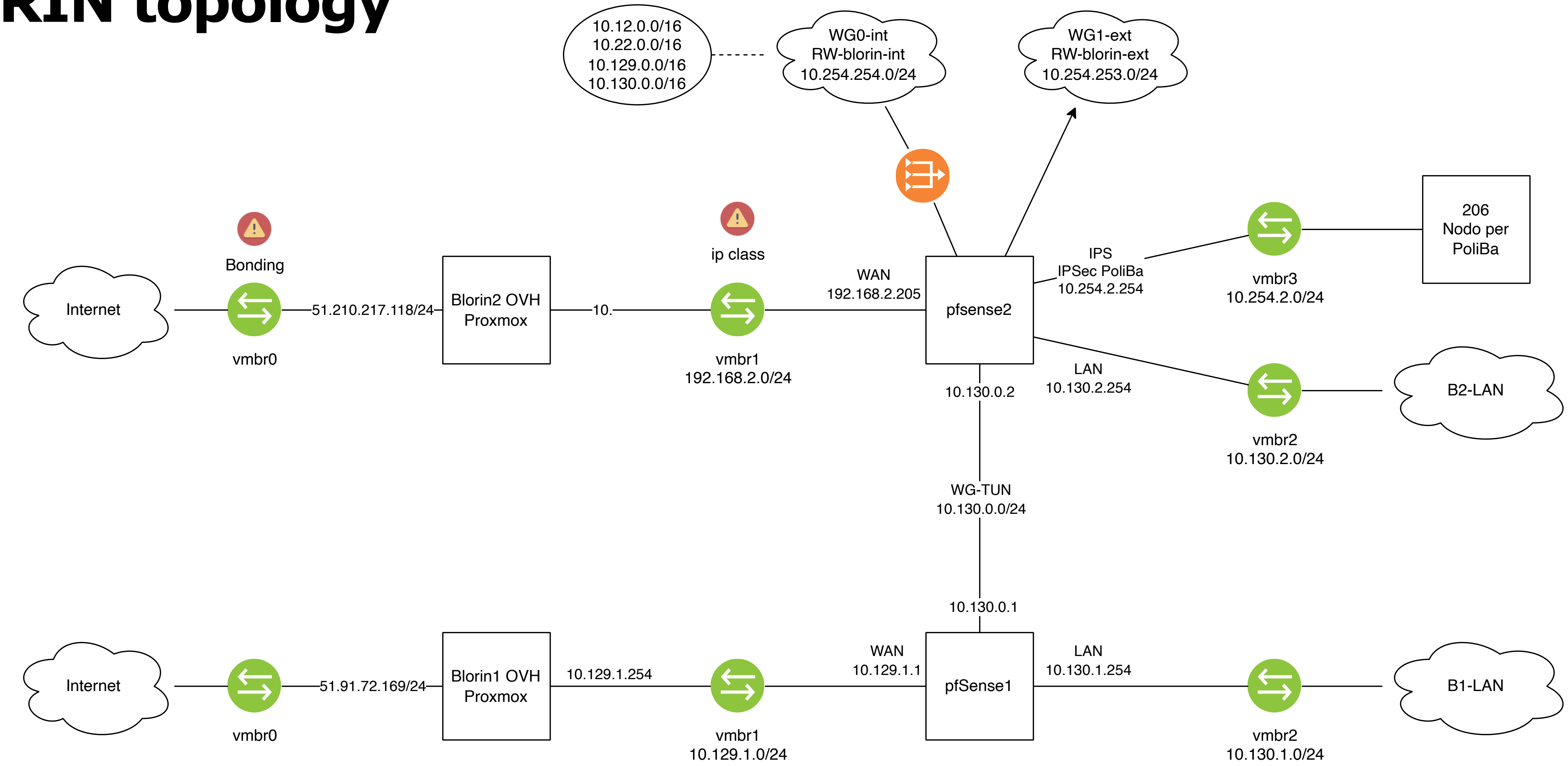


Monitoraggio
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Edifici
Monitoraggio
Edificio Lampedusa
POTENZA
ENERGIA
Potenza
Zoom 1g 3g 1s 1m 6m 1a Tutto
Da: Set 13, 2021 A: Set 19, 2021
Potenza (kW)
12:00 14. Set 12:00 15. Set 12:00 16. Set 12:00 17. Set 12:00 18. Set 12:00 19. Set
Potenza Baseline Target



Monitoraggio
V2G
Stato
Rete
Condizioni batteria
Report usura
Demand Response
Edifici
Monitoraggio
Edificio Lampedusa
POTENZA
ENERGIA
Energia consumata
Zoom 1s 1m 6m 1a Tutto
Da. Set 1, 2021 A. Set 19, 2021
75
50
25
0
Energia (kWh)
1. Set
3. Set
5. Set
7. Set
9. Set
11. Set
13. Set
15. Set
17. Set
19. Set
30. Ago
6. Set
13. Set
20. Set
Energia

BLORIN topology



BLORIN challenges and future directions

- **Involvement of public actors (ARERA, GSE, RSE, …):** once blockchain is implemented significant stakeholder consensus is required for a unified direction.
- **Technology acceptance among population**: definition of the 'killer application' and incentives for people
- **Integration with existing technologies**: new-generation, dual channel Italian smart meters, bidirectional charging stations were not that stable
- **Charging station issues:** hardware issues of the power supply and chip shortage

- ICT supporting technical and societal perspectives

SEEDS

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