HIVE POWER

Grids, made smart

Lugaggia Innovation Community - LIC

SaaS for **Smart Grid Analytics** for energy retailers and grid operators to optimise the grid and asset management

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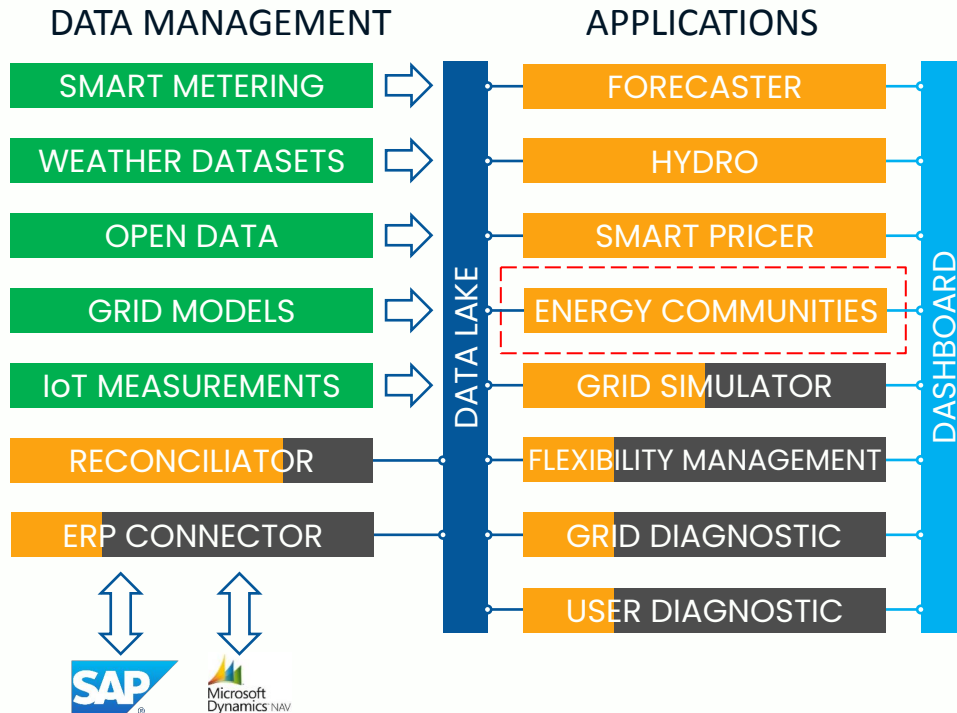- SUPSI - Researcher

Hive Power - CEO and co-founder

THE PRODUCT – THE HIVE PLATFORM

A platform for managing and extracting value from the data of electricity companies

- **Easy**
- **Smart**
- **Scalable**
- **Robust**
- **Modular**

Implemented as SaaS

DATA MANAGEMENT

- SMART METERING
- WEATHER DATASETS
- OPEN DATA
- GRID MODELS
- IoT MEASUREMENTS
- RECONCILIATOR
- ERP CONNECTOR

DATA LAKE

APPLICATIONS

- FORECASTER
- HYDRO
- SMART PRICER
- ENERGY COMMUNITIES
- GRID SIMULATOR
- FLEXIBILITY MANAGEMENT
- GRID DIAGNOSTIC
- USER DIAGNOSTIC

DASHBOARD

SAP

Microsoft Dynamics NAV

Technology Readiness

- On the market
- In pilot phase
- Prototype validated
- In development

https://www.youtube.com/watch?v=QPKa-hm16Nk

The final Clean Energy Package contains two definitions of energy community:

- **Citizen energy communities** constitute a new type of entity due to their membership structure, governance requirements and purpose (purpose being framed around provision of services/benefits for members or the local community – as opposed to profits).

- **Renewable Energy Communities** constitute a new type of entity that can be distinguished from other market players based on, inter alia, size and ownership structures.

Energy Communities in Switzerland follow a **physical set-up**, rather than virtual ones we see in other countries, like Italy.

Two main cases happening:

- **Condominium,** where all tenants are joining the community, sharing the energy produced by the solar rooftop (technically easy, but you have to convince all the tenants)
- **Part of a district,** in a sort of micro-grid setup, where in the LV grid all users are joining the community, creating a new point of common coupling to the distribution grid (technically complicated, to manage the local grid)

In reality these setups are successful only on condominiums or in new districts. Very often DSOs are the agent implementing the communities.

LIC - LUGAGGIA INNOVATION COMMUNITY

In compliance with the new Swiss energy law, Hive Power is testing a **self-consumption community** to optimize and automate the use of local solar energy between 18 prosumers in the same district combined with a public solar and battery plant. The Lugaggia community is testing a blockchain solution for a local flexibility market, decentralized and fully automated.
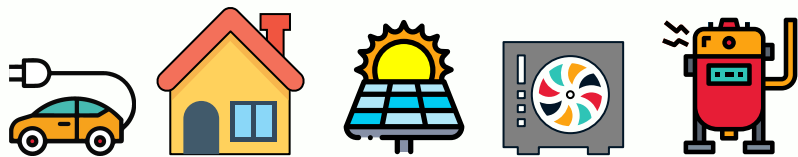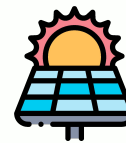
Community of 18 single family houses with:
- 3 solar rooftops, totalling 33kWp
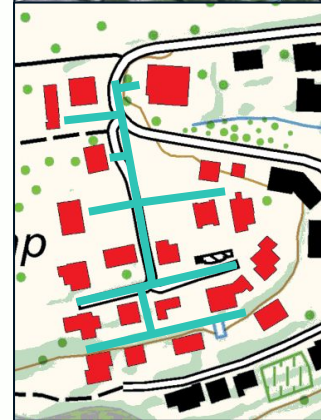- 26 kW of electric heater for DHW
- 10 heat pumps
- 1 electric vehicle

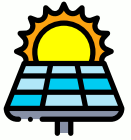A kindergarten with 30kWp of solar rooftop

District battery 50kWh

Hydro Plant 4MW

University of Applied Sciences and Arts of Southern Switzerland
SUPSI

AEM
Azienda Elettrica di Massagno SA

Landis Gyr+

PostFinance

https://lic.energy

FLEXIBLE DEVICES

Generation

Solar power (curtailment)

Storage

Storage battery

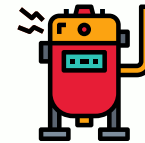Electric Vehicle

Demand

Heat pumps and air conditioning

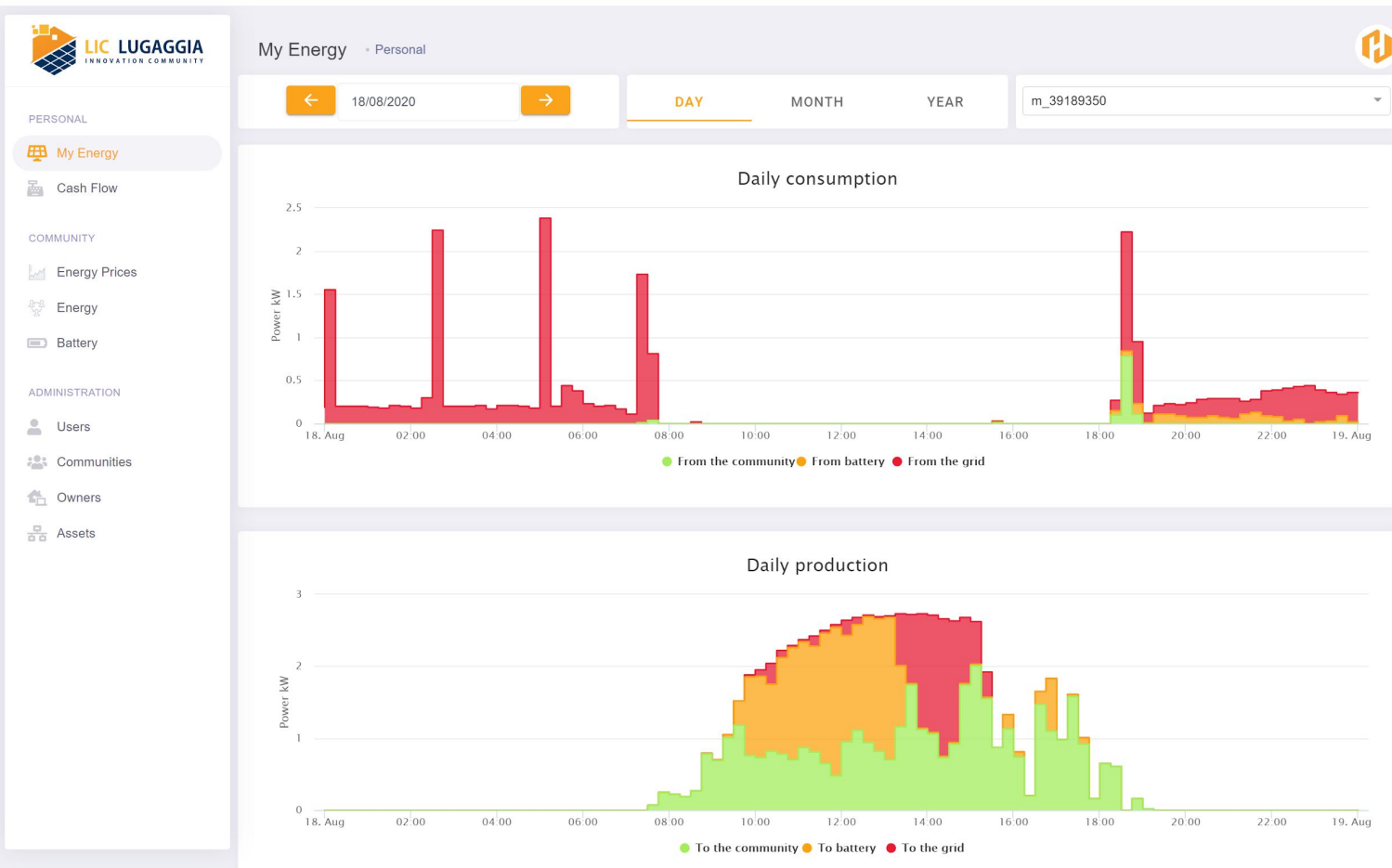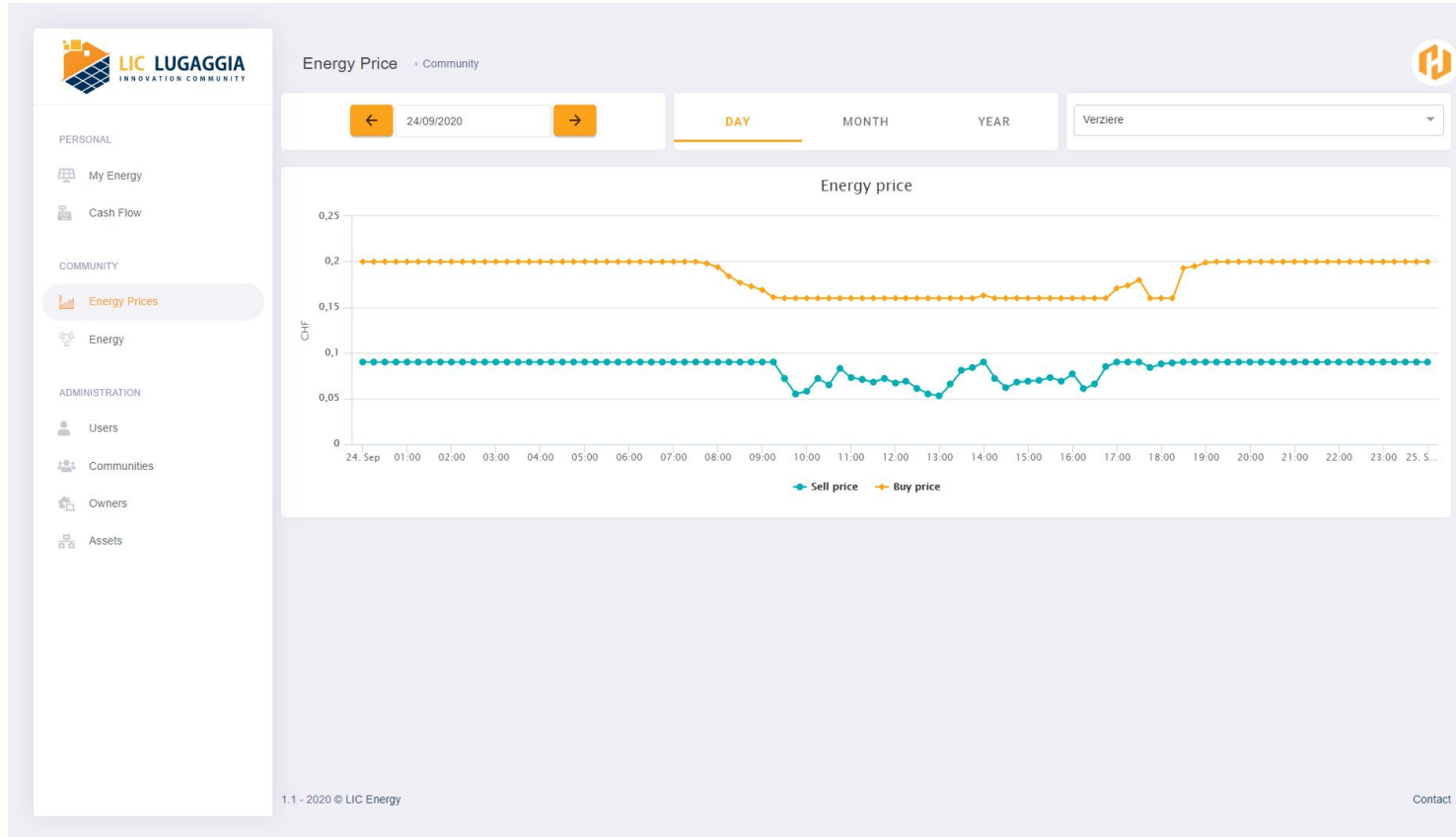Electric boilers for domestic hot water

ENERGY COMMUNITY APP

Energy and cash
data at user level

Community
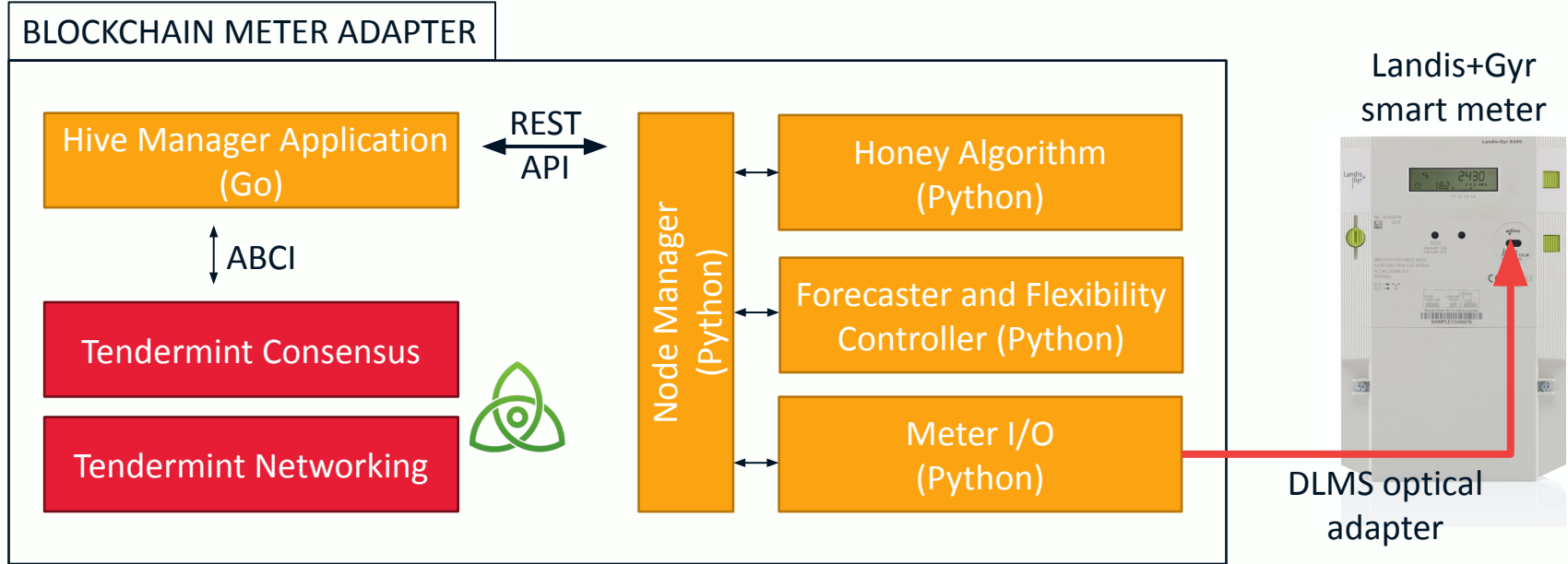energy data

Community
management

Dynamic prices as a function of the community self-consumption rate

NODE SETUP IN LIC

- In every node of the community (household's main cabinet) the blockchain adapter is installed (green rectangle)

- Each chain node is running on a Raspberry 3+ -based board
    - ❖ CPU: ARMv8 64-bit 1.2GHz
    - ❖ RAM: 1 GB
    - ❖ DISK: 32 GB (onboard flash memory)
    - ❖ Connectivity: mobile network 4G USB dongle (violet rectangle)
    - ❖ Data collection: performed by USB optical reader (red rectangle)

- The Hive Manager application runs on the adapter and periodically (typically every 15 minutes) sends custom transactions (e.g. metering readings) on the sidechain
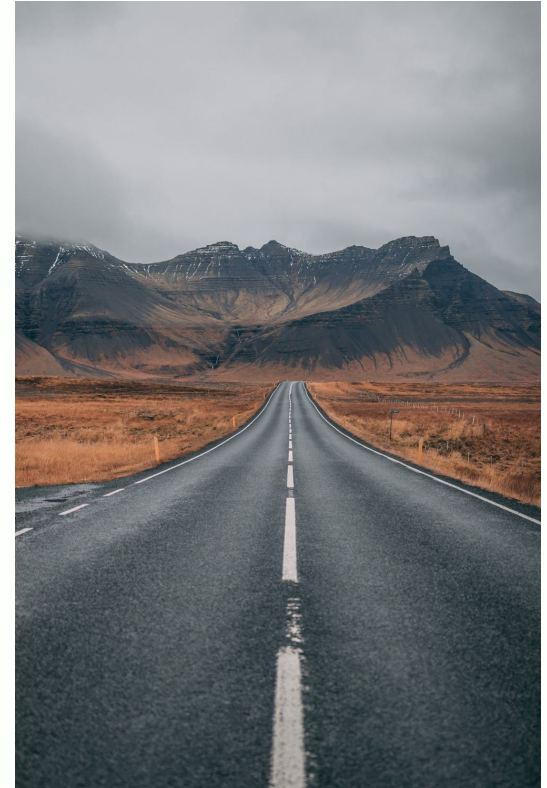
INSIDE THE BLOCKCHAIN METER ADAPTER

BLOCKCHAIN METER ADAPTER

Hive Manager Application (Go)

REST API

Node Manager (Python)

Honey Algorithm (Python)

ABCI

Forecaster and Flexibility Controller (Python)

Tendermint Consensus

Tendermint Networking

Meter I/O (Python)

Landis+Gyr smart meter

DLMS optical adapter

Blockchain will eat the world, but energy is **hard** to chew:
- Smart meters are not yet smart enough:
- Energy-intensive appliances have old and limited interfaces
- Digitalization is still ongoing, especially for the low voltage grid

However the potential is huge: the combination of blockchain, automation and IoT will be needed to ensure a resilient operation of the grid of the future dynamic, heterogeneous and fossil-free grid.

Piloting and experimentation are crucial: to unlock this potential we need an interdisciplinary effort connecting domain experts with data-driven generalists.

That's what we aim for in **Hive Power**.

Thanks for your attention