SOLVERA
LYNX

GemaLogic Energy Flexibility platform – Virtual Power Plant (VPP) case study

Tomaz Buh, Solvera Lynx d.o.o.

SOLVERA LYNX TODAY

REGIONAL LEADER IN INDUSTRIAL ENERGY MANAGEMENT WITH MAJOR FOCUS ON PRODUCT AND SOLUTION DEVELOPMENT

Innovative EM system architect for technical fields in energy, manufacturing, infrastructure, and transport.

Provider of custom-made EM solutions based on state of the art products (software & hardware) developed in-house.

Technical pioneer, incorporating three pillars of modern energy practices: energy monitoring, energy efficiency, and energy flexibility.

IMPORTANT MILESTONES

2002

Company foundation

Solvera Lynx d.d. (former Genera) was founded in Ljubljana, Slovenia

Development of the first ComBox energy and gas data loggers

2004

GemaLogic launch

Launch of the GEMA Energy Management information system

Launch of the GEMA.R railway Energy Management information system

2006

GemaLogic Gas Solutions launch

"Most entrepreneurial idea" in the young innovative companies category

Launch of the GEMA.PLIN gas management information system

2008

Rebranding

Reshaping into a limited company and renaming the company to Solvera Lynx

2014

Pioneer in LoRa technology

Solvera Lynx is among the first to begin developing the LoRaWAN protocol

2015

GemaLogic VPP launch

Launch of energy flexibility solution for smart grid and active demand response

ISO 50001 Certification of GemaLogic software

2016

ComBox.L launch

The ComBox.L device is among the first to receive the LoRaWAN certificate

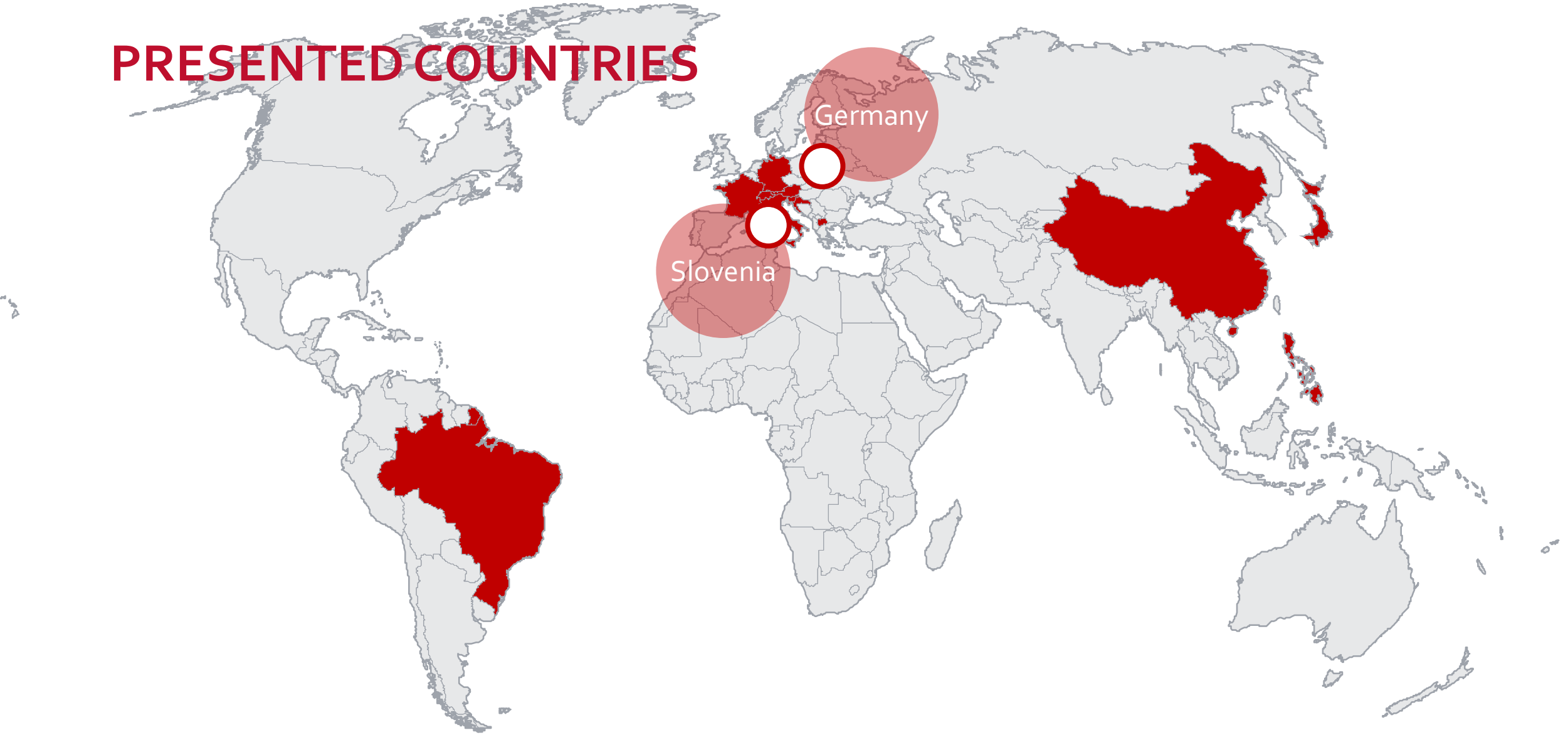
Solvera Lynx becomes a member of the LoRa Alliance

2018

GemaLogic transformation

Launch of modular design of GemaLogic product with solutions for Monitoring, Efficiency and Flexibility

PRESENTED COUNTRIES



SOLVERA LYNX MARKET MAP

CORE BUSINESS ACTIVITIES

- Software development (GemaLogic)
- Hardware development (ComBox, ICT, IoT, LoRa)
- Energy Management & Engineering
- Customer support & Installation

FOCUS ON CUSTOM-MADE SOLUTIONS

Our Energy Management solutions based on three pillars of modern energy practices

- Energy Monitoring (EM)
- Energy Efficiency (EE)
- Energy Flexibility (EF)

APPLICATIONS

- EM: Gas, Electric Energy, Railways
- EE: Industrial facilities, Buildings, Energy Audits
- EF: Virtual Power Plants, Smart Grid, Power Line Optimisation

TECHNOLOGICAL PIONEER

- 15 years of software and hardware development
- Certificates: TÜV SÜD, ISO certificates, LoRaWan certificate
- Among the first to certified Data Communication Devices by LoRaWAN standard

EXPERTISE & STRONG R&D

- The biggest interdisciplinary Energy Management team of experts in the region
- Systematic R&D projects in software, electronics and optimization in the field of Energy Management

FACTS & FIGURES

SOLVERA LYNX IN NUMBERS

1	Slovenian provider of custom- made Energy Management solutions
9	Applications: Gas, Electrical Energy, Railways, Industry, Buildings, Energy Audits, Virtual Power Plants, Smart Grids, Power Line Capacity
15	Years of experience in Energy Management
30	Countries covered with our EM solutions
50+	Best interdisciplinary Energy Management experts (IT, ICT, Energy Management)
100+	Satisfied clients and innovative GemaLogic Software installations
3000+	Total installations of our state-of-the-art products ComBox.L and ComBox.M
20000+	Measuring points connected to our GemaLogic software platform

USE CASES & REFERENCES

GemaLogic Flexibility

Use-case: „Virtual Power Plant“

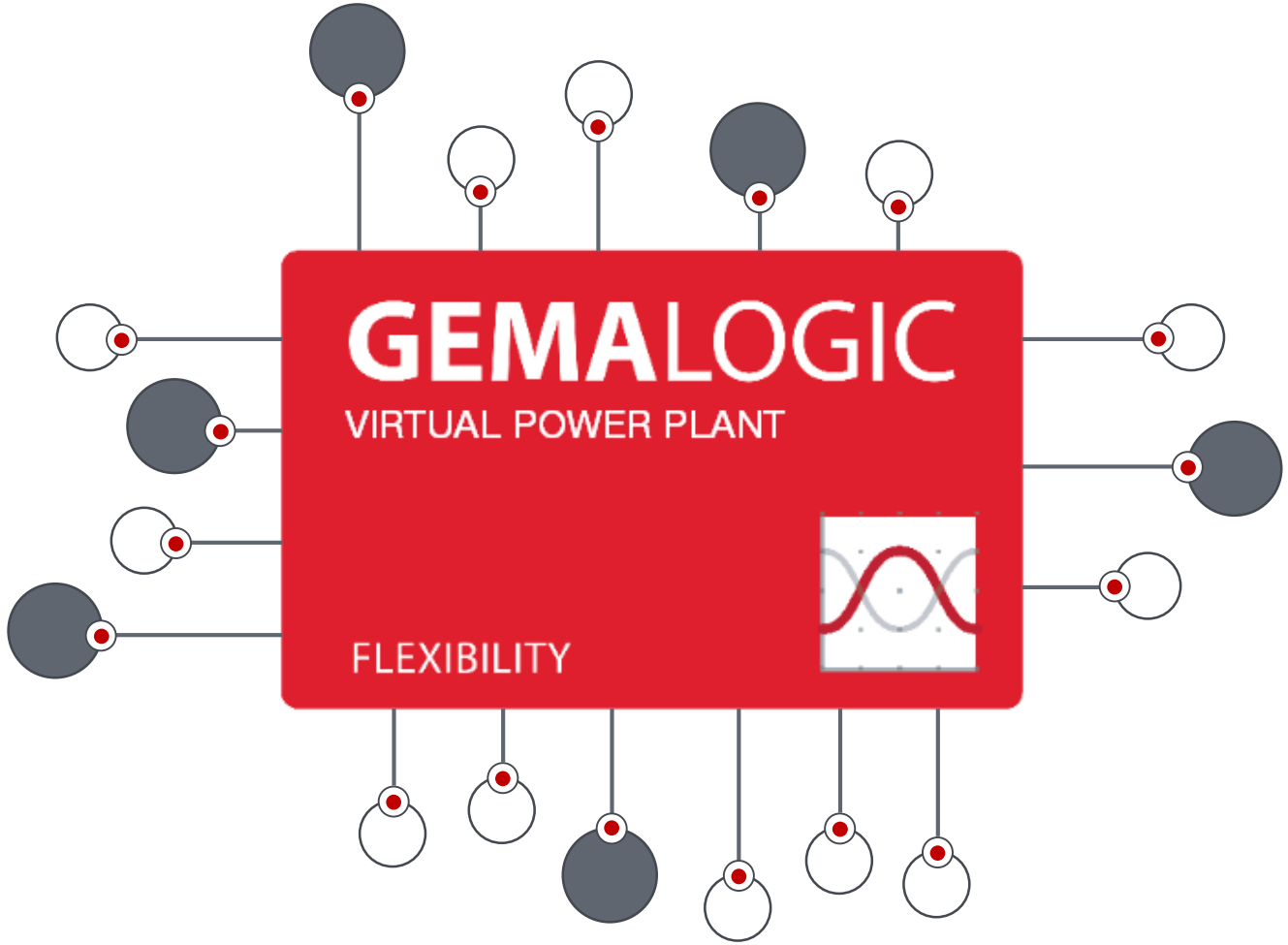
Functionalities

- System Balancing – manual Frequency Restoration Reserve (mFRR)
- Market Balancing
- Aggregation
- Forecasting
- Optimization (control and scheduling)

Sources

- Distributed Energy Resources (DG, Gas, etc.)
- Renewables (PV, CHP, Wind, Hydro, BIO gas, etc.)
- Flexible loads (Industry, commercial and residential buildings)
- Coventional sources and storages

GemaLogic Flexibility – Virtual Power Plant



GemaLogic Flexibility Industry
GemaLogic Flexibility small commercial and residential buildings

Distributed Energy Resources, Flexible loads

GemaLogic Flexibility

Use-case: „Commercial and residential buildings“

Demand Response Control System (DRCS)

- integration based on CIM (IEC 61968-100) with distribution management system, meter data management, notifications (e-mail, SMS), HEMS, LoRa

Functionalities

- Billing data collection
- Automatic LV network topology setup
- Forecasting models for commercial and residential buildings
- Demand Response potential
- Direct Load Control
- Virtual Power Plant integration

GemaLogic Flexibility

Use-case: „Steel and glass industry“

Functionalities

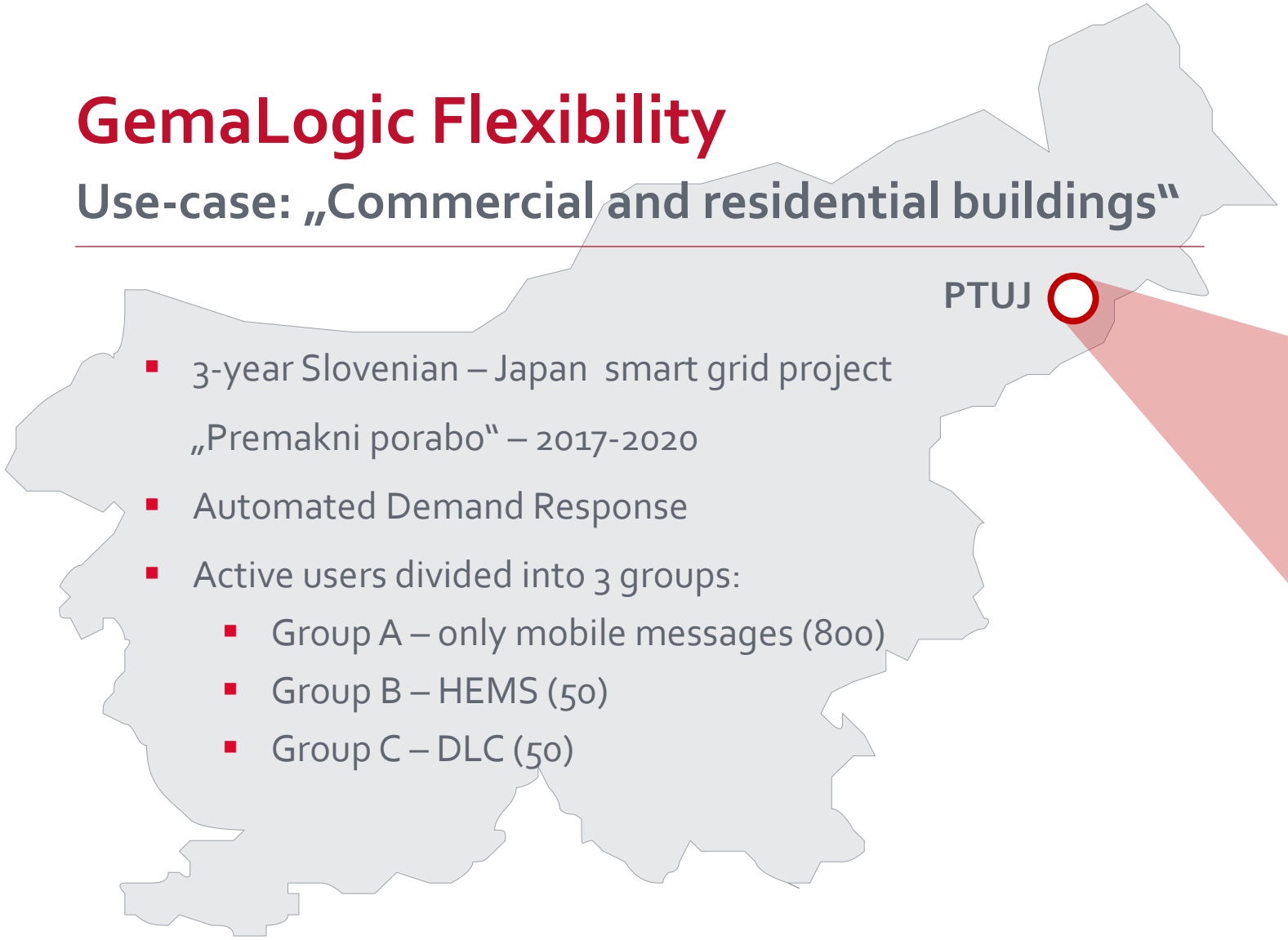
- Monitoring
- Aggregation
- Forecasting (loads and renewables)
- Optimization (control and schedule)
- Demand Response potential
- Load Shifting
- Peak Shaving
- Virtual Power Plant integration

Integrations

- EMS – specific consumption,
- SCADA – management and control
- MES – production data

GemaLogic Flexibility

Use-case: „Commercial and residential buildings“



- 3-year Slovenian – Japan smart grid project „Premakni porabo“ – 2017-2020
- Automated Demand Response
- Active users divided into 3 groups:
  - Group A – only mobile messages (800)
  - Group B – HEMS (50)
  - Group C – DLC (50)

826
Participants

17-30%
Demand Response

GemaLogic Flexibility

Use-case: „Diesel Gensets control“

Connectivity

- OpenADR implementation
- Integration platform – Service Mix for backend information system integration:
  - Diesel Gensets
  - Asset management (IBM)
  - Alarming system
  - Meter Data Management System (MDM)
  - SCADA
- Connectivity platform for integrating industry and SCADA protocols:
  - ModbusTCP
  - ICCP – TASE.2
  - OPC UA

ENERGY FLEXIBILITY REFERENCES

PETROL

elektro gorenjska

ELEKTRO MARIBOR

NEDO

ELES

PREMAKNI PORABO

Bodi aktiven in prihrani!

sij | ravne steel

sij | acroni

SOLUTIONS PORTFOLIO

SOLVERA LYNX SOLUTIONS

Energy Monitoring

Monitoring of the conditions in the gas grid

GAS

Control and analysis of electric energy consumption

ELECTRIC ENERGY

Optimization of energy use on railway infrastructure

RAILWAYS

Energy Efficiency

Low costs, improve efficiency and safety, improve your carbon footprint

INDUSTRY

Low costs, improve the effectiveness and safety. Offer extra to building tenants

BUILDINGS

The key step in efficient decrease in energy use

ENERGY AUDITS

Energy Flexibility

Utilize flexible energy from distributed energy resources and local flexibility platforms

VIRTUAL POWER PLANT

Provide demand response functionality & connect industry into responsive unit

INDUSTRY

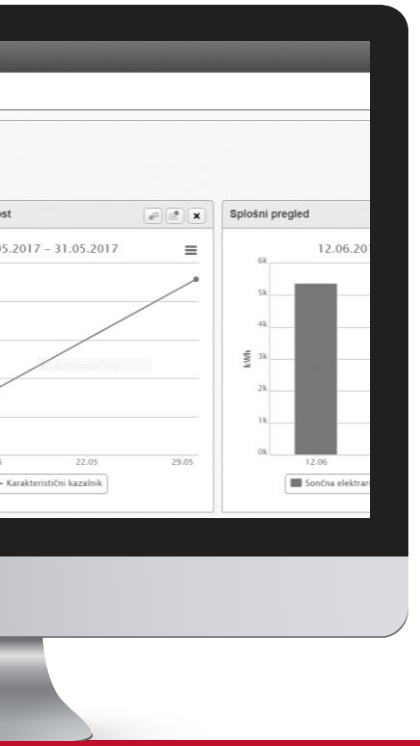
Demand response control system increase the ampacity of existing distribution network

COMMERCIAL AND RESIDENTIAL

PRODUCT PORTFOLIO

INNOVATIVE TOOLS FOR ENERGY MANAGEMENT

OUR OWN SOFTWARE, COMMUNICATION EQUIPMENT AND LORAWAN SOLUTIONS



GEMALOGIC

ADVANCED ENERGY MANAGEMENT SOFTWARE PLATFORM

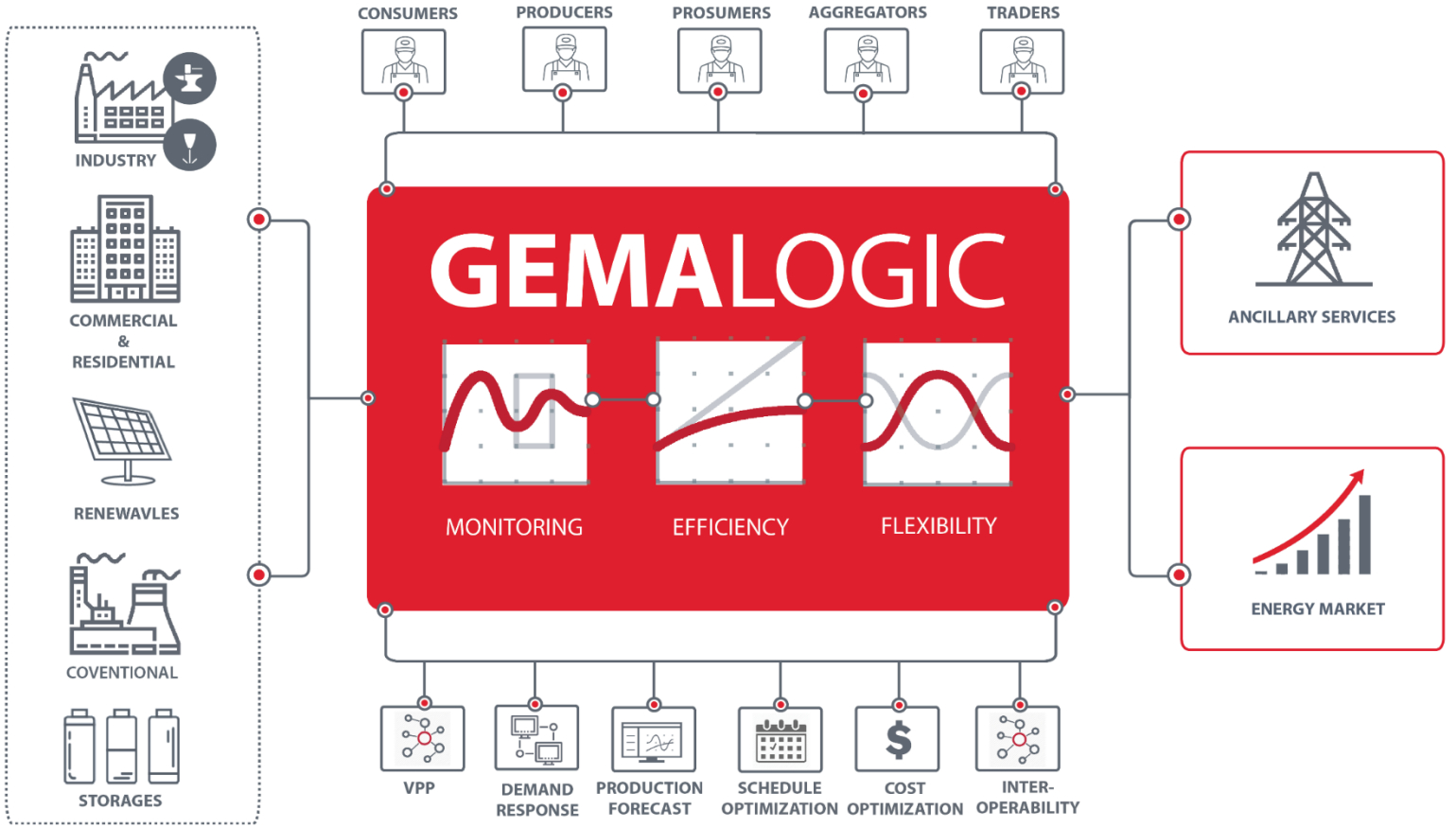
COMBOX

INNOVATIVE DATA COMMUNICATION EQUIPMENT

GemaLogic Energy Flexibility Platform

VIRTUAL POWER PLANT, INDUSTRY, COMMERCIAL AND RESIDENTIAL

- **VIRTUAL POWER PLANT-** utilize flexible energy from distributed energy resources and local flexibility platforms.
- **INDUSTRY** - provide demand response functionality & connect industry into responsive unit.
- **COMMERCIAL AND RESIDENTIAL** demand response control system increase the ampacity of existing distribution network.



GemaLogic FUNCTIONALITIES

Resources overview

- Partners
- Resource types: Loads, Generators, Prosumers

Monitoring panel

- Actual load,
- Load forecast (48h),
- Calculation and presentation of adjusted forecast,
- Request for load curtailment from activation

Load optimization (automatic/manual)

Load forecast (prediction models):

- Machine learning methods (LR, NN, RT, SVM)
- For each resource – adaptive prediction models with different models
  e.g.: 48 h / 1min resolution

GemaLogic FUNCTIONALITIES

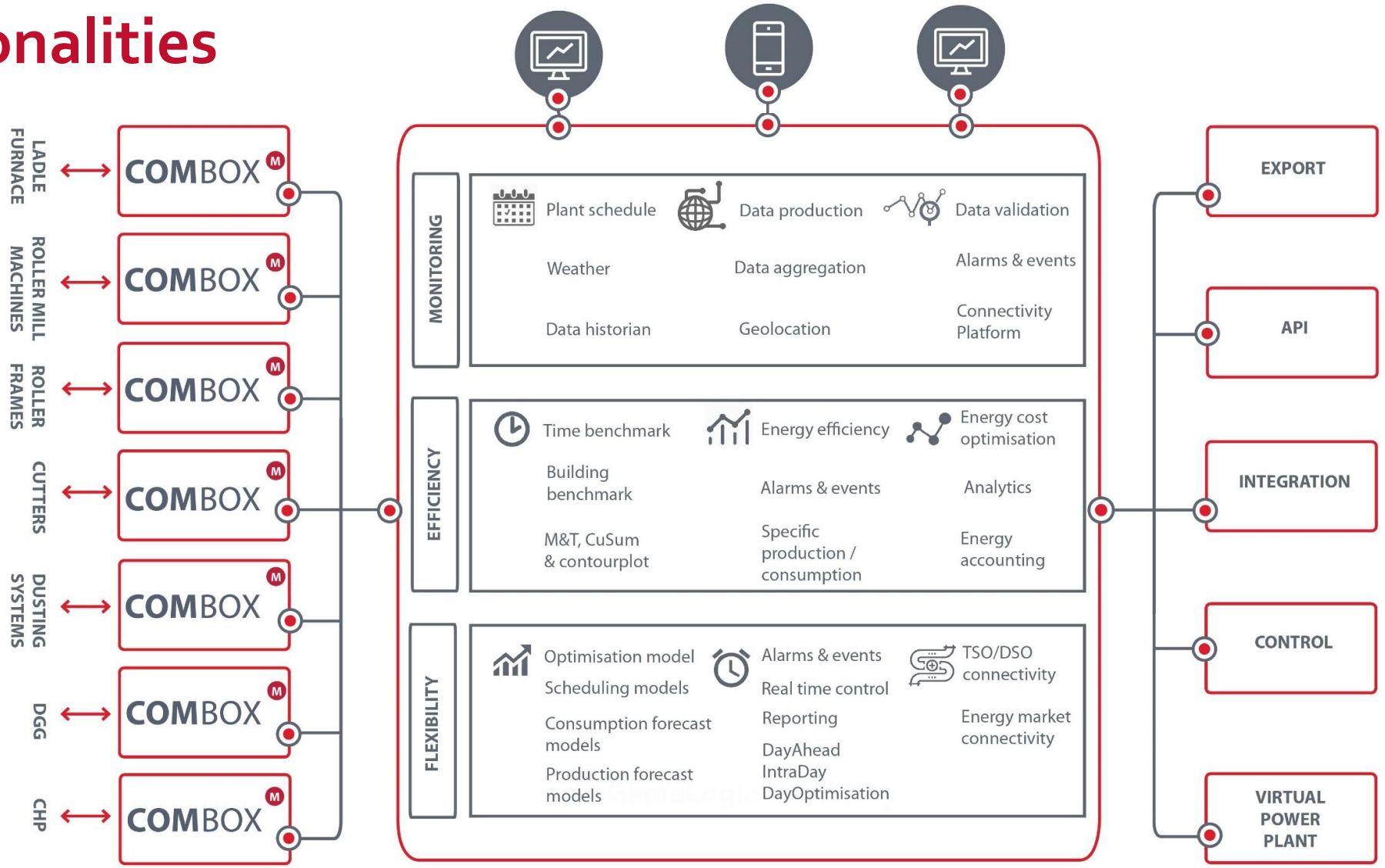
Activations

- Activation overview (history)
- Activation triggering (sent request,
- Example for tertiary reserve
  - 100% of offered power in 15 minutes from the request
  - Maximum duration of activation is 4 hours
  - Maximum unit non-availability time after finished activation is 10 hours

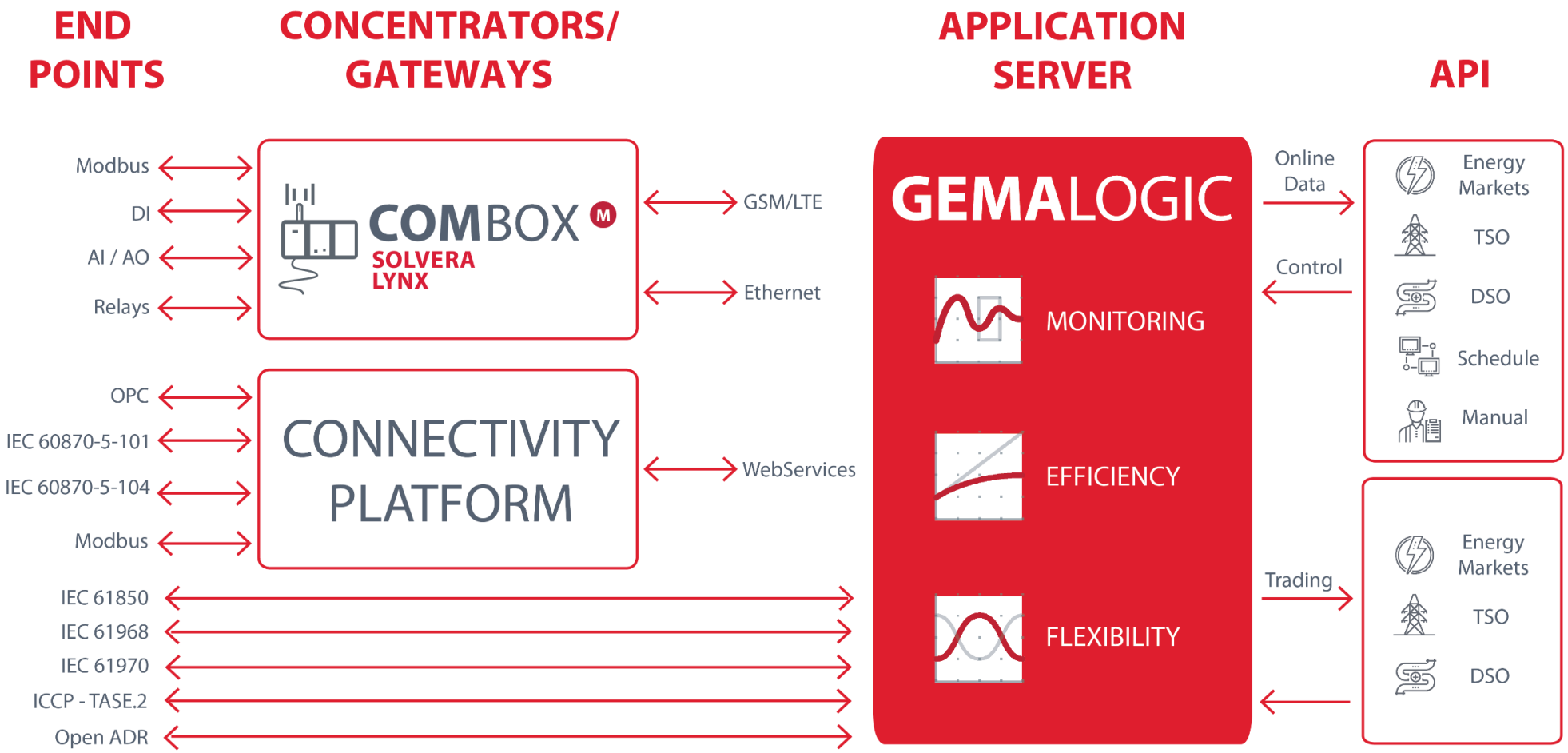
Settlement reports

- How many kW/time was successfully activated
- Availability time
- Comparison of data from system operator and measured data

Functionalities



Connectivity



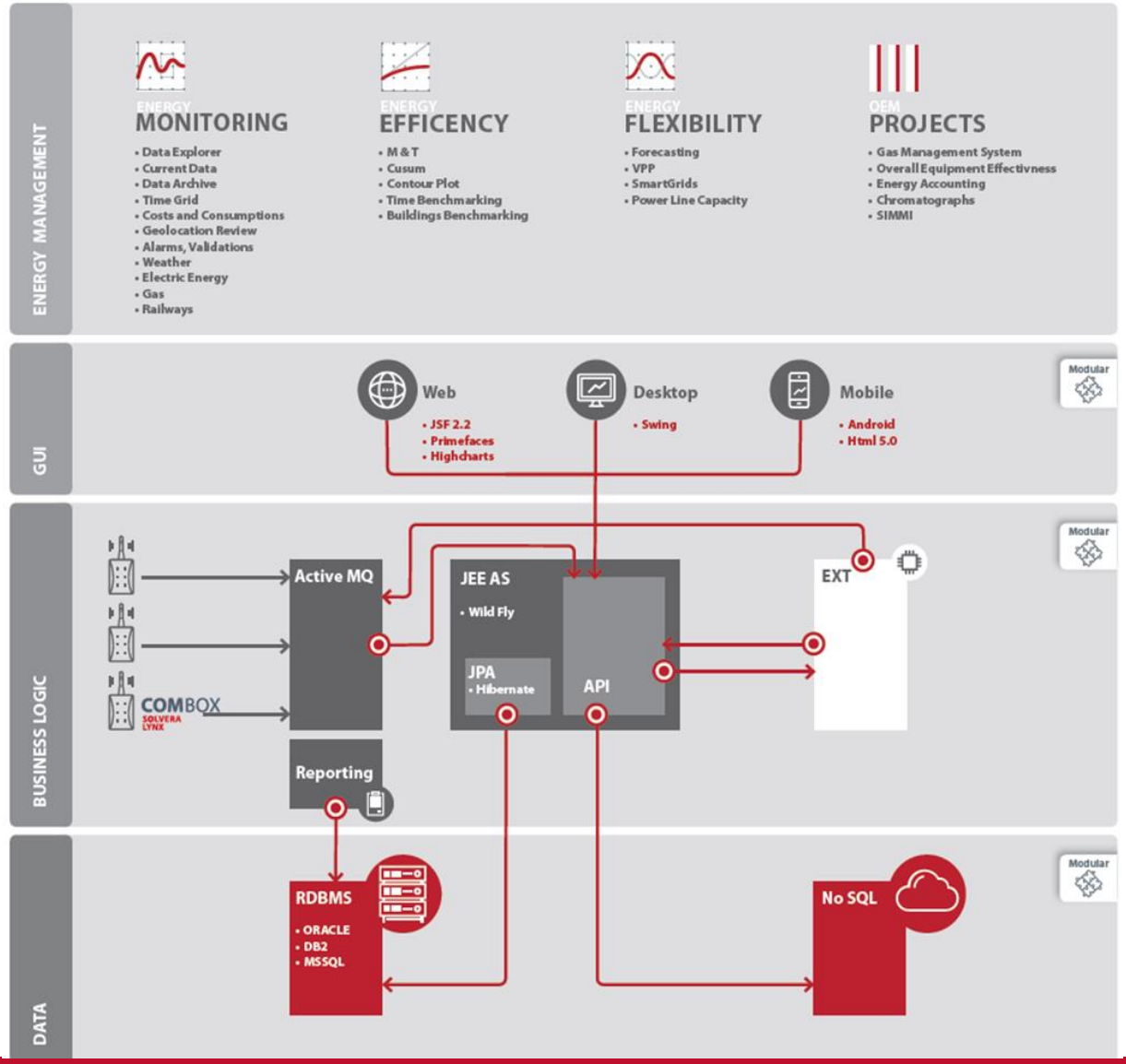
ARHITECTURE

MODULAR

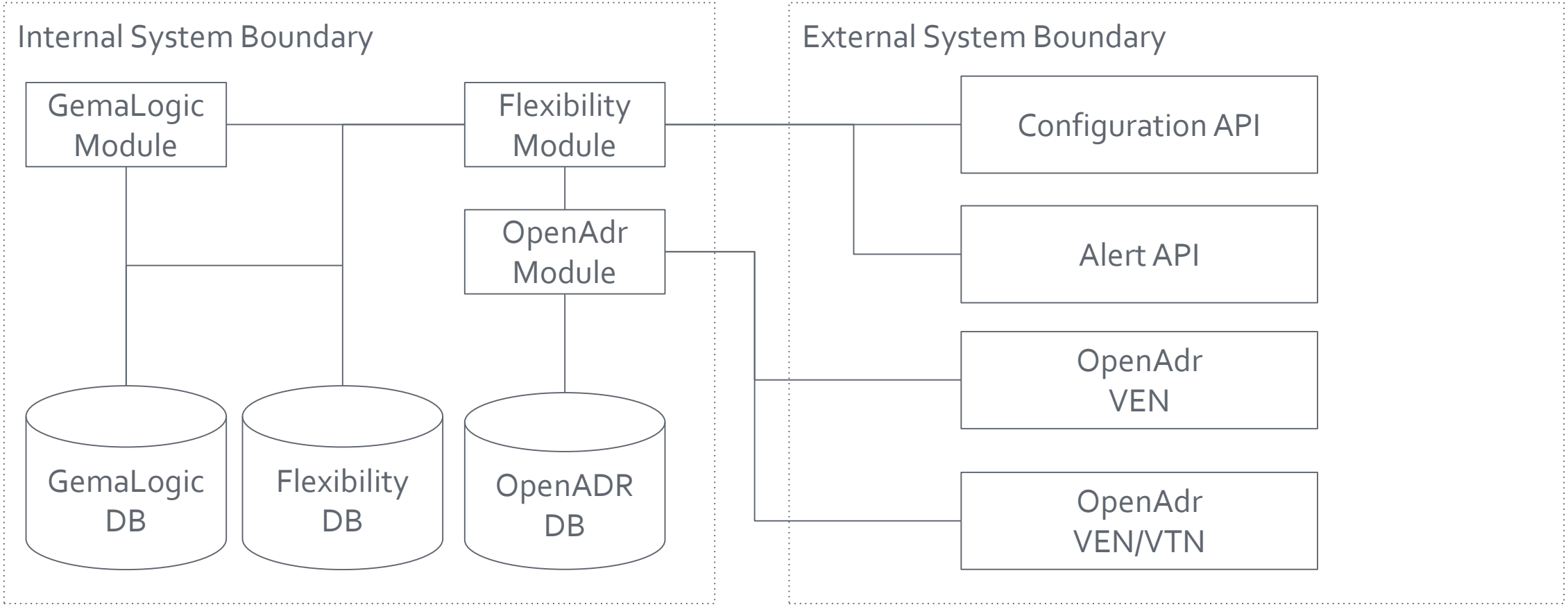
- User interface
- Business logic
- Data acquisition and aggregation
- Energy Monitoring, Efficiency, Flexibility

TECHNOLOGY

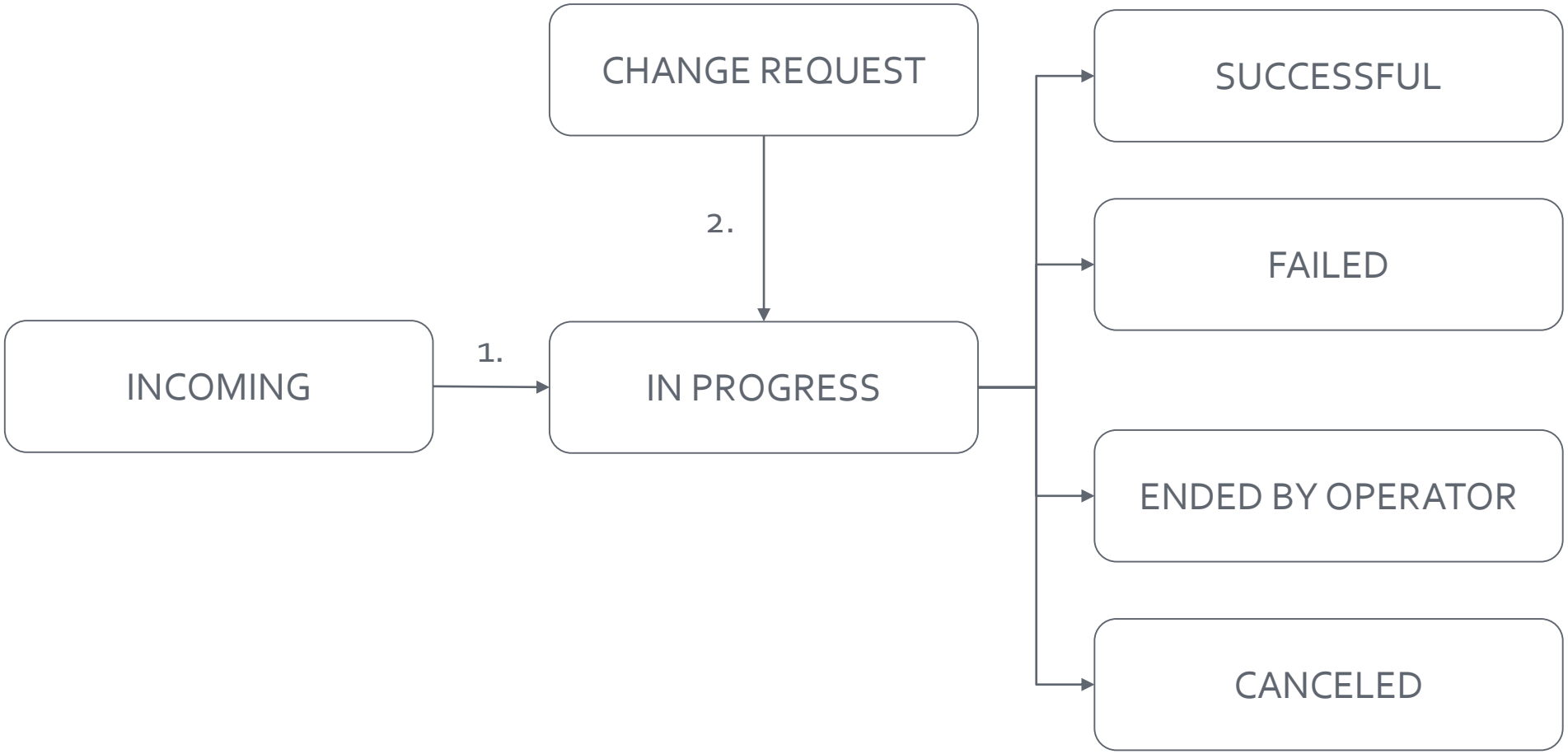
- MS SQL
- Java EE
- WildFly Application Server
- WebServices (REST, SOAP)
- Apache Service Mix
- Active MQ (RabbitMQ, Kafka, Artemis, JMS)
- TypeScript
- PrimeFaces
- OmniFaces



Overview

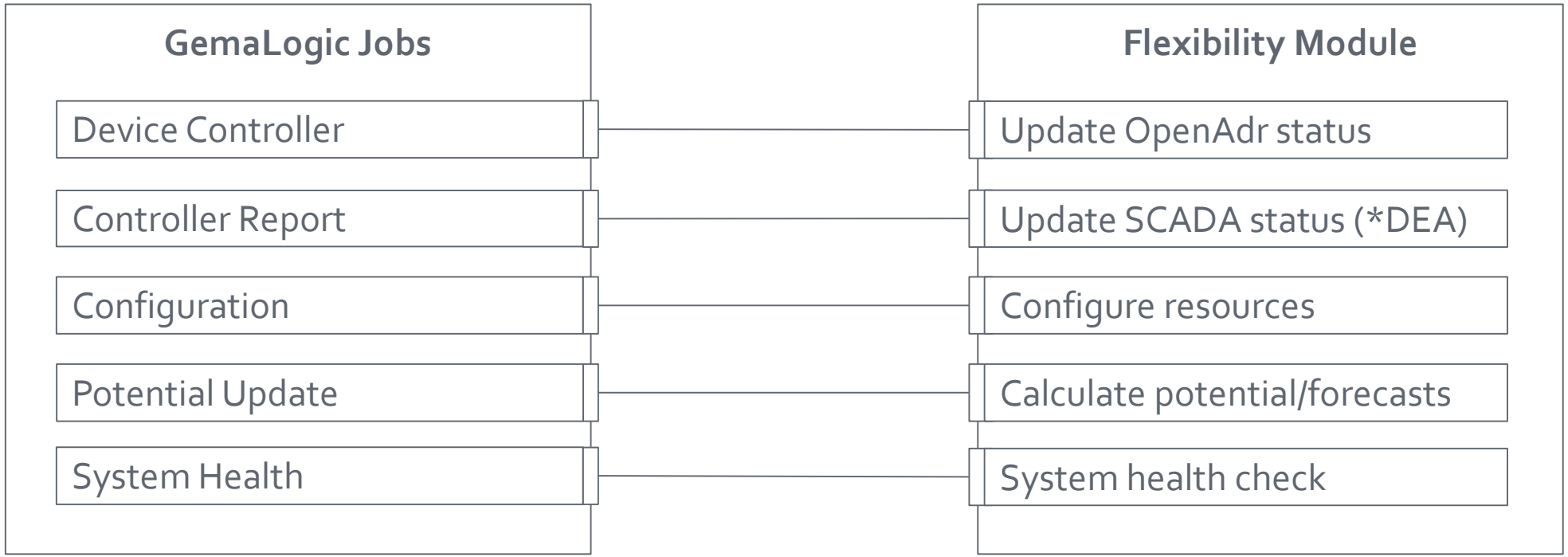

Internal System Boundary
GemaLogic Module
Flexibility Module
OpenAdr Module
GemaLogic DB
Flexibility DB
OpenADR DB
External System Boundary
Configuration API
Alert API
OpenAdr VEN
OpenAdr VEN/VTN

Activation State

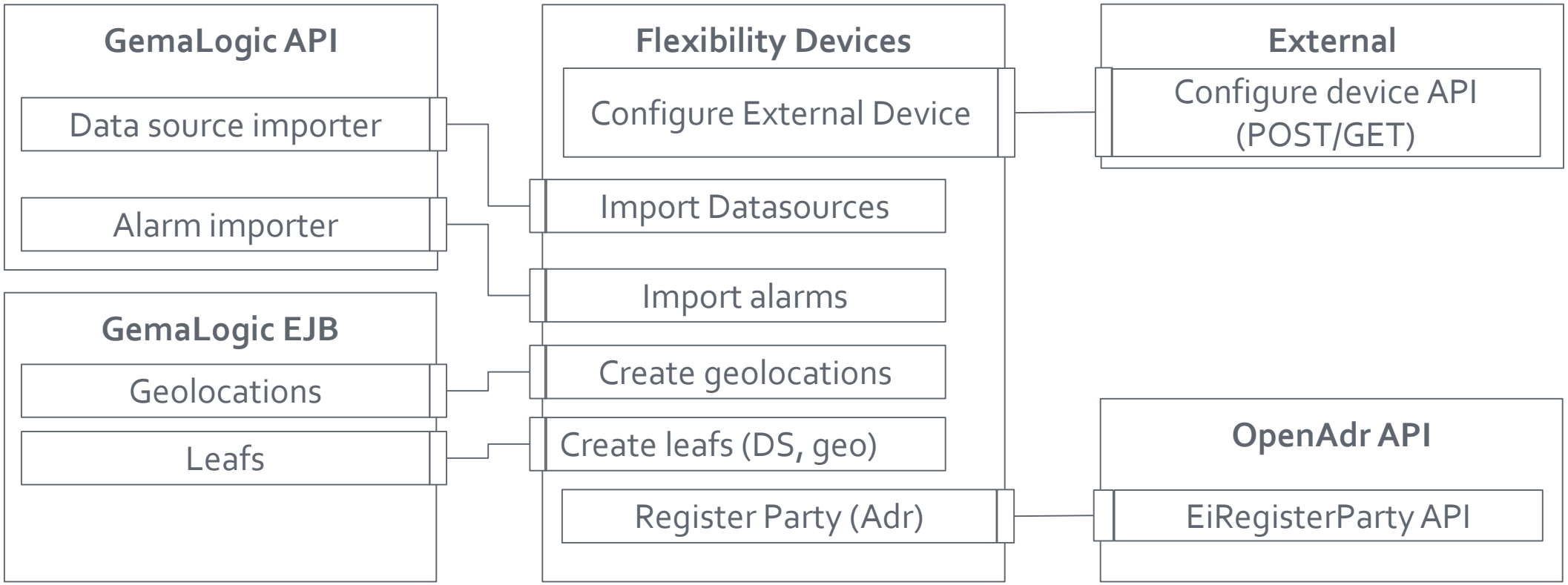


Activation Timeline

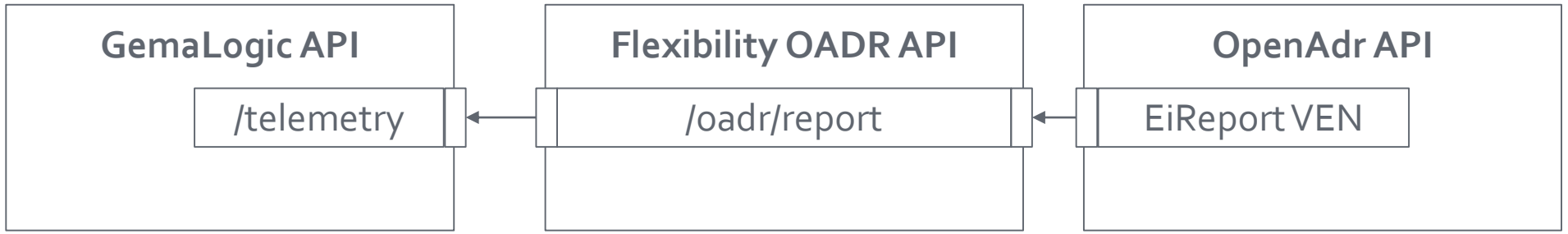
Flexibility Jobs



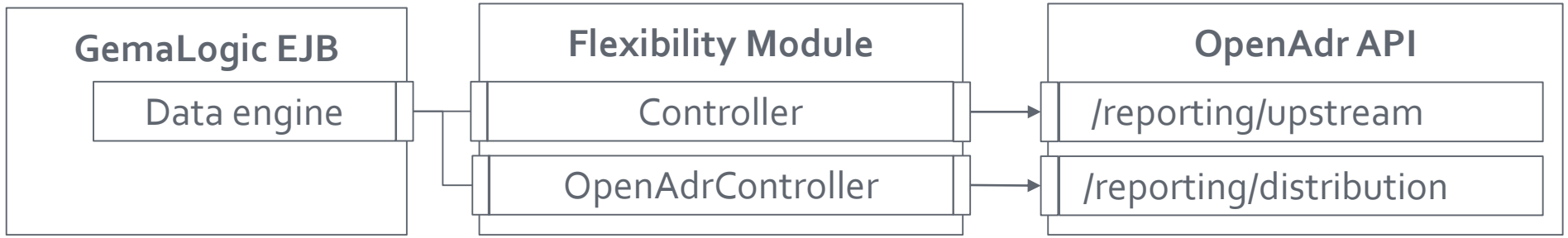
Flexibility Configurator



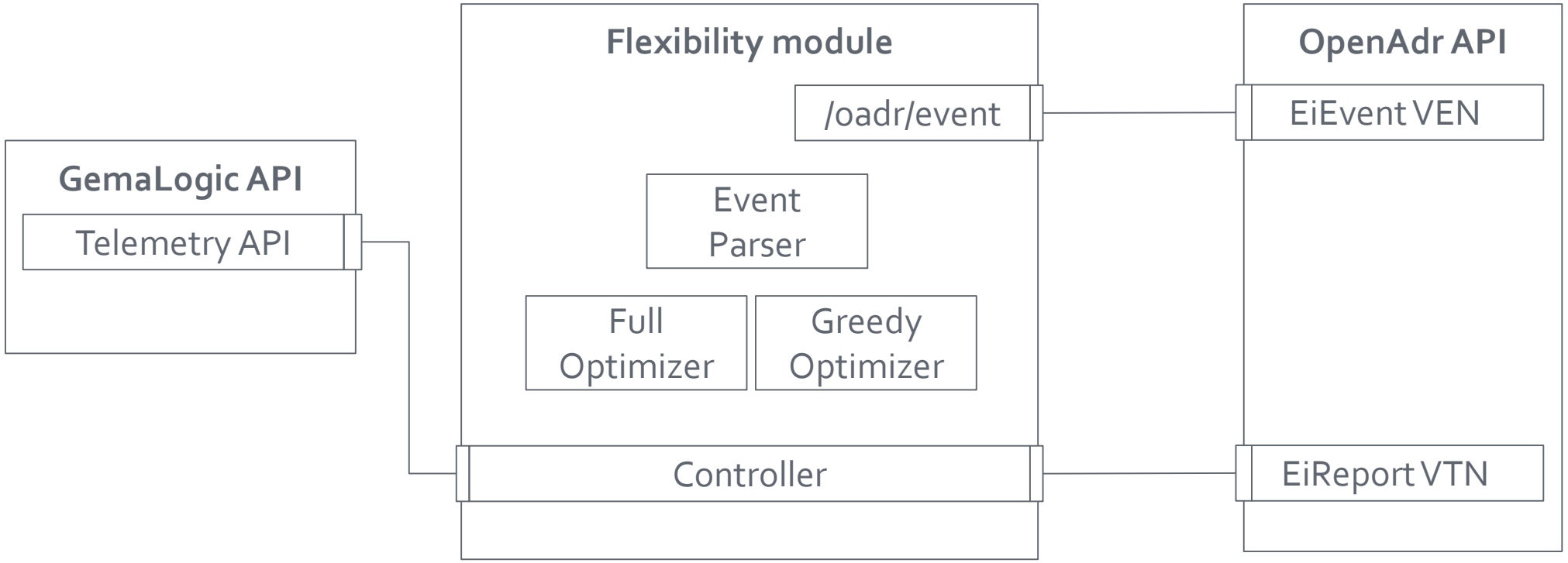
Flexibility Data Flow (IN)



Flexibility Data Flow (OUT)

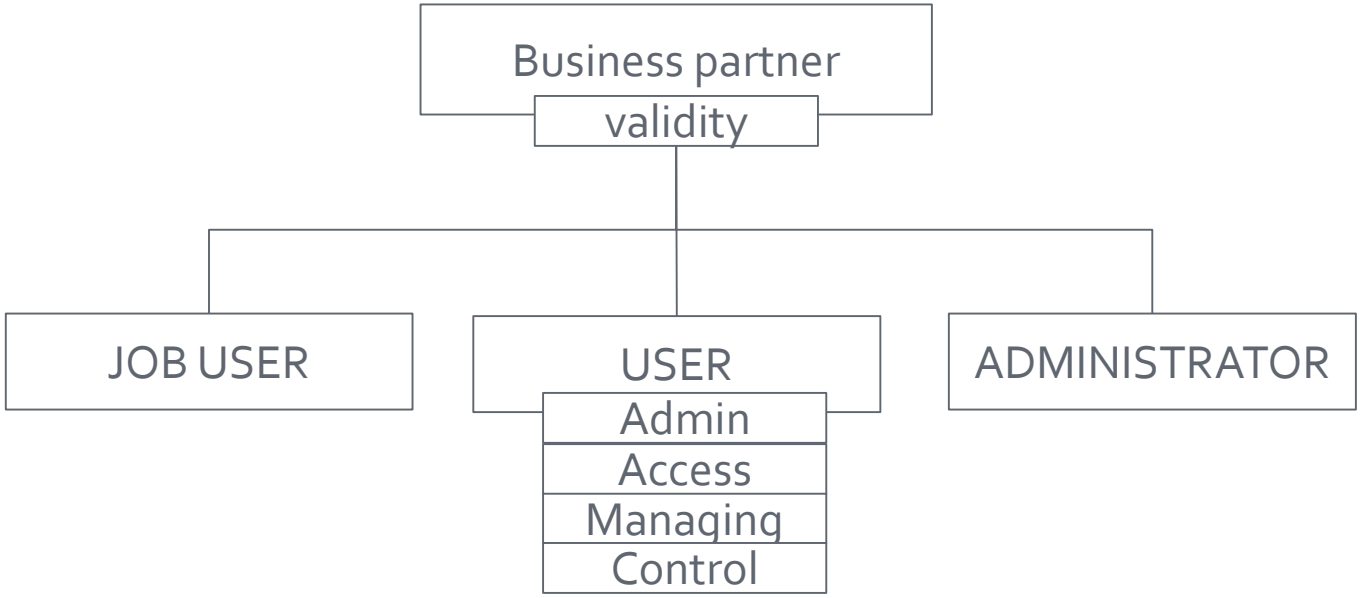


Flexibility Event Flow (IN)



Flexibility Event Flow (OUT)

User management

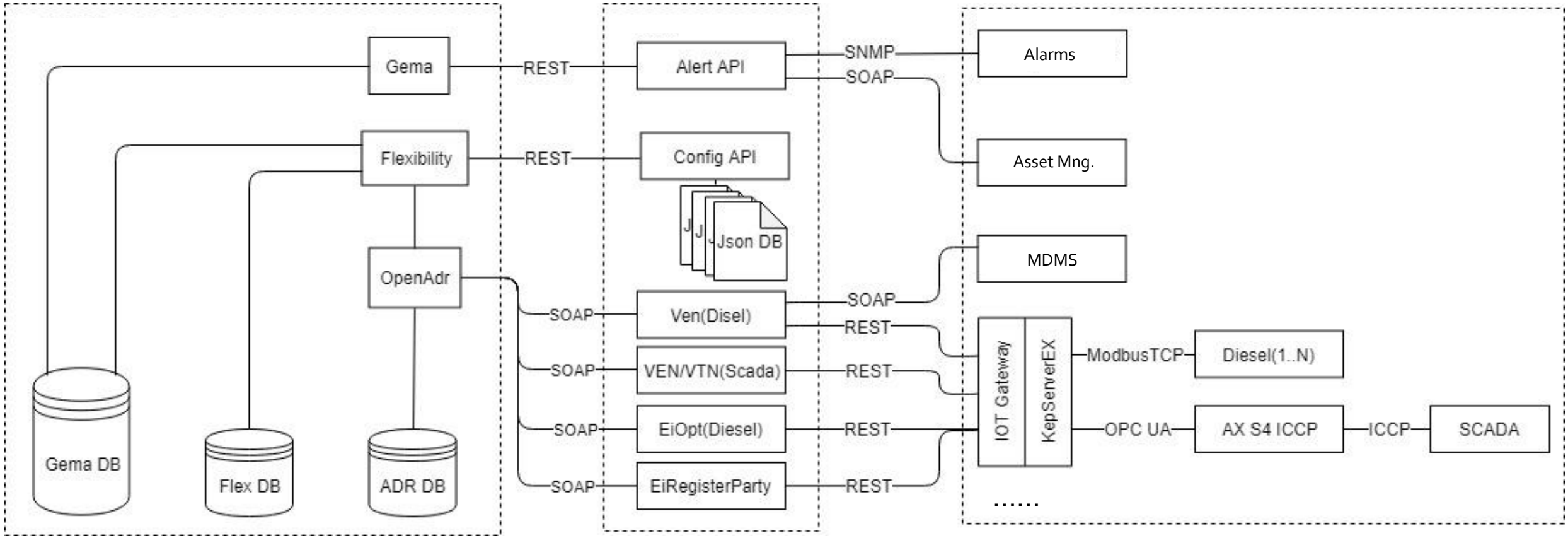


System architecture

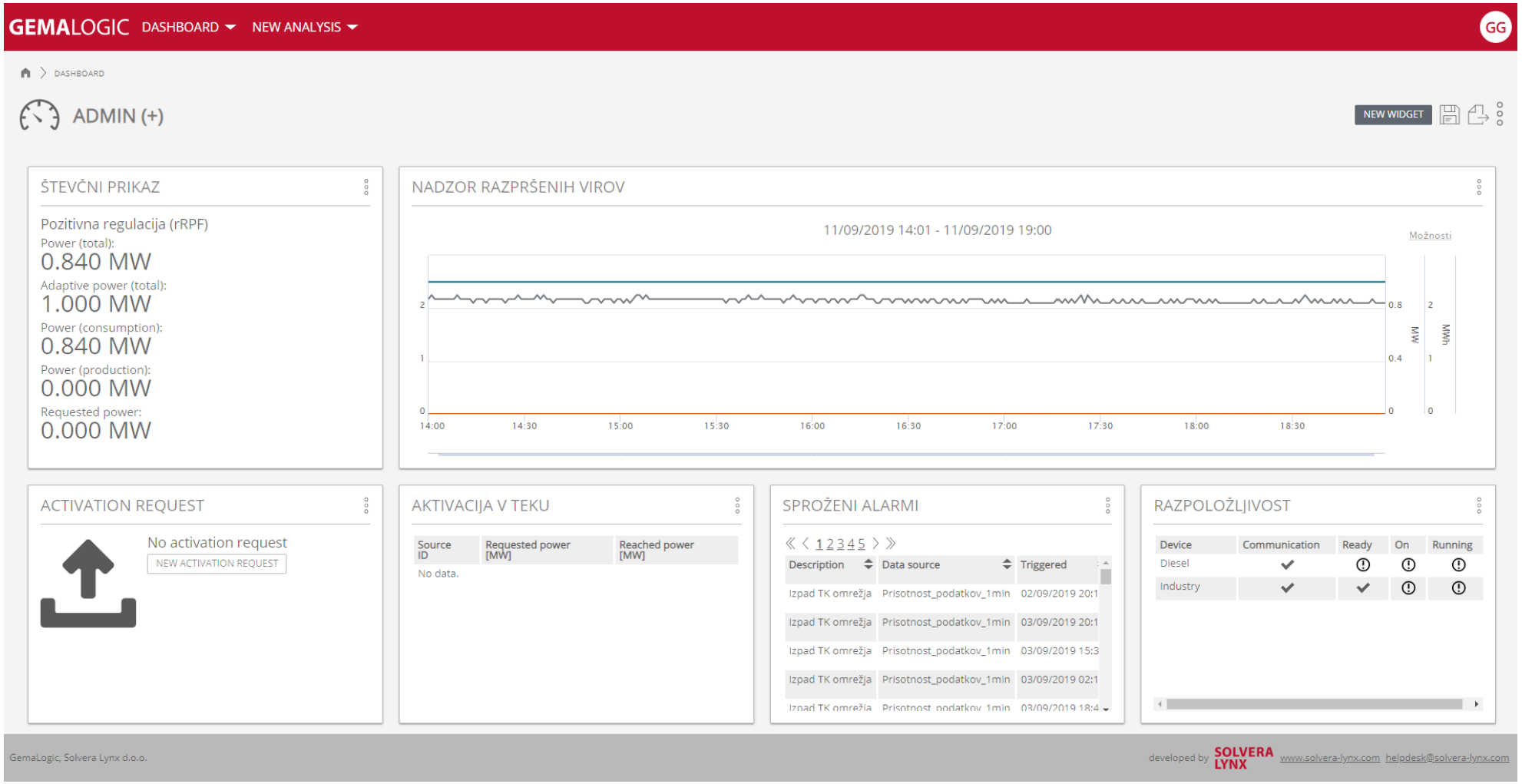
Application layer

Integration layer

External services

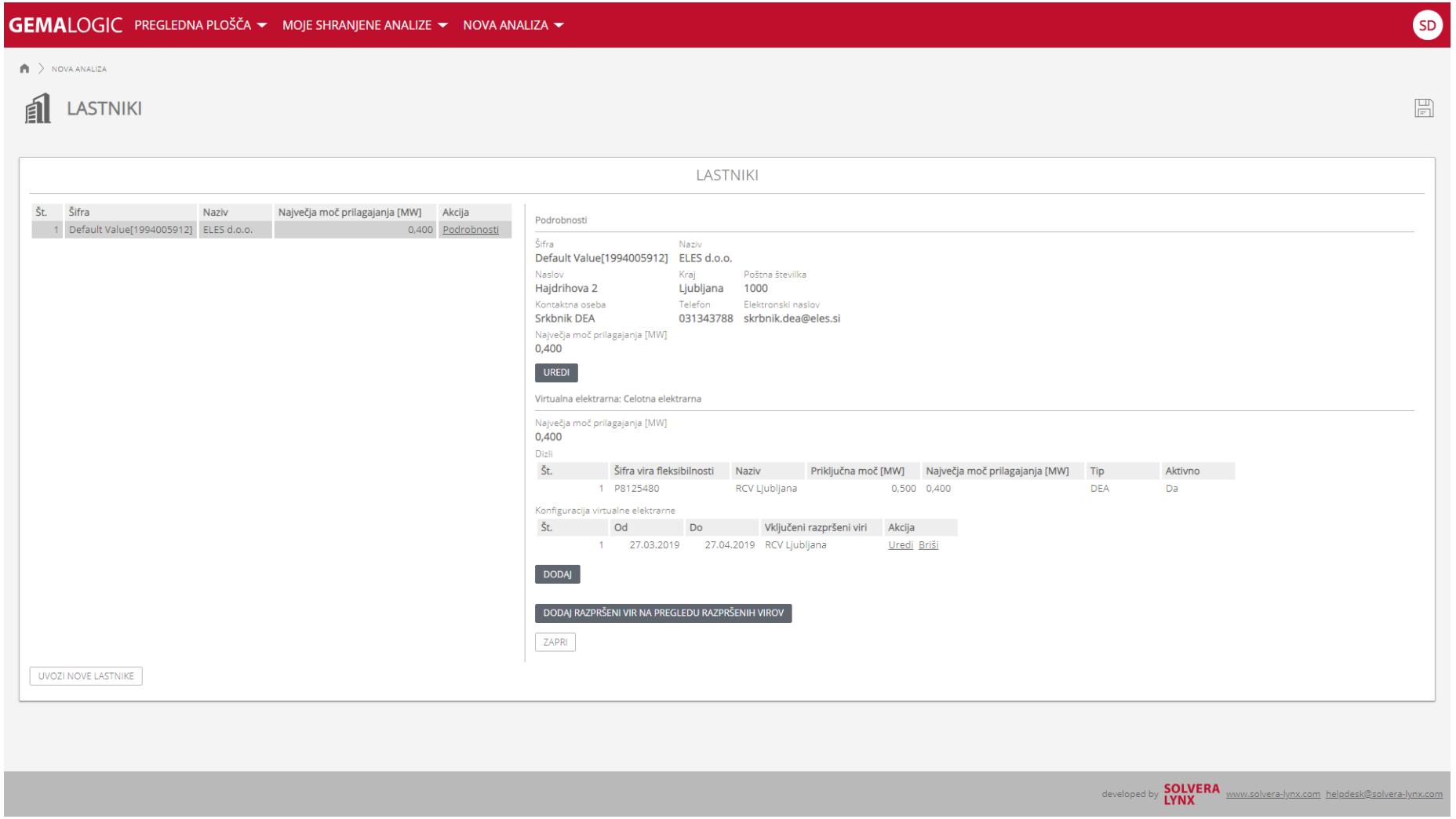


Dashboard

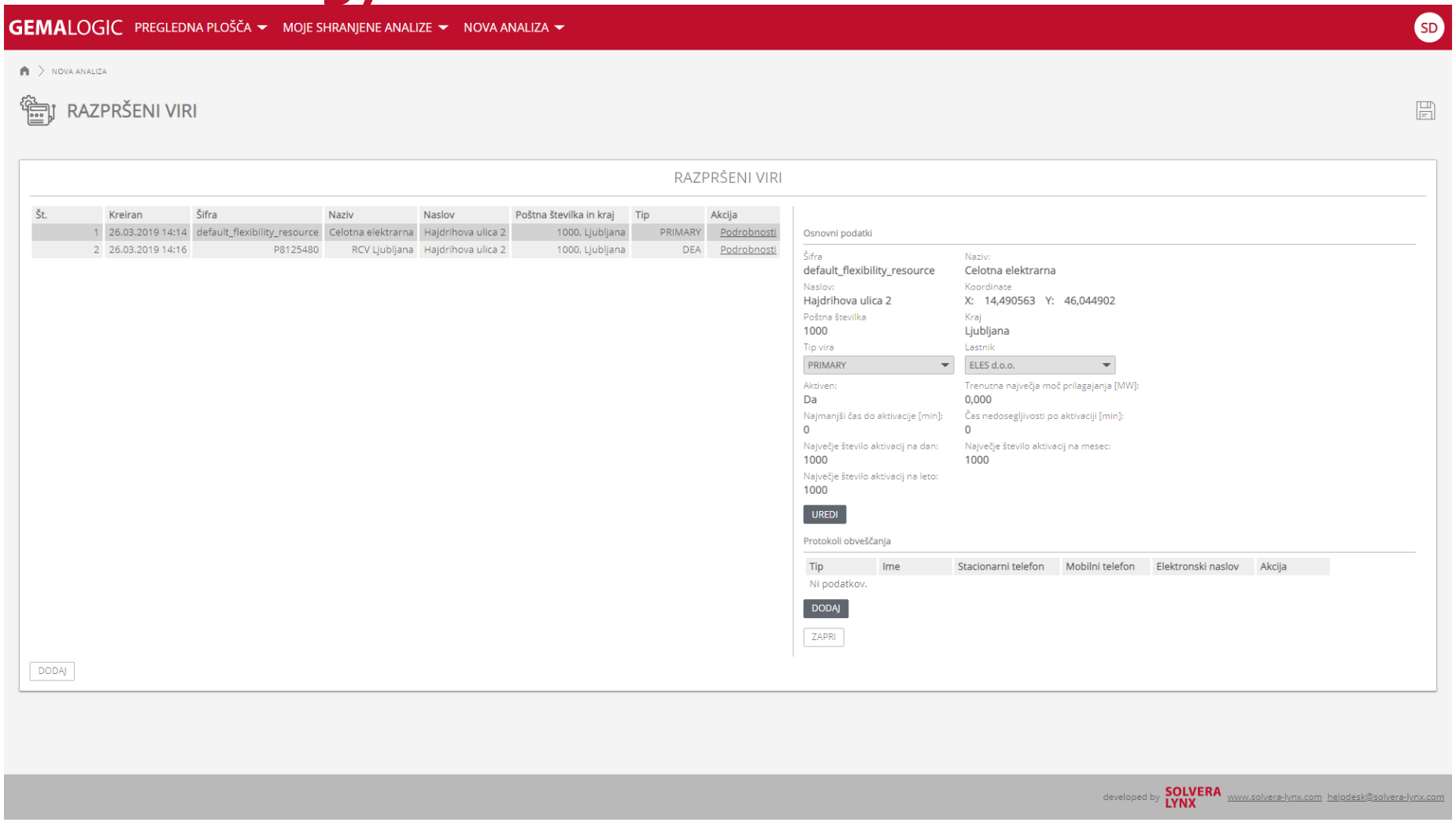


- Current available power,
- Measurements, Forecast, Corrected forecast and requested power
- Availability
- Activation request

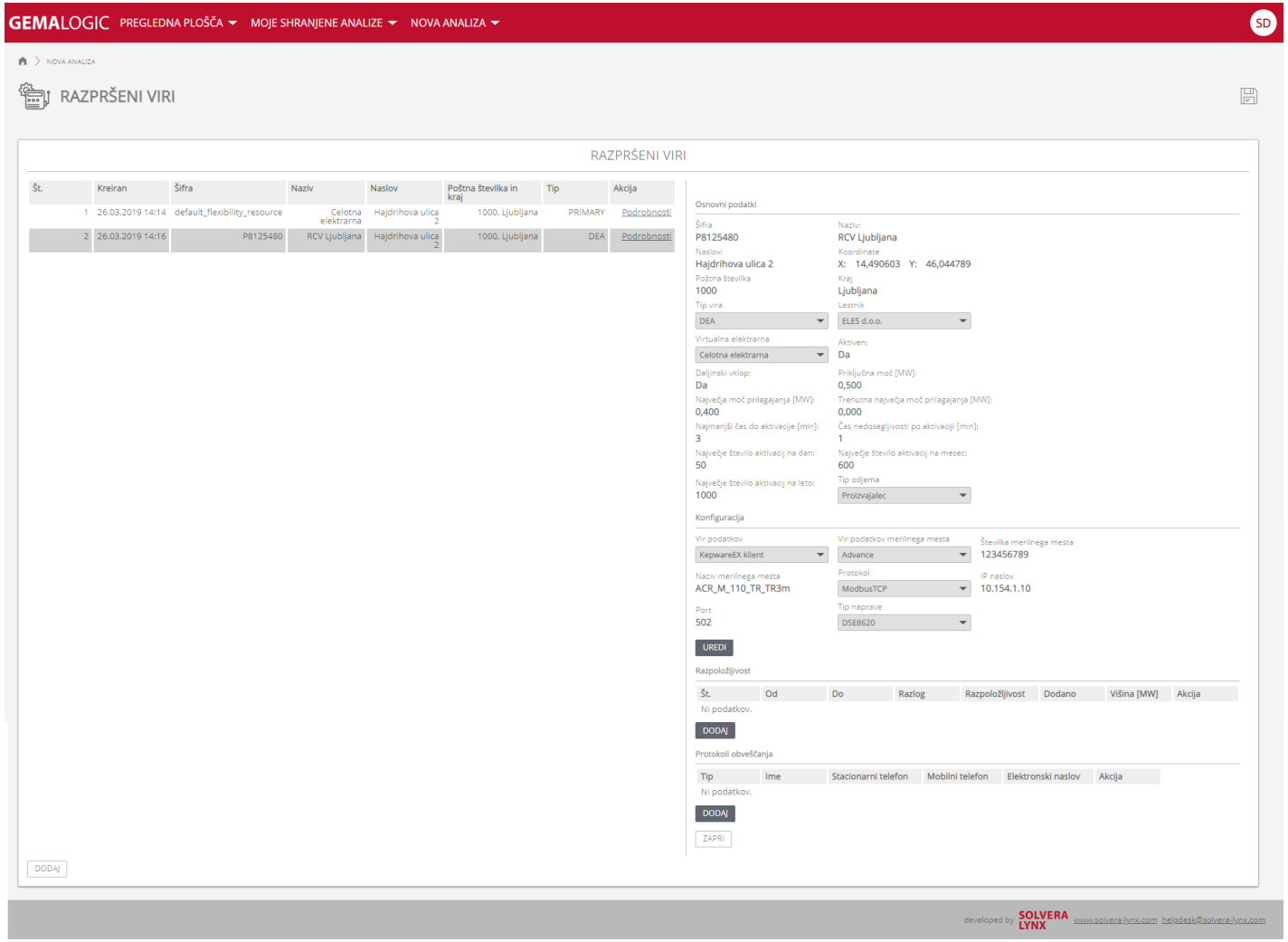
Owners


GEMALOGIC
PREGLEDNA PLOŠČA
MOJE SHRANJENE ANALIZE
NOVA ANALIZA
SD
NOVA ANALIZA
LASTNIKI
LASTNIKI
Št. Šifra Naziv Največja moč prilagajanja [MW] Akcija
1 Default Value[1994005912] ELES d.o.o. 0,400 Podrobnosti
UVOZI NOVE LASTNIKE
Podrobnosti
Šifra
Default Value[1994005912]
Naziv
ELES d.o.o.
Naslov
Hajdrihova 2
Kraj
Ljubljana
Poštna številka
1000
Kontaktna oseba
Srkbnik DEA
Telefon
031343788
Elektronski naslov
skrbnik.dea@eles.si
Največja moč prilagajanja [MW]
0,400
UREDI
Virtualna elektrarna: Celotna elektrarna
Največja moč prilagajanja [MW]
0,400
Dizli
Št. Šifra vira fleksibilnosti Naziv Priključna moč [MW] Največja moč prilagajanja [MW] Tip Aktivno
1 P8125480 RCV Ljubljana 0,500 0,400 DEA Da
Konfiguracija virtualne elektrarne
Št. Od Do Vključeni razpršeni viri Akcija
1 27.03.2019 27.04.2019 RCV Ljubljana Uredi Briši
DODAJ
DODAJ RAZPRŠENI VIR NA PREGLEDU RAZPRŠENIH VIROV
ZAPRI
developed by SOLVERA LYNX www.solvera-lynx.com helpdesk@solvera-lynx.com

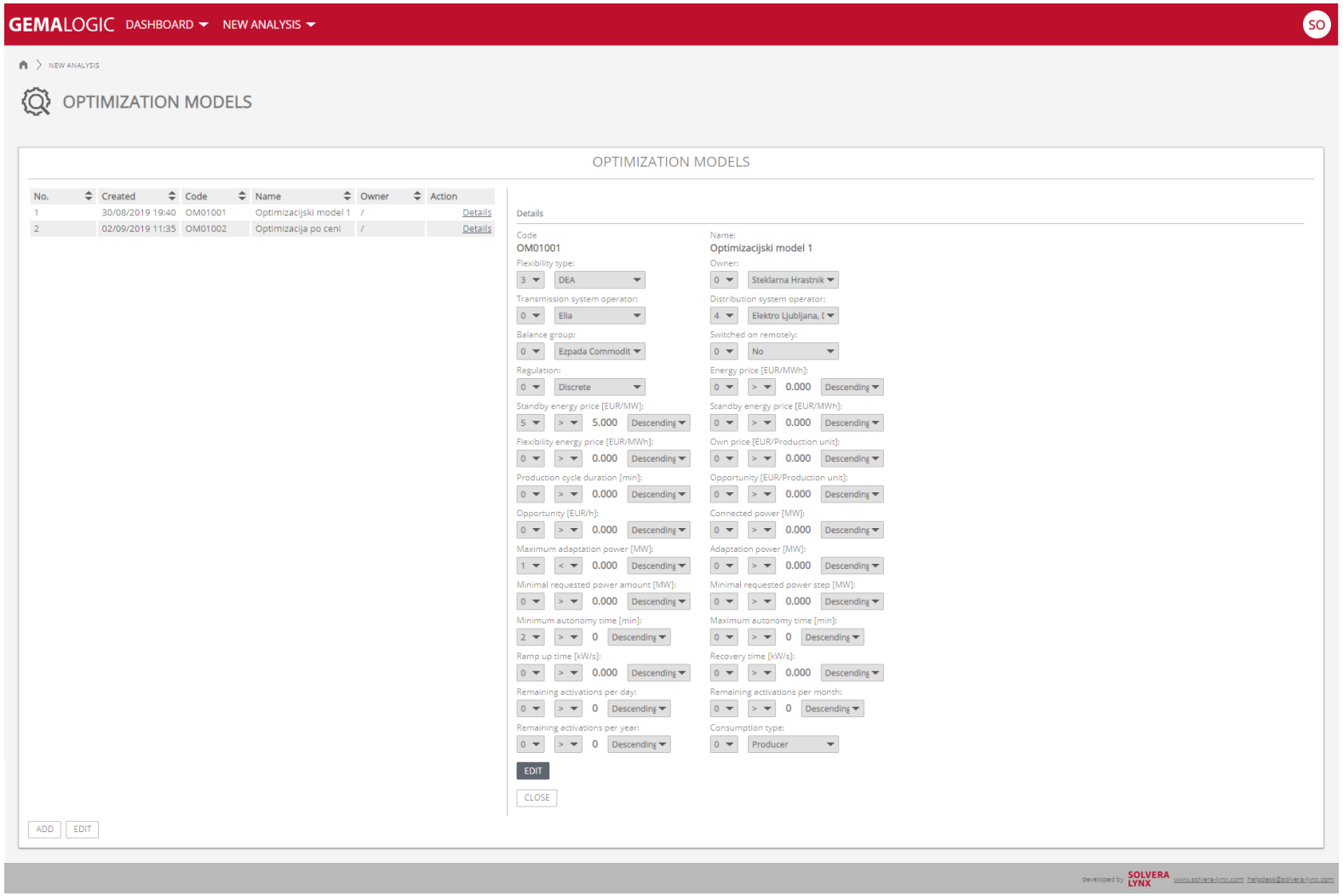
Distributed Energy Resources



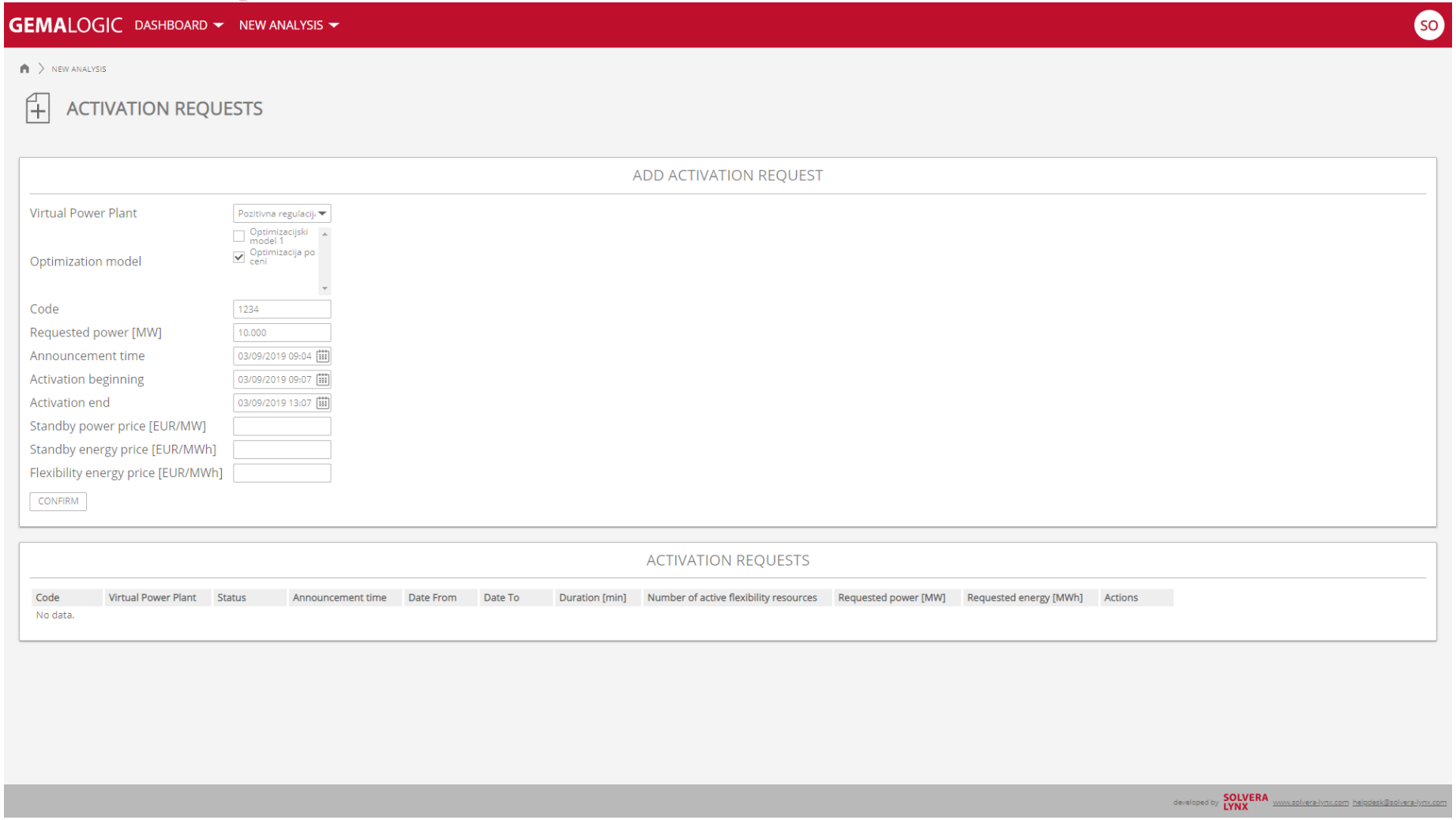
Configuration wizard



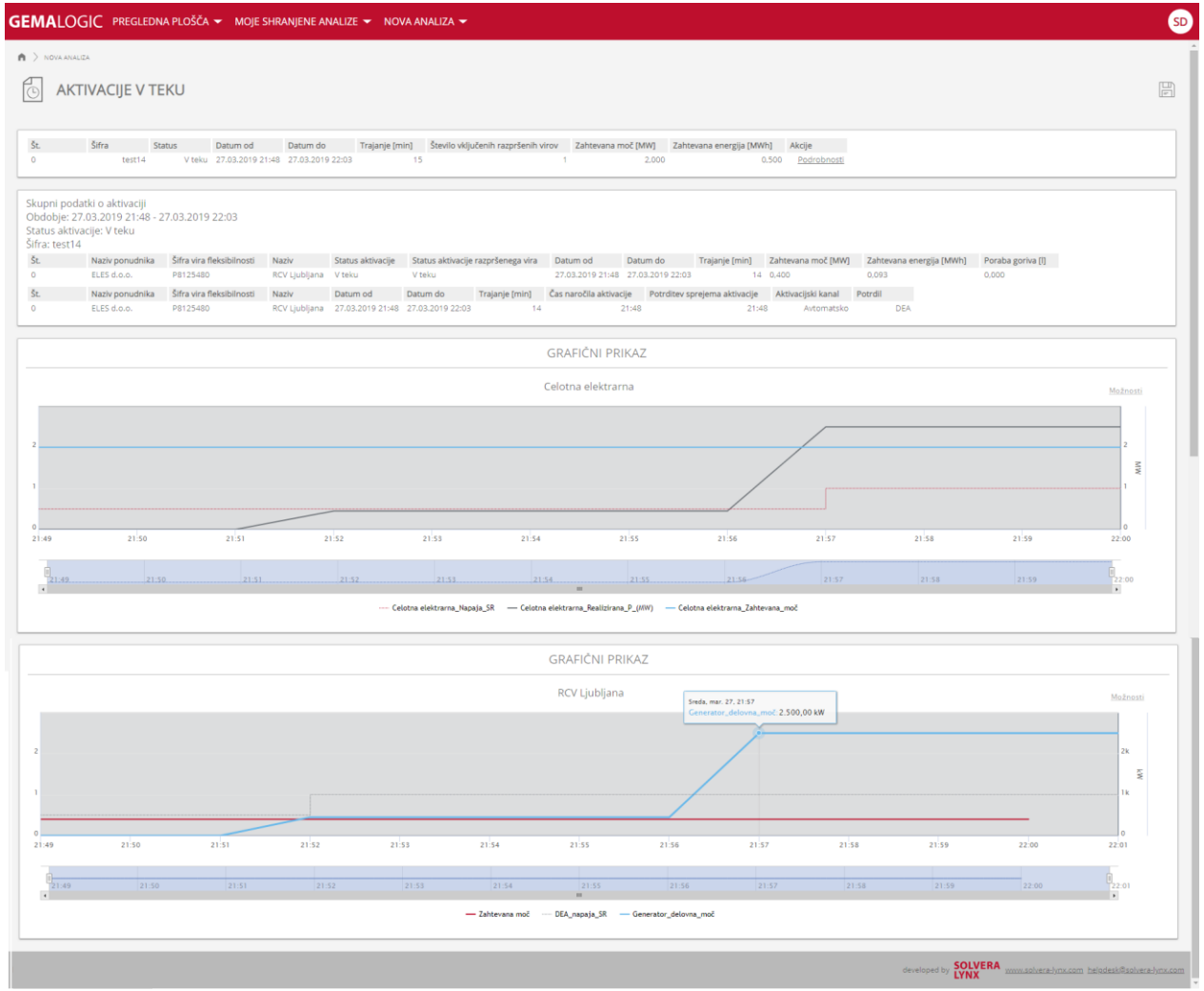
Optimization models wizard



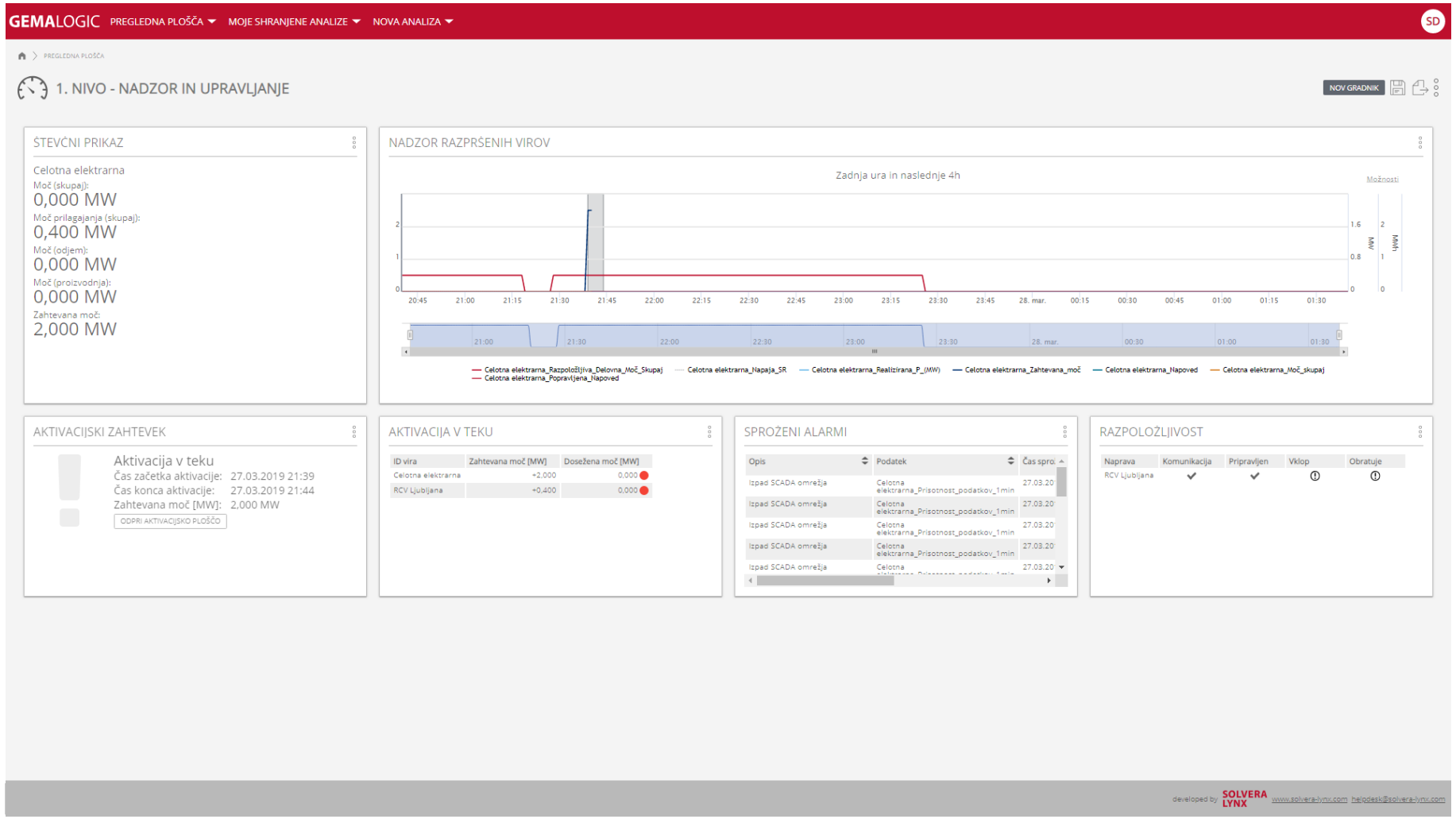
Activation requests



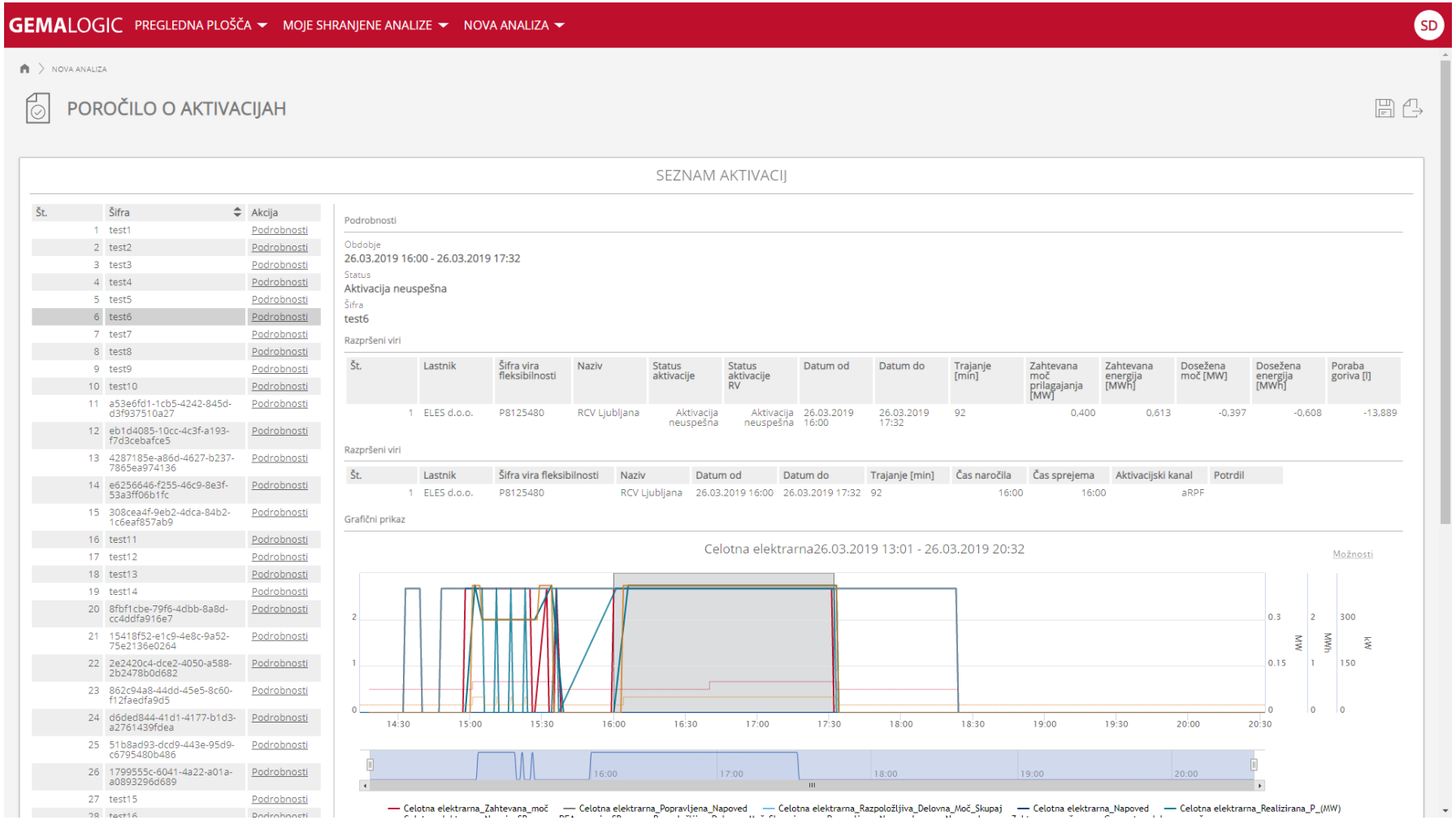
Running activation



Dashboard


GEMALOGIC
PREGLEDNA PLOŠČA
MOJE SHRANJENE ANALIZE
NOVA ANALIZA
SD
PREGLEDNA PLOŠČA
1. NIVO - NADZOR IN UPRAVLJANJE
NOV GRADNIK
ŠTEVČNI PRIKAZ
Celotna elektrarna
Moč (skupaj):
0,000 MW
Moč prilagajanja (skupaj):
0,400 MW
Moč (odjem):
0,000 MW
Moč (proizvodnja):
0,000 MW
Zahtevana moč:
2,000 MW
NADZOR RAZPRŠENIH VIROV
Zadnja ura in naslednje 4h
Možnosti
MW
MWh
Celotna elektrarna_Razpoložljiva_Delovna_Moč_Skupaj
Celotna elektrarna_Napaja_SR
Celotna elektrarna_Realizirana_P_(MW)
Celotna elektrarna_Zahtevana_moč
Celotna elektrarna_Napoved
Celotna elektrarna_Moč_skupaj
Celotna elektrarna_Popravljena_Napoved
AKTIVACIJSKI ZAHTEVEK
Aktivacija v teku
Čas začetka aktivacije: 27.03.2019 21:39
Čas konca aktivacije: 27.03.2019 21:44
Zahtevana moč [MW]: 2,000 MW
ODPRI AKTIVACIJSKO PLOŠČO
AKTIVACIJA V TEKU
ID vira
Zahtevana moč [MW]
Dosežena moč [MW]
Celotna elektrarna
+2,000
0,000
RCV Ljubljana
+0,400
0,000
SPROŽENI ALARMI
Opis
Podatek
Izpad SCADA omrežja
Celotna elektrarna_Prisotnost_podatkov_1min
RAZPOLOŽLJIVOST
Naprava
Komunikacija
Pripravljen
Vklop
Obratuje
RCV Ljubljana
developed by SOLVERA LYNX
www.solvera-lynx.com
helpdesk@solvera-lynx.com

Report on Activation



Communication device

WHY SOLVERA LYNX?

Custom-made solutions

Complete Energy Management package based on SW and HW solutions.

Potential for full customization according to customer's request

Expertise

The biggest interdisciplinary Energy Management team of experts (IT, ICT, energy management) with 17 year+ experience

Partnership

Long-term cooperation with customers after the implementation of the EMS (upgrade, maintenance)

Quality

Certification: TÜV SÜD, ISO, LoRaWAN

LoRaWAN member since 2015 to warranty data collection

THANK YOU!

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