

Project Green Agenda: Tailored support

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Tailored support by the GFA Technical expert pool



Operational Models for Battery Energy Storage Systems in the Balancing Market of NOS BiH



The concept of data exchange between system operators in Bosnia and Herzegovina



Technical specification and requirements for integration of RES into DSO Telecommunication network

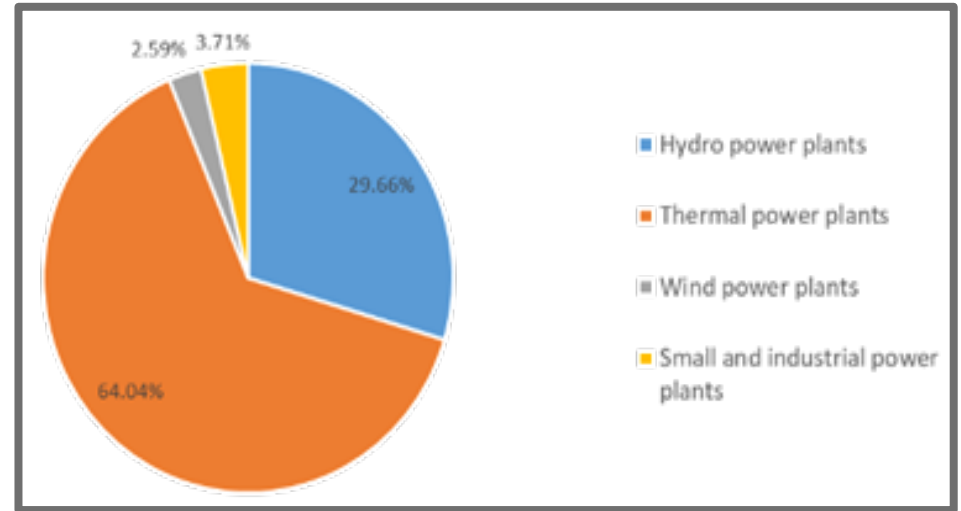


Operational Models for Battery Energy Storage Systems in the Balancing Market of NOS BiH

The goal in BiH power system:

- Increase the share of variable RES
- Phase-out coal-based thermal power plants

BES stands as a strong candidate to enhance system flexibility.



Operational Models for Battery Energy Storage Systems in the Balancing Market of NOS BiH

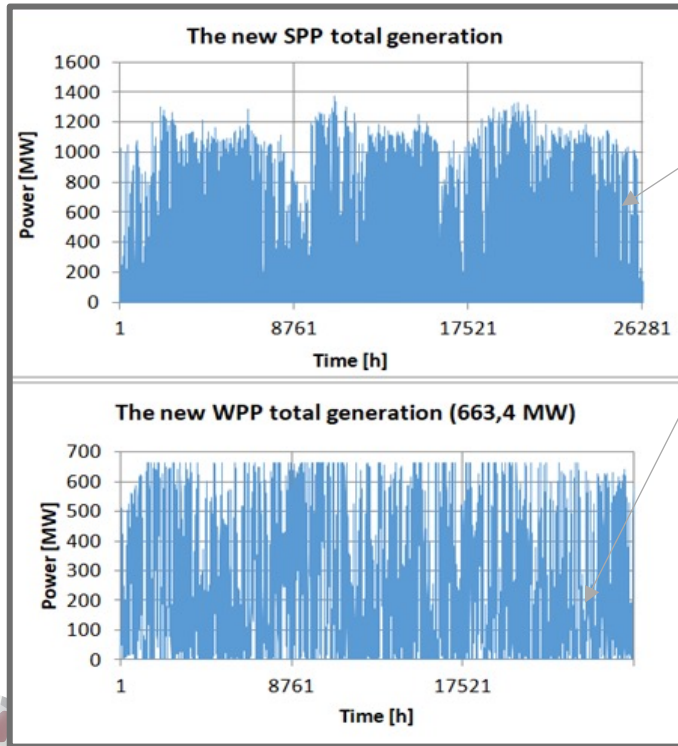
The primary objective: **assess the required potential of battery storage systems in BiH for balancing the grid with additional capacity of wind and solar and to analyze the associated revenue streams:**

- 1500 MW of solar – hourly production profiles
- 1000 MW of wind – hourly production profiles

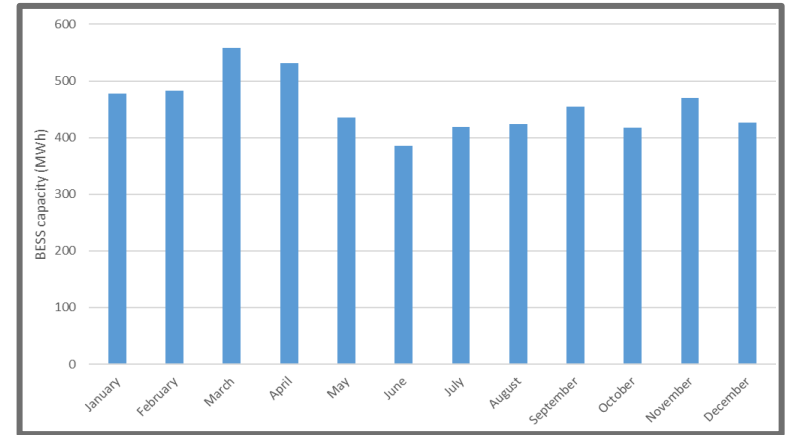
The study seeks to explore the revenue-generating opportunities for battery storage systems, particularly through participation in ancillary service markets.



Operational Models for Battery Energy Storage Systems in the Balancing Market of NOS BiH



Forecast errors 2-6%



BES capacity for balancing 1500 MW of solar and 1000 MW of wind production in the scenario with higher forecast errors

Operational Models for Battery Energy Storage Systems in the Balancing Market of NOS BiH: Key findings

Secondary Regulation (significant revenue):

Total annual costs of delivered services in 2023 were almost 4 million EUR, with additional 3.2 million EUR required, but not delivered

Additional requirements due to increased variable renewable sources are estimated to 23.6 million EUR

The estimated annual revenue from BESS operations stands at approximately 4.5 million EUR

Seasonal Production Patterns: Solar production peaks in summer, while wind production is highest from January to April and in November and December. These complementarities offer opportunities for optimization.

System Size Considerations: Peak power demand in BiH is approximately 1.9 GW, making significant challenges for high shares of RES.

Wind-to-Solar Ratio: BiH's expected wind-to-solar production ratio of 40:60 suggests a moderate need for storage compared to regions with higher wind dominance. Simulation results indicate a requirement of 450-560 MWh battery energy storage capacity for balancing purposes, depending on forecast errors.



Operational Models for Battery Energy Storage Systems in the Balancing Market of NOS BiH: Key findings

Comprehensive Study: Conduct a top-down analysis considering system size, wind-to-solar ratio, current balancing sources, and future scenarios to refine storage requirements.

Location Optimization: Explore optimal locations for battery storage systems to enhance grid flexibility, improve voltage conditions, and reduce transmission losses.

Strategic Deployment: Consider phased deployment of multiple battery storage systems with capacities of 150 MWh and power of 75 MW each to maximize system benefits.



The concept of data exchange between system operators in Bosnia and Herzegovina

Motivation



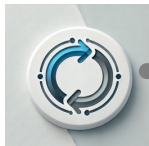
Enhance data accessibility and streamline information exchange among system operators in Bosnia and Herzegovina for more efficient collaboration.

Objective



Standardize data models and communication interfaces to facilitate information exchange between system operators and develop a unified data exchange platform.

The concept of data exchange between system operators in Bosnia and Herzegovina



General principles of data exchange

Data exchange between system operators in EU

Data exchange between system operators in B&H

Preparation of Use Cases

Identification of exchanged data

Propose standard data models

Technical requirements for data exchange

Propose data exchange architecture

- DSO requirements for data exchange
- Data classification
- Common data model

- An overview of network codes and EU regulations
- An overview of the current data exchange in B&H
eBIX

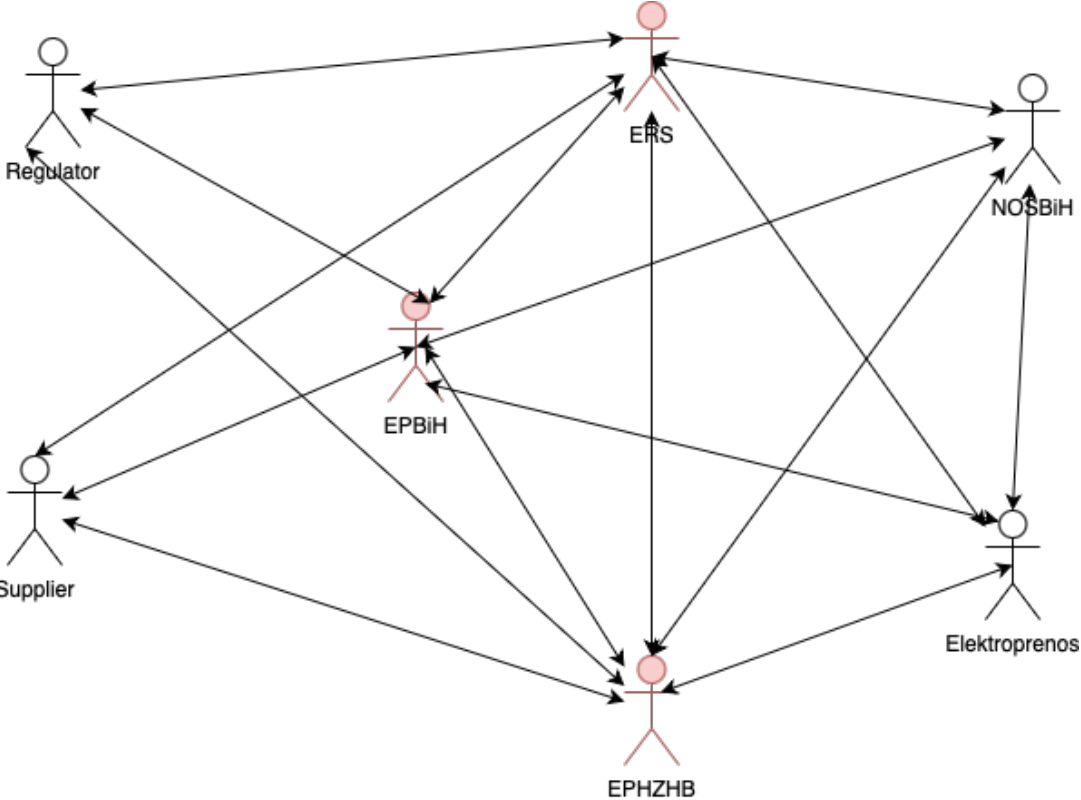
- IEC 62559-2 methodology
- Identify stakeholders on electricity market in B&H
- Use cases that include data exchange between Sops
- Use Case repository

- IEC 62559-2 methodology
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- CIM

- Data classification and data flows for use cases
- High-level architecture
- Data exchange platform functionalities
- Data governance
- Cyber security

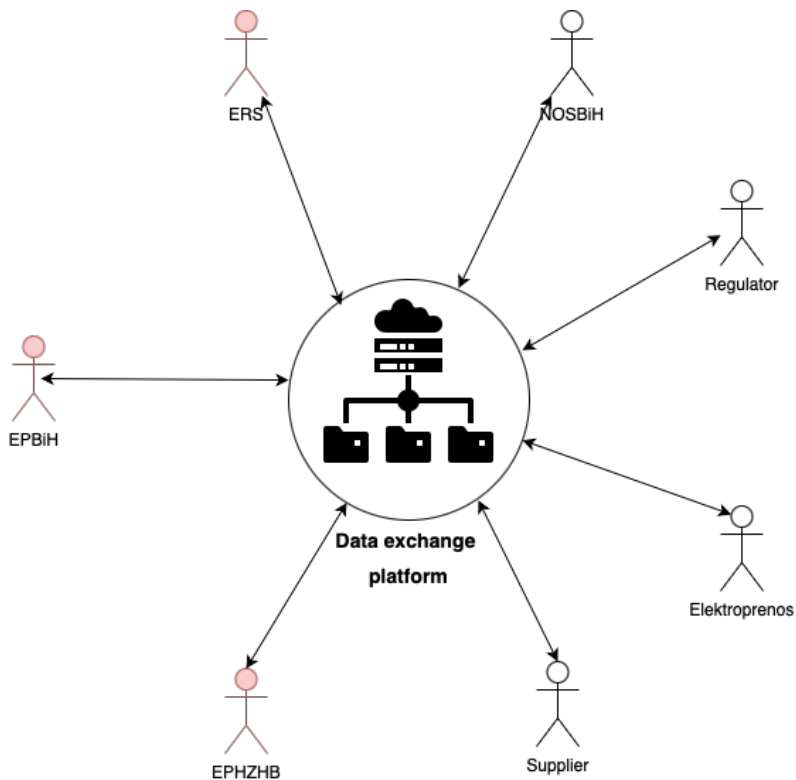
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Current state



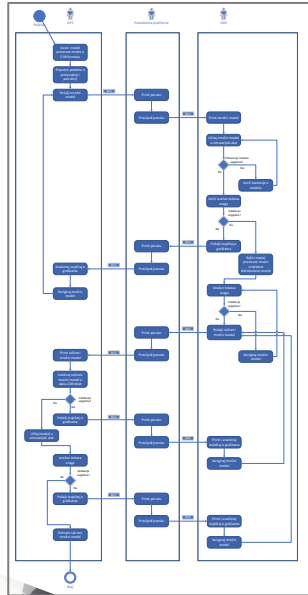
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Going toward harmonized communication interfaces and data models

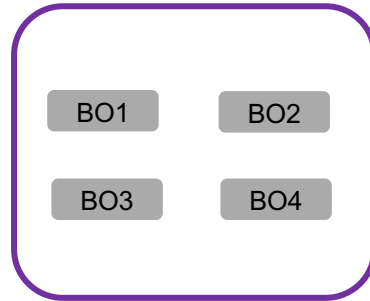


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Currently identified and described
3 Use Cases



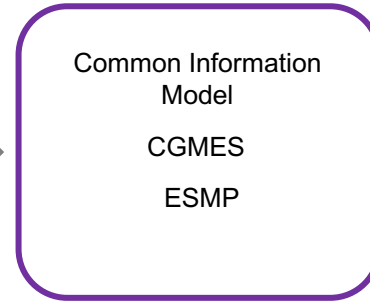
Information
exchanged



- Market and structural data
- No real-time data considered in UCs



Data models



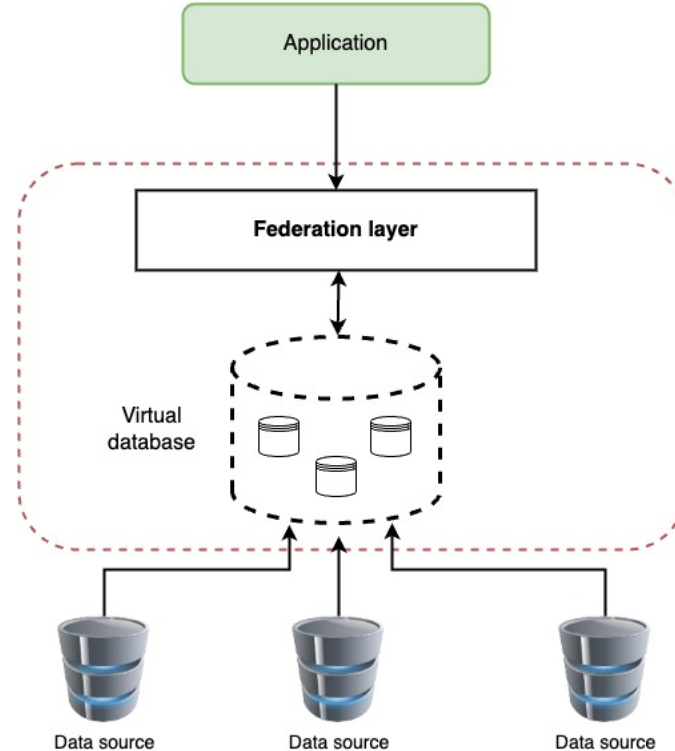
- Focus to leverage CIM
- Current data exchange in existing ESR use case utilise ebIX.



The concept of data exchange between system operators in Bosnia and Herzegovina

Data federation concept

- **Each actor keeps and maintains it's own data** – no need for large central storage.
- **Single source o truth** - most recent data is entered, the data federation database will have it.
- **Fast data access** – no complex infrastructure.
- **No historical data** - data federations only have the most recent, current data.



Each stakeholder can be a data source or data consumer!

Technical specification and requirements for integration of RES into DSO Telecommunication network



Motivation



The large-scale integration of solar power plants in the distribution grid profoundly impacts its operational state, challenging the consistency and quality of power supply.

Objective



Strengthen the observability of solar power plants connected to the distribution grid to optimize visibility and control, enabling a more efficient and reliable operation of the distribution system.

Technical specification and requirements for integration of RES into DSO Telecommunication network



Communication and control requirements for solar plants: EU landscape

- Network Code on Requirements for Grid Connection of Generators (RfG),
- System Operation Guidelines (SOGL), and
- Emergency and Restoration (E&R) Network Code.



Best practices for RES monitoring in EU DSOs

- Slovenia
- Austria
- Germany
- Spain
- Netherlands
- UK



Data exchange requirements

- Collected data and frequency of collection
- Communication protocols, data models and data formats
- Communication interfaces available at inverters
- Requirements for cyber security in data exchange



ICT architecture of DSO PV monitoring system

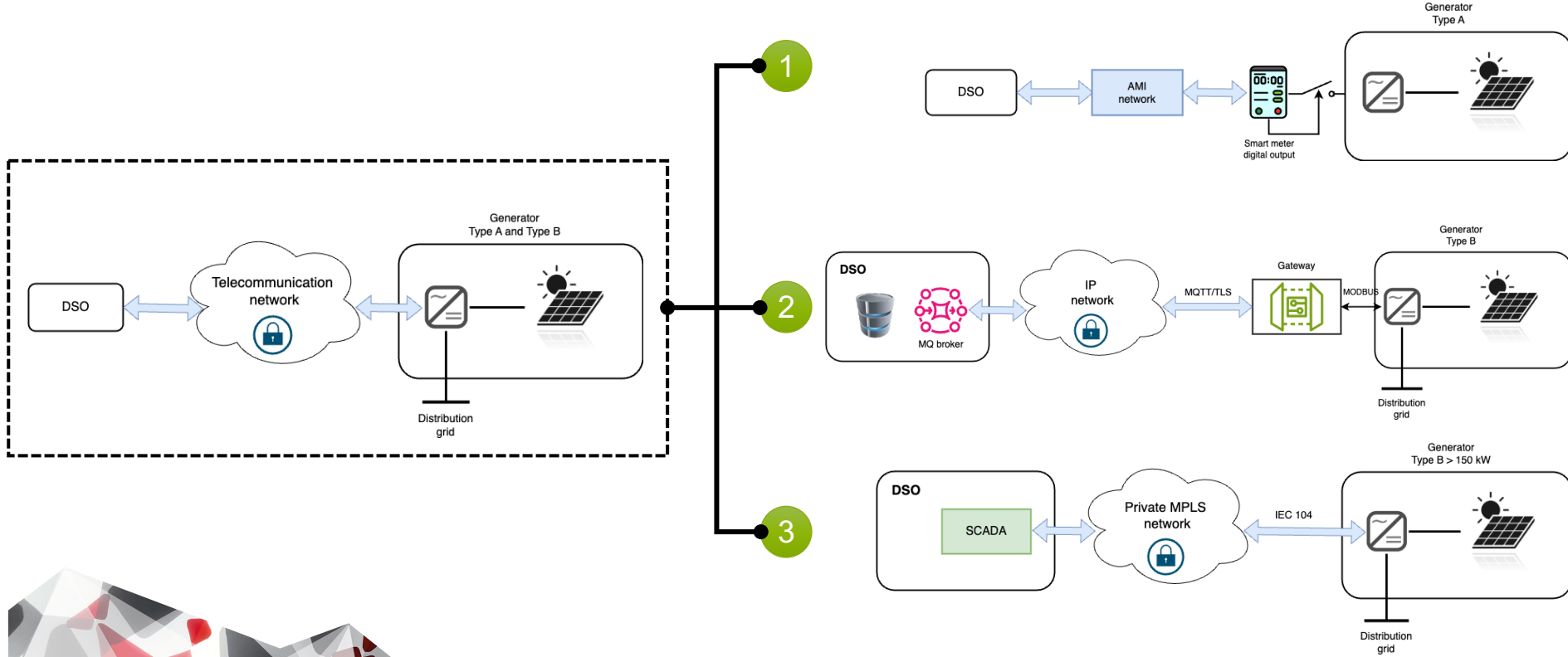
- System functionalities
- High-level architecture



Technical requirements for solar/PV power plants

- Technical requirement for solar powerplants connected to the MV grid
- Technical requirement for prosumers connected to the LV grid

Technical specification and requirements for integration of RES into DSO Telecommunication network





*Thank you for
your attention!*

