How to efficiently procure battery energy storage systems for hybrid energy systems through a tender process

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ABO WIND

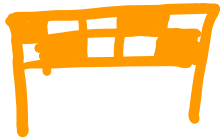
Agenda

Goal:
share knowledge for a more economic, techno-logical agnostic and performance focused procurement of BESS for RE based hybrid or stand-alone systems for a thus faster implementation around the world.

1. **Helpful definitions for tender processes and stakeholders**
2. **Key-learnings for tender design**

There are different tender formats fulfilling different purposes

Time before COD



Request for Information | Expression of Interest | Request for Proposal | Request for Tender | Request for Quotation

	RFI	EOI	RFP	RFT	RFQ
Purpose	Get first market feedback	Get shortlist of seller	Find seller for overall solution for unspecific request	Purchase best overall solution for specific request based on several criteria	Purchase best overall solution for specific request based on price
Level of detail on requested tech. solution	Low	Low	Medium	High	High
Level of commitment of buyer	Low	Low	Medium	High	High
Level of effort of bidder/seller	Low	Low	High	High	Medium

Focus of analysis

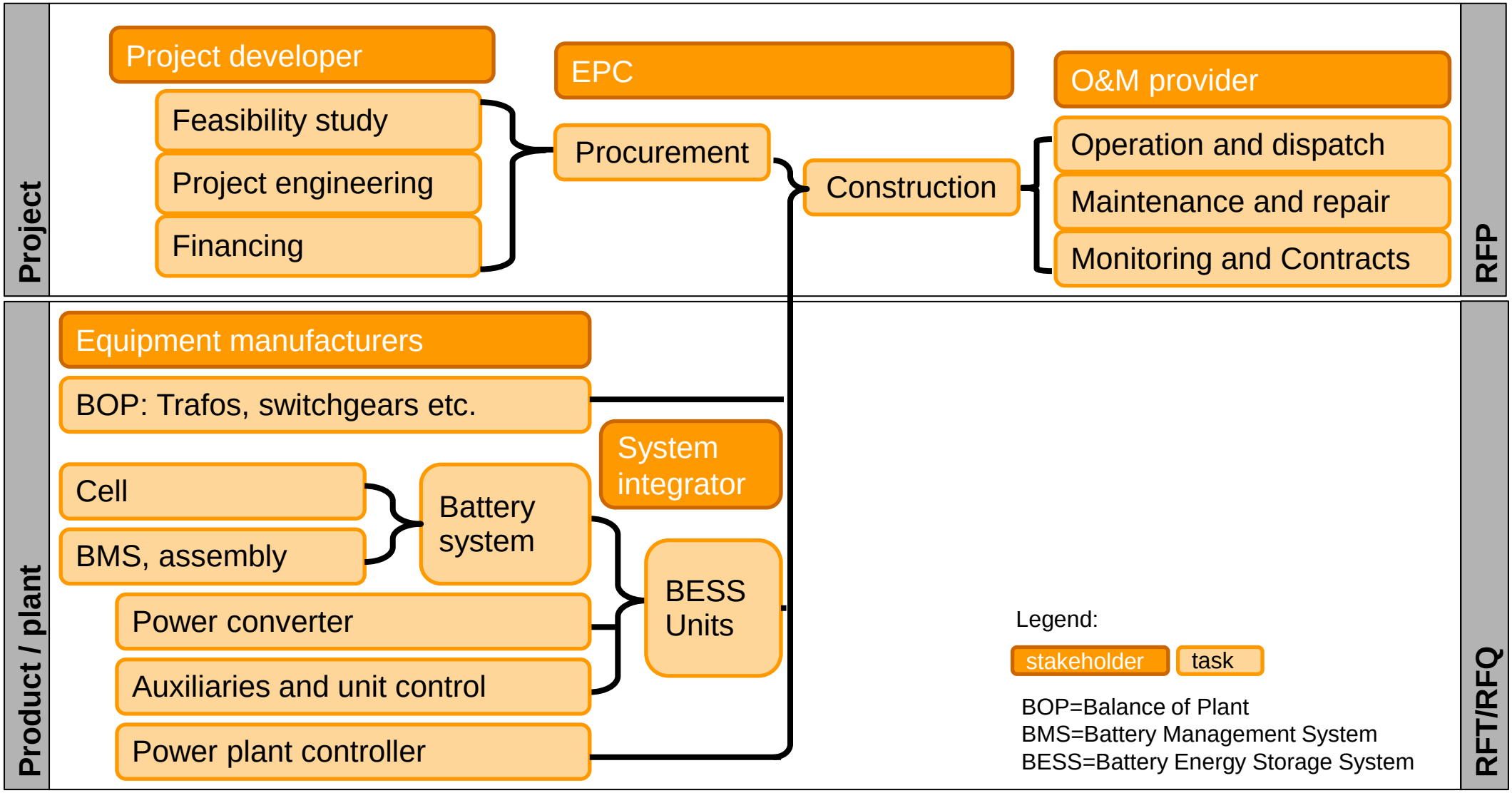
Within an RFP different services can be requested resulting in a different level of minimum information requirement

Risk Profile/Complexity

Type	Power Size	Clear use case definition	Environmental conditions	Timeframe	Permitting
Built own operate/transfer (BOO/BOT)	X	X	X	X	X
Engineering Procurement Construction (EPC)	X	X	X	X	-
Operation and Maintenance (O&M)	X	X	X	X	-
Project Management	-	-	-	X	-
Project Development	-	-	-	X	X

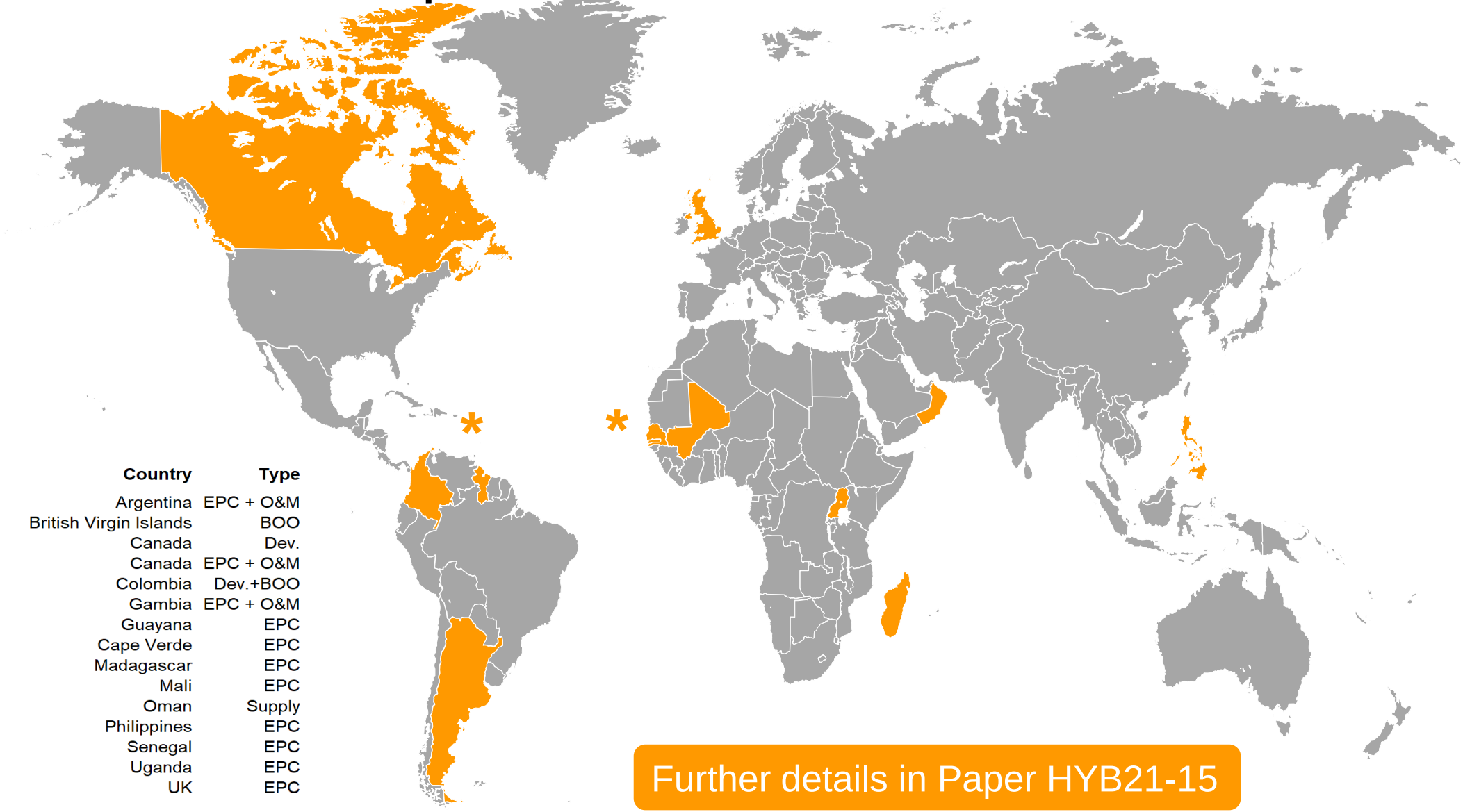
- With higher associated risk for the bidder more information must be given in the RFP
- For any RFP a clear and realistic timeframe is an absolute must
- A clear description of the general goal of the project and the current circumstances is more important than a clear definition of the technology

The different tender formats and requested services are served by different stakeholders along the battery supply chain



Background information

The underlying analysis is based on 15 tender processes from 5 continents + additional market experience



Country	Type
Argentina	EPC + O&M
British Virgin Islands	BOO
Canada	Dev.
Canada	EPC + O&M
Colombia	Dev.+BOO
Gambia	EPC + O&M
Guayana	EPC
Cape Verde	EPC
Madagascar	EPC
Mali	EPC
Oman	Supply
Philippines	EPC
Senegal	EPC
Uganda	EPC
UK	EPC

Further details in Paper HYB21-15

Background information

There is a gap between typically given information and the granularity of information that is requested to be answered with the bid

What one **could** built with the given information

What one **should** deliver in the request for proposal

Seller driven market with high insecurities on the buyer site about product possibilities currently solved through over complex RFP

Describe the use case/ required functionality to get better solutions

- Be precise with the following requirements:
  - Operation mode with
    - (1) Grid forming operation,
    - (2) parallel operation to other generators and
    - methods for active and reactive load share
  - Load/generation profile that shall be served (15min-1h resolution for a year) with future projection of changes in the load (esp. for off-grid)

    → Maximum power required for which duration at which time of the project lifetime

    → expected number of cycles in a year
  - Location specific data
  - in a HES with wind turbines: data from met mast or expected generation profile

- BESS should be considered as standardized, type tested units especially for smaller projects

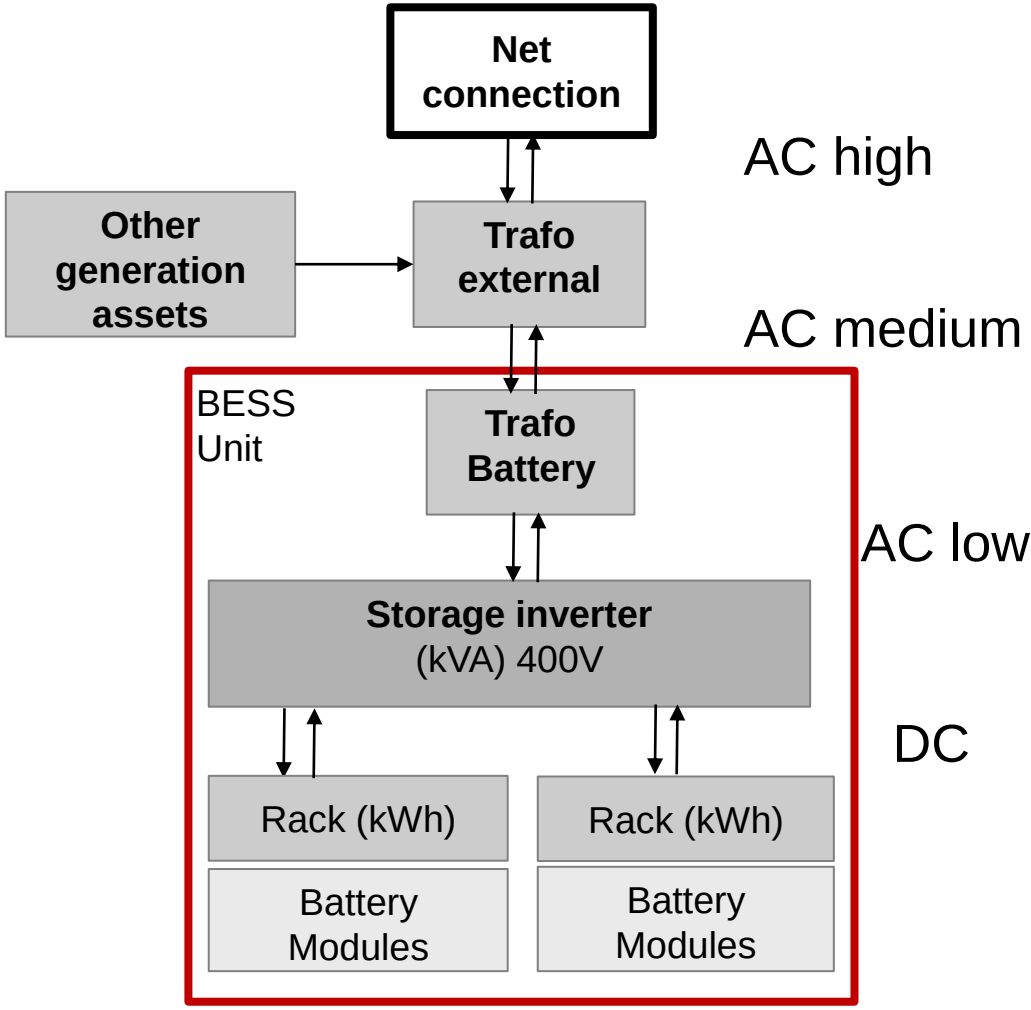
50 kW/190 kWh for self-consumption and load shaving

50 MW/25 MWh for auxiliary services and arbitrage trading

Key-learnings for tender design

Be precise with the design criteria of the BESS for a better comparability

- Round-trip-efficiency
  - DC-to-DC or AC-to-AC
  - Low, Medium or high voltage level
  - under full or average load
  - with or without auxiliary supply
- Cycles
  - Full equivalent cycles with 100% DoD and full power
  - Cycles with specific DoD under average C-rate
  - …
- Capacity
  - Begin-of-life or end-of-life
  - nominal or usable
  - Usable under full or partial power



Practical hint:
a clear document with the definitions to be pre-filled by the bidders supports a quick comparison

Key-learnings for tender design

Set a realistic timeframe for better and more competitive bids

- 4 Phases to be considered until expected commissioning of the project
  - tender, contract negotiation, procurement and construction
- Tender phase for a simple BESS EPC RFP ~ 4-6 weeks
  - The more you request with an RFP the longer the expected timeframe should be

Parameter	Tender	Contract	Procurement	Construction
Size of the project		+	+	+
System complexity	+	+	+	
Service complexity	+	+		
Permitting		+		+
Clear use case definition	−	−		
Quality of documents & data	−	−		

+ Additional time needed − Time savings possible

Best practice for effective tender processes

- Key-learnings for tender design
  - Describe the use case/ required functionality to get better solutions
  - Be precise with the design criteria of the BESS for a better comparability
  - Set a realistic timeframe for better and more competitive bids

- Special consideration for smaller sizes
  - Allow even more for standardized solutions
  - Combine several projects to a program for a roll-out of similar systems (program approach, where applicable)
  - Use where possible existing standards and recommendations
    - IEC 62933-2-1:2017 - Electrical energy storage (EES) systems - Part 2-1: Unit parameters and testing methods - General specification, 2017.
    - EPRI, "ESIC - Energy Storage Integration Council," https://www.epri.com/pages/sa/epri-energy-storage-integration-council-esic?lang=en-US

Thank you very much for your attention!

Feel free to get in contact and develope hybrid systems around the world

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Overview ABO WIND

Pioneer of Renewables

- Founded in **1996** in Germany, more than 7**00 employees** worldwide
- **Core business**: Project development, financing and turnkey construction of wind, solar parks and BESS
- **Other services**: Energy Park Management, Repowering, Hybrid Energy Systems, Bioenergy, Mobility Systems and Research
- Active in **16 countries** worldwide
- 2.3 GW developed and sold, of which **1.5 GW** also installed
  - References: https://www.abo-wind.com/en/track-record/projects.html

ABO Wind - Project examples

Kells Battery 50 MW / 25 MWh

- Country
  - Northern Ireland
- Status
  - Under construction with COD in June 2022
- Technology
  - 50 MW / 25 MWh Lithium-Ion Battery stand-alone
- Application
  - Ancillary service provision under DS3 scheme and arbitrage trading
  - Fast response with 150 ms
- Project volume
  - ~27 Mio. €

ABO Wind - Project examples

Innovation Tender: PV + Battery

- Country
  - Germany
- Status
  - Under construction with COD in January to October 2022
- Technology
  - 10 MW_p + 3.5 MW / 3.5 MWh Lithium-Ion Battery co-located at 3 sites
- Application
  - Feed-in tariff and PPA
  - Arbitrage trading and secondary reserve

Overview on Interfaces in a BESS project