Your Partner for Clean Energy

Increased self-consumption for industrial customers

Julian Gerstner, Barcelona at 05.11.2019

ABO WIND

Contents

Company

Services

Why ABO Wind

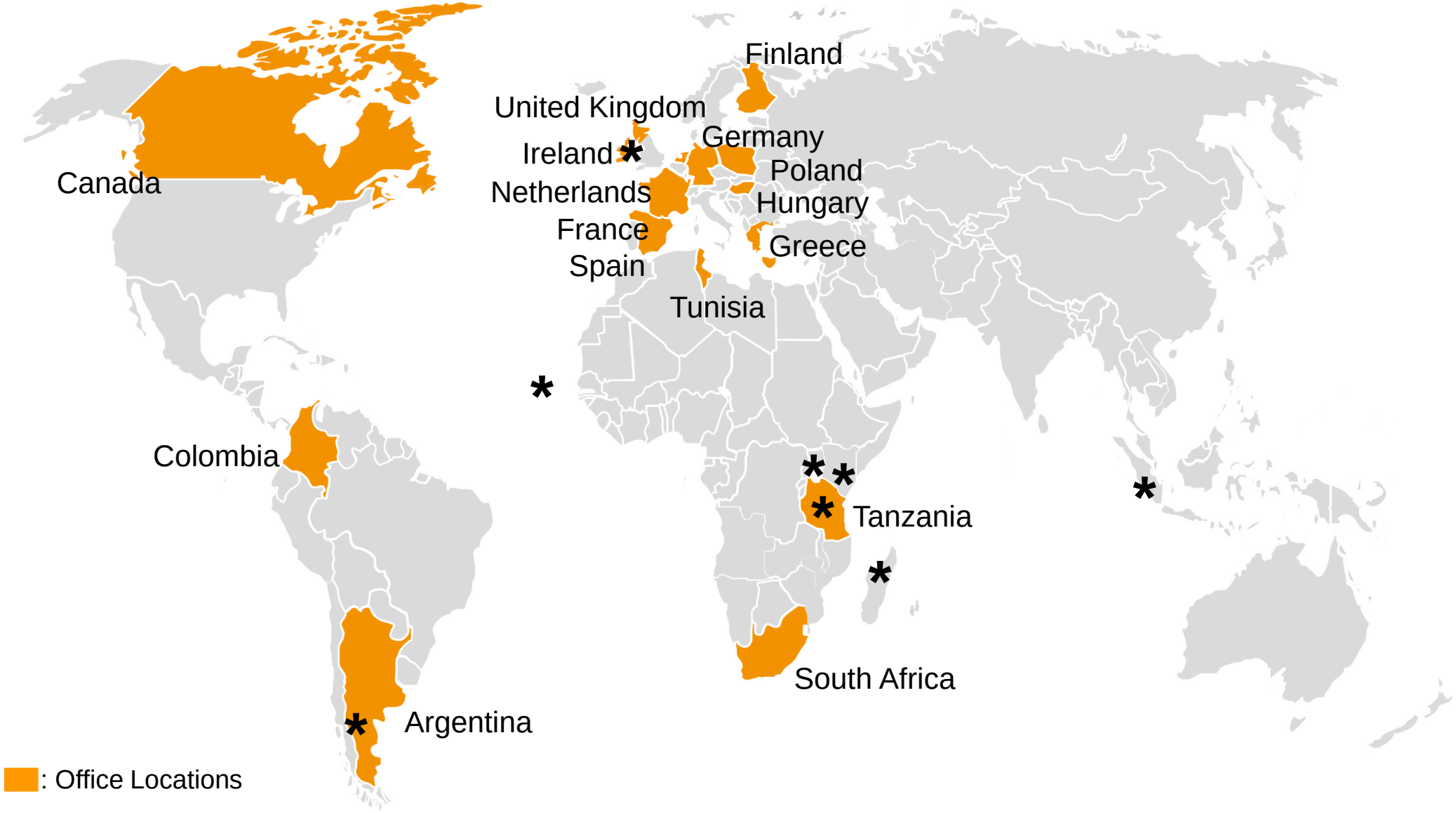
Hybrid Energy and Battery Storage Systems

Dr. Jochen Ahn | Andreas Höllinger | Matthias Bockholt | Dr. Karsten Schlageter

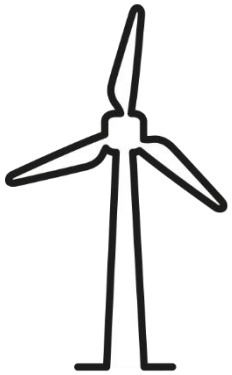
Pioneer of Renewables

- Founded in 1996 in Germany
- Around **550 employees** worldwide
- Annual project volume of around **EUR 300 million**
- 2 GW developed and sold, of which **1.5 GW** also installed
- **Operation & Maintenance** for most commissioned projects (> 1.2 GW)
- **Managing Directors** (from left): Dr. Jochen Ahn, Andreas Höllinger, Matthias Bockholt, Dr. Karsten Schlageter

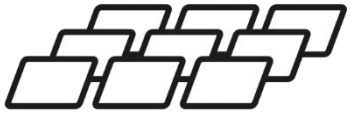
Project Development in 16 Countries



Developer of Renewable Energy and Energy Storage Projects



Wind Energy

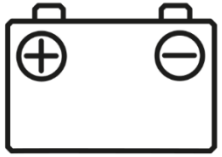


Solar Energy

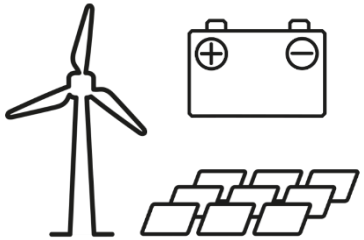
Bioenergy

Team

Hybrid Energy and Battery Storage Systems

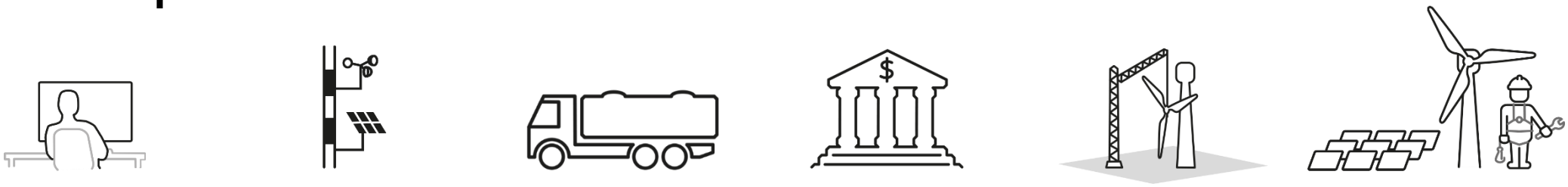


Energy Storage



Hybrid Energy

Core Competences



Development	Engineering	Procurement	Financing	Construction	O&M
Project Identification & Land Acquisition	Wind and Solar Measurement & Park Layouts	Tendering & Contract Negotiations	Due Diligence	Execution of Construction Sites	Technical Operations Management
Environmental Impact Studies & Permitting	Basic Engineering	Supplier Audits & Quality Control	Bank Financing	Supervision, Quality Control & Environmental Management	Commercial Operations Management
Grid Connection Permission & Agreement	Detailed Engineering & Drawings	Logistics	Equity & Investor Search	Health and Safety	Maintenance

Cooperation and Partnerships

- **Greenfield development** as well as acquisition and sale of renewable energy project rights
- **Cooperation with partners** at all stages of development (joint ventures etc.)
- **Technical and financing support** for projects under development

Engineering

- Experienced in-house civil, mechanical, and electrical engineers ensure high quality
- Optimised wind/solar farm engineering (layout, technical and economic optimisation) ensures competitive cost effectiveness
- Working with different suppliers ensures optimised performance/price ratio
- Concentration on free field and large roof-top systems ensures economies of scale

Procurement

- Competitive Prices
- Strong balance sheet
- Extensive network of suppliers
- Well-known brands
- High quality products
- Supplier-independent purchasing

Construction

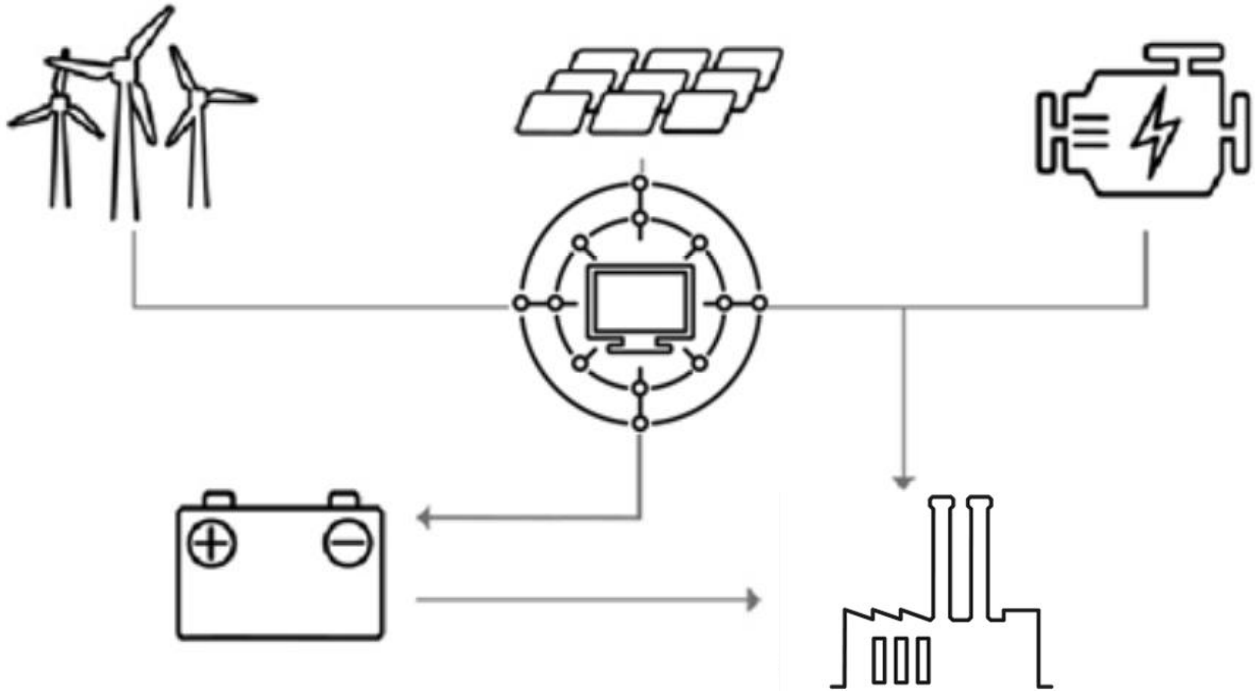
- Quality control & project management
- On time and on budget
- Highest Standards:
  - Health & safety
  - Quality
  - Environment
  - Social impact
- Worldwide installations
- Grid compliance

Why ABO Wind: Your Partner for Clean Energy

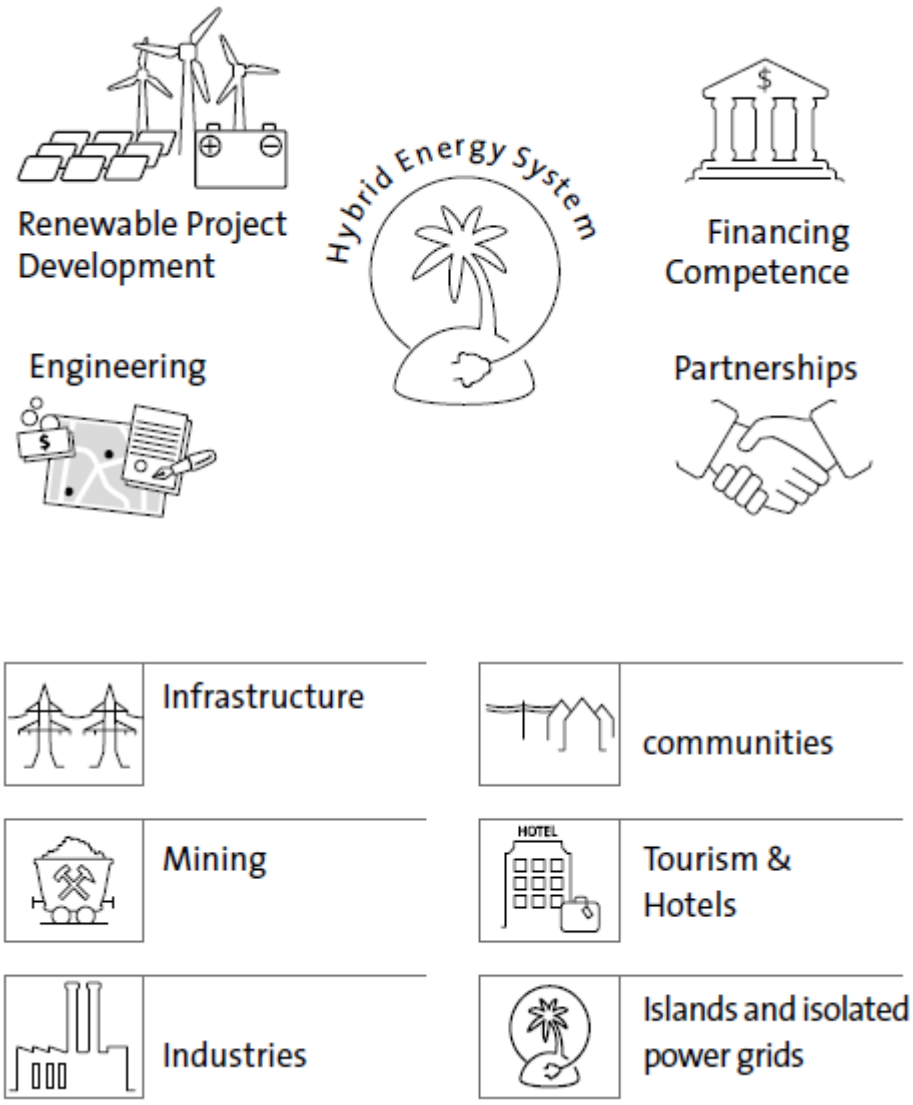
Benefits

- Reliable and trustable company
- Active globally in mature as well as emerging markets
- Wide expertise from project development to turnkey construction and O&M
- Fast and professional implementation
- Integrated in-house expertise for power plant EPC, substation EPC and grid connection
- Competitive pricing

Hybrid = Something bundled or crossed



- A energy system is a Hybrid Energy System (HES), if it consists of at least two different energy converters.
- Island-, micro and off-grid systems as well as a main grid connected areas can be served with HES.

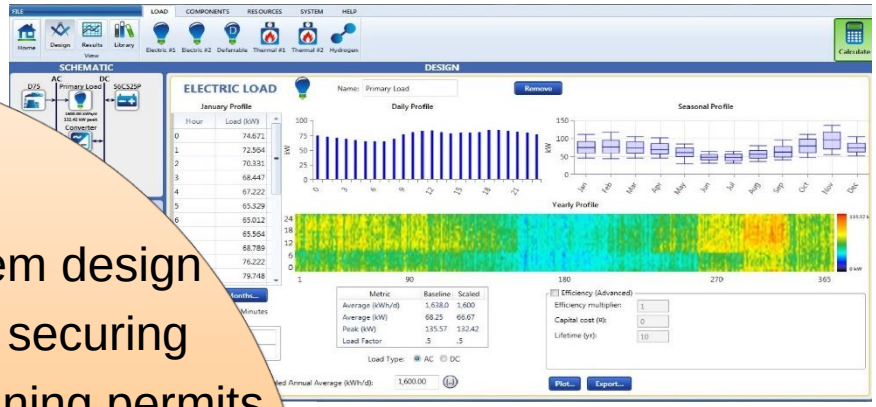


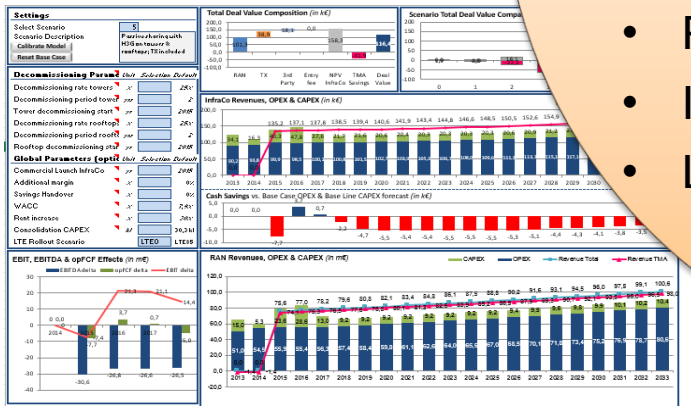
Hybrid Energy Solutions

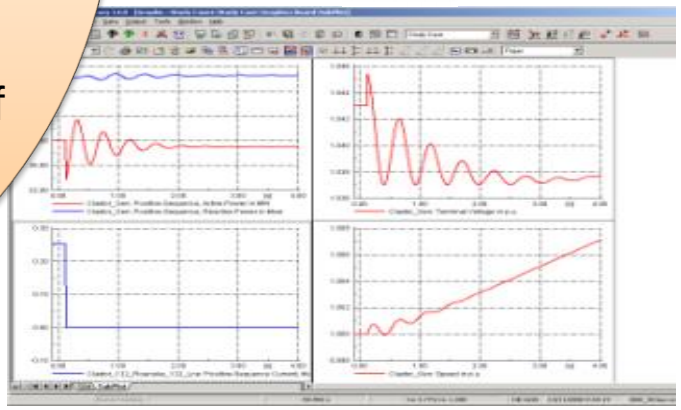
- **Applications**:
  - **optimization of energy costs,**
  - **access to reliable energy**,
  - integration of fluctuating renewable energy into grids
- **Services**:
  - Engineering,
  - system modelling,
  - cost optimization and implementation
- **Potential clients**:
  - **large consumers (e.g. production facilities, hotels, hospitals, computing center),**
  - **grid operator, utilities**
  - Mining & other industries in remote areas

Goal of the participation in the AHK business trip

- **Project acquisition**
- Partnerships
- Advertising
- System design
- Land securing
- Obtaining permits
- Negotiations
- Financing
- Funding
- IPP / PPA
- Leasing Model
- Validate technical feasibility
- Adjust layout if necessary







Project Example: PV + Battery Storage for industrial customer

https://www.qinous.de

- **Future Situation**
  - Hybridization with photovoltaic, battery storage and energy management system
  - Fully automated operation
  - **0.08 €/kWh >** Avg. cost of electricity **< 0.15 €/kWh**
  - Avoid solar tax and CO_2-emissions through local PV utilization

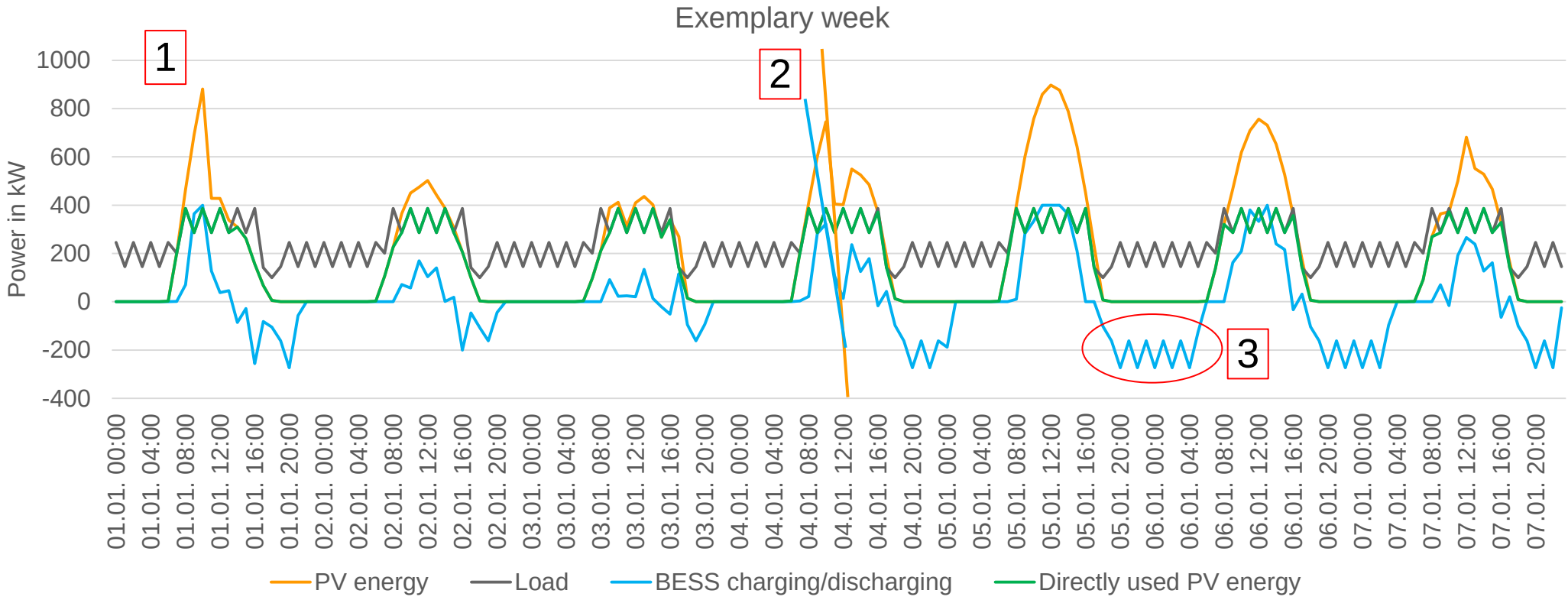
Typical uses cases for a storage system for industrial customer

1. PV energy shifting = BESS charging = Increase level of grid autarky or energy arbitrage

   → Increase from ~40% PV consumption to up to 80% depending on system dimensions and economics

2. Gradient reduction of PV output = system stability

3. **Optional:** stand-alone microgrid: Grid forming with BESS inverter = Max. autarky from grid



Contact

Julian Gerstner

Project Manager Hybrid Energy and Battery Storage Systems

ABO Wind AG

Phone: +49 (0)611 267 65 754

Mail: julian.gerstner@abo-wind.de

www.abo-wind.com