From Micro-grids to Grid-scale – Energy Storage integrates Distributed Generation

Dr. Wolfram Krause // CoNDyNet Industry Workshop // Frankfurt

Nov 23, 2016
From south pole to Alaska: Experience of 150 MW in the field
Why do we need short-term storage?

SIE VERLASSEN DEN CO2 PRODUZIERENDEN SEKTOR DIESER WELT.

YOU ARE LEAVING THE CO2 PRODUCING SECTOR OF THE WORLD.
More generation from Wind and Sun – Constraint System Services

More volatility
Constraint System Services

Decreasing base load demand
Increasing peak load demand
Surplus generation

Source: SRU, Systemkonflikt in der Transformation der Stromerzeugung, 2010
Battery Power Plants provide fast and precise flexibility
Battery Power Plants provide pure flexibility without “Must run”

Frequency Containment Reserve provided by thermal power plants

- **Must run**
  - [-]
  - [+]

Frequency Containment Reserve provided by batteries

- **Make way for wind and sun**
  - [-]
  - [+]

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Validation of Battery Storage Micro-grid application using our MW-scale technology center
Diesel needs to be replaced by battery storage system delivering system services

Battery plant delivers:
- frequency control
- voltage control
- short-circuit power
- Instantaneous switch from acting as generation to acting as load (or vice versa) based on the state of the island grid

A grid with less system inertia requires faster regulation - batteries can form a stable grid with high renewable share
Graciosa: MW-scale real-world demonstration
Graciosa: Full-scale island micro-grid with up to 65% RE share

2.8 MW/3.2 MWh Battery Storage
4.5 MW Wind & 1.0 MWp PV
RE barrier without Battery Storage: 15%
Grid-scale Battery Power Plants
Battery Power Plant WEMAG (Schwerin) Li-ion battery with 5 MW / 5 MWh
5 MW Battery power plant components – From cell to turnkey

- Battery room (optimized AC, fire suppression, etc.)
- Lithium ion battery system & lifetime warranty
- Medium voltage switchgear
- Power conversion systems
- Auxiliary power transformer
- Power transformers
- Low voltage main distribution board
- Battery power plant controller, SCADA and ICT
- Building & Auxiliaries
Battery Power Plant WEMAG (Schwerin)  
Power and Frequency - FCR
Battery Power Plant WEMAG (Schwerin) Power and Frequency - FCR
Battery Power Plant WEMAG (Schwerin) 15 min metered values

Source: WEMAG AG
Younicos
Let the fossils rest in peace.
Further questions?
We are looking forward to hearing from you!

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