

Mesa Redonda B2G Smart Grid: Tecnologías de Almacenamiento como Grid Booster

TRANSNETBW GRID BOOSTER

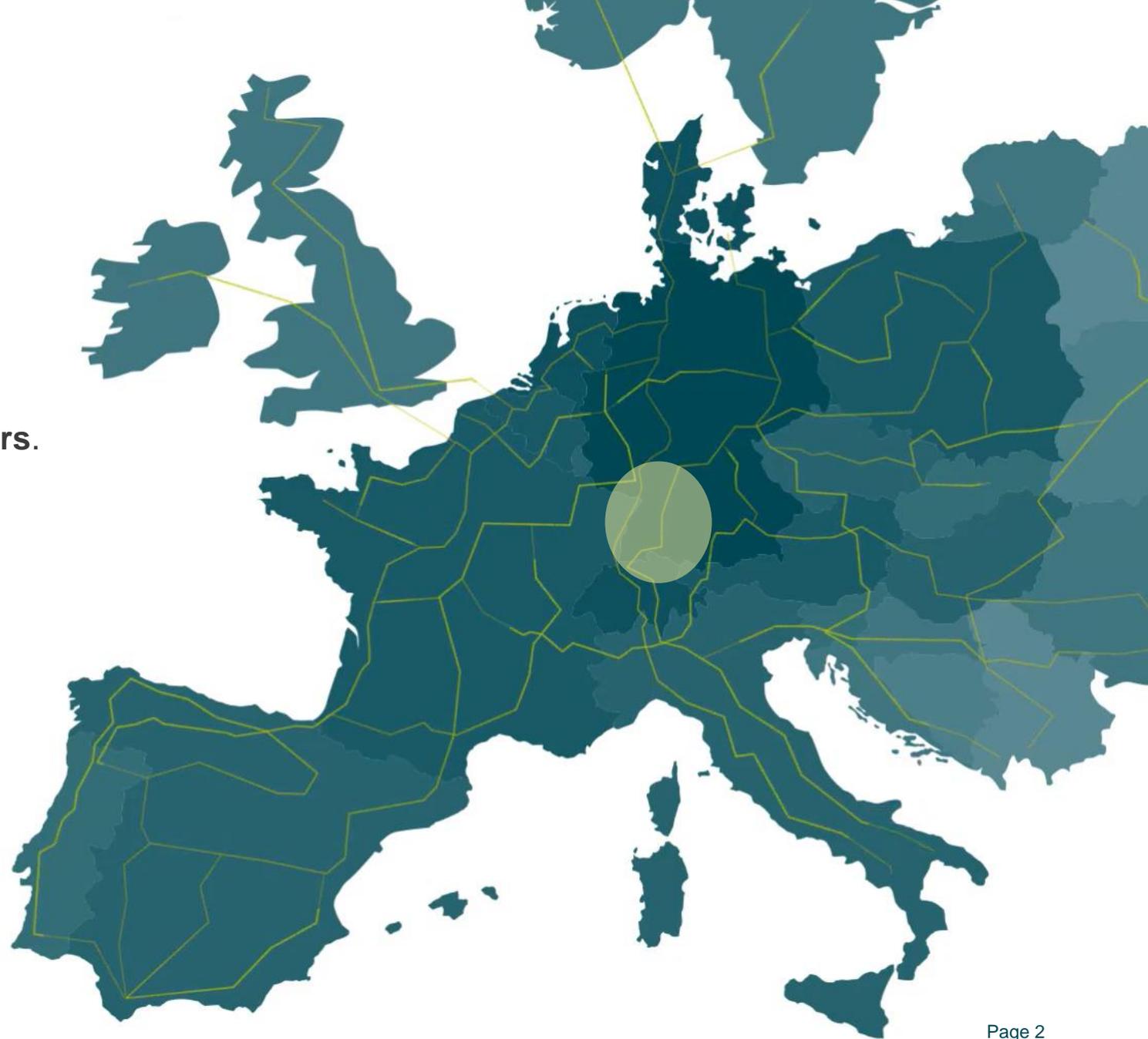
JONAS LOTZE, STRATEGIC GRID DEVELOPMENT, TRANSNETBW GMBH

Online // October 12, 2023

01 | Company

WHO IS TRANSNET BW?

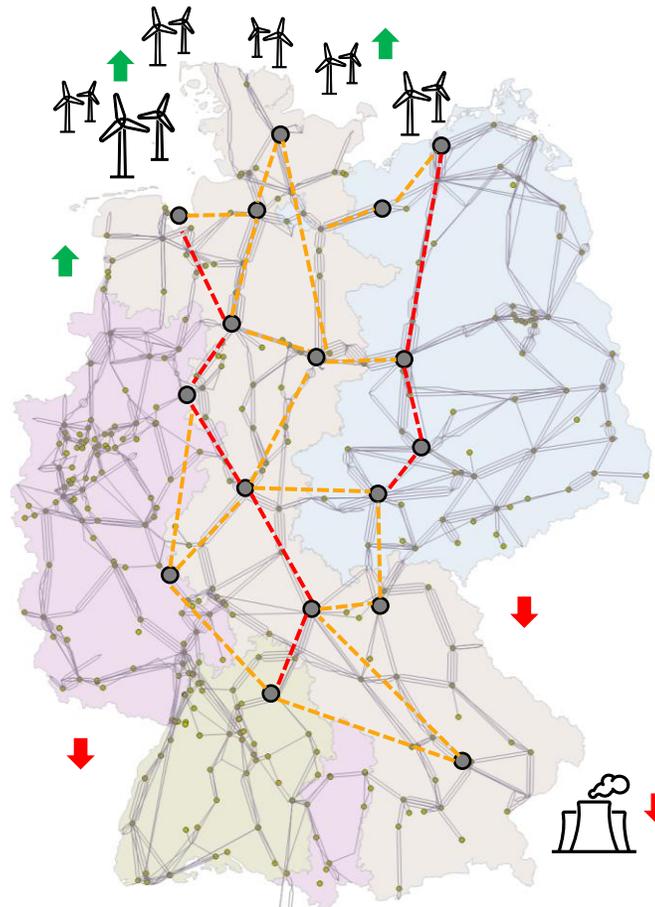
- / At the heart of the European transmission grid:
As transmission system operators for Baden-Württemberg, we ensure the **transmission of energy across state and international borders.**
- / Area served 34,600km²
- / Total line length 3.114 km (220 and 380 kV)
- / 50 substations
- / We **integrate renewables** into the electricity system.
- / Numerous interconnectors integrate the TransnetBW grid into the **German and European interconnected transmission system.**



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CHALLENGES IN THE GERMAN GRID

Rising Costs for System Operation triggers innovative Grid Solutions



Energy Policy Goals

- / **04/23:** phase-out nuclear power plants
- / **2038:** phase-out coal power plants (minus >30GW)
- / **2030:** 80% RE-share in energy consumption
 - / >30GW Offshore
 - / >115GW Onshore

Consequences

- / Growing energy imports to Baden-Württemberg
- / Growing difference in generation & load (North – South)
- / Growing costs for curtailment and redispatch to secure the system operation (2021: 2.3 Mrd.€, 2022: 3.1 Mrd.€)

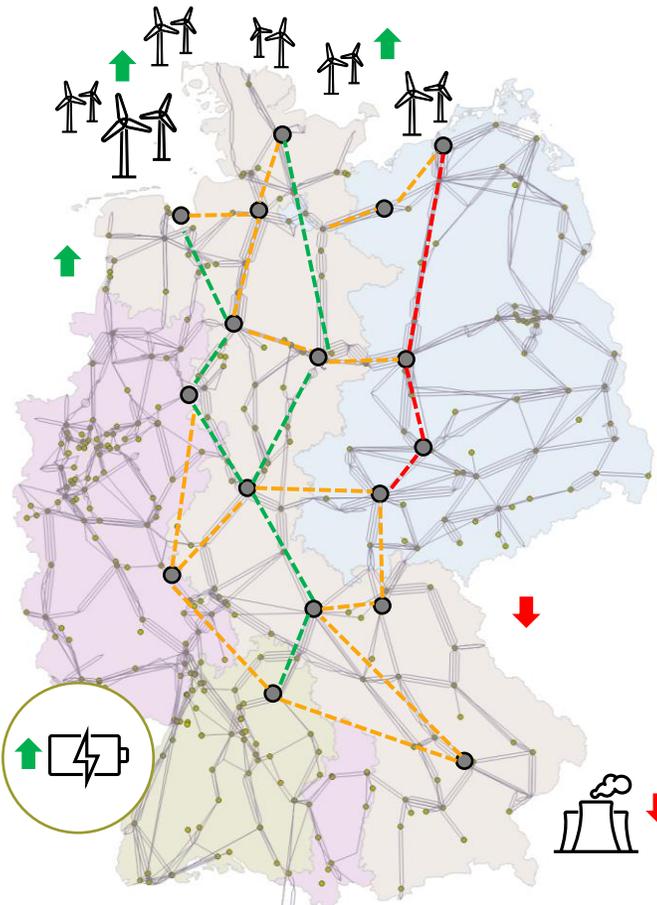
Solutions

- / Accelerate grid expansion for large grid projects through changes in regulation
- / Optimize utilization of existing lines through innovative solutions

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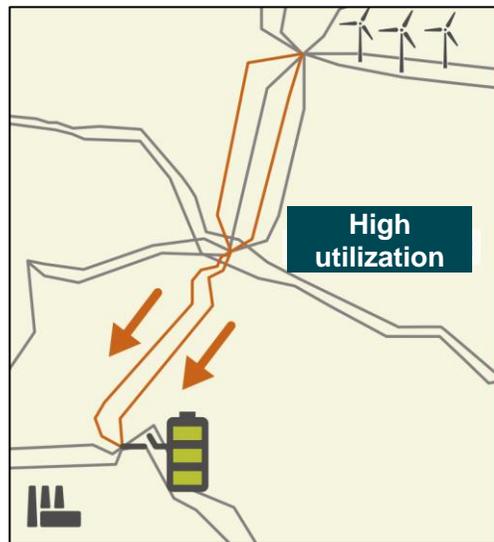
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2018: first conceptidea for grid boosters, 2019: confirmation of TransnetBW Grid Booster project in national Grid Development Plan

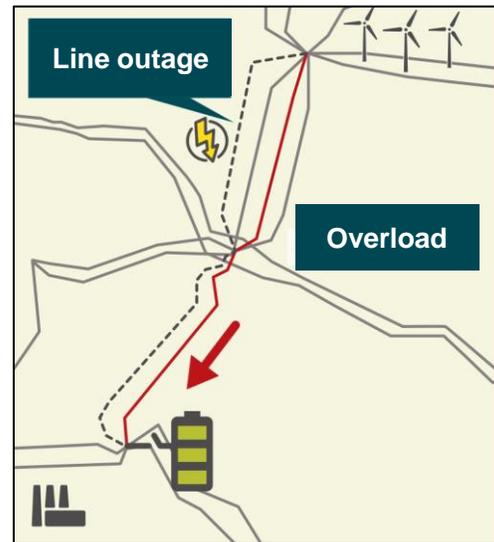
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CONCEPT & TECHNICAL IMPLEMENTATION

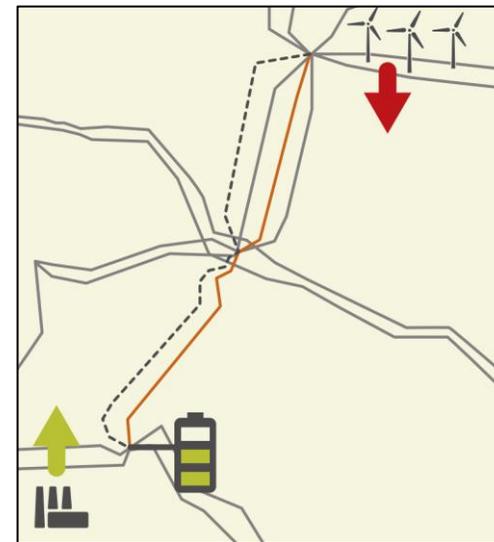
Grid Booster as part of an innovative stabilisation system for a safe and resilient grid



High utilization on the parallel circuits (in the "n-1" case utilization >100 %)

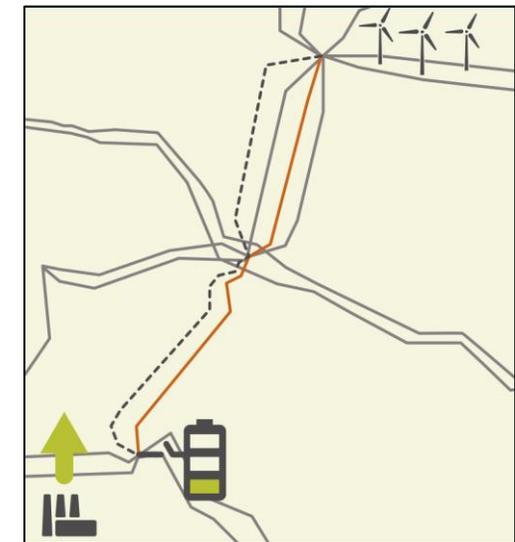


Failure of one circuit leads to overload of the remaining circuits



Fast reaction of grid booster:

- Reduction of generation in the north
- Use of storage in the south



Replacement of storage by shifting measures, feed-in management, or conventional redispatch.

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CONCEPT & TECHNICAL IMPLEMENTATION

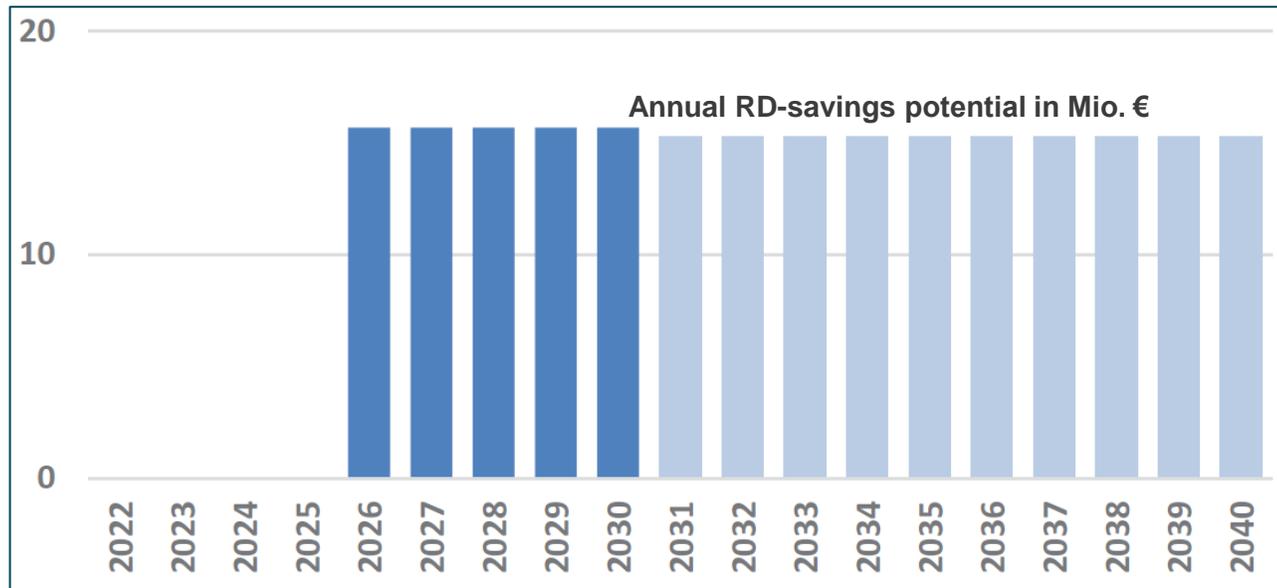


Description	Battery System 250 MW for 1h (250 MWh) + connection to HV-Substation Kupferzell + communication system with wind farm in the North of Germany and TransnetBW Control Center in Wendlingen
COD	2025 (trial operation), 2026 (full operation including ~17 AC-lines)
Footprint	~ 50.000 m ²
Special features	Pilot for testing an innovative concept to increase the utilization of the transmission grid (“curative system operation”), STATCOM functions

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ECONOMIC ANALYSIS AND PROFITABILITY

End consumer/ economy cost savings (pilot project):



From today's perspective:

- / Annual RD-savings potential of approx. 17,5 Mio. € for national end consumers
- / Reactive power taken into consideration with approx. 33 Mio. €
- / **Payback time of approx. 11 years**

CONCLUSION & OUTLOOK

Today's Grid Operation

Preventive – redispatch of fossil power plants

- TSOs keep sufficient reserves in existing grid infrastructure to ensure n-1 criterion & for the event of possible line failures / outages
- Large delta in n-1 contingency reserves:
Reserves = PATL – TATL (Delta)
- High number of preventive measures, redispatch & RES-curtailment

Future Grid Operation with Grid Booster Assets

Curative – use of large-scale storage & volatile RES

- **Ideal grid situation:** Higher utilization of grid infrastructure by utilizing existing n-1 contingency reserves & maintaining the same security level
- **Fault situation:** short-term 'overload' of transmission line, restoration of grid security by triggering the grid booster in millisec. (balance-neutral)
- **Result:** reduction in the number of preventive measures & redispatch savings potential

PATL Permanent Admissible Transmission Loading
TATL Temporary Admissible Transmission Loading

THANK YOU FOR YOUR ATTENTION!

I'm looking forward to your questions!



Jonas Lotze

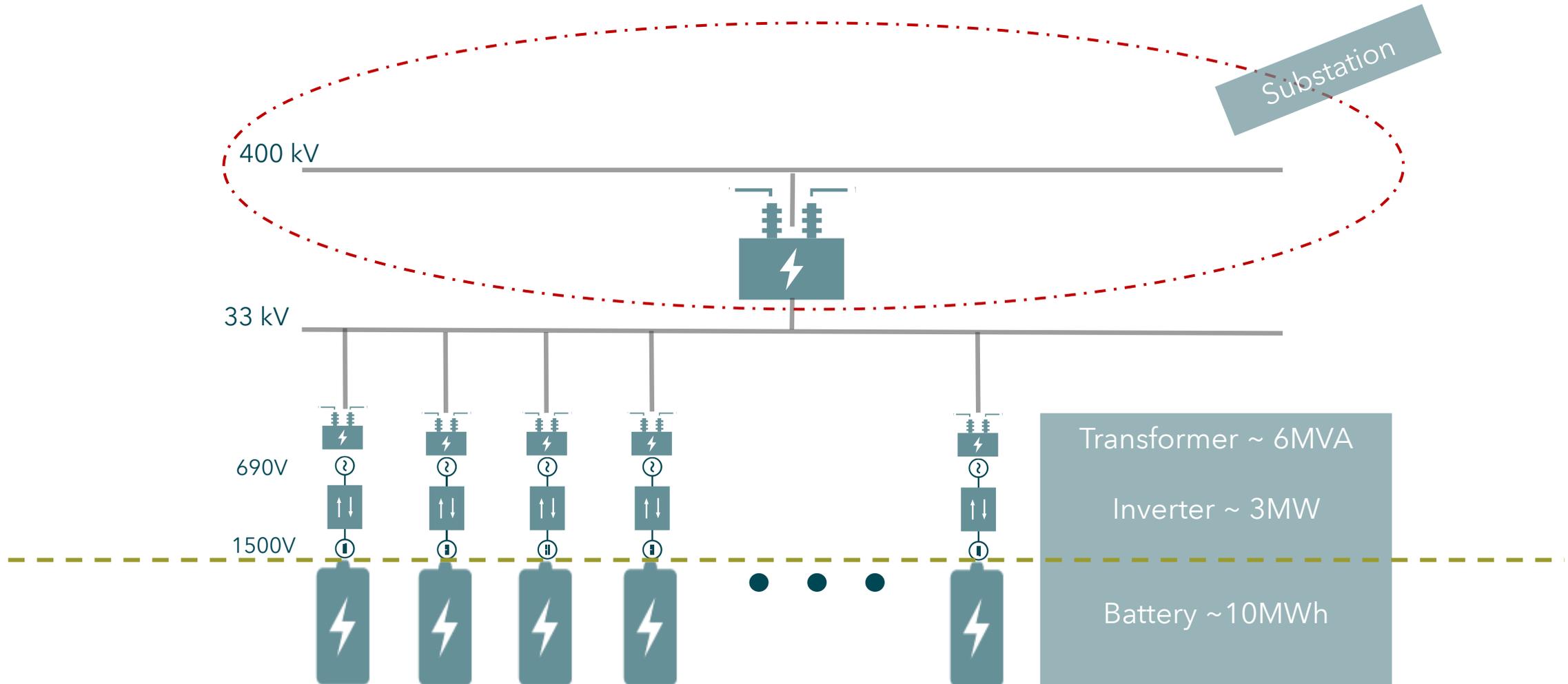
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Appendix | TransnetBW Grid Booster

TECHNICAL CONCEPT



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