Advanced Grid Stability
Battery Storage and the Inertia Market

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AGENDA

Company

Reason for Action & Experience

Inertia Market in Germany

Stability BESS optimized Solution

Summary

Energy transition pioneer since 1981

> 160 GW
installed inverters

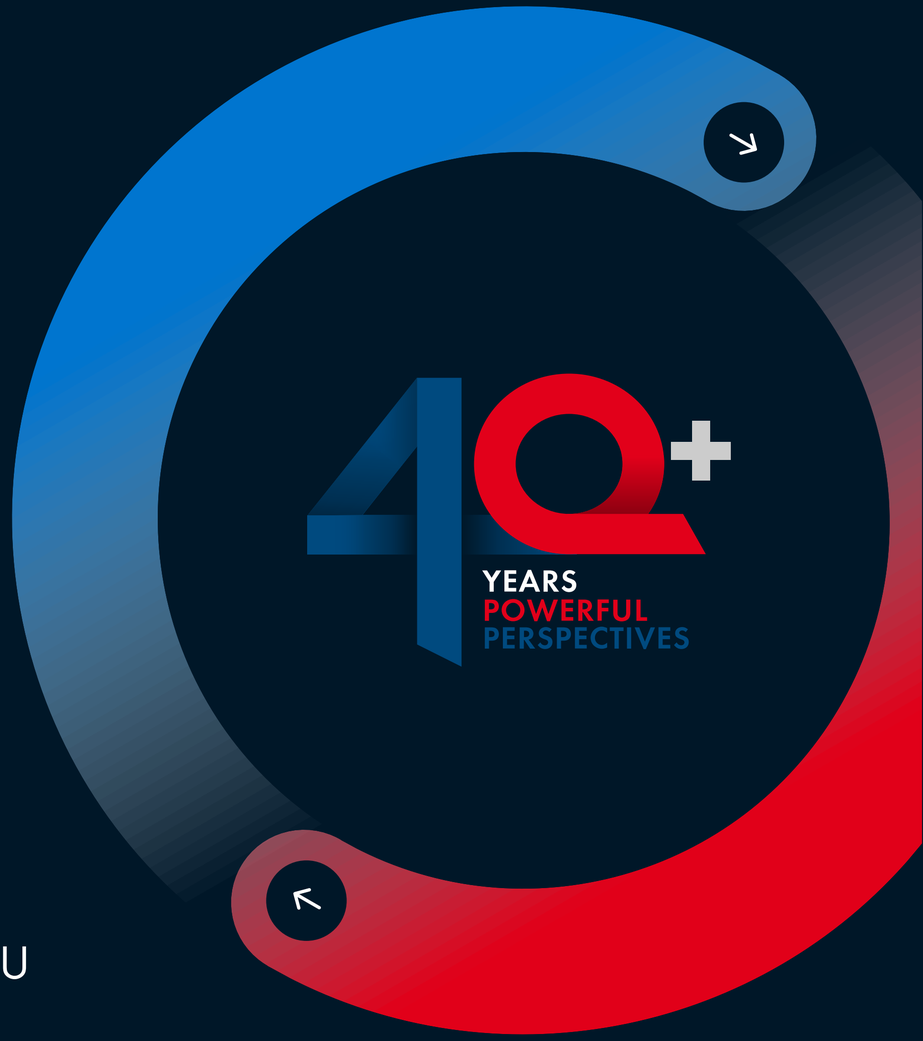
> 20 GW
installed battery inverters

> 1,600
patents & utility models

> 4,000
employees

> 20
countries (sales & service)

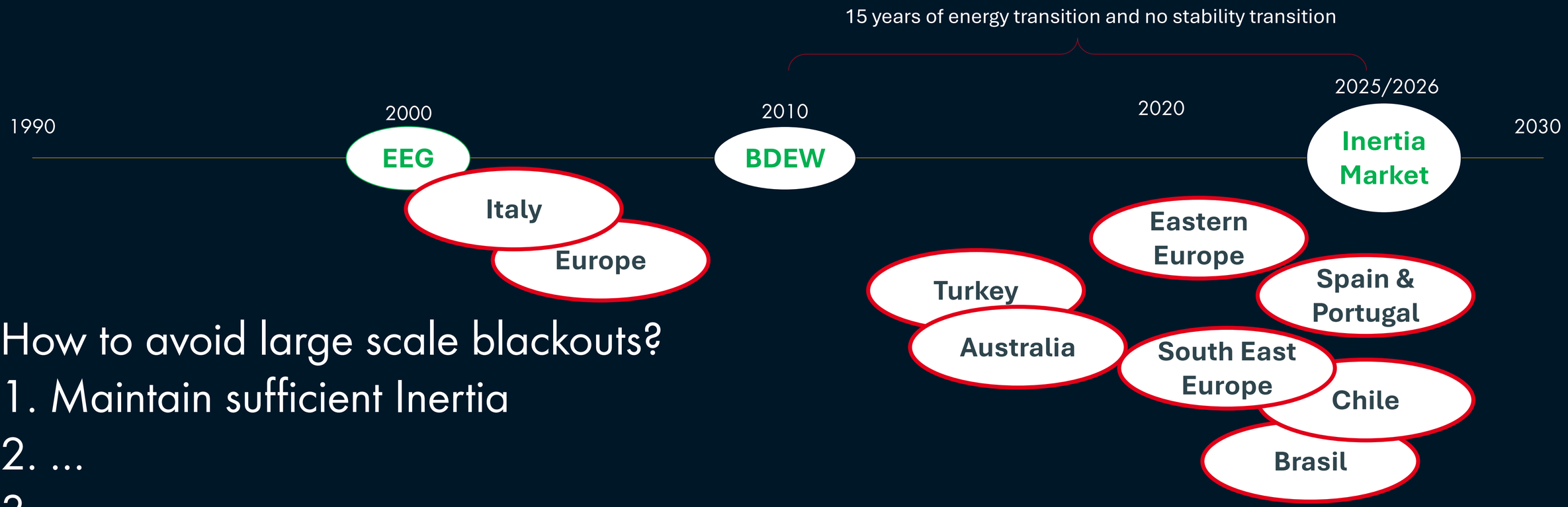
> Compliant
HQ and Production in EU



All figures as of end of 2024

Reason for Action & Experience

Energy Transition TOP, Stability Transition ...



How to avoid large scale blackouts?

1. Maintain sufficient Inertia
2. ...
3. ...

Battery Storage as the multi-purpose tool for future power systems

Energy, Ancillary and Stability Services	Synchronous Condenser	E-STATCOM	BESS Grid Following	BESS SMA Advanced Grid Forming
PRIMARY/SECONDARY FREQUENCY RESERVE	--	--	Yes	**Yes**
STORAGE FOR SYSTEM BALANCING (ARBITRAGE)	--	--	Yes	**Yes**
CONGESTION MANAGEMENT (GRID BOOSTER)	--	--	Yes	**Yes**
REACTIVE POWER (STATCOM)	Design spec *	Design spec *	Design spec *	**Design spec ***
INERTIA	Design spec *	Design spec *	--	**Design spec ***
FAULT CURRENT / SYSTEM STRENGTH	Design spec *	Design spec *	--	**Design spec ***
BLACKSTART / ISLAND CAPABILITY	--	--	--	**Yes**

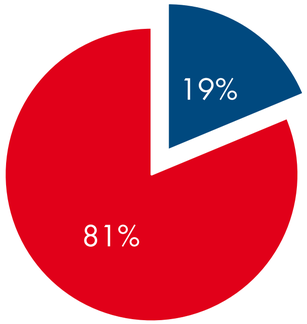
*Design Spec refers to a quantity of the service being procured by the system operator that means the asset needs to be design to performance which contradicts the discussion of mandatory GFM in the grid codes

Commercial Results and Analysis

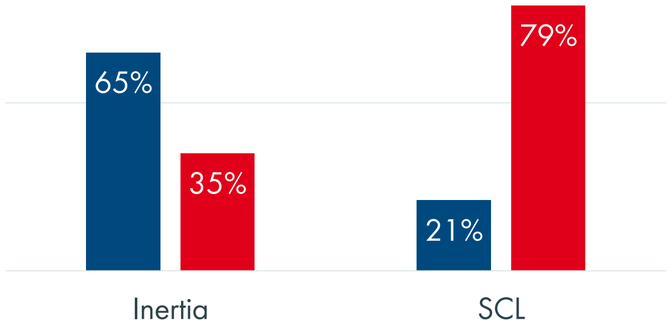
Data Source: NOA Stability Pathfinder | ESO (nationalgrideso.com)

BESS | Syncon

Cost share – tender level

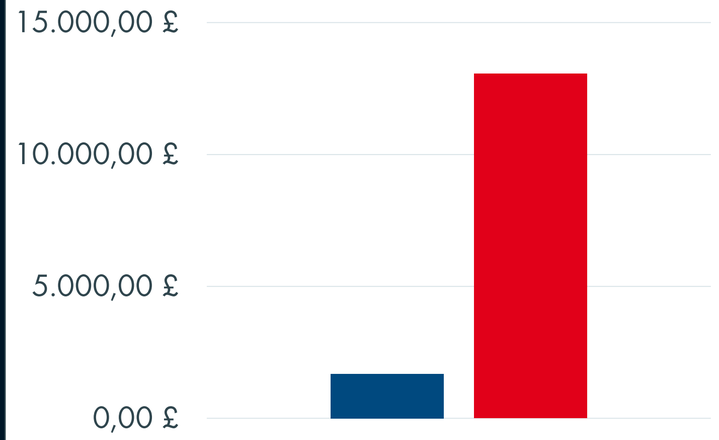


Stability Service share – tender level

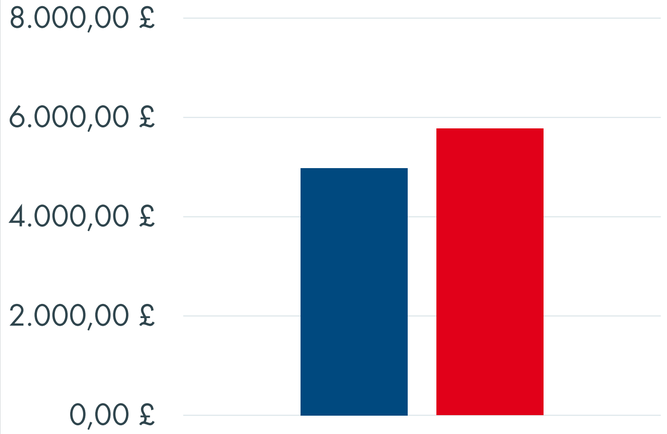


Specific prices per stability service (all winners)

Weighted Specific Price INERTIA [GBP/year/MWs]



Weighted Specific Price SCL [GBP/year/MVA]



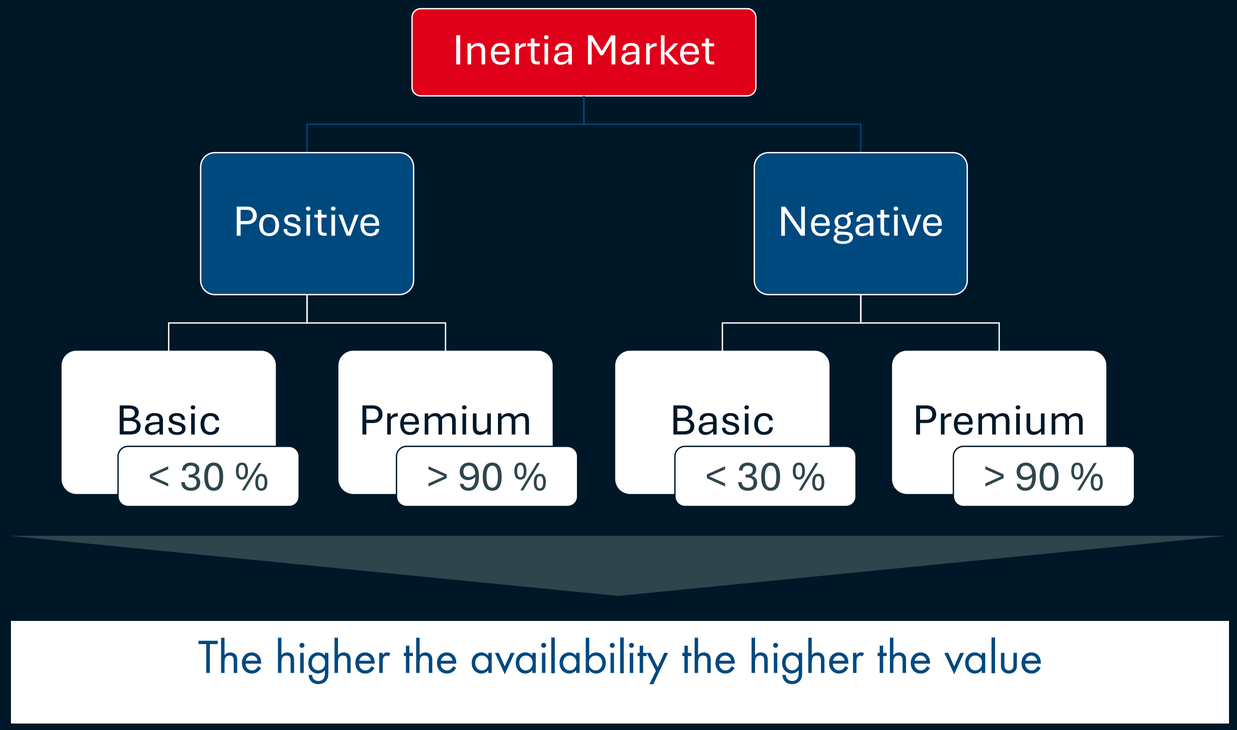
Out of 225 projects 5 BESS projects have been selected! BESS is the most competitive solution!

WORLD'S FIRST transmission connected Multi-Purpose Storage Asset

200 MW / 400 MWh (Phase 1)
Inertia: 370 MWs
Short Circuit Level: 116 MVA
10 years stability contract

Inertia Market in Germany

1200 GWs Inertia is equivalent to ~100 GW for 1 second

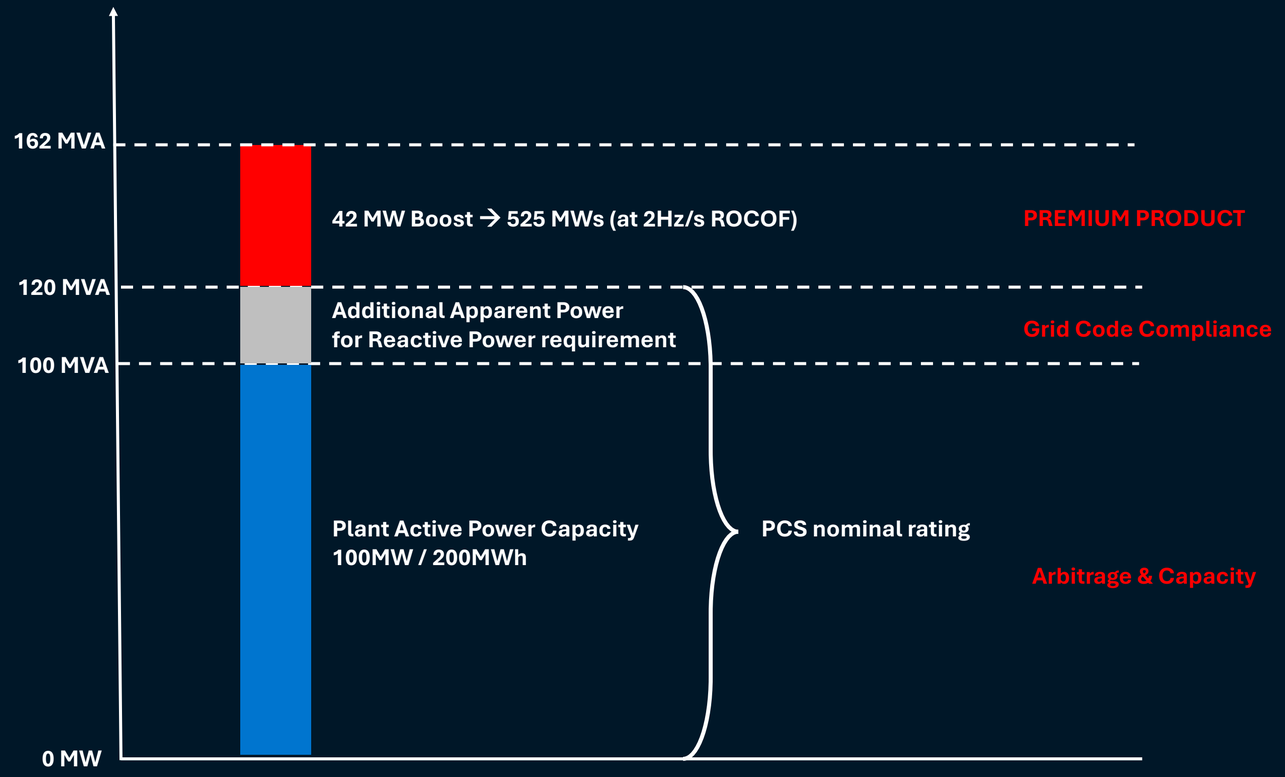


- ✓ Market Design finalized and approved
- ✓ Technical Requirements finalized and approved
- ✓ Validation & Compliance procedure approved
  - Certification Program (Fall 2025)
  - Price evaluation in progress (End 2025)

Boost Capability for Inertia

- +35% Boost capability over 5sec
- 100MW / 200MWh plant can provide 525 MWs Inertia <u>on top</u>
- At 2000 € / MWs p.a.:
  525 MWs Inertia are worth

1,050,000 € p.a.



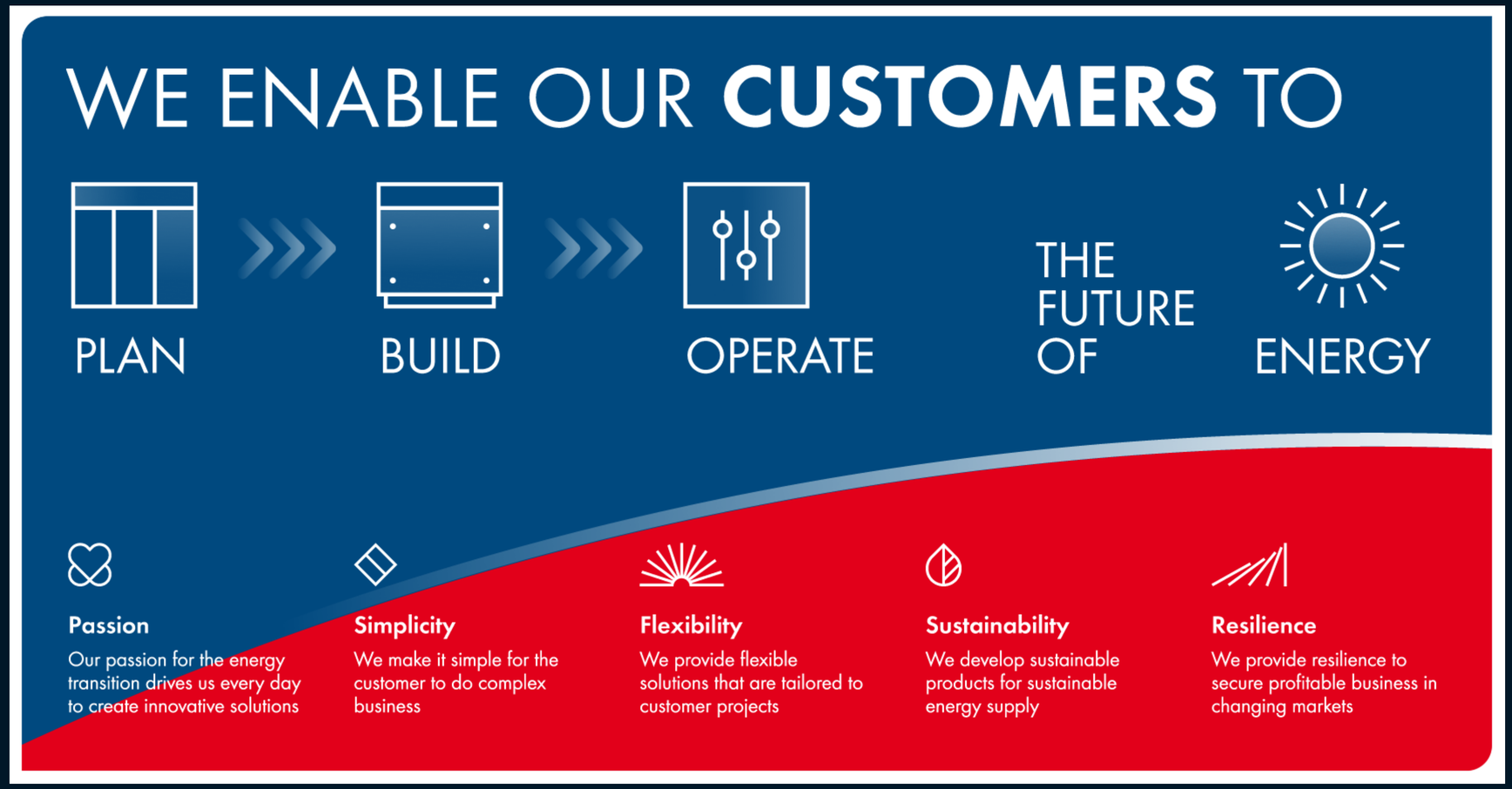
*Assumptions: Inertia price: 2000 € / (MWs x a);

Stability BESS optimized Solution

INTRODUCING – BESS Tailored SiC MOSFETs

Medium Voltage Power Station with Sunny Central Storage UP-S (SiC MOSFETs)

Stack topology	B6 Bridge with 1x2.0 kV SiC	Compliant Grid-forming
Temperature Derating	0% till 35 °$C_{ambient}$	Less PCS, more density
Derating in charging direction	0% (fully bi-directional)	Less PCS, more density
Efficiency (DC/AC)	99.2%	Less batteries, more throughput, less DoD
Thermal Reserve	significant	More inertia, more power cycles



- ✓ First Hand information
- ✓ Project Specific Engineering Support
- ✓ World's First Stabilitiy Asset operational on HV in UK
- ✓ Stability BESS optimized Power Conversion Unit with SiC MOSFETs and BOOST
- ✓ Plant-Level-Performance is key and obtained with SMA PPM

Thank you!
Questions?

ENERGY
THAT
CHANGES

SMA Solar Technology AG
3rd of June 2025
Energy Storage Summit, Stuttgart

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