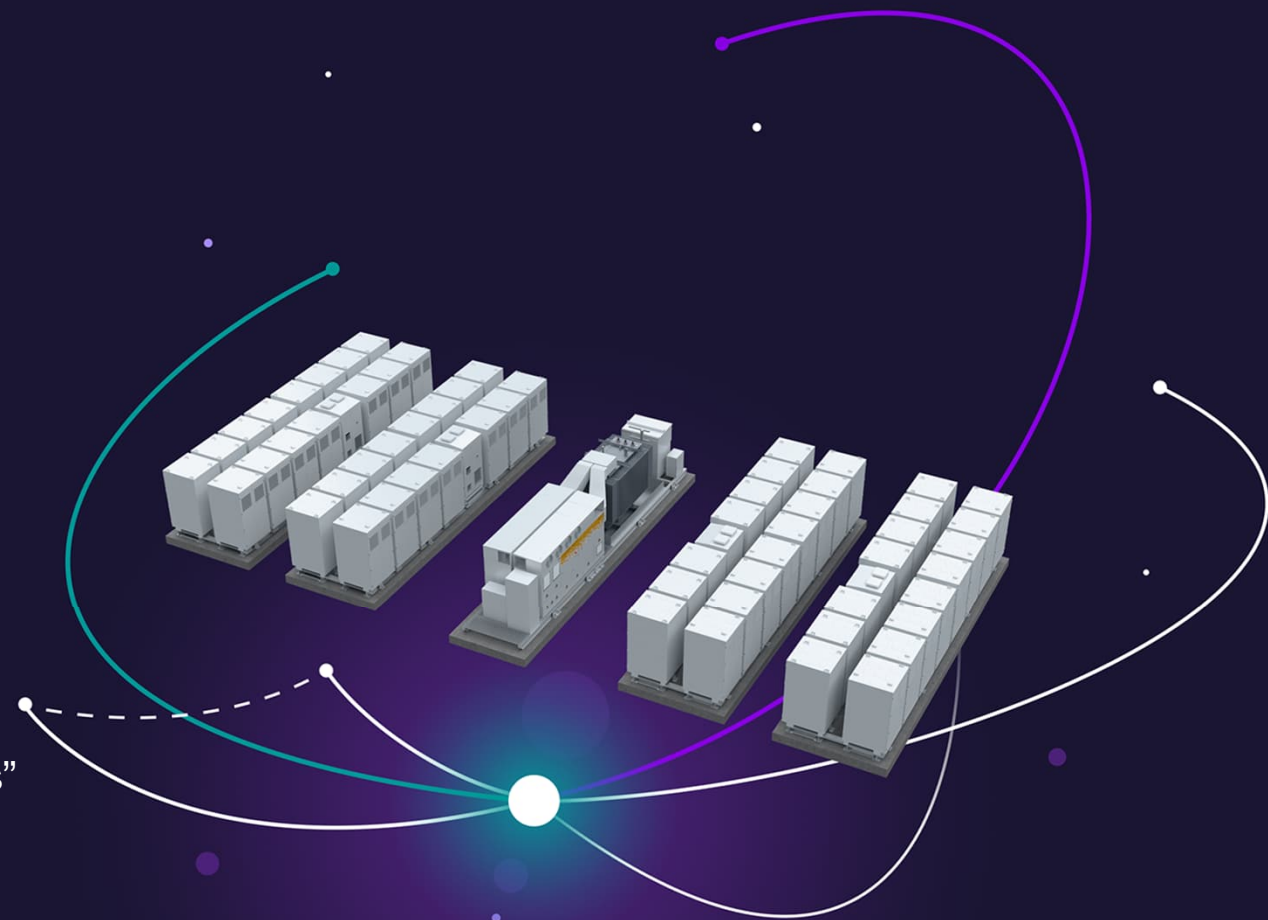


Siemens Energy

Battery Energy Storage Systems

24.05.2023_München_Schloss Nymphenburg "Eisernes Haus"



Globalization

Demographic change

Urbanization

Climate change

Digitalization

are drastically changing
our environment.

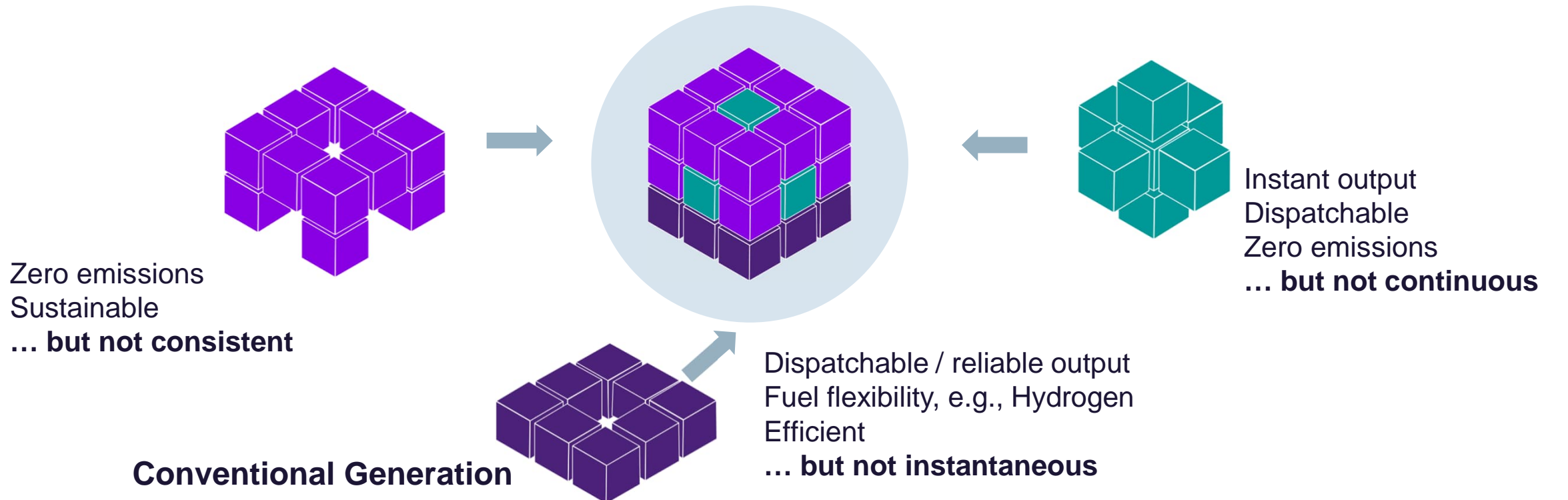
Market Analysis

The need for battery storage

Renewables Generation

Future Energy Systems

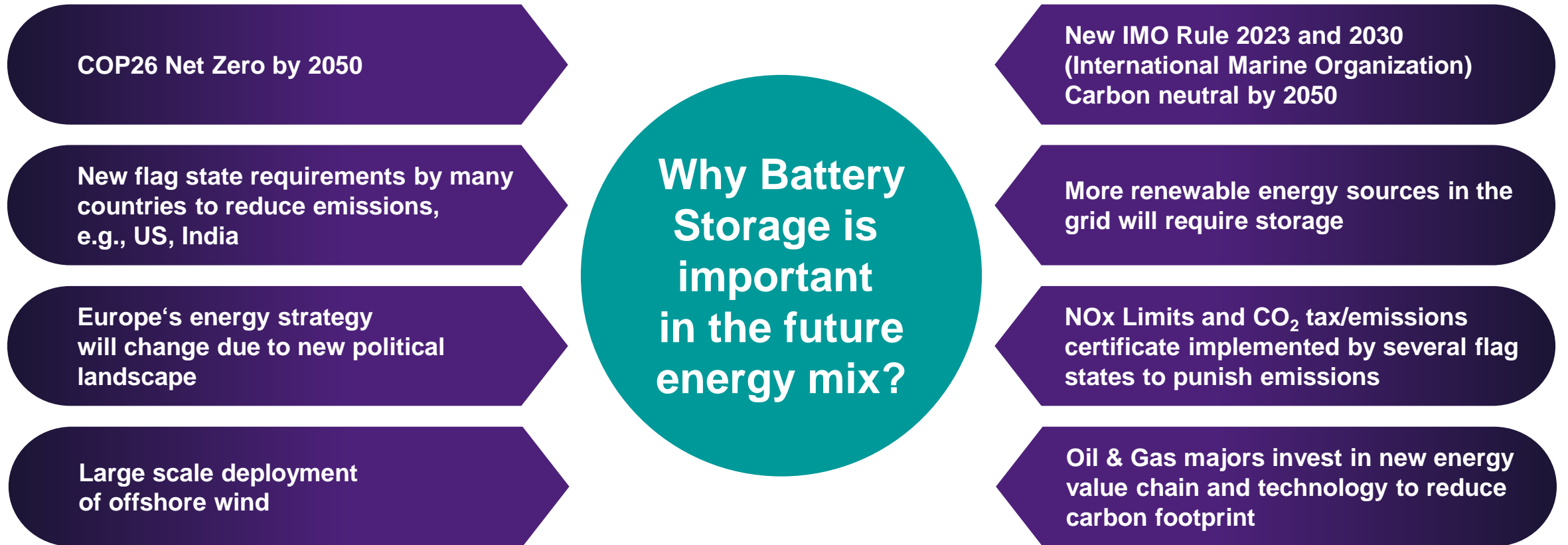
Battery Storage



Our energy storage technologies are fully integrable into any asset via our green- and brownfield approaches.

Market Analysis for Battery Storage

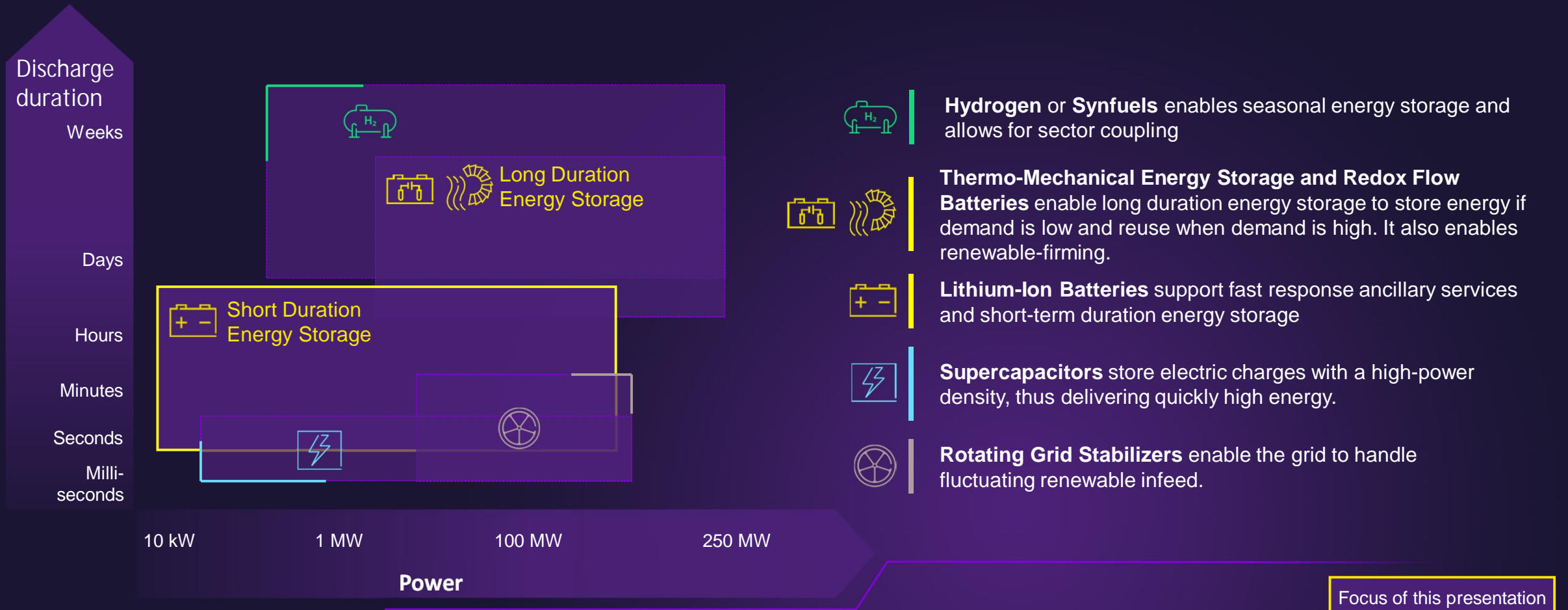
Global Political Incentives



Several geo-political drivers require battery energy storage for the future energy systems

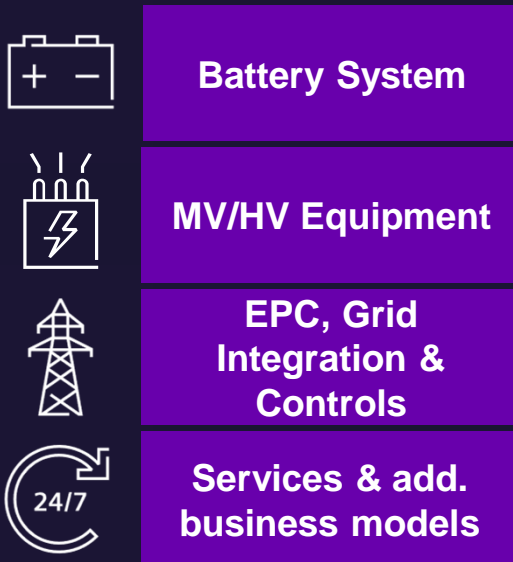
Our Portfolio

Both short and medium duration energy storage are key elements for the transformation of energy systems



With an existing product and our integration capabilities we are able to serve various industries and use cases

Our approach



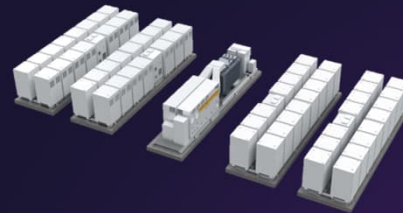
Providing **turnkey solutions** incl.

- **system design & grid integration**
- **I&C & perf. monitoring software**
- **service** concepts

Exploring **new business models** as natural extension to OEM role

Our portfolio

Grid connected



Integrated, modular and scalable BESS for **high-energy** applications

Off-grid



In-house BESS solution for **high-power** applications in **high safety environments**

Our customer segments



We enable a reliable, sustainable and digital grid through a leading portfolio

Our Grid Technology portfolio



- Grid Consulting
- IoT and Edge
- Grid Automation



- High-Voltage Direct Current (HVDC) – onshore & offshore
- Flexible AC Transmission System (FACTS)
- Substations – onshore & offshore
- Medium-Voltage Direct Current (MVDC)



- Power and Distribution Transformers
- Bushings, Instrument Transformers & Coils
- Renewables & Traction
- Switchgears
- Product bundles and systems



- Turnkey battery energy storage solutions (grid connected and off-grid/offshore)
- Li-Ion BESS
- System integration in HV grids
- Modular designs



- Product services
- Modernization and upgrades
- Long-term service concepts and grid integration

- > Siemens Energy offers BESS plus Grid Consulting & Service out of one hand**
- > Modularized Solution from 10MW and more**
- > Full transparency from Siemens Energy as a BESS integrator**
- > Service offering over the entire lifetime of the system**
- > BESS integration center Mülheim – visit us**

Siemens Energy Battery Energy Storage Solution



10MVA / 20MWh



PCS skid

- Cutting-edge technology for maximum efficiency
- Consisting of MV switchgears, inverters, transformers and communication device



Battery unit

- Durable design suitable for outdoor installation
- Outer dimension adjustable according to customer's need



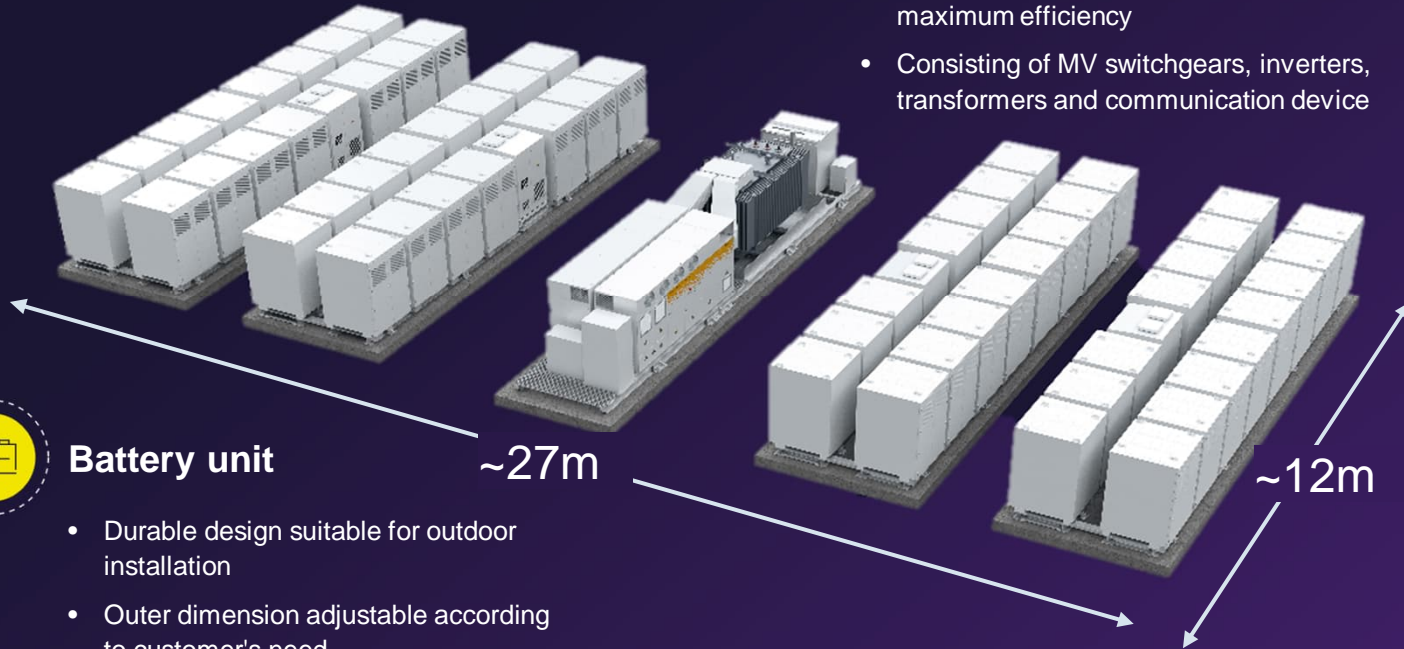
Safest containerized solutions following UL and IEC standards



Scalable to maximize utilization



Fast reaction in <200ms to full load



Flexible design using different established suppliers for batteries and inverters



High level of prefabrication limiting time on site



Digital solution optimizing dispatch based on production and / or market data



Long-term service optimizing component performance and ad-hoc aftersales support

Example of containerized solution 1h discharge

10MVA / 10MWh



PCS skid



Battery unit



Scope overview Siemens Energy BESS



BESS Core



Battery rack

Including:

- Battery cells, modules, racks
- Fire detection & Protection
- Battery Management System
- HVAC

Electrical and Battery control Gamesa



Inverter

5 MVA
 $Batt_{max} 1500V_{DC}$
 $LV 810V_{AC}$

Controls

Transformer

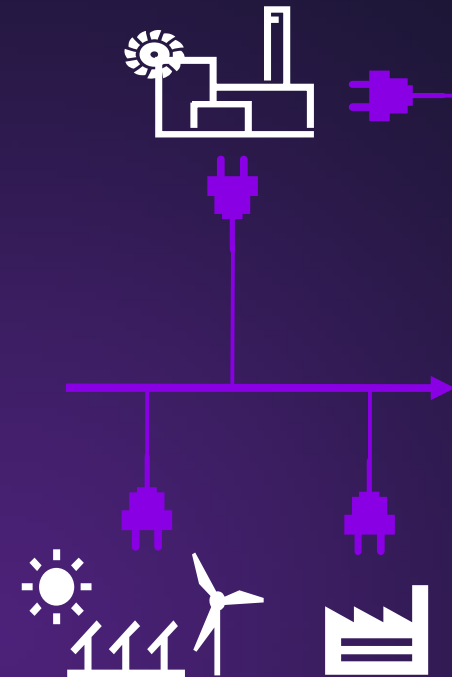
Medium Voltage

MV & LV switchgear installed in Power Control Center
 LV transformer & distribution

Instrumentation & Controls

Automation Server (AS) System
 Centralized I/O cabinets (ET-200) located in PCC
 PROFINET field bus network to BESS Group controller
 Main Server Rack, Control Software

Controls and Integration



HV connection

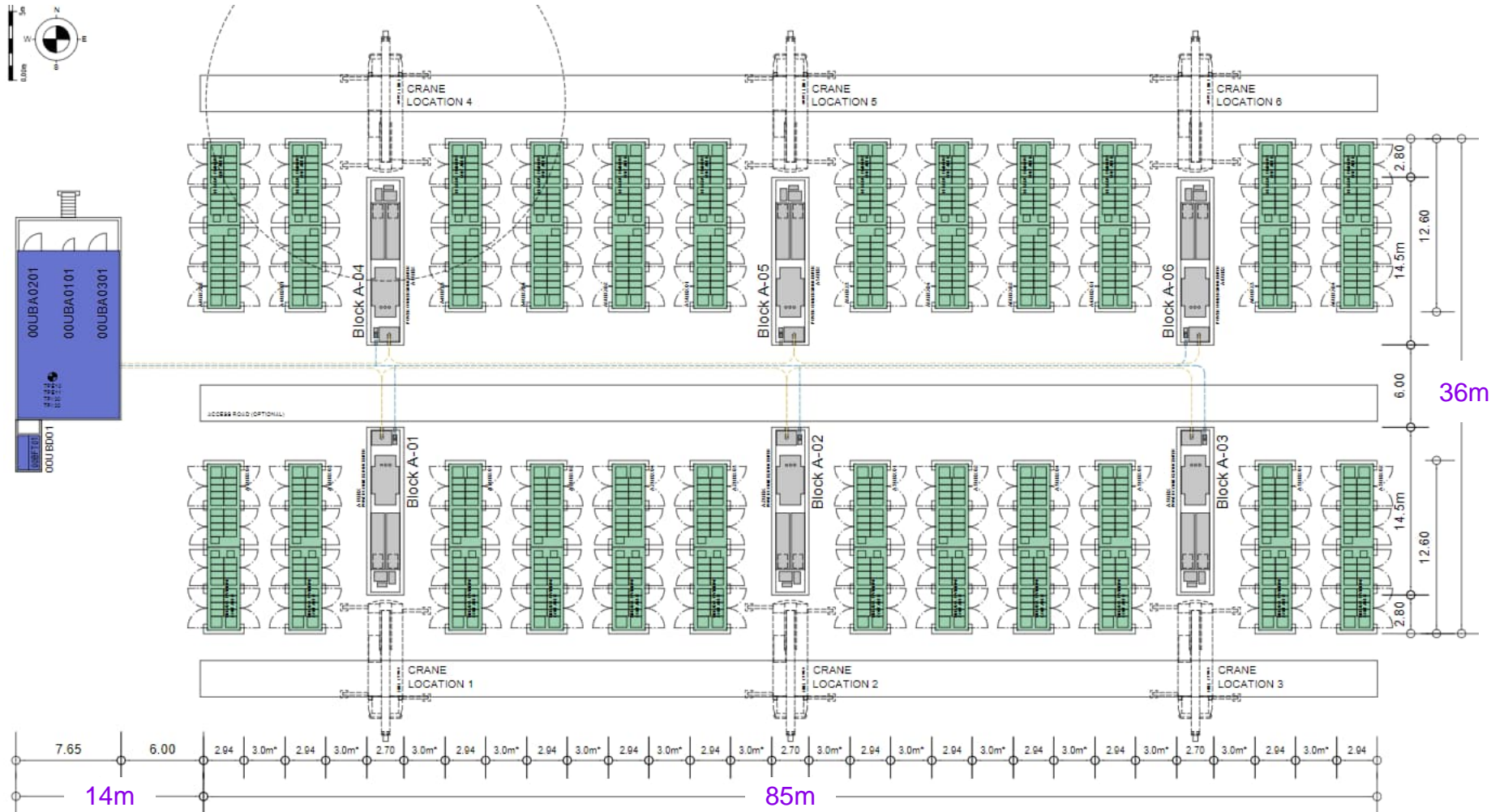


High voltage grid connection



System integration, Erection & Commissioning, logistic, project management, quality,
 Power cables & trays, foundations, civil works, steelworks, grounding

Layout 50MW/100MWh



- Battery Container
- PCS Skid
- MV Switch; Aux Trafo

Service offering

Service packages

	Service	Advisory Service	Extended Service	Full Scope Service	Asset Management
Monitoring	Help Desk	◆	◆	◆	◆
	Data collection	◆	◆	◆	◆
	Remote monitoring		◆	◆	◆
	Asset operation				◆
	Asset Manager				◆
	Dispatch Optimization Software				◆
	Annual business review				◆
Maintenance	Software updates			◆	◆
	Preventive maintenance			◆	◆
	Corrective maintenance		◆	◆	◆
Parts	Initial system warranty	<i>Incl. in new build contract</i>	<i>Incl. in new build contract</i>	<i>Incl. in new build contract</i>	<i>Incl. in new build contract</i>
	Extended warranty			◆	◆
	Additional spare parts			◆	◆
	Consumables			◆	◆
	End of life management	◆	◆	◆	◆
Guarantees	Nameplate capacity			◆	◆
	Round trip efficiency	<i>Opt. in new build contract</i>	<i>Opt. in new build contract</i>	<i>Opt. in new build contract</i>	<i>Opt. in new build contract</i>
	Degradation / Augmentation			◆	◆
	Availability			◆	◆
Extended Services	Business risk management				◆
	Financial management				◆
	System operation				◆

BESS References

Mauritius Republic , CEB & GCF Energy Storage Projects

3x4MW/2MWh & 1x2MW/1MWh – Jinfei; La Tour Koenig; Anahita; Wooton



In operation since 2021

4 Battery Energy Storage Systems
14 MW/7MWh LiO Battery storage system
inverters, step-up transformer,
20 kV MV switchgear container, auxiliary
transformers for each substation.

Grid stabilization
Different sites at same time
Limited area for installation.
Supply chain and integration management

Peak shaving
Frequency regulation
Voltage support

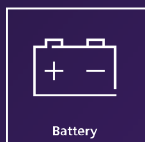


Black start with use of batteries Marsh Landing, North America



PROJECT TYPE

Low Carbon Solution



Battery



Gas turbine

Customer Challenge/Driver

Flexible generation due to renewable penetration in energy mix
Restart electricity to auxiliary systems in the case of an outage or blackout situation



Portfolio Elements

- Battery Energy Storage System (BESS), transformers, switch gear, electrical, civil and structural engineering and control system modifications



Scope

Our role: solution provider w/ engineering, procurement and construction
Customer: Clearway Energy Inc., North America

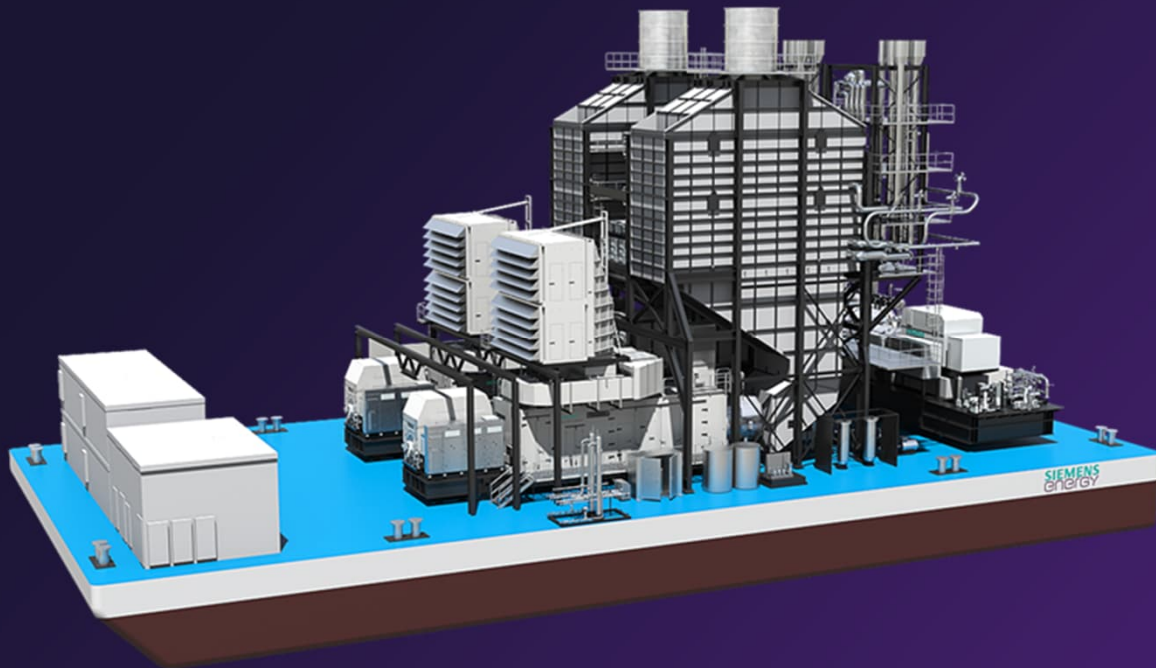


Customer Benefit

- Carbon-neutral way to (re-)start one generator unit
- Up to three attempts within one hour to restart one unit
- grid reliability in the Bay Area
- securing the power grid

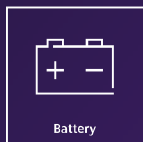


Hybrid power plant solution with integrated battery energy storage

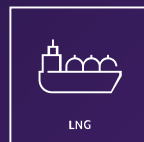


PROJECT TYPE

SeaFloat, Fuel Switch



Battery



LNG

Customer Challenge/Driver

Intensive costs for land acquisition; land scarcity, Reduce country risk, Long duration of permitting process



Portfolio Elements

SCC6-800 2x1 Barge + SIESTART Battery Solution



Scope

Our role: Power Island

Partner: ST Marine for Barge, Owner for site preparation



Customer Benefit

- Enabling frequency regulation control while constant power plant load
- Providing grid services even during plant shutdown
- Reduced CO₂-emissions compared to black start diesel or gas motors
- black start capability through SIESTART

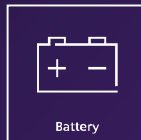


Siemens Energy modernizing industrial power plant with key components



PROJECT TYPE

Low Carbon Solution



Battery



Gas turbine

Customer Challenge/Driver

- Depending on maximum availability of industrial power plant and need for quickly responding to fluctuations in power demand
- Reducing emissions



Portfolio Elements

SGT-800 gas turbines
SIESTART Battery energy storage solution



Scope

Our role: solution provider w/ engineering, installation and commissioning
Customer: BASF Schwarzheide GmbH



Customer Benefit

- black start capability through SIESTART
- Reduced CO₂-emissions compared to black start diesel or gas motors
- Enabling island operation to ensure an independent power supply when needed

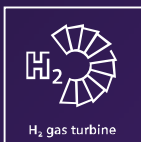


Siemens Energy providing Leipzig with a climate neutral power supply

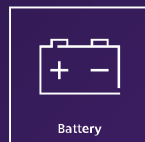


PROJECT TYPE

Decarbonization Journey



H₂ gas turbine



Battery



Fuel shift hybridization

Customer Challenge/Driver

Make power and district heating independent from lignite power/heat and serve the strategy to decarbonize the city of Leipzig, Battery solution contributes to decarbonization journey by providing black start capabilities and improving grid stability



Portfolio Elements

Two SGT-800 gas turbines, two SGen-100A generators, SIESTART Battery energy storage solution



Scope

Our role: solution provider w/ engineering, installation and commissioning
Customer: Stadtwerke Leipzig



Customer Benefit

- black start capability through SIESTART
- Contributing to a more reliable grid by providing non sync. grid stabilization
- Reduced CO₂-emissions compared to black start diesel or gas motors



Contact page



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