Storage – Armazenamento de Energia

Sessão Técnica do Ciclo dedicado à Eficiência Energética

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You are never too young to lead
and we are never too old to learn

Kofi Annan

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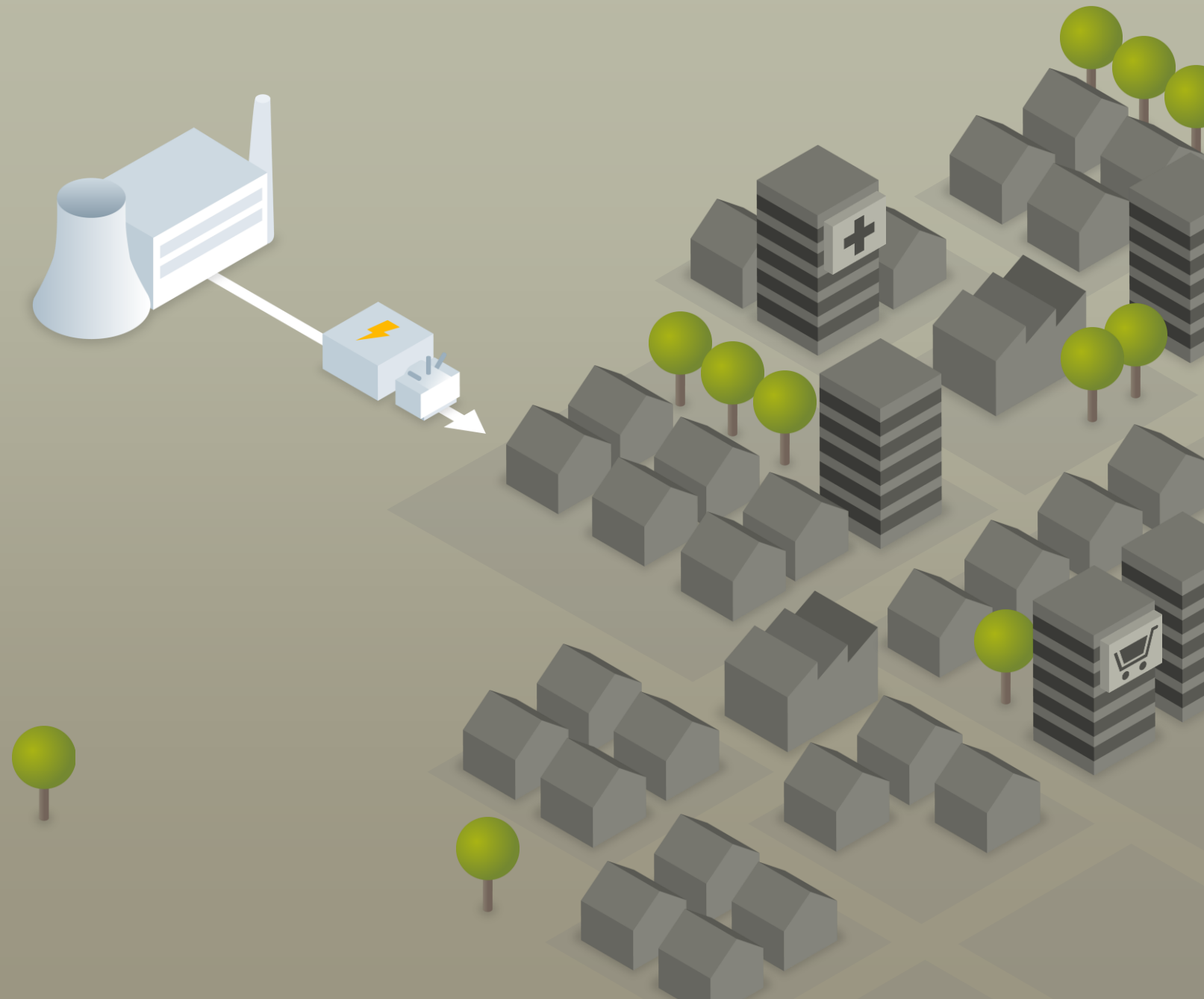
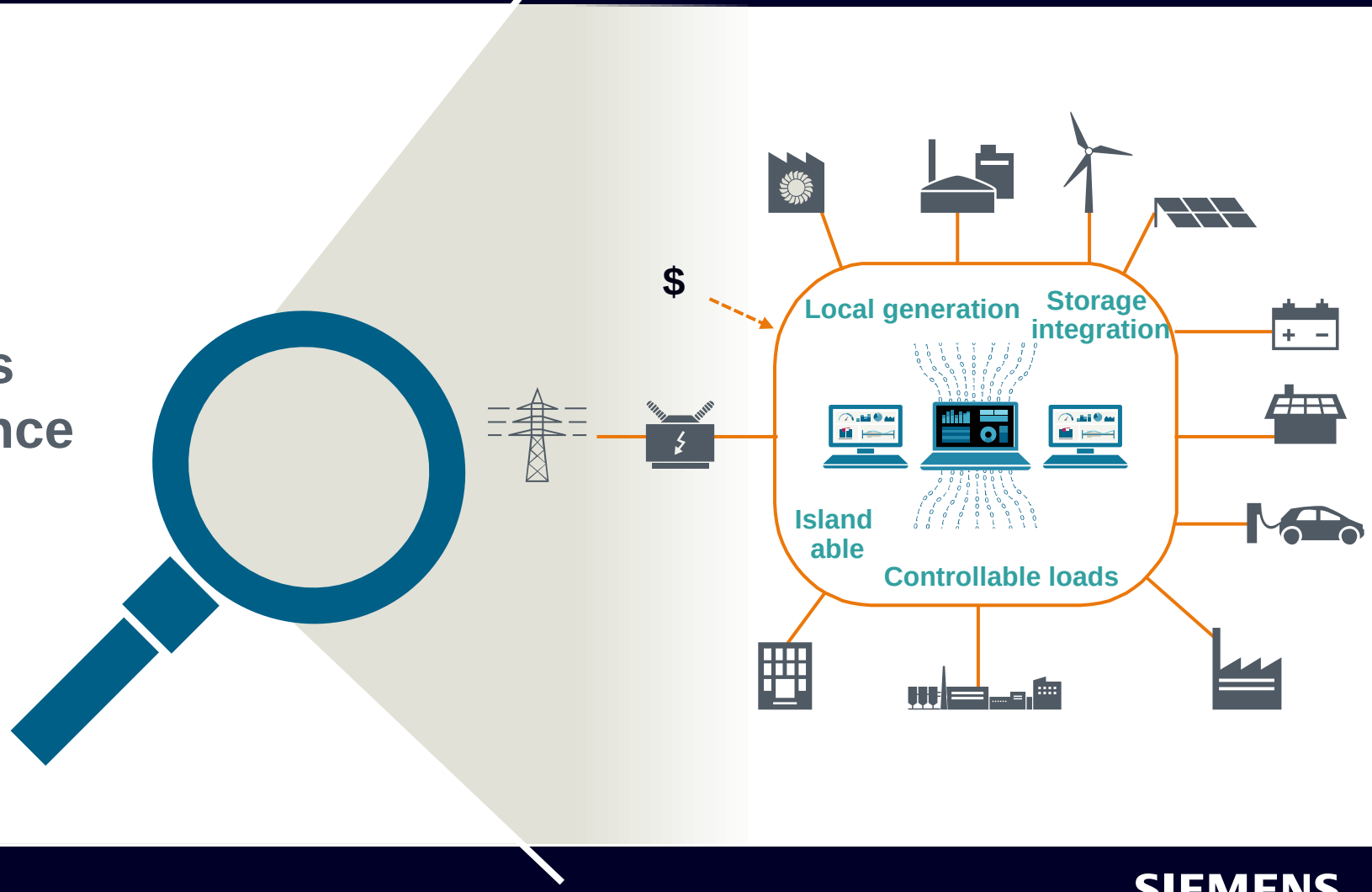
The energy system back in the day



The energy system today

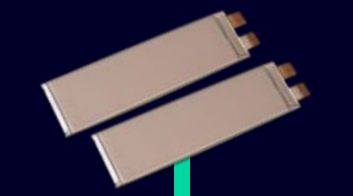
From centralized, unidirectional grid to distributed and bidirectional in Decentralized Energy Systems

- Increased Reliability
- Reduced Energy Costs
- Improved Grid Resilience
- Lower Emissions
- Enhanced Control



What is BESS?

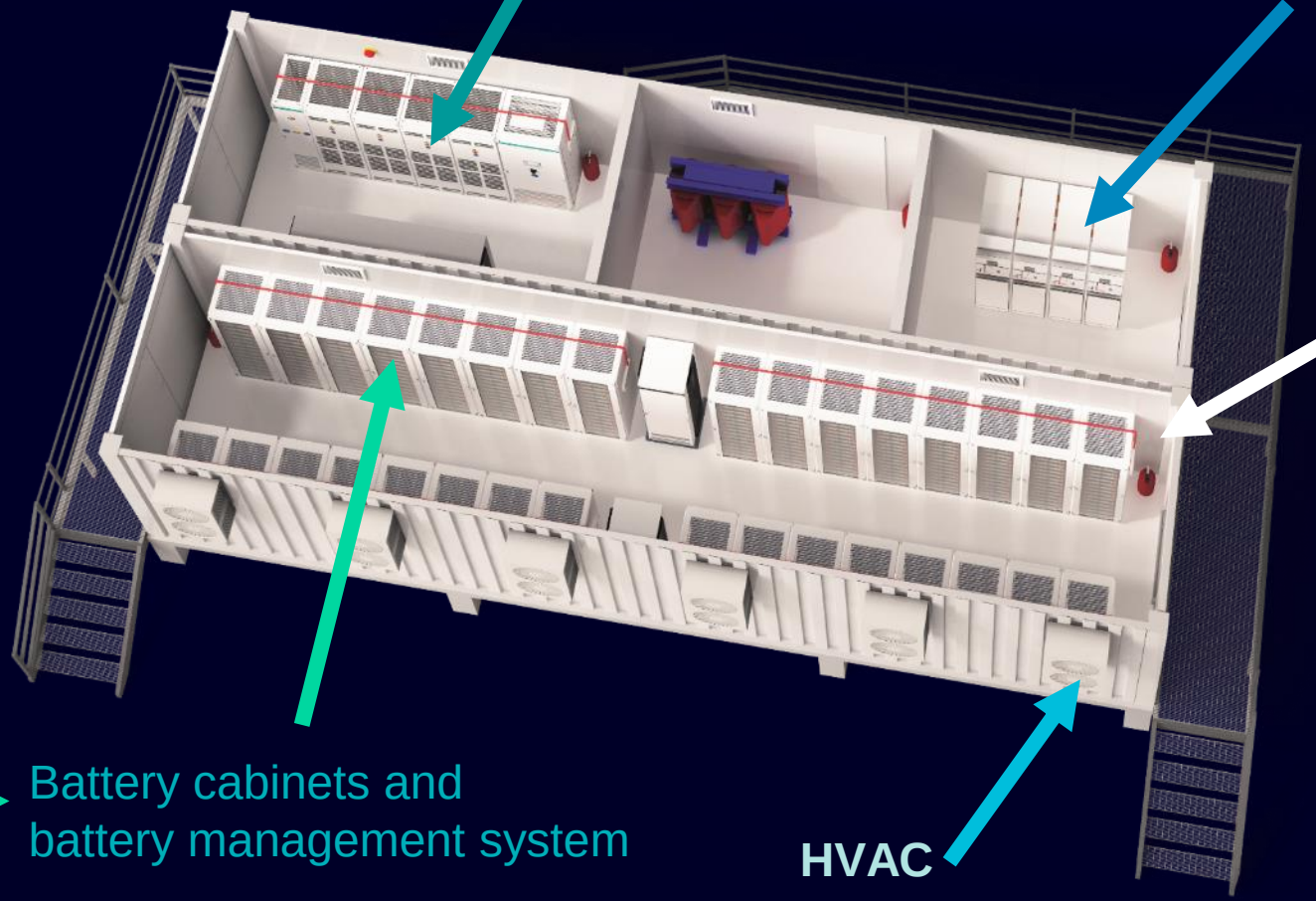
Modular, scalable arrays of proven technologies integrated at utility and industrial scale.



BATTERY CELLS

BATTERY MODULES

BATTERY CABINET



Power Control Electronics

Low voltage and medium voltage components

Fire detection and extinguishing system

Battery cabinets and battery management system

HVAC

Intelligence:
Array Controls & Application Software

Connection:
Electrical & Other Balance of Plant

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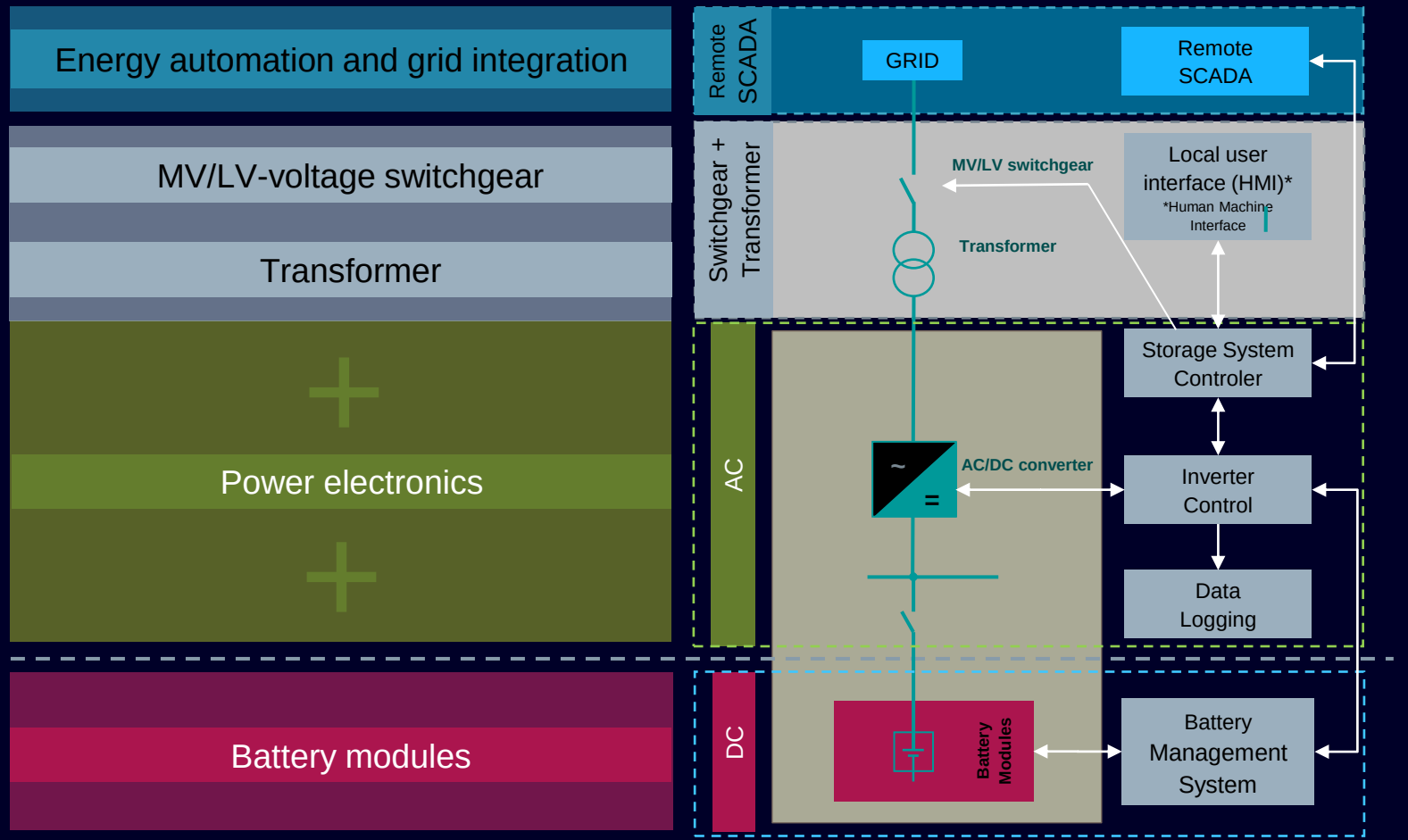
Overall BESS System architecture



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Key Applications

1	2	3	4	5	6	7	8
Frequency Regulation	Microgrids & Islands	Critical Power	Energy Cost Control	Generation Enhancement	Capacity Peak Power	Renewable integration	T&D Enhancement
• 0,5 to 1 h	• up to 4h	• up to 1h	• up to 4 h	• up to 1 h	• up to 6h	• up to 4h	• Up to 4h

Insurance

3. **Critical Power**
5. **Generation Enhancement**

Save cost & protect environment

2. **Island / diesel offset**
4. **Energy Cost Control (peak shaving)**

Make Money

1. **Frequency control**
6. **Capacity / Peak Power**
7. **Renewable Integration**
8. **T&D**

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Applications and use cases

Use cases	Applications
 **Electricity supply for microgrids/ isolated grids**	• Black start • Ramping control • Time shifting • Capacity firming • Diesel offset • Frequency regulation (Primary Control Reserve) • Peak load management
 **Electricity supply for industry**	• Black start • Backup energy • Diesel offset • Peak load management
 **Integration of renewable energy**	• Ramping control • Time shifting • Capacity firming
 **T&D upgrade deferral**	• Peak load management • Ramping control • Frequency regulation

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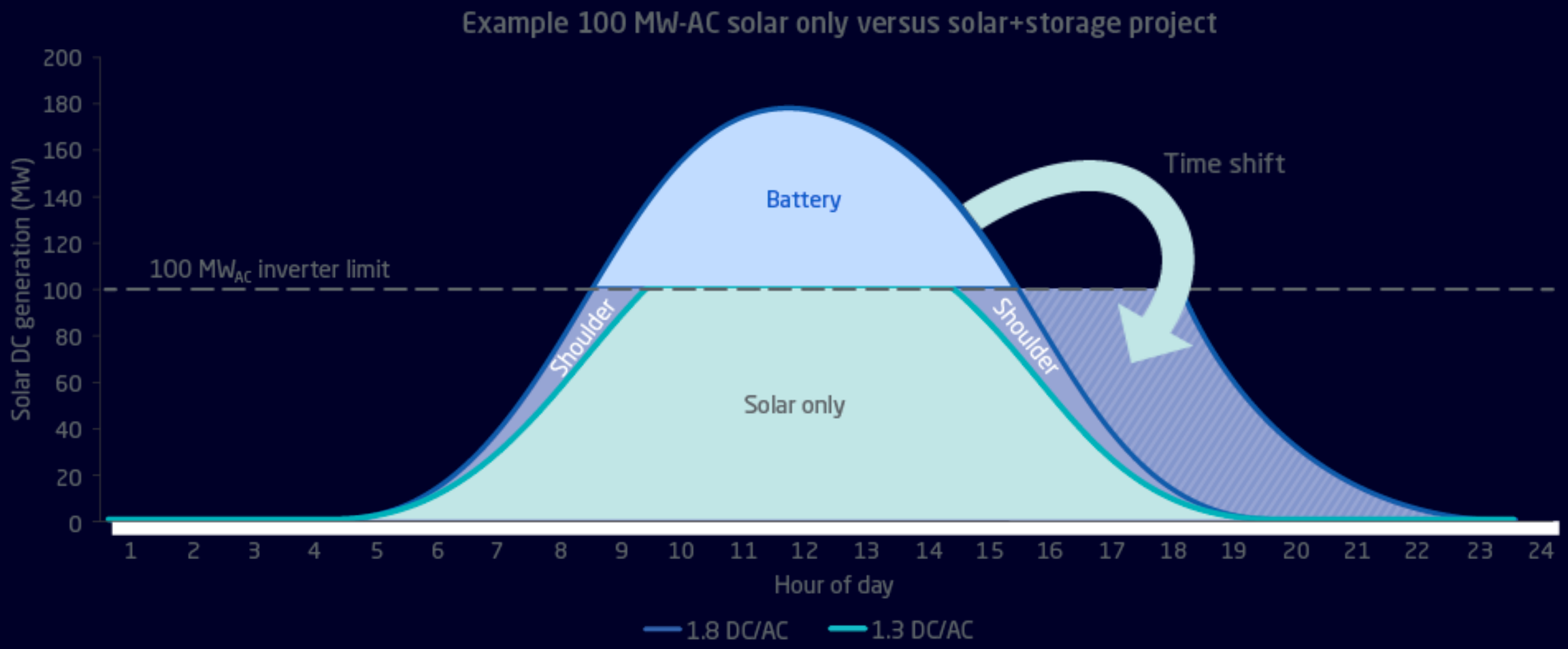
Practical case for PV+ Storage (Time shifting + Ramping Control)



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Creating Self-Sustainable Islands with Microgrid Control System

Challenge - accelerate the energy and digital transition in Azores and Madeira

Solution

- 24 MW battery power plant
- 16 MWh of energy storage capacity
- Inverters, batteries, MV/LV, P&C and transformers
- Spectrum PowerTM Microgrid Management System

Main Pillars

- Sustainability - leverage renewable penetration, reduction of fossil fuel consumption and CO2
- Digitalization – Siemens Microgrid Management System allows optimal operation of the Island

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Terceira Island, Portugal

Energy Storage and Microgrid Management System for Island towards sustainability

Customer environment

Grid with high complexity:

- Isolated grid (electrical island)
- Network size (tip ≈ 33 MW)
- Very diverse energy mix including fuel / diesel, water, wind, solar, geothermal and waste burning.

Use case

- Resiliency and energy independence
- Prediction of consumption and energy production
- Energy cost reduction
- Operation optimization
- Renewable integration
- Fossil fuel consumption reduction

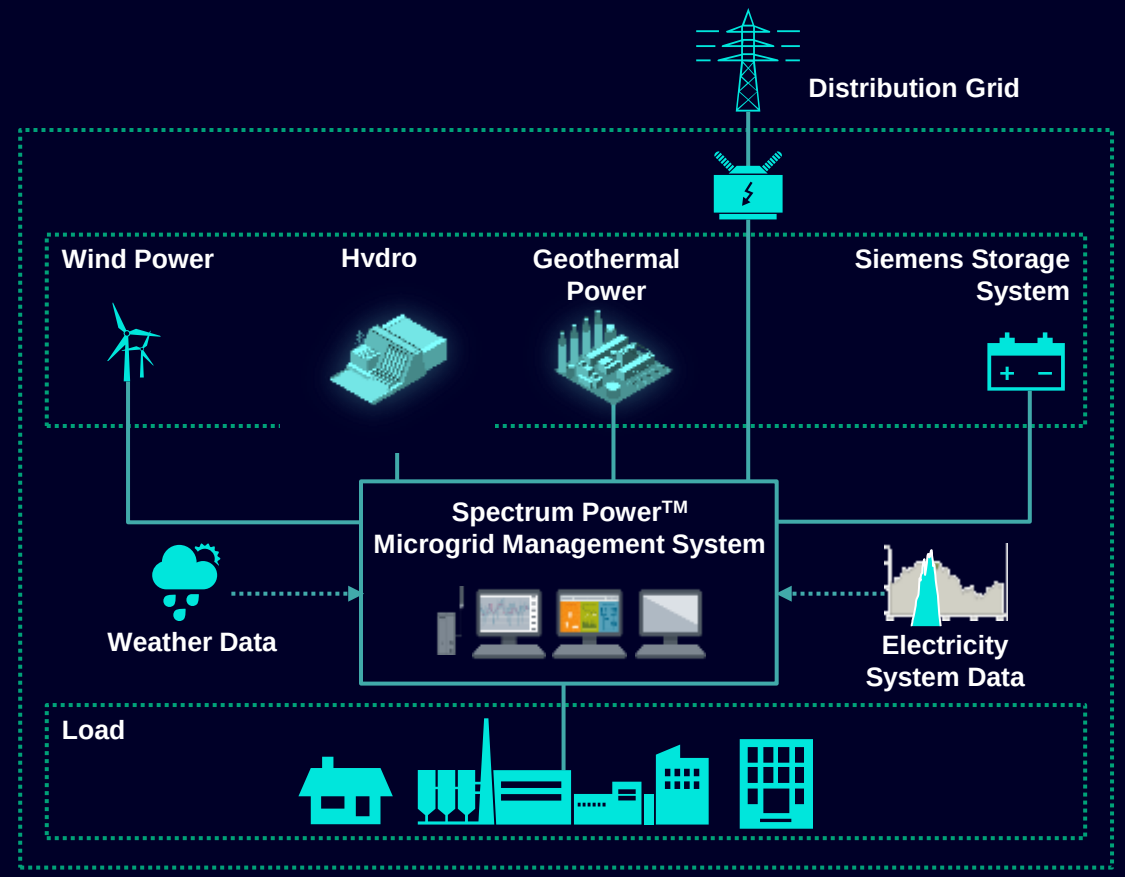
Component

Siemens Storage System
Spectrum Power™ Microgrid Management System

Features

- Real-time monitoring
- Load and generation forecasts
- Renewable production forecast based on weather forecast
- Calculation of the optimal operation strategy of the Micro-Network
- Economic mode - minimize cost of production
- Ecological mode - minimize emission
- Calculation of required reactive power reserve
- Load shedding

Configuration



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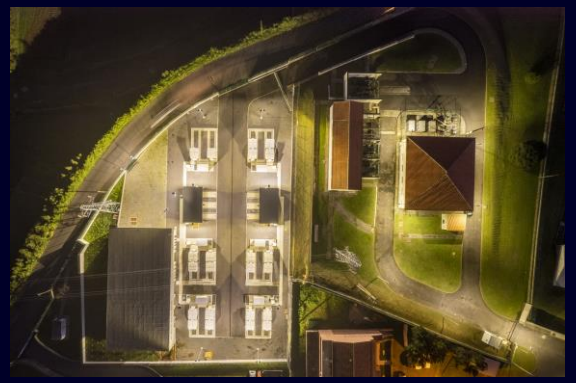
Sustainability KPIs



~67%
Increased share of renewables
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~10,736 t
Reduction of fuel oil consumption per year

>33,883 t
decrease of CO2 emissions per year

Note: These values include the expansion of a 6 MW geothermal power plant

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