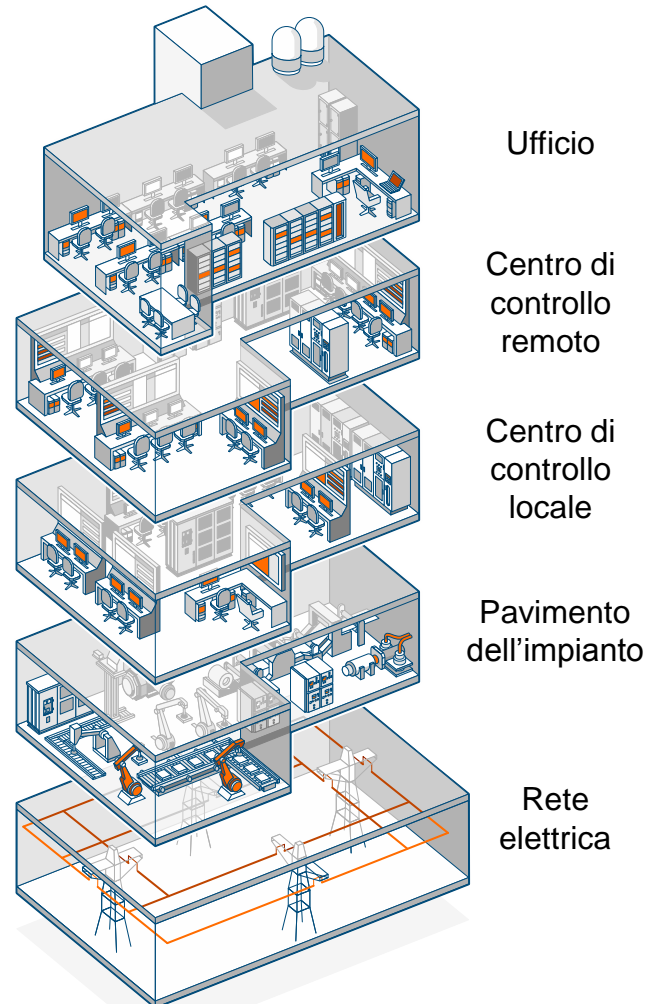


L. Ambrosi, Global Product Manager – Remote Services and Optimization

Smart Energy Systems @ABB

IEEE Forum for RESEARCH and TECHNOLOGIES for SOCIETY and INDUSTRY

Software is one of the main pillars of ABB products and solutions



Software embedded

- From protection logic till interactive features of our instrumentation components and robot controls, embedded software is a key component of many ABB products and systems

Software systems

- Focus on control and harmonize operational processes in industrial plants, from chemical facilities till power grids

Enterprise software

- After recent acquisitions, this allows ABB to fill the gap between operational technologies and information technologies and business intelligence, supporting the decision process for operations

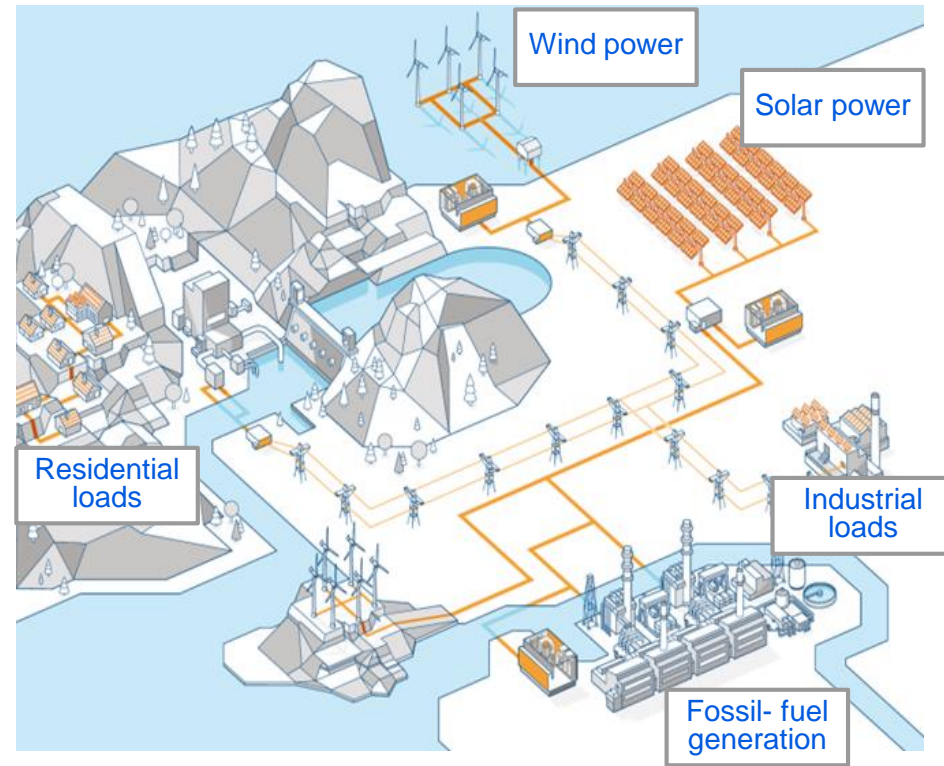
Renewable Integration

Sustainable access to electricity anywhere

Microgrids powered by renewable energy sources

Connected μ G

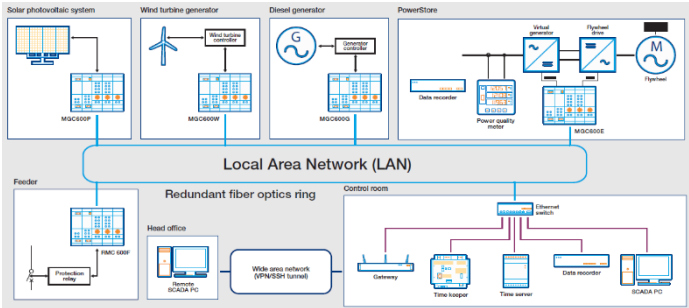
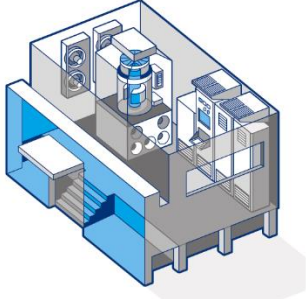
Isolated μ G



Microgrids achieve secure power generation with grid-quality electricity while integrating renewable energy
- SEU in Italia -

ABB microgrids and RE integration

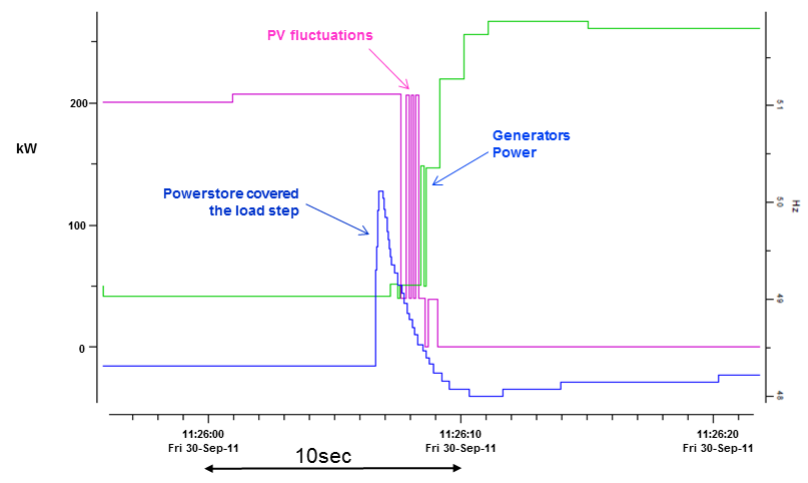
Technology overview

Microgrid Plus system	PowerStore
<p>Specially designed networked control system responsible for coordinating the operation of hybrid power stations</p>	<p>Grid stabilizing system that offers real and reactive power to enable intermittent renewable energy to be integrated into grids</p>
	
<ul style="list-style-type: none"> • Maximizes fuel savings • Optimizes use of renewable energy • Guarantees optimum loading and spinning reserve in fossil fuel generators • Distributed logic enhances reliability and scalability for future system expansions 	<ul style="list-style-type: none"> • Can be used in isolated grids or in grid support mode • Maximizes fuel savings through highest possible renewable penetration • Ensures high power quality by stabilizing renewable energy generation

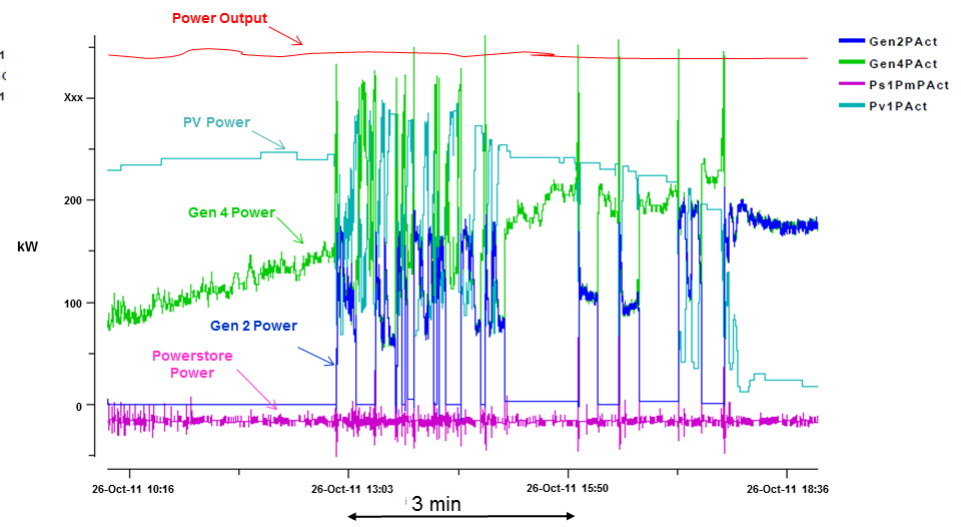
PowerStore and M+ System

Ensuring a stable microgrid electricity network

PowerStore reduces instabilities in the grids by managing instabilities caused by load steps and RE fluctuations in grid connected use cases



Load step and PV power fluctuations covered by power injection from the PowerStore



Stable power output ensured through quick power injection and absorption capability of the PowerStore



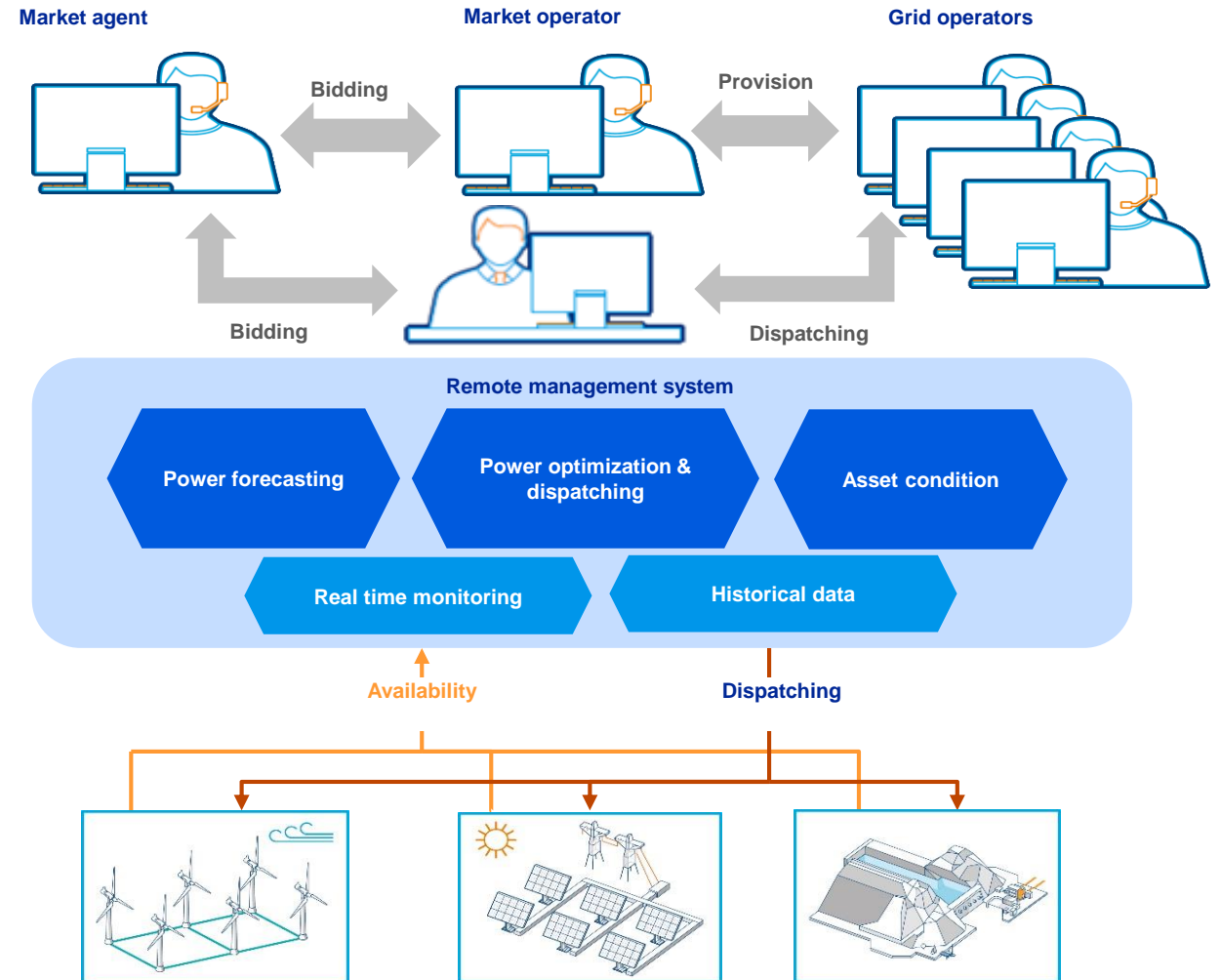
Security of supply

Virtual power plant provides grid support with renewable power



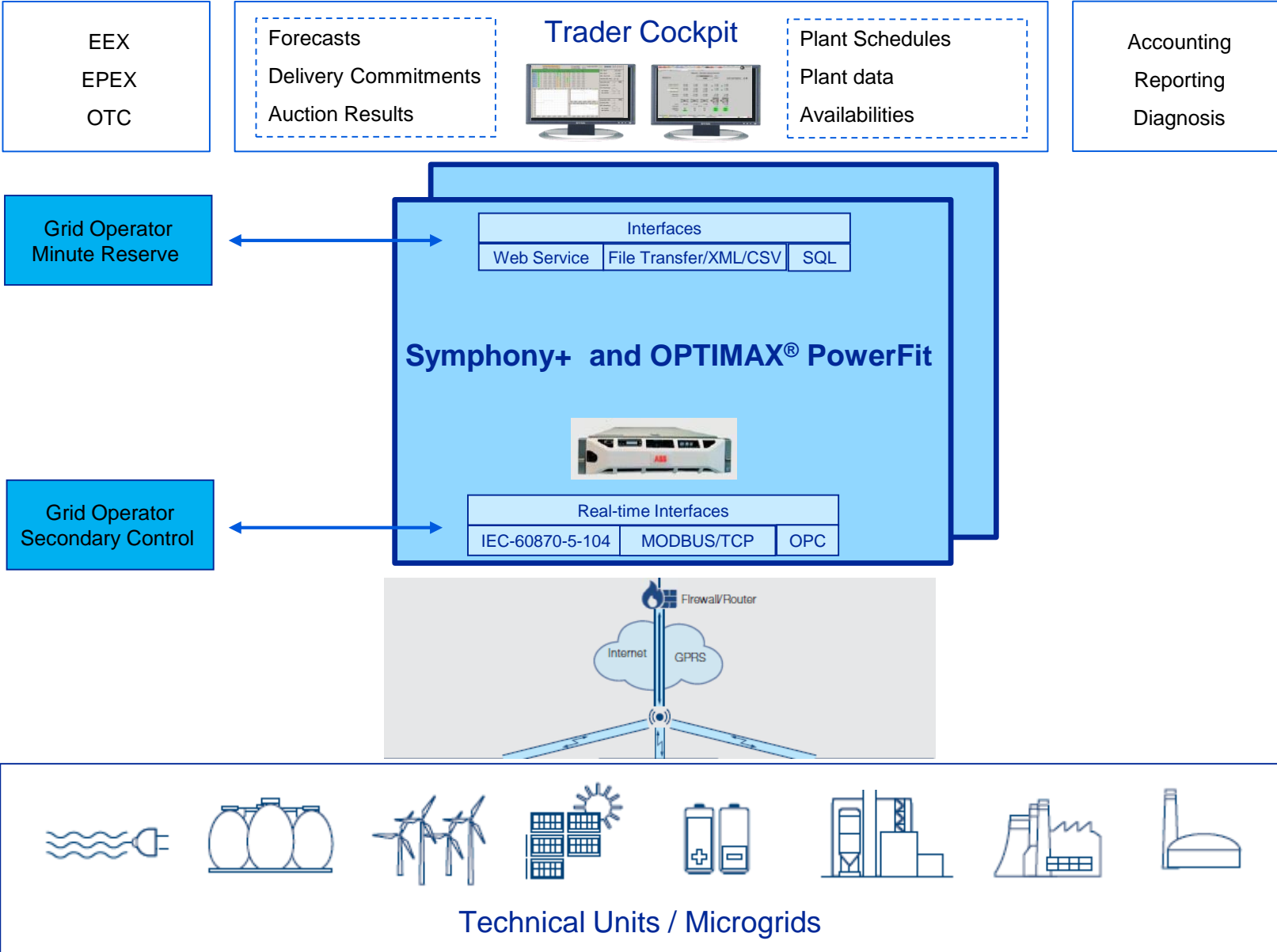
Next Kraftwerke, Germany

- Remote management of more than **2000** renewable plants (biomass, wind, solar) up to **2GW** aggregated peak power
- Optimal power dispatching to turn the plants into a Virtual Power Plant
- Intraday energy planning using integration with power forecasting system
- Provides balance power support to 4 grid operators in Germany



Virtual Power Plant

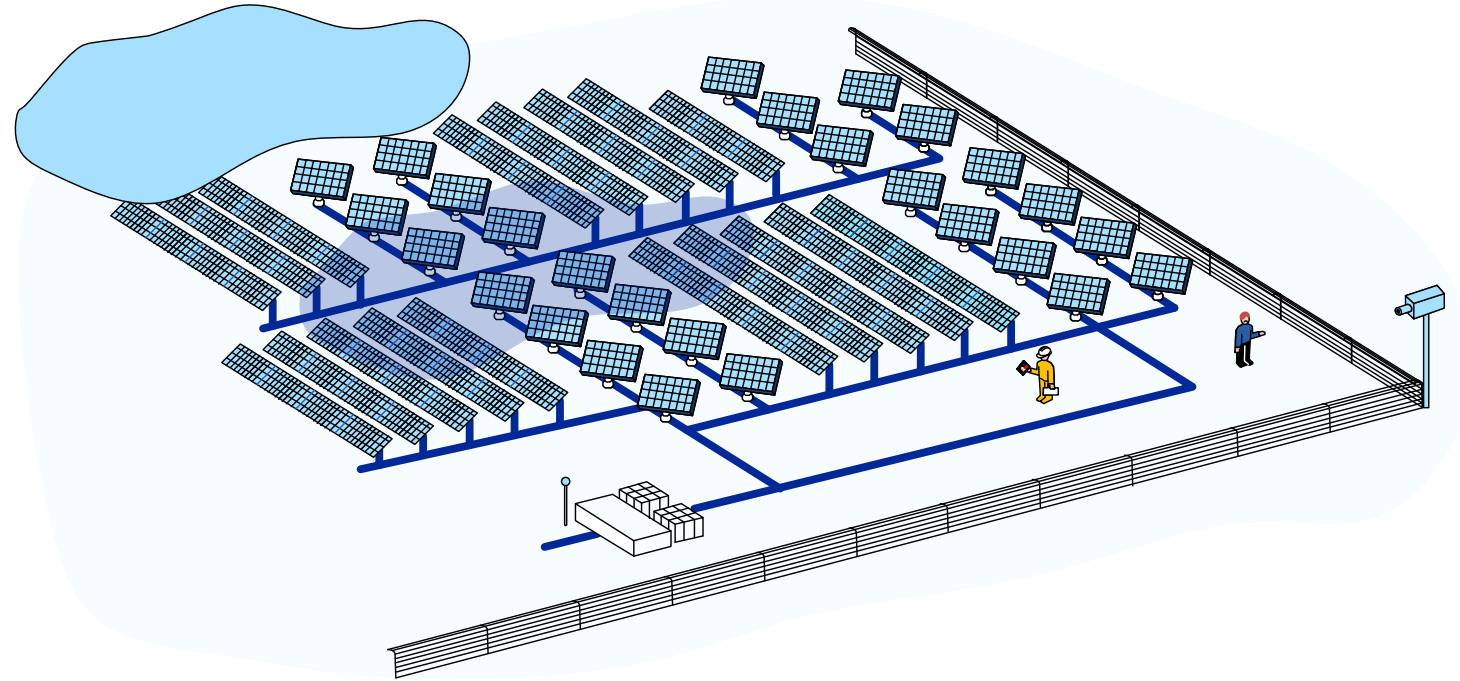
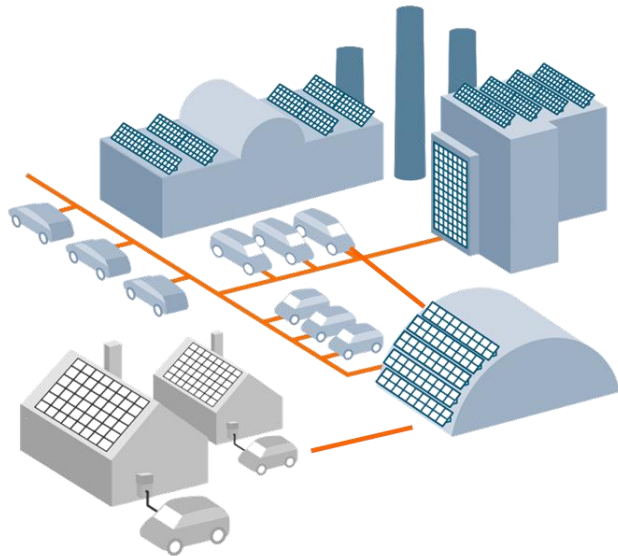
Detailed architecture view



Value Added Services

Some examples

- Building energy management integration
- Short term forecasting for PV and WT
- Prognosis and Condition monitoring for grid assets: WT, PV panels, transformers, breakers, etc.



Smart Generation and Distribution

Smart Lab

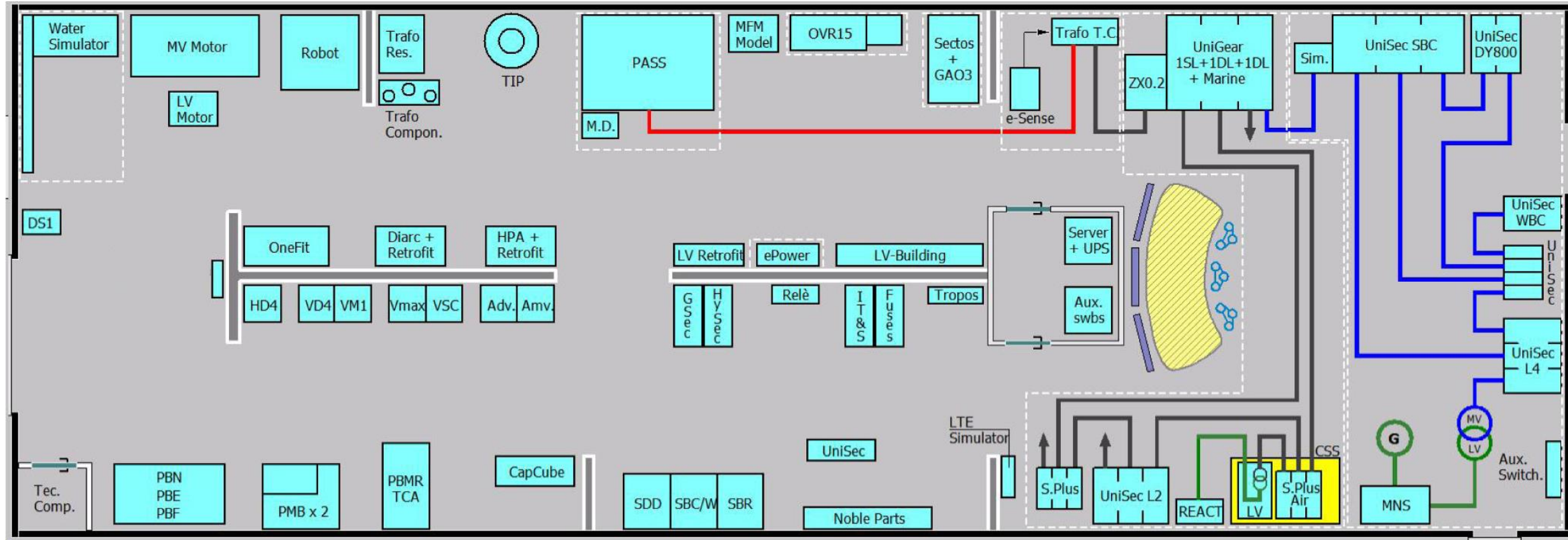


ABB Plants and offices in Italy

Italian technology in the SmartLab



Smart Lab



Mega trends: Renewable integration, Smart Grids, Energy saving in water and electrical distribution, Micro Grids, domotic and energy storage, Internet of Things, Services and People

- Grid behaviour:
 - Thanks to interconnected components, through telecontrol and communication systems, its possible to simulate the behaviour of radial and meshed smart grids, rural networks and microgrids. Furthermore we can simulate components for building automation systems, data cente and energy efficiency
- Simulation
 - Water and electrical network simulation to analyze behaviour, efficiency and reliability
- Reliability
 - Trhough simulation, we can have real filed conditions to understand which components has to be used and which control strategy to implement in falut situation
- Communication
 - Ethernet and wireless communication networks, both on public and private networks like GPRS or LTE

Who is using the lab?

- The lab is used by customers, schools and Universities, Research Centers and consultants
- First version visited by 3000 people, of which nearly 1500 only in the last 6 months
 - Kalasatama consultants from Finland won the price for the longest visit with 3 hours and 45 minutes
 - Maximum number of visitors in one day: 220 students (ITIS Day)
 - Maximum number of Universities in one day: 7 (EE Day)
 - Maximum number of nationalities in one day: 29 (OEM Days)
- Current version has been prepared in [2 months](#)
 - We have products on display from each of the 13 different factories of ABB in Italy
 - We do cooperate with other companies as well, as National Instrument
- Take advantage of your visit to the Smart Lab to see also our Lean Manufacturing organized plant, so beautiful to be also selected for [TV ads](#)

Power and productivity
for a better world™

