ETIP Wind

EUROPEAN TECHNOLOGY & INNOVATION PLATFORM ON **WIND ENERGY**

Energy Management System

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What Energy Management System is

- What is it
  - A suite of software tools used today by the players involved in the energy sector to manage, operate and trade electricity
- How is used
  - **Generators** – manage the generation production
  - **Consumers** – manage the energy consumption
  - **Grid operators** – ensure that frequency and voltage across the grid are within the permitted values
  - **Traders** – optimize the production/consumption across the entire portfolio

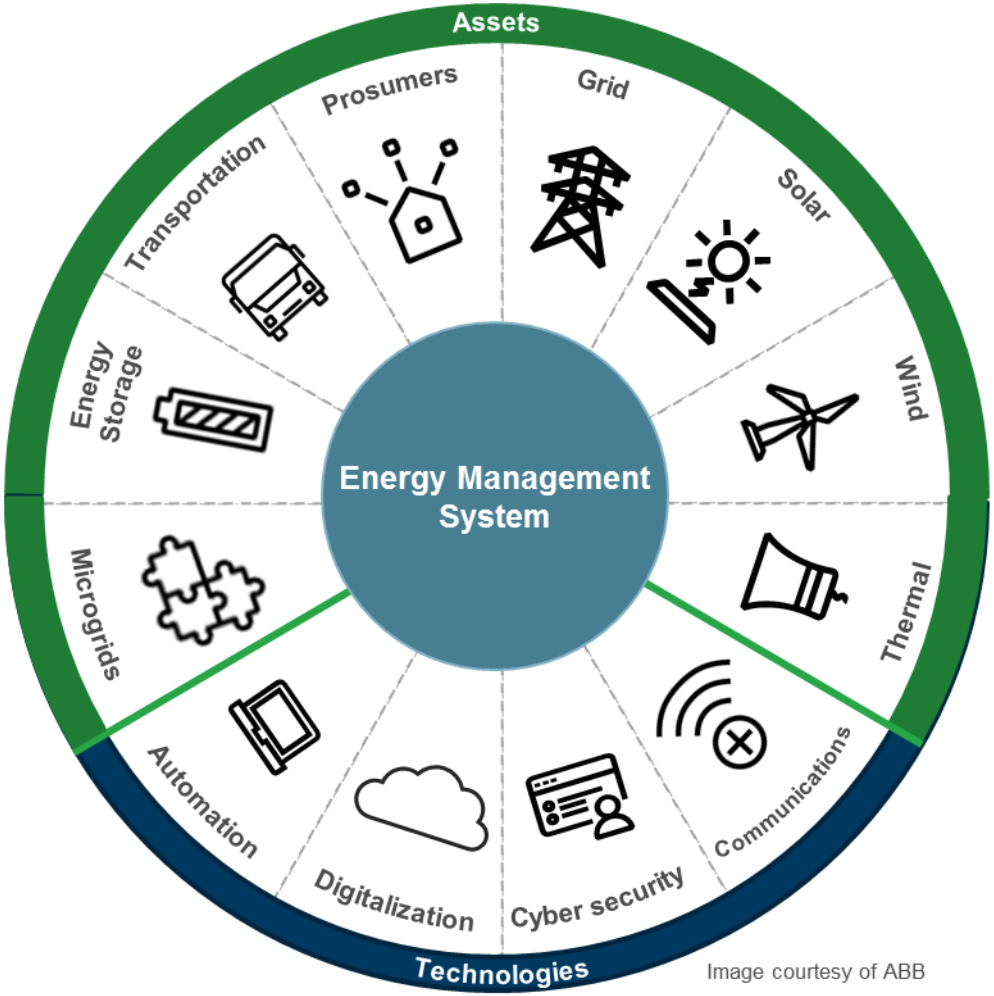

Image courtesy of ABB

Why we need to reconsider energy management

- Market
  - Rapid generation growth at the edge of the grid, with millions of assets connected to the power system
  - Replacement of large and centralized production facilities with distributed and remote generation
  - New type of assets: renewables, EV[1] charging, batteries, prosumers
- System needs
  - Power flexibility needs to be provided by the new assets
  - Consider weather changes and associated power production
  - Consider customer behavior and transportation patterns
  - Consider the amount of interconnected systems, sub-systems and devices
- Technology
  - New technologies emerge: cloud, machine learning and artificial intelligence, fast communications and high power computing
  - New concepts to interact with the system

[1]EV = Electrical vehicles

Why investing in EMS

- Decarbonizing the energy sector
  - EMS facilitates integration of renewable and other assets in the operational and planning processes of power grids
  - Improved predictability of power production and grid analysis and control
- Reducing cost of energy
  - Improve performance and productivity of assets
  - Improve operations, maintenance and trading processes
  - Allow trading of renewable generation and power flexibility
- Maximizing the use of new technologies
  - Derive accurate health condition of components using data analytics, machine learning and artificial intelligence
  - Automated, optimized and highly reliable solutions based on data analytics and high power computing
  - Fast and seamless reaction to system events based on high speed communications, predictive and real time scenarios
- Looking into the future
  - Today's power system is operated using solutions and concepts designed in 70's
  - New technologies and new concepts allow us to do more and better

Key points to take away

- High ambitions to decarbonize the energy sector
- The energy system is changing, we need to change the way we manage the energy today
- We (Europe) are in the middle of the energy transformation and more investment is necessary to finalize our aspirations
- R&D funds are necessary to design and define the way forward, considering all use cases and all players implications

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