

PUBLIC

---

PETRI HOVILA 13.6.2019

# **Evolving energy system requirements**

Smart Otaniemi seminar

Innopoli 1, Espoo



---

# Smart Otaniemi seminar

Ongoing revolutions in ABB domains

## The Energy Revolution



## The Fourth Industrial Revolution



## The eMobility Revolution



**Utilities**

**Industry**

**Transport & Infrastructure**

# Evolving energy system components

Power distribution system point of view

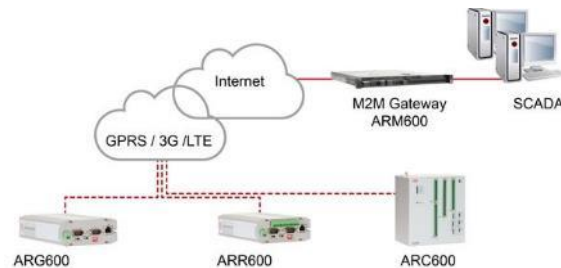
## Primary components

- New elements
  - Production
  - Storage
  - Charging, eMobility
- Reliability
- Long term investments



## ICT infrastructure

- Challenges
  - Cybersecurity
  - Privacy, GDPR
- New technologies
  - Distributed computing
  - 5G communication



## Operation

- Complexity
  - Grid connected microgrid
  - Offgrid or energy islands
  - Nested microgrids
- System thinking in planning
- Predictive operations
  - AI
  - New sensors
- Safety



## We are part of energy system

- Prosumers
- Energy communities



plan – scale – optimize - engage

---

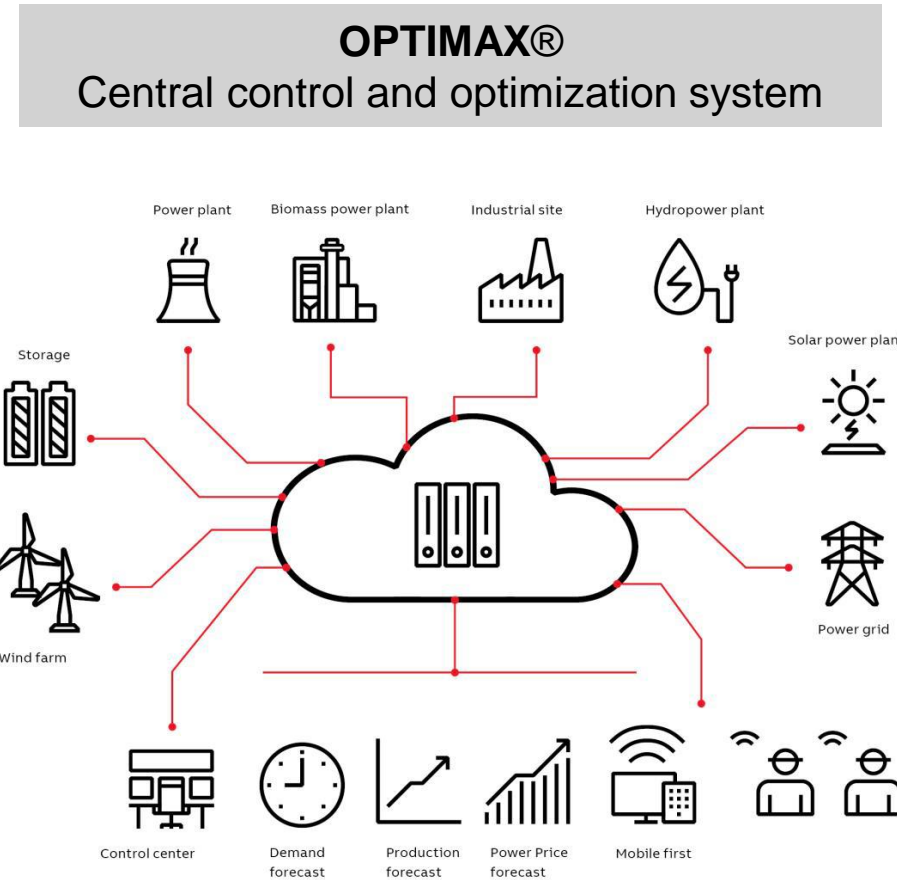
# What we can deliver today

# Virtual Power Plants

Aggregates decentralized generation, flexible loads and storage systems to enable **participation in energy markets**

## ABB Ability™ Energy Optimization for power producers

- Central **control and optimization** system
- Combine tens or thousands of DERs
- Plan and adjust production dynamically thanks to advanced forecasting
- Trade intelligently on the **energy market**
- **Sector coupling** for electricity, gas, heating & cooling, water and e-mobility



# Example 1 - Smart Farm

Very small system

## Customer need

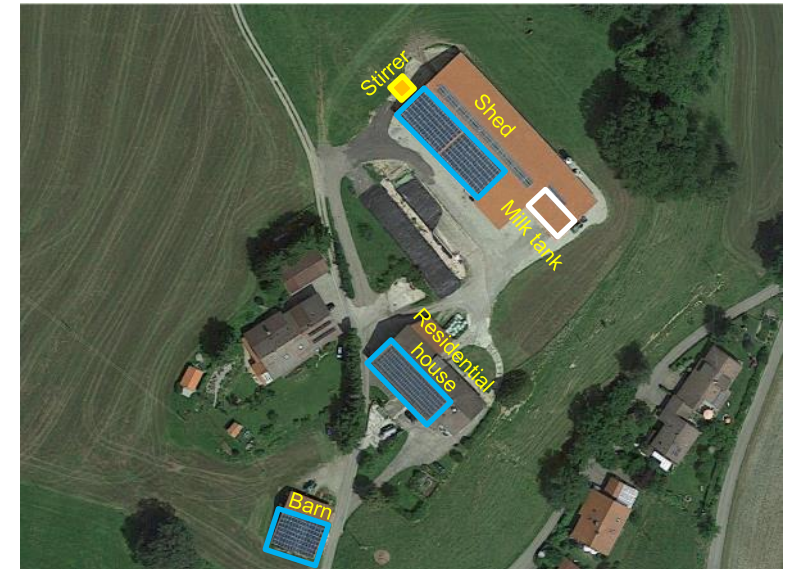
- Maximization of internal power supply
- TUs: PV, battery, e-tractor, milk tank, stirrer & grid connection
- Merger of several companies

## ABB response

- Optimization
- Merger of several companies to participate in the trade

## Customer benefits

	not optimized	optimized
Grid purchases	70 kW	32 kW
Self consumption rate	31,0 %	50,2 %



Customer: AÜW  
Location: Kempten  
Delivery: OPTIMAX®



## Example 2 - Next Kraftwerke

From a start-up to a Large-Scale Virtual Power Plant

### Customer need

- High scalability for a rapidly growing business (>6.800 units with >5.9 GW)
- Independent extensibility
- Marketing of available capacity on energy market

### ABB's response

Central control system for one virtual power plant:  
Biogas, Biomass, CHP/MicroCHP, Water / Hydro, Solar, Wind, Industrial Sites, Power-2-Heat, Standby-Sets,...

### Customer benefits

- Balancing power & direct marketing
- Optimal distribution of balancing power calls
- Virtual server architecture with 11 servers in geographically redundant datacenters



Customer: Next Kraftwerke  
Location: Cologne  
Delivery: OPTIMAX® PowerFit

**ABB**