The Energy System in 2020, Data Analytics and ICT

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Trends

• Energy Systems 2020:
  - Use of (smart) meters and many sensors
  - Communication between energy systems
  - Aggregation (on all scales)
  - Intelligent data analytics
  - Demand response
  - Energy flexible automated manufacturing
  - Big Data, IoT, IoS technologies
  - Robust methods for planning and operation (wind and solar lead to more variability)
  - Adaptive methods for forecasting and control
Smart-Energy OS
With more than 25% wind/solar power the main focus is on energy storage (rather than electricity).

(Virtual) storage principles using ESI:
- Buildings (thermal mass) can provide storage up to, say, 5-12 hours ahead.
- District heating/cooling systems can provide storage up to 1-3 days ahead.
- Gas systems can provide seasonal storage.
Meter data and buildings

- Reliable Energy Signature
- Energy Labelling
- Automated Proposals for Energy Savings (buildings):
  - Replace the windows?
  - Put more insulation on the roof?
  - Is the house too untight?
  - ......

- Integration of Solar and Wind Power using DSM
Discussion

- Intelligent Energy Systems Integration can provide (virtual) storage solution
- ICT methods for coupling of energy systems
- Big Data, ICT, IoT, Data Analytics, and an Energy-Systems Operation System (ES-OS) are essential for implementing future low carbon energy systems
- Focus on zero emission buildings - and less on zero energy buildings (the same holds supermarkets, wastewater treatment plants, etc.)
- Intelligent use of sensor (and meter) data is important
- Cloud based solutions for forecasting and control
- A large potential in Demand Side Management using data analytics