

An European perspective on Smart Grids



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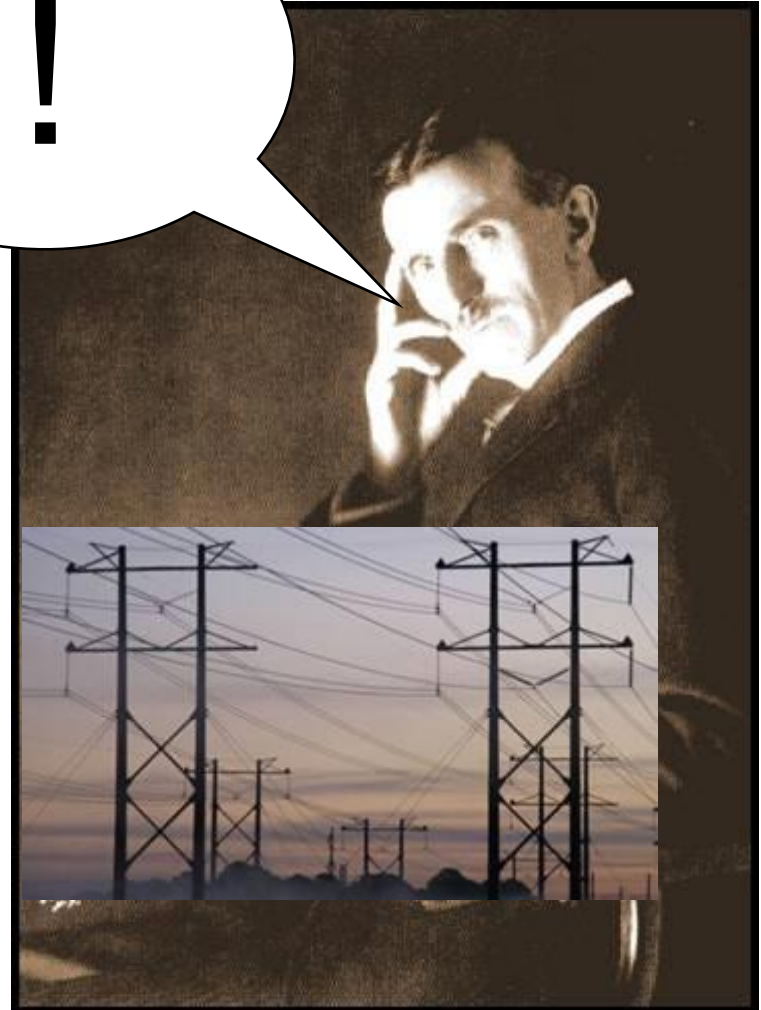
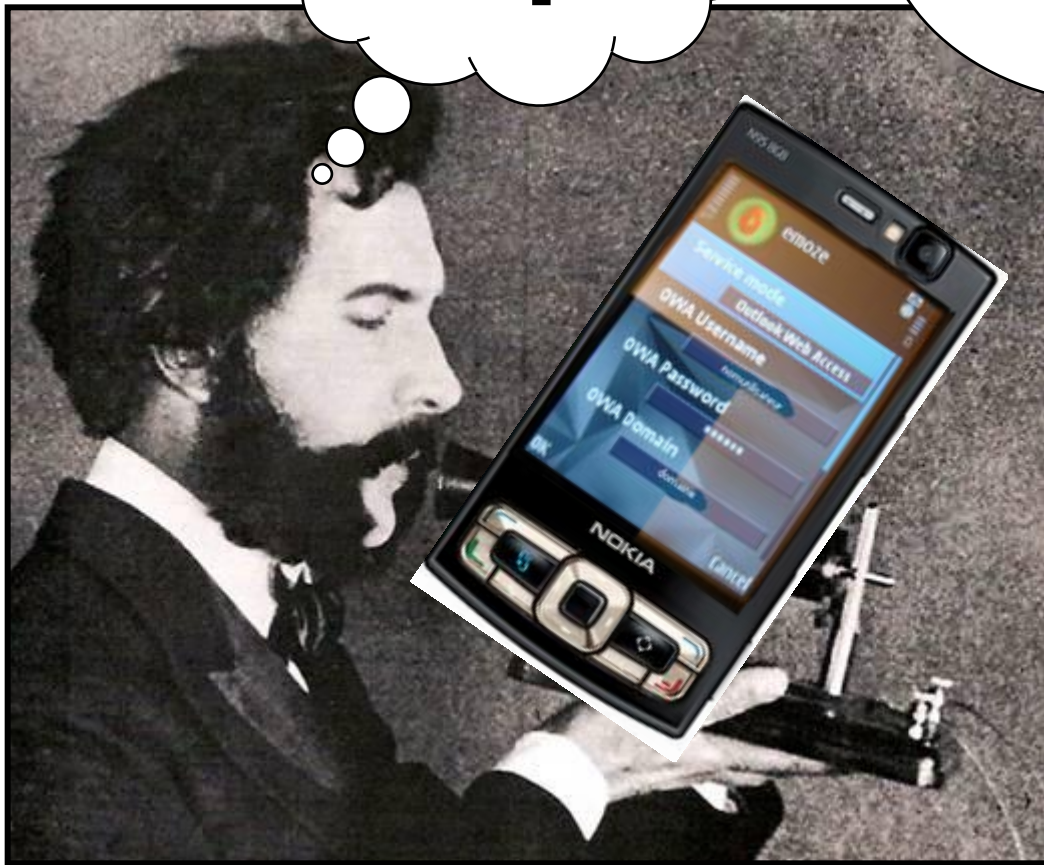
CEO Göteborg Energi AB

Chairman Swedenergy

Chairman Geode



Gothenburg



 **Göteborg Energi** (1847-1922)

Nikola Tesla (1856 –1943)

● Statements on Smart Grids

Directive 2009/72/EC of 13 July 2009

□ Recital 27

Member States should encourage the modernisation of distribution networks, such as through the introduction of smart grids, which should be built in a way that encourages decentralised generation and energy efficiency.

□ Article 3, 11

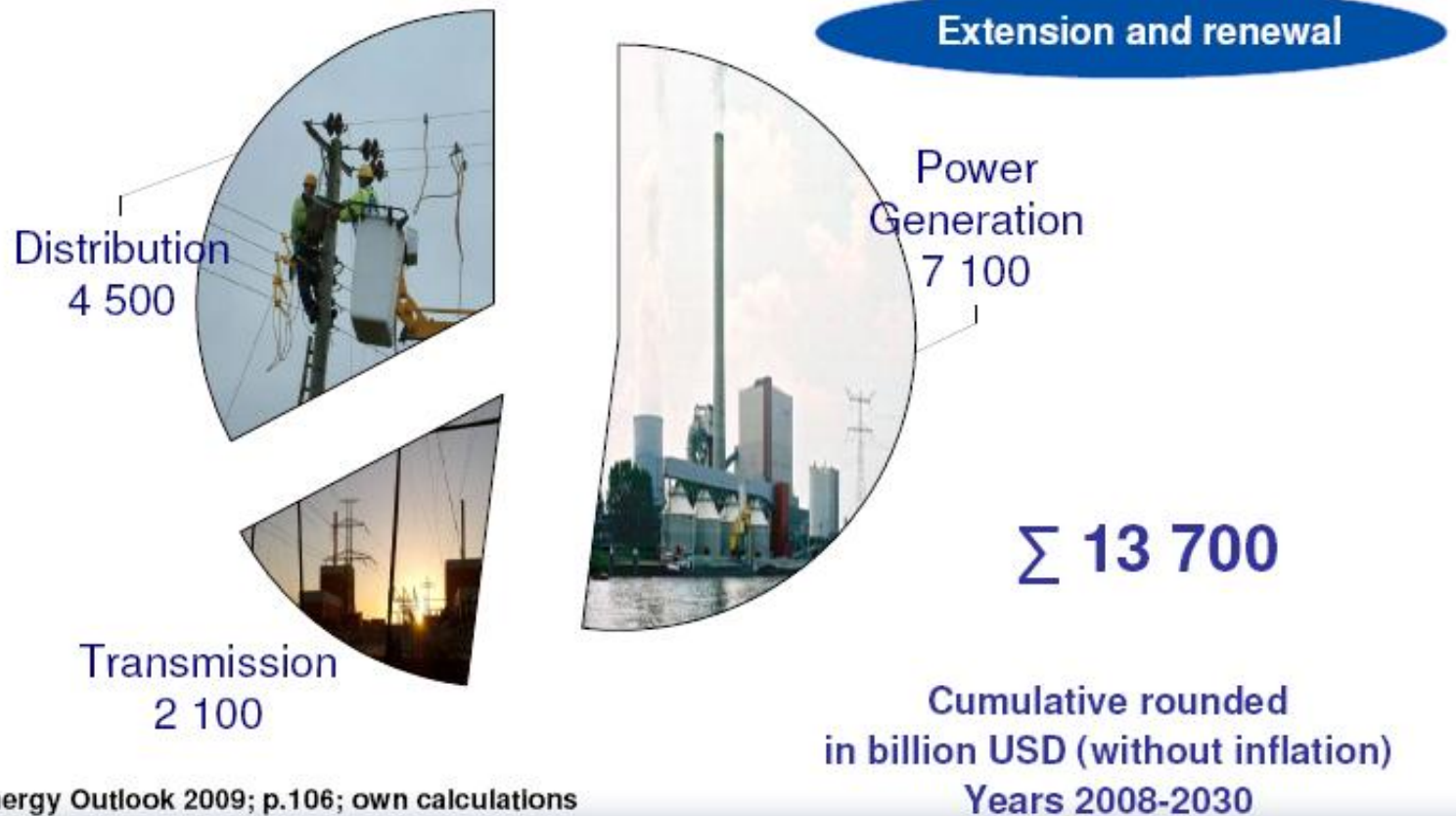
In order to promote energy efficiency, Member States, or where a Member State has so provided, the regulatory authority shall strongly recommend that electricity undertakings optimise the use of electricity, for example by providing energy management services, developing innovative pricing formulas or introducing intelligent metering systems or smart grids, where appropriate.

□ **Annex I:** Measures on Consumer Protection and preventions for the smart meters assessment by 2012 and roll-out by 2020.



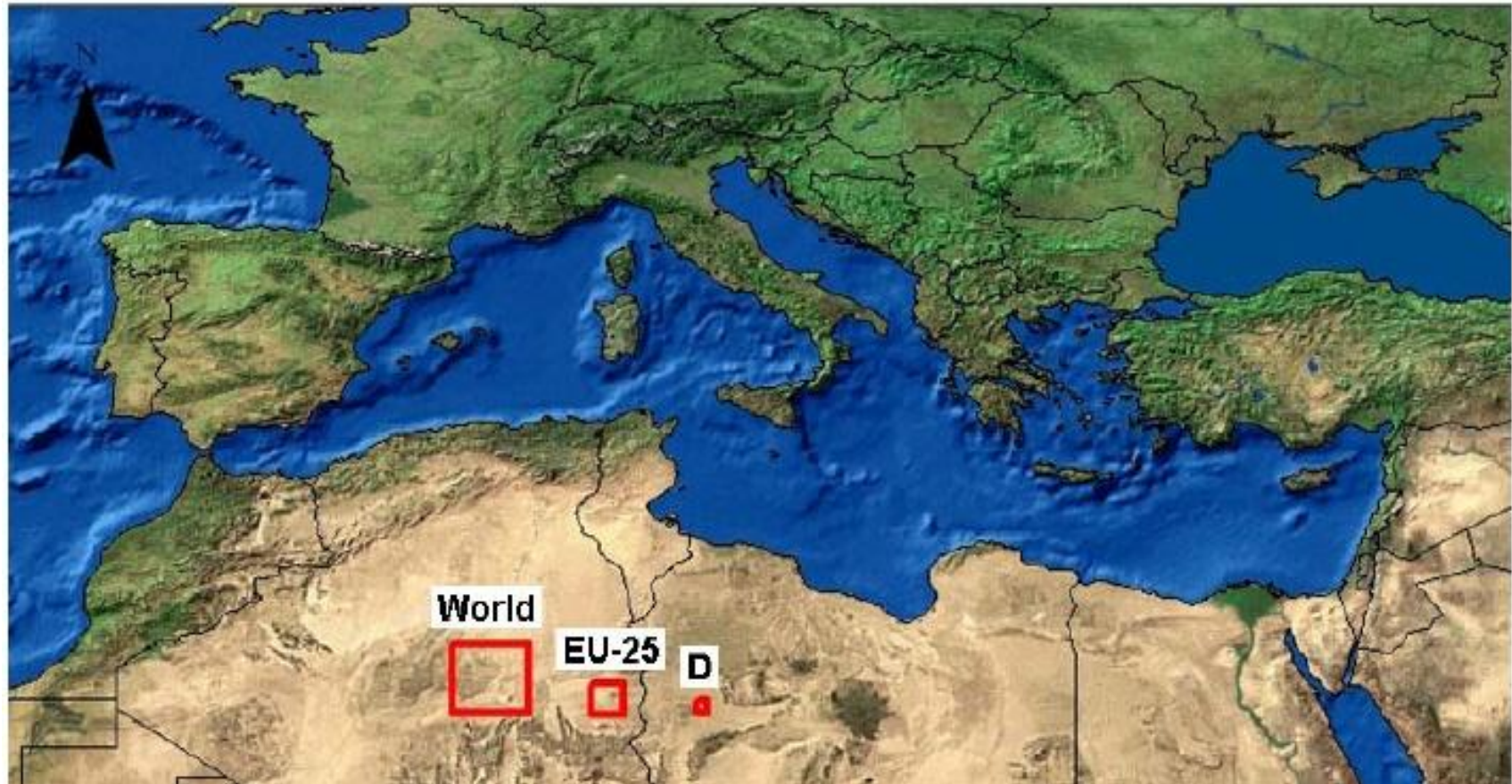


The IEA sees about 6 600 billion USD investments into the global power grid by 2030



Solar power is the biggest renewable energy-resource by far

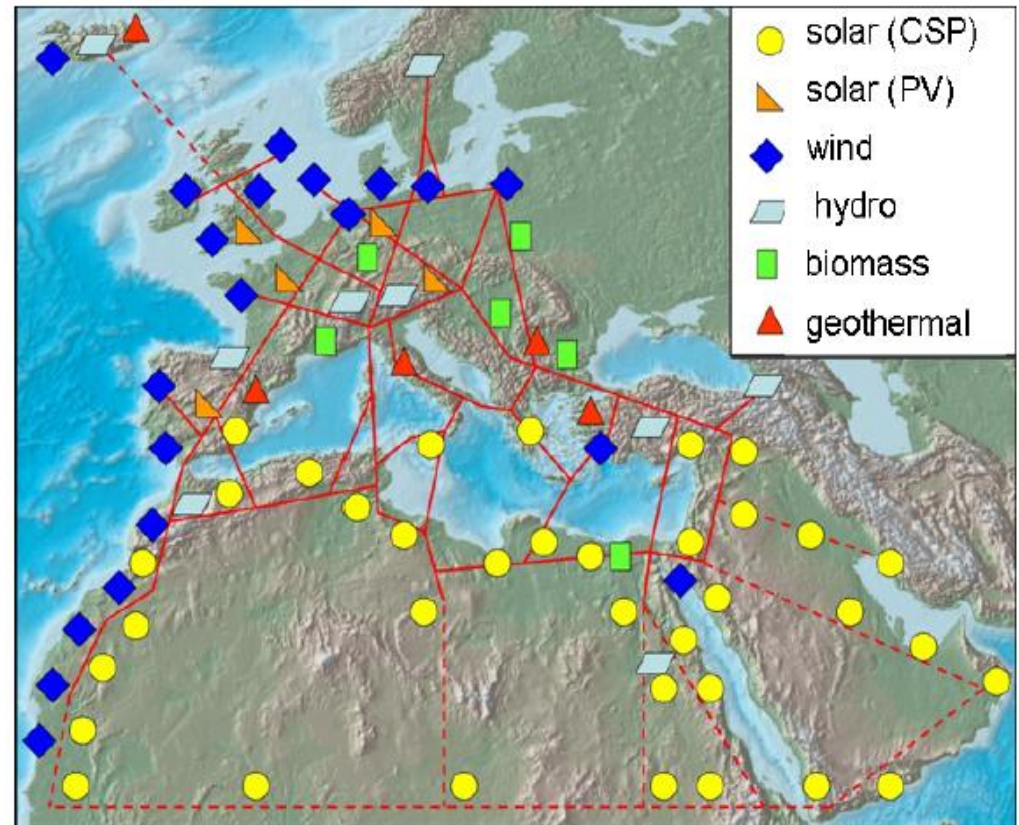
Economic renewable electricity potentials vs. demand in Europe and MENA



Supergrid, or how the energy reaches the customer

Electricity transfer from MENA to EU
over a distance of 3000 km

- Hydrogen electrolysis and fuel cells: very high costs and 75% energy losses
- AC / HVAC lines: high cost and 45% / 25% energy losses
- 800 kV HVDC lines: lowest costs and 10% energy losses



www.desertec.org

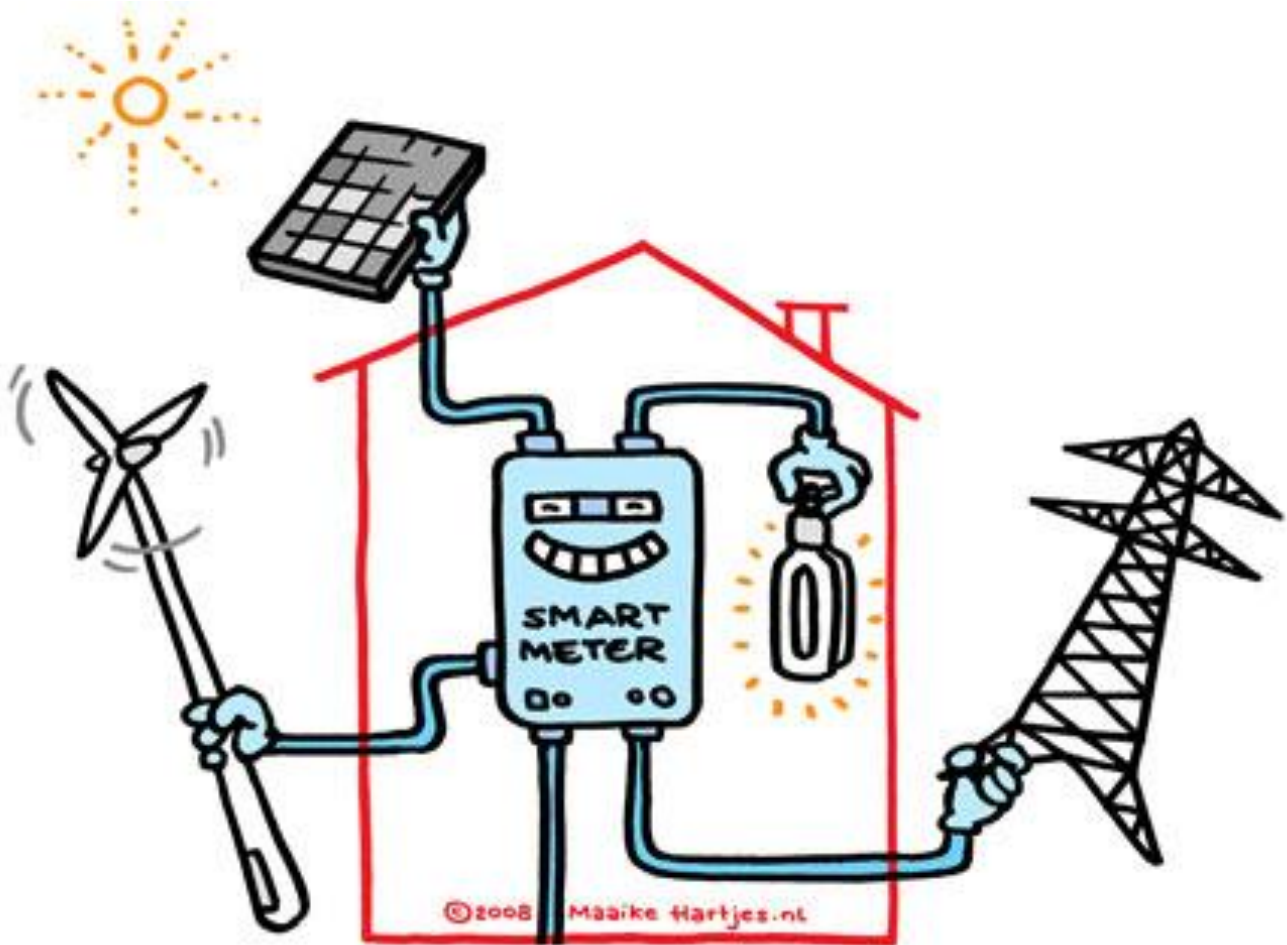
3. Grid applications for energy storage

Grid connection of renewable generation



When connecting large wind farms to the power grid, they will typically be connected to weak grids.

- steep power changes
- voltage control
- grid stability during and after faults and
- frequency regulations
- separate wind power networks



2. Power metering in substations



Power metering in Substations together with metering in all access points below will give a very good overview of where losses occur. Opportunity to reduce losses.

Information about historical and momentarily load of the transformer

Business case for metering in Substations is under work, payback period 10-12 years

STATUS: Currently pilots and finding ways to decrease cost of implementation. Installations will probably start the coming autumn

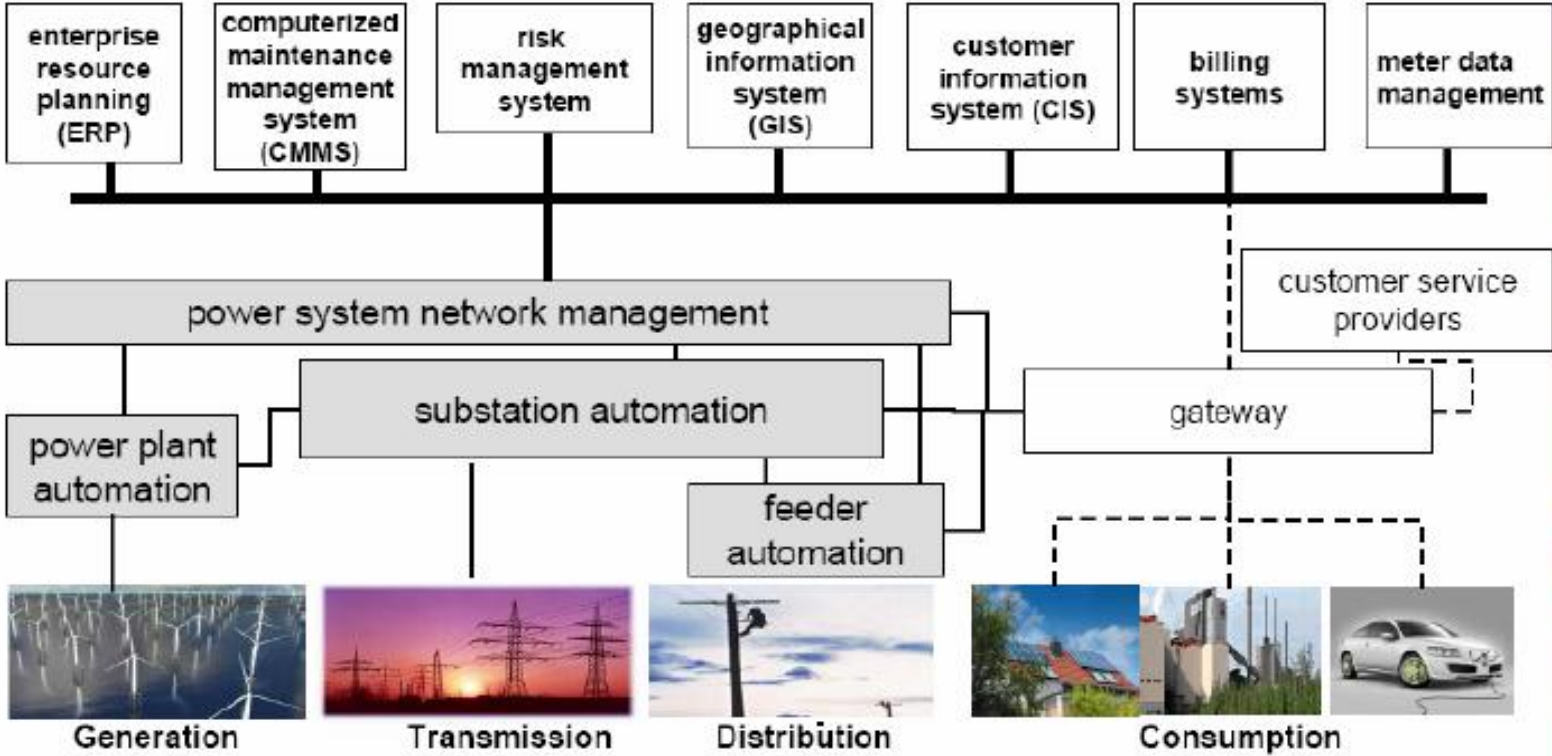
4. Integration of Metering system and NIS (Network Information System) and on to SCADA system (Grid operation system)

- Will give online status of low voltage network, faster fault detection, more precise dispatch of work crews and faster and more accurate customer information
- Will also give operators of metering system online information on outages on low voltage grid

STATUS: Integration is currently being planned

Smart Grid Solutions

Automation/IT configuration



Enterprise integration bus
 Real time mission critical communication
 Non-critical communication
 Real time operation systems



3. Technical perspective: Smart charging

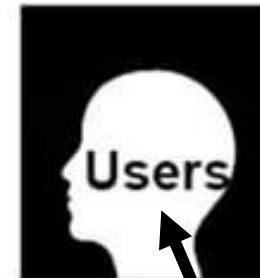




Stakeholders in Smart-Grid



Network companies



Researchers

Energy service providers

Consumers

Prosumers