CIGRE's View on the future of the electric power system

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Energy's Environmental Footprint has to be reduced

Electricity plays a crucial Role

Sustainable electric energy generation

Prosumers

Electricity plays a crucial Role

increase of efficiency by electrification and/or advanced technology

transport

heat pumps

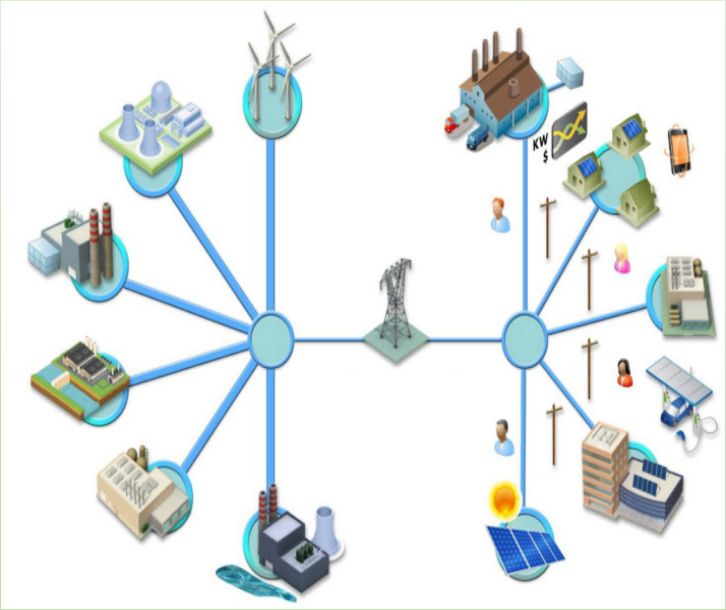
Combined cycles
Industrial Processes

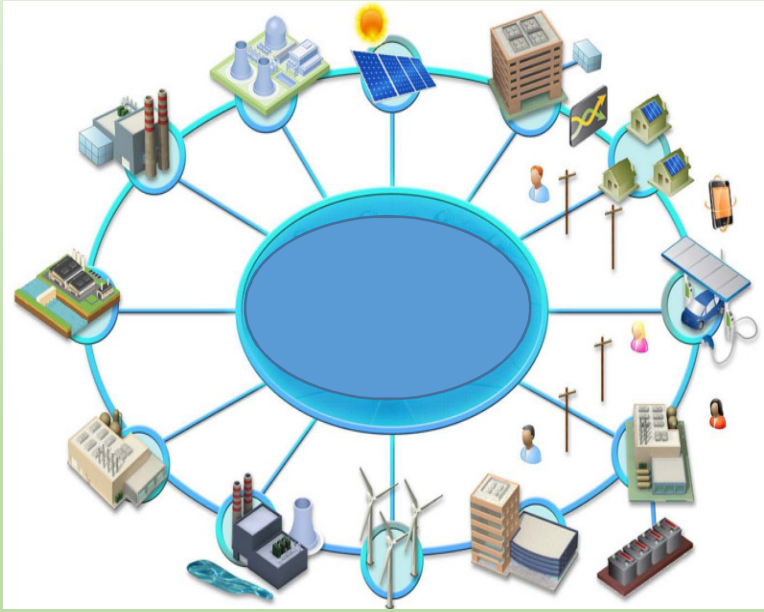
high tech lighting

The technical challenges for the network

- Very long distance transport
- Better Interconnection between countries/continents
- Reversed load flow from low voltage to transmission level
- Intermittancy of new-renewable sources
- Complex system structures with high intelligence are needed on all voltage levels
- Regulation needs to adapt to technical and soci-economics needs

Changes of the power grid are necessary





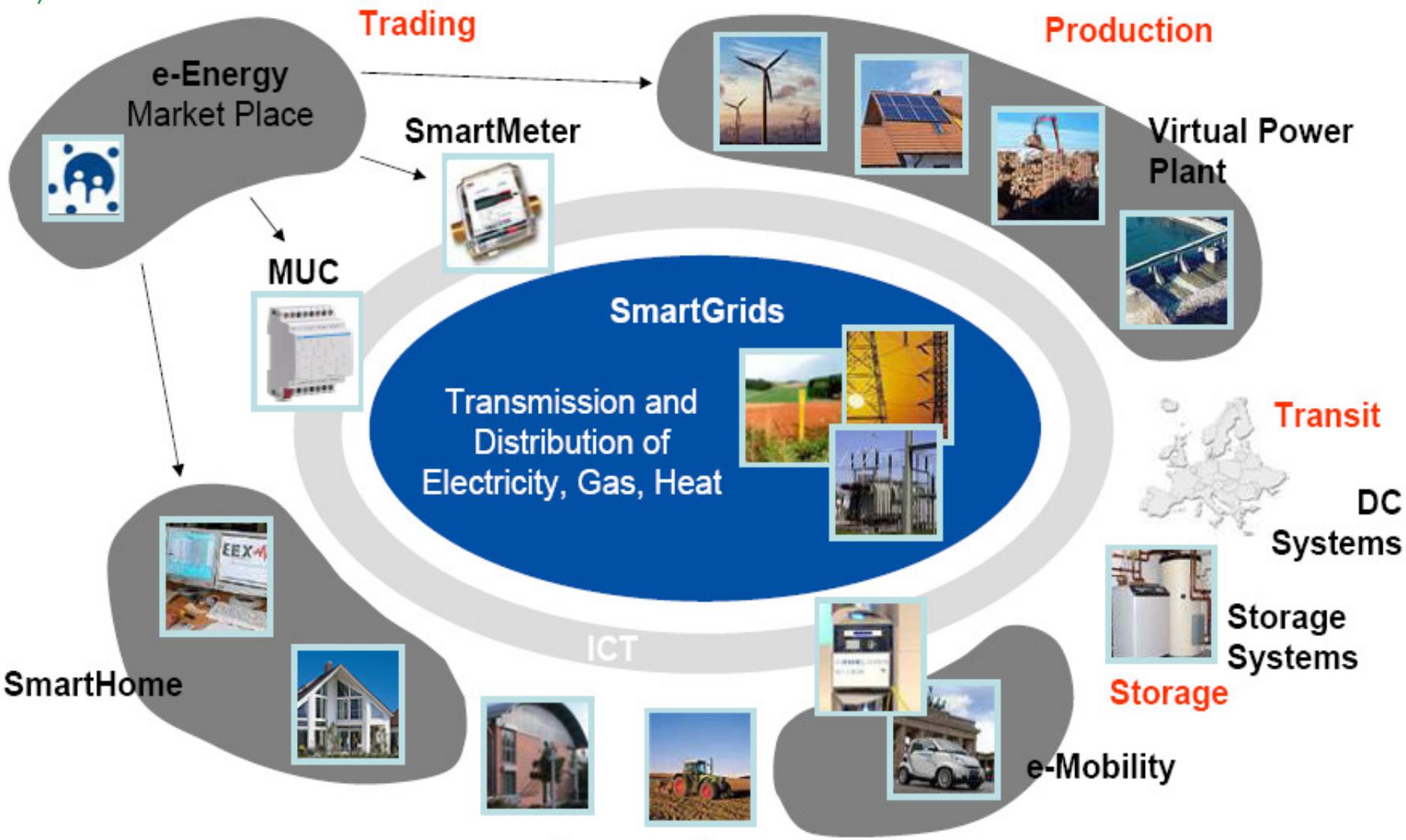
transmission distribution

Interactive network
□Smart Grid

Uni-directional load flow

Bi-directional load flow

The Smart Grid Evolution



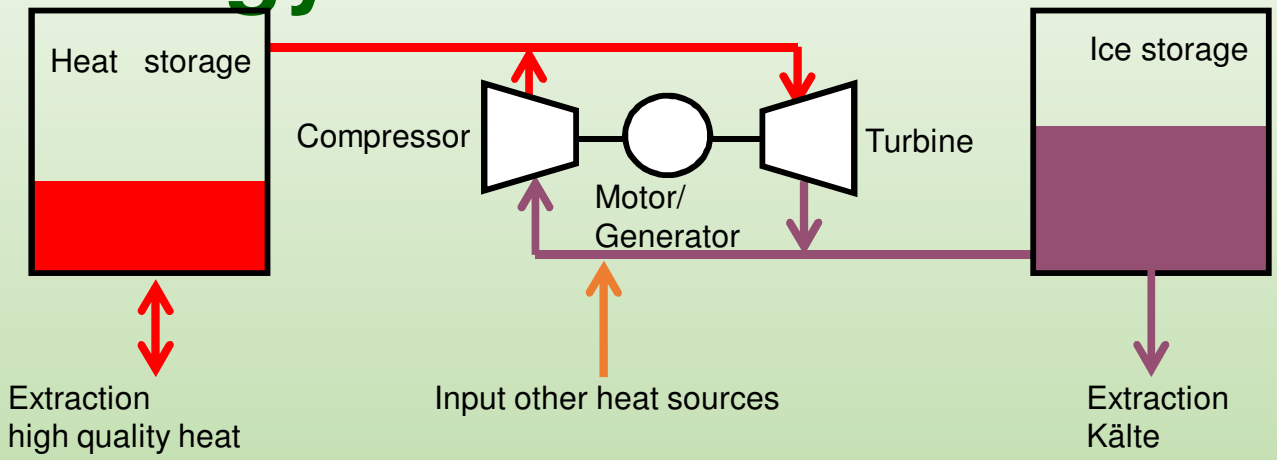
MUC = Multi Utility Communication
ICT = Information- and Communicationtechnology

Examples in recent technological development in transmission

- Submarine cables; trend for greater depth
- Compact overhead lines
- UHV for 1100 kV AC
- HVDC fast growing (grids?)
- Study by SC B4: Low frequency transmission in consideration by CIGRE (e.g.16 2/3 Hertz)
- IT tools for system analysis, control and automation and modelling

Desperate need for storage technology

Thermoelectric energy storage



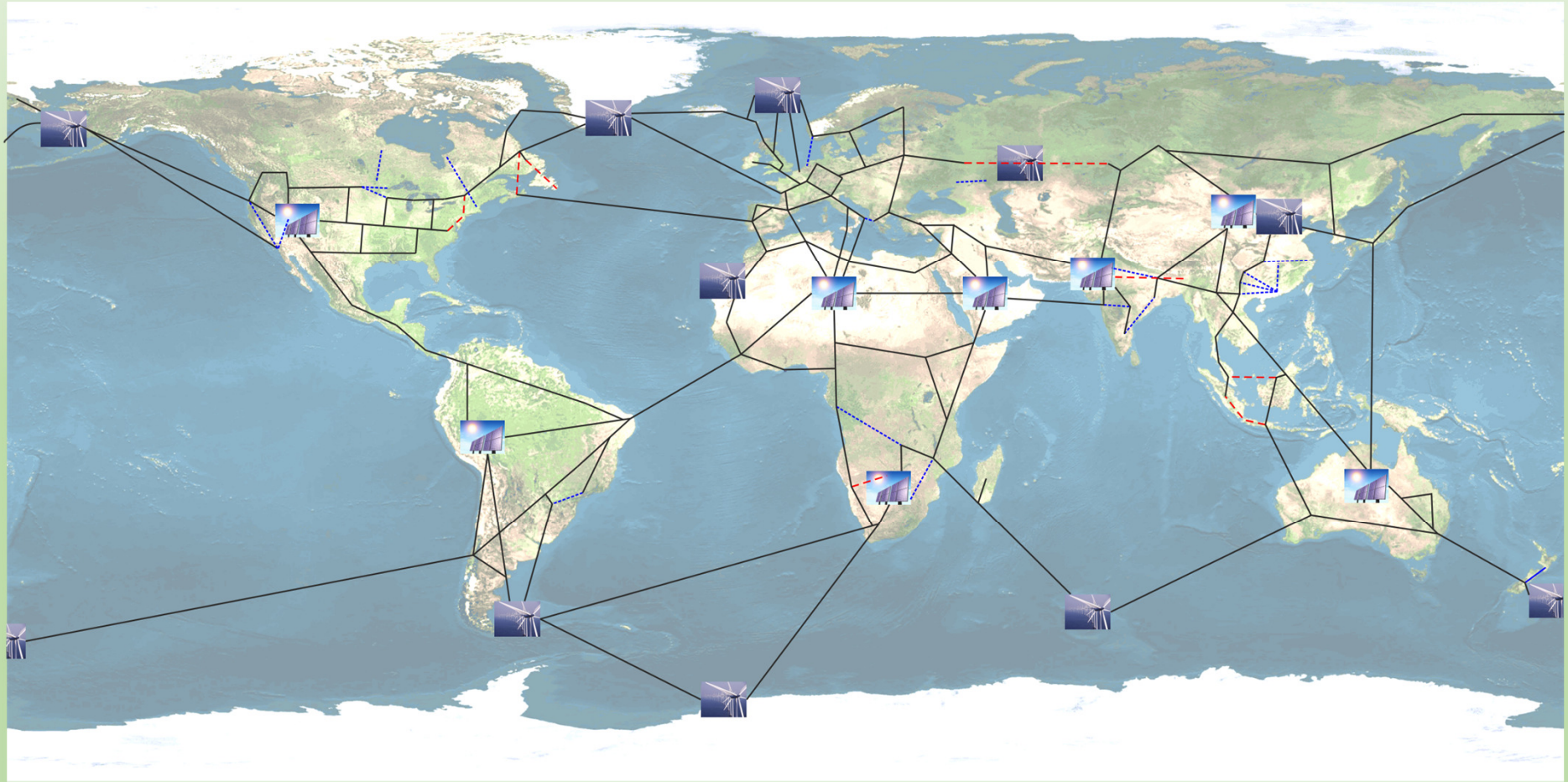
Expected efficiency >70% - like Pumped Hydro Power

Picture: Courtesy ABB

Batteries

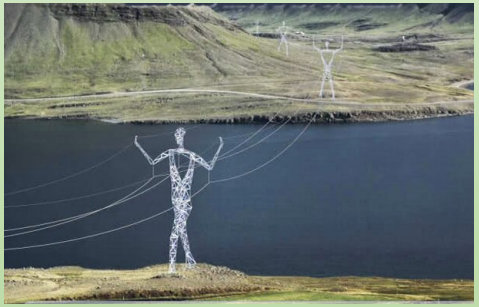
(recently up to 40 MWh)

The Vision of a Global Grid



Many environmental issues
Study Committee – SC C3 and others

- Land requirement (corridors)
- Esthetics
- Emissions (EM,electric fields, audible emission)



Pour acceptance of the public needs better information and/or mediation

- Prevention and recovery at catastrophic events

CIGRE's Strategic Directions

- Future power system
- Best use of existing systems
- Environment and sustainability
- Unbiased information for all stakeholders

The CIGRE vision of the network of the future

Currently 225 Working Groups