

Communication meets eEnergy

How ICT supports the Grids of the Future

Josef Lorenz
Head of Innovations
Research, Technology, and Platforms

Cebit - GreenIT World - Forum

1 © Nokia Siemens Networks



Our environmental vision



World Connected

Net positive impact on environment



SMART 2020: enabling the low carbon economy in the information age

While ICT's own sector footprint currently is two per cent of global emissions and will almost double by 2020 it is countered by sector's ability to monitor and maximize energy efficiency within and outside its own sector and could cut CO2 emissions by up to five times ICTs own footprint

Company Confidential
2 © Nokia Siemens Networks



Snapshot of the upcoming Electricity Grid



Company Confidential
3 © Nokia Siemens Networks

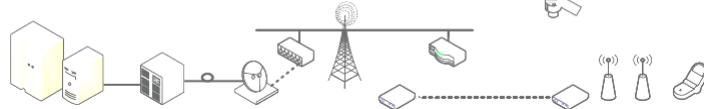


eEnergy is integrating two infrastructures

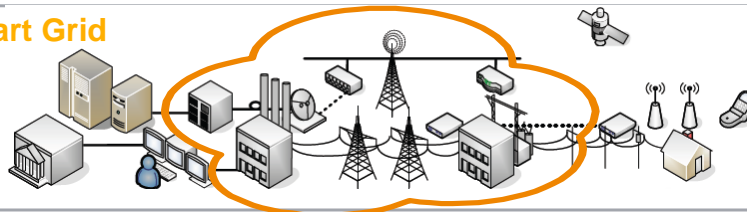
Electrical 'blind' Infrastructure



'Intelligent' ICT Infrastructure



Smart Grid



Source: Electric Power Research Institute (EPRI)
Company Confidential
4 © Nokia Siemens Networks



Background and Motivation

- **External drivers**

- Climate change
- Peak oil and peak gas

Peak oil already happened or will happen within the next few years. Natural gas reserves will follow.

- **Key measures**

- Renewable energies
- Energy efficiency

The distributed nature of renewable energies is one of the key drivers towards distributed generation of electricity.

- **Legislative framework**

- Market deregulation
- Guaranteed feeding tariffs

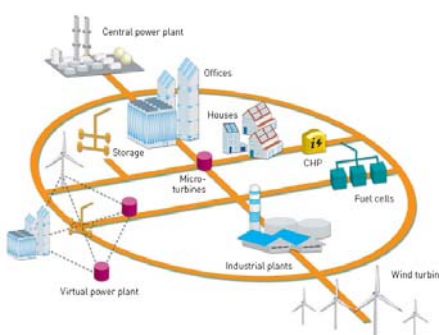
The energy usage can be cut by half or even more without lowering the wealth of people or the strength of economy.

- **Avoid Blackouts**

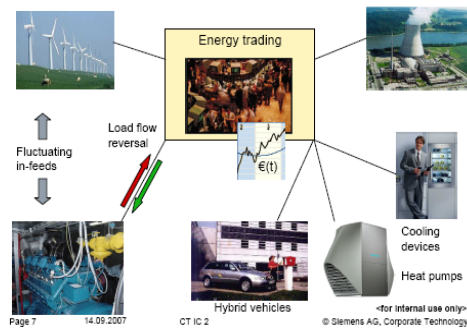
- Grid Reliability

Large blackouts happen cross regional. Distributed energy generation makes grid even more vulnerable.

Just like internet, electricity grid will be interactive for both power generation and power consumption



A wide range of energy technologies



The grid as Pseudo energy storage

Operation of system will be shared between central and distributed generators. Control of distributed generators could be aggregated to form microgrids or 'virtual' power plants to facilitate their integration both in the physical system and in the market.

eEnergy the change – Bits are cheaper than iron

20th Century Grid

21st Century eEnergy

Electromechanical, analog	➔ Digital
One-way communications- if any	➔ Two-way communications
Built for centralized generation	➔ Accommodates distributed generation
Radial topology	➔ Network topology
Few sensors	➔ Monitors and sensors throughout
Manual restoration	➔ Semi-automated restoration - self-healing
Prone to failures and blackouts	➔ Adaptive protection and islanding
Check equipment manually	➔ Monitor equipment remotely
Emergency decisions by phone	➔ Decision support systems
Limited control over power flows	➔ Pervasive control systems
Centralized billing	➔ Trading by software agents
Consumer demand uncontrolled	➔ Optimal use of energy by intelligent agents

Opportunities for the Communication Industry: Advanced Metering Services

- ▶ Flexible Connectivity via multiple access networks
- ▶ Efficient Machine2Machine Communication
- ▶ High transaction rate in data collection and processing
- ▶ Reuse of existing billing / OSS / BSS platforms
- ▶ High availability, reliability and data security

Further Opportunities for the Communication Sector

- **Transmission and distribution grid monitoring**
- **Demand side management**
 - Smart Home / Smart Offices / Smart Factories
- **The Market Place – Energy Brokerage Systems**
- **Forecast Systems and Demand Balancing**
 - Prosumer Optimization
- **Vehicle2Grid Communication – Park and make money**
- **.... and many more**

Disruptive Approach and Deregulation lead to creation of new Business Roles

Communication Network Operator

Provide connectivity for AMI solutions

Advanced Metering Infrastructure Operator

Besides meter operation also provide infrastructure and interfaces for price and demand response signalling, connect/disconnect, distribution net logging and monitoring

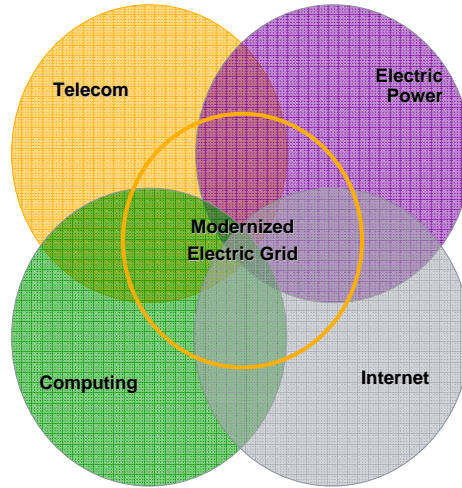
Energy Broker

Operate online trading platform for real time energy trading between virtual power plants.

Grid Monitoring and Supervision Service Provider

Monitoring of the grid, alarm management, dispatch preventive and corrective actions, forecasting, balancing

eEnergy: Opportunities for the ICT Industry are there, we just need to grab them



**Nokia Siemens
Networks**

