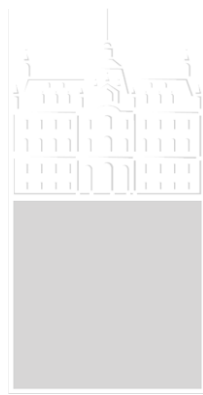


Smart Grids and WSN in Slovenia

Wireless sensor networks & Small medium enterprises (WSN-SME):
Prosense workshop
20 May 2010

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Content

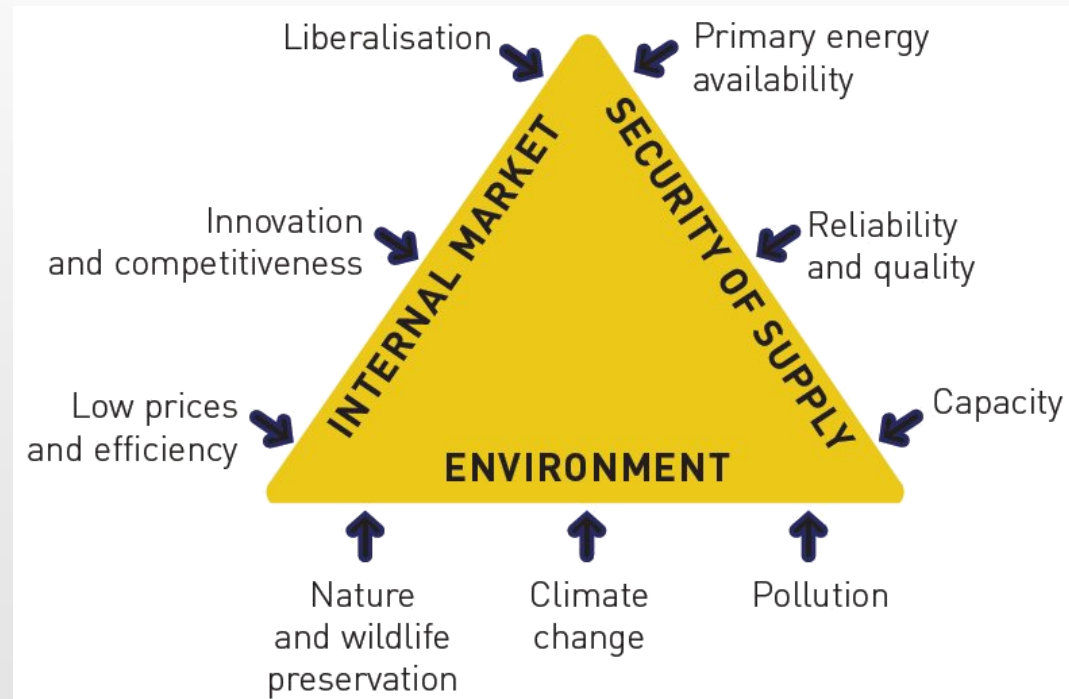


- Why do we need a Technology Platform for Smart Grids?
- What are the characteristics of today's (yesterday's) networks and the networks of tomorrow?
- How to realize the common European vision?
- Slovenian Electricity Networks Technology Platform
- What were/are the strategic goals and Research & Technology Development areas in Slovenia?
- What are opportunities for WSN?
- What is the state of play?

Why do we need an electricity networks technology platform?



- the same driving factors in all EU countries
 - security and quality of supply
 - energy market
 - environment



Characteristics of today's (yesterday's) power networks



- power flows in one direction
- generation, transmission, distribution, consumption
- large generation units
- centralized control
- limited interconnections among national systems
- passive role of customers
- balance between generation and consumption

Characteristics of the networks of tomorrow

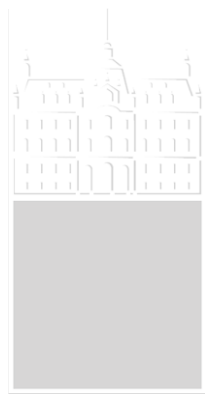


- large number of small generation units (distributed generation):
 - control, protection, voltage quality, planning
- still large generation units
- active role of customers
- bi-directional power flows
- strong interconnections among national systems
- still balance between generation and consumption

European vision of the networks of tomorrow



- **flexible** – fulfilling customer's needs
- **accessible** – granting connection access to all network users
- **reliable** – assuring and improving security and quality of supply
- **economic** – providing best value through innovation, efficient energy management, competition and regulation



How to realize the vision?



- to activate all relevant actors in the electricity sector and those influencing its operation
 - operators of transmission and distribution networks, generation companies
 - equipment manufacturers
 - research and education institutions
 - politics
 - customers

Slovenian Electricity Networks Technology Platform



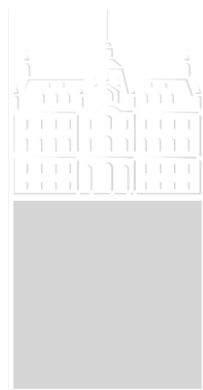
- first meeting of the Initiative Committee on 20 April 2006
- letter of support of the Minister of the Economy of RS
- acquired funds for promotion of development of technology platforms in year 2006
- national workshop on 25 September 2006
- setting up a web page www.smartgrids.si
- other activities (national research programs, demonstration proposals, ...)

- today – upcoming reorganization
 - new organizational structure
 - more professional approach (membership fee)

Members of the Electricity Networks Technology Platform



- Transmission Network Operator Elektro Slovenija – **National Coordinator**
- University of Ljubljana, Faculty of Electrical Engineering
- Electric Power Research Institute Milan Vidmar
- Distribution network operator SODO
- Elektro Ljubljana
- Elektro Primorska
- Elektro Maribor
- Elektro Gorenjska
- Elektro Celje
- HSE Group - power generation
- University of Maribor, Faculty of Electrical Engineering and Computer Science



... members of TP



- Institut Jožef Stefan, Energy Efficiency Center
- Istrabenz Gorenje energetske sistemi
- Iskra Sistemi
- TSN
- C&G
- Korona
- Iskraemeco
- Ensico
- Elpros
- Esotech
- Iskra MIS
- INEA,
- Solvera Lynx
- Sipronika, ...

- coordination of activities with the Directorate for Energy,
Ministry of the Economy and Energy Agency of RS – regulator



Strategic goals



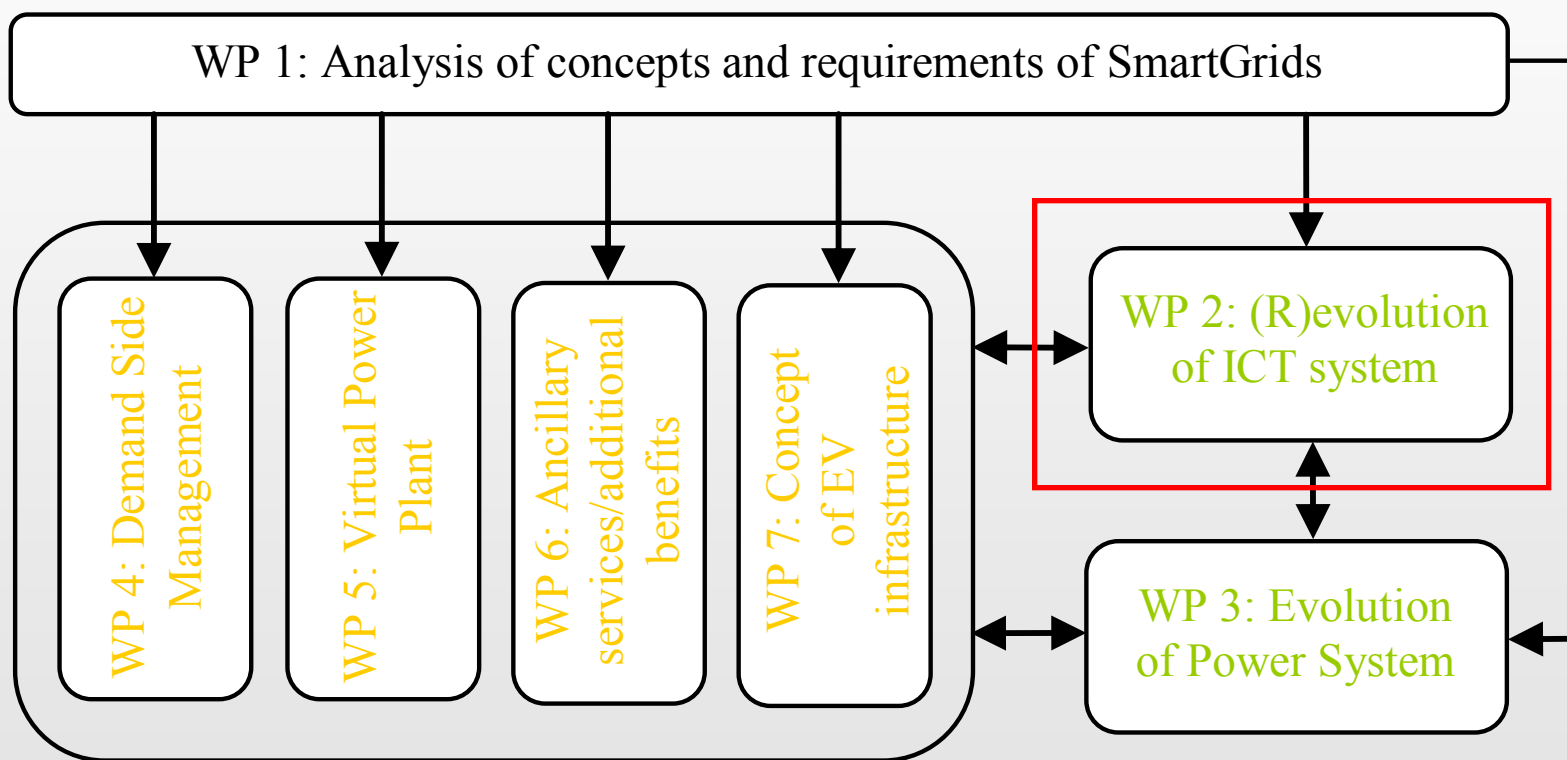
- to find new technical solutions that will enable efficient and viable connection of new energy sources to the existing networks
- to harmonize legislation, regulations and conditions on the market
- to develop technical standards and procedures that will enable free access to the network and services
- to develop information, computer and telecommunication technologies for efficient utilization of new services
- to connect new sources and technologies with undisturbed operation of existing control and operational functions of the power system
- ...

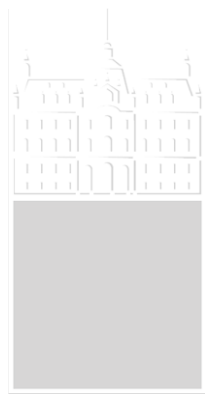
Research & Technology Development areas



- development and integration of renewable energy sources (PV, biomass, fuel cells, small hydro power plants, ...) into the electricity network
- use of FACTS technology for control and improvement of transmission capabilities
- development of secondary equipment for protection and control of electricity networks
- power electronics modules
- switchgear technology
- Intelligent (smart) metering
- ICT infrastructure

National strategic demonstration projects proposal

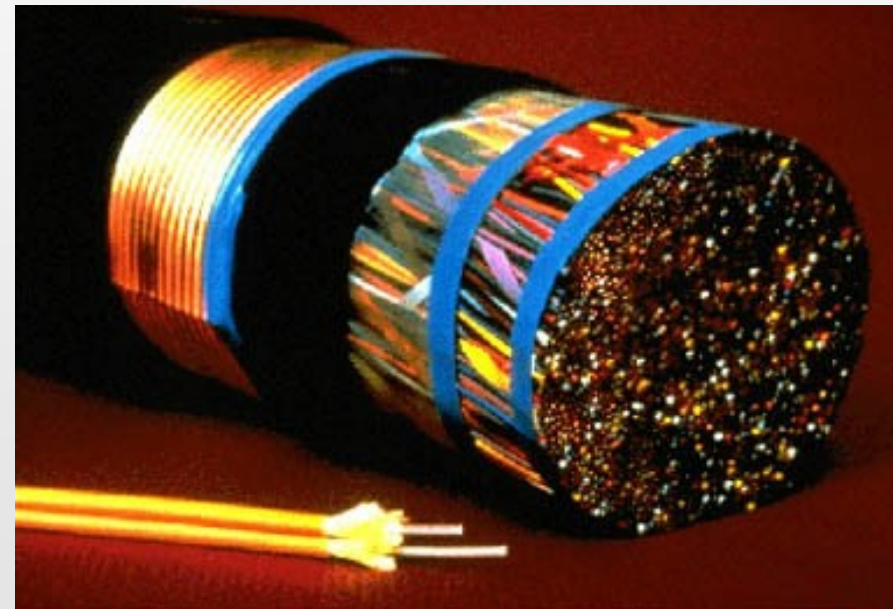




Opportunities for WSN – 1



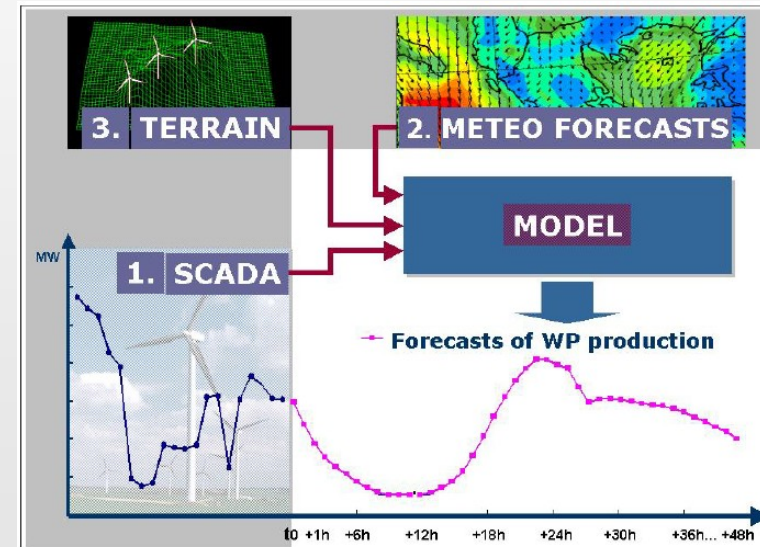
- Information and Communication Technologies in Power System
 - acquiring
 - storing
 - processing
 - distributing
- Intelligent control based on ICT
 - monitoring
 - forecasting
 - control



Opportunities for WSN – 2



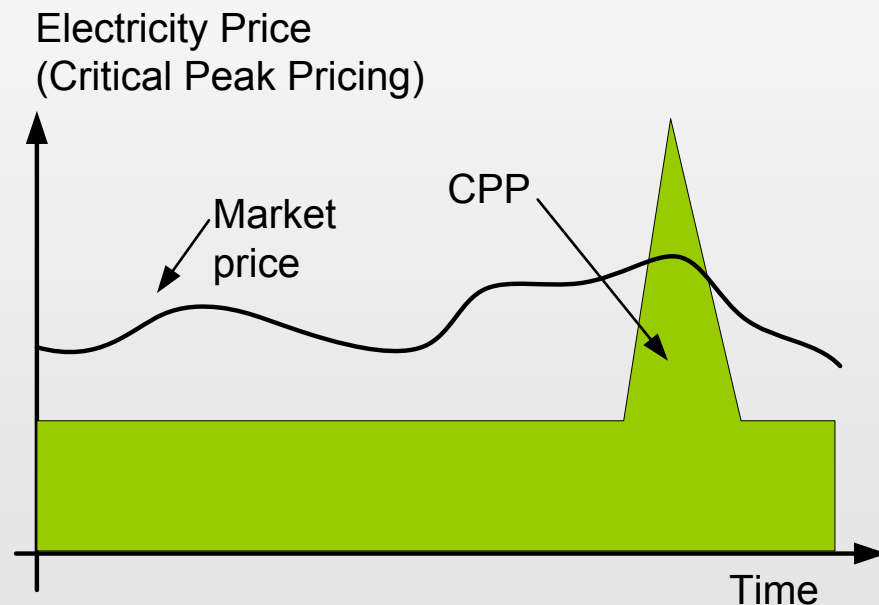
- communication between controllable devices and control units
 - generation and load control
 - network reconfiguration
 - control of active compensators
 - monitoring
 - prediction of consumption, production and prices
 - Virtual Power Plant
- communications media
 - power line carrier
 - lines (telephone, optics)
 - wireless (radio, GSM)



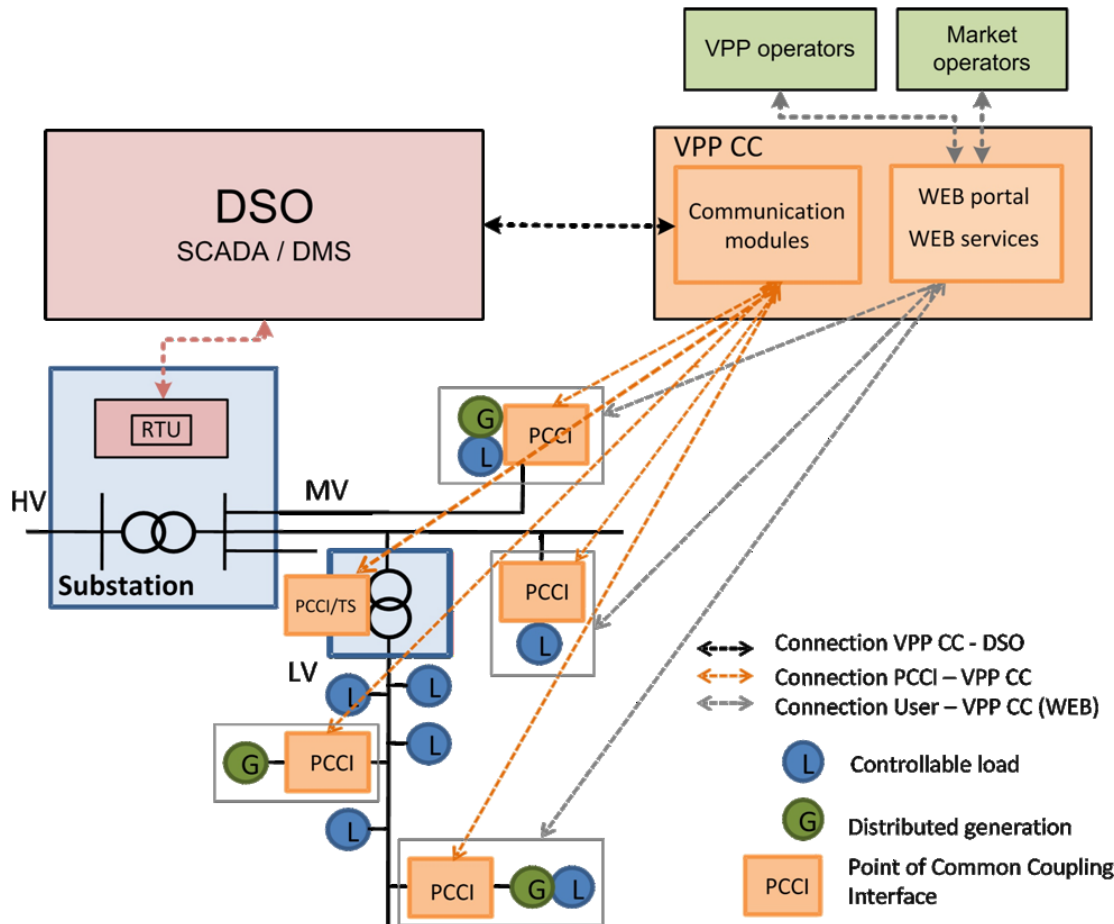
Opportunities for WSN – 3



- DSM initiatives
 - incentives for increase in energy efficiency
 - sending price signals to customers
 - disconnection of consumers (according to a contract)
 - consumers offer disconnection of a certain load for a certain price
 - SmartHome solutions



Opportunities for WSN – 4



- example of ICT infrastructure in power system

Conclusions – where are we now?



- driving factors for Smart Grids remain the same
- electricity networks of tomorrow are becoming reality
- customers are dictating current activities
- network operators are facing new technical challenges
- equipment manufacturers are responding with new solutions
- research institutions were/are always willing to participate
- Smart Grids are a big challenge also for WSN
- Do we need more Research and Development?
- Yes, also in the area of WSN