



Člen skupiny **e-on**

EU Energy Roadmap 2050 & Implications to Slovakia

Andrej Juris, ZSE Distribúcia
Bratislava, 26 November 2012

ZSE operates in Slovakia since 1922

Members of ZSE Group:

- Západoslovenská energetika a.s.
- ZSE Distribúcia a.s.
- ZSE Energia a.s.
- Enermont s.r.o.

- **ZSE Distribúcia a.s.** Is the largest distribution company in Slovakia (40% market share)

- **Customer structure**

Residential 900 000

Commercial 120 000

Industry 5 000

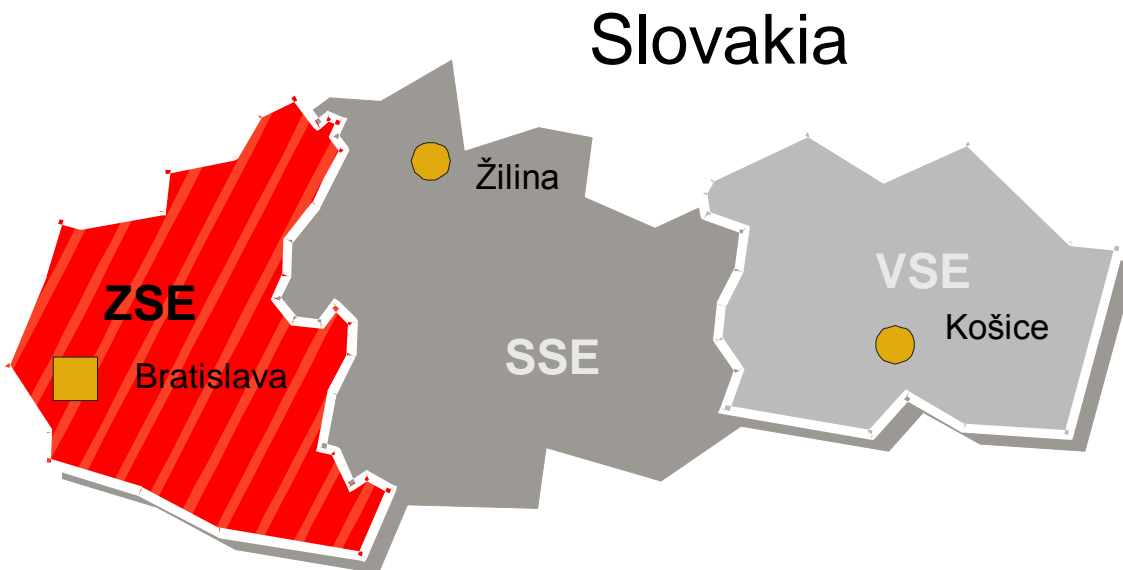
- **Distributed power 8,5 TWh/y**

- ZSE shareholders' structure

- 51 % FNM

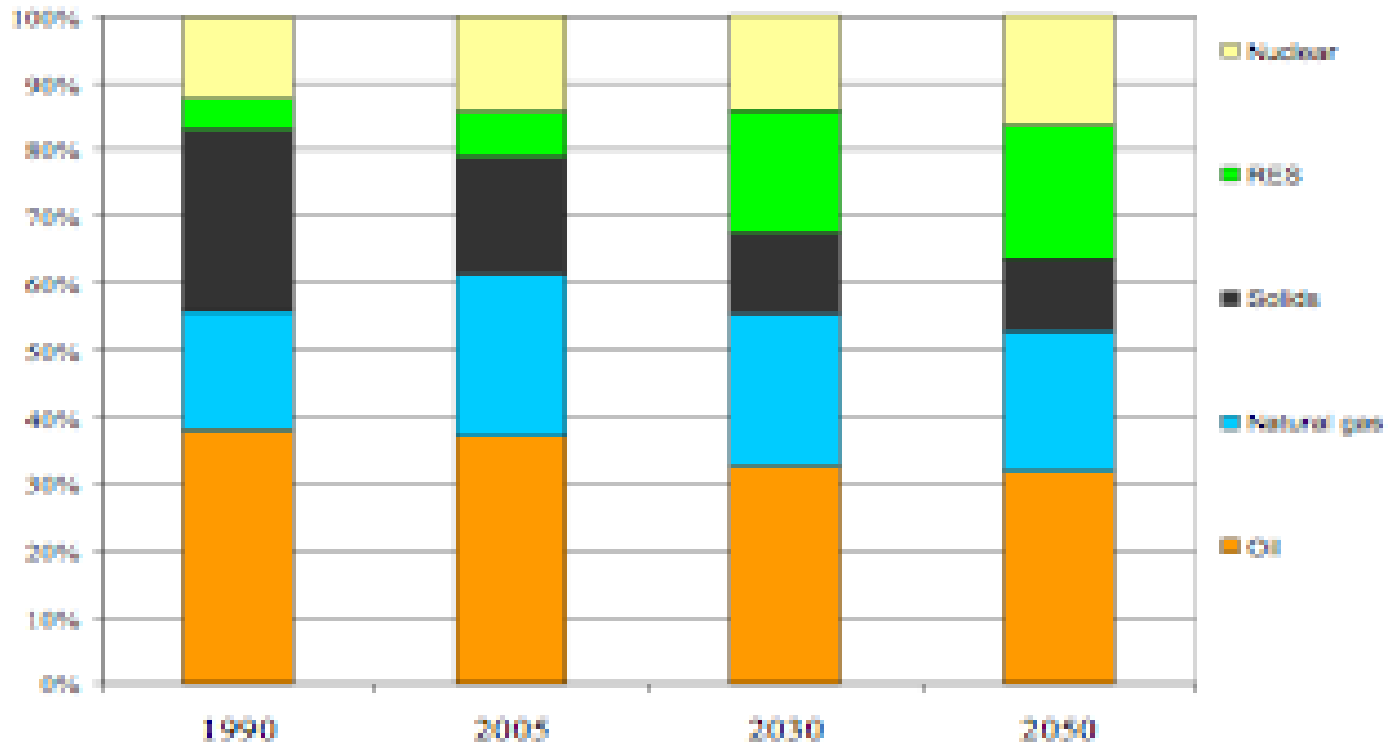
- 40 % E.ON

- 9 % EBRD



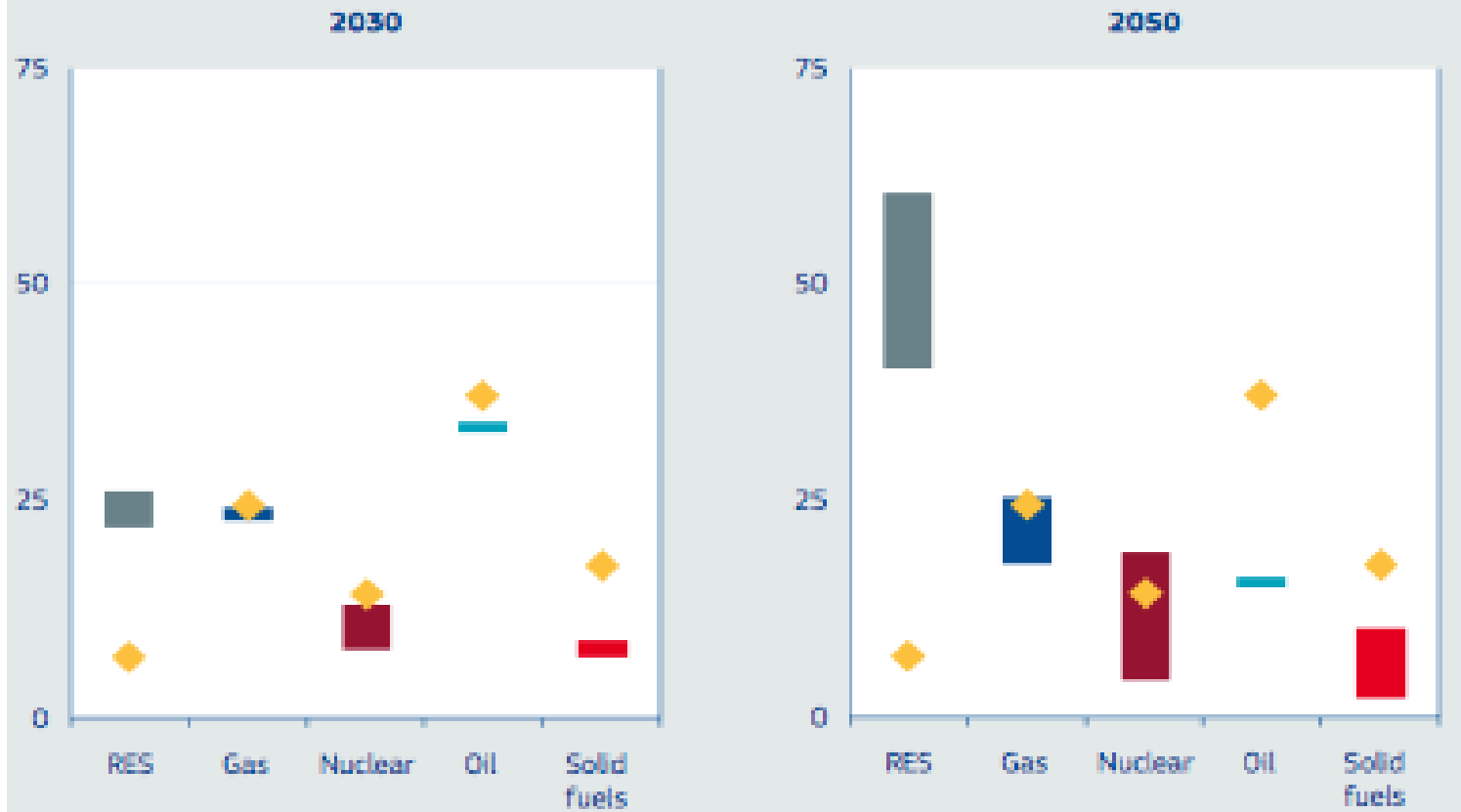
- Initiative of the European Commission to track long term changes in the energy industry
- Assessment of impact on competitiveness and capital requirements
- Develops seven scenarios of development
 - Reference scenario
 - Current policy initiatives (CPI)
 - High Energy Efficiency
 - Diversified supply technologies
 - High renewable energy sources (RES)
 - Delayed CCS
 - Low nuclear

Fuel shares in primary energy



Source: Energy Roadmap 2050, EC

Graph 1: EU decarbonisation scenarios — 2030 and 2050 range of fuel shares in primary energy consumption compared with 2005 outcome (%)



Source: Energy Roadmap 2050, EC

Table 6: Average annual total energy system cost (without auctioning and disutility)

Average annual total energy system costs 2011-2050

<i>Bln. EUR'08</i>	Ref	CPI	High Energy effie.	Div. supply techn.	High RES	Delayed CCS	Low nuclear
Capital cost	955	995	1115	1100	1089	1094	1104
Energy purchases	1622	1611	1220	1295	1355	1297	1311
Direct efficiency inv. costs	28	36	295	160	164	161	161
Total cost for final consumers excl. all auction payments and disutility	2582	2619	2615	2535	2590	2525	2552

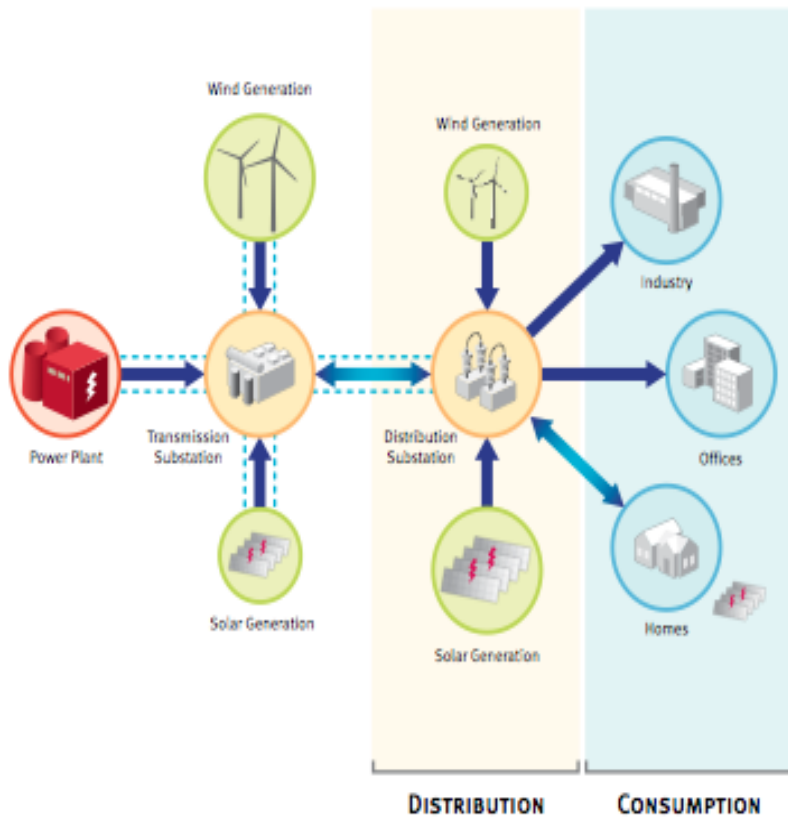
Table 7: Cumulative system costs related to GDP 2011-2050

	Cumulative system costs related to GDP
Reference	14.37%
CPI	14.58%
High Energy Efficiency	14.56%
Diversified supply technologies	14.11%
High RES	14.42%
Delayed CCS	14.06%
Low nuclear	14.21%

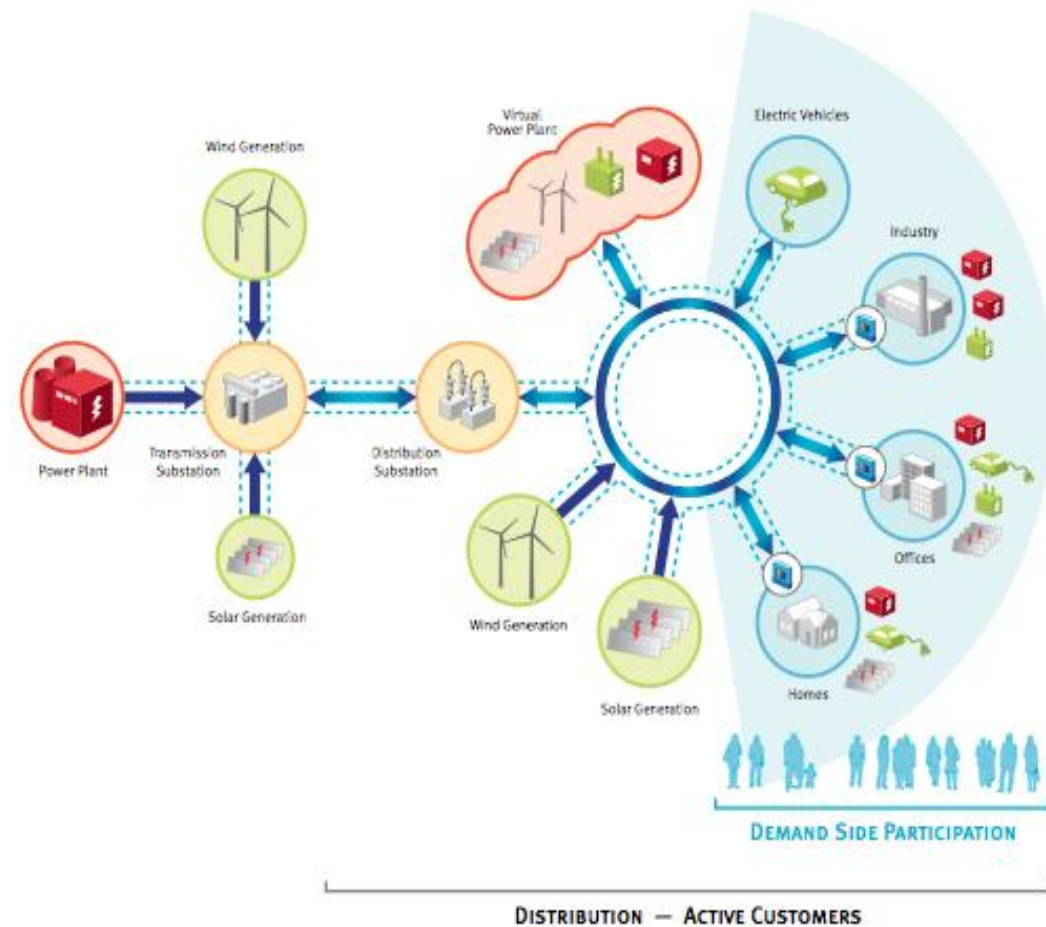
Source: Energy Roadmap 2050, EC

- Energy savings and demand management are responsibilities for all market participants – access to information and correct price signals
- Switching to renewable energy resources – integration into grids and markets
- Gas plays an important role in transition – global gas markets
- Transformation of other fuels – “keep the foot in the door”
- Nuclear energy as an important contributor – security and safety issues
- Smart technologies, storage and alternative fuels – smart grids, e-homes, e-mobility,...

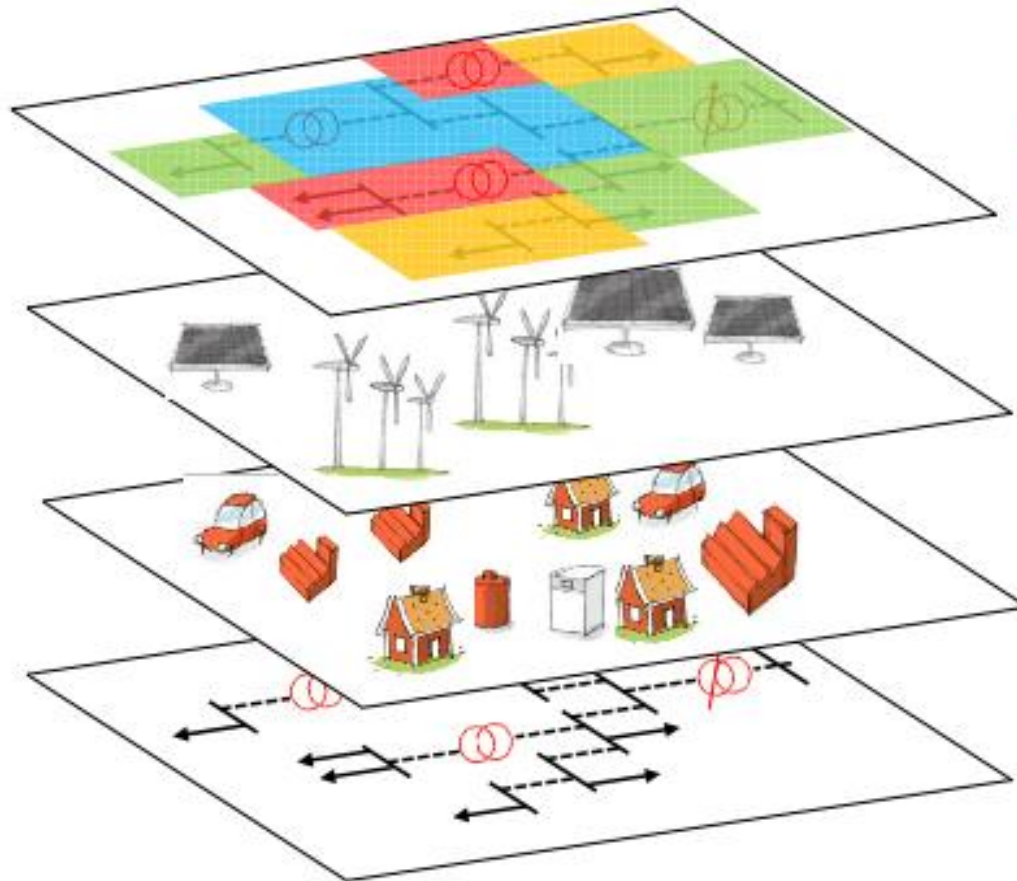
Power system of **TODAY**



Smart system of **TOMORROW**



Source: Eurelectric



Identification of hot spots – each location requires specific solution in a specific time frame. Gradual development of smart grid functionalities.

**Identify Network
“Hot Spots”**

- Network Planning Needs
- Asset Upgrades Required
- New network Developments
- Assess effectiveness of potential solutions



DG Layer

- DG Models
- Projected Growth



Demand Layer

- Demand Models
- Projected Growth Scenarios
- New Technologies



Network Layer

- Line Capacities
- Transformer Thermal Ratings
- Fault Level
- Voltage regulation
- Reactive Power

Quantify Costs



Source: EON

Dramatic growth of distributed generation at LV grid, mainly RES

Increasing demand for higher quality of power supply and data

Customers demand better control over their consumption

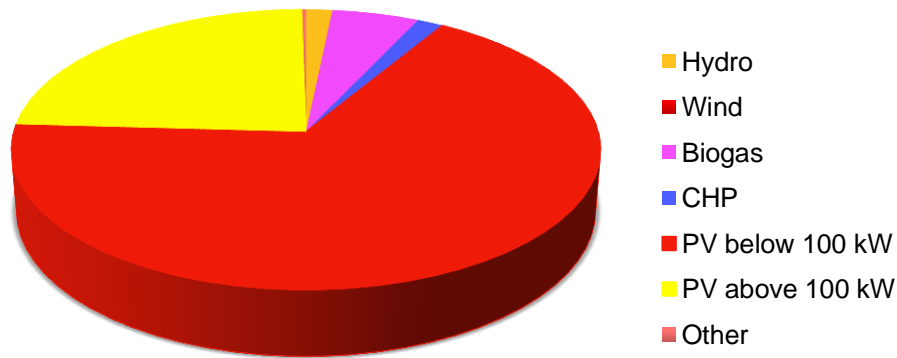
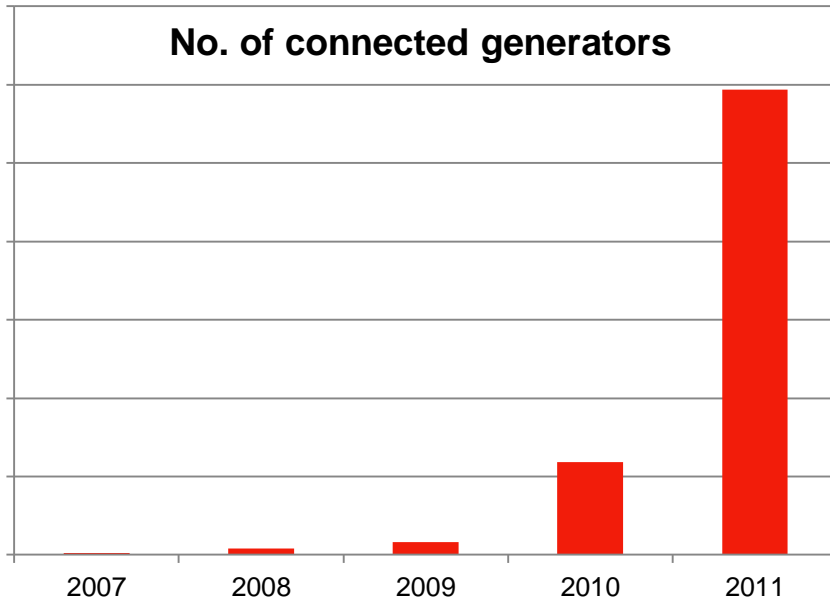
First sights of e-mobility

Smart metering implementation

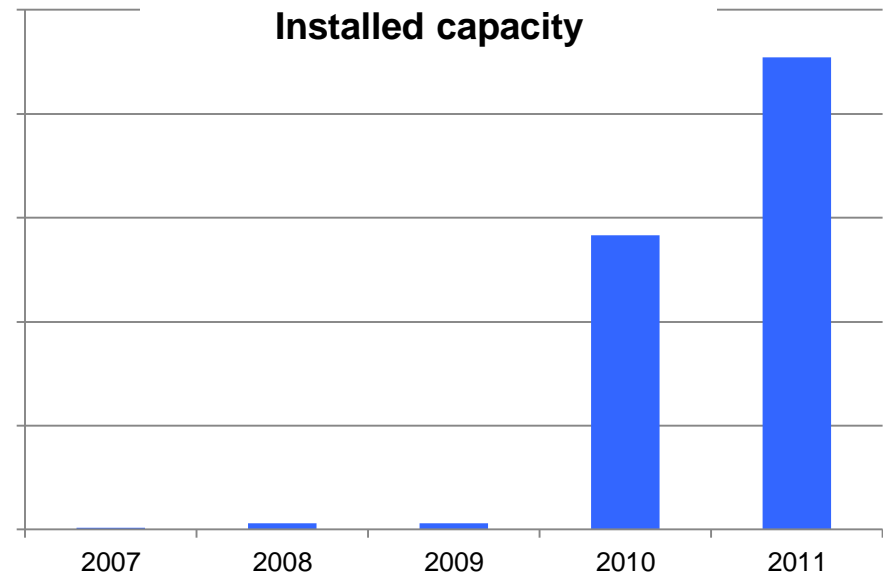


- Integration of distributed generation, especially at LV grid
- Effective management of LV grid
- Preparation for smart metering implementation
- Strengthening grid protection and labor safety systems

No. of connected generators

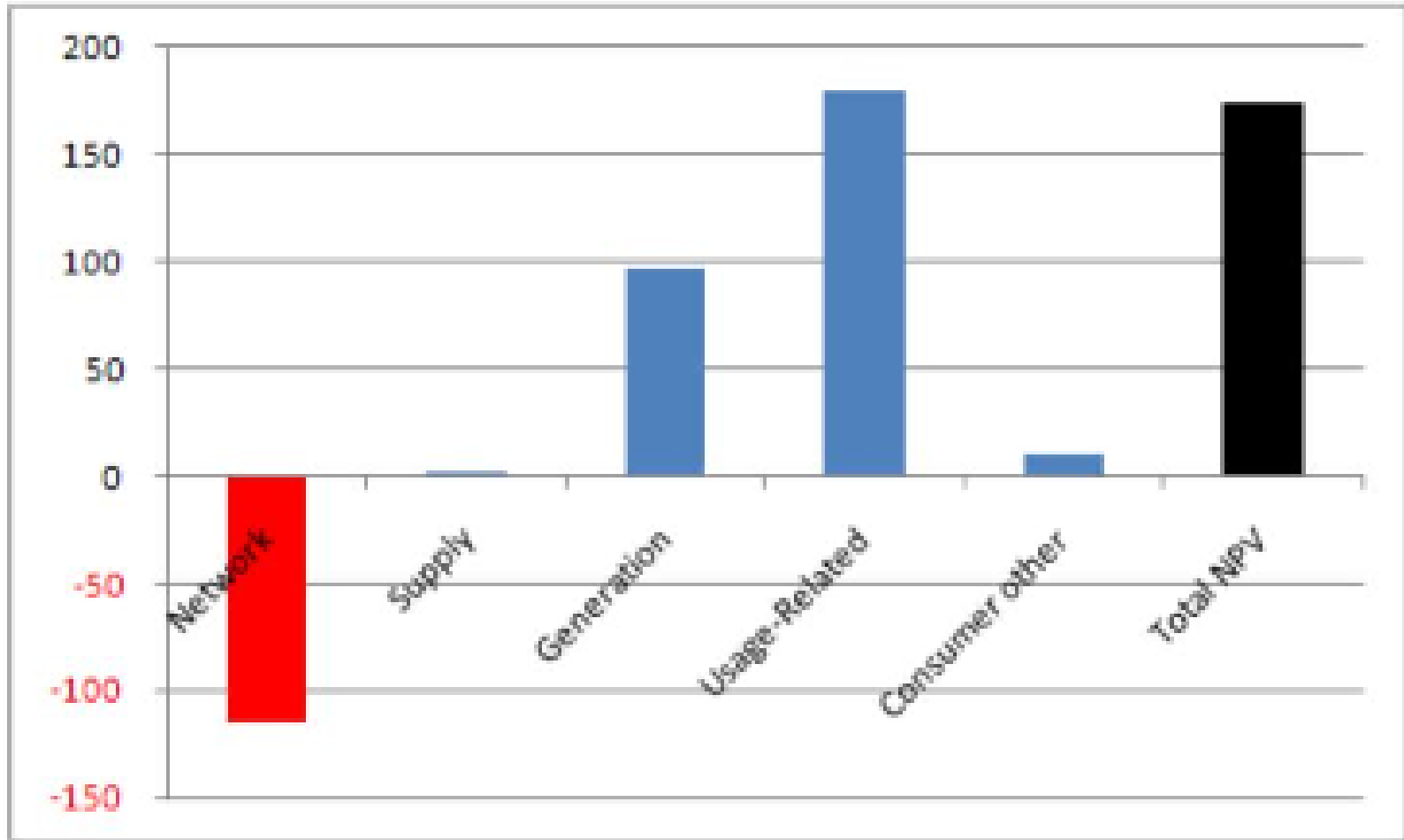


Installed capacity



- Smart grid is „objective reality“ at HV and a large part of MV grid
- Further development of smart grid is in integration of distributed generation and smart metering at LV grid, as a response to present challenges
- Smart metering does bring benefits, but they are unevenly distributed
- Ensure principle – those who benefit also pay – in implementation of smart technologies and smart metering
- Regulation mechanisms to motivate investment in smart grid / smart metering => smart regulation

Cost-benefit of Smart Metering in Ireland



Source: Eurelectric

- Focused on remote control of selected grid facilities to monitor, evaluate, and manage the grid in real time
 - Automatization of 110/22 kV substations and 22/0,4 kV trafos
 - Remote control of section switches on MV lines
 - Remote failure identification in urban cable lines
 - Remote control of distributed generation above 100 kW
 - Central metering at LV section of 22/0,4 kV trafos
 - Smart metering of industrial customers and commercial segments
 - Pilot projects of smart metering for residential and small commercial customers
- Smart grid investments represent up to 10% of annual capex

- Smart grid is

„an electricity network that can cost efficiently integrate the behaviour and actions of all users connected to it – generators, consumers and those that do both – in order to ensure economically efficient, sustainable power system with low losses and high levels of quality and security of supply and safety.“

Source: http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/expert_group1.pdf

Grid management

- Effective operation of the grid, namely in dispatch, failures and repairs management
- Efficient grid development
- Smart metering

Integration of distr. Generation

- Ensuring grid stability with high degree of integrated distributed generation, namely RES
- Integration of generation, EVs, storage, etc.

Smart markets and customers

- Aggregation of distributed generation, customer loads, and e-mobility
- Facilitation of demand management by customers

Source: EC, Eurelectric

Smart grid generates specific benefits to each type of market participants – generators, suppliers, customers, grid operators,...