

FUTUR/E/MOTION

ENERGIE ZÍTRKA

 nová energie pro život

STRATEGIC GUIDELINES



More possibilities for people to make **decisions** about their way of using energy

Increase of comfort, field for energy savings and better planning of consumption



Implementation of new pillar to traditional power engineering: **local production**

Higher security of supply and reduce of costs



E-mobility support, charging infrastructure

Major reduction of noise and emissions of cars



Support of **science and research** and application of new technologies and processes in production, consumption and distribution

Reducing negative impact on the environment





WHAT SMART GRIDS MEANS?

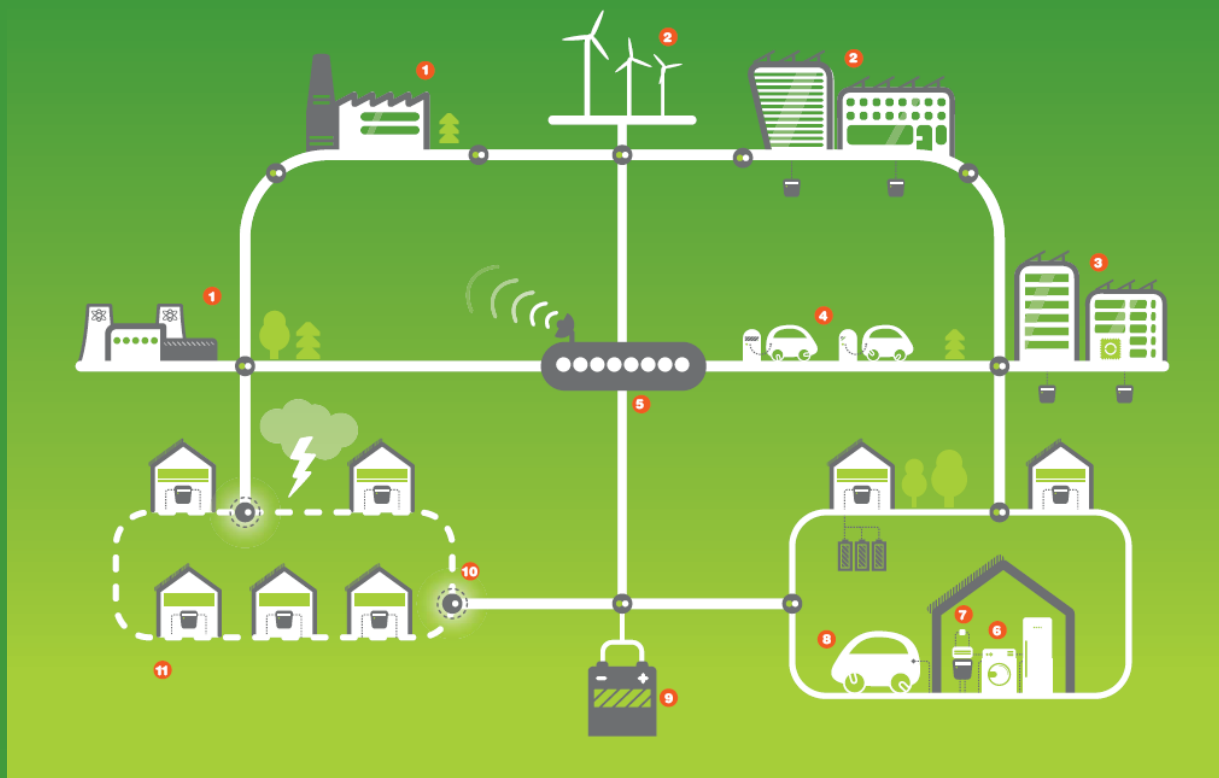
Smart Grids or "**intelligent grids**" are reliable, automated and effectively managed distribution grids of 21st century. The principle is an **interactive bidirectional communication** among production, distribution grid and consumers about current possibilities of production and consumption of energy.

Basic characteristics:

- Automation and monitoring of distribution grid
- Balance between consumed and produced electric energy
- Integration of consumers, smart metering
- Adaptation to different ways of energy production



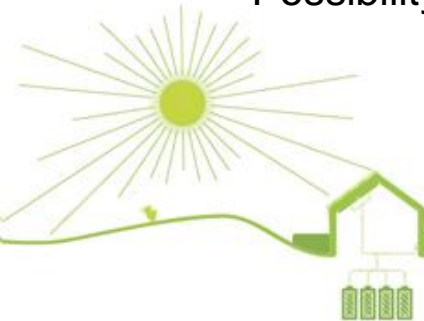
SMART REG ON A PILOT PROJECT OF CEZ GROUP





WHY SMART REGION IN VRCHLABÍ

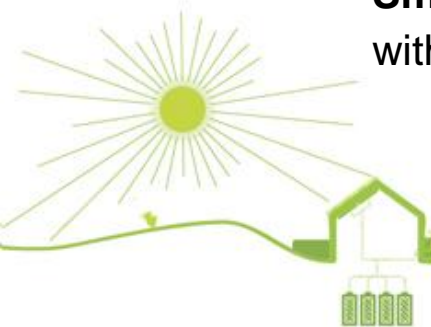
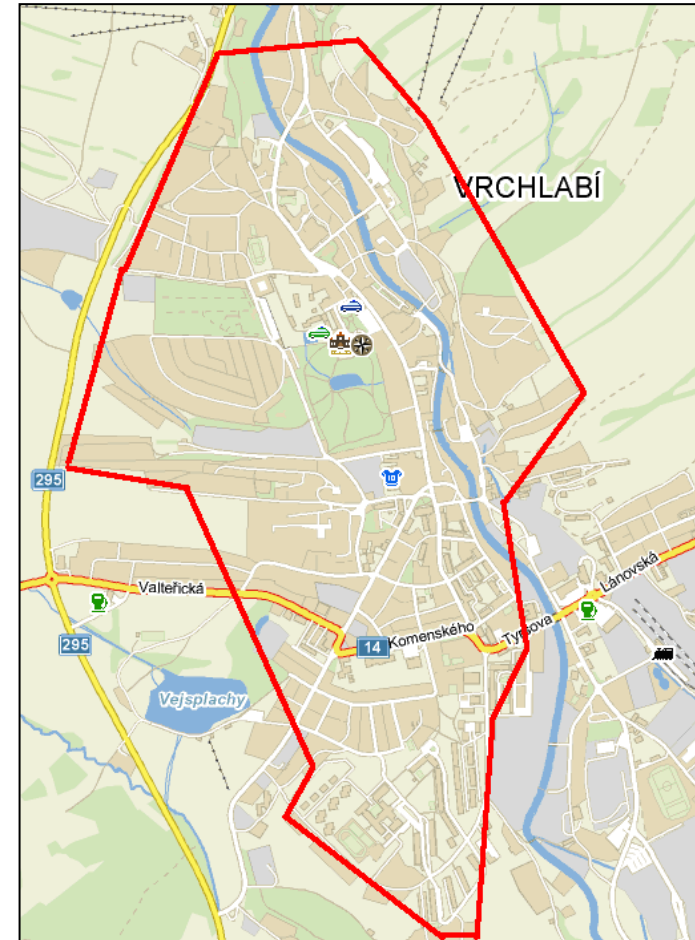
- Appropriate **size and range** for pilot project
- Appropriate distribution grid with possibility of **synergy effects from unification** (10 → 35 kV)
- Existing integrable **DER** and possibility of several **CHP units**
- For **E-mobility concept** is Vrchlabí ideal: in neighborhood with **National Park Krkonose** and emphasis on environmental conditions
- **Close cooperation with municipality**
- Possibility of **involvement of local industry**





SMART REGION IN VRCHLABÍ

- Pilot project Smart Region in **Vrchlabí**
- Realization of project in **2010 – 2015**
- **Range** of locality:
 - Town cable **MV grid** 10 kV (ca 12 km)
 - **LV grid** – cable and line (ca 66 km)
 - Ca **4 600 consumption points**
- **Structure of DER**
 - **CHP units** - development (**4 MWe**)
 - **Small hydro power plant** – cooperation with current plants (**0,5 MW**)





SMART REGION COVERAGE

Smart Grids

- Grid modernisation – response to customers and producers needs
- Two-way communication between distributor and customer
- Integration of innovative functionalities into the grid (including EV charging stations)

Smart Customers

- Smart Meters for near real time power consumption imaging
- Better awareness of customer's own consumption patterns
- Multi-utility measurements in households
- Consumption optimisation, efficiency and savings for customers

Smart Technologies

- Construction of EV recharging stations
- Automation and monitoring of LV, MV components
- Local grid supervision allowing the quick problem solving in case of malfunction
- Testing the wireless IT technologies for remote data transfer

Smart Power Generation

- Construction of local CHP plants
- Electricity and heat supplies into grid and central heating system
- Power generation units for testing island electricity system operation

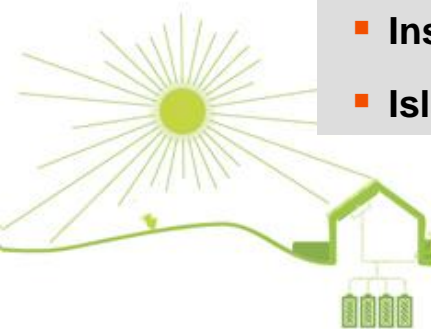




PLANNED MILESTONES

Pilot Project Smart Region

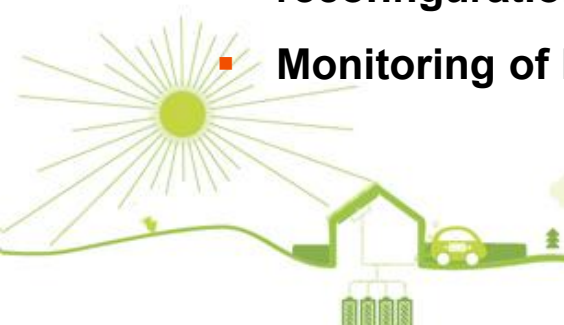
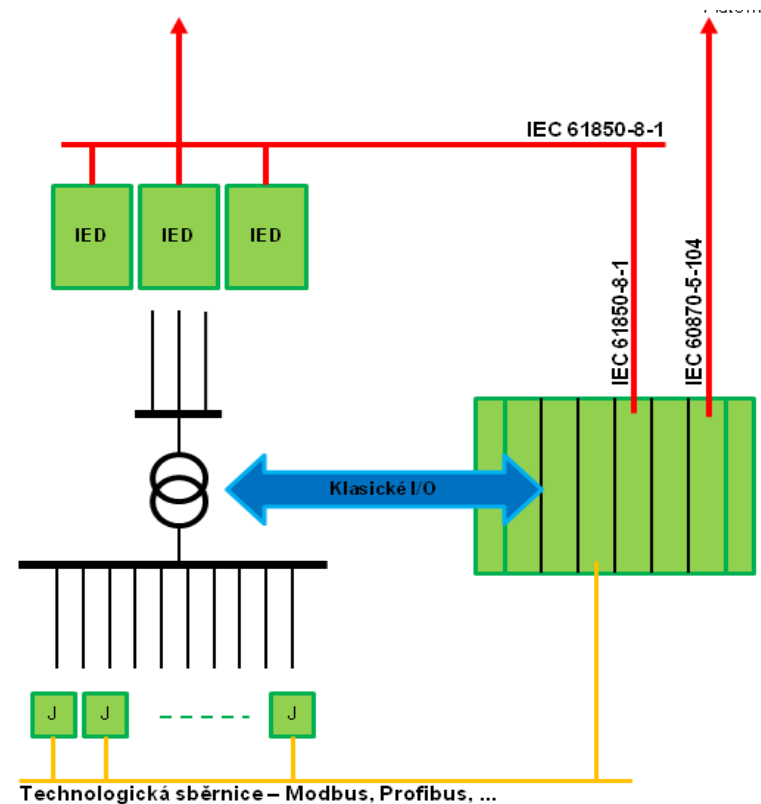
- | | |
|---|---|
| <ul style="list-style-type: none">▪ Research and development studies | <ul style="list-style-type: none">▪ 2010 – 2012 |
| <ul style="list-style-type: none">▪ Smart Meters Implementation | <ul style="list-style-type: none">▪ 2010 – 2011 |
| <ul style="list-style-type: none">▪ Reconfiguration of distribution grid (mainly MV and DTS) including unification (10 → 35 kV) | <ul style="list-style-type: none">▪ 2011 – 2015 |
| <ul style="list-style-type: none">▪ Installation of E-mobility charging stations | <ul style="list-style-type: none">▪ 2011 – 2013 |
| <ul style="list-style-type: none">▪ Implementation of new automation and monitoring devices | <ul style="list-style-type: none">▪ 2011 – 2014 |
| <ul style="list-style-type: none">▪ Distribution Management System with Smart Grids functionalities implemented | <ul style="list-style-type: none">▪ 2013 – 2014 |
| <ul style="list-style-type: none">▪ Installation and operation of CHP Units | <ul style="list-style-type: none">▪ 2012 – 2015 |
| <ul style="list-style-type: none">▪ Island operation testing | <ul style="list-style-type: none">▪ 2014 – 2015 |





CONCEPT OF LV AND MV LEVEL AUTOMATION

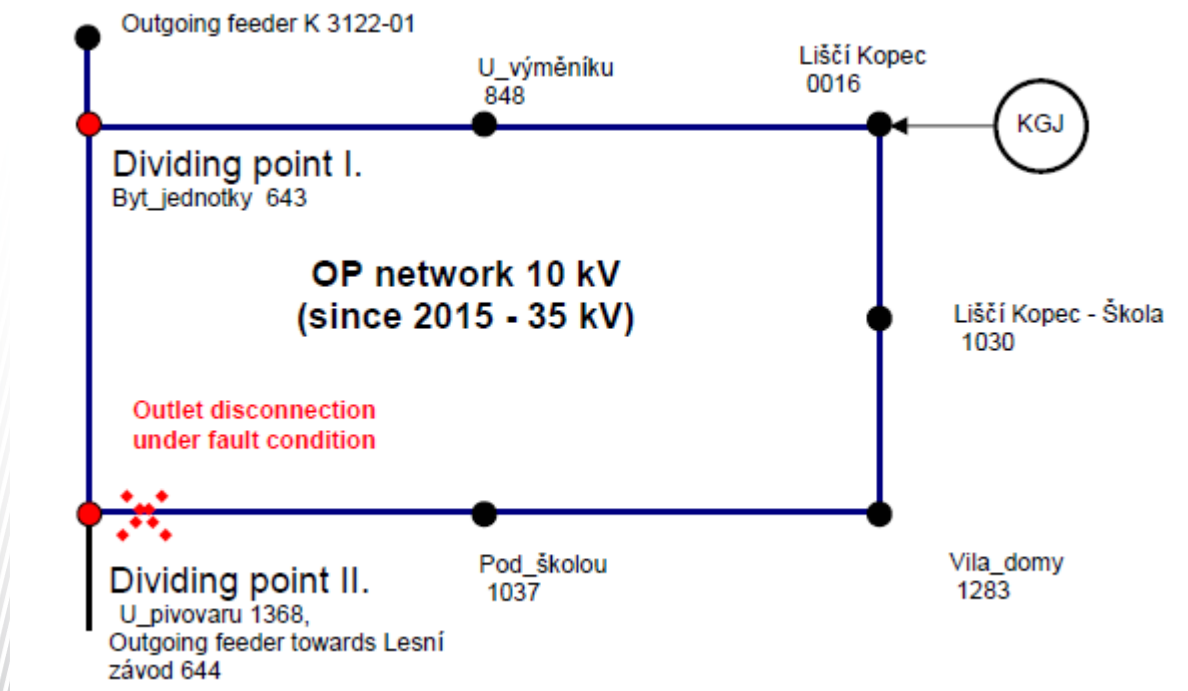
- MV automation and monitoring
- Protection concept within MV switchgears with IEC 61850/GOOSE messages using
- Protection parameters adaptation
- Protection coordination
- Control of demand, testing of Demand Side Management
- Full automation on LV level in Vrchlabi/Lisci Kopec
- Self-healing functionalities via DMS with possibility of automatic reconfiguration
- Monitoring of EV's charging station influence on distribution grid





AUTOMATION OF GRID DISCONNECTION, ISLAND OPERATION

- Management of consumption by LV switchgears in DTS, optimization of consumption
- Management of production CHP including heating accumulation using
- Integration of Smart Meters with optimization of consumption





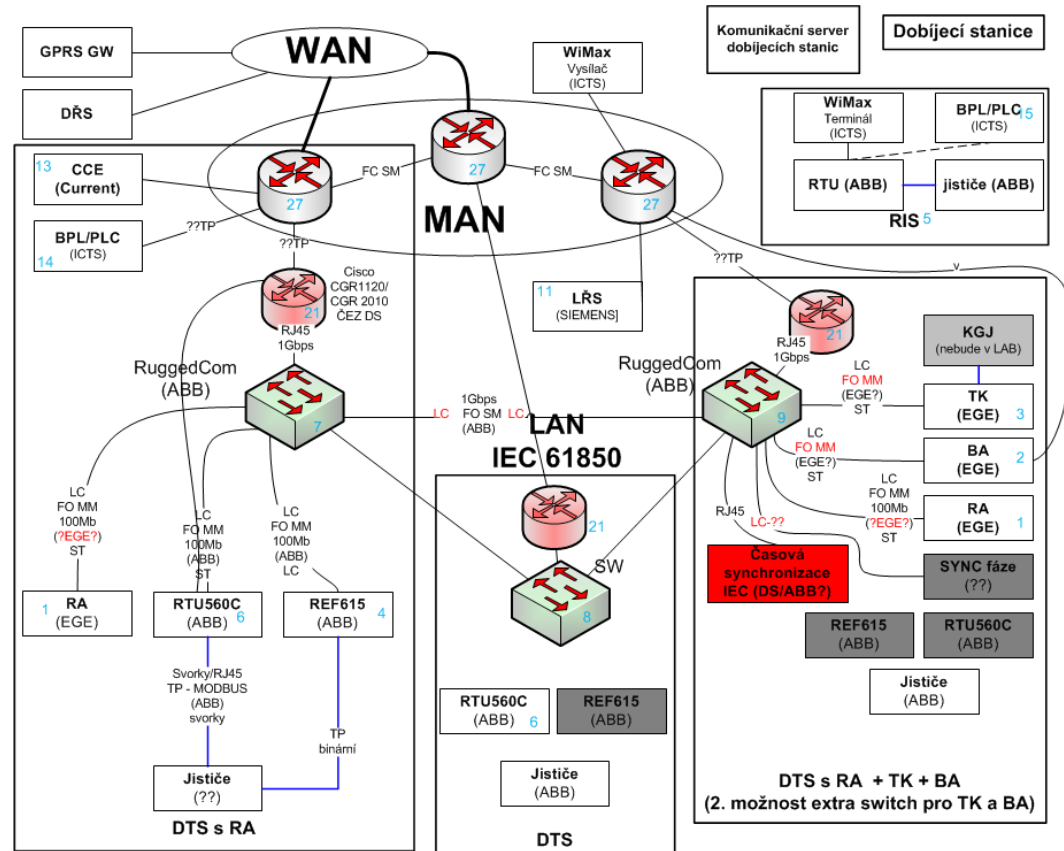
LABORATORY TESTING

Equipment tests

- RTU
- IED
- DMS
- Automatics for islanding
- Charging station
- ICT routers, switches

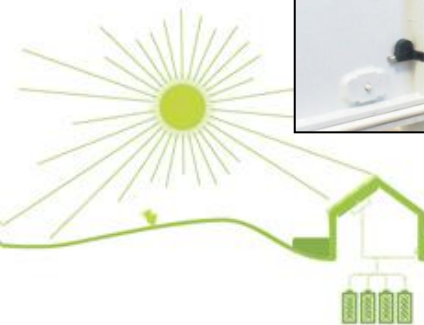
Test of telco communication

- Optical fiber connection
- Metallic connection
- PLC, BPL
- WiMAX





LABORATORY TESTING





SMART REGION - REALIZATION PHASE

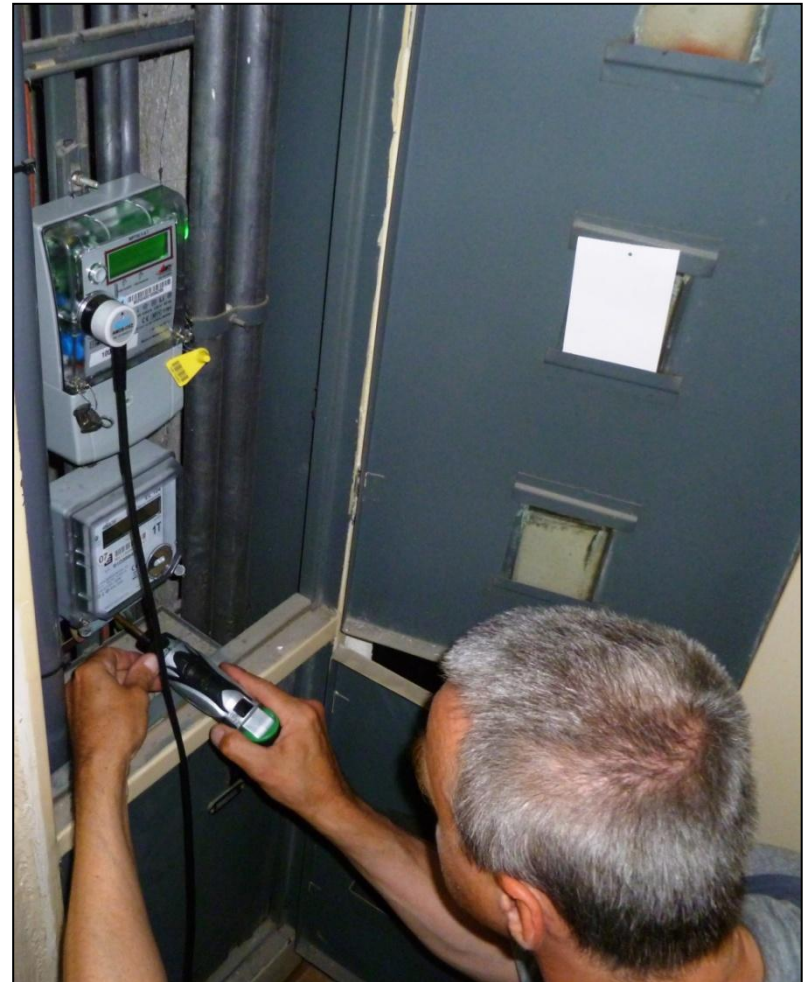
MV cables exchange





SMART REGION - REALIZATION PHASE

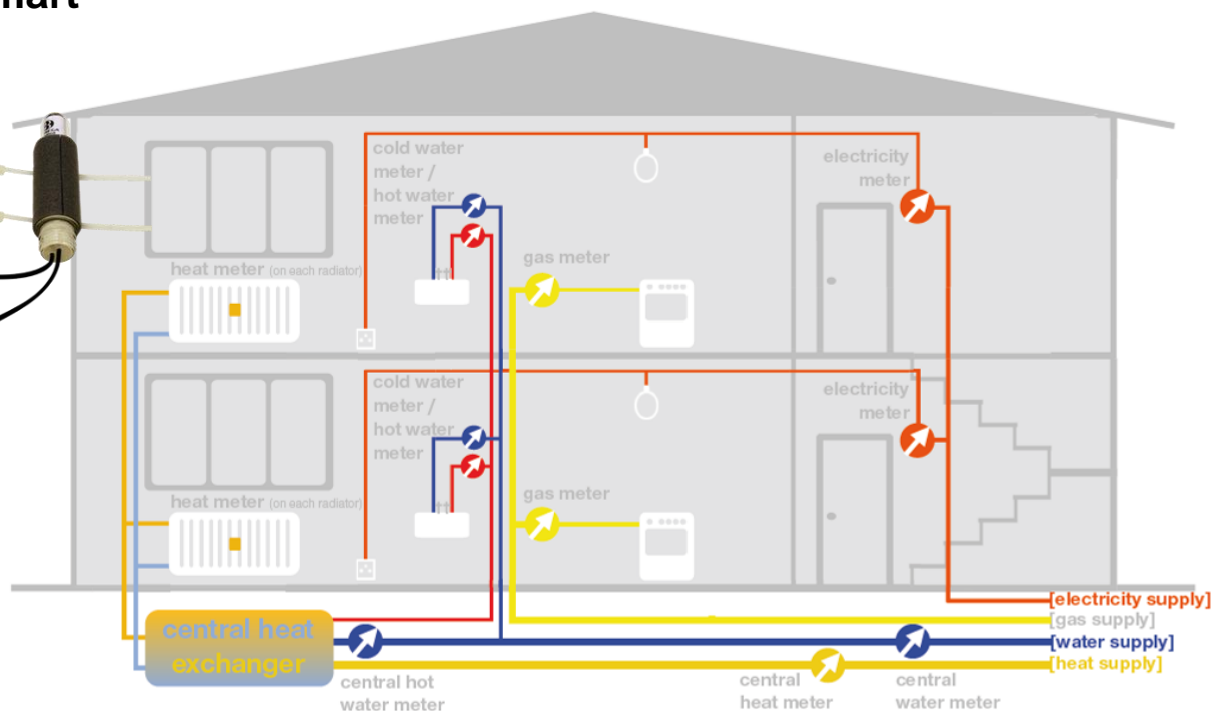
Smart Meters installation





SMART REGION - REALIZATION PHASE

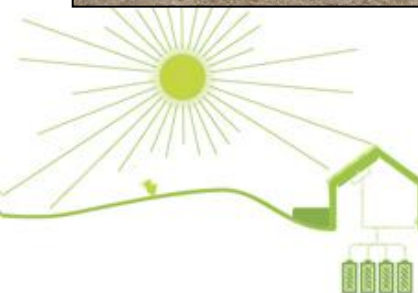
Multi-utility house – measurement of electricity, heat, water, gas via Smart Meters





SMART REGION - REALIZATION PHASE

Smart DTS installation



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SMART REGION - REALIZATION PHASE

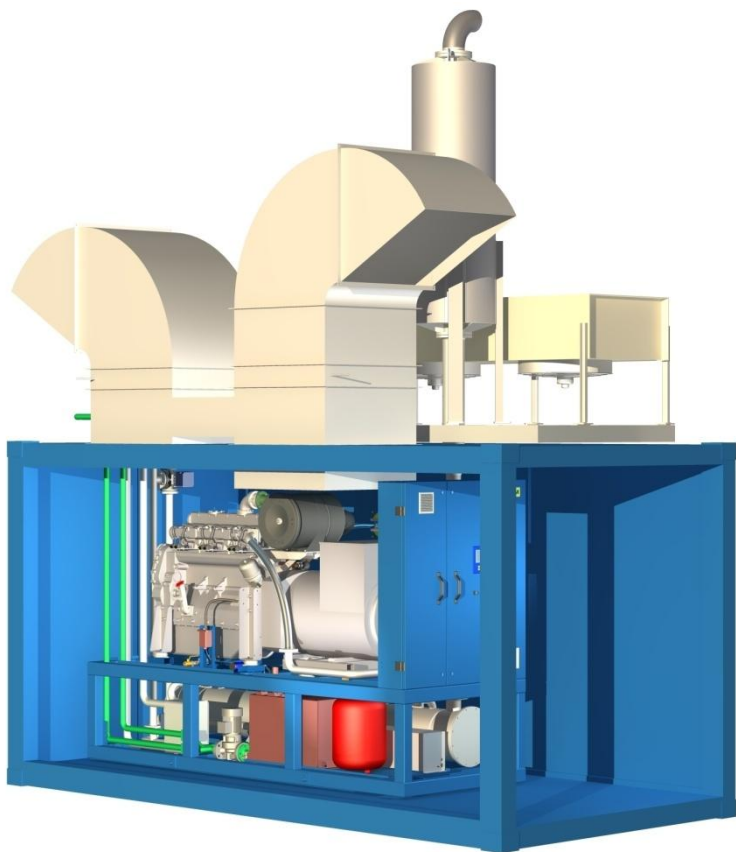


EV's and charging station operation

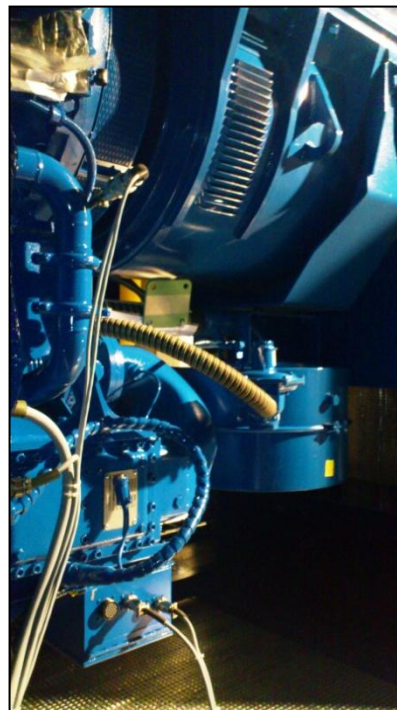




SMART REGION - REALIZATION PHASE



CHP Units installation





CUSTOMERS IN SMART REGION

- Installation of **Smart Meters** to all customers within Smart Region
- **Customers will be able to monitor the consumption** using **web portal** and compare their consumption with „ideal consumer“. Through the interface customers will have a possibility to **see graphs with their history of consumption** from hourly to annual period.
- CEZ will prepare a list of recommendation to customers about **electricity consumption and possibilities of savings.**
- CEZ will research **social acceptance** of Smart Meters and potential benefits





CUSTOMERS IN SMART REGION



SKUPINA ČEZ

PORTÁL NAMĚŘENÝCH DAT

EAN 859182400706037442 ([Odhlásit](#))

Customer information portal

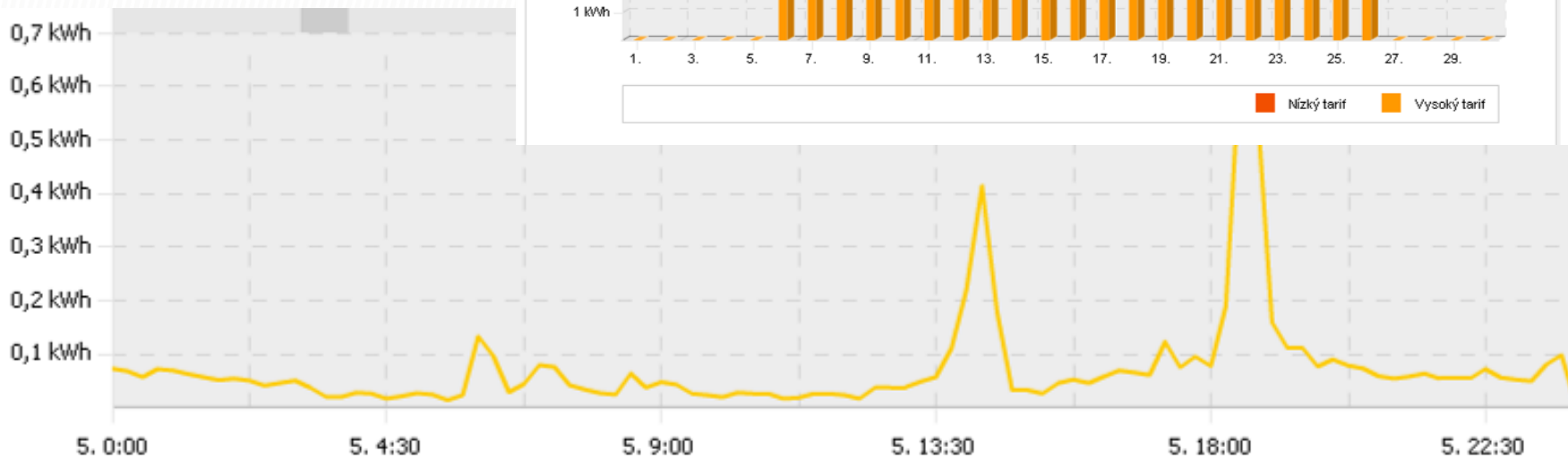
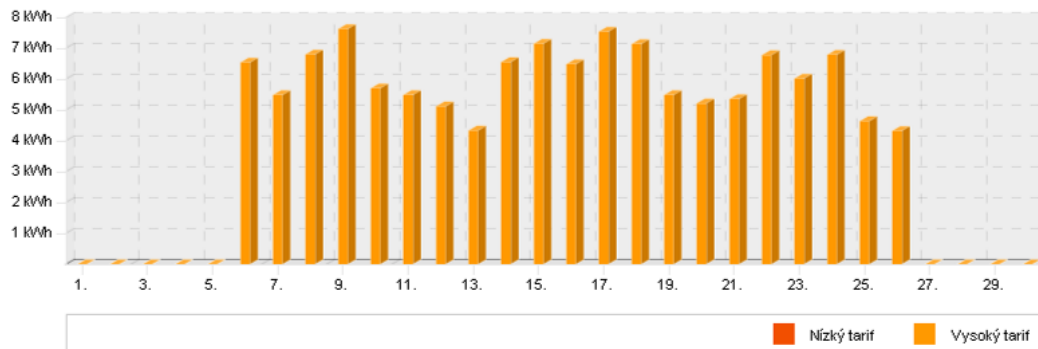
Odběrné místo	OM 859182400706037442	Rok	2011	Měsíc	září
Zobrazovaný interval	měsíc		2010		září
Typ zobrazených dat	Součet tarifů	<input type="checkbox"/> Porovnat s			
<input type="button" value="Zobrazit"/>					

Statistiky za období 01.09.2011 – 30.09.2011

Celkem: 120.111kWh

Min: 4.33kWh

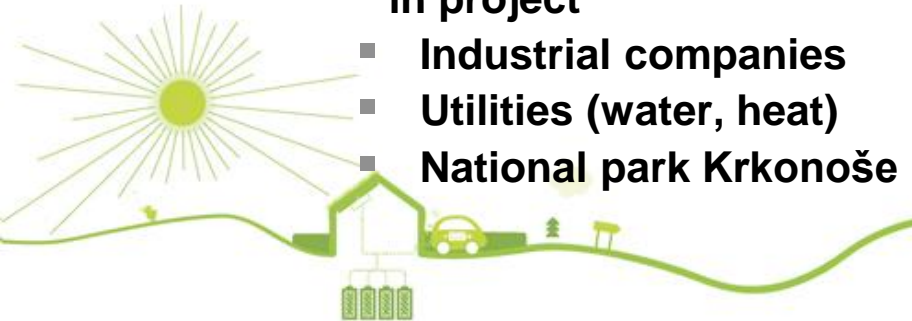
Max: 7.629kWh

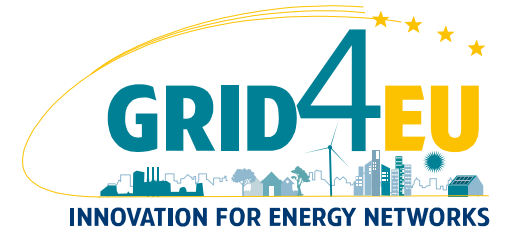




CUSTOMERS IN SMART REGION

- **Emphasis on communication with customers**
- **Web-sites, press releases**
- **Articles about Smart Region project in town's newspapers PULS**
- **Annual press conference with active participation of customers (discussion)**
- **Regular reporting and meetings with mayor and town council**
 - **Local industry companies involved in project**
 - **Industrial companies**
 - **Utilities (water, heat)**
 - **National park Krkonoše**





« Grid4EU » project

Large-Scale Demonstration
of Advanced Smart GRID Solutions with wide Replication
and Scalability Potential for EUROPE

An EU FP7 Smart Grids project



- Project lead by 6 Electricity Distribution System Operators - covering altogether more than 50% of metered electricity customers in Europe
- Overall 27 partners from various horizons (utilities, manufacturers, universities and research institutes)
- Duration: 51 months from November '11 to January '16
- Total eligible costs: €54M - requested EC Grant €25.5M

Project Coordinator



Technical Director



Chairman of
General Assembly



6 Demonstrators – 27 Partners



Two categories of objectives

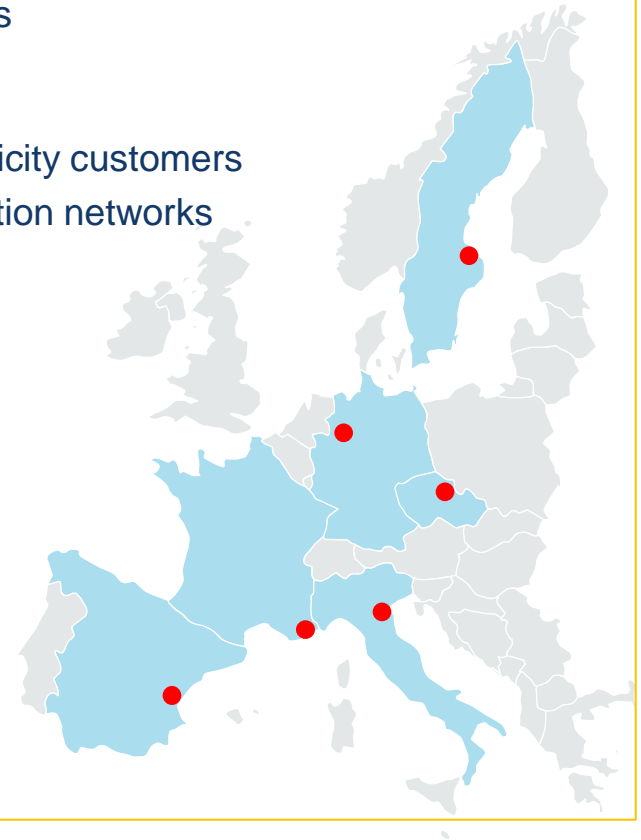


R&D and innovative technology Topics

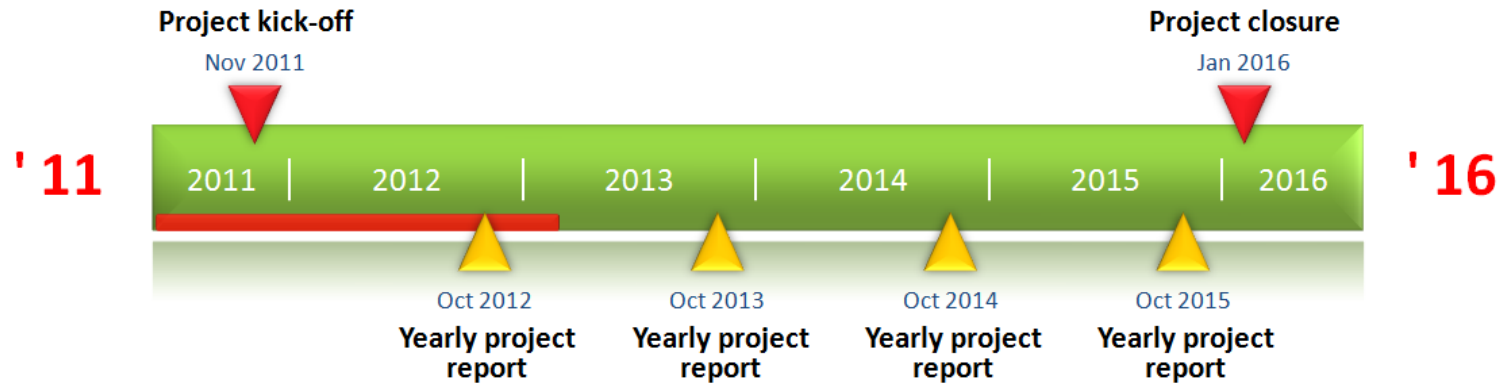
- Implementing active, more efficient participation of customers to electricity markets (active demand)
- Improving peak load management through increased interactions between network operation and electricity customers
- Using more renewable energy sources connected to distribution networks
- Secure energy supply and network reliability
- Medium and low voltage network supervision & automation
- Storage
- Micro-grids & islanding

Business and Societal Topics

- Smart Grid cost-benefit analysis
- Technologies and standards
- Scalability and replicability over Europe
- Knowledge sharing



Project Milestones



Definition and publication of technical specifications



Installation of the equipment for each demonstrator



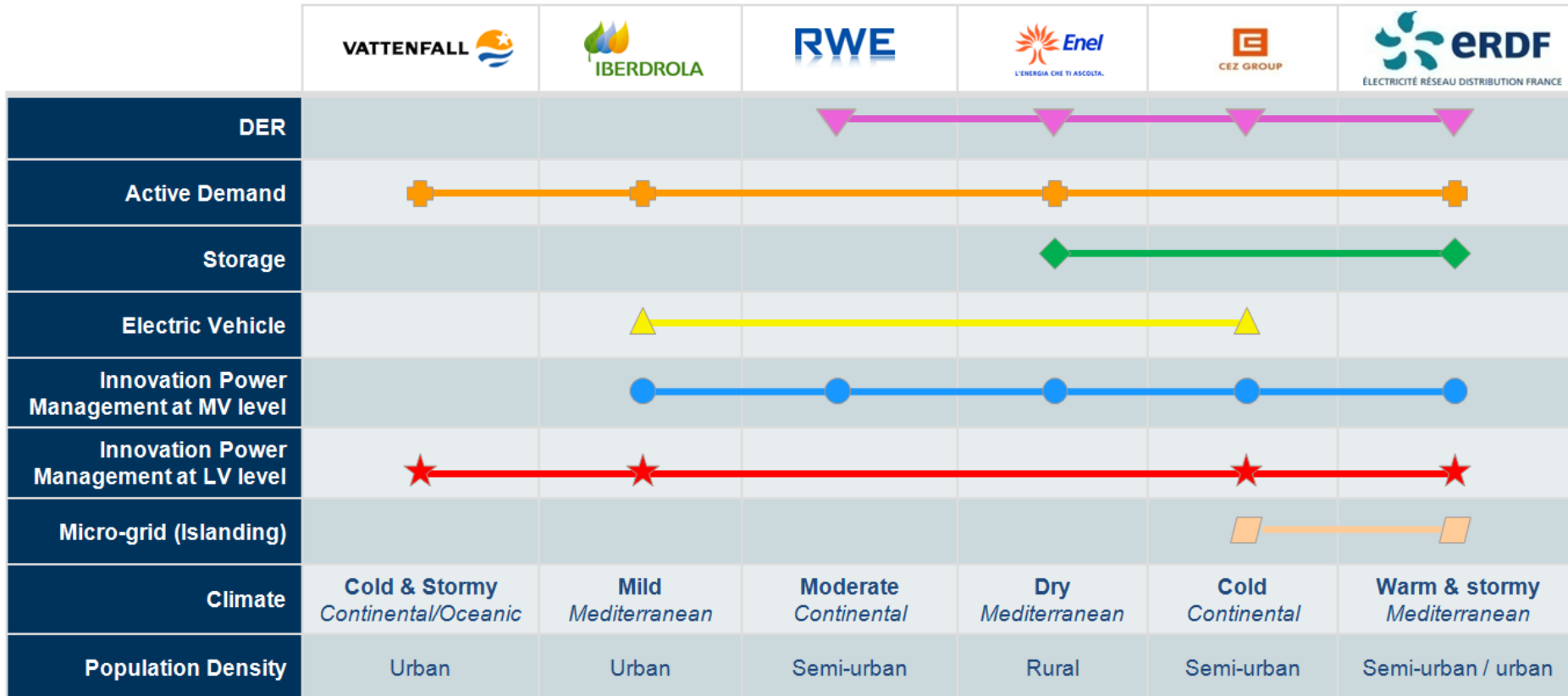
Test of the demonstrators/
exploitation of data and functionalities



Return on Experience, projections and replication of results



Interactions and synergies between Demonstrators // common topics



 Innovation Power Management at MV level

 Innovation Power Management at LV level

 DER

 Storage

 Active Demand

 Micro-grid (Islanding)

 Electric Vehicle

Interactions and synergies between Demonstrators // common work

All Demonstrators Use Cases modeled using a common methodology: the SGAM (Smart Grid Architecture Model)

Common Demonstrators' Use Cases description

Overall Technical Coordination

- Technical coordination of the Demonstrators to maximize the added value of the joint impact at EU level
- Pro-active identification of barriers faced by Demos to propose common solutions

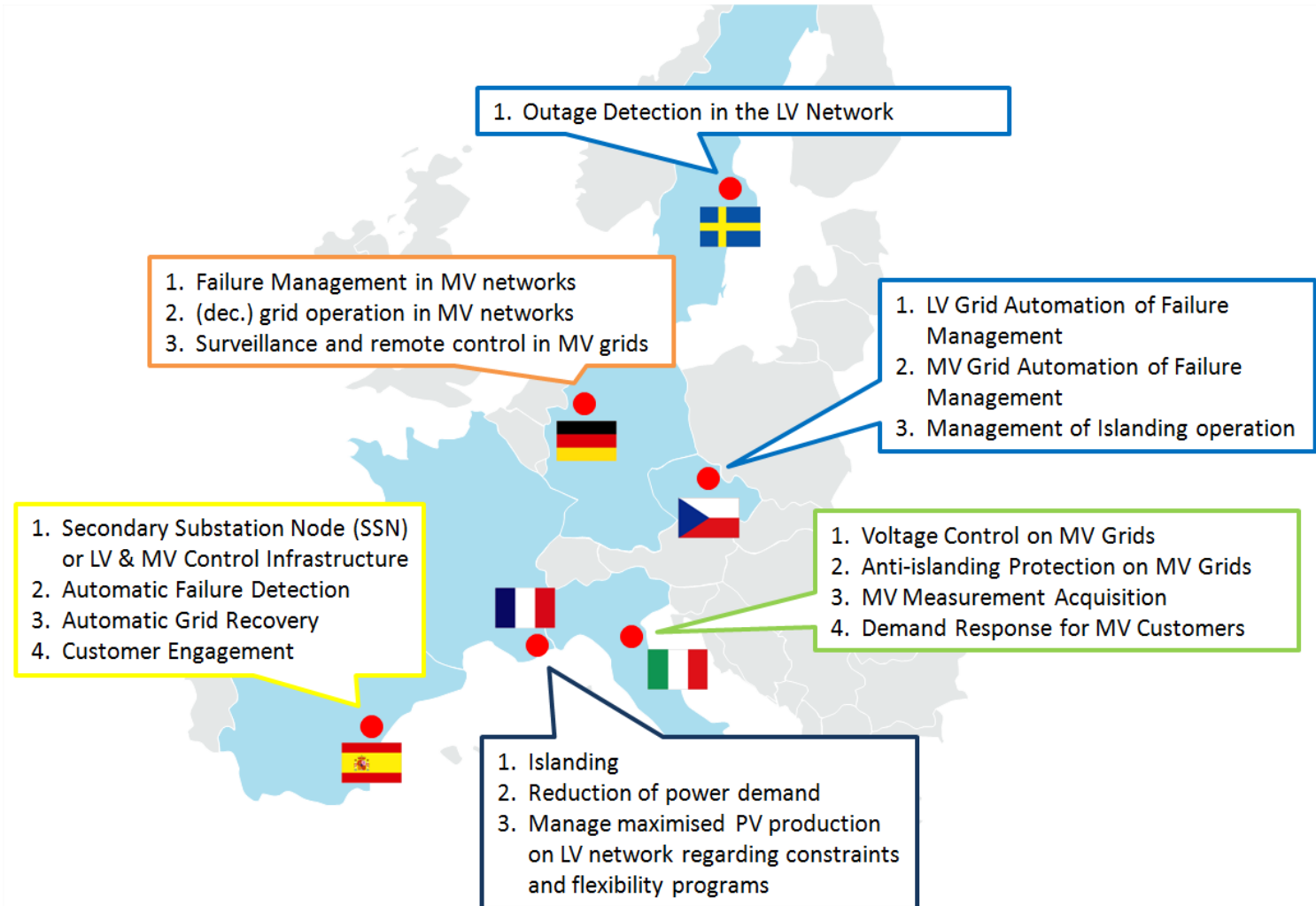
8 Common Key Performance Indicators (KPIs) defined for 2 or more Demonstrators

Common Demonstrators' KPIs definition

Peer-review process between Demonstrators







Deliverables consistently reviewed by another Demonstrator team to foster knowledge-sharing and common work

Demonstrators Use Cases



KPIs common to multiple Demonstrators



	 The energy to lead			 Distribuzione		 REGIÓN DE REGULACIÓN Y PLANIFICACIÓN	
Energy losses (GWP2.2_KPI_1)	✓		✓	✓	✓	✓	The monitoring and in some cases minimization of energy losses through different solutions presented in DEMO projects.
Fault Awareness, Localization and Isolation Time (GWP2.2_KPI_2)	✓	✓	✓		✓		Faster reaction time to grid failures and faults
Network Hosting Capacity (GWP2.2_KPI_3)	✓			✓		✓	Increased hosting capacity of RES in the MV and LV grid
Line voltage profiles (GWP2.2_KPI_4)				✓	✓	✓	Power Quality improvements (in this case voltage quality)
Islanding metric (GWP2.2_KPI_5)					✓	✓	Voltage deviation during islanding
Use of standards (GWP2.2_KPI_8)	✓		✓	✓		✓	Actual use of standards in different DEMOs with respect to initially declared use
Recruitment (GWP2.2_KPI_6)			✓	✓		✓	Fraction of consumers and producers accepting participation in the different demos
Active Participation (GWP2.2_KPI_7)			✓	✓		✓	Fraction of consumers/producers actively taking part in the different demos

Demonstrate that existing distribution networks having smart metering and CHP units can be upgraded to **allow automatic** islanding while ensuring enough power supply

- Where ?
 - Located **in Vrchlábí , Czech Republic**
 - Network characteristics : **LV/MV, old, winter local peak**
 - 1900 customers with smart meters, up to 10 secondary substations, distributed energy resources (CHP)
- Objectives
 - Demonstrate that existing distribution networks having smart metering and CHP units can be upgraded to allow for automatic islanding while ensuring enough power provision
 - **full smart meters deployment**, including launching of an **information customers web portal**
 - installation of **generation capacity of 1,6 MW** in DER (CHP units)
 - **automation** of the existing MV and LV grid
 - running of **automatic island operations ensuring sufficient power supply to the area during the island operations**





CLOSING

**WEB
INVITATION**

www.futuremotion.cz/smartgrids
www.grid4eu.eu

BROCHURE

FUTUR/E/MOTION
Smart Grids in ČEZ Group

**QUESTIONS AND
ANSWERS**

