

Smart Power Grids – Poland Consortium's role in defining Poland's future energy landscape

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Agenda

- What plan has Poland in terms of smart grid ?
Why is Poland decided to roll-out across the board in the target 2020 ?
- The current status of smart metering in Poland
Experiences, best practices and lesson learned from the pilot projects
- Methods and forms as Polish regulator (URE)
motivates the distribution companies to mass deploy of smart metering
- The vision and concept of civic smart power grids
How to prepare for new challenges and how to meet them
- About Smart Power Grids Consortium Poland
Science&Business co-operation in R&D

Memorandum



„Poland has a unique opportunity to avoid the mistakes made by other countries and to implement intelligent network solutions before the mass connection of renewable energy sources to the power system of our country.”

„Poland has an excellent both academic and technical staff and could become a European leader in the application of smart power grids technology.”

Resolution No. 2 / 2011 of the Programme Council
Smart Power Grids Consortium – Poland, 2011, April 1st

Agenda (1)

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Social, economic and political reasons justifying SPG roll-out in PL



- 20% increase of efficiency in energy up to 2020
- 50% increase of electrical energy demand up to 2030
- network infrastructure is now obsolete in most established from 30 to 50 years ago, and infrastructure growth is half slower than the growth in energy demand
- energy losses in transmission and distribution networks reach 6 - 9% of total energy produced
- an increasing threat of power system failures (blackouts)
- Poland offers very well educated engineering and electrical power staff as well as ICT specialists

Key challenges for smart grids in Poland (1)



- decrease in transfer losses and power consumption for the needs of power plants
- dynamic loads of electric power grids adjusting them to the existing climatic conditions
- optimum integration of distributed generation sources – in particular wind energy sources – with the electric power systems
- elimination of damaged system elements thanks to intelligent safety algorithms
- controlling of active and passive power generation will be adjusted to the current demand and situation both in normal and failure states

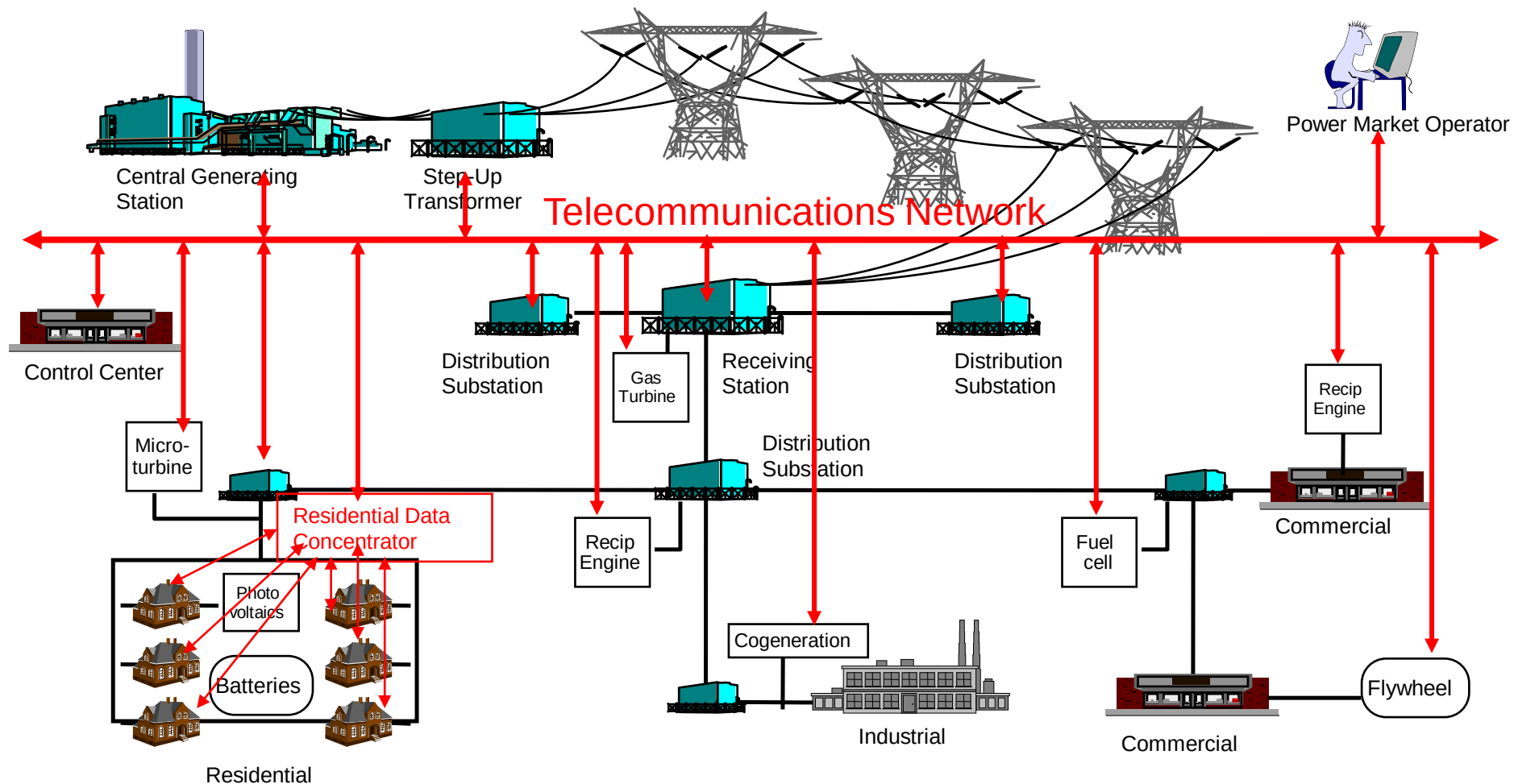
Key challenges for smart grids in Poland (2)



- optimisation of transfer capacity will be achieved through intelligent control of the FACTS systems, regulation of transformer voltage and adaptation compensation of passive power
- intelligent algorithms of post-failure restoration ensure quick and precise localisation of faults and selection of the best restoration strategy
- intelligent creation of autonomous electric power systems will result in the creation of subsystems which are locally balanced and able to carry out island operation which will increase the power supply safety at the time of blackouts

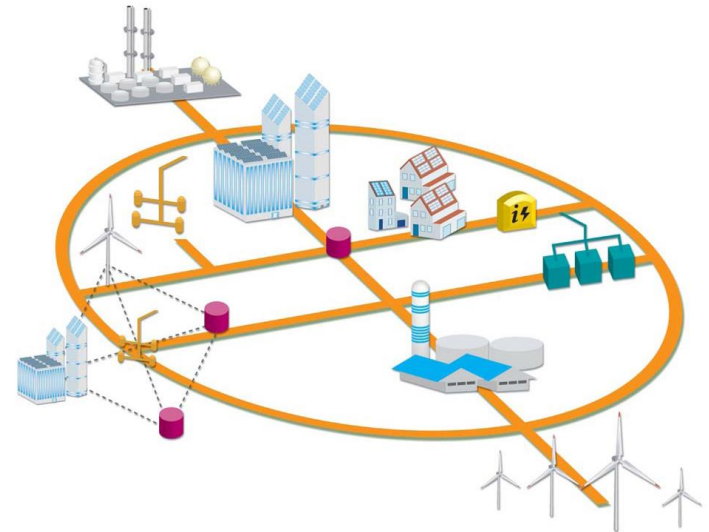
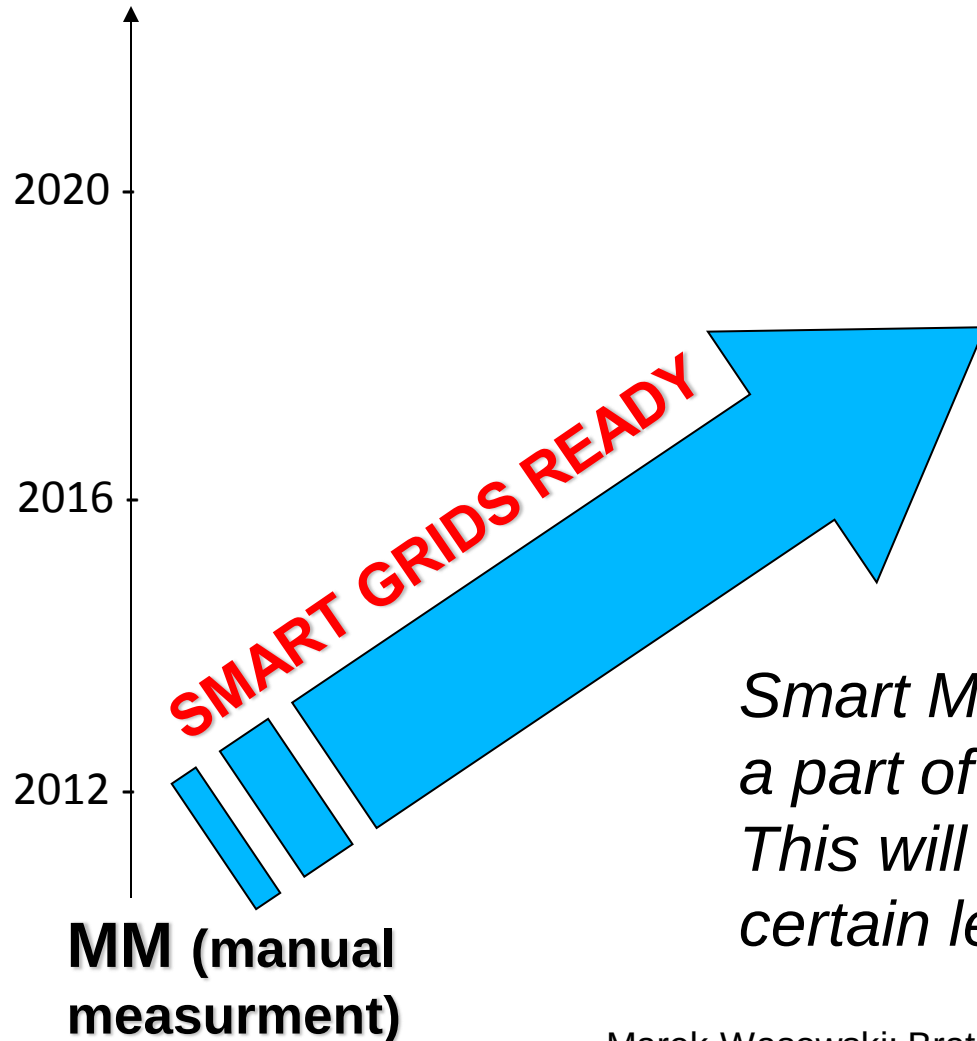
Initial vision of Smart Grids

Simple digitalization of traditional grid



Phases of SG roll-out in Poland

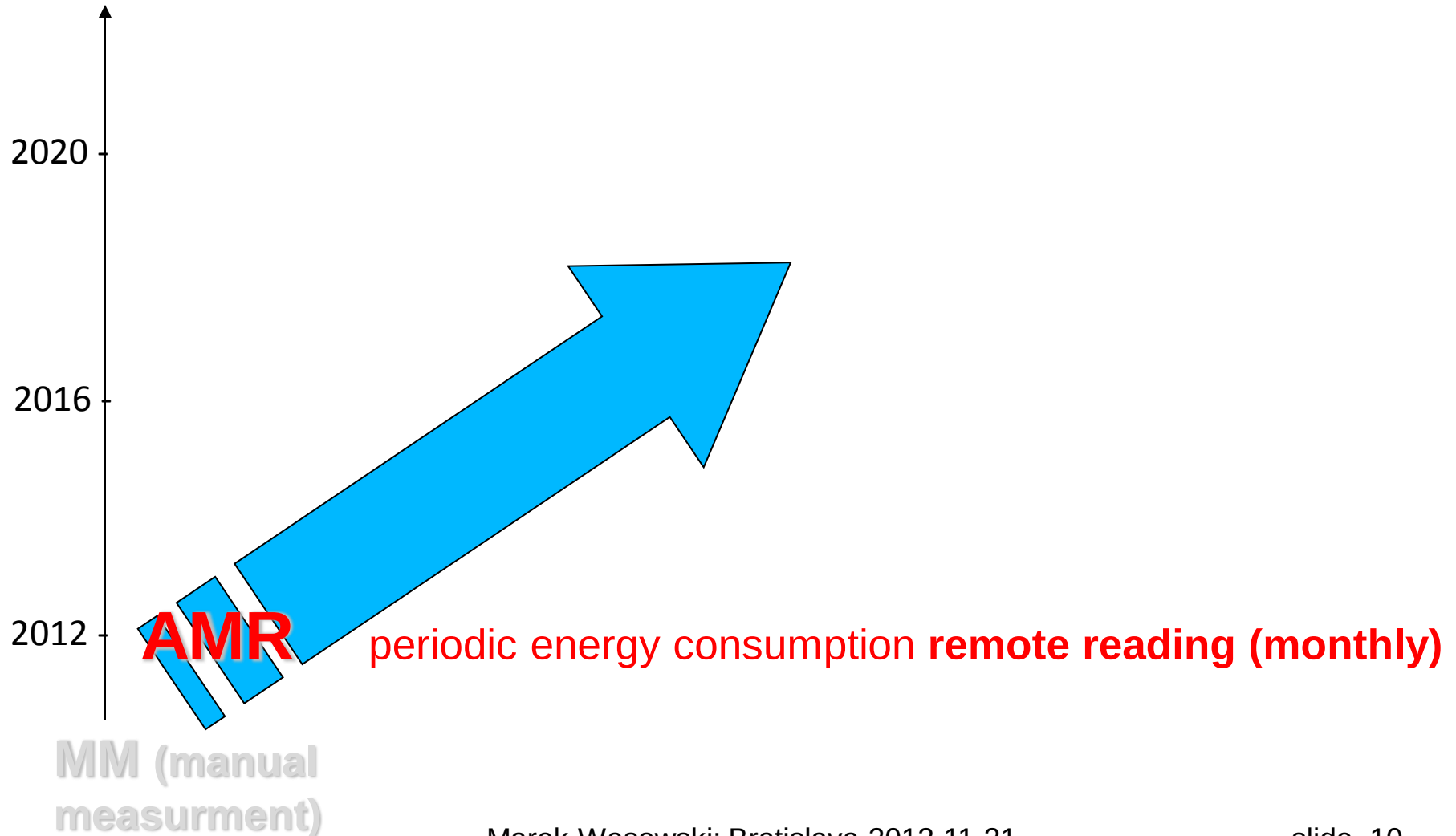
by Polish National Energy Regulatory Office (2011)



*Smart Metering— in principle – is not a part of Smart Power Grid.
This will be a part of it just after certain level of maturity of the grid.*

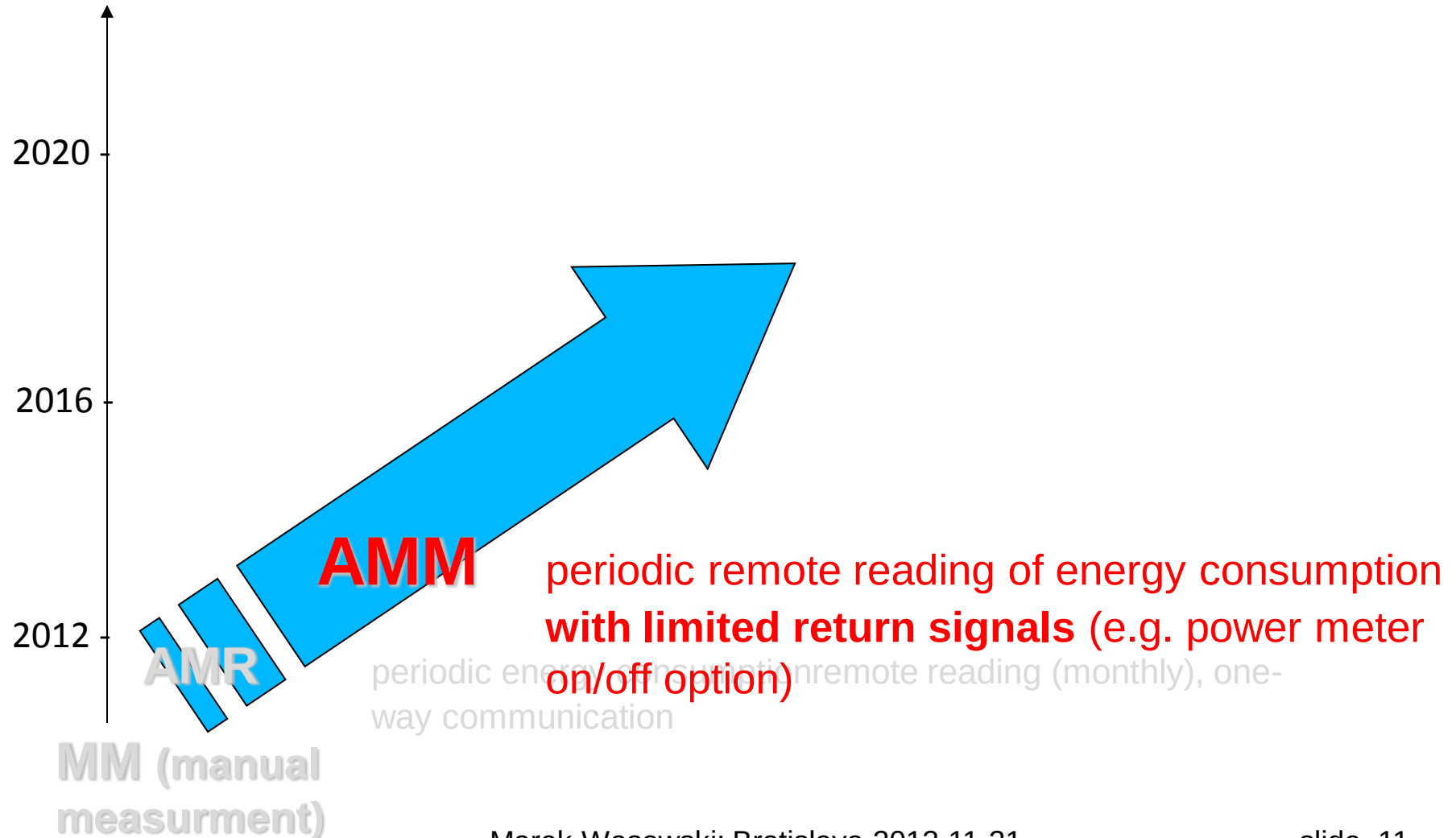
Automatic Meter Reading

one-way communication



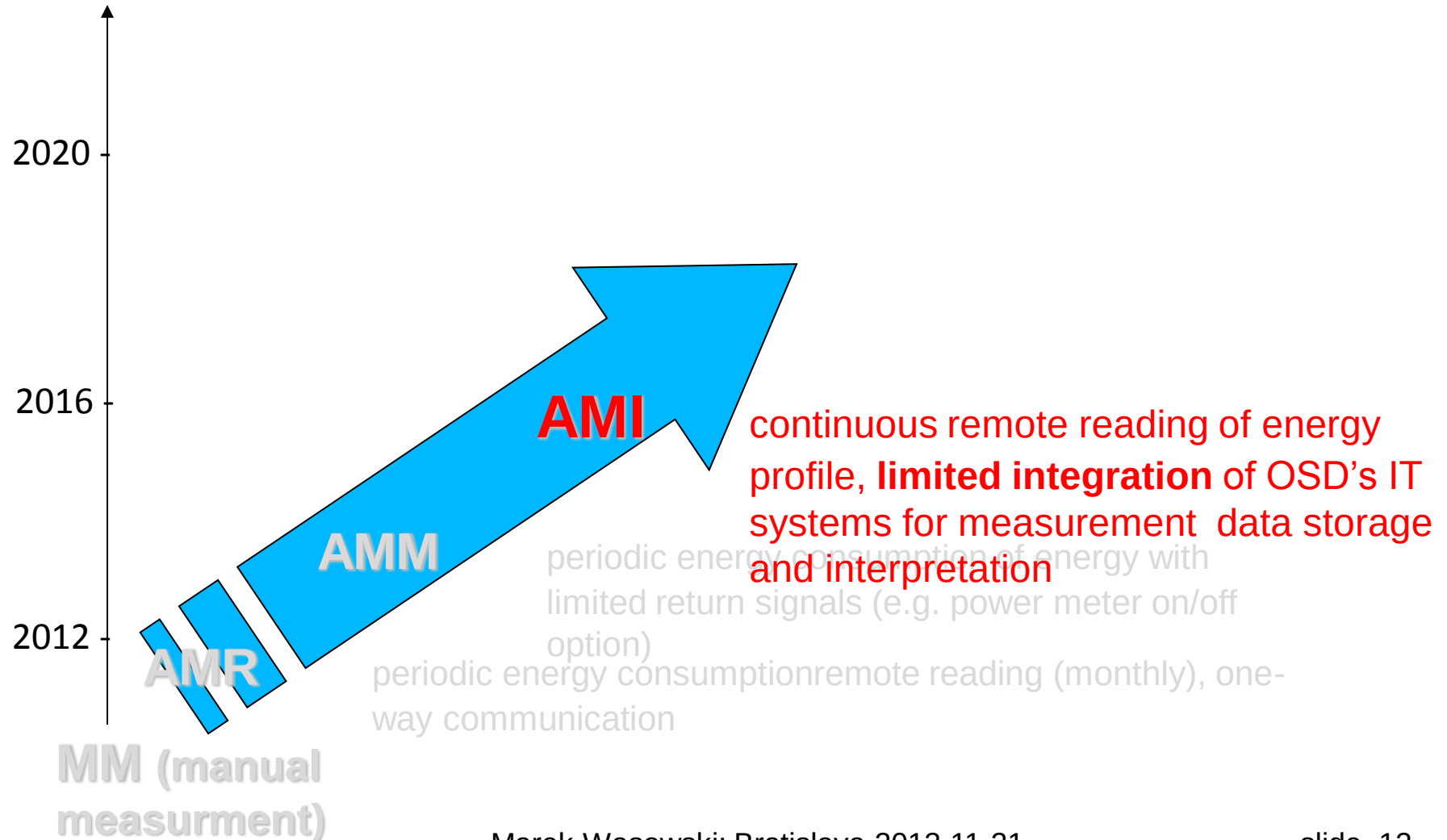
Automatic Meter Management

limited two-way communication



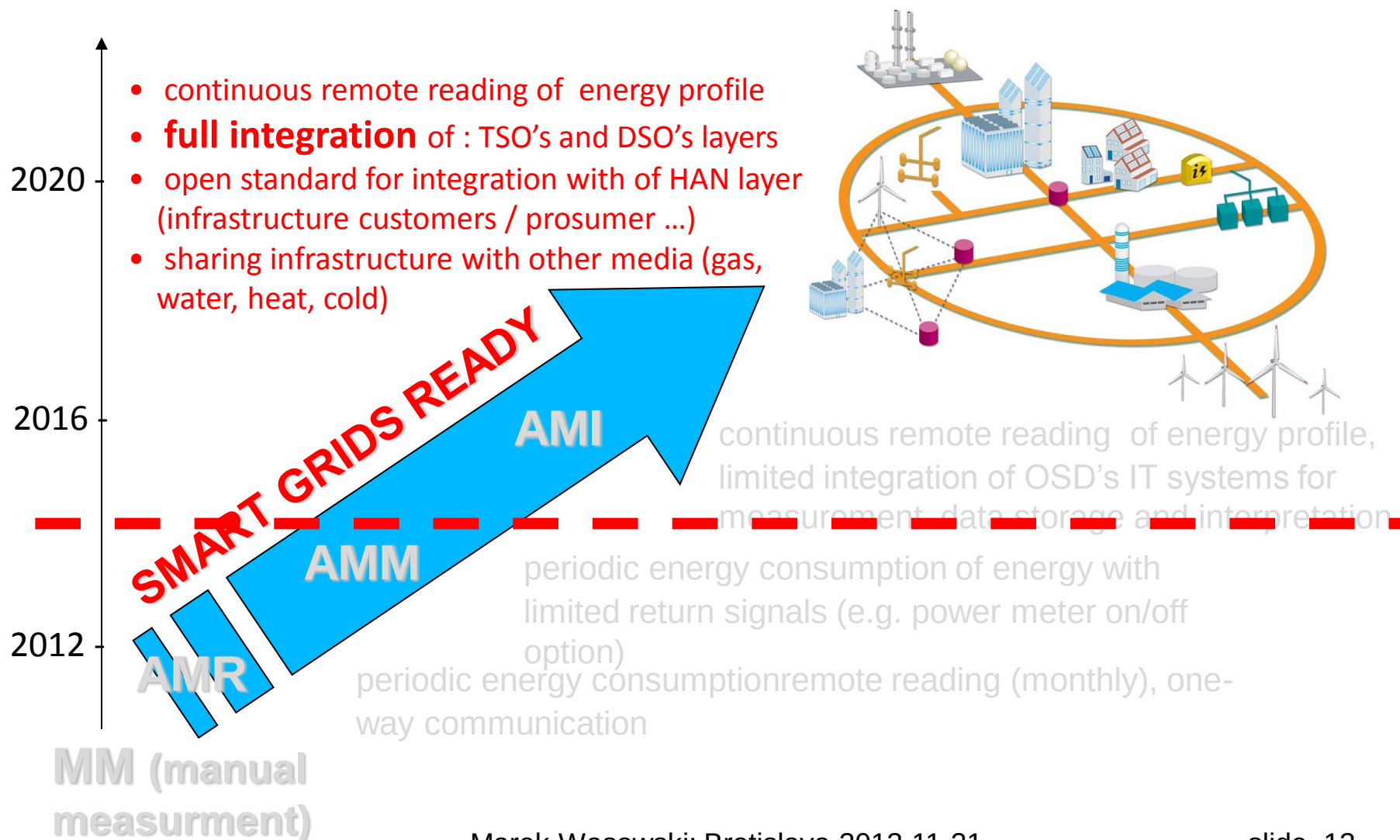
Advanced Measurement Infrastructure

continuous two-way communication



Smart Grids Ready Power Networks

by Polish National Energy Regulatory Office (2011)

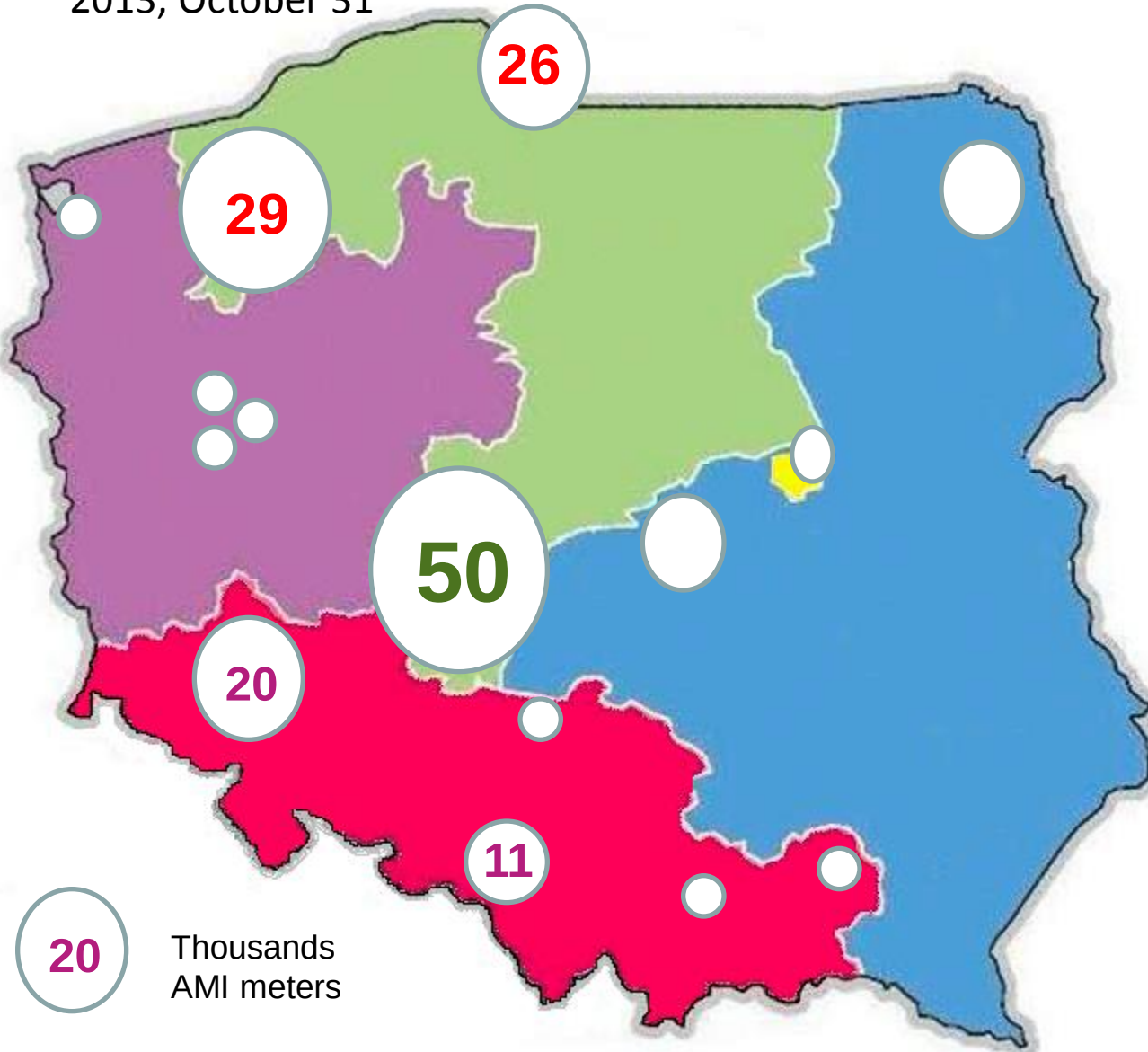


Agenda (2)

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22 SM Pilot Projects in Poland

*2013, October 31st

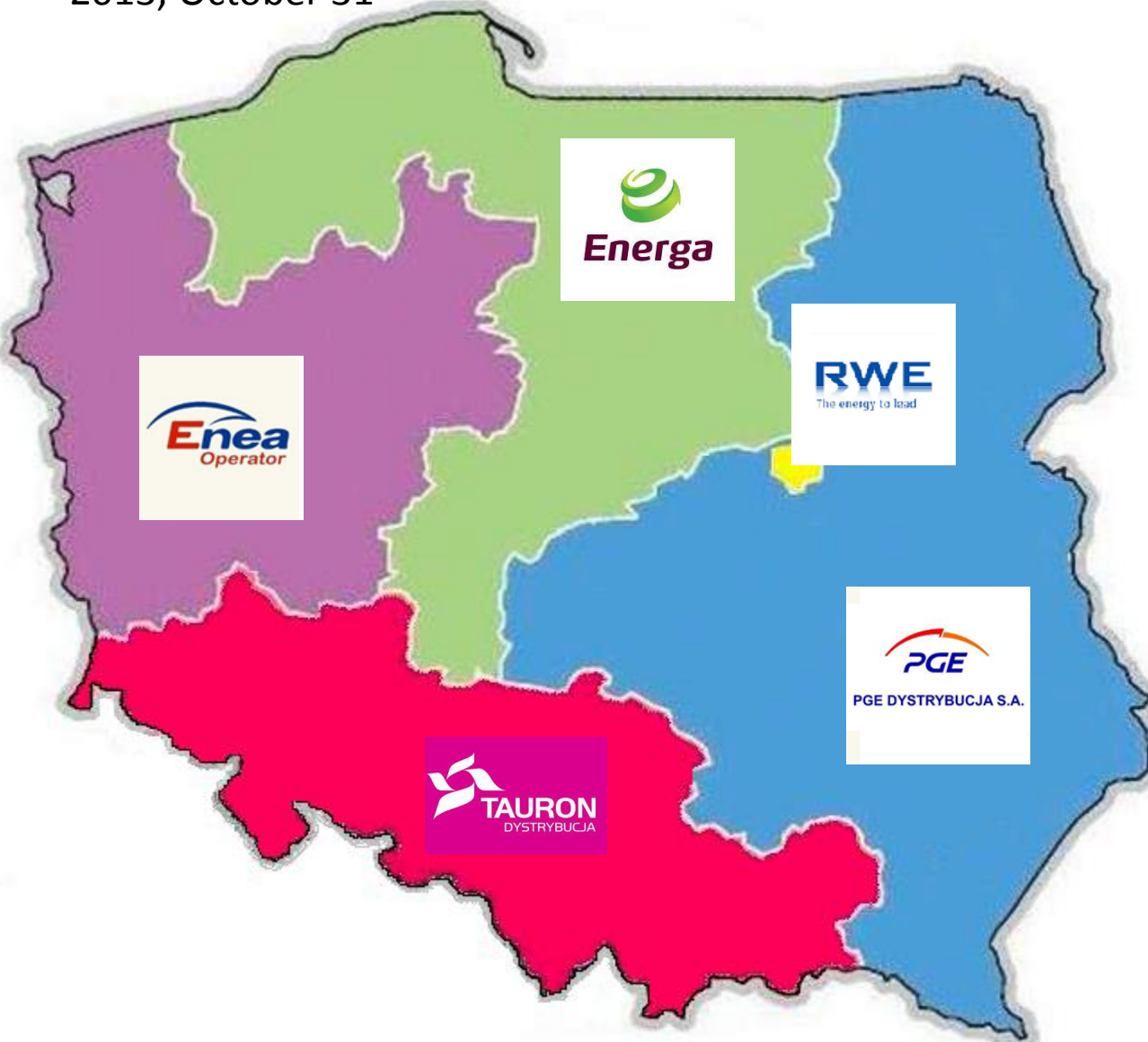


2013

- Szczecin
- Skarbimierzyce
- **Drawsko Pomorskie**
- **Hel Peninsula**
- Augustów
- Grodzisk Wlkp.
- Opalenica
- Rataje
- Warszawa
- **Kalisz**
- Łódź
- **Wrocław**
- **Legnica**
- **Wałbrzych**
- Pyskowice
- Toszek
- Częstochowa
- Kraków
- Tarnów

Smart Meters in Poland

*2013, October 31st

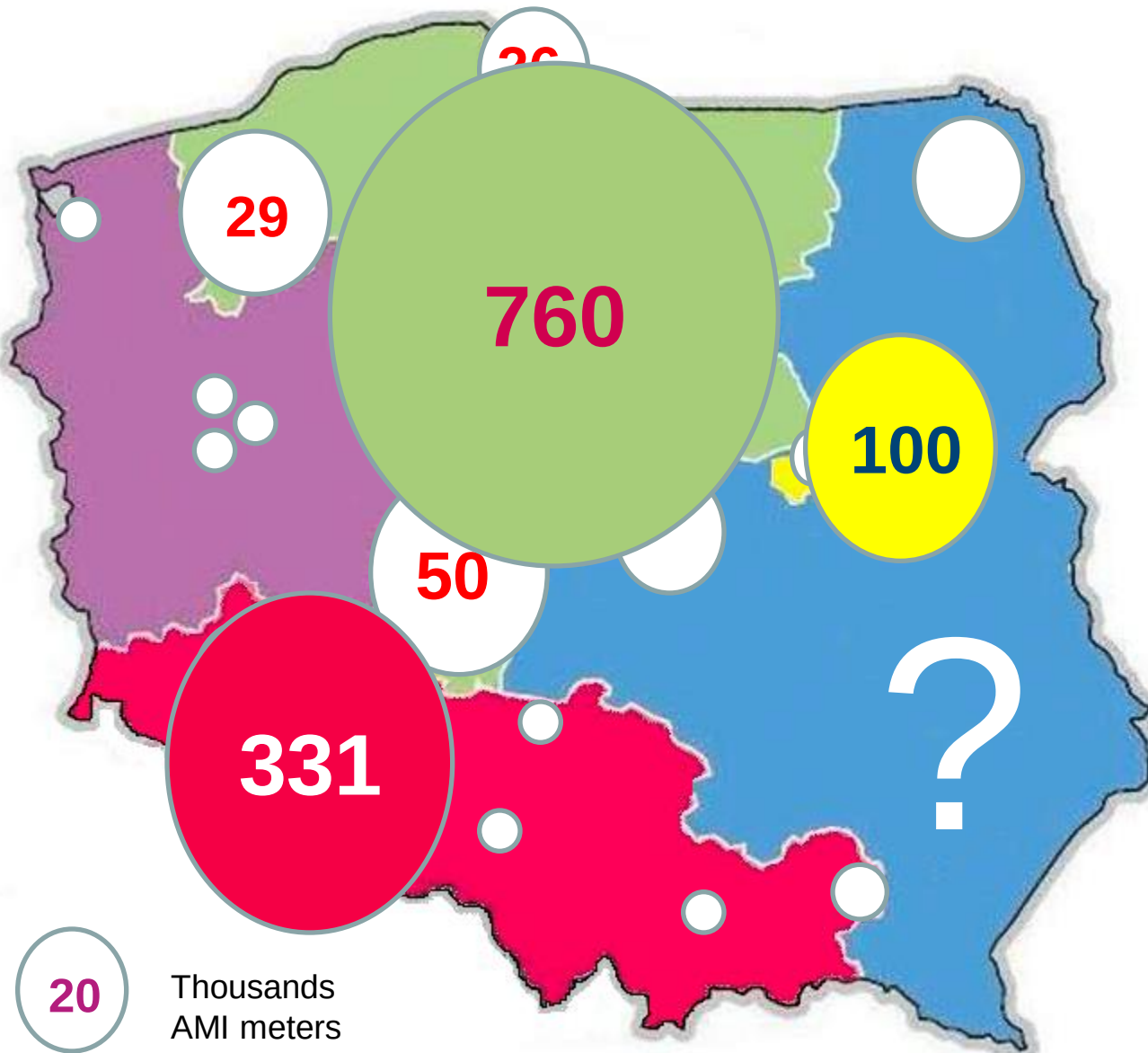


2013

- Energa ~105.000
- Enea ~ 1.000
- RWE ~ 900
- PGE ~ 51.000
- Tauron ~ 41.000
- other ~ 5.000

~ 200.000 installed

Smart Meters roll-out in Poland



2014–2016

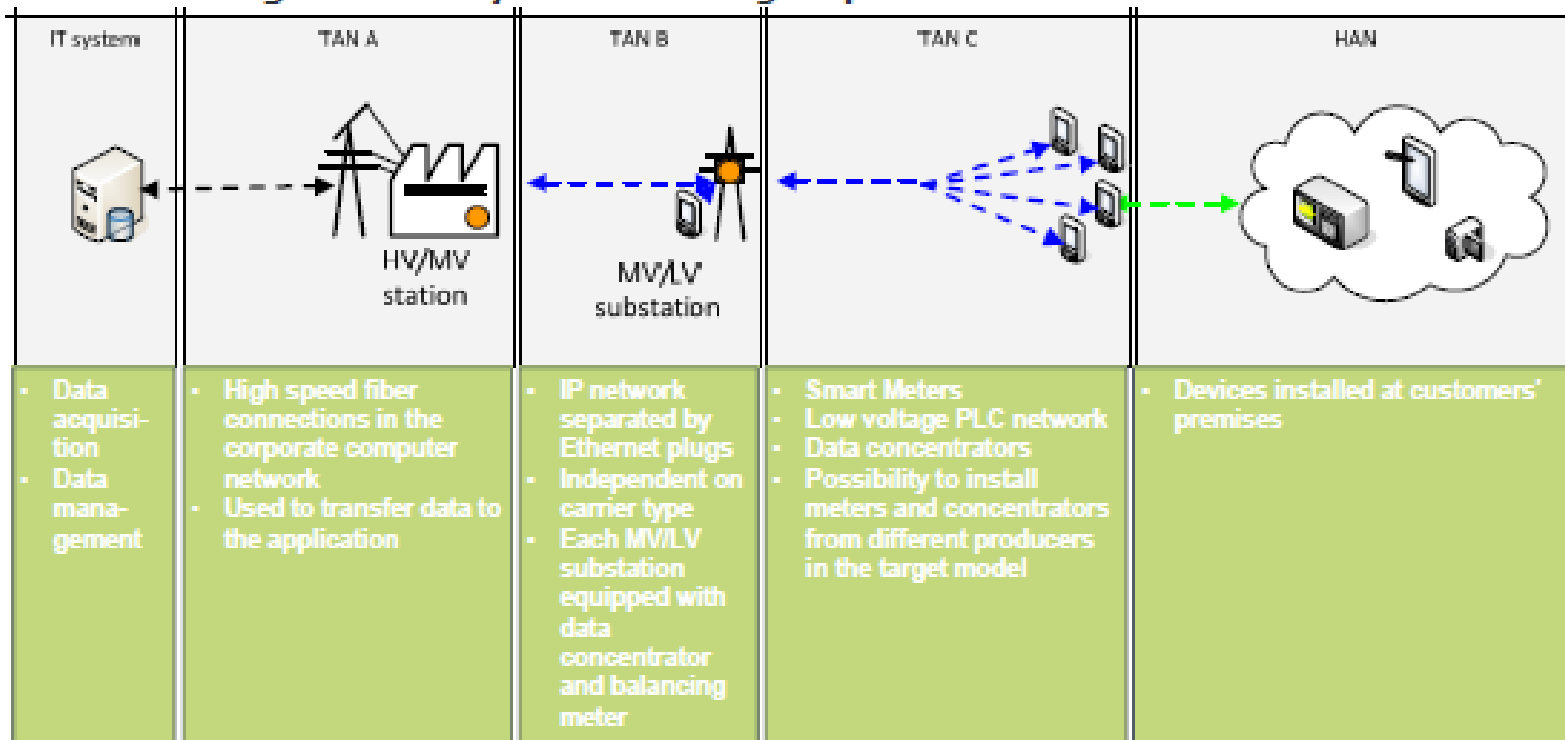
- Gdańsk
- Koszalin
- Olsztyn
- Płock
- Słupsk
- Łębork
- Człuchów
- Malbork
- Kętrzyn
- Toruń
- Sierpc
- Gostynin
- Konin
- Ostrów
- Jarocin
- Warszawa
- Wrocław
- ...

**~1.200.000
announced**

Energa Operator AMI system is split into several modules separated by well-defined interfaces



General design of AMI System in Energa Operator



Separation of modules in our system gives us required scalability and makes us independent from suppliers





Since February'13 Kalisz town is encompassed by Energa's smart metering system



- ✓ Remote ***suspension and resumption*** the supply of electricity in connection with customer debts
- ✓ Remote ***change of tariffs*** in customer meters
- ✓ Execution of ***individual*** meter readings such as related to change of energy supplier
- ✓ 120.000 remote readings to the billing system completed
= ***320.000 PLN savings*** (September'13)
- ✓ AMI system is prepared to ***the other utilities remote readings (water, gas)***

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Positions and Adjustments

of Polish National Energy Regulatory Office (URE)



- ✓ 2011-02-11 - Position on the AMI layer
- ✓ 2011-07-21 - Position on the HAN layer
- ✓ 2012-01-13 - Position on the National Measurement Data Operator (OIP)
- ✓ 2013-01-11 - Adjustments to stimulation and control of AMI investments implementation
- ✓ 2013-05-28 - Position on the AMI interoperability

Further Documents Perspective

- ❖ Requirements for measurement data market model
- ❖ Safety requirements, including the meaning of the Act on Personal Data Protection
- ❖ Regulations for gas, heating and other utilities

Smart Power Grids Scheme

by Polish National Energy Regulatory Office



Architektura funkcjonalna

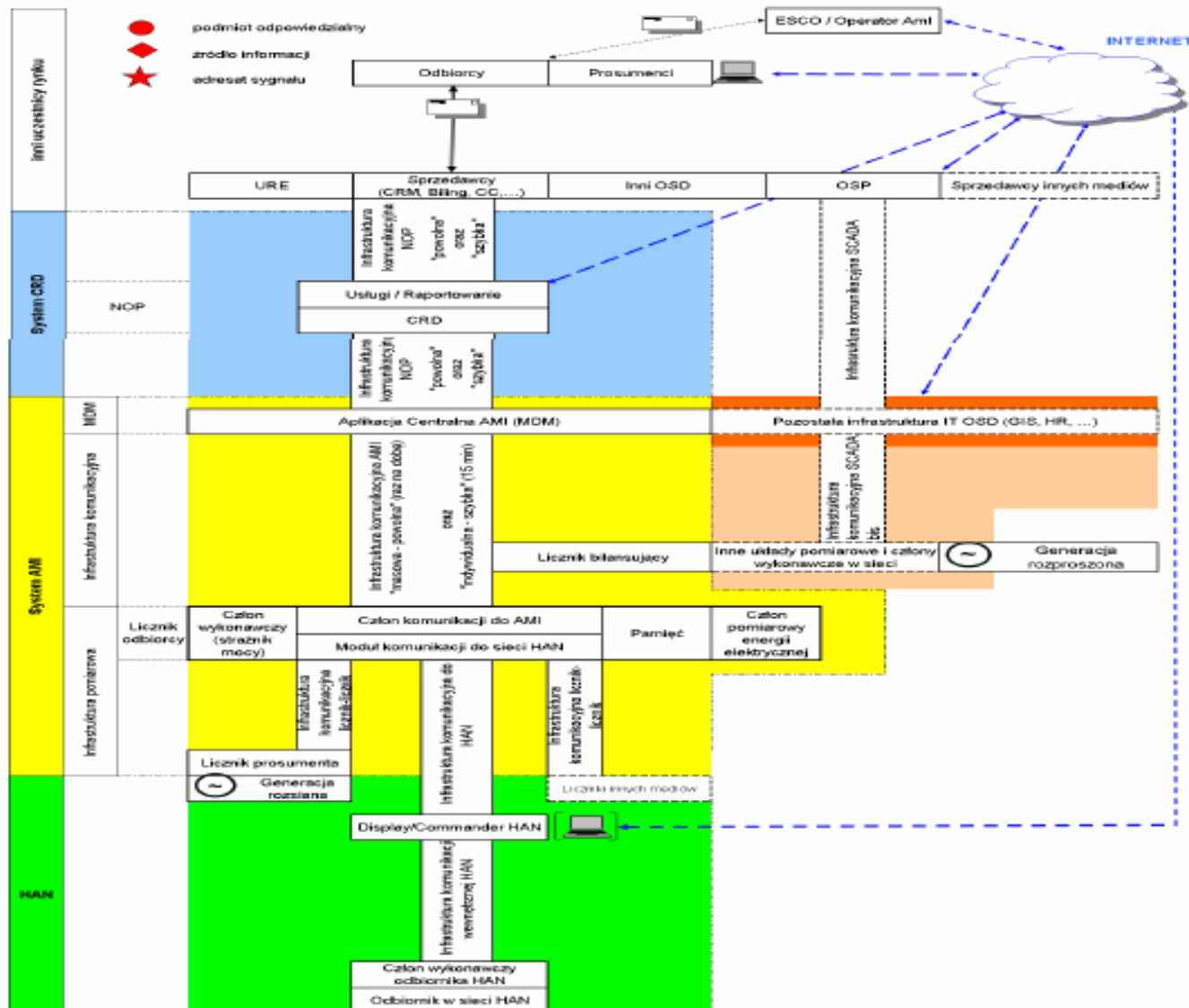
~~NOP~~

OIP

AMI

~~HAN~~

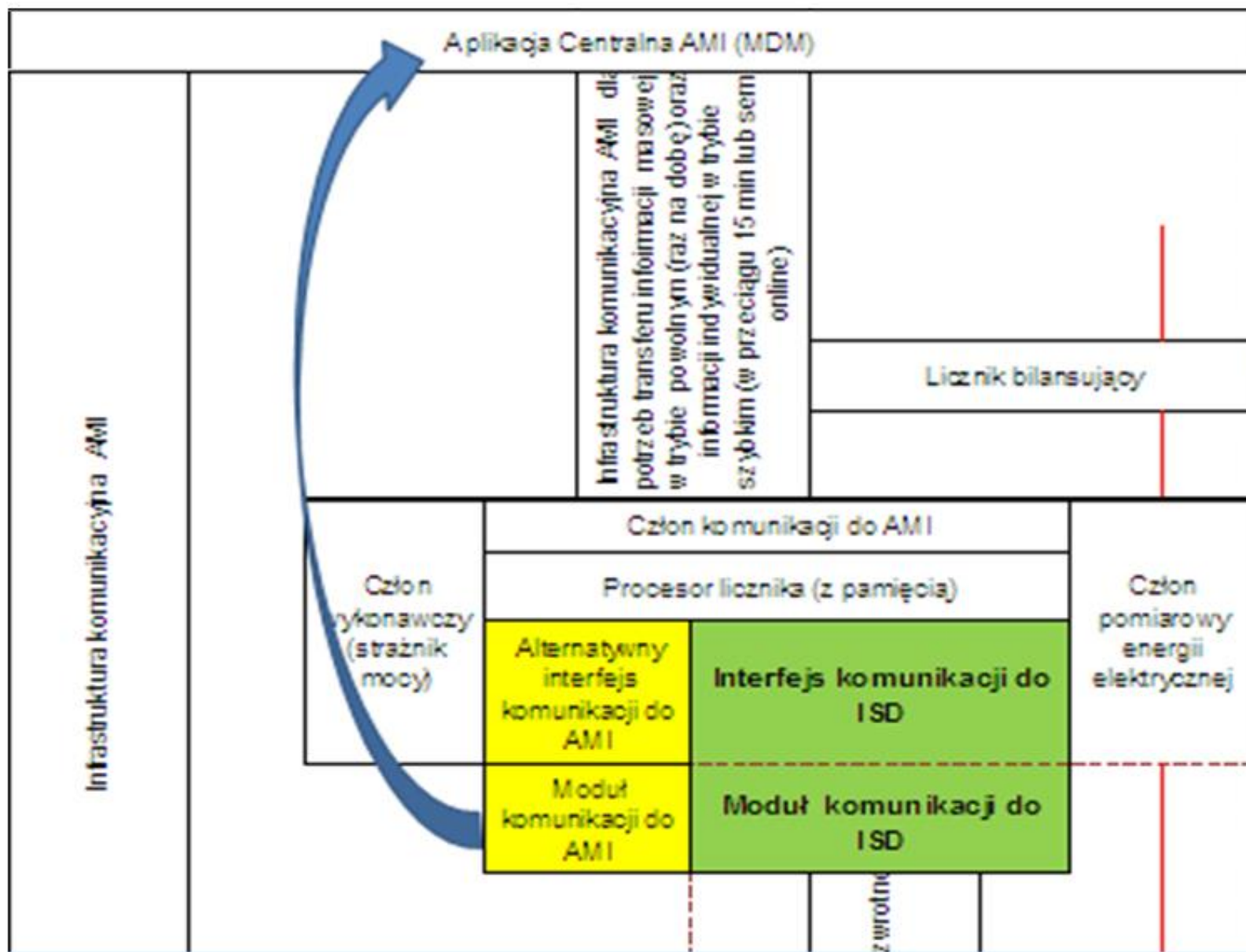
ISD



OSD

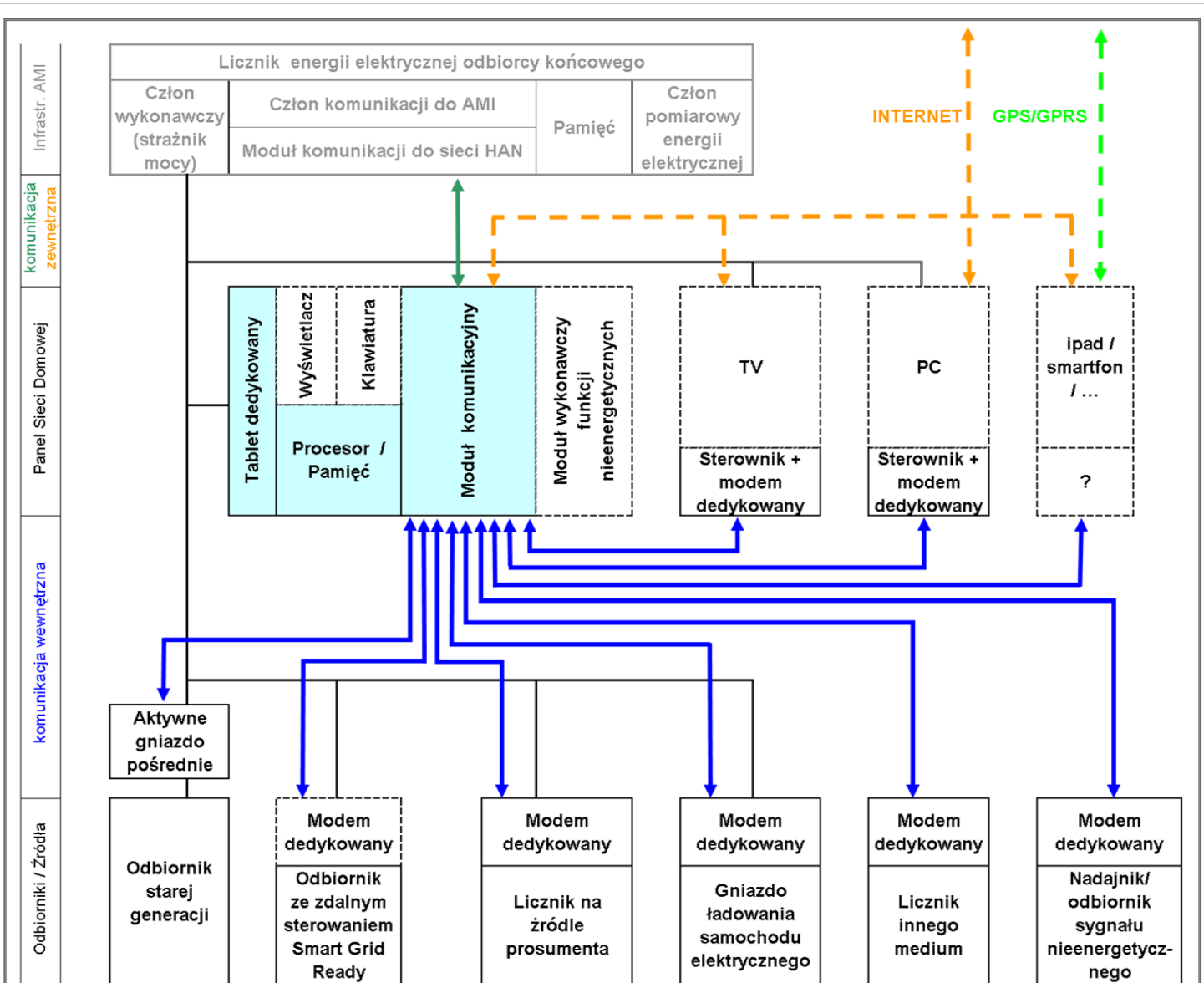
Smart Meter Scheme

by Polish National Energy Regulatory Office



Home Area Network Scheme

by Polish National Energy Regulatory Office

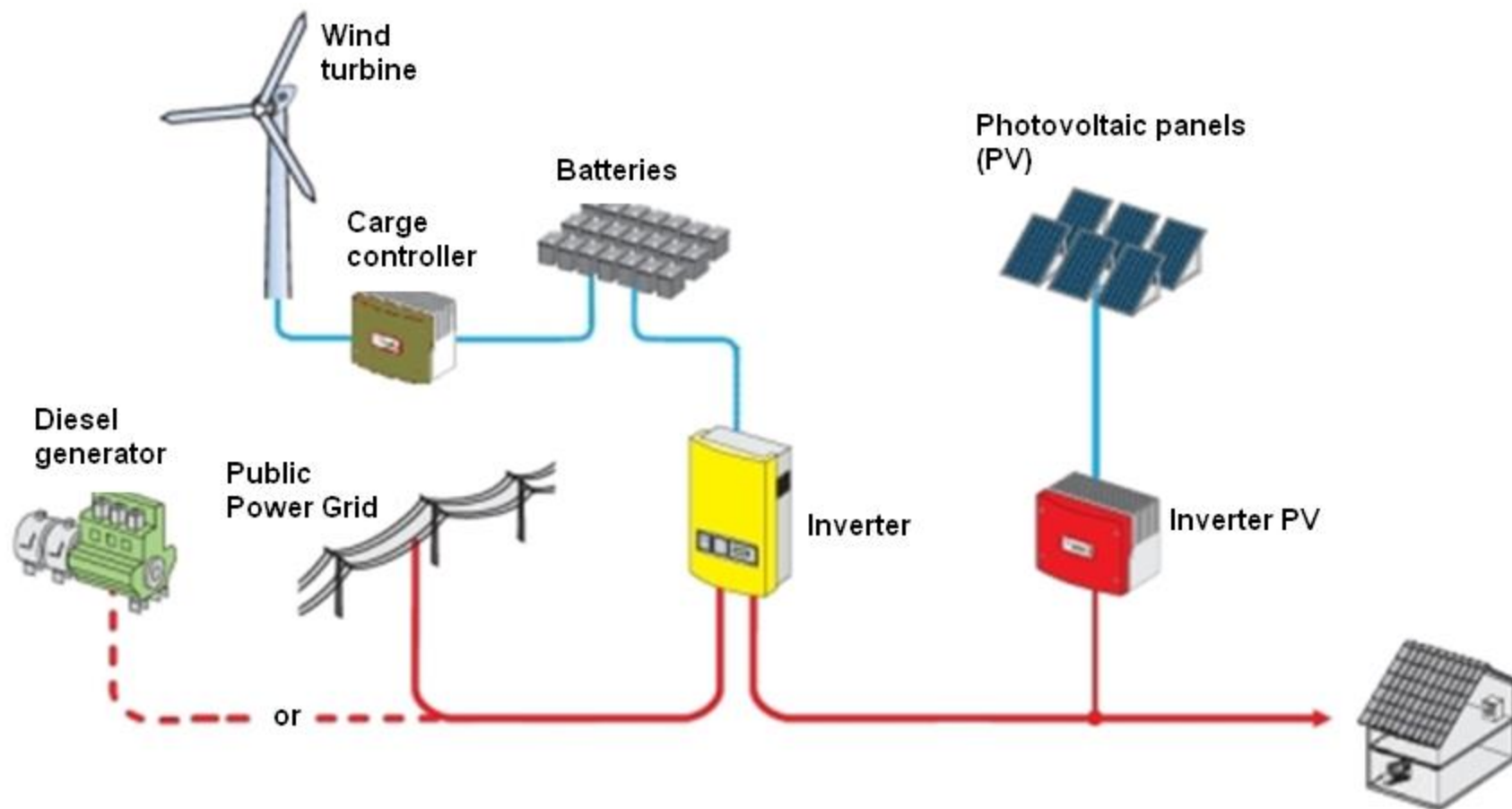


Agenda (4/5)

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Civic Power Grids Vision

Smart micro power grids



An autonomous power system (example of civic smart micro-grid)

Smart Power Grids Vision

by Smart Power Grids Consortium - Poland



- smart power grid built on requirements of renewables, **microgeneration and smart metering**
- **sensor networks** play a greater role, with business opportunities for Polish ICT companies
- **improved communication** infrastructure cannibalize existing monitoring networks (data acquisition and simulation of possible incidents)
- Business Intelligence supports decision makers (adaptive and **intelligent decision making algorithms**)
- close **co-operation** between Polish science and business reduce risks of smart grids technology deployment

Agenda 5/5)

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Consortium Foundation



The Smart Power Grids Consortium - Poland was established on 2010, November 3rd at the Wroclaw University of Technology. The declaration of establishing new organization was signed by **Honorable Founding Committee** members:

- **Mariusz Swora**, President of Polish Energy Regulatory Office
- **Anna Streżyńska**, President of the Office of Electronic Communications
- **Jan Raczka**, President of National Fund for Environmental Protection and Water Management
- **Mateusz Morawiecki** - President of Bank Zachodni WBK (Santander Group).

Consortium Members

*2013, October 31st



SCIENCE



INDUSTRY



ICT

Consortium Programme Council



In the Programme Council there are the representatives of all Consortium Partners.

Programme Council consists of 17 Members (October 31st, 2013)

The Programme Council supervises the activity of the Consortium Office and the activities of the Consortium undertaken to achieve its goals.

President of the Programme Council
Prof. Andrzej Wiszniewski



7 Key Areas of Activity (1)

of Smart Power Grids Consortium - Poland



- integration of activities of all participants in processes of generation, transmission, distribution and consumption of energy, to ensure power provisioning in a cost-effective, sustainable and safe way,
- application of sensor networks for energy demand response and to increase the efficiency of renewable energy sources
- application of smart grids for analysis, modeling and forecasting network traffic to plan and ensure the correct network operation and reduction of transmission losses;

7 Key Areas of Activity (2)

of Smart Power Grids Consortium - Poland



- development of new, effective and environmentally safe energy storage technologies and putting them into operation;
- reducing blackout risk by eliminating the risks associated with the occurrence of violent weather events, network congestion, faulty or criminal actions of people;
- protect the confidentiality, integrity and security of data processed in smart grids (cyber security).

Education Activity

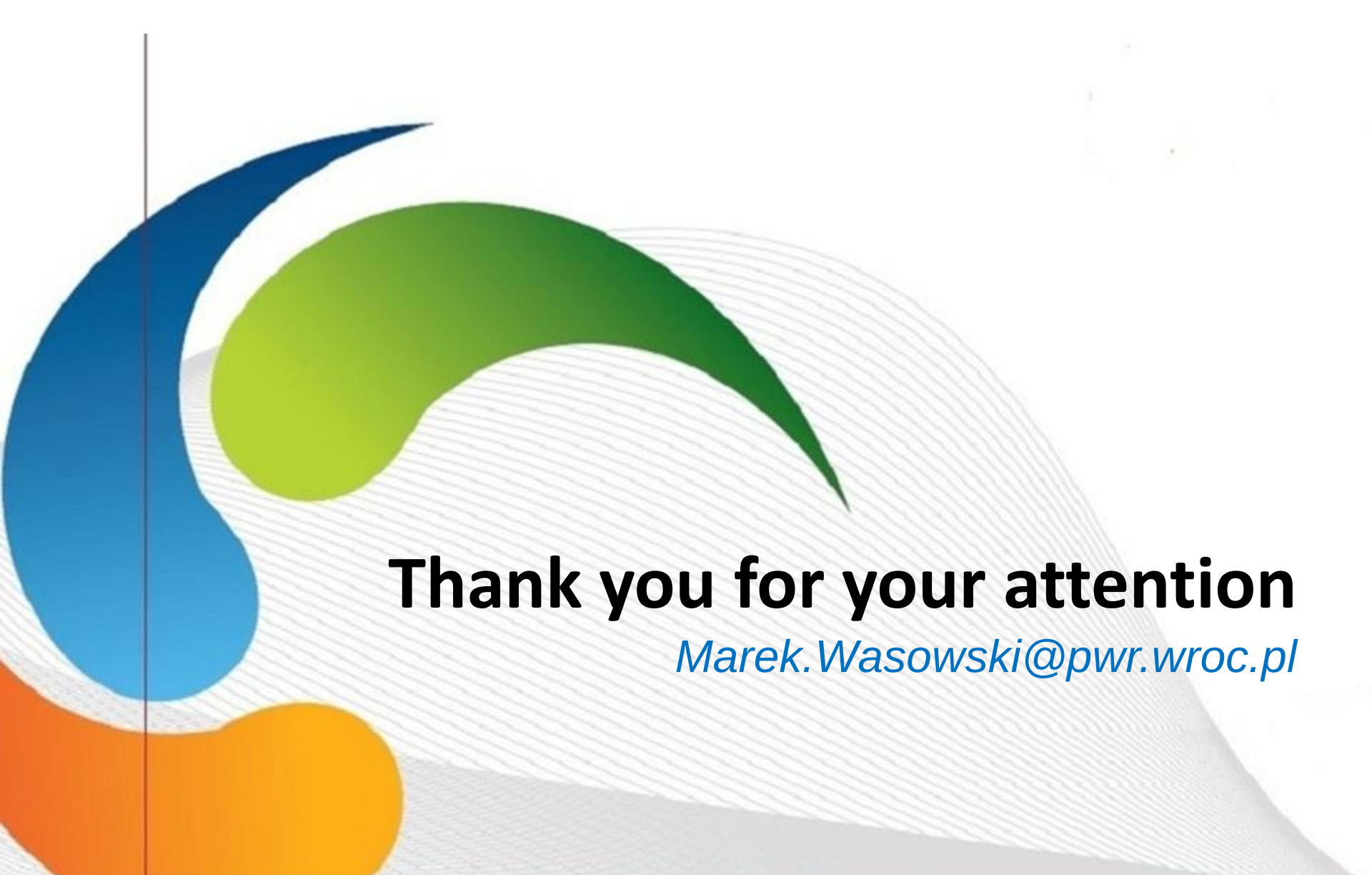
at University of Technology in Wrocław

Smart Power Grids **Postgraduate Studies** intended for senior and middle level employees in the DSO, the departments of energy in industry and ICT companies serving the energy sector.

Duration: 2 semesters (170 hours) are held in extramural system (meetings on Saturdays and Sundays).

The first edition (2011 - 2012) graduated 27 students, the second edition (2012-2013) is currently finalizing 17 students.





Thank you for your attention

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