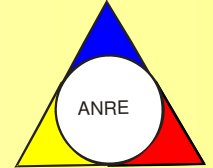




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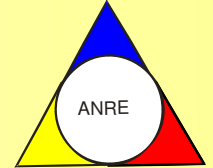


The Romanian Experience in Supporting Innovation in Network Operation - The Main Challenges for Smart Grids Investments

Laurentia Predescu

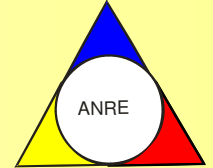
Dubrovnik, 5-7 October 2011

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Legal Framework (I)

- **Directive 2009/72/EC concerning common rules for the internal market in electricity**
 - *“... Member States should encourage the modernization of distribution networks, such as through the introduction of smart grids, which should be built in a way that encourages decentralized generation and energy efficiency....*
 - *... It should be possible to base the introduction of intelligent metering systems on an economic assessment....”*, which should be used by the Member States in order to prepare a time schedule with a target of maximum 10 years for the implementation of these systems
 - At least 80% of consumers should have intelligent metering systems by 2020

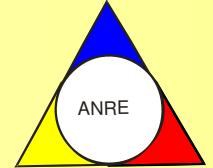


Legal Framework (II)

- **EC Recommendation of 09.10.2009 on mobilising Information and Communications Technologies to facilitate the transition to an energy-efficient, low-carbon economy – C (2009)7604**

Asks the Member States, through the competent authorities, to:

- ✚ *agree on the minimum technical requirements for intelligent meters by the end of 2010*
- ✚ *ensure a time schedule for the generalization of intelligent metering systems by 2012*
- ✚ *attract stakeholders in pilot projects on a large scale*
- ✚ *inform the EC about the measures taken based on these recommendations within 12 months after publication (first deadline - october 2010!)*

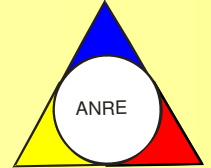


Legal Framework (III)

■ Climate changes pack – targets for 2020

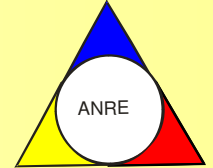
The European Working Group for implementation of smart grids shall inform the EC on the policy and regulatory lines at European level, ensures coordination of steps for implementation of smart grids, according to the third legislation pack:

- *Ensures a common view in the implementation of smart grids;*
- *Identifies the strategic and regulatory lines necessary at European level;*
- *Achieves a strategic action plan for the implementation of smart grids.*



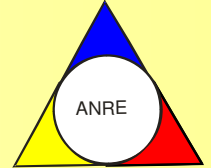
❖ **The first steps towards the implementation of *smart grids* concept**

- *Identification of functionalities of smart grids and intelligent meters;*
- *Reccommendations regarding data management;*
- *The role and responsibilities of parties involved in generalization of smart grids.*



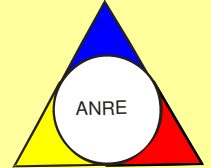
Where is Romania standing? (1)

- ❑ We are in the final phase of reorganization generation sector, with respect EU demands for greater efficiency, optimizing investments and reduction production costs. We stimulate generation in high efficiency cogeneration on the one hand, and generation from RES on the other hand, based on support schemes approved by the EC;
- ❑ Romanian TSO is a publicly traded company;
- ❑ 8 principals DSO (which cover the entire surface of Romania), of which 5 are privatized;
- ❑ 184 electricity licensed suppliers;



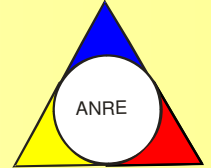
Where is Romania standing? (2)

- ❑ We have a functional electricity market, 100% legal openness, 52% real openness, with the following structure:
regulated market, competitive market, DAM, balancing market;
- ❑ The Energy Strategy of Romania is in the final phase of the upgrade, with inclusion objectives of the EU;
- ❑ In February 2010, *Ministry of Economy Trade and Business Environment* decided to implement in Romania **smart grids** concept and has approved the Action Plan, with the main measures which all societies of the National Power System must begin to implement them.



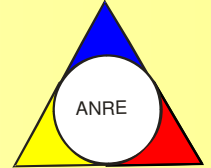
Characteristics of the National Power System (1)

- The existing transmission and distribution networks in Romania delivery the electricity from producers to household and industrial consumers and are built for the most part, by principle **to ensure the continuity of supply to the consumers**. In the present, the structure of our energy system is largely one before 1989.
- The networks were built for an energy system, where the electricity is produced in large units such as power plants based on coal or gas, nuclear or hydro. In this system, the connecting of distributed energy resources arise adequacy problems. In these systems electricity move "in a single direction."



Characteristics of the National Power System (2)

- There are not basically two-way communication to ensure interaction between the excess area and the poor area. If several low energy distributed sources appear throughout the network, but mainly due to the emergence of wind power plants, **the movement of power can change the direction periodically** and can cause problems adjusting the frequency and / or the voltage;
- These new circumstances leading to the need for network transformation **from unidirectional model to an integrated and interactive model**;
- It is necessary that the network to gain "intelligence" and to ensure the communication in the both directions between producers, TSO, distributors and consumers.



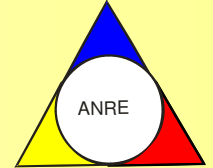
Evaluation of the costs for implementation of *smart grids* in Romania (1)

- **Estimation of the expenses necessary for the implementation of *smart grids*—assumptions regarding the number of intelligent meters needed:**
 - Total number of intelligent meters: 9 000 000;
 - Total number of special meters for metering points for big consumers: 20 000;
 - Total number of special meters for metering points for small consumers: 600 000;
 - Total number of special meters for metering points for domestic consumers: 8 380 000.

- **Estimation of the expenses necessary for the implementation of *smart grids*—assumptions regarding the cost of intelligent meters needed:**
 - Average cost for installing special meters for big consumers: 1500 Euro/piece;
 - Average cost for installing special meters for small consumers: 150 Euro/piece;
 - Average cost for installing special meters for domestic consumers: 75 Euro/piece.

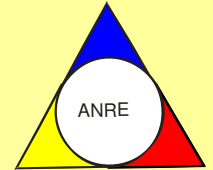


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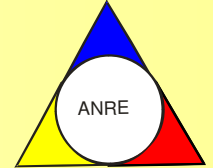
Evaluation of the costs for implementation of *smart grids* in Romania (2)

- Estimated investment necessary for total country: 750 mil. Euro
- Electronic meters that can be considered within the *smart grids* concept, already installed: 50 mil. Euro
- The target to reach the provisions of Directive 2009/72/EC: 560 mil. Euro in the next 10 years



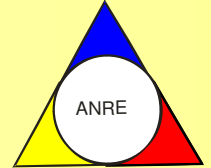
Consequences (1)

- The current trend is a significant increase of distribution tariffs, that can be hardly accepted by the market, failing other advantages;
- Instead, the implementation of smart metering concept has a series of other advantages:
 - ◆ Significant reductions of the costs for manual readings;
 - ◆ Reduction of consumption and increase of efficiency of the electricity use, as well as achieving the proposed efficiency targets;
 - ◆ Cost reduction for the consumers, and customer awareness regarding the energy price and the operation of energy markets;



Consequences (2)

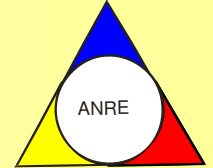
- ◆ Reduction of consumption at peak hours;
- ◆ Detailed knowledge of load curve and improved consumption forecasts (reducing the expenses with imbalances);
- Stimulating opening electricity retail market;
- Creating the need for openness to other types of services such as DSM;
- Seamless integration of production (especially the renewable).



The permanent obligation of the network operators is to supply electricity to the consumers under safety conditions (1)

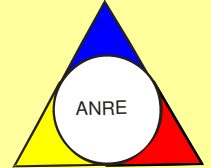
Thus, the following are necessary:

- ✓the development of digital technology at the protection control systems, meant to improve reliability, safety and efficiency of power distribution and transmission networks;
- ✓capacity to develop, store, send/receive digital information regarding the use, costs, tariff, time of use, type of use, storage, or other relevant information on electricity and the equipment, network or procedures used by operators;
- ✓ensuring the coexistence of centralized and distributed generation (distributed resources with possibility of real time interconnection);
- ✓mature, integrated wholesale and detail market, offering to the consumers the possibility to participate in the market (informed, involved and active customers).



The permanent obligation of the network operators is to supply electricity to the consumers under safety conditions (2)

- ✓ cost optimization, improved system tariffs;
- ✓ increasing quality in transmission and distribution services, and reducing expenses with customer care centres;
- ✓ power quality becomes a priority;
- ✓ promoting efficient technologies, with low carbon emissions;
- ✓ highly improved data acquisition;
- ✓ online problem detecting and solving.

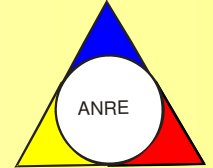


What we do next

- Proposals for drawing up a **primary and secondary legislation**;

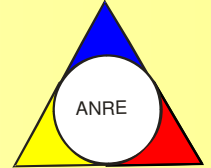
- Drawing up a **Strategy** for implementation the concept of **smart grids** in SEN;

- Allocation of budgetary funds necessary for research and development studies and projects for smart grids.



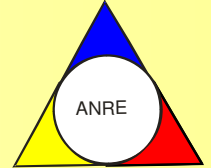
The role of regulation in this process

- Supervision of the investment programs – recognition the costs;
- Identification and application of interoperability standards;
- Ensuring the operation of the energy market;
- Promoting distributed generation (renewables, high efficiency cogeneration);
- Encouraging the introduction of instruments for flattening of the load curve (electrical vehicles, energy conservation, accumulators).



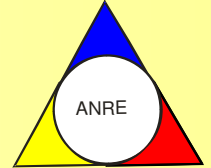
Main areas considered in the next period

- Implementing the digital systems and the self operation of the power system, for generation, transmission, distribution and electricity supply;
- Identifying providing the primary resources for long term development of new capacities in the power system;
- The communication infrastructure and EMS-SCADA for *smart grid* requirements;
- Metering systems;
- Improving the safety standards for workers and the public;
- Cyber Security;
- Improving the dialogue and the relationship with consumers;
- Improving the human resources policy.



Public awareness

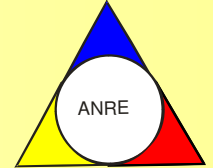
- Conferences and mass-media presentations will be organized in order to introduce the smart grids concept;
- Workshops where participants will discuss how to achieve a more energy efficient end-use by customers and, overall, a more responsive demand side;
- Customers will increasingly manage and adjust their consumption (energy savings and energy shifting/shaving) on the basis of responses to real-time information and dynamic price signals;
- Pilot projects: Bucharest, Braşov, Craiova, Sibiu, Avrig and Floreşti.



CONCLUSIONS (1)

Advantages of implementing smart grids in National Power System

- ✓ Optimization operation of the transmission and distribution networks, including reducing losses, given that the criteria for functioning plants is economic criteria, regardless of geographical situation;
- ✓ Power flexibility in setting up the schemes for supply electricity to consumers, taking into account the lower consumption in certain hours of the load curve and then remove the functioning of lines and transformers download;
- ✓ The modernization / development can solve congestion management in the energy market;
- ✓ A smart grids delivers electricity from suppliers to consumers, using digital technology with two-way communication, to control home appliances, in order to save energy, to reduce the costs and increase reliability and transparency of services;
- ✓ The main distribution operators in Romania may produce joint regulation approach for smart meters with Regulatory Authority (ANRE) and other institutional Authorities, may develop technologies and services around the smart meters and grids.



CONCLUSIONS (2)

Advantages of implementing smart grids for consumers

- Increase the quality of service → Increase the customer satisfaction;
- All requests of the customer are satisfied within standard time;
- Real consumption is charged.

Advantages of implementing smart grids for environment

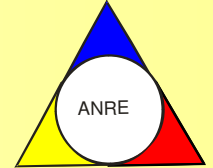
- CO2 emissions reduction;
- Using RES versus classic resources saving.

Advantages of implementing smart grids and improving energy efficiency

- Reducing losses in electric networks;
- More efficient use of electricity by flattening the load curve.



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Thank you for attention!

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