REPUBLIC OF ALBANIA
ELECTRONIC AND POSTAL COMMUNICATIONS AUTHORITY - AKEP

TELECOM & ENERGY
«Collaborating to Power the Smart Grids for Digital Growth«

Geneva, 28 February 2017

SUMMARY

- What is Smart Grid
- Communications Networks
- Energy and Telecom Cooperation
- Barriers to adoption
- Encourage Smart Grid
- Regulatory Topics
- Policy implications

WHAT IS SMART GRID

- A new digital meter on your breaker panel?
- A wireless network that reads those meters remotely or the data management system that processes the information?
- Some solar panels on the roof?
- A load-controller on the heating, ventilation, and air conditioning system?
- Smart Grid is the inclusion of all of these

SMART GRID

- "An automated, widely distributed energy delivery network characterized by a two-way flow combination of electricity and information, that link together generation, transmission, distribution, and customer end-use technologies".

- From regulatory perspective, a clear definition of smart grid is important for two reasons:

    I. It helps if consumers, utilities, vendors and regulators all start from a common understanding of smart grid.

    II. How smart grid is defined establishes the framework to guide expectations, resource allocation decisions, and implementation priorities.

SMART GRID CAN

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- ✓ Identify and resolve faults on electricity grid
- ✓ Automatically self-heal the grid
- ✓ Monitor power quality and manage voltage
- ✓ Identify devices or subsystems that require maintenance
- ✓ Help consumers optimize their individual electricity consumption (minimize their bills)
- ✓ Enable the use of smart appliances that can be programmed to run on off-peak power

SYSTEM INTEGRATION

- The smart grid system integration process three common objectives:

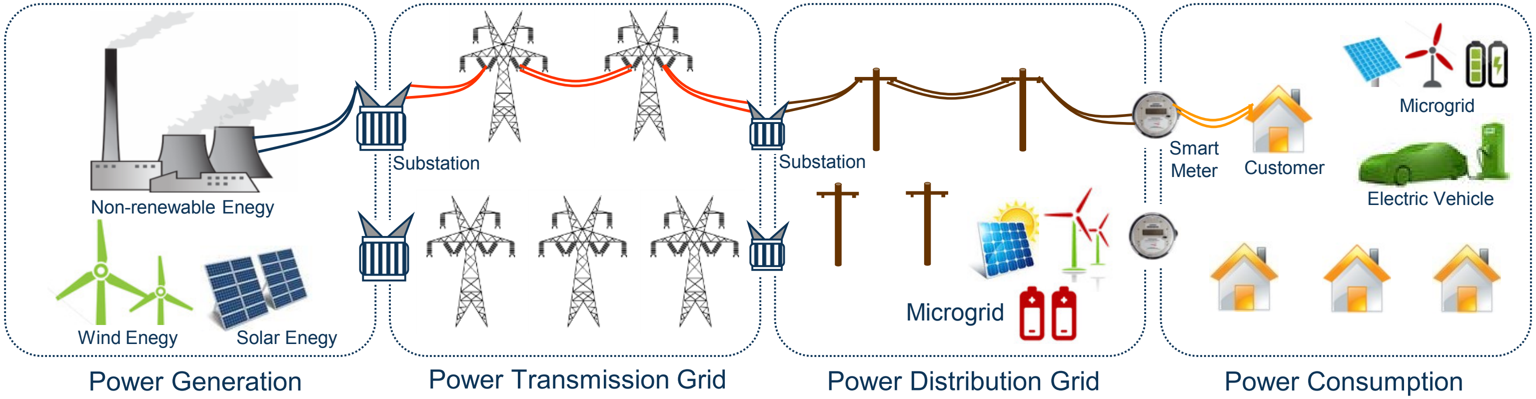
I. **Promote customer choice** – provide customers with information, rates and pricing, and technologies that will allow them to make better usage decisions;

II. **Improve reliability** – use automation on the grid and in customer premises as well as alternative generation options to improve system reliability and stability, and

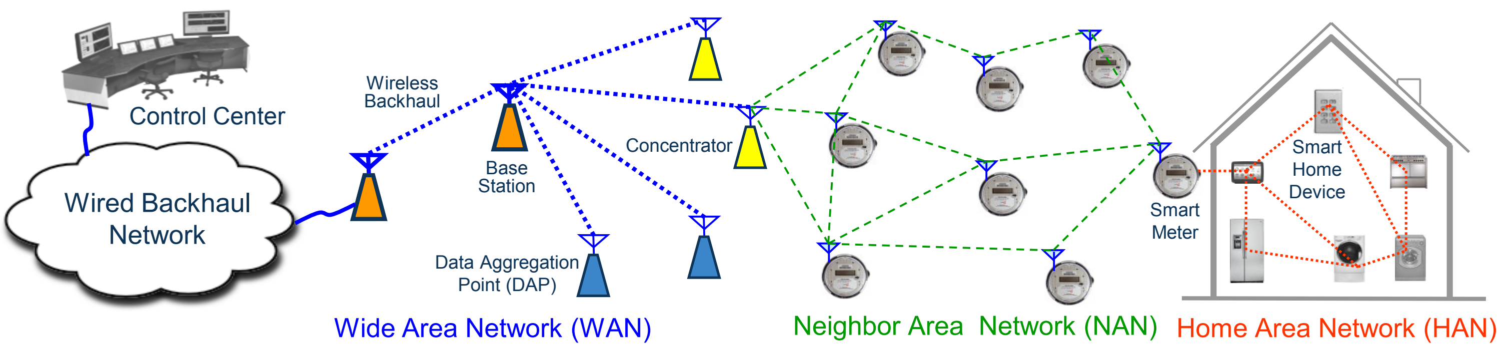
III. **Integrate renewables** – support alternative generation and storage options that minimize or reduce environmental impacts, improve overall system efficiency, and reduce carbon-based fuel usage.

- The key to achieving these potential benefits of SG is to successful build up Smart Grid Communications Network (SGCN) that can support all identified SG functionalities
  - Advanced Metering Infrastructure(AMI),
  - Demand Response (DR),
  - Electric Vehicles (EVs),
  - Wide-Area Situational Awareness (WASA),
  - Distributed energy resources and storage,
  - Distribution grid management, etc.

COMMUNICATIONS NETWORK



(a) Power System Layer



(b) Communications Layer

COMPONENTS CONSIDERED

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Technology	Benefits	Challenges
Cellular	• Most Geographic Coverage (typically) • No additional infrastructure for backhaul • Broadband coverage • Rapid deployment	• High variable expense cost for data usage • Reliance on cellular infrastructure • Rapidly changing environment and technologies
Wireless	• Engineer accordingly to requirements • Build for the future (higher bandwidth) • Potential for synergies within field network • Rapid deployment (once in place)	• Infrastructure cost • Achieving coverage, i.e., geographies, meter density in certain areas • Permitting
Hardline	• Proven technology • Able to configure/size accordingly	• High fixed expense cost • Difficult to manage individual circuits • Reliance on carrier infrastructure • Long Installation timeframes
BPL\PLC	• Utilize existing infrastructure • The “Broadband” promise • Large “theoretical” geographic coverage	• Frequency interference • High price point • Limited success in the field trials

Most deployments rely on multiple technologies to achieve a full coverage cost effective solutions

INFORMATION INFRASTRUCTURE

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- The move towards Smart Grids and next-generation networks in utility communications is already under way, requiring utilities to give special attention to their critical applications.

- A typical smart utility communications network should include the following elements/capabilities:
  - Support for legacy services and traffic
  - Carrier-Grade Ethernet for Power Utilities
  - Traffic management and hard/hierarchical QoS
  - Synchronization
  - Security

COOPERATION

- **Infrastructure sharing** - Most common cooperation between the two sectors is shared of infrastructure consisting in installation of optical fiber on electrical poles or pylons.

- **Smart energy metering** – Installation of smart meter for energy end customers with possibilities for remote consumption monitoring through telecommunication network, remote connect/disconnect for problematic cases and load limiting feature for people in need with limited incomes.

- **Energy production/losses monitoring** - Deployment of Smart metering in primary substation, secondary substation and collective boxes to enable the amount of energy produced and the amount of energy utilized by the end customer.

- **Renewable energy sources** – Monitoring and measurement of energy produced and inserted in grid by the renewable production sources ex: local hydropower plants.

- **Smart City/Smart Home** - M2M solutions offer great potential for cities of all sizes: connected traffic-light systems optimize traffic flows, intelligent parking and mobility management solutions guide drivers to the nearest available parking spots.

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Drivers:

- Country-wide existing infrastructure and plans of further developments.
- Operational expenses optimization related to lease & maintenance.
- Demand for cost savings in CAPEX and OPEX.
- Demand for automation of processes.

Barriers:

- Different level of development for each sector.
- Respective infrastructure capabilities to offer significant use case of cooperation.
- Specific laws and regulations.

BARRIERS TO ADAPTION

❑ Standards

- A lack of standards raises investment and business risks in deploying technology.
- An absence of agreed standards poses a significant investment risk and can result in stranded assets.
- Standards are required for multiple components of the smart grid, including communications security, metering data interface, home area network communications, and grid-side application communications.
- The lack of standard-enforcement capability for crucial aspects of the smart grid (such as cybersecurity and interoperability) can pose a threat to potential investments in innovation by manufacturers and utilities alike.

Policy Levers to Incentivize Smart-Grid Investment

- Traditional cost-plus rate structures pass on operational savings to consumers and thus do not offer the possibility of increasing long-run profits to the utility.
- To overcome this barrier, consider structures that incent the optimal investment level by manipulating the long-run allocation of investment expenditures and cost savings.
- Could take a variety of forms, each of which entails certain trade-offs.
- Focus on currently available policy levers for regulators.

REGULATORY TOPICS

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- **Shift Regulatory Focus from Costs of Investment to Net Benefits of Investment**
  - Policymakers aware that a system that is changing because of grid modernization will require additional costly investments, will be passed through to consumers in the short run, but should benefit them in the long run.
  - Focus on the overall social net benefits of an investment plan in rate cases rather than on the minimization of infrastructure costs.

- **Adapt Pricing Structures to New Technologies**
  - Pricing policies should both reflect the marginal benefit or cost of a service and recognize the need to recover sunk costs.

- **Mandate Smart-Grid Investments**
  - Laws that require such investment.

REGULATORY TOPICS

Create and Enforce Smart-Grid Standards

- As the vision for the smart grid continues to be refined through a deepened understanding of the available technologies and collected data, so too should the framework of standards and regulations evolve to accommodate development and nurture innovation

Recognize Differences in Local Electric Systems

- Should be mindful of the different contexts and path dependencies inherent in electricity regulation and tailor both regulatory systems and grid-modernization plans accordingly.

Require Transparency in Data Collection and Usage

- Need to understand the trade-off between all the potential benefits of smart-grid data and the privacy concerns that come with them.

POLICY IMPLICATIONS

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- **Converging -** Energy and telecommunications services, potential need for open access provisions allowing smart meter service providers and utilities access to data capacity over broadband networks, integrating energy policy objectives into national broadband plans.

- **Connectivity -** Communication channels need to be available across the economy to all electricity users to maximize the potential benefits of smart grids.

- **Interoperability -** Open standards for communications protocols are important to enable innovation.

Thank you!

Geneva, 28 February 2017

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