Smart Grids
The Development of Smart Grid Pilot Projects in Argentina

Presenter: Oscar Medina
Characteristics of the Argentine Electrical System

- **Installed capacity:** 32,748 MW
  - 19,689 MW Thermal.
  - 11,108 MW Hydro.
  - 1,755 MW Nuclear.
  - 195.6 MW Solar and Wind.

- **Peak demand:** 24,034 MW

- **Annual power generated:** 134 TWh

- **More than 50 Generation Companies**

- **10 Transmission Companies**
  - 13,824 km in 500 kV.
  - 1,116 km in 330 kV.
  - 1,675 km in 220 kV.
  - 16,416 km in 132 kV.

- **23 Distribution Companies**
  - More than 400 electric cooperatives
  - 360,000 km of high, medium and low voltage.
  - 14.9 million users across the country
  - 12.5 million residential users
  - 2,576 Large Users
Smart Grids in Argentina

Background.
Rationale.
Pilot projects.
Conceptual model of a smart grid

Traditional Energy Flow

New Flow

Prosumer
Smart Grids in Argentina

Rationales ("Motivadores")

- **Greater energy efficiency:** promoting the efficient and rational use of electricity is a key objective of the Government, following the regulatory guidelines set in place in 2004, and the development of new technologies such as smart grids is one of the tools that is being investigated to achieve that objective.

- **Demand management, network management and improved customer service:** are emerging as necessities to improve both the quality of service and electrical product, by optimizing demand management resources, network management, reduction of technical and non-technical line losses, improving customer satisfaction through faster attention of their demands, diminishing service disruptions and restoring it more quickly, and allowing the customer to better manage their daily energy use.
Rationales

- **Greater inclusion of renewable energy:** developing this new technology efficiently in the short term will allow for self-generation by residential customers to meet their own demand and sell their surplus to the grid. The deployment of photovoltaic panels and micro-wind turbines is a reality in today's world and the massive integration of these technologies in the network will help reduce the consumption of fossil fuels and the costly importation of natural gas and oil.

- **Development of new technologies at the country level:** the development of smart grids in the country will help the creation of new capacities and technological developments at the local level. For this, the participation of the Ministry of Science and Technology, various local Institutes of Technology and the INTI and National Universities is very important. Also, the development of smart grids helps to create more and better jobs for highly skilled workers.
Argentina-US Cooperation

- In April 2010 the Ministry of Federal Planning, Public Investment and Services signed a Memorandum of Understanding on cooperation in clean energy with the United States Department of Energy.

- In this context, the Argentina-United States Binational Energy Working Group (BewG) - was established. The BewG has 4 sub-groups:
  - Wind Energy.
  - Smart Grids.
  - Non-conventional gas (Shale Gas).
  - Nuclear Energy.
Argentina-US Cooperation

1. Establishment of a working group between the Ministry of Energy, Cammesa ADEERA and INTI to study issues related to Smart Grids.

2. Two seminars were organized in the framework of the Binational Energy Working Group on the present situation and prospects in Argentina and the US in the month of September 2012, and again in September 2013 with Pacific Northwest National Laboratory (PNNL).

3. The aim of these was to determine the state of the development of smart grids, from the point of view of the distribution companies and suppliers of equipment and services.

4. The participation of specialists and suppliers from Argentina and the United States allowed a detailed overview of the development of smart grids in both countries, expanding the possibilities for partnership and smart grid development.
AMI systems in Cooperatives in the province of Córdoba
Smart Grids in Argentina

Smart meters installed and used in poor neighborhoods of the city of Tucuman (Edet)
Smart Grids in Argentina

Smart meters used in poor neighborhoods of the city of Tucuman (Edet)

- Preventing energy theft
- Monitoring and balancing transformers
- Better management of blackouts
Smart Grids in Argentina
THE ARMSTRONG PILOT

Location chosen for the first experience: Armstrong, in the province of Santa Fe. The city has 12,000 inhabitants and is supplied by Armstrong Cooperative, which has 5,712 electricity users (4486 residential customers, 540 commercial customers, 418 rural customers and 217 industrial customers) and has a peak demand of 8 MW.

An agreement between the SE and the Armstrong Cooperative was signed and the first pilot smart grid in Argentina was developed. The project will be developed in two stages: the first consists of the installation of remote systems, remote monitoring and measuring at about 1000 points.

It is in a second stage where distributed generation (solar, mini-wind, mini-hydro, biogas), active demand management and efficient lighting will be incorporated. At this stage an Integrated Management System will also be developed.

The idea is to install between 20% - 50% of users with smart meters to test different equipment and devices and acquire experience in the manufacture and operation of the devices in the network, the necessary support for them and experience in the operation of the smart grid.
Smart Grids in Argentina

Pilot Project in the Armstrong Coop.

The project is designed as two (not mutually exclusive stages)

First Stage
- Smart Metering
- Remote monitoring
- Remote control

Second Stage
- Distributed renewable energy
- Integrated management
- Efficiency
SMART METER INSTALLATION WITH THESE FEATURES:
- Multi-tariff records by time band
- Indicators signals users about rates
- Load profile (log energy in periods of at least 15 min)
- Event Logs
- Two-way communication with hubs
- HAN Communication
- Relay disconnection and reconnection
- Bidirectional measurement of active and reactive energy

800 HAVE ALREADY BEEN INSTALLED
Components of the project to incorporate **Distributed renewable energy**

1- Incorporation of distributed generation
2- Energy Efficiency
3- Substitution of sources
4- Information and communication
5- Training and capacity building
6- Analysis of regulatory, legislative and economic framework
San Martín Pilot Project. EDESTE - Mendoza

Area approximately 20 km²
More than 5000 users
88% Residential
8% Commercial
2% Industrial
2% Rural
100 Transformation Centers
25 MVA installed
San Martín Pilot Project. EDESTE - Mendoza

- Photovoltaic Plant 500KW
- Self-supply 4 modules total 30KW
- Remote Monitoring 10 salidas
- Remote Control 20 points
- Energy Efficient Lighting 200 LED – 50 w/ remote management
- Smart Meters 4500
- Demand Management
- Applications Self-supply 4 modules total 30KW
- Collection and Administration of Data
Implementation of Smart Grids in Salta
Government of Salta - EDESA - Catholic University of Salta.

Zone of impact
Analysis of the regulatory, policy and economic framework.

Regulatory aspects:
- Comparative analysis of the evolution of various rules and regulations to incorporate renewable energy into the grid.
- Relevant international experience.
- Harnessing of best practices and developments that have been made in this and other provinces.
- Proposal to adopt rules for the Project.

Economic and tariff aspects:
- Analysis of the economic and financial conditions for the successful incorporation of smart grids and distributed generation.
- Analysis of the costs and benefits of such projects and interventions.
- Cost analysis of the various technological options.
- Tariff analysis: possibility of adopting fees for different time bands.
- Tariff analysis: what are the best tariff conditions for the development of distributed generation?
Probable financing scheme for Smart Grid pilot projects

- FONARSEC
- Providers of equipment
- Distributor or cooperative
- Ministry of energy
CONCLUSIONS

BENEFITS FOR USERS:

- Efficient billing. No reading manual is required.
- Flexible rates. Multiple time bands.
- Remote power management.
- Ability to sell electricity to the grid.
- Monitoring of day-to-day consumption.
- It is essential to involve users.

ADVANTAGES FOR THE COUNTRY:

- Diversification of the energy matrix to promote the inclusion of distributed generation and renewable energy.
- Reduction of costly fuel imports.
- Stimulus for new investments in the power sector.
- Development of local suppliers of equipment and devices.
- Greater energy efficiency.
- Creation of new skilled jobs.
- Knowledge creation, capacity building and new technological developments.
CONCLUSIONS

We are witnessing a technological change in the electricity sector that can be revolutionary. These include developments in:

- ENERGY EFFICIENCY
- RENEWABLE ENERGY
- SMART METERING
- SMART GRIDS
- ELECTRIC VEHICLES

This is the way towards the development of a sustainable energy mix and a new world of great opportunities in ICT.
Thank you.

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