

TOWARDS ADVANCED SYSTEM OPERATIONS: SEARCHING FOR SOLUTIONS IN NORTHERN POLAND

Magdalena WASILUK-HASSA
Poland
Magdalena.Wasiluk.Hassa@pse-operator.pl

Slawomir Noske
Poland
slawomir.noske@energa.pl

ABSTRACT

Smart Grid is becoming the fact in transmission and distribution of electricity. However, it should not be limited to utility companies. Instead, the grid and its effects should be available to the local communities. The Polish distributors and transmitters understand the idea of the Smart Grid in this broad sense. Northern Poland is particularly active in the field.

INTRODUCTION

Our companies, PSE Operator S.A. along with ENERGA Operator S.A. have unchanged and still challenging tasks to tackle:

- To continue our reliable operation of the bulk electricity grid
- To facilitate open and competitive wholesale electricity markets by bringing together buyers and sellers
- To embrace the challenge of balancing wind energy sources
- To advance energy storage technologies to facilitate that challenge
- To enhance efficiency of our operation
- To ensure power reliability and quality
- To secure our operation
- And the most important is HOW TO ENGAGED THE CUSTOMERS?

Why do we need to do?

The entire T&D system in Poland must build 7700 km of new lines by the year of 2015 at the cost of 10.5 billion PLN. These numbers show not only how big is the task ahead of all of us in Poland, but also show the huge potential for smart technology applications! We firmly believe that successful and effective application of this task must include the customers.

However, we need to overcome few barriers in customers' understanding and to create awareness among their firm support of future applications of Smart Grid.

Thus, we are targeting the key issues:

- How to make sure that the local (regional) community i.e. cities and countryside alike will

fully benefit from the Smart Grid and other "smart" related ideas and initiatives?

- How to address the needs and ambitions of local community to be an active market participant as well as a planner of infrastructure development?
- How to support local community in its efforts to be more competitive, more energy independent, more attractive for investors?

Why are we asking these questions?

Because we need involvement of customers and to deal with their perception of different, ongoing smart activities.

Smart Grid is still being perceived as electric utility-developed and driven initiative with minimum (or nothing at all) benefit to consumer. It is also being viewed as a utility benefit and legitimate way to increase tariffs and to profit at the end. The reason for that kind of "understanding" stemmed from the fact there were no awareness creating campaign developed by utilities when Smart Grid concept has been introduced.

Nobody has taken time to explain to customers how they are going to benefit? Example? Smart Metering has been introduced as the SG benefit to customers without any explanation how it will be derived? Thus Smart Metering is still being viewed by many as action to benefit the party on the other side of the meter. That feeling already has resulted in consumers' uproar in California where social movement called SSM (stop smart meters) already succeeded in obtaining moratorium on smart metering deployment in Marin County (north of San Francisco). This is quite influential county where their residences have politicians from San Francisco and Sacramento, as well as celebrities like movie stars and movie directors. Therefore it could be expected that other similar regional actions are going to be undertaken bringing a bad rap to the notion of Smart Metering. Or let's look to city of Boulder, in Colorado, home of largest state university where local city council rejected any further deployment of Smart Metering technologies as unfulfilling the expectations of the community.

It is obvious that necessary communication with customers and dissemination of relevant information have been poorly managed, if any, and can have further ripple effect. As a consequence of these "actions" the concept of two way

communication called “prices to devices” is still not fully embraced by consumers thus still very low rate of actual consumer participation and responsiveness.

On the other hand there are 10 Polish cities participating in Smart City program under auspices of the Convent of Mayors. In response to Polish law and regulations, regional governments have undertaken responsibilities to modernize local infrastructure (e.g. renewable integration, transportation, water, waste utilization, communication). There are 17 special technology and economic parks in Poland promoting innovation and facilitating start-up enterprises.

We have concluded that there are all elements in our country which need to be connected into clearly defined action. **Thus, we in Poland, have focused our efforts on developing and implementing the idea of Smart Region.**

It is a concept which brings together local government and its branches, community leaders, local academic community, electric utility, vendors (hardware and software) in effort to create seamless approach to benefit from all “smart”-related ideas. It facilitates integration of technical elements into manageable network of applications. It also accelerates necessary application support leading to ever growing deployment of smart technologies. In short: it is a platform to exchange information and help to form other technology transfer activities as well as to build a mechanism to elevate self-governing ambitions of the local community, provide them with tools to achieve their goals and satisfy their needs.

While the necessary smart grid functional requirements, interoperability and cyber security standards are still being developed, we need to look very carefully not to jump into premature technology applications and look into transitional technologies first and then to match them with existing needs and expectations.

While selecting technologies based on a given set of requirements for Smart Region (and AMI has been a first step in building it), we have followed the “IntelliGrid Methodology”, a process recommended by EPRI and the IntelliGrid Consortium for performing project planning, requirements definition, architecture development, technology selection and deployment.

We have focused on three key steps:

- Mapping technologies to functional areas to determine in general which technologies are applicable to which part of AMI
- Mapping requirements to components in order to determine the physical components and, in turn, the functionalities to which each requirement applies

- Mapping requirements to technologies step examines each requirement in turn based on its component, functional area and priority.

We already have few successful applications of this concept in the northern region of Poland. One of them has been initiated by the distribution company in Poland, ENERGA-OPERATOR SA located in the city of Gdansk and serving northern part of Poland. They came up with idea of creating the smart region concept. The objectives of this project are going to provide real-life test for different functionalities on the Hel Peninsula. It is also a great “case study” for further cooperation between transmission and distribution companies crossing technical and business boundaries, getting things together for the benefit of customers while assisting local governing bodies.

This kind of project assures the proper communication among all parties involved, facilitates understanding, and help to manage expectations.

This is a first Smart Region-type project where the direct operational benefits could be supported by indirect benefits such as local community and local government involvement, creation of activities and services to increase the local industry's competitiveness. The expected results will increase greatly value of customer feedback on new smart-technology-based solutions, their effectiveness and usefulness. This project will provide first field-tested smart technologies “at work” and to point in which direction should Smart Region be developed in the future for the benefit of entire country.

SMART SOLUTIONS IN NORTHERN POLAND

ENERGA-OPERATOR SA is the first integrated power distributing company formed after the transformation of the distribution sector in Poland. ENERGA-OPERATOR SA supplies power to 24% of the Polish territory and 2.8 million customers.

The company has changed the organisation and assets management. It has implemented an integrated an information system, which helps manage the grid. The changes have formed the basis for further steps in the area of grid management and development. Those further steps are aimed at moving from the “traditional” network to Smart Grid. The two key projects in this respect, now in progress, are: development of the Advance Metering Infrastructure, and the Smart Grid. Implementing AMI and Smart Grid are a key elements of ENERGA-OPERATOR 's Strategy. The projects reach out beyond the company itself. Their effects are intended to open new possibilities for all entities participating in the energy market.

AMI Project

In the year 2010, ENERGA-OPERATOR SA finished its rollout of about 18 500 smart meters to commercial customers. Each of about 15 500 customers connected to the commercial smart metering system receives a daily report about their consumption in the previous 24 hours. Reports

are currently sent by email in the form of Excel files, yet further improvements are planned on this part and in future it will also be available in the form of a webservice. Thanks to this, commercial customers are more aware of their consumption patterns and therefore can optimize their energy use. The implemented system reads the data at 15-minute intervals. Its communication is supported by the GPRS. The project was the largest of its kind in Poland. ENERGA-OPERATOR SA plans the next stages for the years 2011 to 2017. The intention is to introduce AMI across the Operator's entire business territory. The project covers about 2.5 million domestic and about 0.3 million business consumers. The implementation of AMI includes:

- Exchange of electric energy meters at the clients'
- Installation of balance meters in transformer stations MV/LV
- Telecommunications layer (in the PILC, GPRS, or WiMAX technologies depending on the location),
- Central application of AMI, including the measurements database.

Stage one scheduled for 2011 assumes AMI introduction at three pilot sites and will embrace more than 100 000 consumers. The pilot area will include the Hel Peninsula, which is where the pilot Smart Grid erection project first started. In its telecommunication aspect, the implemented AMI will be ready to meet the requirements of the future Smart Grid. Engaging in the AMI project, ENERGA-OPERATOR SA is not oriented on generating benefits only for itself. According to the arrangements reached with the Energy Regulatory Office, power consumers will benefit most from AMI implementation.

Smart Grid Project

ENERGA-OPERATOR SA sees introduction of the Smart Grid as the subsequent stage in the development of the distribution system. Its definition of the Smart Grid is not limited to changing and developing the technological platform or the grid management system. ENERGA-OPERATOR SA understands that effective use of the new capacity will only be possible in mutual cooperation with all participants in the energy market. Those parties include energy operators, sellers, generators, and consumers. The local government plays a major role in the group. On the one hand, it is a prime consumer of electricity. On the other hand, it can support efforts taken to change the power consumers' habits and assist engaging them actively in the Smart Grid.

At the moment, EOP is pursuing the first in Poland, pilot project of implementing the Smart Grid. The selected site is the Hel Peninsula. The grid there includes about 150 km of MV power lines, 80 MV/LV stations, and 100 km of LV lines. It supplies electricity to about 15 000 consumers. The project is divided into 2 stages. Stage I consists in developing the concept of changing from the „traditional” network to the Smart Grid and involves feasibility analysis.

Completion of that task is planned for October 2011. Stage II consists in building the Smart Grid in the pilot site area. The beginning of the latter Stage is planned for 2012.

The following basic requirements have been formulated for the Smart Grid:

- development of the model control system for the Smart Grid area. Its basic function will be fulfilled by an integrated system regulating the voltage and managing the active and passive power so as to create the possibility of adjusting the grid load level to the distribution potential and energy parameters at any given time (through matching the load or generation parameters of the individual entities in the network to the current grid parameters),
- creation of the potential to maintain an island supply system in the event supplies from the national power grid falter,
- creation of the potential for the Smart Grid to work together with intelligent buildings equipped with microgeneration,
- erection of pilot installations dedicated to charging electric cars in a way matching the current conditions and the load carried by the distribution grid,
- putting the proper grid infrastructure in place, including metering systems that will allow remote reading of the data and controlling energy supplies to the consumers. It is expected that the solution will make it possible for businesses trading in electricity to introduce new products and services to the market.

Actions aimed at actively involving other participants in the regional energy market in the project have already been taken in Stage I. Making the first step, ENERGA-OPERATOR SA has concluded a consortium agreement with the prime energy seller, ENERGA-OBRÓT SA. The purpose of the agreement is to ensure their cooperation in implementing the Smart Grid at the pilot site. It is expected the consortium will allow pursuing works in several areas, all at the same time. These will include developing technical solutions for the Smart Grid and preparing solutions for new customer products, for instance the rating systems that will enable gaining active consumer involvement and managing the demand. The key to Stage I is the development of the Smart Grid concept. To cope with the task, the Consortium works together with the 'Institute of Power Engineering, Gdańsk Branch', an R&D organisation, which is yet another party engaged in the development of the Smart Grid concept at EOP. EOP sees it vital to cooperate with the local power generators and the local government. These organisations have been invited to join in the Project, and ENERGA-OPERATOR SA is steadily entering into cooperation agreements with them.