SMART GRID SWITZERLAND: COOPERATION MODELS TO ACHIEVE A STANDARDIZED AND OPEN SMART GRID

Adrian PETER
BKW FMB Energie AG – Switzerland
adrian.peter@bkw-fmb.ch

Wolf Rumsch
BKW FMB Energie AG – Switzerland
wolf.rumsch@bkw-fmb.ch

Alex Lüscher
IBM Global Bus. Services - Switerzland
alex.luescher@ch.ibm.com

ABSTRACT

This paper describes the cooperation models developed in a joint initiative by BKW FMB Energy Ltd and IBM to initiate a Swiss Smart Grid standard and the hereupon initiated process.

INTRODUCTION

Most Distribution System Operators (DSO) in Switzerland currently evaluate the introduction of smart metering and started pilot projects. On the smart grid side there are so far only very limited activities. Since no DSO has defined its strategy and since nobody has started investments in the smart grid area, there is a unique opportunity to address the topic of a common approach for a "Greenfield" Swiss smart grid development.

In the following sections we outline the framework of the project and describe the cooperation models that have been developed. Furthermore we give an overview on the financial case for cooperation and present the achieved results and the current status of the cooperation.

FRAMEWORK

The 2009 founded public-private partnership "inergie" was the ideal framework to place the idea of a "Greenfield" Swiss Smart Grid development. Inergie has five members, each representing an area of excellence:

- BKW (Energy)
- IBM (IT)
- Swiss Post (Logistics & Transportation)
- Swisscom (Telekommunication)
- City of Ittigen (Gemeinde)

The aim of inergie is to group different areas of excellence and to start new innovative project related to the energy usage in the future.
BKW and IBM took the idea a "Greenfield" Swiss Smart Grid and set it up as a common project with a target to convince more than 50% of the addressed DSO of the common approach. The selection of the DSO is based on the number of customers served.

Following Swiss DSO have been chosen for the presentation of the cooperation models:

Axpo Holding
Axpo AG
AEW (Aarau)
CKW (Luzern, Schwyz, Uri)
EKZ (Zurich)
SAK (St.Gallen, Appenzell)
EWZ (City of Zurich)
EWB (City of Berne)
IWB (City of Basel)
St. Galler Stadtwerke
Romande Energie (Waadt)
Groupe e (Fribourg, Neuchatel)
SIG (Geneva)
SIL (City of Lausanne)
EBM (Birseck Münchenstein)
AIL (City of Lugano)
SES (Sopracenerina)
EKT (Thurgau)
EW Lichtenstein

COOPERATION MODELS DEVELOPED

All models developed focus on the distribution side of the grid, because here the need of standardization and a common vision for the use cases is most needed. Without a standard in the distribution side of the smart grid, 2 problems would arise (as shown in Fig.1):

1. Market opening would be prevented. The lack of a standard would result in different implementations of smart grid functionality resulting in customers not being able to switch from one supplier to another.
2. The exchange of data and control commands between DSO would be difficult due to the differently implemented central systems.

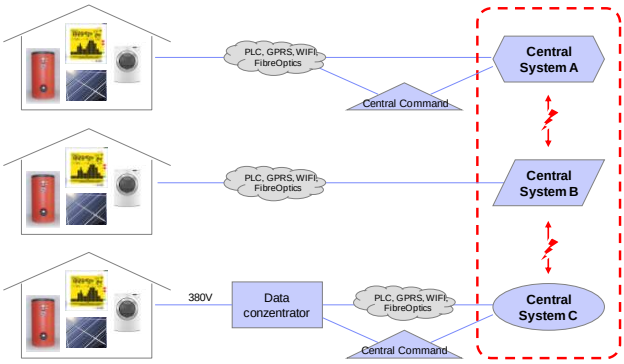

Fig. 1 – Problems without standardization

Three main challenges for a successful introduction of a Smart Grid have been identified by the project:

1. **Interoperability**
2. **Risks of Implementation**
3. **Value Chain**

A cooperation scenario for each challenge was developed is presented hereafter:

Standardization body

To tackle the issues of interoperability, a standardization body should be created. Its main task is to coordinate the development of a national smart grid standard. The focus is not on the development of a new standard but moreover to select and adapt internationally available standards for use in Switzerland.
Additionally the body facilitates the accumulation, usage and distribution of know-how to all members. Finally the body should also engage itself to inform the public, governments, regulators and law-makers.

In a first phase the standardization body would develop both a technical and a business smart grid reference architecture. After having described use cases, models for interoperability (processes, information and data), standards for interfaces to field equipment (meters, actors) and central DSO-owned applications like billing, ERP etc. should be defined.

Smart Grid consortium

To overcome the second challenge, the risk of implementation, a smart grid consortium should be created. The smart grid consortium is the main cooperation model developed, as it brings the biggest benefits.
It would consist only of DSO's. Like the standardization body described above, the consortium would develop a common smart grid vision and select international standards to be introduced by the DSO's itself.
This is the big difference in both cooperation scenarios: While a standardization body only makes suggestions on which standard to use, the smart grid consortium can actually decide to **use and roll out** the selected technology. Therefore only DSO are admitted in the consortium.

Swiss Energy Bank

To address the third challenge of the value chain, a concept of a 2-level aggregator model has been created. While the two first models are pre-competitive models making cooperation between DSO simple, the last model creates earning possibilities and is thus more competitive.

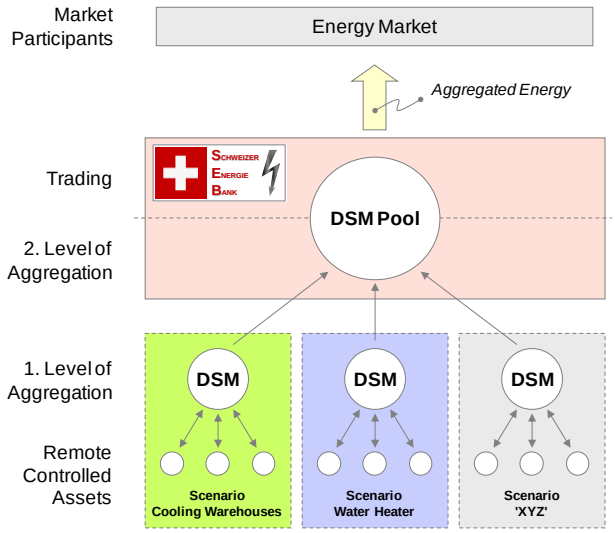

Fig. 2 – Concept of the Swiss Energy Bank

The concept uses as a first aggregation level Demand Side Managers (DSM), which specialize into one or more remote controllable assets like cooling warehouses or water heaters. The DSM looks for interested asset owners and engages them with contracts. The amount of remote controllable assets and thus the manageable energy that could be shifted per DSM would often be too small to be sold directly on the market. Therefore a second level of aggregation through the "Swiss Energy Bank" is introduced. The role of this Energy Bank is to group shiftable energy into bands and offer them to the market to achieve the best price. For this the bank runs a central platform on which all the DSM are connected.
Another role of the Energy Bank would be to standardize the way, how the assets with shiftable Energy are controlled.

FINANCIAL CASE

A detailed financial case has been developed for the smart grid consortium. It is based on an approach that uses simple electronic meters connected to smart gateways with communication and switching capabilities.

The consortium would specify, procure and roll-out the smart grid.

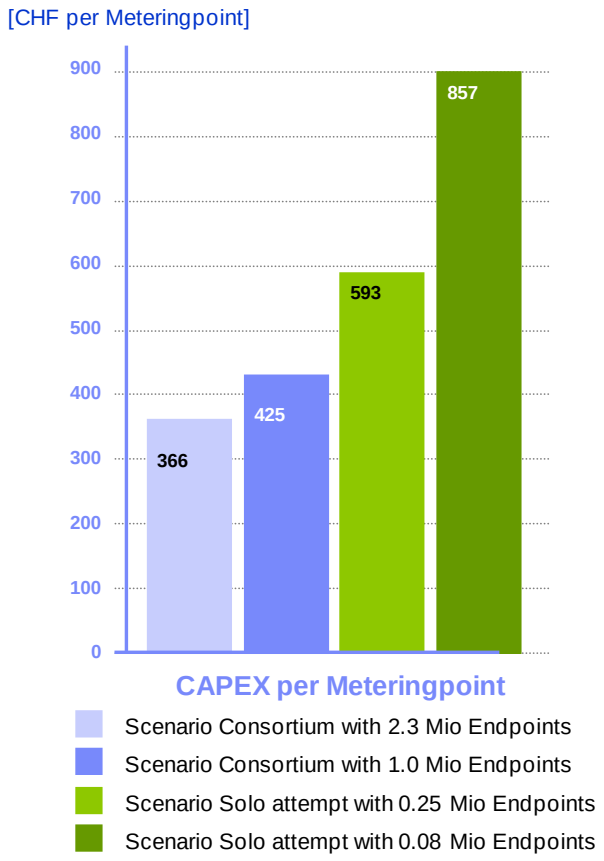

Fig. 3 – Results of the Financial Case

The results show clearly that a solo attempt of a small sized DSO would cost more than double than a consortium-based approach. The largest DSO in Switzerland (BKW) has only 330'000 endpoints.

CURRENT STATE OF THE COOPERATION

Between May and September 2010 the concept was presented to executive level managers (Head of Networks, Head of Strategy) of all selected DSO. The reactions were very positive. The cooperation model of the smart grid consortium found the most appreciation.

In October 2010 the DSO were asked to express their interest in form of a letter of intent. Until January 2011 eight DSO have signed the Letter of Intent. It is intended to establish an association for the first phase of the consortium.