HOW CAN YOU GET THE LOADS/CAPACITIES AND WHAT TO DO? ICT POINT OF VIEW

mag. Peter Nemček, cyberGRID GmbH

The Virtual Power Plant (VPP) that aggregates Demand Response, Distributed Generation and Renewable Energy Resources into the Balancing and Reserve capacity is the most typical case of a SmartGrid asset. Its multidisciplinary nature comprises electricity, ICT and many process and energy related areas, like industrial, commercial, residential, CHP, biomass, biogas, wind etc. But in order to build successful VPP its business model is as much important as related technology.

Virtual Power Plant is a complex management infrastructure that collects electricity measurement data from electricity meters and data loggers. The data is perpetually analyzed in order to assess the availability and reliability of potential flexibility capacity of connected resources (storage, loads and generation adaptability). Balancing or Reserve Event triggers the optimization algorithms that scans all VPP resources, its parameters, characteristics, analysis and optimally aggregates them into a required balancing or reserve product. Automatic notification of VPP resources is done via different communication paths using primarily internet and mobile network. During the balancing event the regulation algorithms control the aggregation of resources. After each balancing event, standardized reports are generated and distributed to the stakeholders involved allowing automatic billing of this novel system service.

Several factors define business models under which VPPs operate:

- Method of financing (market or incentivized)
- Target market (system services, imbalance management, day ahead, intraday, balancing market, etc.)
- Motivation factor (price structure, environmental aspect, system aspect, etc.)
- Customer type (household, commercial, industrial, public)
- Consumption characteristics (responsiveness, capacity, reliability, frequency, duration, etc.)
- Distributed generation characteristics (primary resource, responsiveness, capacity, reliability, frequency, duration, etc.)
- Activation type (response time, duration, changes, capacity, etc.)
- Mode of communication or activation (manual, semi-automatic, automatic).

Normally, the right combination of the factors mentioned above will set the success for a relevant Demand Response program and VPP operation.

Electricity retailers are today seeking new opportunities on how to serve their customer base better and the VPP concept is recognized as the most efficient. In three to five years, all market leaders will enable their customers to take an active role in VPPs and reduce their cost or generate new revenue through widely accepted demand response programs. Those retailers, who will lag behind this vibrant development, will face serious challenges, especially from independent aggregators who will “attack” much of their customer base – especially large customers. When these customers are

assigned to independent aggregator programs, this will become a good opportunity for them to take away much of the old utilities' retail business.

When deciding which electricity consumer base should constitute the VPP capacity the characteristics of residential, commercial and industrial sector has to be analyzed. In most European households consumption is relatively small. Therefore it is very hard to achieve reasonable payback periods. Commercial and Industrial (C&I) programs on the other hand are already commercially viable and can offer good ROIs.

Many studies show that there is significant available dynamic or adaptable capacity. In most cases C&I customers are able to reduce between 10 and 60% of their overall consumption for one or two hours without any major implications to their existing business. This, of course, depends on the type of loads being controlled and the willingness of the customer.

Currently there are two approaches what kind of loads to aggregate. First – the extensive approach – is to gather and manage as many simple loads (HVAC, boilers, fridges, etc.) as possible. The second – the focused approach – is to go deeper into the management of process related loads. Each approach has its own set of characteristics and therefore its own set of results. In most of the European countries, the focused approach has been found to be more suitable.