

Flex4Grid

Prosumer Flexibility Services for Smart Grid Management

Flex4Grid aims at creating an open data and service framework that enables a novel concept of managing flexibility of prosumer demand and generation, utilising cloud computing for power grid management and opening DSO infrastructure for aggregator services.

KEYWORDS: Prosumer flexibility management, demand response, smart grid management

At a Glance: Flex4Grid

Prosumer Flexibility Services for Smart Grid Management



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Partners

- VTT Technical Research Centre of Finland Ltd (Finland)
- SAE - Automation, s.r.o. (Slovakia)
- Smart Com d.o.o. (Slovenia)
- Institut "Jožef Stefan" (Slovenia)
- Fraunhofer Institute for Applied Information (Germany)
- Stadtwerke Bonn Energie und Wasser GmbH (Germany)
- Elektro Celje d.d. (Slovenia)
- Bocholter Energie und Wasserversorgung GmbH (Germany)

Duration: 36 months

Start: January 2015

Total Cost: 3.2 M€

EC Contribution: 2.7 M€

Contract Number: 646428

Main Objectives

The advent of distributed power sources, such as photovoltaics and windmill plants, gave rise to energy prosumers (producers-consumers), which generate and consume electrical energy. Energy demand and energy generation by prosumers are volatile and can impact the grid infrastructure and stakeholders, but they can be flexibly adapted to thwart those impacts.

Flex4Grid aims at creating an open data and service framework that enables a novel concept of managing flexibility of prosumer demand and generation, utilising cloud computing for power grid management and, opening DSO infrastructure for aggregator services. The system will be built up from existing ICT components developed by the consortium partners over many years in research projects on IoT and Cloud computing. This high maturity allows Flex4Grid to aim for a system prototype of TRL 7 which guarantees a maximum impact and competitiveness in the area of the smart grid challenge.

The Flex4Grid system will include a) a data cloud service with anonymised interface and advanced security and privacy mechanisms for data exchange and service management, b) prosumer generation and demand flexibility, and c) a more viable business model to accelerate the deployment. The major innovations are a) opening the market for new entrants by secure and privacy enabling third party cloud data and energy management services, b) actionable common and multilevel data management and analytics services for Smart Grids, and c) the use of co-creation to bring end users into the value creation process.

System validation will be carried out in real-world pilots in three live electricity networks with different scenarios ranging from deployment during smart meter rollout and retrofitting to large scale operation and federated demonstration of multi-site pilots.

Flex4Grid will focus on developing a system for new market players offering data analytics and aggregation services for Distribution System Operators to forecast and influence the load on the grid avoiding blackouts caused by network overloads or lack of power supplies.

Technical Approach

The goal of Flex4Grid is to combine communication and data cloud service infrastructures with the power grid of DSOs into a data and service framework that enables a novel concept of managing demand and generation flexibility, i.e. prosumer flexibility management and opening DSO infrastructure for operator services.

Flex4Grid will draw up new business models, for the demand and generation management scenario co-creation will be used to bring end users, i.e. prosumers, into the value creation process and to engage them in it. An engagement platform will be used to support evolving value-generating ideas.

A third-party service model for data management, including data analytics, will be developed in the Flex4Grid project to decouple the data acquisition by the smart meters from the data processing by the DSOs. The focus will be on security and privacy, while empowering the user to decide the level of involvement; the data access can be limited to an anonymised interface for example.

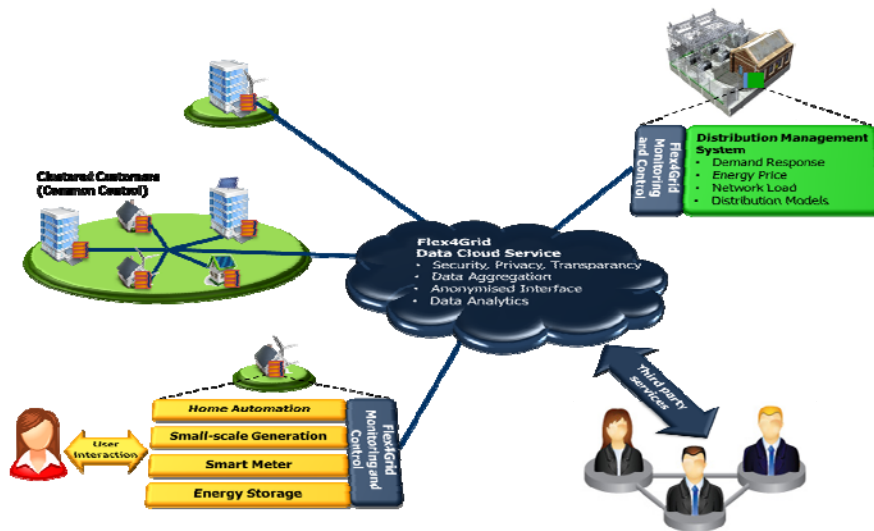
Security aspects will be addressed by Flex4Grid in three areas: secure end-to-end data exchange on shared communication infrastructure, secure and privacy aware cloud data storage and management service, and trust and key management for extended set of stakeholders and services.

Pilots covering scenarios from rollout to large-scale federation will be carried out to demonstrate the achievements of the Flex4Grid activity. This is made possible by the three DSO consortium members and their electricity networks that feature different characteristics where the Flex4Grid prototype will be integrated into the Distribution Management Systems and a selected group of households in their electricity networks. In these real-world pilots we will prove that Flex4Grid offers added value and can exploit its prosumer management facilities in order to efficiently reduce and shift peak loads and also to ensure network stability and continuity of electricity supply by managing efficiently the whole network with different

distributed generation and demand response scenarios.

Real-world evaluation in multi-site demonstrators

Three DSOs are part of the consortium and the Flex4Grid system will be piloted in their networks, including a significant number of prosumers and Flex4Grid gateways that bridge the communication between DSOs and HAN (Home Automation Network) / Building Management System (BMS). These three distribution networks exhibit different characteristics that allow validating the Flex4Grid system in different scenarios. An iterative approach will be applied in order to ensure a smooth deployment of the Flex4Grid system in settings of growing complexity and size, and to maximise the feedback on technical and business level.



Expected Impact

The system introduced by the Flex4Grid activity will use results from preceding research projects as baseline to transfer the results into the market and follows a business-driven approach by exploring new value-generating service offerings for customers.

Active demand response will be demonstrated in the life electricity networks of all three pilot locations. New business models will be deployed where DSOs, prosumers and the third party hosting the data manager will act as marketer. Participating companies will roll out new services to the market place to ensure business viability of the project.

The Flex4Grid system will open new markets for third parties via cloud-based services, going beyond smart meters. Applying cloud solutions (security, privacy, analytics, predictions for the customer) in the context of smart grids will strengthen the competitiveness in this sector.