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The creation of local electrical markets to promote the prosumer role in Smart Grids is no longer just an idea, but also the main objective of EMPOWER, which started on January 2015. The project addresses the topic "Modernising the European electricity grid: LCE 7 – 2014: Distribution grid and retail market" of the call "Competitive Low-Carbon Energy" of the HORIZON 2020 work programme 2014-2015. Aiming to develop and verify a local market place and innovative business models, including operational methods, the project encourages micro-generation and the active participation of prosumers to exploit the flexibility created for the benefit of all connected to the local grid.

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EMPOWER: leveraging citizen energy engagement

The EMPOWER project focuses on local electricity markets development, through the creation of an energy trading platform. Its design is based on the analysis of local market place and innovative business models including operational methods to encourage micro-generation and active participation of prosumers to exploit the derived flexibility. This target will be achieved through the next 5 steps:

Develop a new market design for local trading and involvement of the consumer/prosumer end of the distribution net by means of cloud based ICT. This market design will be based on the micro-market concept and operate in conjunctions with other micro-markets also to form a neighbourhood market. The market design will adhere, but will not be dependent on the structure of a micro-grid. In fact we assume a design that can contribute to the lay-out of efficient micro-grids in the future. The market design will converge towards the design and development of a set of software agents customized for trading within a local market. The agents should be accommodated within the SESP control cloud.

Develop prosumer oriented business models relevant for the market design developed. In particular we will seek to define the business concept for a role that we have called SESP and which cater for the local energy market. The SESP will enable the business transactions, the flow of communication, flow of energy and internal credit assignment. It monitors it and establishes trading channels with the central market or other local markets. The entity that controls the SESP role (i.e. the prosumer community, the local utility, a third party service provider) will significantly influence the choice of business model.

Develop an ICT based monitoring and management system that can be accommodated in the SESP control cloud. The control system will use prediction and big data analytics for market optimization to maintain grid balance within the SESP area by communicating demand response strategies to the local controllers.

Develop full bidirectional and secure communication between the market and business part of the SESP control structure and the physical infrastructure below that controls the flow of energy according to the business exchanges defined at a given time and the actual energy generation.

Integrate the different parts and demonstrate the viability of the concept created in at least two physical regions in Europe with different geography, demography, sociography and maturity in terms of prosumer activities, implementation of DER and new loads that call for efficient and intelligent demand-response programs

About the project consortium

EMPOWER believes in the strength of the synergy industry-university for building a sustainable future. The consortium is constituted by very diverse entities: Schneider Electric, a reference in the control of electrical energy and industrial automation, SmartIO-Smart Innovation Østfold, which manages the NCE (Norwegian Centre of Expertise) cluster of companies and institutions from the academia with special focus on the energetic markets, eSmart, which develops IT solutions, the norwegian distribution company Fredrikstad eEnergi Nett – FEN, the University de St. Gallen – UNISG, which large experience in developing business models, the Centro de Investigación Tecnológica en Accionamientos Eléctricos de la Universidad Politécnica de Cataluña, CITCEA-UPC, characterized by its experience in Mechatronics and Enertronics, with special incidence in the fields of power electronics and digital control, Malta Intelligent Energy Management Agency – MIEMA, energetic agency which targets its research in the promotion of energy efficiency and the grid integration of renewable sources and NewEn Projects GmbH – subsidiary of Diersch & Schröder (DS), an energetic company with divisions on petroleum sector, renewable energy and IT services.

Steps done so far

Empower project started on January 2015. It is organized in 9 work packages being developed simultaneously and which are enabling the conceptualisation and construction of the trading platform that will adjust the operation of grids with flexibility, introduced by renewable power generation and prosumers participation.

On the one hand, business models for creating flexibility in electrical markets have been identified. The role of timing-based business models in the power sector has been explored, distilling four ideal-type business models of flexibility creation with timing classifying them in two dimensions: costs of multiplicity and intervention costs. These business models offer 'coupled services', combining resource-centered and service-centered perspectives.

On the other hand, the architecture for the local smart grid where these business models will apply has been designed. The architecture structure has been constructed based on SGAM (Smart Grids Architecture Methodology) and includes control, market and communications clouds description. The control cloud is in charge of managing the orders and schedules that the market cloud defines and the required information is exchanged through the communications cloud.

The architecture includes prediction and big data analytics in order to monitor and manage the local market operation. The main actors of the system and their relations are identified, without constraining them to the available services and infrastructures in pilots: consumers/prosumers, storage facilities, EV facilities, DER, the DSO, the SESP and the metering system. The functions, information, components and communications needed for ensuring the operation and control of the system are detailed through the definition of the function, information, component and communication layers, respectively. The interaction between the SESP and the market and control clouds has been analysed and reflected in the definition of use cases. The operational rules for the local markets have been established and inserted on the trading platform. The equipment needed for its implementation in the pilots is being identified.

Empowering EMPOWER

1st Workshop on co-operation between Smart Grids and Storage H2020 projects

Presentation of "Local Electricity Retail Markets for Prosumer Smart Grid Power Services" by Dieter Hierdes, held in Brussels on May 2015. The background of the EMPOWER project and the local energy markets were presented and discussed.

International Summer University on Energy 2015

Presentation by Moritz Loock on at the "International Summer University on Energy 2015", held in Falera on September 2015. The presentation discusses fundamentals of EMPOWER based business models and 60 participants from all over the world engaged in business modeling for EMPOWER.

St. Gallen Forum for Management of Renewable Energies 2015

Presentations by Moritz Loock, Bernt A. Bremdal, René Bohnsack, Marvin Kirschner & Calebe Künzle on the "St. Gallen Forum for Management of Renewable Energies", held in St. Gallen on May 2015.

Within a large, innovative EU-funded research project software companies, technology providers, project developers, utilities and researchers from Norway to Malta are working together to develop EMPOWER: local electricity retail markets for prosumer smart grid power services.


Executive Eductation Training with business modeling for EMPOWER

Presentation on "Novel grid developments, novel business models" by Moritz Loock on the "Executive Eductation Training with business modeling for EMPOWER", held in Lausanne on May 2015. The presentation outlines drivers of EMPOWER based business models.

Presentation of micro-markets for distributed energy resources at Imperial College

Presentation by Pol Olivella, on December 2015, held in Imperial College. Summary: nowadays, the power system is evolving from centralized to distributed generation. There are different factors which provoke this change: distributed energy resources (DER) expansion, ICT technologies enabling the installation of sensors in the distribution grid, and the cost reduction of technologies like batteries, power electronics and photovoltaic panels.
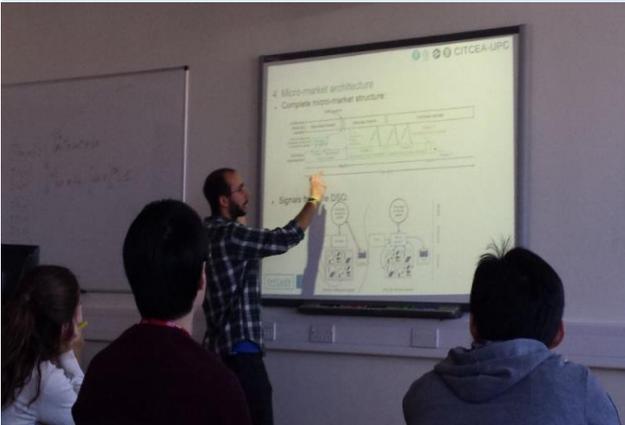
The proposal is to create local electricity micro-markets at distribution level to manage resources locally. Thanks to this, the future problems at distribution level due to the renewable generation could be solved locally with the management of electric vehicles, storage units and demand side management programs in a competition environment. The H2020 EMPOWER project's partners are developing the micro-market system to deal with these situations.

EMPOWER project present at ETSEIB Forum

CITCEA-UPC and its spin-off, teknoCEA participated in the Forum organized in the Superior Technical School of Industrial Engineering at Barcelona (ETSEIB), from the Catalonian Polytechnic School (UPC).

This was a chance for showing EMPOWER vision to engineering students (and prosumers of the future).

NEW paper published on business models for flexibility creation in ENERGY POLICY

The rise of prosumers and the ongoing diffusion of wind and solar energy in the power sector requires more flexible energy systems. New business models can be an important aspect in this regard. Within the EMPOWER project we have studied a new type of business models: timing-based business models for flexibility creation. In a recently published paper in the prestigious journal Energy Policy, we show how timing-based business models create flexibility through timing supply and/or demand. Within EMPOWER we proceed studying how the concept of timing-based business models for flexibility creation can be applied to the distinct context of local electricity retail markets for prosumer smart grid power services.

Please check out the paper here: http://dx.doi.org/10.1016/j.enpol.2016.02.036

Coming events: St.Gallen Forum 26-27th May

This workshop will take place in the frame of the event "7th St. Gallen Forum for Management of Renewable Energies".

In the future, most of the energy we use will be produced where it is consumed. The surplus from your PV panels may be sold to your neighbours or stored locally for later use. Central energy production facilities will experience decreased sales and revenues. Central grids and local distribution grids will be relieved from heavy peak loads. Investments in increased transmission capacity can be postponed. But what does it mean if a TSO or DSO to loose 80% of their grid rental charges? If not 80%, even a 20% loss could be a direct challenge for local DSOs and their owners. Decentralized renewable energy production and storage will soon revolutionize the energy sector. Energy produced, consumed and traded locally requires local energy markets.

This is exactly what the EMPOWER project is developing: a new model for local energy markets and a software platform for local energy trading. In St. Gallen, the EMPOWER project invites experts from its Technical Advisory Group (TAG) and participants from the St. Gallen Forum to the EMPOWER TAG Workshop. This participants will be updated on the project's status and are invited to contribute to the next generation local trading platform.

Download the programme here
Register here
+ info

Interested in the project?

Join our TAG

The Technical Advisory Group (TAG) and suitable profile of its members
The TAG is an instrument for dissemination, general promotion and preparation for EMPOWER exploitation. It is constituted by members of the industry or academia that are experts on the topics included in the project (microgrids, smart grids, electrical markets, communication systems, operation and control of electrical systems) and which are not directly related to the project (their institution is not inside the consortium). An example of topic that could be treated during a TAG meeting is international communication formats and standardization.

Responsibilities for TAG members
The TAG includes members from the most important types of stakeholders and constitutes a network of interest that shall help to promote the project in a knowledgeable manner, solicit target for exploitation and yield advice on the demo and our R&D effort. This means that TAG members should be aware of the progress of the project. They are invited to the project meetings and to any event organized in the project frame and they should give advice at different stages of the project.

What kind of arrangement (e.g.; financial) that was included when becoming a TAG member?
Unfortunately, any part of the budget of the project can be dedicated to the TAG. This means that its members they cannot be paid and any expenses derived from project meetings or attendance to related events can be covered.

Join FRIENDS OF EMPOWER

Joining Friends of EMPOWER means keeping you informed of all the news of our project and the possibility of being part of the TAG (Technical Advisory Group) being constituted.
Sign up here to be a member of Friends of EMPOWER.