ETIP SNET

EUROPEAN TECHNOLOGY AND INNOVATION PLATFORM

SMART NETWORKS FOR ENERGY TRANSITION

ENERGY STORY:

Reversing energy perspective: consumers first

How a local flexible energy market can benefit customers, environment, and retailers

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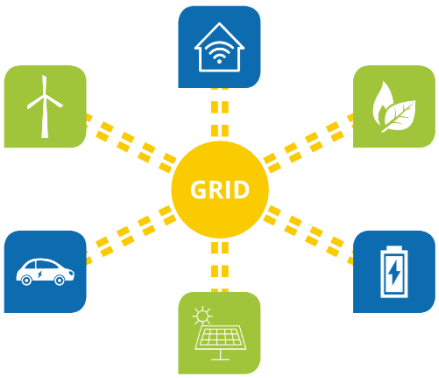

Over the last decades, widespread deployment of renewable energy sources, electric vehicles and storage technologies are radically changing the one-way production-to-consumption concept of the electrical grid. Customers can now be actively involved in the electricity grid strategy of the future by producing their own energy (with e.g. solar panels) and consuming it themselves (making them "prosumers"). They can also save the energy in batteries making them independent from energy taken from the grid. However, these changes make the work of the energy system operators, such as Distribution System Operators (DSO), a little more complex and challenging.

The **InterFlex project** addresses this challenge, enabling a range of technical and practical innovations to smoothly transition to cleaner energy sources and boost the decarbonisation of mobility and heating sectors. By activating flexibility and interactions between energy market participants (i.e. prosumers, consumers, storage managers, distribution grid operators), the InterFlex project allows DSOs to give signals to energy producers and consumers, who can adjust their generation and/or consumption patterns accordingly to optimise the operation of the system. The InterFlex solution serves to avoid disruptions in energy distribution thanks to improved control of energy system flexibilities, thereby unlocking potential savings for end customers.

InterFlex relies on a set of innovative use cases: six industry-scale demonstrators are set up in different European cities, together with 20 Partners, including energy companies, universities, and technology specialists.

Local flexibility solving current and future energy grid challenges.

Throughout the three years of project execution, five paths of action were identified to produce new business models and innovative technologies.

A *local flexibility market* was realised with an IT platform that points out time independent energy consumption and production, so called flexibilities in the energy grid. Activating this flexibility makes it possible to adjust the consumption around peak time avoiding high energy pricing. This solved the complicated issues of managing various independent generation sources, by implementing a communication which allows the exchange of information among several energy players simultaneously.

End consumers are playing a key role in obtaining the right *demand response* and therefore, use of the electricity grid. Depending on the level of demand and the energy requested/consumed by the customer, a modulation of controllable loads is activated. Loads can be electrical appliances such as washing machines, stoves, and other energy consuming devices. A market-based approach selects the most suitable demand response patterns, which means to consume during times with low energy pricing and to reduce consumption in peak energy demand intervals. InterFlex attracted numerous customers, allowing end-users to trade privately the generated energy within their neighbourhoods, and developed a platform that displays the household's energy balance.

Smart functions and grid automation enables households' automatic fast switching from grid connection to self-consumption (islanding), directly impacting power quality[1] and customer comfort. The stabilised voltage grid power quality creates reduced stress on electrical household equipment which increases their lifetime at lower cost. Islanding of individual homes makes them less dependent from the grid and is enabled by automatic actions based on price signals.

Cross energy carrier synergies focus on the entangling of heating and electricity systems to achieve a cost optimisation and better efficiency of energy resources. Unlocking the potential of distributed energy resources surplus and using them for district heating contributes to the decarbonisation of the heating sector.

Multi-service storage & islanding makes individual homes more independent from disturbances on the main electricity network while being more energy and environmentally friendly. Maximising the efficient usage of batteries increases the wider use of renewable energies and reduces greenhouse gas emissions. Consequently, customers increase their self-consumption and significantly reduce their costs whilst participating actively in grid services.

Impact

Thanks to the engagement with customers in the demonstration sites, the final InterFlex result is a cost-effective solution that has increased the grid's capacity to host distributed energy resources. Forecasting algorithms enable DSOs to adapt to constantly changing flows in the grids by using suitable power control equipment.

InterFlex demonstrates new business models that accommodate the fast-increasing share of renewable energies, in line with EU energy target of reaching, at least, 32% of renewable share by 2030. The project outcomes can be highly beneficial in similar geographical area and customer / RES environments due to easy adaptation and mitigation of the current setup, as well as by engaging the project partners for further collaboration.

Project Benefits

- Improved network management.
- Decreased carbon emissions
- Efficient business models & market design.
- Economic profit
- Decreased network costs.
- Improved social acceptance

Keywords: Flexibility market; ICT; DSO; demand response; customer engagement; end users;

More info at: InterFlex website and Closing event video

Note: Project benefits based on specific criteria outlined in ETIP SNET monitoring exercise

[1] Electric power quality, or simply power quality, involves voltage, frequency, and waveform. Good power quality can be defined as a steady supply voltage that stays within the prescribed range, steady a.c. frequency close to the rated value, and smooth voltage curve waveform (resembles a sine wave

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