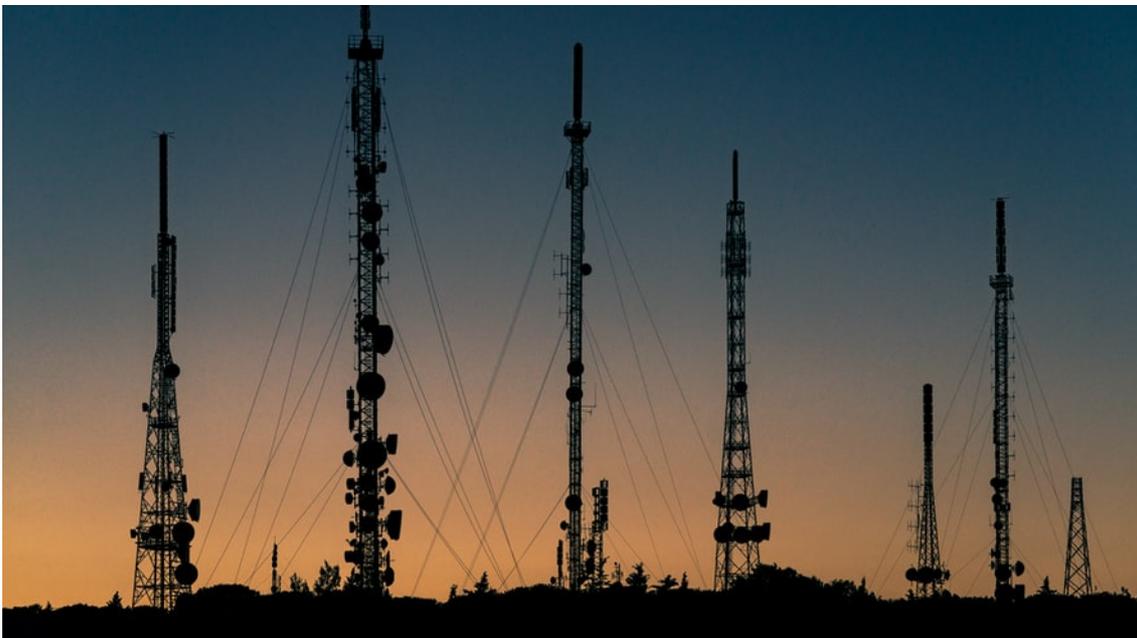




ETIP SNET

EUROPEAN
TECHNOLOGY AND
INNOVATION
PLATFORM

SMART
NETWORKS FOR
ENERGY
TRANSITION



ENERGY STORY:

SmartNet project: Smart ways for a flexible energy system

Back-up batteries of telecommunication towers and smart ways of heating pools can provide much needed flexibility to the energy system in order to enable integration of more renewable energy sources.

PLAN. INNOVATE. ENGAGE.



The European electricity system is in transition. The traditional, centralized power generation scheme with controllable hydro, coal, gas or nuclear plants is in transition to a decentralized one, where sources of energy are much more scattered.

This trend brings the issue of energy storage into the scope, because consumers may want to use surplus energy generated by their photovoltaic rooftops on a sunny day at night for charging their electrical vehicles. Batteries and other types of energy storage can support the stability of power grids in the near future.

Although the rapidly growing usage of renewable sources is providing a way towards a much cleaner energy system, it brings new challenges too. As the output of these generation sources depend on the intensity of sunshine or the wind, they are hardly able to be controlled directly. However, due to the physical need to balance power at all times, the power system controls must be more flexible in order to allow the integration of solar, wind and other renewable energy generators.

Building new traditional types of large-scale power generators to keep the balance of the energy system would not get us closer to achieve carbon neutrality. Another way is to tap into those flexibility sources which can be provided by masses of smaller scale energy generators, electrical vehicles and energy storages of any kind.

Flexibility is everywhere

Flexibility source providers can be found in the most extraordinary places: for example, in the telecommunication sector. Within the frame of SmartNet project, it was demonstrated in Spain how radio towers of the mobile phone network operators could also play a role in balancing the energy supply and demand. The central back-up batteries of these towers have capacities that were able to store surplus electricity when demand was lower than production and feed it back to the system in times when demand increased, or the level of production dropped.

The experience brought positive results and the method is up-scalable, therefore it can be viable also on a larger geographical level. Only this one single service provider in the demonstration has the capacity of more than 250 megawatts of flexibility throughout Europe which is equivalent to the capacity of middle-sized gas-fired power plants.

Another demonstration within the project was set up in Denmark where the heating of indoor pools of summer houses served as flexibility providers to the system. In this case, pool owners received periodic price signals; electricity was cheaper in those periods when the production was high, and more expensive, when there was a need from the system operator to lower demand.

The SmartNet project demonstrated that management of consumption could be mutually beneficial: providing new tools for balancing the system on one hand and saving money for the consumer on the other. According to the results of the demonstration in Denmark each of the 16 summer houses involved was able to save 1600 euros a year by using electricity for the pool at the right times.



The third demonstration of the project was set in Italy, where, through a newly developed telecommunication-based device, several hydro power plants in the Alpine region of the country were connected, thus being able to provide real-time information for distribution grid monitoring. In addition to that, these plants could play an important role to keep voltage and frequency of the grid stable.

The SmartNet project made progresses beyond this: it achieved a much further-looking aim, by deep-diving into the complexity of enabling all kinds of flexibility sources and their integration into the system. To achieve this, the system operators of high (transmission) and low (distribution) voltage levels must develop new ways of cooperation.

The main challenge here is to access these sources of flexibility for system operators on both levels to exploit their full potential. This means a new energy market which currently does not exist - to find the best structure and design for it was the focus of SmartNet project. Experts of the 24-party project consortium – led by the Italian public research center, RSE – examined four different schemes for cooperation between transmission and distribution system operators to determine which version would be the most beneficial for all parties.

Impact

By testing and analysing these coordination schemes in various scenarios, SmartNet project was able to form recommendations for how the system operators and consumers should work together, taking the most cost-effective option. Their contribution to the future regulation of energy markets will be very important to facilitate the energy transition in Europe.

Implementing these schemes will enable smaller scale electricity generators to provide flexibility services to the system, thus paving the way for them to enter the market. This way all three parties (transmission, distribution system operators and prosumer) can take advantage of a new approach, which results in reduced cost of operations and leads to reduced electricity and grid-use costs for consumers.

On a larger scale, this project support the easier integration and growth of renewable energy sources in the power generation mix and brings us closer to a carbon-neutral Europe by 2050 while the security of energy service stays as high as we are used to.

Keywords: renewable energy sources, flexibility, security of supply, prosumers

More info at: <http://smartnet-project.eu/> + [project video](#)

Note: Project benefits based on specific criteria outlined in [ETIP SNET monitoring exercise](#)

Project Benefits

- Reduced energy bills
- Decreased carbon emissions
- Efficient business models & market design



ETIP SNET

EUROPEAN
TECHNOLOGY AND
INNOVATION
PLATFORM

SMART
NETWORKS FOR
ENERGY
TRANSITION



This publication has been developed in the frame of the INTENSYS4EU project, funded by the European Union's Horizon 2020 Research and Innovation Programme under grant agreement N° 731220.

www.etip-snet.eu

PLAN. INNOVATE. ENGAGE.