

Liberalized electricity market and sustainable development of renewable energy resources open opportunities for energy market players – including any electricity user – to participate in the development of an on-going embryonic *power ecosystem*, which is called the *Energy Web*. Its development is possible thanks to the tremendous development of Information and Communication Technology (ICT) - during the 90's up to now - that is revolutionizing our society (the way we live and interact with our environment has deeply changed thanks to the speed at which the information is propagating). In this e-Society, the relationship between producer and consumer is evolving rapidly. The *Energy Web* is part of different embryonic ecosystems which are underway in the business and economic revolution since the formidable development of the Internet. Its ubiquitousness and the development of Internet aware micro-controller embedded in household electric equipment are technological catalysts, which are going to make the *Energy Web* possible.

The *Energy Web* is a power ecosystem in which every smart power nodes - this could be a renewable/distributed energy resource (DER) or equipment that can be put in some mode to reduce its power consumption - interconnected to a correctly designed power grid has the capability of *interpreting and understanding the real-time price signal*, received from the *Energy Web infrastructure*, to adapt its consumption or generation according to the participant strategy. In this “new” power market model – this is already a reality for example in France – every electricity user has the option to become energy vendor. The real-time price signal is generated and sent to the participants by the electrical system operators using real-time data from the power markets.

The energy flows generated by the participants are monitored in real-time by the *system operators*, who operate real-time metering infrastructures for establishing the energy balance and *ensuring the safety of the electrical systems*. The historical records of power consumption and generation with the corresponding prices and billing are periodically sent to the back-office of the market participants for financial settlement.

The road that leads to the Energy Web is not very far but it has some technical barriers and challenges: a real-time metering standard and infrastructure, a real-time electricity pricing infrastructure, standardized DER control and communication interface to the Energy Web infrastructure, price-smart responsive and adaptive power network nodes, “DER ready” power distribution network, resilient control strategy of system of systems.

Facing such challenges, new *scientific foundation and engineering methodology* need to be developed to support *the design, the simulation and the verification* of expected *resilient properties* of the Energy Web infrastructure.