Integrated Community Energy Systems: Passive Consumers VS Smart Prosumers

The evolution from passive to active distribution grids has required new operating and planning actions. Such requirements resulted in conducting profound studies on the operational, planning, and market strategies, mainly at the distribution level. A plethora of energy system integration based on coalitional solutions, comprising community microgrids (CMGs), virtual power plants (VPPs), energy hubs (EHs), and integrated community energy systems (ICESs), among others, has evolved over the past years to adequately cope with the challenges presented by the energy system transformation. However, the ICES, by comprising the valuation of existing energy infrastructure and available resources in a community maximizes the energy efficiency via the most ecological, technical, and economic fashion. ICESs not only address the issues regarding the network side such as security, energy efficiency, and volatility of renewables and demands but also provide more flexibility to the consumers, and consequently to the system while mitigating climate change. Through article 16 of the Directive on common rules for the internal energy market (COM (2016) 864), the European Commission requires that the Member States adopt a legal framework that ensures the possibility for local energy communities to own, establish, or lease community networks and to autonomously manage them. These communities can access all organized markets either directly or through aggregators or suppliers. Such a degree of freedom empowers innovative energy service companies to offer smart energy solutions to consumers in new ways that were not possible before. Therefore, among the options stated above, ICESs provide better collaboration and services to external systems as well as take into account self-provision and self-sufficiency offering a secure infrastructure that significantly supports the future energy and climate objectives. It is noteworthy to mention that the ICES can be applied in all sectors with different scales such as large (for city and region), medium (for the neighbourhood), and small (for households or other buildings). Therefore, the ICES is expected to contribute more powerfully due to a higher degree of community engagement. In this speech, we particularly cover the role of passive consumers and active prosumers in constructing the ICESs.