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An IoT-based solution for monitoring and control prosumagers' battery energy storage

Every day, more and more battery storage systems are installed in residential and commercial buildings, combined with photovoltaic systems and modern electronic dc-ac converters that regulate the power flow between the prosumagers of energy communities and the electricity grid. This integration of storage systems in low voltage electricity grids is strategic [1,2] because by coordinating the charging and discharging of the batteries it is possible to increase the exploitation of renewable energy sources and the safe operation of the electricity grids, favoring the current energy transition. Coordinating a vast set of batteries remotely implies a significant exchange of data and information [3] also via 5G [4], new technologies such as smart contracts and blockchains [5], cloud platforms [6], but also information visualization [7], monitoring and control systems [8,9].

In the sophisticated framework of communication and control systems [10], the use of the Internet of Things (IoT) is today a rapidly growing trend [11,12]; the latest IoT open-source applications show the versatility, applicability, usability, and cost-effectiveness of IoT in supporting intelligent grids [13], especially in measurement, communication, data processing and command implementation [14]. However, suitable IoT devices are still absent from the market and the literature is still scarce. Therefore, how can the manager of a renewable energy community monitor and control the distributed storage systems that fall within the community?

The authors propose a practical and feasible IoT solution, composed of a cloud infrastructure and a home gateway; this combination creates a direct communication channel between the cloud infrastructure of the energy community manager and prosumers' battery storage systems, avoiding the exchange of information with the cloud infrastructures of the storage system manufacturers (see Figure 1). The home gateway has high interoperability requirements and ease of installation/implementation, it is compatible with a variety of commercial storage systems from different manufacturers, it avoids the use of closed-access communication protocols

Biography: Domenico Cimmino has a degree in Computer Science and actively operates in technological innovation and R&D Sector applied to energy sector and IoT field. He is the founder and the project leader of "Eugenio" for Evolvere: an ecosystem (gateway, cloud infrastructure and different software applications) for the management and optimizations of different types of Distributed Energy Resources. As R&D and Innovation Technology Manager, Domenico constantly analyzes the evolution of scientific research and energy market trends to experiment and implement solutions and services with a high innovative content.

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