Project Description

OneNet – ActiveProsumer

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Project Title:	Active Prosumer in the loop with the Cyprus demo of the OneNet project
Acronym:	OneNet - ActiveProsumer
Project website:	http://www.wisewiresolutions.com/ActiveProsumer (under construction)
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Proprietary Rights Statement

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CONTENTS

1 TITLE

Project Title:	Active Prosumer in the loop with the Cyprus demo of the OneNet project
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2 COMPANY/ORGANIZATION

H. Wise Wire Energy Solutions Limited (WiseWire) is a start-up company offering innovative solutions and consultancy services in the area of smart grids and energy efficient buildings. The company is based in Cyprus and was founded in 2020 with an aim of transforming innovative research results into marketable products and services. The team has strong scientific and technical expertise with significant experience in research-innovation projects. The mission of the company is to create innovative solutions and services for the green and digital transformation of buildings and energy infrastructure. Our solutions aim to advance the integration of renewable energy sources and maximize their penetration into the energy infrastructure, reduce the electricity cost for the consumers, and enable zero emission buildings. WiseWire is participating in research and innovation activities and focusing on creating novel ICT-based solutions to enable sophisticated and scalable energy management functionalities and their commercialization.

3 SHORT PROJECT DESCRIPTION

3.1 Challenge

The green and digital transformation of power systems considers the replacement of large conventional generation plants with decentralized generation based on renewable energy and the adaptation of information and communication technologies (ICT) to enable intelligent operational functionalities for future energy systems. Current trends indicate a fast transition for the electrical grid from a fully centralized architecture to a decentralized one. This transition, however, demands the cooperation and increased flexibility and adaptability from all related stakeholders (i.e., system operators, energy market, and active prosumers). At the same time, prosumers are currently faced with rapid changes and increased energy costs while they are unable to actively participate in the energy market and grid operations actions. This can lead to a non-cost-effective operation of both the prosumers and the grid.

Therefore, innovative solutions are required which breach the gap between the power system operators and active prosumers to achieve a synergistic and mutually beneficial operation at both the market and the network levels of the future power systems. These solutions need to support the active participation of prosumers and the efficient and reliable grid operation while maximizing the allowable penetration of renewable energy.

3.2 Proposed solution

The ambitious vision of the OneNet project contributes towards the evolution of the European power system by developing new market, products, services, and ICT systems. To support this vision, the OneNet – ActiveProsumer project will develop new innovative grid services based on ICT technologies to fully exploit demand-response, storage, and distributed generation while creating fair, transparent and open conditions for the consumer; thus, enhancing the engagement of household consumers towards the cost-effective and reliable operation of power grids.

The key objective of OneNet – ActiveProsumer project is to enable the participation of actual prosumers in distribution grid management by allowing the provision of flexibility services to the grid. Towards this direction, the project will focus in two enabling pillars. The first pillar focuses on the development of a fast, secure and reliable communication between the prosumer and the DSO control center, while the second pillar emphasizes on intelligent power control methodologies.

Initially a secure two-level communication framework will be developed. This framework will be responsible for a) the internal communication at building level to allow the coordination of flexible resources within the prosumer infrastructure, and b) the external communication allowing the exchange of measurements and coordination signals between the prosumer and the DSO. The internal communication at the consumer level will be established over the prosumer local area network (LAN) and will be managed by the WiseWire Energy Box (see Figure 1) which will receive fast measurements and send coordination signals to key power equipment at building level (i.e., PV inverter, battery inverter, fast-reporting smart meter, etc.). The external communication will be established between the prosumer (WiseWire Energy Box) and the DSO control center (ABCM-D platform) through the WiseWire Cloud platform (see Figure 1). The communication will employ MQTT for communication, a widely utilized protocol in IoT applications offering scalability and a cost-effective solution for plug-n-play applications. Proper API frameworks will also be developed to facilitate the data exchange between the prosumers and the DSO control center.

The intelligent power management schemes that enable the provision of ancillary services by the prosumer will be developed and integrated in the local processing unit of the WiseWire Energy Box and the cloud within the WiseWire Cloud platform. The intelligent power management algorithms will monitor and utilize forecasting and optimization methodologies to control the flexible resources of the building while ensuring the capability of provisioning of ancillary services efficiently and effectively. These services will maintain a regulated active and reactive power exchange between the prosumer and the grid according to the DSO coordination set-points.

The proposed solutions will be integrated into an actual prosumer located in Nicosia, equipped with a rooftop photovoltaic system, a battery storage, and a fast-reporting smart meter. The prosumer will continuously interact (e.g., every 30 seconds) with the DSO control center (ABCM-D platform of OneNet), to exchange power measurements and coordination signals. The fast measurements will be provided to the ABCM-D platform to allow the representation of the prosumer operation in the digital twin of Cyprus grid. The coordination signals generated by the ABCM-D platform will be communicated to the actual prosumer, which in turn will manage its own flexible resources to provide ancillary services accordingly.

The infrastructure, architecture and concept of OneNet - ActiveProsumer project are presented in Figure 1.

3.3 Expected Results

The scientific outcomes of the project will include cutting edge intelligent control and management methodologies and are expected to act as the foundations of the next generation grid services and products that can increase and fully exploit the flexibility at the prosumer level in a fair and transparent manner as well as ensure prompt demand response for the system operators. In turn, the newly developed technologies that incorporate cloud services and enable active prosumer participation are expected to have a key role in the changing energy system architecture and are envisioned to be considered as necessary pieces for the future customer-centric grids. At the same time, the proposed integration of intelligent control methodologies at the consumer level aims to increase consumer's gains from energy cost savings. Further, the provision of ancillary services by the prosumers enables the market participation of flexible electricity consumers with the aim of reducing their electricity cost up to 20% with great social-economic benefits. On the other hand, the increased flexibility provided to the system operators is expected to significantly increase the utilization of grid capacity by 15%, reducing the investments for upgrading the infrastructure and

allowing higher penetration of renewable resources. Distributed flexibility services can also be utilized by the operators to enhance the efficiency by reducing the grid losses by 5-10%. Finally, the facilitation of the active participation of the consumers in the energy generation is expected to significantly increase the adoption rate of renewables and support the transition to a greener energy sector.

4 FIGURES

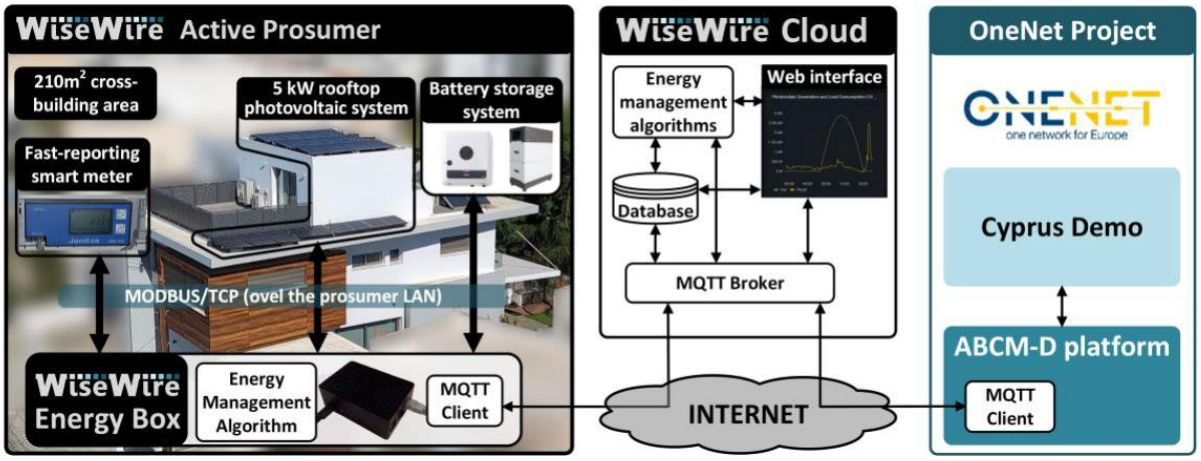

Figure 1: The infrastructure, architecture and concept of OneNet - ActiveProsumer project.

5 COMPANY'S LOGO (HIGH-RES TRANSPARENT)

WiseWire
Energy Solutions