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2023



# A SUNNY AND SMART COMMUNITY

**ENERGY TECHNOLOGIES CATEGORY.** In summer 2022, a pioneering three-year pilot project concluded in Lugaggia, a small village near Lugano. It successfully demonstrated that an intelligently networked and controlled combination of electricity consumers and solar power producers can significantly increase self-sufficiency. Behind this sunny alliance of the Lugaggia Innovation Community are the regional distribution system operator Azienda Elettrica di Massagno (AEM), the University of Applied Sciences of Southern Switzerland (SUPSI), the companies Hive Power and Optimatik, and Landis & Gyr. They succeeded in connecting Lugaggia's pre-school, 18 residential buildings, 10 heat pumps, 6 electric boilers, a 60kWh community battery and six photovoltaic systems with a total

output of around 70kW in such a way that 94 per cent of the solar electricity not used directly could be shared and consumed within the community.

AEM is a small energy supplier with 25 employees and around 9000 customers, mainly households. "We are small, but that's why we have to be particularly innovative and agile. Going forward, the energy industry will need new approaches and AEM has the potential to show the way," says Dr Daniele Farrace, Chief Innovation Officer at AEM. The company has its own applied research team and has been working closely with SUPSI and the SUPSI spin-off Hive Power for around five years.



Left to right: Dr Daniele Farrace, Chief Innovation Officer at AEM and Prof. Vasco Medici, Head of Energy Systems Sector at SUPSI



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For the Lugaggia Innovation Community pilot project, a power line was specially laid to connect the series of buildings into a legally compliant community for self-consumption (also known as collective self-consumption). The centre of the network is the Lugaggia pre-school, where a 30kW photovoltaic system is installed on the building. The community's 60kWh shared battery is located in the basement. There is only one electricity meter in the electric control box where the connections of all the houses come together, as the community is considered a single customer by AEM. The electricity from the photovoltaic system is primarily consumed by the pre-school; the rest flows via the community grid to the other consumers. If more electricity is consumed than is produced, the energy stored in the battery is used first. Only once it is empty is the public grid used.

Battery and consumption are automatically controlled by an intelligent algorithm that reliably estimates each household's load profile based on previous consumption data and current weather forecasts. In the pilot project, this resulted in the community's consumption of self-produced electricity increasing to 94%. Previously, it was around 30%. The community therefore had to 'import' less electricity from the public grid but also 'exported' less because of the high degree of self-consumption. And residents saved up to around three cents per kilowatt hour.

The goal of optimising self-consumption collectively using artificial intelligence and smart meters was thus achieved. The project, which was supported by the Swiss Federal Office of Energy, the cantonal renewable energy fund and the regional development of Lugano and the commune of Capriasca, also

examined the advantages and disadvantages of a centralised and a decentralised system. "It has been shown that a central platform that controls heat pumps and boilers, for example, is more efficient than when households' individual smart meters communicate directly with each other," explains Prof. Vasco Medici, Head of Energy Systems Sector at SUPSI.

Meanwhile, AEM is already working on new projects. In the neighbouring village of Tesserete, for example, another such community has been in existence since 2021. This community comprises commercial enterprises, a football pitch, a swimming pool as well as residential buildings, which are all linked to one another. Moreover, the new community, which also integrates the new bidirectional charging station from the V2X Suisse project, is running without public funding. "In the short term, it's not worth it for AEM," says Daniele Farrace. But he's convinced: "In the longer term, when more and more photovoltaic systems feed electricity into the grid, the high costs to expand the electricity grids can be avoided thanks to communities like these."

### **WATT D'OR VIDEOS**



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Since more than ten years, the Swiss Federal Office of Energy rewards best performances in the energy sector with the Watt d'Or. The aim of the Watt d'Or is to increase awareness of these achievements and thus motivate companies, politics and the general public to discover the advantages of innovative energy technologies for themselves. [www.wattdor.ch](http://www.wattdor.ch)



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