



Photos: Infrastruttura S.p.A.

The Acate PV Plant, 1,597 kW in size, is located in Sicily. Comparatively smaller Italian islands are presenting opportunities today for large scale storage deployment.

Italy examines battery benefits

Italian storage: Italy met 7.8% of its electricity needs in 2015 with solar, and to date the country has installed a cumulative PV capacity of around 19 GW. Yet, despite this astonishing outcome, the rate of Italy's new PV installations has declined dramatically with the majority of solar being added through Italy's net metering scheme. Can energy storage and net metering boost the Italian PV market?

According to the GSE, the state-owned company responsible for the promotion of renewable energy in Italy, the country had installed 18,910 MW of solar PV cumulatively by the end of 2015. This figure is not expected to differ substantially today due to the current anemic growth of the sector. In fact, the number of new PV installations in 2015 was about 300 MW, similar to the rate achieved in 2014.

By contrast, Italy's electricity transmission grid operator company Terna has published some impressive data, revealing that in 2015 the country cov-

ered 28.5% of its electricity needs with renewable energy. Specifically, 44,751 GWh of energy came from hydro plants, 24,676 GWh from solar PV installations, 14,589 GWh from wind, and 5,816 GWh from geothermal units. This corresponds to solar PV systems covering 7.8% of the country's electricity mix last year, up from 7% in 2014.

Hence, the energy storage question arises quite naturally due to the high penetration of renewables in the Italian power system. However, another reason why energy storage has emerged in Italy's

energy discourse is the large number of net metered installations.

Based on the GSE report, at the end of 2015 there were approximately 520,000 generation plants using net metering, corresponding to approximately 4.47 GW of installed power capacity. Of those 520,000 plants, about 96% are installations smaller than 20 kW, and most of them are PV systems. Furthermore, since FIT payments for all new PV plants ended in July 2013, net metering is currently the only remuneration policy scheme for new PV systems.

Energy storage: policy update

Italy does not currently have legislation regarding the storage of electricity, Carlo Parmeggiani, President of the energy storage group in Italy's energy association ANIE Energia, told **pv magazine**. However, the country's energy market regulator, the AEEGSI, is committed to reform the Italian electricity market and has released two important resolutions aimed at developing the usage of electrochemical energy storage systems. These are resolutions 574 and 642, introduced in 2014.

Resolution 574 defines how storage systems can access and use the electricity grid, and resolution 642 complements the 574 by defining the grid services to be provided by storage systems. Furthermore, the Italian Electrochemical Committee (CEI), which is a private association responsible for the country's technical standardization in the electrochemical fields, has released the technical requirements CEI 0-16 (HV and MV storage applications) and CEI 0-21 (LV storage applications). These requirements define the connection diagrams

of the storage systems to the grid, with relative measurement and protection systems, and the grid services required for effective integration of the same. The energy regulator's resolutions 574 and 642 are not policy recommendations, nor legal documents, noted Parmeggiani. Yet they are significant for the development of a domestic storage market because, together with CEI's technical requirement documents, they have set the rules for storage installations. Thus, businesses know where to begin. The AEEGSI resolutions and the CEI requirements "are driving the cost reduction of storage systems," opined ANIE Energia's Parmeggiani.

Small islands, big opportunities

"ANIE Energia is committed to opening up the domestic market for energy storage systems and is actively participating in the debate, which is leading to the reform of the Italian electricity market. In particular, ANIE is working on allowing renewable energy systems coupled with energy storage systems to participate in the dispatching and balancing

AT A GLANCE

- Flush with solar PV after an initial boom, Italy's clean power landscape is seeking ways to reinvigorate the sector's growth.
- Storage is being touted as one viable option, supporting the net metering scheme that has rooted itself firmly into the renewable landscape.
- Italy's market regulator AEEGSI has introduced new regulations designed to help energy storage systems slot into the energy mix.
- The country's small islands offer large opportunities as testbeds for solar-plus-storage solutions.
- However, Italy's strong energy ties with its neighbors allow it to exchange power almost at will, suppressing demand for storage, at least for the time being.

electricity markets," Parmeggiani added.

However, perhaps the most immediate opportunities lie in Italy's small islands. These are Tremiti, Egadi, Pelagie, Pontine, the Tuscan archipelago (Elba excluded), Ustica and Capri. Spe-

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The Chiamonte Gulfi PV Plant, located in Sicily, is 4 MW in size.

cifically, following the release of the Law 9/2014 and the Law Decree 91/2014, ANIE Energia is supporting the Italian Parliament in developing the related Implementing Decrees. “The main objective of this legislation is to make the electrical system in the minor islands that are not connected to the grid more efficient both at the distribution and consumption level. Once implemented, it will introduce all the necessary market tools in order to reduce the price of electricity. In detail, it will support the development of renewable energy coupled with storage systems, as well as the wide spread of electrical vehicles with a view to a smart

grid,” said Parmeggiani. The downside of this is that the implementation of the Law 9/2014 and the Law Decree 91/2014 is part of the wider reform of the electricity market. And apart from some implementing decrees in progress, there are no specific deadlines as to when they need to be fully implemented.

Net metering & storage

The Law Decree 91/2014, introduced in August 2014, also increased the upper limit for net metered systems from 200 kW to 500 kW per installation. Asked about the payback period of net metered PV plants in Italy, Alberto Pinori, Presi-

dent of ANIE Rinnovabili (the renewable energy arm of ANIE Energia), replied that it is difficult to calculate because it depends on the size of the plant, the market value of a plant’s components, the electricity price when invoicing net metered systems, the voltage level of the connection, the self-consumption rate, a site’s solar irradiation, the decay in performance of PV plants, construction costs, and so on. However, according to a recent study by ANIE Rinoovabili, the net metering payback time can range from seven to nine years, Pinori said.

Pier Francesco Rimbotti, CEO of Infrastrutture S.p.A., an Italian company headquartered in Milan, agrees with Pinori. For residential systems, the current payback period for a net metered system in Italy is around seven years, Rimbotti said. The payback period for a net metered system combined with energy storage on-site is not simple to calculate, “due to the fact that the market is still young in Italy and the product price is still high,” Rimbotti explained. “But on the basis of our evaluation the payback time remains around seven years currently. Only when the storage system is perfectly sized and joined with an appropriate and smart management of the energy, the savings procured could pay for the expenses incurred for its purchase in a shorter time.” For larger, commercial net metered PV systems combined with storage, the payback times increase significantly, he concluded.

In Parmeggiani’s view, Italy’s “net-metering [the ‘scambio sul posto’] is today more profitable than the usage of the energy storage systems. Therefore, net metering is far the most-used market tool for the virtual storage of electricity.”

Given that all three stakeholders agreed that the payback time is closely linked to the consumption profile of each single user, the Italian case is reminiscent of all other countries post solar energy subsidy cuts. So, rather than just installing PV, the sector’s business model moves towards a holistic approach that offers energy management solutions, including PV and storage as a component of it.

Hop on the storage train?

Infrastrutture S.p.A, has been active in the Italian energy sector for over 50 years, is also investing in Italy’s solar PV and wind plants and has recently expanded into Japan. The company now



The 2 MW Giarratana PV Plant, also located in Sicily.

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plans to enter Italy's energy storage market, according to CEO Rimbotti. "At the moment we are studying [storage] technologies, doing all our evaluation and waiting for the dominant technologies while also looking for potential partners or suppliers," he said.

Certainly though, Rimbotti added, there is potential for energy storage growth in Italy. "We are still in the first stages; there are still lots of doubts about the contribution of storage to the income statement of a PV plant and the payback time is still too long." But in the wake of U.S. and German storage market developments, "there is a stirring, and several foreign operators such as Tesla, Sonnen, SolarEdge and others are betting on the Italian market."

In September 2015, Enel Green Power (EGP) inaugurated Italy's first large-scale solar-plus-storage facility in Catania. The 1 MW/2 MWh battery facility, which uses the Durathon sodium-metal halide technology developed by General Electric, is connected to EGP's 10 MW Catania 1 solar plant, and aims to increase flexibility in management of the power plant, smooth the electricity flows, reduce intermittence and provide auxiliary services to the grid.

"Technologically advanced storage systems like the one at the Catania 1 solar plant will reduce intermittency and enable us to manage the unpredictability of certain renewable sources, thereby helping to ensure the stability of the grid," said EGP's CEO Francesco Venturini at

the time of the inauguration.

Two months later, in November 2015, EGP also inaugurated a 2 MW/2 MWh storage facility, comprised of Samsung lithium-ion batteries and located at the 18 MW Potenza Pietragalla wind farm, in the region of Basilicata. By some reports, the system feeds back almost all of the electricity it stores.

"Among the available storage solutions, batteries, thanks to their modularity, make it possible to meet various needs of the electricity system, both regarding generators (deferred feeding of the generated energy or energy shifting) and network operators (uniform feeding or peak leveling and intermittency reduction of non-programmable sources or peak shaving)," said EGP. Speaking at the Energy Storage Update Europe conference held in London in December, EGP's Head of Innovation and Sustainability Riccardo Amoroso told the audience that there are several business models available to storage, for example ancillary services and price arbitrage.

However, such business models need to change per country depending on the regulatory framework of the application, added Amoroso. His view reflects his employer's business strategy. Following the inauguration of the storage facility at the Potenza Pietragalla wind power plant, EGP said its goal is to transfer the know-how it has gained in Italy to its other plants abroad, with applications that vary according to specific business contexts and possibilities.

The crucial question that remains, though, is what happens with other Italian stakeholders that do not aspire to invest abroad and would rather focus on the domestic market? Although the Italian regulator's resolutions and CEI's technical standards have set some clear rules, further regulatory work is required for the storage market to become established.

Energy storage competitors

Will Italy's government move forward to establish an adequate energy storage policy framework soon? The answer is far from certain despite its stellar renewable energy success and the plentiful advantages of the storage systems. The reason is that energy storage, unlike power generation and transmission, is not a unique proposition. On the contrary, storage has a lot of competitors, such as electricity interconnections. Italy's geographic position enables it to exchange and trade power with neighboring countries using interconnecting power lines.

Furthermore, in February 2015, Italy's electricity market was coupled with neighboring France, Austria and Slovenia, and will soon link with Switzerland and Greece. Market coupling aims for the integration of power spot markets in Europe by optimizing the allocation process of cross-border capacities thanks to a coordinated calculation of prices and flows between countries. Thus, by using implicit auctions, market players do not receive allocations of cross-border capacity themselves but simply bid for energy on the relevant spot market. The power spot market then uses the available cross-border transmission capacity to minimize the price difference between two or more areas. Eventually, the price coupling of the day-ahead wholesale markets in Europe will lead to a convergence of wholesale electricity prices, providing the right signals for investment.

This is an excellent development, but regulatory obstacles do not allow demand response to take part in electricity markets on an equal footing with generators. Both national and European Union policy frameworks need to adapt to include storage. This serves as another example of why and how storage faces competition. Will Italy move quickly to support it? It depends a lot on its energy agenda. But adding storage to the smaller islands in the short term will help immensely. ♦

Ilias Tsagas



Pictured above is the 1 MW Monterosso Almo PV Plant in Sicily.