

4 The TOP 4 EU residential battery storage markets / continued

Bremen, Hamburg, Schleswig-Holstein, and Baden-Württemberg, with the last one's legislation requiring buildings to include solar installations as of May 2022.

It seems unlikely we will see the introduction of new storage subsidy schemes at federal level – it will rather be the renewal of the current regional subsidies to support further market growth across the country. Additional market drivers will continue to be the effects of the COVID-19 recovery stimulus initiated last year, which has pushed the demand for electric vehicles, which is leading in turn into a bigger interest for solar & storage systems. Households who do not own a PV or a storage system yet will be attracted by the possibility to save money on their bill against the high Germany electricity prices and be an active part of the sustainable transition by charging their cars with green and cheaper energy.

The new EEG Law 2021 amended in January has brought some positive changes for prosumers, among

which raising the tax exemption threshold for solar PV systems from 10 kW up to 30 kW. Moreover, among the new amendments there are easier procedures to retrofit post-EEG solar systems.

Many pilots (various SINTEG C/sells research projects) are currently ongoing in Germany in order to determine what kind of mechanisms could help tap the potential of local, low-voltage flexibility assets, which could unleash further revenue streams for residential BESS.

Overall, Germany is expected to remain the biggest and most developed residential storage market in Europe over the next years. Our Medium Scenario estimates new additions of 5.95 GWh for 880,000 new units between 2021 and 2025. However, with the Green party joining the new government coalition a much higher 2030 solar installation target is expected to be announced soon, which would lean solar & storage growth rather toward our High Scenario of 7.1 GWh of new installations.



© sonnen

4.2. Italy

The residential BESS market in Italy has been, and in the next few years, will continue to be driven by attractive public subsidies. The first residential solar & storage installations in the country were registered in 2015. Since then, the sector started to grow rapidly following financial schemes available in the regions of Lombardy and Veneto and the extension to batteries of the 50% tax credit for the purchasing of a residential PV system. Last year's introduction of the new Superbonus 110% incentive scheme provides the most significant boost to the market – and will continue do so over the next two years. In total, almost 40,000 units have been registered in the country, with a cumulative storage capacity of 272 MWh. In 2020, the additional residential storage capacity installed reached 94 MWh, growing 44% in comparison to 2019. Despite Italy being hit very hard by the pandemic, the market did not shrink, registering a growth beyond initial expectations, which is also thanks to the introduction of this big new fiscal incentive in mid-2020.

Residential solar & storage market in Italy

Unlike in several other solar markets, the residential segment was the main driver of the Italian solar sector in recent years, with an average share of 37% among total installed PV capacity in the last 5 years. This has led to a cumulative capacity of 4.1 GW and more than 900,000 homes. The residential PV market in Italy took off between 2005 and 2013, following the five Conto Energia decrees, setting a subsidised feed-in tariff for small-scale solar generation. Between 600,000 and 700,000 homes have been equipped during this period, and still benefit from the scheme as the FIT incentive was granted for 20 years from the commissioning of the system. Residential solar installations went down after 2013, fluctuating around 200 MW installed per year since then. The Italian energy authority GSE offers a net-billing scheme (*Scambio sul Posto*) for any PV system below 500 kW. Under this scheme, on a yearly basis prosumers subtract the value of electricity fed into the grid to the bill of electricity consumed. A typical residential customer with a consumption of 3,000 kWh per year would save 0.21 EUR/kWh exported to the grid.

The government also provides an incentive for the installation of small-scale PV generation assets in the

form of a 10-year long tax credit covering 50% of the investment cost. Typically, a household spending 10,000 EUR for a PV system would benefit from a 500 EUR tax rebate per year during the next 10 years.

The residential BESS market in Italy emerged in 2016, when the Lombardy region introduced a new incentive specifically for small-scale storage. The budget set was 2 million EUR first and was then renewed every year since, each time amounting to 3–4 million EUR.

In 2018, the 10-year tax incentive for the installation of residential PV covering 50% of the upfront investment cost were extended to small-scale BESS. All systems installed simultaneously or after the commissioning of the PV system were eligible. In mid-2019, Veneto launched an incentive program for residential BESS and Lombardia renewed it for one more year. While the incentive scheme in Veneto was not renewed, the Friuli Venezia Giulia region also decided to launch a grant for residential storage, with a budget of 200,000 EUR. From 2020, however, none of the regions have renewed their financial subsidies for solar & storage.

In July 2020, as part of the COVID-19 national recovery plan, the government introduced the aforementioned Superbonus 110%, important significant measures to encourage energy efficiency interventions in residential buildings. The measure gives the possibility to obtain a tax credit of 110% for the expenses occurred from July 2020 until 2023, to be spread over a 5-year period in five annual instalments of equal amount. In order to obtain the credit, the law makes an important differentiation between “leading” (*trainanti*) and “towed” (*trainati*) improvements. The former concern thermal insulation, winter air conditioning systems and seismic risk reduction works; while the latter include the installation of grid-connected PV systems, battery storage, EV charging infrastructure, and other energy efficiency measures. Therefore, in order to benefit from the Superbonus, the PV and the storage systems must be installed in conjunction with one of the main interventions and the overall investments made must lead to an improvement of the building's energy efficiency rating. In the case of ineligibility for the Superbonus, it is still possible to obtain the 10-year 50% tax credit already in place for the installation of small-scale PV generation assets and BESS.

4 The TOP 4 EU residential battery storage markets / continued

Economics for residential storage in Italy

The only application for residential BESS in Italy currently is to improve the self-consumption rate of small-scale PV plants. Household batteries cannot charge from nor feed to the grid, but can only interact with the co-located solar PV system, which makes it impossible to use storage for other business models such as energy arbitrage. The current framework for self-consumption under the *Scambio sul Posto* net-billing scheme also provides a barrier to the storage business case, since prosumers get a remuneration for the electricity they feed into the grid.

In the last decade, the Italian retail electricity rate has oscillated between 0.20 and 0.25 EUR/kWh. Italy was one of the pioneers in the rollout of smart meters, but it did not translate into many innovative electricity offers for residential customers. Static time-of-use pricing contracts, with a lower rate at night and during off-peak periods are widely available and often chosen by PV owners. However, dynamic time-of-use tariffs are inexistent yet.

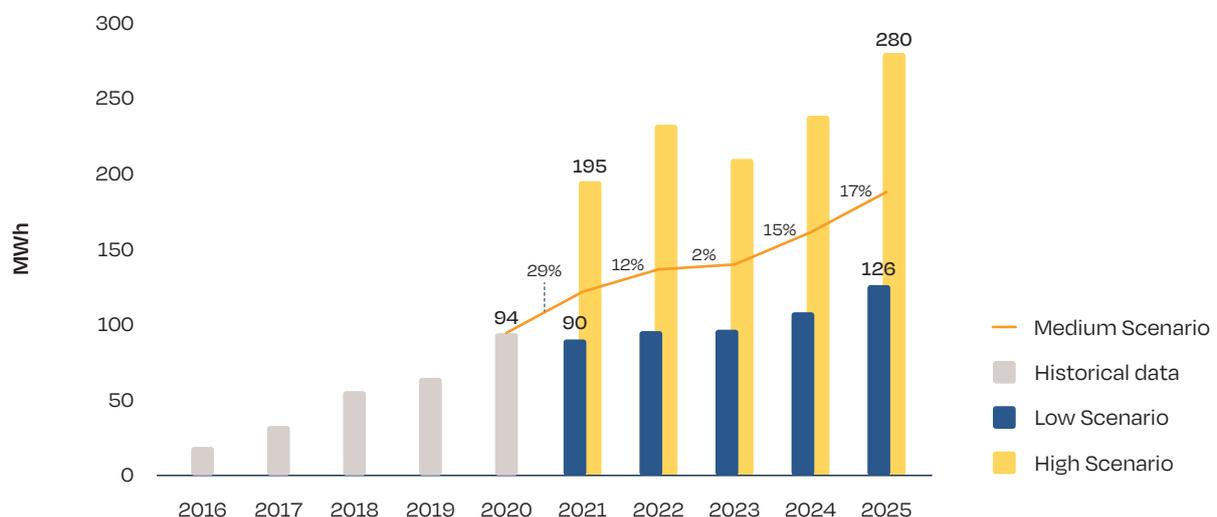
The main drivers for the purchase of BESS by homeowners equipped with PV remain the very generous incentives currently offered. Thanks to those, Italy is by far the most attractive European country for small-scale solar & storage systems regarding payback time. The 110% or 50% tax reliefs

drastically eases the investment in a residential BESS, and the additional independence it provides together with a PV appeals many customers.

Prospects

Thanks to the large incentives provided through the Superbonus 110%, we expect a strong growth of battery installations in Italy. According to our Medium Scenario, 122 MWh will be installed until the end of 2021, for a total of 16,500 batteries (Figure 4.3). This is equal to a 29% growth compared to 2020 installed capacity. We anticipate a significant increase also in 2022, with an annual market of 137 MWh and a 12% year-on-year growth. However, there is a possibility that the market will be much larger than that, provided that there are no significant obstacles to access the Superbonus. The more optimistic end of our outlook foresees 195 MWh in 2021 and 232 MWh in 2022. With the end of the incentive scheme in 2023, our expectation is that the market will take a break that year, and to regain traction through 2025 as residential PV installations continue growing. The Medium Scenario anticipates the Italian home storage market to reach 188 MWh in 2025. Throughout the period 2021-2025, our market estimates forecast a total of 625 MWh home battery capacity additions in the Medium Scenario. Under this scenario, 2025 is the year when the BESS fleet in Italy will exceed 1 GWh in total capacity.

FIGURE 4.3 ITALY RESIDENTIAL BESS ANNUAL SCENARIOS 2021-2025



© SOLARPOWER EUROPE 2021

4.3. United Kingdom

The UK residential BESS market has been active since 2016. Overall, approximately 37,000 units have been installed in the country so far, with a total cumulative storage capacity of 272 MWh. During 2020, the country installed 81 MWh of residential storage capacity, which represents a 26% increase if compared with the figures added in the previous year that amounted to about 9,000 units. The UK storage market is actually larger than previously assessed, not too far from Italy and confirming itself as a market with a solid base despite the absence of any support scheme. Even with the COVID-19 pandemic did not have a slowdown effect on the BESS market, which has continued its growth trajectory in line with the previous years. We expect 2021 to be another positive year, with 93 MWh installed according to our Medium Scenario and a 14% growth, as the lessening of health crisis measures will bring a further raise of both residential solar and BESS installations.

Residential solar & storage market in the UK

The small-scale solar PV segment in the UK was supported for a number of years by a generous government subsidy. From April 2010, a homeowner installing solar PV on its rooftop had the possibility to be compensated for every kWh generated, whether it was consumed on site or exported to the grid. In addition, an extra-payment was granted for every kWh exported. Those subsidies were contracted for a duration of 20 years from the date of commissioning.

Thanks to this scheme, the residential solar PV market saw a steady growth since 2010, with more than 150 MW installed every year and a peak at 560 MW of additional capacity in 2015. In 2017 and 2018, the new residential PV capacity installed fell below 100 MW subsequently to the sharp decrease of the generation premium rate.

The government subsidy support scheme closed to new applicants on 31 March 2019. Prosumers now have to subscribe to a specific contract with their retailer to be compensated for the excess electricity they may export to the grid, following the Smart Export Guarantee regulation. Despite the fall in new residential solar installations in 2017 and 2018, the market was on the rise again in 2019 – but that was due to the installation rush in the three months of the year before the FIT scheme was closed on 1. April 2019. An additional residential solar capacity of

125 MW was commissioned, accounting for approximately 45,000 households.

After the slight market recovery started again in 2019, the solar growth trend continued also in 2020, with circa 50 MW of new residential PV installations, leading to a cumulative amount of 2.4 GW installed at the end of the year.

In parallel, the UK's residential battery market emerged around 2015 thanks to falling installation costs and a rising gap between the electricity retail price and the export rate. Another important driver was the emergence of new tariffs structure that encouraged time-of-use optimisation. Since 2015, BESS demand has seen moderate but consistent growth, mostly coming from new solar PV installations installed concurrently with a battery storage. This has happened even if no specific support mechanism for storage systems have been introduced, and the economics for the end consumer remain less favourable than in other markets. In 2020, around 11,000 residential BESS have been installed, accounting for about 40% of the new residential solar PV systems and a corresponding storage capacity of 81 MWh.

Economics of residential electricity storage in the UK

In the UK, the electricity price for households has historically been rather low compared to Mainland Europe. However, it has also risen steadily for a decade, from 0.14 EUR/kWh in early 2010 to 0.19 EUR/kWh in 2015 and around 0.22 EUR/kWh in 2020, improving market conditions for households to look at solar & storage as a means towards more independence from the electricity grid.

Network charges for electricity retailers integrate time components that are often reflected in the final consumers' bills through time-of-use dependent rates. The Distribution Use of System (DUoS) charges compensate for the distribution network costs, and their rates vary depending on three time bands reflecting the variation of power demand during the day. In addition, the Transmission Network Use of System (TNUoS) charges compensate for the transmission network costs, and are based on the share of demand during TSO peak load periods. This way, and due to the liberalised retail electricity market, utilities are encouraged to offer time-of-use contracts to their customers, where the final price of electricity depends on the time when it is consumed.

4 The TOP 4 EU residential battery storage markets / continued

Ofgem, the UK energy regulator, is regularly assessing new network tariff structures to take advantage of smart energy management at a residential level. Moreover, the taxation on electricity for households being quite low, bill components provide clear price signals to encourage consumers to optimise their electricity consumption. Hence, the smart meter rollout still has to be boosted in order to empower residential customers. But the original plan to have about 80% of households equipped with smart-meters in 2020, was delayed – the new target is 85% by 2024.

This evolution toward more cost-reflective retail electricity rates has gone a new step forward with the Smart Export Guarantee (SEG), which entered in force from 1 January 2020. Under this new regulation, every energy retailer has to offer its own contract to buy any exported electricity from an eligible small-scale generation system. SEG contracts may have fixed price or they may include some elements of “smartness” and dynamic variations. Suppliers are also allowed to include energy storage within their offer. If so, they have to decide which kind of power they wish to compensate for, whether being “green” electricity coming from the customers’ PV systems or “grey” electricity that comes from the grid and has been stored before being exported.

Overall, the UK retail electricity market is at a high stage of liberalisation, with suppliers being free to design their own tariff structures, both for import and export rates. This already allows decentralised generation and storage assets owners to make big savings by smartly managing their energy use. The efforts should now focus on the smart-meter rollout, in order to make time-of-use tariffs more accessible for households.

Without a government FIT scheme, the economics for residential solar & storage are much more difficult to estimate as the remuneration strongly depends on the retailer considered. At the beginning of 2021, 14 suppliers offered Smart Export Guarantee contracts, with the export rate within those contracts offered at a level of up to 0.08 GBP/kWh (0.087 EUR/kWh), making it valuable to increase self-consumption as much as possible with a residential BESS.

In addition, value could be tapped from energy arbitrage. Home batteries enable prosumers to manage smartly their energy use and production, storing electricity from the grid when it is cheap and exporting it back at a time where the export rate is higher. Some SEG contracts are specifically designed for consumers equipped with both solar PV and storage, optimising the house load to the benefits of



© Tesla