Energy storage can help cut Italy's power prices

With stable policies, Italy can speed up deployment of renewables and electricity storage and cut its reliance on costly gas power, even when the sun isn't shining or the wind isn't blowing, as other countries already show.

Available also in: Italian

Published date: 26 November 2026
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About

This joint analysis by Ember, Cleantech for Italy and Energy Square looks at how battery storage can help cut Italy's power prices. It compares the cost of stored solar and wind power with gas power, assesses the MACSE storage auctions and their cost to bill payers and tracks deployment against Terna's estimates of future needs. It also examines Italy's battery supply chain and the role of long-duration storage, and sets out policy recommendations.

Summary

Energy storage is becoming central to Italy's power system, enabling better use of renewables and mitigation of power prices during peak hours. The second auction under MACSE, Italy's centralised storage procurement mechanism, will contribute to bringing grid-scale batteries to 38 gigawatt hours (GWh) by 2029, up from 7 GWh today.

MACSE storage contracts will now cover the next three years, but Italy needs to look beyond 2030. Projected deployment still falls short of the storage amount that Terna, Italy's grid operator, estimates will be needed by 2035. A storage action plan for Italy can close the gap. Combined with faster renewables growth, faster storage deployment can then cut Italy's heavy reliance on expensive gas power when the sun is not shining, as other countries already do.

Italy, like the rest of Europe, depends on imports for battery cells and materials. Its current cell production is small, but it already has real strengths in building stationary storage systems, and planned factories could significantly expand cell manufacturing. The challenge now is to turn these projects into competitive, long-term production.

01 **Solar and wind power from battery storage costs up to 49% less than gas power in Italy.** Renewable power stored and shifted to the evening could cost €106/MWh, against €210/MWh for gas power at October 2026 gas prices.

02 **Italy's MACSE storage auctions are expected to boost the country's grid-scale battery fleet and could cost bill payers nothing.** The capacity to be tendered in November 2026 equals twice Italy's large-scale storage fleet in July 2026. Market revenues could cover the full auction cost. Even so, planned capacity falls short of grid operator Terna's scenarios for 2035, so Italy needs to go further and faster, particularly if gas prices remain high.

03 **Planned factories at Teverola and Brindisi could produce up to 16 GWh of batteries a year by 2030, comparable to or greater than the expected annual growth in stationary storage in Italy (11 GWh).** To compete the domestic battery industry will also depend on predictable demand. A multi-year storage auction calendar, firm purchase commitments and European-origin requirements introduced gradually would give manufacturers a reliable order base and encourage investment in production in Italy.

Italy has plenty of sun, but it still runs its evenings on expensive gas. Batteries change that, carrying low cost renewable power into the hours when prices peak. Italy is already one of the most advanced EU countries for batteries connected to the power grid. If Italy gets the rules right, accelerating on storage and renewables will mean lower power prices for consumers.

Beatrice Petrovich
Principal Energy Analyst – Europe, Ember



The challenge for Italy is not simply to install more batteries, but to build an electricity system that makes the most of renewable energy. Storage, grids and new generation need to develop together. As renewables grow, the value of each investment increasingly depends on the others. Capturing these synergies is key to translating this progress into lower costs for the electricity system as a whole.

Michele Torsello
Director, Energy Square



Every battery Italy installs is also an industrial opportunity. With a clear order book for the next decade, Italian factories could meet the country's own storage demand and sell into Europe. The window is open now, while Europe's battery industry for grid storage is still taking shape.

Federico Cuppoloni
Director, Cleantech for Italy



Batteries can lower Italy's peak power prices and make better use of renewables

Italy has already taken significant steps in the development of energy storage, including through the introduction of centralised storage auctions for grid-scale projects (capacity market auctions and MACSE auctions). Maintaining the momentum and accelerating deployment brings benefits: it enables more effective use of growing renewables and reduces power prices' exposure to gas prices during peak demand hours, while providing essential grid stability services.

Stored solar and wind power costs up to 49% less than gas power in Italy

Gas power is the most expensive way to generate electricity, and more battery capacity would let Italy use less of it when demand is highest, lowering wholesale prices at those times. Batteries charge when the power is cheap and discharge when it is expensive, so adding more of them narrows the gap between the highest and lowest prices.

Ember's analysis suggests that solar or wind power stored in a battery and shifted in time could cost on average up to €106-122/MWh, depending on when exactly the battery charges. This estimate uses a conservative charging-power price of €57-73/MWh, based on 2025 renewable auctions. It also assumes

battery costs consistent with the systems awarded in the first MACSE auction, implying a 'time-shifting' cost (the levelised cost of storage, LCOS) equal to €49/MWh (see Methodology). The estimated LCOS is an average cost of storing and shifting a unit of electricity, taking account of investment costs and utilisation (see Methodology).

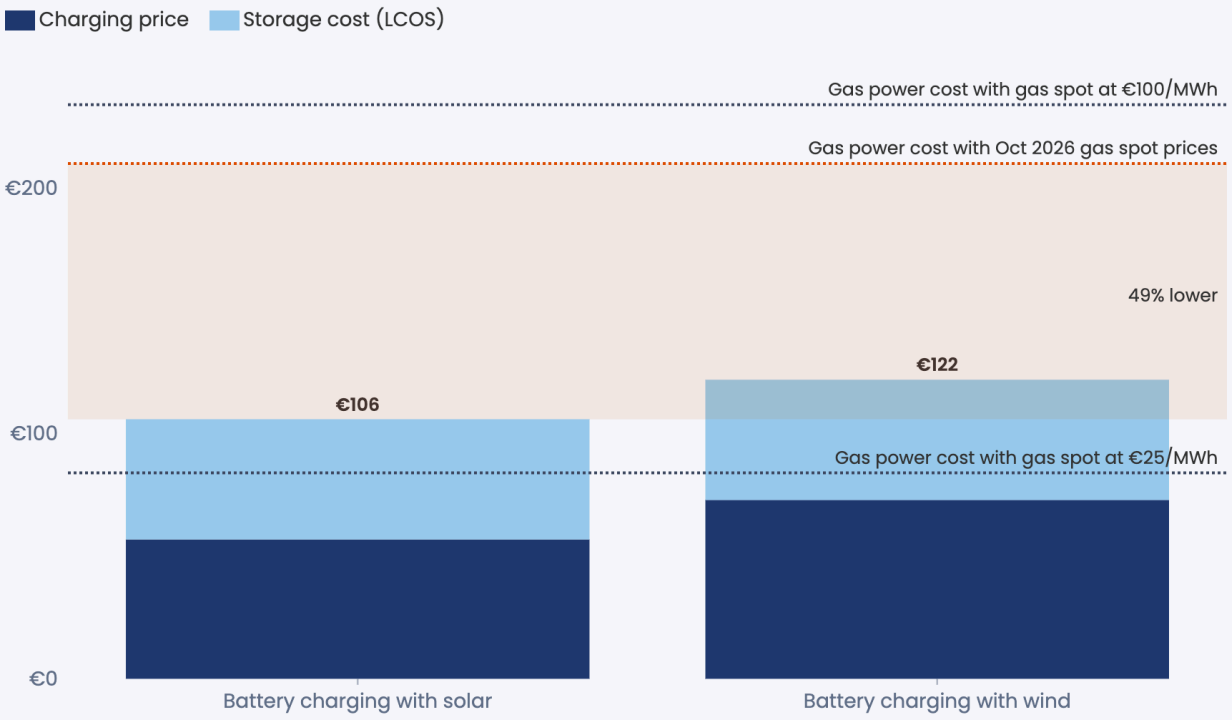
Even with this conservative estimate, clean power shifted in time with a battery would still be up to 49% cheaper than the cost of producing electricity with a typical gas power plant, which averaged €210/MWh in Italy with gas prices in October 2026.

The conservative estimate for charging price reflects the average price of the electricity produced by renewable projects winning a contract for difference in auctions held in Italy in 2025 (€57/MWh and €73/MWh, respectively for solar and for wind). However, in some hours batteries might be able to charge at much lower prices, as in hours with plentiful solar production Italy's power price can go below €20/MWh. In those circumstances, solar or wind power stored in a battery and shifted to the evening could cost as low as €64/MWh in Italy

Growth in storage could help lower wholesale power prices, especially during the morning and evening peaks. By supplying power at prices that can undercut gas plants, batteries will increase competition, reduce the market power of fossil generators and replace some output from the least efficient plants. The effect on prices depends on two conditions. First, solar and wind generation must grow: without it, storage would bring limited benefits. Second, market players must genuinely compete, including through MACSE secondary auctions and merchant battery projects.

Solar and wind power stored in batteries could cost up to 49% less than gas power in Italy

Estimated average cost of renewable power stored and discharged by a battery, compared to cost of electricity generated with gas (€/MWh)



Source: GSE, ARERA, Ember analysis
Storage cost: levelised cost of storage (LCOS) for a system like the winners of Italy's first MACSE storage auction – all-in capital cost of $120 USD/kWh, 20-year lifetime, 90% round-trip efficiency. Gas power cost: short-run marginal cost of a typical Italian gas plant – 50% efficiency (HHV), 0.37 tCO2e/MWh, €86.5/tCO2e carbon price, €2/MWh variable operation and maintenance cost.
Charging price: Italy's 2025 contract-for-difference auction results for solar and wind.

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Batteries are starting to displace gas in Italy, as they already do elsewhere

Batteries met an average of 2.8% of Italy's evening peak demand in the first half of 2026, more than double the level in the first half of 2025 (1.3%). This is small next to fossil power's 40% share, but it could grow quickly as contracted projects come online.

Markets that are further ahead show what could happen in Italy as battery deployment speeds up.

Within the EU, Bulgaria's grid-scale battery fleet grew from nearly nothing in 2024 to almost 3 GWh by the end of 2025 and 16 GWh by August 2026, overtaking Italy's despite a much smaller power system.

In the first half of 2026, batteries routinely supplied over a quarter of Bulgaria's electricity demand (28%) during the 20:00 evening demand peak, up from 4% one year prior, while fossil power's share of the evening peak fell from 35% to 31%. The country's power exports contributed also to lowering use of fossil power in neighbouring countries during evening peak hours.

Bulgaria experienced less extreme price spikes during the summer 2026 heatwave than neighbouring countries, with strong battery discharge being one of the mitigating factors. Bulgaria has become a destination for excess daytime solar from neighbouring Greece and Romania, discharging it back across borders during evening price spikes, contributing to lowering regional prices and improving energy security.

Batteries' share of Italy's evening peak demand more than doubled to 3% in early 2026, while Bulgaria's rose from 4% to 28%

Share of electricity demand met by source, hourly average (%)



Source: Hourly generation data, Ember

Below zero: battery and pumped hydro charging, and exports. In Bulgaria, evening solar is output from solar plants with co-located batteries. Title figures: average share of demand met by batteries at the evening peak hour (19:00 in Italy, 20:00 in Bulgaria), January to June.

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In Australia, energy shifted by grid-scale batteries more than tripled year-on-year in the third quarter of 2026. Batteries set the price in almost half (48%) of dispatch intervals, up from 18% in the same quarter of 2025. This limited the hours when gas set the power price and contributed to a 27% fall in average wholesale power prices in the third quarter of 2026 compared to the same quarter one year prior.

Two factors are critical for Italy to follow a similar path, on top of accelerating battery deployment speed. First, without a substantial base of solar and wind, storage will have limited impact in lowering electricity prices by displacing gas power. Second, fostering robust competition among battery operators is essential to ensure that increased storage capacity effectively translates into lower market prices.

Italy's battery storage fleet almost doubled in two years, but grid-scale growth falls short of 2035 needs

Grid-scale batteries backed by capacity market contracts drove most of this growth, and more auctions are lined up. On current plans, however, deployment will not reach the levels Terna estimates Italy needs.

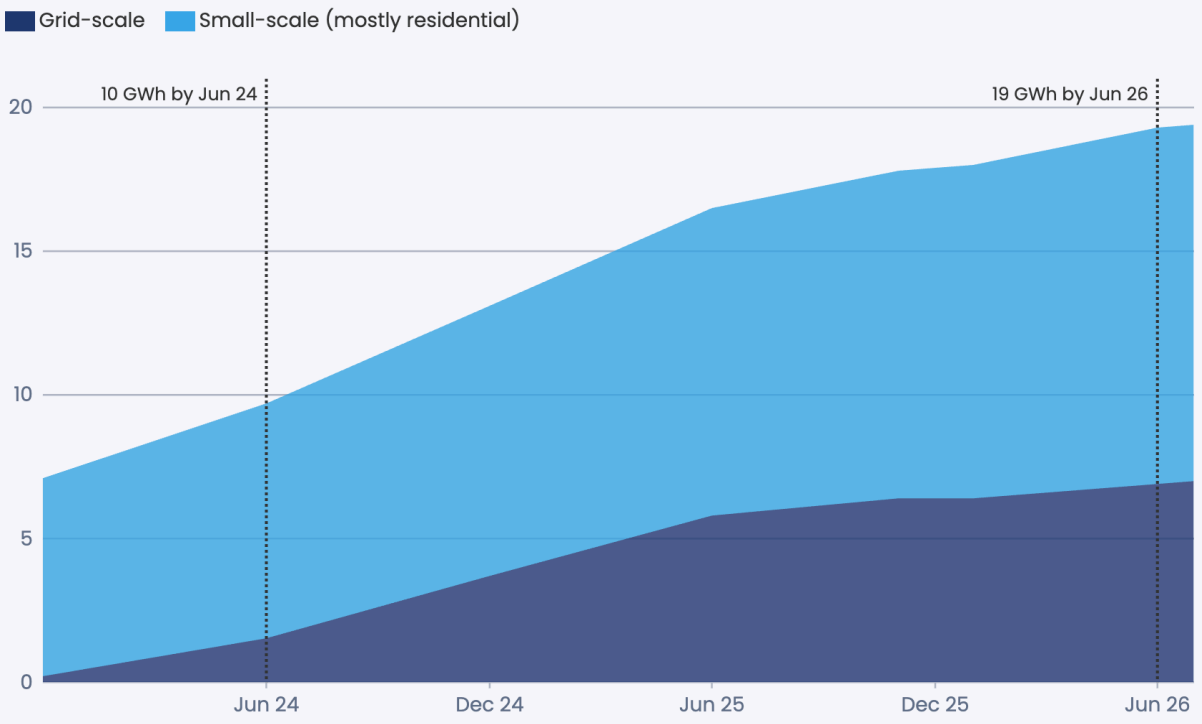
Grid-scale batteries are driving Italy's storage growth, up fivefold in two years

By June 2026, Italy had 19 GWh (7.7 GW) of battery storage capacity across 919,000 installations, all lithium-ion. Most of this (11 GWh) is small-scale, often residential systems paired with rooftop solar. The rest is grid-scale (7 GWh), and Enel owns over 85% of operating capacity.

Italy's total battery storage, including small home systems, almost doubled over the two years to June 2026. The growth of small-scale batteries in Italy has been driven by investment grants (superbonus and ecobonus schemes) and risks slowing as those support schemes are phased out. Grid-scale batteries grew even faster, fostered by projects being awarded capacity market contracts, reaching 7 GWh, five times their level two years earlier.

Italy's battery storage capacity almost doubled in the two years to June 2026

Cumulative installed battery capacity in Italy (GWh)

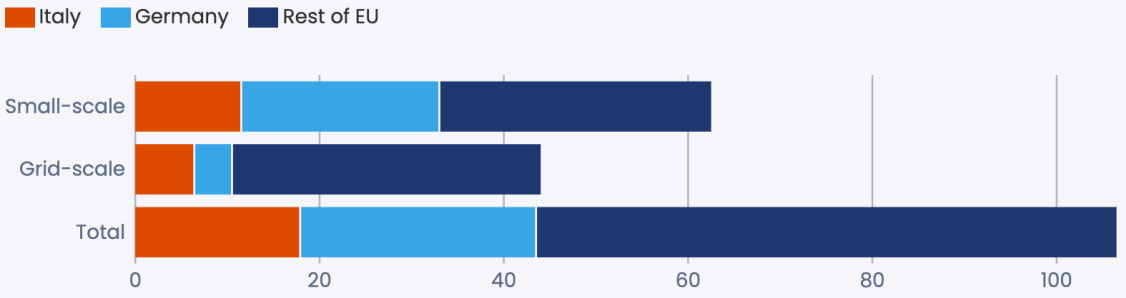


Source: Terna monthly reports • Grid-scale includes systems with capacity > 10 MW, 3.5 h duration assumed when GWh for grid-scale not disclosed by Terna

Thanks to this growth, nearly a fifth of EU operational battery capacity is located in Italy, making the country one of the most advanced EU countries in terms of batteries connected to the power grid.

By end of 2025, almost a fifth of EU operational battery capacity was located in Italy

Cumulative installed capacity by segment and country, end of 2025 (GWh)



Source: Terna monthly reports, Bundesnetzagentur retrieved from battery-charts.de • EU battery capacity estimated based on different sources (JRC, national sources, Solar Power Europe). Small-scale refers to behind-the-meter batteries.

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Further growth could come at no extra cost for Italian bill payers, but it needs to accelerate

By 2029, at least another fivefold growth is expected for grid-scale batteries in Italy mainly thanks to the MACSE storage auctions (see *box*), which, together with capacity market auctions, help secure another increase to at least 38 GWh by 2029. If the second MACSE auction, taking place on 24 November 2026, is fully subscribed, it will secure an increase in grid-scale storage capacity equal to double the existing capacity as of July 2026, operational by 2029.

MACSE storage auctions: Italy's first-of-a-kind centralised procurement scheme for grid-scale storage projects

MACSE (Meccanismo di Approvvigionamento di Capacità di Stoccaggio Elettrico) is Italy's centralised procurement scheme for new grid-scale storage. It uses competitive auctions organised by Terna, Italy's transmission grid operator. Developers planning to build new storage facilities can participate.

Winners receive a fixed annual premium from Terna, expressed in euro/MWh/year, in return for building the storage system and making its capacity available to the grid. Terna pools the committed capacity of all MACSE batteries and sells its use through time-shifting contracts open to any generator or trader.

Through a time-shifting contract, any renewable generator can shift its production in time without owning or controlling a battery. The Italian market operator, GME, will manage the platform for these contracts. Any capacity not sold for time-shifting will be offered for ancillary services on the balancing and redispatch market (MBR).

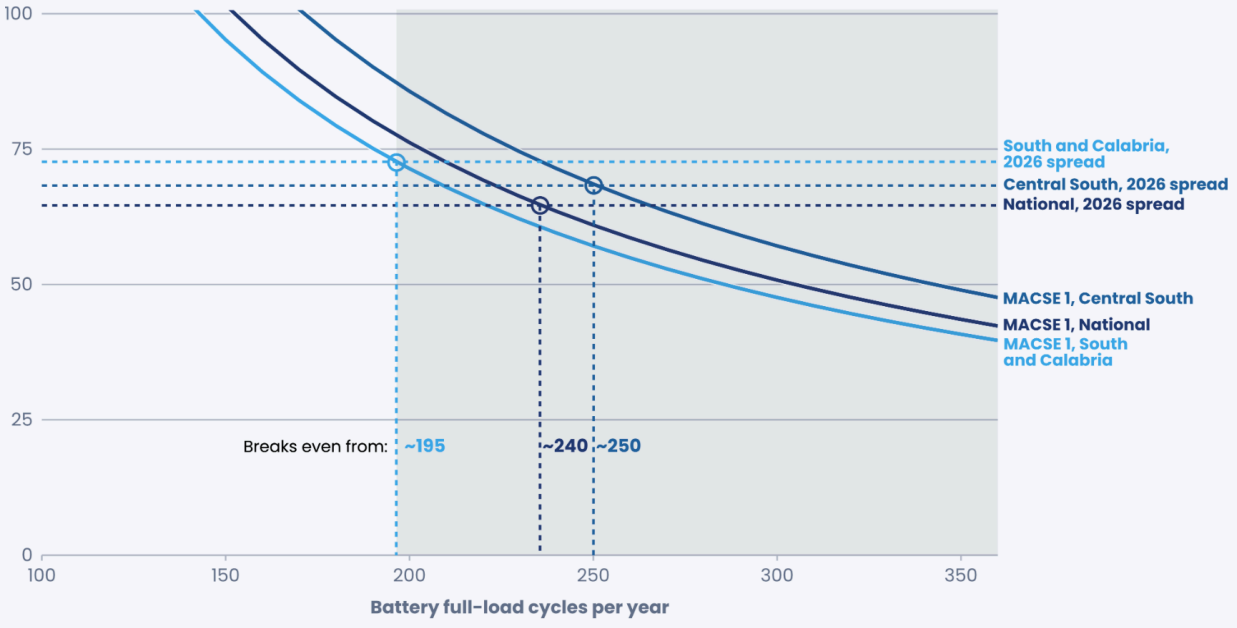
Revenue from time-shifting contracts, plus 80% of ancillary-services revenue, helps Terna cover the fixed annual premium. If these revenues are insufficient, the shortfall is recovered through a levy on consumer electricity bills, included in dispatching-related system charges.

The first MACSE auction took place on 30 September 2025. Terna allocated 10 GWh of storage capacity for operation in 2028 – meeting 100% of the capacity sought – and received bids more than four times higher than the available capacity. The weighted average price was about €13,000/MWh/year, roughly one-third of the €37,000/MWh/year auction cap. The second auction is scheduled for 24 November 2026. It will offer 16 GWh for delivery in 2029, with a price cap of €27,000/MWh/year.

MACSE could cost Italian bill payers nothing. Bids in the first auction were so competitive that Terna's revenues from the sale of time-shifting products could cover the full cost of annual premiums, or even return money to consumers. We estimate that, if the price gap between solar and non-solar hours (the intraday price spread, see Methodology) remains at 2026 levels and the price of time-shifting contracts reflects it, the first MACSE auction costs consumers nothing as long as batteries complete at least 200 cycles a year. This is a very reasonable assumption given that grid-scale four-hour battery systems typically cycle 1.2 times per day (or about 440 cycles a year) and eight-hour systems once a day.

Italy's storage auctions are likely to pay for themselves through market revenues, with no need for an additional levy on bill payers

Price spread batteries need to break even (solid lines) vs 2026 spreads (dashed lines), €/MWh



Source: GME, Terna

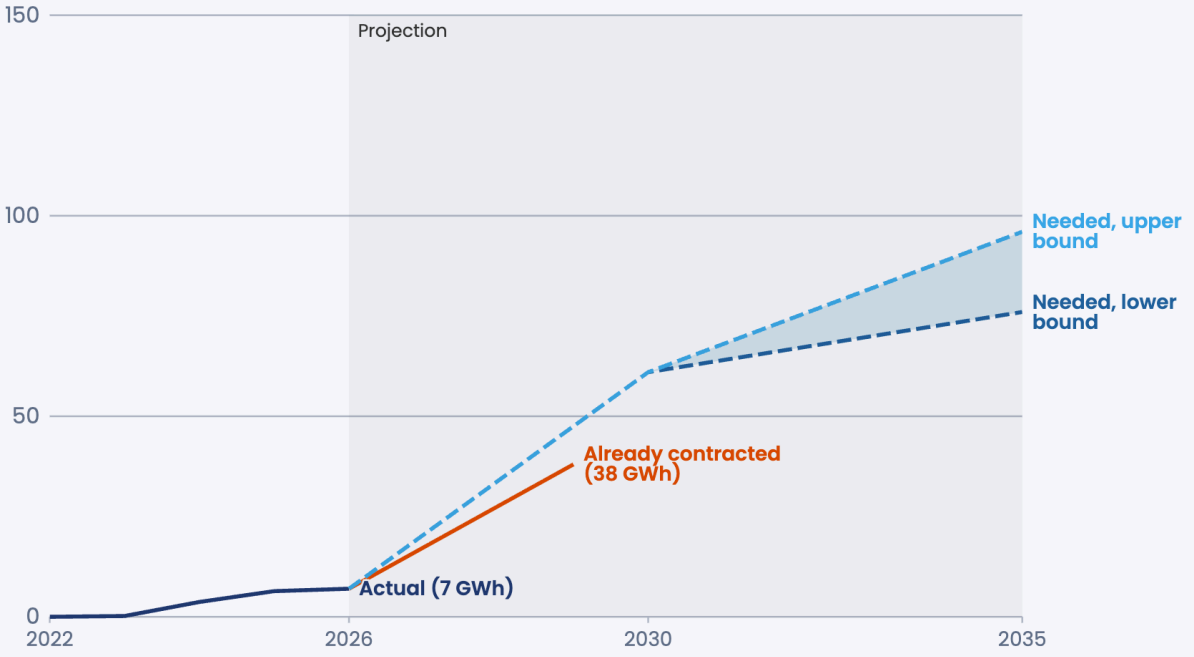
Break-even counts time-shifting revenue only, excluding balancing markets, so it understates real revenues. Battery Energy Storage Systems (BESS) assumes 85% round-trip efficiency. Spread: day-ahead market, 7-hour spread, Jan–Sep 2026. MACSE: Terna's centralised storage auction.

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Despite the progress, Italy still faces a storage gap. Auctions are expected to bring operational grid-scale battery capacity to 38 GWh by 2029, up from 7 GWh in mid-2026. This remains below the 76-96 GWh of storage needed by 2035 in Terna and Snam's scenarios, depending on the pace of renewable deployment. This requirement could potentially reach 134 GWh, assuming gas prices of around €32/MWh. A stable policy framework can help close the gap.

Italy has contracted 38 GWh of grid-scale batteries by 2029, well short of the 76–96 GWh it needs by 2035

Large-scale battery capacity in Italy (GWh)



Source: Terna, DDS 2026 for 2030 and 2035 needs • 2026 data till July 2026. Already contracted: existing capacity plus large-scale battery storage that secured a capacity market or MACSE contract, operational by 2029. Needed: Terna's need assessment for storage capacity in 2030 and 2035, net of existing pump hydro storage, including capacity market volumes.

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Italy has the potential to build its own domestic battery storage industry

Italy's storage growth relies on imported batteries, while planned factories could give the country a battery industry on the scale of its own demand, with support through ramp-up and a predictable order book.

Italy's storage growth creates demand for a domestic battery industry

Over 90% of stationary storage installed worldwide in 2025 used lithium iron phosphate (LFP) batteries, a type of lithium-ion battery. China produces over 98% of the world's LFP cells and LFP cathode material and also dominates the processing of several other key battery inputs. MACSE, Italy's storage procurement mechanism, is technology-neutral and sets no origin criteria. In the absence of specific criteria regarding the origin of the cells – which are under discussion at European level – batteries contracted in its auctions largely rely on Chinese cells because of their cost advantage.

Italy already has strengths in the final stages of the battery supply chain, including system integration, pack assembly, manufacturing equipment and recycling. The main gaps remain in cell production and battery materials. Filling these gaps would help diversify supply for one of Europe's leading storage markets.

Planned factories could produce 16 GWh of cells a year, more than Italy is expected to install

By 2030, planned factories at Teverola (Seri Industrial) and Brindisi (Eni, with Seri Industrial) are expected to reach 16 GWh of annual production capacity for lithium iron phosphate (LFP) battery cells. That exceeds the average 11 GWh of stationary storage Italy is expected to add each year by 2030 under Terna and Snam's scenario. These investments are joined by around 685 MWh per year of initial production capacity for LFP batteries and storage systems at the Intertoll–Renesys Energy project in Termoli, backed by more than €200 million of investment. The project is supported through Italy's Net Zero development contracts (Contratto di sviluppo Net Zero).

These factories would also fill a gap in Europe. The EU already makes battery cells, but mostly for electric vehicles and using nickel manganese cobalt (NMC) chemistry: in 2024, LFP accounted for just 0.2% of EU cell production capacity. Italy would become one of Europe's first LFP manufacturing hubs dedicated to stationary storage.

Projects to produce active materials (cathode materials, anode materials and electrolytes), as well as to recycle and recover materials from end-of-life batteries, would extend Italy's presence further upstream in the battery value chain. The Brindisi factory plans to add production of LFP cathode material, which is currently manufactured almost entirely in Asia. On recycling, Italy already pre-treats end-of-life batteries, while scrap from new factories would give recyclers a predictable supply of materials.

The competitiveness of Italian cells will depend on several factors, which will determine their market uptake. EU policy is moving in the same direction. The Battery Booster Strategy explicitly identifies cell manufacturing and industrial ramp-up as strategic for the security of both automotive and energy-storage supply chains, and its €1.5 billion Battery Booster Facility provides interest-free, performance-based loans to European cell producers during the critical ramp-up from pre-series to full commercial production.

This EU approach also matters for stationary storage: support goes to cell production and industrial ramp-up, not just to assembly. Full production capacity has to translate into real, sustained output. For Italy, maintaining and developing cell production therefore means keeping process expertise and industrial capacity in a strategic part of the supply chain, alongside its already strong expertise in assembly, system integration and manufacturing equipment.

Factories need to reach high production yields quickly, which requires efficient and automated lines. Furthermore, they need steady orders to run close to full capacity and affordable inputs, from materials to electricity, as cell manufacturing is energy-intensive.

Italian long-duration technologies could add storage beyond eight hours

Shifting power from midday into the night becomes more valuable as Italy adds more solar. Lithium-ion batteries currently dominate short- and medium-duration storage and can also be configured for around eight hours. Beyond that, each extra hour means buying more cells, but those hours are needed on fewer days of the year, so they are harder to pay back. Other technologies store energy in low-cost materials, so they can add storage hours for little extra cost. As duration increases, technologies in which energy and power can be sized more independently may become increasingly competitive, depending on site, application and market conditions.

Italy has its own long-duration technologies, largely built from widely available materials: CO2-based storage (Energy Dome), flow batteries (SinergyFlow, Green Energy Storage) and thermal storage for industrial heat (Magaldi, Enel, Eni). They range from first commercial plants to prototypes, and tenders with defined durations, volumes and delivery dates would help them scale in Italy and abroad.

Policy action to realise the full potential of storage

Italy's fast-growing battery fleet can make the power system more efficient, cut reliance on gas power and keep electricity prices in check. A national storage action plan, alongside faster renewables deployment, should focus on six priorities.

1. Give investors certainty beyond 2030

A multi-year calendar of storage auctions, coordinated with renewables auctions, would let investors and manufacturers plan ahead. Future schemes should also reward longer-duration storage.

2. Ensure fair competition between storage and gas plants

Italy should revise capacity market rules that penalise batteries, starting with their very low de-rating factors, and remove barriers to grid services markets. Gas plants still needed for rare periods of low renewable output could be kept in a strategic reserve with transparent costs.

3. Speed up grid connections and permitting

Grid connection reform should be accelerated, with flexible connection agreements, connections for co-located batteries that reflect how they complement renewables and priority for former coal sites. A commissioner could take over procedures when permitting deadlines are missed, and standard compensation schemes would help host municipalities accept projects.

4. Make Italian battery production competitive

Public support under the EU state aid framework (CISAF) should be temporary, tied to measurable cost, productivity gains and workforce training. Joint purchase agreements would give manufacturers steady orders.

5. Diversify supply and make the supply chain more resilient

Future auctions could apply minimum supply-diversification requirements to a significant share of capacity, gradually reward environmental performance and supplier diversity, and restrict high-risk suppliers for the most sensitive components, such as inverters. Investment in battery materials and recycling would reduce dependence on imports further along the supply chain.

6. Unlock private investment beyond public auctions

Italy should adopt tariffs that reward flexibility and simplify access to grid services markets for customers and aggregators. Leasing, storage-as-a-service models and transparency on grid constraints would help steer investment to where storage is most valuable.

Supporting materials

A Storage Action Plan for Italy

A national storage action plan, alongside faster renewables deployment, should focus on six priorities.

1. Give investors certainty beyond 2030

Italy needs a multi-year calendar of storage auctions, coordinated with renewables auctions under FER X and FER Z and framed as a non-fossil flexibility support scheme under the EU electricity market design. The assessment of storage needs should be more directly driven by regulator ARERA, with the support of third parties (RSE; universities), not solely owned by Italy's grid operator. Clear signals on volumes and timing would let investors plan projects and manufacturers plan production capacity. Future support schemes should also reward technologies that can store energy for longer, keeping the system secure when renewable output stays low for several days.

2. Ensure fair competition between storage and gas plants

Electricity market rules need to reflect the growing contribution of storage to system security and flexibility. Italy should revise the capacity market rules that penalise batteries, starting with their very low de-rating factors. It should also remove barriers to grid services markets, including how batteries are dispatched in balancing, and properly reward the flexibility that different technologies provide. Gas plants still needed for rare periods of very low renewable output could be kept through a dedicated strategic reserve, with transparent costs and use limited to what the system actually needs.

3. Speed up grid connections and permitting

Complex permitting procedures and delays in grid connections risk slowing investment. Italy should speed up the reform of the grid connection process already set out in recent legislation, introducing flexible connection agreements as foreseen in the EU grids package. Connections for batteries co-located with renewables should reflect how the two assets complement each other, rather than simply adding up their capacity, and former coal plant sites should be prioritised for storage. Statutory permitting deadlines must be respected: where they are missed, a commissioner could take over the procedure within 60 days. Clear and consistent compensation schemes for host municipalities, with standard agreements provided by regions, would also help local communities accept new projects.

4. Make Italian battery production competitive

Italy's growing storage market can support a domestic battery industry capable of competing at European level, in a context increasingly shaped by supply chain resilience criteria. Public support under the EU state aid framework (CISAF) should be temporary and linked to measurable improvements in yields, automation and costs. It should come with workforce training and access to clean electricity at competitive prices. Alongside a multi-year auction calendar, joint purchase agreements across several developers, with minimum volumes and agreed delivery windows, would give manufacturers steady orders. Qualifying Italian cells with European system integrators would open markets beyond Italy.

5. Diversify supply and make the supply chain more resilient

Dependence on a few suppliers affects not only cells, but also battery materials and components. In future auctions, a significant share of the capacity offered should be subject to minimum supply-diversification requirements. Auctions could also give extra weight to environmental performance. In line with the EU's proposed Industrial Accelerator Act, auction rules should gradually introduce European-origin requirements for battery management systems and, at a later stage, for cells and other key components. The share and timetable should be set in line with EU rules, taking account of supply availability and competition,

and keeping additional costs under control. For the components most critical for cybersecurity, such as inverters, auction rules could apply the restrictions on high-risk suppliers that already apply to EU funding. Investment in battery materials, and agreements between manufacturers and recyclers starting with production scrap, would reduce dependence on imports further along the supply chain.

6. Unlock private investment beyond public auctions

Storage growth should not depend on public procurement alone. Households and businesses also need better conditions to invest in batteries and run them efficiently. Simpler access to grid services markets, for customers and aggregators alike, would add revenue streams. IT systems should be upgraded to avoid systemic underuse of clean flexibility in balancing the grid. Leasing, storage-as-a-service models and independent performance testing could make investment easier for businesses with limited upfront capital. Greater transparency on grid constraints and curtailed renewable power would also help steer investment to where storage brings the most benefit to the power system.

Methodology

Offer price for batteries time-shifting renewables

Offer price for Italian batteries operating by time-shifting renewable generation is approximated as the sum of two cost components:

- Charging price: while in reality BESS are available to absorb power from the grid being generated from a range of technologies, with increasing renewable capacity penetration it is reasonable to expect that the level at which a storage system will charge in the near future will coincide with the average captured price of such plants. Hence, the two reported examples ('Battery charging with solar' and 'Battery charging with wind') have been proxied from the weighted average strike prices of the Italian 2025 CfD auctions (FER X) results (~€57/MWh for solar PV and ~€73/MWh for wind).

Historically, power prices have been lower than this in Italy in hours with plentiful solar production, so this can be considered an upper-bound estimate.

- Levelised Cost of Storage (LCOS): computed through the live calculator developed by Ember, which allows users to work out this metric based on their own assumptions, based on a 90% utilization factor and $120 USD/kWh CAPEX (equivalent to the first MACSE results published in October 2025). The resulting figure is ~€49/MWh.

MACSE break-even calculation

Costs of MACSE auctions in Italy are expected to be repaid by Terna (Italy's transmission system operator) through three channels:

1. Time-shifting contract sales, whose physical execution is guaranteed by the mechanism's winners (battery systems).
2. Provision of ancillary services (MBR) through capacity that the mechanism's winners have not used for time-shifting (1).
3. Increase in electricity costs for consumers, passed down through the power market value chain to compensate for the costs not covered by time-shifting (1) and ancillary services (2), in practice working like an additional levy on electricity bills.

The break-even calculation considers the case of a winning project from the first MACSE auction, hypothetically operating under 2026 market conditions, under the following assumptions:

- BESS average round-trip efficiency: 85%
- BESS energy-to-power ratio: 7 hours
- The cost of time-shifting contracts reflects the spread that the battery is able to capture through perfect foresight, with one cycle being equivalent to a full charge and discharge. Hence, from the BESS point of view, repaying itself is equivalent to capturing an average intraday spread for at

least a certain number of cycles each year of its operating lifetime, totalling a yearly revenue equal to or higher than the yearly MACSE premium for the bidding zone the plant is located within.

The geographical scope includes the National aggregate ('Prezzo Unico Nazionale', PUN), Central South (CSUD), South and Calabria (SUD only), the latter two being the most significant due to the volume distribution from the first storage auction result.

'Intraday price spreads' are computed as the average difference between the mean of the highest and the lowest 7 hourly prices in a day between January and September (included) 2026. This step was validated by also computing spreads for 2024 (~€46/MWh PUN) and 2025 (~€48/MWh PUN), following statements by Terna representatives about MACSE being able to pay for itself through time-shifting alone.

Hourly day-ahead market prices were sourced from the Italian electricity market operator (GME).

About Ember

Ember is an independent, London-based energy think tank with a global focus. We aim to accelerate the clean energy transition through data and policy, providing targeted insights to advance policies that urgently shift the world towards a clean, electrified energy future.

About Cleantech for Italy

Cleantech for Italy is a coalition that brings together innovators, investors and research institutions to advance Italy's leadership in clean technology. Through research and policy engagement, it promotes industrial policies that turn Italy's innovation and manufacturing strengths into cleantech leadership.

About Energy Square

Energy Square is a think tank that brings together research, business, finance and institutions to foster informed dialogue on Italy's energy future. Through rigorous analysis and policy proposals grounded in scientific evidence and international best practices, it aims to contribute to a secure, competitive and sustainable energy system.

Acknowledgements

Izabela Urbańska, Jivan Zhen Thiru, Sachin Sreejith, Josie Murdoch, Kostantsa Rangelova.

Disclosure of AI use

The analysis, charts and text in this report were produced by the authors, drawing on research and expert input. AI tools were used to stress-test the findings, refine the writing and produce a first draft of the Italian translation. All AI-assisted content was reviewed by authors and by colleagues at Ember.

As per Ember's AI use policy, responsibility for the quality and accuracy of the output lies with the authors.