

# Future of Battery Energy Storage Systems (BESS) | UK & Europe

September 2025



# Contents



# Introduction

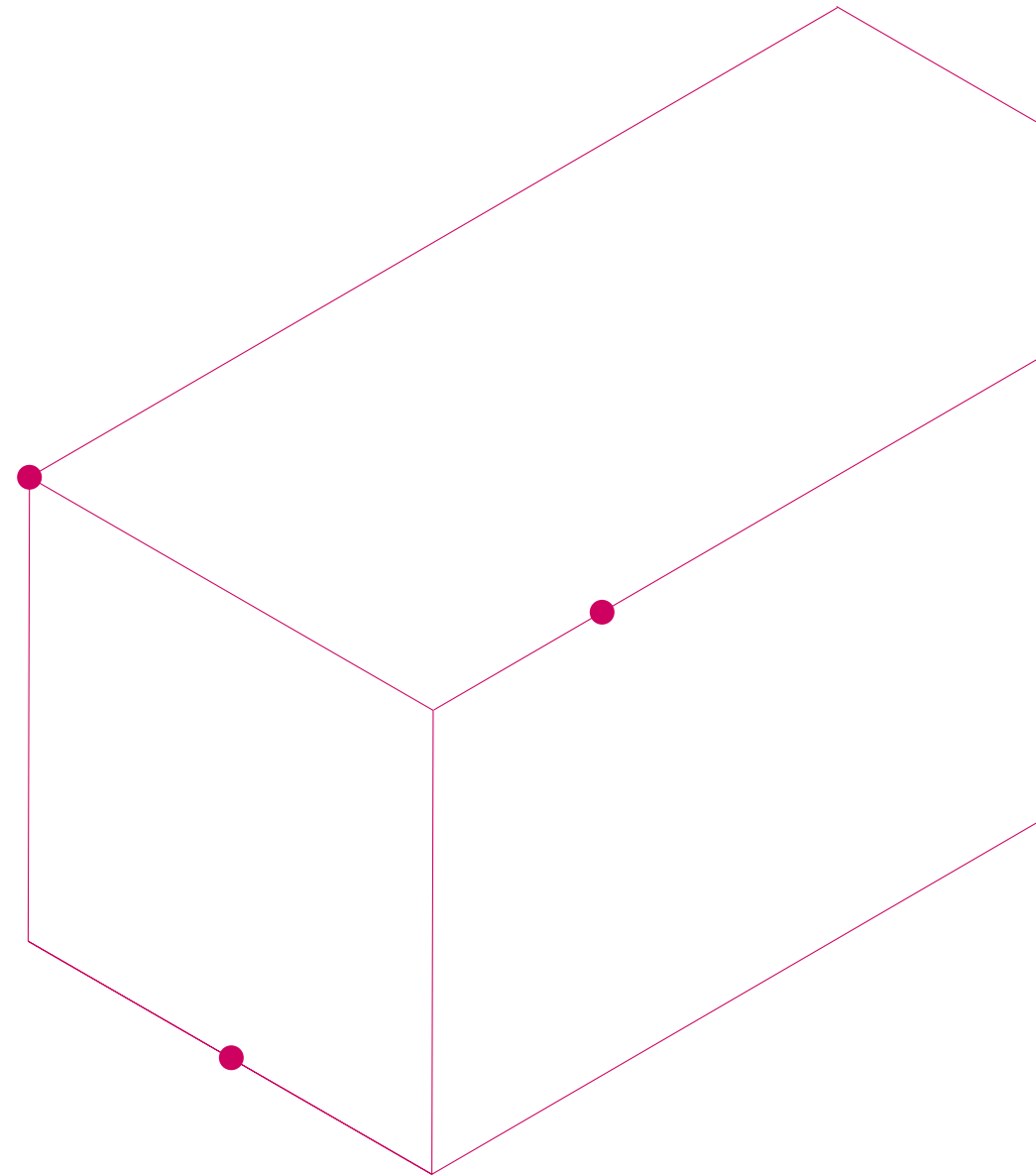
As electrification accelerates and renewable generation grows across Europe, power grids are facing mounting congestion challenges. This is particularly acute in leading markets where connection capacity for new projects - including *battery energy storage systems* (“**BESS**”) - may be limited as a direct consequence of these bottlenecks. Despite these challenges, BESS technology is widely recognised as a crucial enabler for grid flexibility, improved system stability, and the continued expansion of intermittent renewables.

In recent years, Europe has experienced substantial growth in the deployment of BESS, setting new annual installation records despite a moderate slowdown in market expansion in 2024. To maximise the benefits of BESS, more European countries will need to implement supportive policy frameworks and investment conditions. Jurisdictions already leading in BESS deployment should also intensify their efforts to address ongoing challenges, including limited grid connection capacity, complex permitting processes and double grid charges.

## European regulatory framework: progress and remaining hurdles

The European Union has taken significant steps to integrate energy storage into its electricity market framework through the Clean Energy Package, marked by the recast *Electricity Market Directive* (“**EMD**”) and the recast *Electricity Market Regulation* (“**EMR**”). Under these instruments, *battery energy storage systems* (“**BESS**”) is explicitly defined and recognised for its role in shifting electricity use and providing a suite of services (including ancillary and balancing). The EMD requires transmission system operators to enable non-discriminatory access for storage in ancillary service markets and sets limits on grounds for refusing grid connections. Similarly, the EMR mandates non-discriminatory treatment of storage in market and capacity mechanisms, while also prohibiting unjustified discrimination in network charges.

Nevertheless, challenges remain: the EMR’s non-discrimination principle does not entirely prevent the application of double grid tariffs (charging for both offtake and injection), which can materially affect project economics. The European Union Agency for the Cooperation of Energy Regulators (“**ACER**”) has clarified that paying charges for both directions is not necessarily unjustified, yet double tariffs persist as a notable barrier for BESS across jurisdictions.



This publication looks at the main regulatory, policy and market developments in key markets in the UK and Europe.

# Introduction

## Key trends and focus of this contribution

Across Europe, regulatory practice, the availability of dedicated authorisation pathways, and the structure of revenue streams for BESS projects differ markedly from country to country. While broad European rules provide important guarantees for fair market access and service participation, the remaining hurdles - such as connection constraints, non-refunded curtailment, and varying approaches to grid fee exemptions - often require national solutions.

**In this contribution, we examine key regulatory aspects and trends impacting BESS development across jurisdictions.**

**We focus on:**

- > key regulatory aspects, including the nature of permitting and special authorisation regimes;
- > typical revenue streams for BESS projects, including market and policy-based income;
- > common obstacles such as grid access restrictions, double tariffs, and market saturation risks;
- > the design and impact of government support schemes and available subsidies; and
- > bankability considerations that are vital for investment.

**By mapping these key issues, we highlight how BESS can help address Europe's grid congestion and energy transition challenges, as well as where regulatory and market developments must progress to unlock the full value of energy storage for a modern, electrified European energy system.**



This publication looks at the main regulatory, policy and market developments in key markets in the UK and Europe.





Belgium





# Belgium

## Key regulatory aspects

Under the Belgian Federal Electricity Act (*Elektriciteitswet*), a BESS qualifies as an 'energy storage facility' which is defined as an "installation for 'energy storage' where electricity is taken from the grid through the same installation to be fully injected back into the grid later, subject to efficiency losses". In addition, 'energy storage' refers to "deferring the final use of electricity to a later point in time than when it was generated, or converting electrical energy into a storable form, storing such energy, and subsequently converting it into electrical energy or another energy carrier".

Large energy storage facilities require a storage permit from the Minister of Energy prior to commencing operations (further details are provided below).

The Electricity Act obliges the *transmission system operator* ("TSO") or *distribution system operator* ("DSO") to connect BESS projects to the grid. However, when grid capacity is limited and congestion arises, the recently revised Code of Conduct (*Gedragcode*) permits the TSO, in certain cases, to offer a flexible (instead of a fully permanent) connection for BESS connected at the transmission level. The corresponding framework for the DSO level remains under discussion.

A BESS project connected at the transmission level must enter into both a grid connection contract and a grid access contract with the TSO. Moreover, the BESS project must be compliant with the technical requirements set out in the Code of Conduct and the Technical

Regulations (*Technisch Reglement*), which partly implement relevant EU network codes. These instruments set out the procedures and obligations for connecting installations to the transmission grid and organising ancillary services (such as balancing services). Moreover, BESS operators must either themselves act as *balancing responsible party* ("BRP") for their connections or appoint a third party to do so.

Technical rules also prescribe the obligation to notify certain planning information when commissioning a storage facility, an operational notification procedure for connecting storage facilities, and other specific technical requirements.

Developing, constructing, and operating a BESS also requires the relevant building and environmental permits from the competent regional authorities, as well as compliance with applicable soil legislation.

Additionally, regional energy legislation on electricity storage generally applies to facilities connected to the distribution or local transport grid.

## Special authorisations or licences needed

Pursuant to the Electricity Act and the Royal Decree of 27 March 2023, the construction, operation, or modification of a 'large energy storage facility' - defined as an energy storage facility with a capacity of 25 MW or more, and connected to the transmission grid, a closed industrial grid, or an HVDC system - requires the prior issuance of a storage permit from the Minister of Energy. Modifications that result

in an increase in capacity of more than 10 per cent or more than 25 MW are also subject to this permit requirement.

Furthermore, the construction and operation of such a project must comply with all applicable environmental and planning permit legislation, with specific regulatory requirements determined by the region where the BESS project is situated.

## Revenue streams for grid scale battery assets

Participation in wholesale electricity market arbitrage is a key revenue driver for BESS operators. Operators aim to optimise profits by charging batteries when electricity prices are low and discharging - selling electricity back to the grid - when prices are higher, thereby capitalising on price volatility.

Ancillary services to system operators, such as providing balancing services to the TSO (*Elia Belgium Transmission*), may also represent an important income source. BESS operators may be compensated for making capacity available for services such as *Frequency Containment Reserve* ("FCR") or frequency restoration reserves.

Additionally, BESS operators can generate revenue by supporting congestion management for grid operators. For instance, by committing to limit injection to the grid during designated periods, operators help alleviate network congestion and may receive compensation in return.

Many BESS operators partner with third-party providers specialising in BESS optimisation or market access to support commercial operations. In these arrangements, revenue is shared in line with contractually agreed terms.

To help manage merchant risk associated with electricity trading and the provision of ancillary services, operators may enter into revenue optimisation partnerships. In such models, a counterparty - typically a major energy company - manages the BESS's operational strategy and shares part of the generated revenues with the operator.

The Belgian BESS market is also seeing increasing adoption of tolling and commercial offtake agreements. These structures involve BESS operators receiving an availability fee in exchange for making storage capacity accessible to counterparties.

### Obstacles to further deployment

Rising congestion on Belgium's electricity grid - affecting both the offtake and injection of energy - underscores the urgent need for grid innovation and presents an opportunity to drive forward the energy transition through BESS projects. Recent changes to the Code of Conduct have already introduced more flexible connection options for BESS operators, and significant investments are underway to reinforce and expand the grid network further.

However, there is continued uncertainty regarding circumstances under which BESS facilities could face curtailment without compensation when full permanent capacity is missing. However, further regulatory clarifications are expected, which should provide greater confidence for project sponsors and BESS developers.

The evolving landscape offers scope for further BESS growth, although saturation in the ancillary services market is becoming an important consideration. At present, revenue from providing ancillary and intraday services typically represents 40 to 70 per cent of a BESS project's income. As Belgium continues to increase its renewable energy penetration - set to reach 50 per cent by 2030 and adds at least 5 GW of new storage capacity (including pumped hydro, BESS, and demand-side response) - competition in balancing and reserve services is expanding. While this may gradually reduce prices for such services and require operators to adapt their strategies, it also signals the maturity and growing importance of storage solutions in a more decentralised energy system.

Belgium's *Capacity Remuneration Mechanism* ("CRM") further underlines the country's commitment to grid reliability and long-term resource adequacy. Although navigating CRM participation can be complex, ongoing engagement by stakeholders is likely to result in practical refinements that will improve access and transparency for storage operators.

Additionally, while the future of grid fee exemptions for BESS remains under review, continued policy attention to tariff structures indicates a willingness to address concerns surrounding cost stability and the investment climate for new projects. Decisions in this area will play a key role in ensuring a level playing field as the Belgian and European BESS markets continue to evolve.

Overall, ongoing regulatory developments and sustained investment in grid infrastructure are expected to create a more favourable and predictable environment for BESS deployment in Belgium, supporting the country's progress towards its clean energy objectives.

### Government support schemes or subsidies

#### Transmission grid tariff exemption

Belgium's electricity market offers several supportive mechanisms to encourage the growth of BESS, as part of its broader energy transition agenda.

Belgium offers a favourable tariff regime to incentivise electricity storage facilities connected to the transmission network. BESS installations commissioned after July 2018 benefit from a ten-year exemption from most transmission grid charges. This approach is designed to support the development of storage projects by reducing operational costs

in their crucial early years. Applications for this exemption are processed by the TSO. Looking ahead, discussions are already underway to assess whether this exemption could be extended under the forthcoming tariff framework from 2027 onwards. While the final outcome is yet to be determined, the ongoing review reflects a strong policy focus on ensuring storage remains attractive for new investors. For installations that are not eligible for, or have exhausted, the exemption period, current practice is to charge full grid tariffs for both energy imported and exported. However, options for a more tailored tariff structure for storage are being considered, which could further enhance the business case for these projects.

### Capacity remuneration mechanism

Belgium has introduced a CRM to support grid reliability as the energy mix evolves, especially in light of the phased withdrawal of nuclear generation. The CRM is designed to be technology-neutral, enabling storage facilities and demand response providers to compete alongside traditional generation.

Regular tenders are organised, and participants whose projects are successful enter into contracts with the TSO, under which they receive fixed annual payments per megawatt of capacity provided. These payments are in addition to any revenue earned from the sale of electricity on the market, helping create a more predictable and stable income stream for storage operators. This flexible, market-based mechanism reinforces Belgium's commitment to a secure and diversified electricity system and creates valuable new opportunities for innovative storage solutions as the country's energy transition advances.

## Bankability

Several factors support the bankability of BESS projects in Belgium.

Clear and stable regulatory frameworks are a fundamental requirement. The availability of valid, irrevocable permits issued on market-standard conditions ensures that projects can proceed with limited legal uncertainty.

Belgium's regulatory regime provides a supportive context, although continuing clarity - particularly surrounding flexible grid access and tariff exemptions - will further boost investor confidence as the regime evolves.

Revenue certainty is another essential factor. The most bankable BESS projects feature diversified revenue streams, with a portion of income secured through long-term offtake or tolling arrangements. While flexibility in grid capacity allocation offers new opportunities, the resulting risk of uncompensated curtailment should be carefully assessed.

The current policy granting grid tariff exemptions to new energy storage installations improves the financial viability of such projects. Ongoing discussions regarding the potential extension of these exemptions beyond the initial 10-year period indicate a favourable policy trajectory.

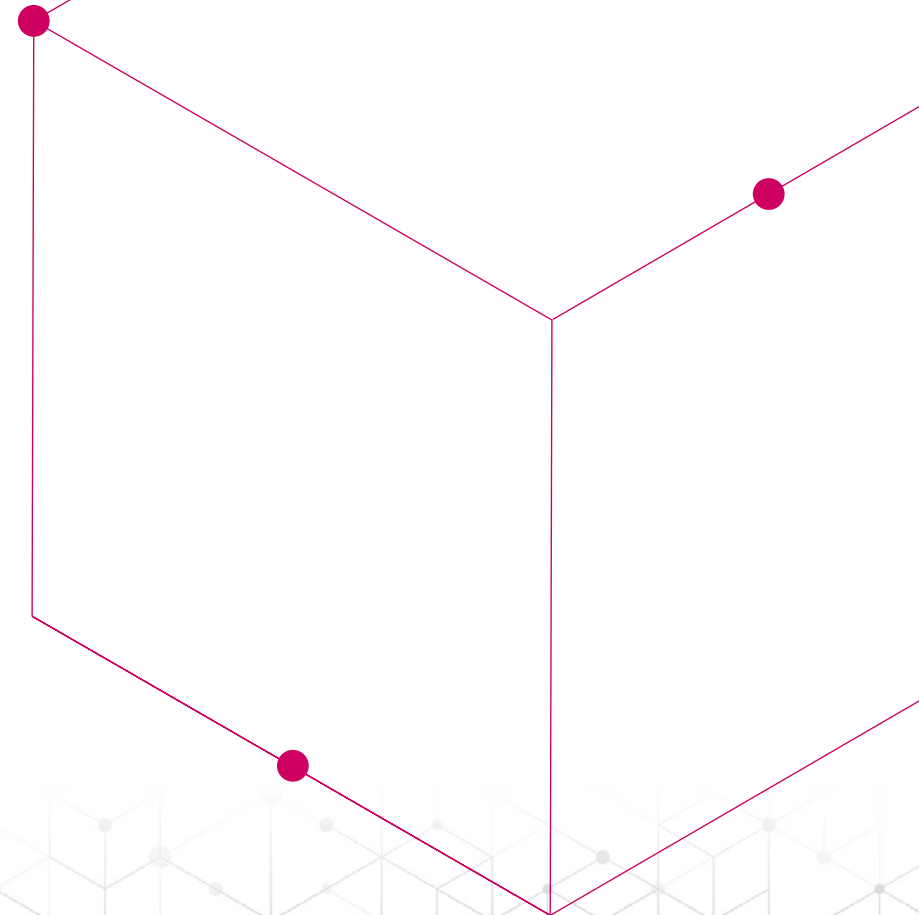
Technical reliability plays a key role. Modern BESS projects in Belgium commonly utilise lithium-ion battery technology, which is favoured for its proven long life cycle and

operational simplicity. Advanced monitoring systems further strengthen bankability by ensuring high availability and enabling rapid detection of performance issues.

Strong supply chains and the involvement of experienced counterparties in both construction and operation underpin the successful delivery and management of BESS assets. In addition, the implementation of robust market optimisation strategies supports the achievement of reliable income.

Finally, clear legal arrangements regarding the ownership and operational rights over the BESS are crucial. In Belgium, appropriate real property rights - such as a right of superficies or a well-structured lease - are essential to ensure that project sponsors maintain full control over the installation, independent of the ownership of the underlying land.

Overall, Belgium's regulatory environment and policy signals contribute to an increasingly bankable landscape for BESS projects.





France







## Key regulatory aspects

### Regulatory classification of commercial-scale batteries

In France, operating commercial-scale batteries is classified as “energy storage in the power system”.

French law promotes the development and operation of energy storage projects by private sector actors. Public electricity network operators and closed distribution network operators are prohibited from owning, developing, or operating storage facilities, except where specifically exempted by the French *Energy Regulatory Commission* (“**CRE**”) for network-integrated installations.

Regarding the network, BESS facilities both withdraw electricity from and inject electricity into the grid. They therefore act alternately as production sites and consumption sites.

### Key regulatory requirements to develop, own, and operate battery storage projects

Battery storage projects in France follow general authorisation frameworks for energy infrastructure. This typically includes planning permission under the Town Planning Code, environmental authorisation under the Environmental Code, and grid connection under the Energy Code (see question 2 for more detail).

## Special authorisations or licences needed

Operating a BESS asset in France requires obtaining standard authorisations for energy infrastructure. Below a summary of the core authorisations and requirements:

**- Planning permission:** The construction of a BESS project is subject to standard planning permissions under the Town Planning Code including building permits and, where applicable, rights to occupy public land.

**- Environmental authorisation (ICPE Regime):** Operating a BESS facility in France generally requires compliance with the classified facilities for the protection of the environment regime (*installations classées pour la protection de l'environnement*, or “**ICPE**”) under the Environmental Code. Most BESS projects, as “charging workshops of electric accumulators”, must be declared to the authorities in accordance with the ICPE classification (nomenclature ICPE). In some cases, if the facility introduces greater risks (for example, storing flammable materials), a full authorisation may be needed instead.

**- Grid connection Legal and policy framework for grid access:** There is currently no specific, dedicated legal grid connection procedure for battery storage facilities in the Energy Code, despite calls from the CRE to implement one. Instead, the technical rules governing grid connection are set out in the technical reference documentation from the French *transmission system operator* (“**RTE**”) (transmission) or the French distribution system operator (Enedis)

(distribution), depending on the scale and capacity of the installation.

Battery storage projects must then secure grid connection agreements whether connecting at the distribution or transmission level. RTE and Enedis provide the relevant procedures, including for assets capable of both injecting into and withdrawing from the grid.

Recent developments include operation profiles and network zoning by dividing the French territory into three zones (introduced by RTE’s Ten-Year Network Development Plan 2025), which aim to optimise battery integration and manage grid constraints.

The connection process follows the operator’s technical reference documentation and requires submission of a formal request, receipt and acceptance of a technical and financial proposal, and execution of other ancillary agreements, notably a network access agreement.

### Operation licence

The Energy Code sets out the framework governing electricity storage activities. However, there is currently no requirement under the Energy Code for an operator to obtain an authorisation to operate a BESS facility or to carry out optimisation activities.

## - TURPE

Under the Energy Code, users of the public electricity transmission network must pay a tariff (“**TURPE**”) to RTE to cover grid management costs.

Upcoming changes to the network tariff regime (Turpe 7) are expected to introduce incentives for batteries to withdraw electricity during high-production periods and inject during high demand, further supporting their commercial viability.

**- Participation in public tenders** (e.g. for capacity or flexibility services) may impose further obligations and these will be set out in the relevant tender documentation.

## Revenue streams for grid scale battery assets

No single revenue stream currently guarantees long-term profitability for BESS projects in France. Operators regularly combine (“stack”) multiple sources of income by actively participating in ancillary services, trading on wholesale markets, and leveraging capacity payments. As regulatory and market conditions evolve, successful projects are those that remain nimble and adapt to ongoing changes in market design.

### 1. Ancillary services (system services)

These are essential services provided to RTE to maintain real-time grid stability. The two key ancillary services are:

- > *Frequency Containment Reserve (“FCR”)* that offers swift, pan-European frequency response; and
- > *Automatic Frequency Restoration Reserve (“aFRR”)* that provides automatic balancing over each 30-minute trading interval. The aFRR market opened to batteries in June 2024, triggering a notable increase in potential revenue.

However, both markets are capped in total capacity hence may see, over time, shrinking margins as participation rises and market saturation sets in.

### 2. Wholesale market revenues

Operators can participate in the wholesale power markets, including both day-ahead and intraday markets:

- > BESS buy electricity when prices are low

(usually during periods of surplus renewable generation) and discharge when prices peak.

- > Market products can be traded in granular blocks as short as 15 minutes and markets increasingly clear close to real time, reflecting growing price volatility.
- > Revenue from wholesale markets is potentially significant but highly variable, as it is directly exposed to fluctuations in electricity prices.

### 3. Capacity mechanism

The French capacity mechanism aims to secure grid reliability during periods of high demand by ensuring enough production and storage is available:

- > BESS operators can access this mechanism by certifying their assets and selling capacity guarantees (measured in €/kW/year).
- > This approach offers a more stable, long-term income stream, which is attractive to financiers for investment planning.
- > In recent years, however, capacity prices have declined and reforms are underway (due to be implemented from 2026) to more fairly reward low-carbon flexible assets, such as battery storage.

### 4. Route to market Agreements

Sets out a number of services to form a revenue stack managed by a single counterparty through a suite of contracts.

## Obstacles to further deployment

Principal legal and operational risks for BESS projects in France

- > Regulatory risk: Ongoing updates to the regulatory framework may create uncertainty around support mechanisms, market eligibility, and long-term visibility.
- > Permitting and environmental compliance risk: stringent ICPE regime can prolong or complicate project development.
- > Revenue risk: ancillary service market size is capped and increasingly competitive; price volatility and cannibalisation threaten project returns.

While regulatory and operational challenges remain, France’s battery storage sector continues to benefit from promising developments and growing opportunities for innovative investors and operators.

### 1. Regulatory evolution and new market incentives on the horizon

France is modernising its regulatory framework to better support battery energy storage. Reforms to the capacity mechanism, expected in 2026, aim to introduce long-term contracts and tailored incentives for storage, presenting a clear opportunity for stable, multi-year revenue streams (often targeting 10 to 15 years). This increase in regulatory certainty is expected to enhance project bankability and attract investment.

## 2. Dynamism in revenue sources and market participation

The French market’s adoption of advanced ancillary services and more granular wholesale electricity products (such as 15-minute blocks) opens up several routes to market. BESS are well positioned to benefit from price volatility and growing regulatory support, especially as operators increasingly use strategies like revenue stacking and hybrid renewable-battery projects to expand and diversify revenue.

### 3. Advances in grid access and ongoing process improvements

French authorities and RTE are committed to modernising grid access rules for storage. Ongoing dialogue is delivering new procedures to make grid connections for BESS projects faster and more transparent. Such improvements are expected to minimise commissioning risks and facilitate widespread deployment.

## 4. Preparation for new operational frameworks

**Regulatory reforms**, including “operational profiles,” are set to further integrate BESS with the broader power system and renewables.

## 5. Enhanced resilience and adaptability

**Developers increasingly use robust risk management**, contract strategies and diversified revenue streams to respond to regulatory and market change. BESS is central to this more flexible, reliable, and opportunity-rich electricity landscape in France.



### Government support schemes or subsidies

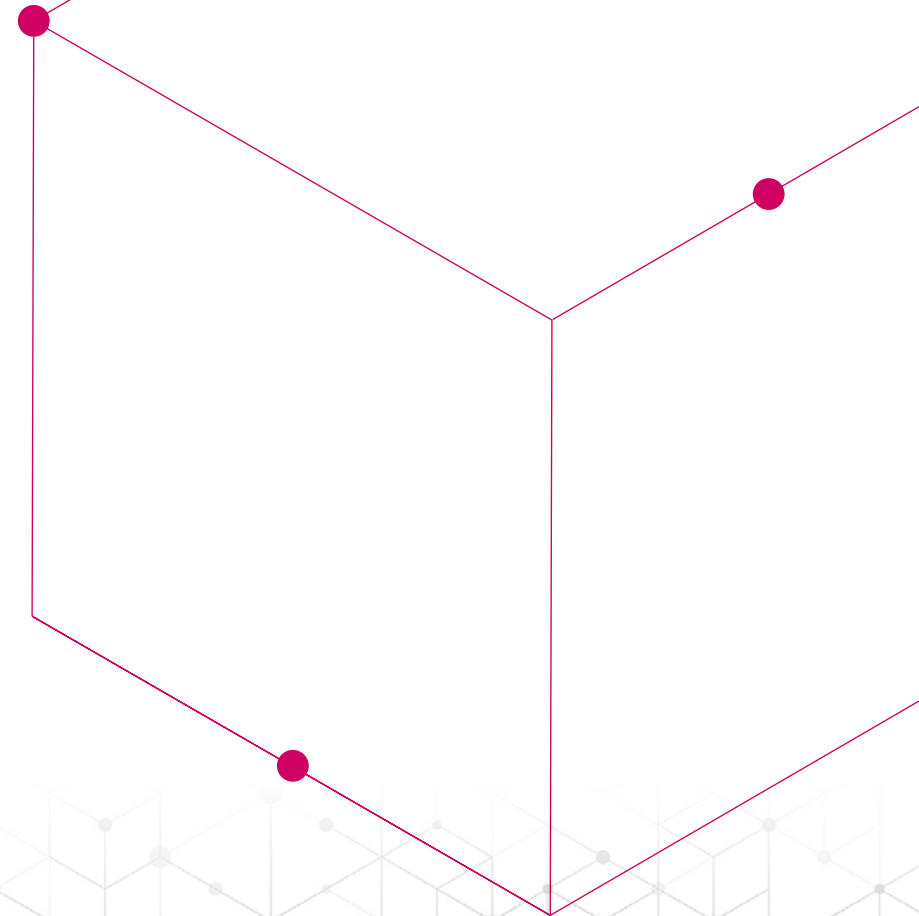
France has several government-backed support schemes for BESS projects. These mechanisms provide both financial subsidies and long-term revenue opportunities to support grid stability.

- > *Long-Term Calls For Tenders (“AOLT”)*: the Ministry of Energy can launch calls for tenders for new capacity, in particular storage, which do not benefit from a support mechanism. RTE contracts with successful bidders and guarantees a fixed tariff for up to seven years in exchange for reliable capacity. BESS are eligible and have already secured contracts for several tender periods (2020–2026, 2021–2027, 2022–2028, and 2023–2029).
- > Specific mechanism for call for tenders applicable to electricity storage facilities: the Energy Code provides for a specific mechanism for call for tenders only applicable to electricity storage facilities and allows the Minister of energy to launch calls for tenders.

By contracting via this mechanism, BESS operators commit to making storage capacity available for grid balancing and notification mechanism for block demand response exchanges known as NEBEF (*mécanisme de Notification d’Echanges de Blocs d’Effacement*), services for a minimum period.

### Bankability

BESS projects in France present specific bankability challenges due to rapid technological evolution, an evolving regulatory framework, and shifting market structures. Lenders and investors focus on revenue predictability—typically derived from a mix of ancillary services, wholesale market trading, and participation in the capacity mechanism. A diversified revenue strategy is expected, including revenue stacking and hybrid models (often pairing batteries with renewables to improve cashflow stability). Aggregators play a key operational role in market participation, but as relatively new counterparties, they present additional credit and performance risks. Lenders conduct thorough due diligence, focusing on technical robustness (including degradation, safety, and supplier credibility), legal compliance, and clear risk allocation within contracts (with a particular emphasis on strong warranties and performance guarantees). Financial structuring typically involves shorter debt tenors, higher equity contributions, and conservative financial projections supported by scenario analysis. Enhanced tailored cash sweep mechanisms and robust contractual protections are also common lender requirements. In this environment, no single revenue stream guarantees long-term bankability, so project success depends on revenue diversification, disciplined risk management, and adaptable financial structures.





Germany





# Germany

## Key regulatory aspects

Even though the German Energy Industry Act (*Energiewirtschaftsgesetz*, “**EnWG**”) foresees a separate definition of energy storage facilities in Sec. 3 No. 15d EnWG, BESS in Germany are still mostly subject to the same rules as are electricity generators on the one hand and offtakers on the other hand, focusing on the ability of BESS to either feed electricity into the grid or to withdraw electricity from it.

**Grid connection:** Grid connection for BESS is governed by the general provisions in Sec. 17 EnWG. Grid operators must connect everyone to their grid on a non-discriminatory basis and are also obliged to enhance their grid capacity where necessary. This may, however, – and often does – lead to substantial delays caused by a limited overall grid capacity in the respective area.

BESS which only feed in electricity from directly connected generators of renewable electricity are considered to be generators of renewable electricity themselves and enjoy preferential grid connection under the German Renewable Energy Act (*Erneuerbare-Energien-Gesetz*, “**EEG**”) compared to other connection requests (except towards other storages (including non-renewable BESS), cf. Sec. 3 and 8 EEG and Sec. 17 para. 3a EnWG).

Grid operators are obliged to grant non-discriminatory connection and access to the grid which includes both, grid connection and its use. Specific criteria for the granting of such rights have not been established by law. Grid operators can, for example, process

such grid connection requests chronologically (“first come, first served”) or, as is increasingly practiced, based on the progress of the respective project (“first ready, first served”). In addition, grid operators also use the so-called “repartitioning procedure” when dealing with connection requests from operators of particularly energy-intensive installations. This procedure determines the available capacities and distributes them proportionally and equally among the parties requesting grid connection.

More detailed rules exist for electricity generators with a nominated capacity of at least 100 MW connecting on 110kV-level or higher. Under the Grid Connection Ordinance for Power Plants (*Kraftwerks-Netzanschlussverordnung*, “**KraftNAV**”) grid connection requests are to be processed on a first-come, first-served basis following a prescribed process. The grid compatibility assessment is subject to a fee and the reservation of the grid access is dependent on a reservation fee of EUR 1,000 per MW. Special information rights and requirements apply to the rejection of grid connection requests. German TSOs apply the KraftNAV to grid connection requests of large BESS, details on how to determine the applicability of the KraftNAV to specific projects are however subject to debate.

**BESS co-location:** Where BESS can be located in proximity to a generator of renewable electricity it is allowed to use the same grid connection point with the generating system (“cable pooling”). This may also be an already existing grid connection point. Such an arrangement can result in the installed

capacity of a renewable energy installation and a storage project together exceeding the available grid connection capacity (“overbuild”). In such cases, a flexible connection agreement between the grid operator on the one hand and the respective grid user(s) on the other hand is required to control the feed-in effectively. There is no explicit right of the grid connection applicant to benefit from cable pooling. The approval of both, the grid operator and the other grid user(s) is always required.

Recent practice has shown that flexible grid connection agreements may not only offer advantages, but also present issues for BESS projects if grid operators offer unattractive terms while simultaneously attempting to fulfil their general grid connection obligation in this manner (see the section below on obstacles to further development).

**Grid connection and cost contributions:** BESS operators are required to bear the costs of the grid connection themselves.

German grid operators are entitled to request a so-called construction cost contribution (*Baukostenzuschuss*, “**BKZ**”) for construction costs necessary for reinforcements of the general grid to accommodate the grid connection request. Although on mid- and high-voltage level grid operators are not legally obliged to demand BKZ they are strongly encouraged to do so by the German Federal Network Agency’s (*Bundesnetzagentur*, “**BNetzA**”) cost auditing policies during grid fee determination. For battery storage facilities with a capacity of 100 MW or more, it is disputed whether they fall under the prohibition

of charging BKZ pursuant to Sec. 8 KraftNAV because they do not only feed-in electricity but also take-off electricity.

There are no specific legal guidelines for the calculation of BKZ on mid- and high-voltage level other than that they need to be proportionate and non-discriminatory. In practice, grid operators often refer to (non-binding) guidelines issued by BNetzA and demand a BKZ calculated as a one-off payment per kW of capacity to be installed. This calculation method has been confirmed by the German Federal Court of Justice (*Bundesgerichtshof*, “**BGH**”) in July 2025 who has also dismissed claims that a grid operator treat storage operators differently than other generators of electricity when demanding BKZ.

A key objective of the BNetzA’s guidelines on BKZ is regional differentiation, whereby locations with high grid demand are burdened more heavily, while regions with unused capacity are relieved. To this end, five levels ranging from 20% to 100% are being introduced, which are to be updated regularly. Grid operators can differentiate when determining the BKZ depending on how advantageous a location is for the overall system, eg, with regard to redispatch. The BNetzA has published a map showing which levels apply in the various network regions.

**Standard agreements:** Grid connection and usage are governed by agreements with the connecting grid operator. While BNetzA publishes and regularly updates a uniform grid usage agreement (*Netznutzungsvertrag*) to be used (with very limited possibilities for

adjustment) by all grid operators, each grid operator uses its own standard agreement form for grid connection agreements. For grid connections at the low voltage level (typically not applicable to commercial BESS) the stipulations of the grid connection ordinance for low voltage (*Niederspannungs-anschlussverordnung*) become part of the grid connection agreement.

In February 2025 the legislator introduced the possibility for parties to agree on limiting the maximum feed-in or withdrawal capacity, thus allowing to prevent strain on the grid by adapting grid usage. The limitation on feed-in or withdrawal capacity may be permanent (static), defined in advance for specific and predictable time periods at varying levels, such as certain midday hours (dynamic), or may consist of a flexible right of the grid operator to reduce capacity, potentially down to an agreed minimum threshold (fully dynamic). Sec. 17 para. 2b EnWG and, for generators of renewable electricity, Sec. 8a EEG regulate the mandatory content for the contractual provisions for such **flexible connection agreements**. Grid operators are not obliged to offer such agreements and –due to the lack of a fully developed regulatory framework – still rarely offer flexible grid connection agreements. So far, initial offers for flexible grid connection agreements by grid operators appear to have been at times unfavourable for BESS operators (see section below on obstacles to further development).

**Exemption from grid fees, further grid charges and electricity tax:** In Germany, grid fees, further grid charges (in particular, levies for specific purposes) and electricity tax become payable when taking-off electricity from the

grid. BESS as consumers of electricity are thus in principle obliged to pay these charges for the electricity they consume. However, given that the electricity fed into the grid by BESS is subject to these charges again when the final customer withdraws it, German law provides for the following, rather extensive exemptions:

- > **Grid fees:** Sec. 118 para. 6 EnWG stipulates that BESS built after 31 December 2008 and commissioned until 4 August 2029 are exempted from paying grid fees for withdrawing electricity for a period of 20 years. The regulatory regime for BESS commissioned from 2029 onward is still under discussion. There are proposals for BESS to be included in the collection of grid fees (see section below on obstacles to further development).
- > **Further grid charges:** Pursuant to Sec. 21 Energy Financing Act (*Energiefinanzierungsgesetz*, EnFG), BESS are exempted from the various grid usage levies imposed under German law. For the so-called concession fee (*Konzessionsabgabe*), an exemption or reduction is possible, which is examined on a case-by-case basis.
- > **Electricity tax:** BESS can be exempt from electricity tax pursuant to Sec. 5 para. 4 of the Electricity Tax Act (*Stromsteuergesetz*, StromStG).

### Special authorisations or licences needed

There are no authorisations/licences to be obtained specifically for battery systems.

Battery storage projects in Germany do not require a generation license nor does the supply of end consumers require a licence. Only when household consumers are supplied directly a notification to BNetzA is required. Also, a permit under Sec. 4 Electricity Tax Act (*Stromsteuergesetz*) for electricity supply may be necessary.

In addition, developers must register the BESS as an operating unit in BNetzA's so-called Core Energy Market Data Registry (*Marktstammdatenregister*) as well as any market roles they may fulfil (like balancing group manager, trader, supplier of electricity)

- > **Building permits:** The construction and operation of BESS generally requires the issuance of a building permit under the applicable state building act. For large-scale installations, planning approval under the EnWG is optionally applicable as an alternative. Recently, the federal state of Bavaria has introduced an approval exemption, which removes the requirement for a building permit for BESS that are privileged in the outlying area (*Verfahrensfreiheit*).
- > **Planning law:** The prerequisite for a building permit is usually a development plan (*Bebauungsplan*) issued by the municipality. If there is no development plan in place and the BESS is located in the so-called outlying area (*Außenbereich*), the permitting process is currently more challenging. Depending

on the federal state (*Bundesland*) where the BESS is to be installed, BESS may or may not benefit from so-called privileged status (*Privilegierung*), which can significantly affect the permitting procedure.

However, it is argued that if the BESS do not constitute standalone projects but instead support another project with privileged status, such as a wind or solar installation, the BESS may themselves also benefit from privileged status. Special consideration may be required where certain Federal States only classify BESS as privileged in outlying areas that have participated in a tender process with the local distribution grid operator for the allocation of grid connection capacity.

The prospects for approving BESS in outlying areas may improve in the future. A current draft amendment to the EnWG expressly gives BESS general priority over other protected interests in planning decisions (Sec. 11c Sentence 2 EnWG-E). This change could facilitate approval for BESS even where privileged status does not apply. However, it remains to be seen how, and to what extent, authorities will apply this new provision in practice.

**Mandatory law:** Furthermore, mandatory law needs to be adhered to (eg, nature conservation law, emissions protection law or water law). An environmental impact assessment (*Umweltverträglichkeitsprüfung*) is not required.



## Revenue streams for grid scale battery assets

**Spot market trading:** Mostly due to a high proportion of volatile electricity feed-in from renewable electricity generation, electricity prices in the German market fluctuate considerably during the day, with particular low prices around mid-day in summer. BESS are taking advantage of these price swings by taking part in spot market trading on the day ahead and particularly intraday markets.

**Provision of balancing services:** BESS are well placed to offer balancing services, ie, capacity as well as energy, to the German transmission system operators (TSOs) whose main responsibility is to keep the frequency of the German power grid stable at 50 Hertz. There are three types of balancing services with a minimum offer size of 1 MW each which primarily differ in their activation speed and product length. BESS mostly bid for the two faster products, ie, the Frequency Containment Reserve (FCR) which must be deployed in the grid area that caused the frequency deviation and be fully delivered within 30 seconds and the automatic Frequency Restoration Reserve (aFRR) which needs to be fully activated within 5 minutes.

There are daily tenders following the pay as cleared rule for FCR balancing capacity with a product length of four hours.

Regarding aFRR, bidders can offer both positive (power injection) and negative balancing services (power withdrawal). Winning bidders in daily capacity auctions receive a remuneration

on the basis of their bids. The actual delivery of energy is then tendered in 15-min-windows for each delivery day based on the pay as cleared principle. Successful bidders in the capacity auctions are obliged to submit a bid, but other bidders are also admitted.

**Innovation tenders:** Since 2021, BESS combined with electricity generation from solar or wind have been eligible to participate in Germany's biannual innovation tenders under Sec. 39n EEG and the Innovation Tender Ordinance (*Innovations-ausschreibungs-verordnung*).

Winning projects are eligible for a top-up of their market revenues in the form of a floating market premium per kWh which is calculated as the difference between the bid price (awarded in the auction) and the yearly average spot market value of electricity for solar (for solar + BESS) or for wind onshore (for wind + BESS and for wind+solar+BESS). No premium is paid in hours at which the spot market price drops below zero and/or if the yearly average spot market value is higher than the bid price. However, unlike with a CFD, no payments are necessary if the market value exceeds the bid price

To qualify, the BESS' installed capacity must amount to at least 25% of the installed total capacity of the combined project and allow for at least two hours of charging at the BESS' nominated output capacity. Also, the BESS may only store electricity from the connected renewable facility, effectively restricting BESS optimization, not least for providing balancing energy (FCR requiring the provision of both negative and positive balancing energy).

## Operation on behalf of grid operators:

German grid operators may under Sec. 11a EnWG tender the construction and operation of a third-party electricity storage facility if the storage is needed for grid operations and costs are comparable to operator-owned facilities. Third parties may build facilities exceeding requirements and, when not in use by the grid operator, can sell electricity from excess capacity on electricity markets. Up to now this option has not been widely used by grid operators.

## Co-location: optimisation of renewable energy assets:

If co-located with a solar or wind power plant promoted under the EEG, a BESS can be used to postpone grid feed-in in times of low or negative prices, thus securing the full market premium for the electricity. Currently, this requires that the BESS exclusively stores electricity from the solar or wind power plant in a given calendar year, Sec. 19 para. 3a EEG. In this arrangement, the battery storage system cannot generally be marketed additionally, eg, by providing balancing services, but switch operation (see below) is possible on a calendar year basis.

Sec. 19 para. 3b EEG, which has been amended in February 2025 will allow BESS co-located with promoted solar or wind power plants to also procure "grey" electricity from the grid. However, this requires a determination by BNetzA on how to delimitate "grey" and "green" electricity stored in the BESS for the purposes of EEG remuneration which BNetzA was preparing when we published this text.

**Co-location:** Peak shifting, peak shaving and further applications: BESS in Germany are also used for:

- > peak shifting, ie, by electricity consumers to optimise electricity consumption patterns, eg, by using electricity stored in times of low or negative prices in times of high prices.
- > peak shaving, ie, by electricity consumers to reduce peak loads. Since grid operators calculate grid fees based on maximum load, reducing consumption during short periods of particularly high demand can permanently reduce grid fees. BESS operators also offer peak shaving as a service to electricity consumers in return for a fee.
- > optimising self-consumption, ie, by electricity consumers in combination with generation assets as electricity produced and consumed on-site without using the public grid can benefit from reduction in taxes, levies, and grid fees making it cheaper than grid power.
- > in cases of limited grid connection capacity, ie, to mitigate limited grid connection capacity for electricity generation assets by storing excess energy locally allowing to postpone grid feed-in.

**Typical agreements** regarding the **marketing of BESS** are optimisation, tolling and hybrid agreements:

- > Under **optimiser agreements** third-party service providers manage dispatch and market access in exchange for a fixed fee or revenue share. To the extent that revenue is shared, it is typically either the entire revenue ("profit share only") or the optimiser undertakes, in return for an increased

revenue share, to pay the operator of the facility an increased minimum remuneration (“profit share with floor”).

- > **Tolling agreements** are emerging, offering fixed remuneration to asset owners which continue to technically operate the BESS while transferring commercial operation rights to counterparties.
- > **Hybrid agreements**, combining profit share and tolling mechanisms, as well as agreements covering the marketing of multiple BESS assets under a single agreement, particularly so-called **multi-asset capacity** tolls, are also being offered.

In the future, the introduction of a capacity mechanism in Germany as well as the procurement of reactive power by TSOs may give the opportunity to generate long-term revenue and broaden the possible income range of BESS.

### Obstacles to further deployment

The principal legal and operational risks for BESS projects in Germany include:

**Grid connection capacity:** Both the German transmission and distribution grids are currently under significant expansion pressure, particularly regarding BESS. As of January 2025, the four transmission system operators alone have received grid connection requests for BESS projects totalling approximately 226 GW – while only 12.2 GW of battery storage capacity, including 1.6 GW of large-scale storage, has been installed to date. Although BESS are entitled to a statutory claim to grid connection, they lack the priority given to operators of renewable energy plants (unless the BESS exclusively store renewable electricity).

Therefore, timing and scope of grid connection need to be assessed based on market practices and the circumstances of each individual case.

In February 2025, new flexibility options were introduced under German energy law regarding flexible grid connection agreements and in particular overbuilding or cable pooling. These flexibility options are intended to facilitate the realisation of projects. However, in practice in Germany, the experience with offers from grid operators for such flexible grid connection agreements has so far at times been the opposite. In some cases, grid operators use legally undefined terms such as “grid-neutral” to justify significant interventions in the BESS dispatch schedule or they prescribe, without considering the interests of the BESS operator,

binding annual time windows during which neither withdrawal nor injection is permitted. In such instances, it seems advisable to insist on the statutory right to unrestricted grid connection under Sec. 17 EnWG (regarding this statutory right, please also see above the section on key regulatory aspects).

Also, the high demand for grid connections has led many German grid operators to work on detailed grid connection allocation rules, to avoid a rush to grid connection on the basis of first-come-first-serve. Currently, there appears to be a shift towards a “first ready, first served” principle. For large BESS, the KraftNAV prescribes the first-come-first-served principle, which provides limited flexibility for TSOs to prioritise projects based on maturity or system relevance.

**800+ grid operators:** Besides the four German transmission system operators, there are more than 800 distribution grid operators operating the low, medium, and high voltage grid. While some agreements and processes for BESS are standardised (eg, grid usage and balancing group management) others are not resulting in different rules and procedures. This particularly affects the process of grid connection request and construction. For operators with projects in multiple grid areas navigating different processes can be time-consuming and pose different challenges.

**Regulatory changes ahead:** Following a judgment by the ECJ dismissing German grid regulation based on the EnWG and more detailed ordinances issued by the German government as violating the independence required by EU law of BNetzA as the national

regulatory authority, BNetzA is currently reviewing both the grid fee system as well as the rules for grid access. By 2029 the latest, the existing ordinances will be replaced by BNetzA determinations. In the consultation process kicked off by BNetzA, BNetzA has put a whole range of possible amendments on the table some of which could also commercially impact BESS. This includes abolishing several grid fee reductions or exemptions and does, for now, not exclude the introduction of grid fees for feeding-in electricity. As BNetzA aims to take the impact of grid users on grid stability into account, BESS might face higher (or lower) costs depending on their location or operational mode.

Also, the question of how BKZ for BESS will be calculated in the future remains pressing. Currently, they vary significantly by region and grid operator. Accordingly, even though the BGH rejected claims by BESS operators for a full exemption from BKZ in July 2025 (regarding this court decision, please also see above the section on key regulatory aspects), uncertainties remain regarding the precise amount of these costs. To the extent such uncertainties persist, payments to grid operators should, as far as legally possible, be made under reservation.

On a more general note, the German government is currently considering various legal reforms of the German electricity market design which could potentially impact the commercial viability of BESS in mid- and long-term including:

- > the current review of the uniform German bidding zone which could possibly lead to the introduction of two or more electricity bidding zones in Germany.
- > ongoing discussions on a future capacity market design.
- > the possibility that fossil power plants which are currently only in standby may be allowed to sell their electricity on the market again.

**Curtailment risk:** Battery systems may be curtailed during grid congestion events, especially in southern Germany. Unlike renewable generators, BESS operators are currently not entitled to full compensation for further financial costs or losses, which can impact revenue certainty.

**Permitting delays:** Large-scale projects often face delays in obtaining environmental and building permits, particularly in regions with limited administrative capacity or complex zoning requirements.

**Force Majeure and supply chain disruptions:** BESS projects are exposed to global supply chain risks (eg, lithium availability, inverter shortages), as well as weather-related construction delays and regulatory changes.

### Government support schemes or subsidies

There are no support schemes or government subsidies tailored specifically to commercial scale batteries. However, BESS can take part in the state-financed Innovation Tenders when co-located with a wind and/or a solar farm.

In addition, BESS benefit from some exemptions and/or reductions from grid fees, other grid charges and taxes (please see above the section on key regulatory aspects).

Battery storage projects commissioned before 2023 and located in certain areas of greater electricity consumption are (in their capacity of feeding electricity into a distribution grid) entitled to payments for so-called avoided grid fees (*vermiedene Netzentgelte*) payable by the grid operator. However, this subsidy programme is set to expire on 31 December 2028 at the latest.

### Bankability

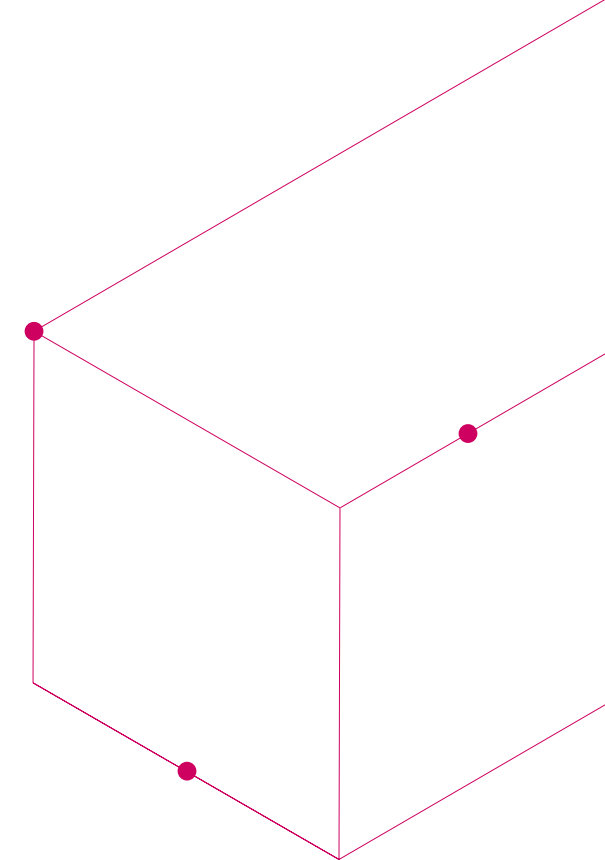
Unless a co-located BESS can secure predictable income under BNetzA's innovation tender (see above) predicting revenue streams for commercial scale BESS is comparably more difficult due to the volatile German electricity market than for other generators of electricity.

However, once grid connection has been secured, BESS taking part in the spot and balancing energy markets have under current market conditions seen impressive returns on investment.

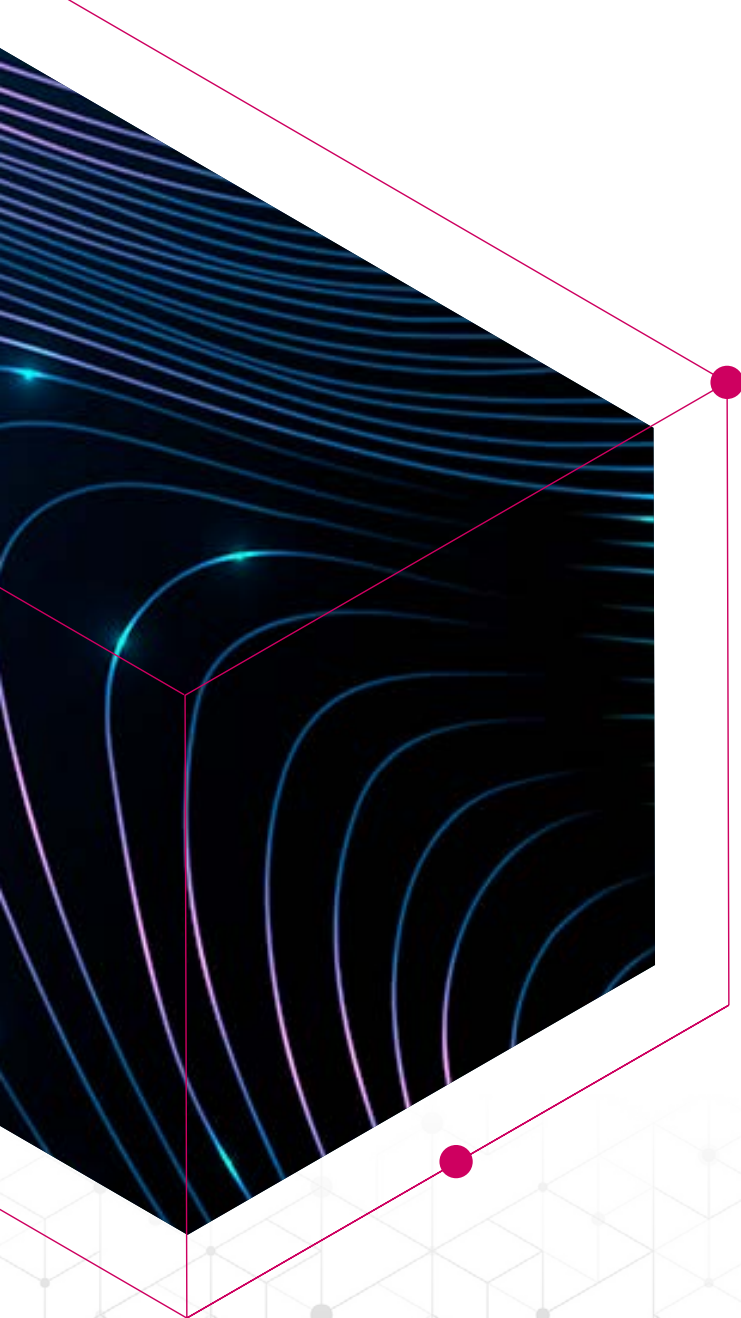
Accordingly, banks have in the past two to three years begun to increase their willingness to finance BESS projects.

While banks still prefer predictable income backed by marketing agreements with guaranteed income streams, for example, through fixed-price or floor models, the current attractive market environment promising fast amortisation of investments has even seen projects securing financing while taking full merchant risk themselves.

In the medium and long term, the question of where a battery storage system is located will increasingly impact project profitability, due to anticipated grid fee policy changes that prioritise grid-friendly behaviour of market participants as well as potential changes to the overall electricity market design.







Italy





### Key regulatory aspects

Regarding regulatory requirements and approvals:

- > **Legislative Decree No. 190/2024** governs administrative procedures to grant the authorisation for the construction and operation of stand-alone BESS projects:
  1. **Free building regime**
  2. **Simplified Authorisation Procedure**
  3. **Single Authorisation**
- > BESS plants are exempt from environmental procedures (“**EIA/Screening**”) unless the related ancillary works are subject themselves to such procedures.
- > **Letter n. 21021, December 2024:** Guidelines for the design, construction and operation of Electrical Energy Storage Systems, which provide methodologies for risk analysis and fire safety measures.

### Special authorisations or licences needed

Under Italian law, battery storage assets are classified as either “**stand-alone Electrochemical Storage Systems**” or “**Electrochemical Storage Systems connected to or serving power generation plants**”.

Depending on whether they are stand-alone or paired with other renewable assets and depending on their power capacity, BESS assets require different types of authorisations:

- > If the BESS’ power capacity is up to 10 MW, no authorisation is required, apart from any consent concerning landscape, environmental protection, safety, and fire prevention required on the basis of the applicable regulation (free building regime).
- > If the BESS, regardless of its power capacity, is to be installed in some specific areas (eg, near industrial plants, existing power generation plants or quarry areas), the authorisation is obtained through PAS (Simplified Authorisation Procedure), by submitting the project to the Municipality.
- > If the BESS’ power capacity is between 10 MW and 200 MW (stand-alone) or between 10 MW and 300 MW (co-located), the authorisation is granted by the competent Region through a Single Authorisation Procedure.
- > If the BESS’ power capacity is over 200 MW (stand-alone) or between 300 MW (co-located), the authorisation is granted by the Ministry of Environment and Energy Security through a Single Authorisation Procedure.

There are no **subjective requirements** needed to operate a battery. However, there are some subjective requirements needed to obtain access to the related incentives.

### Revenue streams for grid scale battery assets

Not unlike in the rest of the world, in Italy BESS projects tend to maximise revenues by generating it from multiple sources; this behaviour is called “revenue stacking”.

**Benefit from public support regimes is the base revenue stream, like Capacity Market or Electric Storage Capacity Procurement Mechanism (“MACSE”) as later described.**

Grid-scale batteries in Italy may also generate revenue through energy arbitrage, a mechanism that permits the purchase of electricity from the wholesale market during periods of low pricing and the subsequent resale of such electricity during periods of elevated pricing. This activity is generally conducted via the day-ahead and intra-day markets operated by the Energy Market Authority (*Gestore dei Mercati Energetici*, “**GME**”). The ability to capitalise on short-term price fluctuations in this manner constitutes a significant revenue stream for battery operators, supplementing additional sources of remuneration, such as capacity payments and the provision of ancillary services.

Among the ancillary sources of revenue available to operators within the Italian grid-scale battery market are traditional mechanisms such as **tolling agreements**, as well as inertia and **mandatory frequency response**.

### Obstacles to further deployment

In Italy, one of the main obstacles is the **slow and complex permitting process**, often aggravated by the fragmentation of responsibilities among local, regional and national authorities, especially following the reform of the permitting framework introduced by the Consolidated Act on Renewable Energy Sources (“**TU FER**”, ie, Legislative Decree No. 190/2024).

On the regulatory front, the MACSE – an incentive mechanism introduced by Terna, Italy’s TSO for stand-alone storage systems – while representing a crucial tool for stimulating investment in storage projects – imposes **strict timelines** for participation and introduces **significant obligations** for operators, such as the contribution to the guarantee fund.

In addition, there are critical issues concerning grid connection, with **lengthy technical procedures and high connection costs**, which can have a significant impact on capex. Terna has highlighted, more than once, critical issues related to the virtual saturation of the electricity grid and the need to reform connection procedures.

### Government support schemes or subsidies

One of the main legal and operational tools supporting the development of energy storage systems in Italy is the **MACSE**, a new forward market approved on 10 October 2024. Through this mechanism, the electric system will be able to acquire new storage capacity via long-term contracts awarded through competitive tenders organised by Terna.

These tenders will be open to operators owning new storage facilities. The first MACSE auction, dedicated to lithium-ion battery storage technology, will be held on September 30, 2025.

The winners of the competitive procedures are entitled to receive a fixed premium paid monthly for the awarded storage capacity, in return for the obligation to offer it on the Dispatching Services Market and make it available to third parties for participation in the electricity markets. The programme will run until 31st December 2033.

The **capacity market** is a mechanism designed to ensure the availability of generation and the reliability of the national electric grid in the medium and long term, by compensating producers for their capability to generate electricity. It operates through auctions, where energy producers commit to being available to supply electricity in the future, receiving a payment in return.

The **PNRR** provides the investment of EUR 500mIn to support the implementation of storage systems by awarding development contracts.

**Mixed Virtually Aggregated Units (“UVAM”)** Auctions, with which storage systems can offer tertiary reserve of power capacity in the context of balancing market awarded by means of annual and monthly auctions with a remuneration up to 30,000 EUR/MW/year.

**Fast Reserve auctions**, managed by Terna to obtain ultra-fast frequency adjustment.

### Bankability

The bankability of BESS projects in Italy depends on several key factors that lenders and investors use to assess risk and project viability. These are the principal considerations:

#### 1. Predictable and diversified revenue streams

Bankability improves when projects can access stable, long-term income. Italian BESS projects often combine revenues from multiple sources, as mentioned above.

Lenders prefer projects with contracted or regulated revenue (for example, from capacity auctions or long-term grid service agreements) over those relying solely on merchant market arbitrage.

#### 2. Robust regulatory and market frameworks

A transparent, supportive regulatory environment lowers risk. In Italy, this includes:

- > Clear technical and market access rules from Terna.
- > Contractual clarity from capacity and ancillary service mechanisms (such as MACSE).
- > Opportunities to participate in both centralised and local grid service tenders.
- > Recent regulatory reforms and support for storage have made the market more attractive.

#### 3. Proven technology and warranty coverage

Lenders scrutinise the technology used, with a preference for Tier 1 battery suppliers offering strong manufacturer warranties (typically at least 10 to 15 years), performance guarantees, and comprehensive operation and maintenance (“O&M”) agreements.

#### 4. Permitting and grid connection certainty

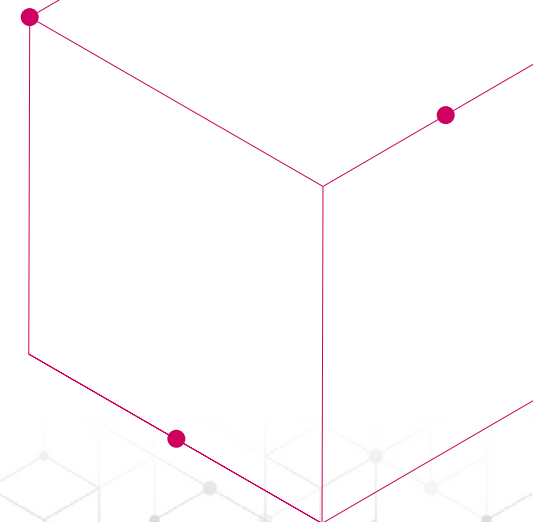
Bankability depends on the status and reliability of project permits (environmental, construction, and operational) and confirmed grid access. In Italy, these processes are becoming more streamlined, but delays or uncertainties can still impact project timelines and risk profiles.

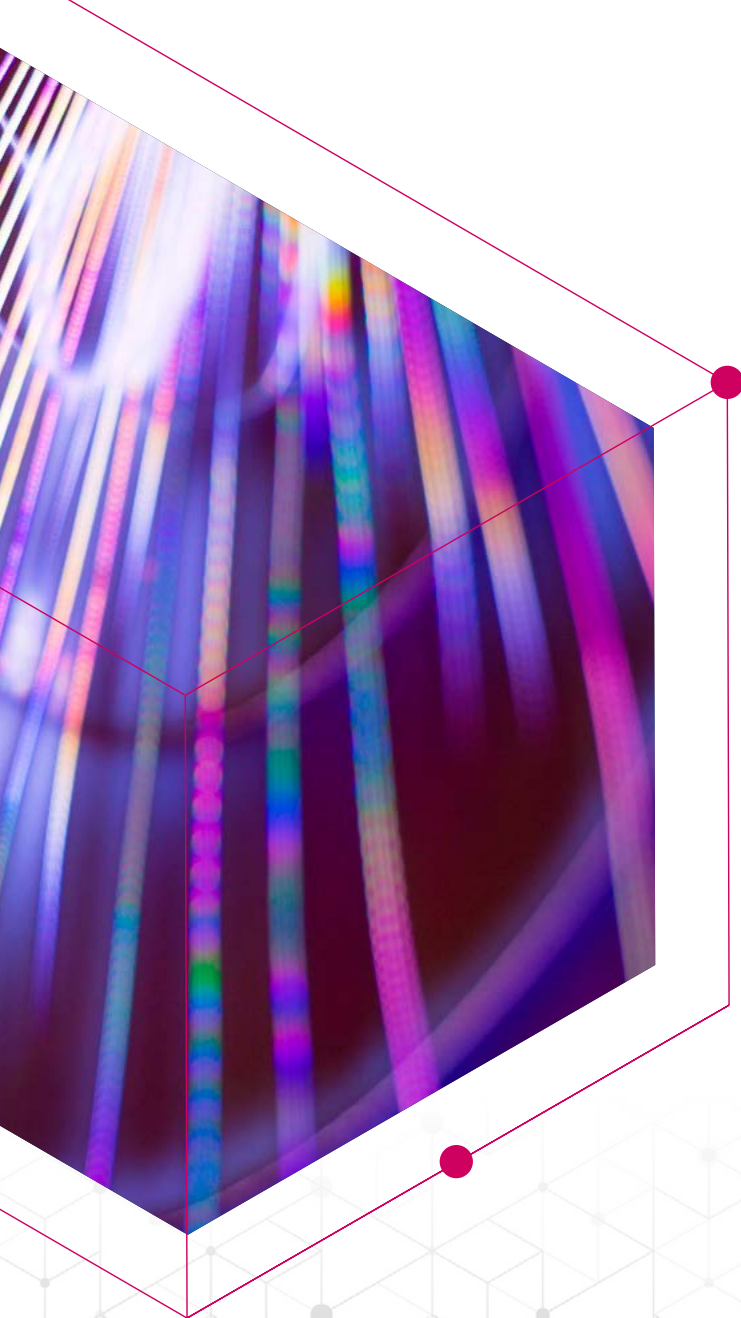
#### 5. Project sponsors and contractual strength

Financial institutions favour experienced sponsors with a track record in renewable or infrastructure investments. Strong contractual arrangements – for construction (engineering, procurement, and construction contracts), O&M, and service provision – are essential for risk mitigation.

#### 6. Financial structure and risk allocation

A well-structured financing package, including appropriate debt/equity ratios, risk allocation among parties, and clear cash flow waterfalls, increases lender comfort.





# Netherlands





# Netherlands

## Key regulatory aspects

At present the Dutch Electricity Act (*Elektriciteitswet 1998*) does include a definition regarding battery storage. The new Energy Act (*Energiewet*), which will become effective as from 1 January 2026, results in changes to the legal framework for electricity storage systems. It includes a definition on 'storing electricity' and introduces new possibilities for sharing a grid connection through cable pooling. The operation of a BESS in the Netherlands as currently included in the report.

The operation of a BESS in the Netherlands requires a grid connection. The Dutch Electricity Act (*Elektriciteitswet 1998*) obliges the *transmission systems operator* ("**TSO**") or *distribution system operator* ("**DSO**") to connect BESS developers to the grid. The terms and conditions will be laid down in a realisation agreement and a *connection and transport agreement* ("**CTA**"). Connections onshore in excess of 10 MVA may be realised by the TSO or DSO, or alternatively by a third-party contractor through a public tender process.

Based on the CTA the TSO or DSO performs the connection and transport services. Connection capacity and transport capacity determine the operational capacity of the BESS. Grid operators allocate available capacity on the principle of 'first come first serve.' In the Netherlands CTAs provide for either fixed or alternative transport rights. BESS operators must act as *balancing responsible party* ("**BRP**") or alternatively, contract a third party to act as BRP regarding its connection. A BESS operator can further take on roles of a congestion services provider or balancing services provider following recognition by the operator of the Dutch high voltage grid (TenneT).

Developing, constructing and operating a BESS is subject to building and environmental permits having been granted by the local authorities (ie, municipality and/or province). The Environmental and Planning Act (*Omgevingswet*). The four decrees issued under this regulation, which came into effect on 11 January 2024, regulate the construction and operation of a BESS within the physical living environment. This may require a technical construction permit, environmental permit, water permit and zoning plan permit depending on the circumstances, such as the location, size and technical details of the BESS.

The Netherlands does not currently operate a capacity market. Although market participants have initiated a debate about its necessity, the Dutch government has not taken steps to introduce a capacity market in the near future.

## Special authorisations or licences needed

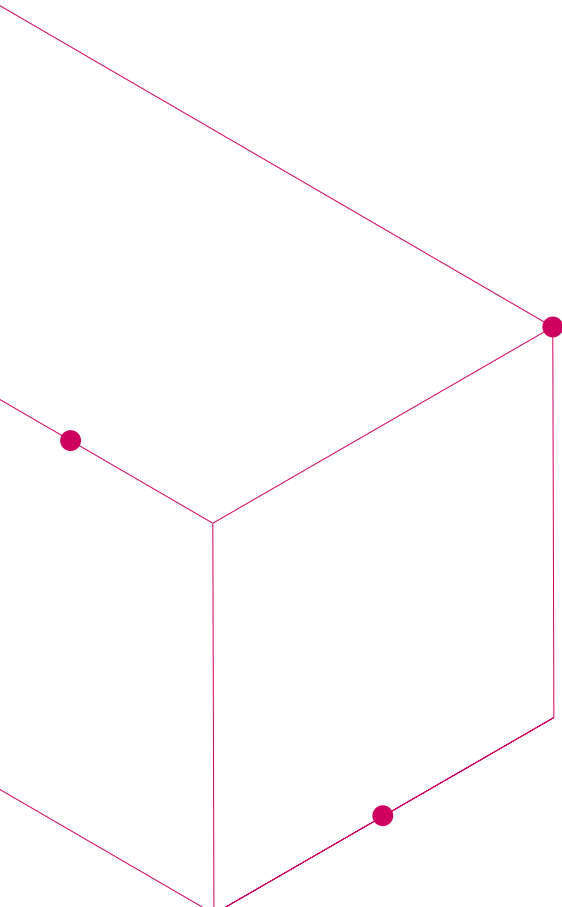
There are no specific authorisations or licenses are required for the operation of a BESS in the Netherlands. A BESS should be classified as a structure under the Environmental and Planning Act.

Standalone commercial BESS (ie, system batteries) with a connection to the Dutch high voltage grid with a storage capacity in excess of 100 MW are considered of national importance. This designation reflects their critical role in ensuring security of electricity supply. Given the focus on optimising spatial planning for the energy system, such large BESS installations must be located in the most appropriate and suitable locations. As a result, these projects may be designated as subject to a project decision (*projectbesluit*), which will set out specific conditions governing their development, construction, and operation at identified sites.

The Building Decree (*Besluit bouwwerken leefomgeving*, "**Bbl**") requires a BESS developer to take all measures necessary for the fire safety of buildings. At present, the conditions of the permit pursuant to the Environmental and Planning Act oblige the BESS operator to adhere to certain environmental and safety requirements.

Often, reference will be made to *Publication Series Hazardous Substances PGS 37-1* ("**PGS 37-1**"). The PGS 37-1 focuses specifically on the safety of lithium-containing energy carriers and their correct application in a BESS.





The Dutch legislator is working on an amendment to the Decree on Activities in the Living Environment (*Besluit activiteiten leefomgeving* “**Bal**”) whereby a BESS is considered as an environmentally harmful activity. Upon such amendment becoming effective, by law the PGS 37-1 becomes legally binding on the BESS operator.

### Revenue streams for grid scale battery assets

**Arbitrage** in the wholesale electricity market has been an important revenue source. Electricity will be sold and purchased against the market electricity price. BESS will be charged when prices are low, and discharge of electricity by the BESS takes place when prices are high.

A second revenue stream is the **provision of ancillary services to system operators**, such as TenneT TSO B.V. (“**TenneT**”), the Dutch operator of the high voltage grid in the Netherlands. This constitutes inter alia the provision of balancing services to TenneT. The BESS operator receives a fee for providing capacity or *frequency restoration reserve* (“**FCR**”) services to TenneT.

**Congestion services to grid operators** are also a type of ancillary services that BESS operators can use to stack revenue. A BESS operator commits to restrict the use of its transport capacity towards the grid operator during a predetermined period. This eases congestion on the grid.

A third party could be contracted to provide **optimisation services** regarding the BESS installation and access to a number of markets.

The BESS developer would receive a fee based on revenue models agreed between the parties.

The merchant risk for the BESS operator as associated by trading on the electricity markets and providing ancillary services can be mitigated by revenue optimisation models. An example would be that a counterparty – such as a large utility – will be sharing revenues with the BESS operators in exchange for optimising BESS operations.

Finally, also **tolling agreements and commercial offtake agreements** play a more dominant role in the maturing BESS market in the Netherlands. Under such agreements the BESS operator will earn an availability fee.

### Obstacles to further deployment

The Netherlands is currently experiencing significant grid congestion, affecting both electricity offtake and feed-in. This congestion presents a barrier to advancing the energy transition, as it restricts timely grid access and adequate transport capacity, particularly for BESS developers. As a result, projects face delays and limitations. Addressing grid congestion relies primarily on major investments to reinforce and expand the network. Accelerating these investments and exploring innovative solutions – such as demand-side management, flexible grid connections, and regional coordination – will be crucial to overcoming these challenges and supporting further development of the Dutch energy system.

In addition, the Dutch legislator introduced legislation for optimised use of connections and the Dutch Network Codes for electricity established by Netherlands Authority for Consumers and Markets (*Autoriteit Consument en Markt*, “**ACM**”) have undergone changes to allow for alternative transport rights. Alternative transport rights consist of time block transport rights (*tijdsblokgebonden transportrecht*) and timebound transport rights (*tijdsduurgebonden transportrecht*). The first transport right entitles the user to use its contracted capacity in pre-determined time slots, whilst the latter entitles the user to use its contracted capacity for 85% of the time only (and allowing the grid operator to constrain grid capacity at its discretion for 15% of the time). Both mechanisms aim to provide for flexibility and users benefit from a discount on the transport tariffs.

To alleviate grid congestion, the ACM has introduced societal prioritisation (*maatschappelijk prioriteren*). Parties qualifying as congestion alleviators shall be given priority when applying for grid access in congested areas. A BESS may qualify as such.

Dutch transport tariffs are high. The ACM classifies BESS operators as consumers of electricity. High grid tariffs continue to impact the business case of BESS projects. Grid tariffs can be reduced if contracts for alternative transport rights are being entered into between grid operators and BESS operators.

The ACM is investigating whether and how BESS can be remunerated for providing grid flexibility. This could ease the burden of the high transport tariffs. The results of this investigation and next steps on potential remuneration for providing grid flexibility will be known in Q4 of 2025.

Finally, the ongoing discussions on tackling nitrogen deposition of renewable energy projects and other construction projects in general have an impact of BESS projects as well. Permitting processes have longer lead times and create uncertainty for BESS developers. On top of this, the political and investment climate in the Netherlands has become less robust and upcoming elections for Dutch parliament may also further affect the roll-out of BESS projects.

### Government support schemes or subsidies

The Netherlands does not provide for support schemes or any governmental subsidies to incentivise developers and/or operators of commercial BESS projects.

Plans have been introduced for subsidies co-located to solar PV parks. However, since such subsidy schemes have been announced, the amount of the budget available has been decreased significantly.

### Bankability

Bankability typically refers to the extent to which both technical and market-related risks are mitigated. A clear, supportive regulatory regime is essential for bankability of BESS projects. Permits must be valid, irrevocable, and come with conditions that are market standard.

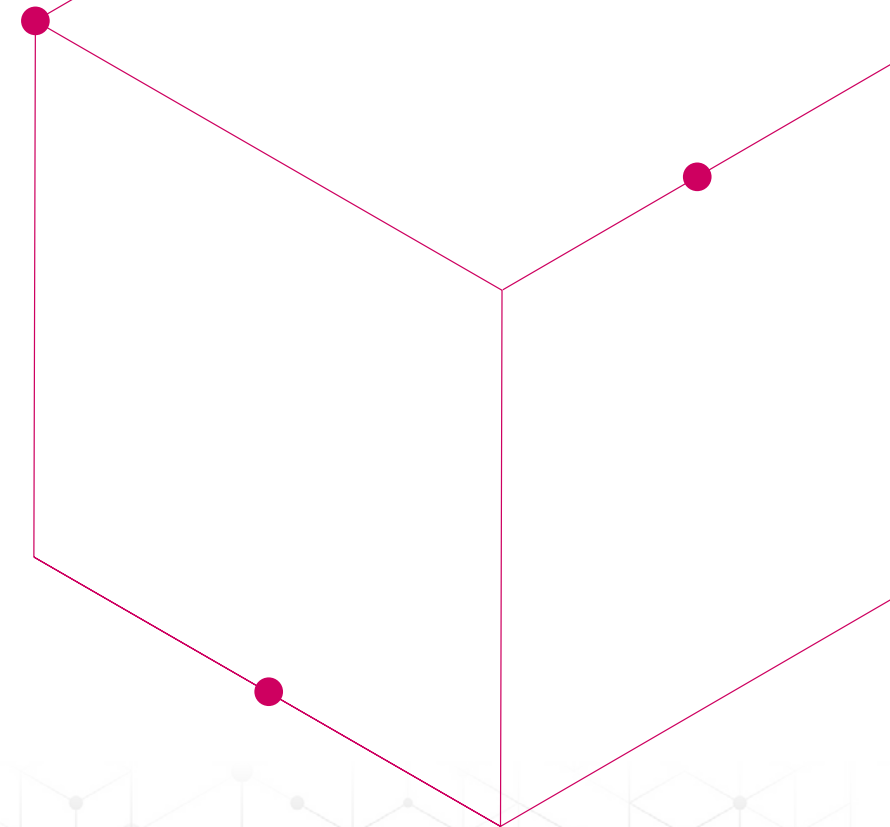
A bankable BESS project must have certain and stable revenues. Notably, BESS projects demonstrate a well-defined revenue stack with at least part of the income under a long-term offtake or tolling contract.

Technical risks and operational performance of the BESS can be underpinned by robust monitoring systems, which can detect underperforming battery modules and help maintain operational availability. Financiers are accustomed to BESS projects being powered by lithium-ion batteries.

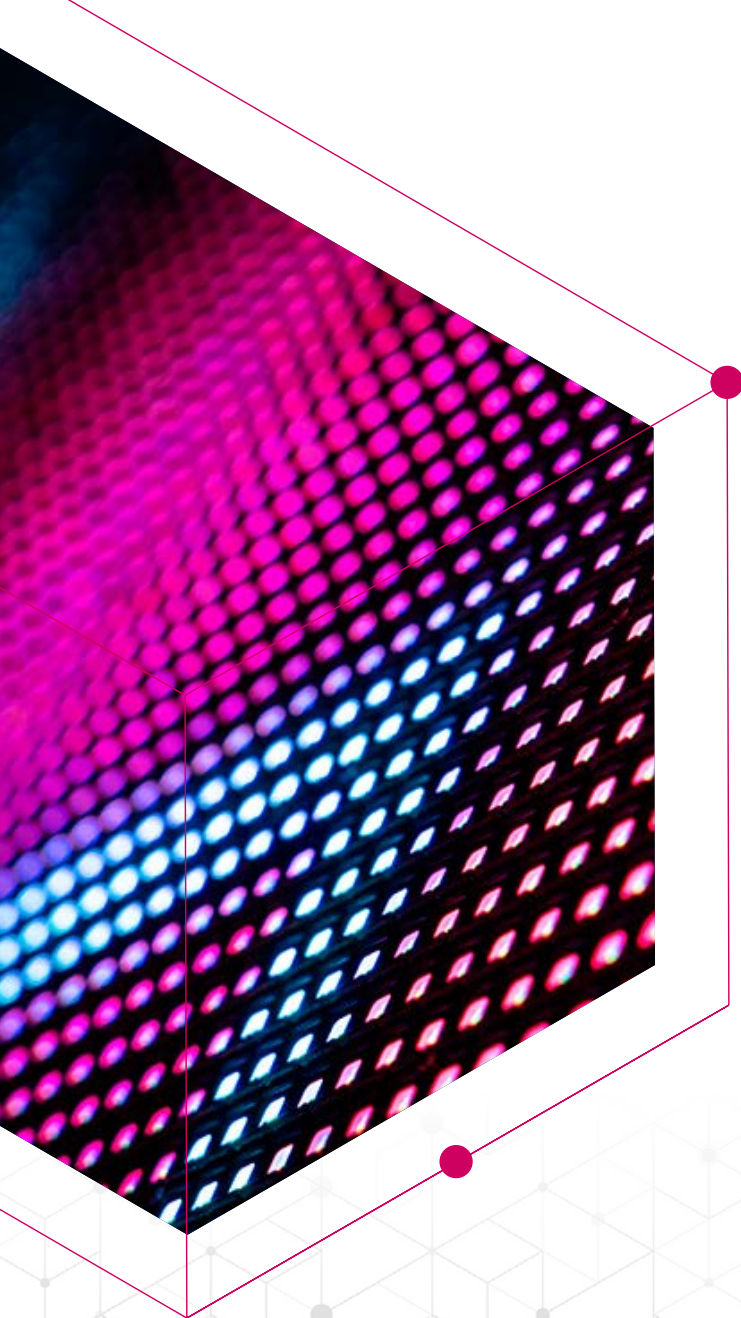
Such batteries are favoured especially due to their long-life cycle and simple operation.

Other factors that impact bankability of BESS projects are credible supply chains, strong counterparties during construction and operation, and clearly defined optimisation strategies for market participation.

Title to ownership and/or operational use of the BESS is key. In the Netherlands, in order for a BESS not to accede (*natrekking*) to the land on which it is constructed, pursuant to which the freehold owner of the relevant plot of land is automatically the (legal) freehold owner of the BESS, rights in rem must be vested. Such rights in rem could be a right of superficies and/or (sub)leasehold. For the bankability of a BESS project verification of such rights in rem, which prevent the general rule of accession, and the registration of such rights with the Dutch Land Register (*Kadaster*).







Norway



# Norway

*Niersholm*

## Key regulatory aspects

Norway represents a less mature market than neighbouring countries Sweden and Denmark. This is driven by the fact that Norwegian hydropower plants put Norway in a fortunate position when it comes to the ability to store renewable energy. In Norway, BESS are however increasingly regarded as a cost-effective alternative to traditional grid expansion.

BESS provides critical support in managing peak loads, enhancing grid stability, and enabling Norway's ongoing energy transition. Batteries have become a strategic component in facilitating the widespread adoption of intermittent renewables, as well as in improving energy efficiency and grid flexibility.

To address these trends, the Norwegian Government launched its **Battery Strategy in 2022**, focusing on building a sustainable, competitive battery value chain. The strategy emphasises the importance of research and innovation, and highlights Norway's ambition to lead in future battery solutions, aided by strong clusters of industry and research institutions. Norwegian research now covers the full battery value chain, from materials and cell production to safety, recycling, and digitalisation.

According to a recent report published by the regulator, the installed BESS capacity in Norway is 50 MW.

## Special authorisations or licences needed

### Regulatory framework and licensing

To establish a BESS facility, there is a need to prepare land, infrastructure, obtain licenses and necessary permits.

The Planning and Building Act and adjacent regulations do not include specific requirements or guidelines on the establishment of BESS projects; however, the requirements related to planning and building of real estate apply, which include:

- > **Preparation of a zoning plan:** The zoning plan must be in accordance with the municipal master plan, prepared by experts and approved by the relevant municipality.
- > **An environmental impact assessment** must be conducted, **and a planning program** must be drawn up. The draft of an environmental impact assessment should be sent to the municipality together with the proposal of a new zoning plan. A dispensation from the municipal master plan may be an alternative to preparing a new zoning plan.
- > An **application for general building permission, project start-up, and completion certificate** must be submitted to the municipality.
- > A **facility license** under the Norwegian Energy Act for the electrical installation will be required and depends on the grid connection interface. *The Norwegian*

*Water Resources and Energy Directorate ("NVE")* issues licenses, granting the right to build and operate power installations under specified conditions. Licensing aims to ensure that project benefits outweigh environmental and other disadvantages, with a strong emphasis on environmental protection. Licensing procedures depend on project size and expected impact.

- > The grid connection process depends on the size of the project. As part of the grid connection process, the BESS project will need to pass certain maturity criteria to be allowed to reserve the requested grid capacity, or alternatively if the requested capacity is not available, to be placed in the grid capacity queue. If connection of the BESS project requires upgrades to the grid, then a **grid investment contribution** will be triggered, and payment of the relevant grid investment contribution is a pre-condition for entering into the grid connection agreement with the grid company.
- > To be able to trade physical electricity in Norway, the BESS entity is required to **obtain a standard trading license**, which are issued by The *Norwegian Energy Regulatory Authority ("RME")*. Companies wishing to participate in the wholesale energy market are also required to enter into balancing and settlement agreements, either directly with the TSO (Statnett and eSett), or via an agreement with a balance responsible party.

### Classification and ownership

In Norway, the classification and ownership of commercial-scale battery systems depend on the use. Customers may own batteries for self-consumption, such as storing surplus solar energy; however, high-voltage systems require a facility license, and any sale of energy to the grid must be coordinated with the grid company.

Grid companies are strictly limited to using batteries for technical purposes – such as voltage support and grid stability – and are prohibited from market-based trading or profit-driven peak shaving. This separation upholds the principles of functional and corporate unbundling outlined in the Norwegian Energy Act.

By law, grid companies may own and operate batteries only as part of the grid infrastructure for technical optimisation.

Commercial energy storage, arbitrage, or market participation by grid companies is not permitted, as these activities constitute production and competitive market activity, from which grid operators are barred.

The Norwegian Energy Act requires legal and functional separation between grid operations and other business activities to prevent monopoly abuse. Grid companies cannot own, control, or be controlled by entities involved in energy production or sales, ensuring operational independence and neutrality. Management overlap and parent-company influence are also restricted to avoid conflicts of interest.

Consequently, grid companies are limited to cost-effective grid operation and may only use batteries for technical support, such as voltage stabilisation – not for commercial energy storage or market sales. Allowing grid companies to participate in market storage would require legal reform, complicated by both the Energy Act and EU law, which prohibit such activities to prevent market distortion.

This means that BESS projects primarily will be driven and owned by public and private owned power producers and private infrastructure investors.

### Revenue streams for grid scale battery assets

Grid-connected battery assets in Norway access multiple revenue streams by providing various services to both the grid and markets.

These can be broadly categorised as **route-to-market agreements** (including flexibility agreements with DSOs), participation in **electricity wholesale markets, capacity-based agreements, and delivery of ancillary services** (reserves).

The primary and most profitable route to market for grid-connected batteries currently is **participation in balancing and reserve markets**. Participation in these markets provides batteries with capacity (availability) payments and, when activated, energy payments. This service is seen as the most feasible and economically attractive use case in Norway as of 2025.

In the longer term, so-called **energy arbitrage** from the spot and intraday markets are projected to be an important part of the revenue stream.

The third revenue stream is **local flexibility services**, where grid companies or industrial customers pay batteries to solve specific needs. This can include reducing grid tariffs, minimising bottlenecks, or regulating voltage. Although regulations prevent Norwegian DSOs from owning or operating batteries, they can contract with third-party battery owners for grid support services (eg, congestion management, voltage regulation). The DSO compensates the battery owner for reserving specific power or energy capacity, typically for limited hours per year. The compensation must at least cover the opportunity cost of not participating in reserve markets during those periods.

Combining revenue streams, such as arbitrage, reserve markets and DSO contracts, increases viability and revenue, as idle battery time is minimised and asset utilisation is increased. However, participation in multiple markets must comply with market sequence/timing and technical requirements.

### Obstacles to further deployment

Principal legal and operational risks affecting the construction and operation of BESS assets in Norway arise from several interrelated factors, foremost among them **regulatory and policy uncertainty and grid connectivity risk**.

Norway's position outside the EU results in reactively adaption – rather than proactively – to changes in European regulations affecting exports, market design, and operational standards. Additionally, Norway has limited influence over EU agenda-setting and industrial strategy, which further increases uncertainty for BESS projects.

**Grid connectivity risk** is also substantial. The *Norwegian Energy Regulatory Authority* (“**RME**”) currently does not have the authority to require grid companies to create separate tariffs for BESS. As a result, battery operators may end up paying a double tariff for both production and consumption, which may reduce the commercial viability of the BESS project. A recent report prepared by RME proposes establishing a separate classification for battery storage, not as a producer or consumer, but as a hybrid customer.

The Norwegian government currently declines to implement controversial EU market design rules and resists deeper integration with the European power system, potentially restricting future cross-border opportunities. Ongoing instability in power markets further complicates commercial viability for large BESS projects. Additionally, Norway's policy support systems are not currently robust enough to sustain the large-scale, long-term investments necessary for industrialisation of battery storage.

### Government support schemes or subsidies

Major Norwegian battery cell projects – Freyr, Morrow, and Beyonder – have received funding from public and European sources, including Innovation Norway, ENOVA, SIVA, Eksfin, and EU programs such as Horizon.

Support is provided through subsidies, debt financing, loan guarantees, and equity investment. Subsidies target research, development, and pilot projects, while debt financing and guarantees also support commercial-scale facilities. Companies have also benefited from research grants, notably through the Green Platform initiative.

Support for BESS focuses on project grants and R&D funding from agencies such as the Norwegian Research Council and ENOVA, with investment extending to demonstration projects and competence centers. Fiscal incentives and tax exemptions are available for distributed storage integrated with commercial or industrial renewables; however, these mainly target generation rather than standalone storage.

Policy and political developments influence the availability and duration of such incentives. For instance, exemptions from grid fees and electricity tax have been introduced for intra-zone solar sharing within commercial and industrial sites.

### Bankability

The bankability of BESS projects in Norway depend on several key factors that lenders and investors use to assess risk and project viability.

These are the principal considerations:

- > Predictable and diversified revenue streams
- > Robust regulatory and market frameworks
- > Proven technology and warranty coverage
- > Permitting and grid connection certainty
- > Project sponsors and contractual strength
- > Financial structure and risk allocation.







# Portugal





# Portugal

## Key regulatory aspects

Pursuant to Decree-law no. 15/2022, of 14 January, and the relevant legislation on national electric system (the “**Regulatory Framework**”), **BESS** can be developed, built and operated autonomously or associated with a power plant or self-consumption unit.

**Different licensing procedures** apply to Portuguese BESS projects:

**(a)** licensing of BESS as per the electrical project before the Directorate-General for Energy and Geology (*Direção Geral de Energia e Geologia*, “**DGEG**”), including securing:

- > the power injection capacity title (to ensure the BESS is entitled to inject the energy stored in the public grid), which can be obtained through different routes: title issued by the grid operator; title issued by the grid operator further to a competitive tender procedure; and direct agreement between the applicant and the grid operator. The request is usually accompanied by the delivery of a bond by the applicant of €10,000 €/MVA subject to a limit established under the relevant applicable law.
- > the prior control procedures aimed at obtaining the production licence (*licença de produção*) – prior to the construction of the BESS – and operation licence (*licença de exploração*) – prior to the operation of the BESS, which are carried out before DGEG. In case the installed capacity of the BESS is below 1 MW, this licensing procedure is simplified (subject to a prior registration (*registo prévio*) – instead of the production licence – and an operation certificate (*certificado de exploração*) – instead of an operation licence).

If the BESS is part of a power plant or self-consumption unit, its licensing procedure follows the licencing procedure of the power plant or self-consumption unit.

DGEG introduced simplified prior control procedures for: (i) changes in technology at unbuilt photovoltaic solar plants with an injection capacity reserve title; (ii) autonomous or co-located BESS using renewable energy plants with a reserve title awarded via the general route; small production units (installed capacity up to 1 MW) with existing registration; and self-consumption units with installed capacity over 1 MW and injection capacity exceeding 1 MVA.

In parallel, licensing the interconnection infrastructure (private and public) before DGEG is required, if the energy stored is to be injected in the public grid.

Both private interconnection infrastructures (notably power poles and/or overhead or underground lines necessary to connect the BESS to the public grid and included within the BESS’ perimeter and used by the same only), and public service interconnection infrastructures are subject to licensing. Prior granting by DGEG of an establishment licence (*licença de estabelecimento*) and, following construction, issuance of the relevant operation licence (*licença de exploração das linhas*). The costs related to the interconnection infrastructures from the BESS up to the public grid are borne by the licence holder.

Once the BESS is connected to the public grid, the grid operator issues a connection statement (“*auto de ligação*”).

**(b)** Licensing of the construction of the BESS before the relevant Municipalities, including the construction licence (*licença de construção*) or prior communication (*comunicação prévia*).

**(c)** The environmental impact assessment procedure or similar procedures to be managed by Portuguese Environmental Agency (*Agência Portuguesa do Ambiente*), if applicable.

Although the environmental legislation does not refer to BESS projects as specific projects to be subject to this assessment, the Portuguese Environmental Agency (*Agência Portuguesa do Ambiente*) has issued a note clarifying that BESS projects may be subject to such assessment, if the project contains any component which requires such assessment or in case the BESS project is able to cause significant environmental impacts, taking into account its location, dimension or nature.

If required, the favourable (or conditioned favourable) decision is a condition precedent to the issuance of the construction licence and of the operation licence.

The Regulatory Framework also sets out compensation mechanisms to the relevant municipalities: the holder of a storage facility with grid capacity is above 1 MVA shall transfer to the relevant municipality(ies) a self-consumption unit with an installed capacity equivalent to 0.1% of the grid capacity allocated to the relevant storage facility or, alternatively, public electric vehicle charging stations with an equivalent capacity. Alternatively, if the case

the relevant facilities already includes self-consumption units, the municipality(ies) can opt for a compensation amounting to €1,500 per MVA of the grid capacity allocated.

BESS licence holders are legally responsible, both civilly and criminally, for damages caused during licensed activities and must maintain current civil liability insurance.

### Special authorisations or licences needed

The Regulatory Framework recognises that the increasing prominence of renewable energy sources in Portugal (particularly solar and wind) creates a need for greater complementarity and articulation (to enable more extensive use of renewable energy) and requires the development of new strategies for the operation and management within the national electric system.

Considering that the implementation of BESS systems (autonomous or co-located) is of crucial relevance to ensure a higher share of renewable energy in the energy mix and a greater resilience, flexibility and efficiency in the electric systems, by balancing supply and demand, facilitating the prevention of supply interruptions and improving service quality, the Regulatory Framework, in particular since 2022, **treats BESS like power plants in terms of licensing procedures and other requirements applicable and treatment throughout the life of the BESS.**

In respect of the licensing procedures, BESS are subject to sectorial/prior control procedures which are similar to the ones applicable to the power plants. For reference, in general, BESS may require (i) power injection capacity title; production licence or prior registration; operation licence or operation certificate; licensing of the interconnection infrastructure (private and public) to connect to the public grid; (ii) licensing of the construction before the relevant Municipalities, including the construction licence (*licença de construção*); and (ii) the environmental impact assessment procedure or similar procedures.

In addition, certain legal requirements/obligations applicable to the power plants are generally applicable to the BESS, such as (i) the regime of compensation to the municipalities applicable to the power plant, (ii) the obligation to maintain insurance, and (iii) obligation to install metering systems.

### Revenue streams for grid scale battery assets

The typical revenue streams for BESS are the following:

**Route to Market** – the energy stored can be subject to sale in the *Iberian wholesale electricity market* (“**MIBEL**”). This energy will, therefore, be sold at the energy price (“**SPOT**”) that is being negotiated in the MIBEL. The sale of this energy shall be undertaken through a market agent (*agente de mercado*) which is qualified to act in MIBEL.

**Power Purchase Agreements (“PPA”)** – the sale of the energy stored can be contracted and covered under the terms and conditions of a bilateral PPA, irrespective of its modality (virtual, physical, among others).

**Services to the system** – an additional revenue stream can be from the ancillary services to support grid reliability and stability (in particular, where the energy mix is mainly renewable), including, but not limited to, capacity services, frequency regulation, voltage support and management of the grid congestion, demand responses and back-up services.

### Obstacles to further deployment

The main legal/operational risks to the development, construction and operation of the BESS are the following:

**Technology** – Successful commercialisation and integration of BESS in the national grid relies on scientific and technical consensus regarding its reliability, scalability, and ability to store a minimum energy volume for a set period. The technology must meet safety standards, be commercially viable with balanced costs and benefits, and address risks of obsolescence through ongoing R&D.

**Supply chain** – sponsors focus on the supply of the BESS as a challenge to the smooth implementation of the projects, to the extent that:

- (i) BESS typically requires materials such as lithium, nickel and others which face increasing global demand (also due to geopolitical conflicts) and are subject to price volatility.
- (ii) the manufacturing of these systems is usually concentrated in Asian countries.
- (iii) transportation of heavy equipment to Portugal coming from countries in other continents is subject to shipping delays, port congestion, among other logistics obstacles.

**Decommissioning** – considering that BESS are composed of hazardous materials, the decommissioning of BESS undertakes environmental risks of contamination and waste management, among others. In addition, difficulties may arise in the implementation of the decommissioning procedures – in particular, as of today lack of management entities capable of dealing with such decommissioning, recycling of the materials or costs for the implementation of this procedure.

**Revenue/market risk** – generally, the revenues are dependent on the capacity to ensure the stored energy is consumed/ injected in the public grid and, therefore, its remuneration is subject to frequency regulation, energy arbitrage, capacity markets or grid services, as well as price volatility. Changes in market rules, regulatory frameworks, or support schemes could abruptly alter how BESS are remunerated.

**Regulatory/Permitting and technicalities** – while the regulatory framework has been recently enacted, the novelty around implementation of BESS will impose challenges to the existing framework, meaning that such implementation will require a strict involvement of the legislator and government to keep the pace of the evolution of BESS, its technology and its role within the whole national electric system (eg, structure of the grid to accommodate the introduction of BESS, among others).



**Financing** – the implementation of BESS projects requires a significant investment in the development/construction phase, meaning the recourse to financing (likely, through a project finance structure) is typically required. The challenges identified above should be tackled to ensure the projects' bankability.

### Government support schemes or subsidies

Both the Portuguese government and the European institutions are encouraging the development and construction of BESS by establishing support schemes, subsidies or incentives.

Currently, there are no guaranteed remuneration schemes (as FiT or CfD) in force in the Portuguese jurisdiction benefiting BESS projects.

However, certain subsidies and/or incentives for the development and construction of BESS projects are available, including, but not limited, as follows:

#### (i) Recovery and Resilience Plan (“PRR”)

– PRR is a national program funded by the European Union, with an implementation period until 2026, which will implement a set of reforms and investments, namely, in the energy transition and innovation. BESS projects are eligible to benefit from such PPR funds, provided that the applications are opened.

(ii) **Portugal 2030** – this program aims at implementing an agreement between Portugal and the European Commission which sets out the strategic objectives for 2021–2027,

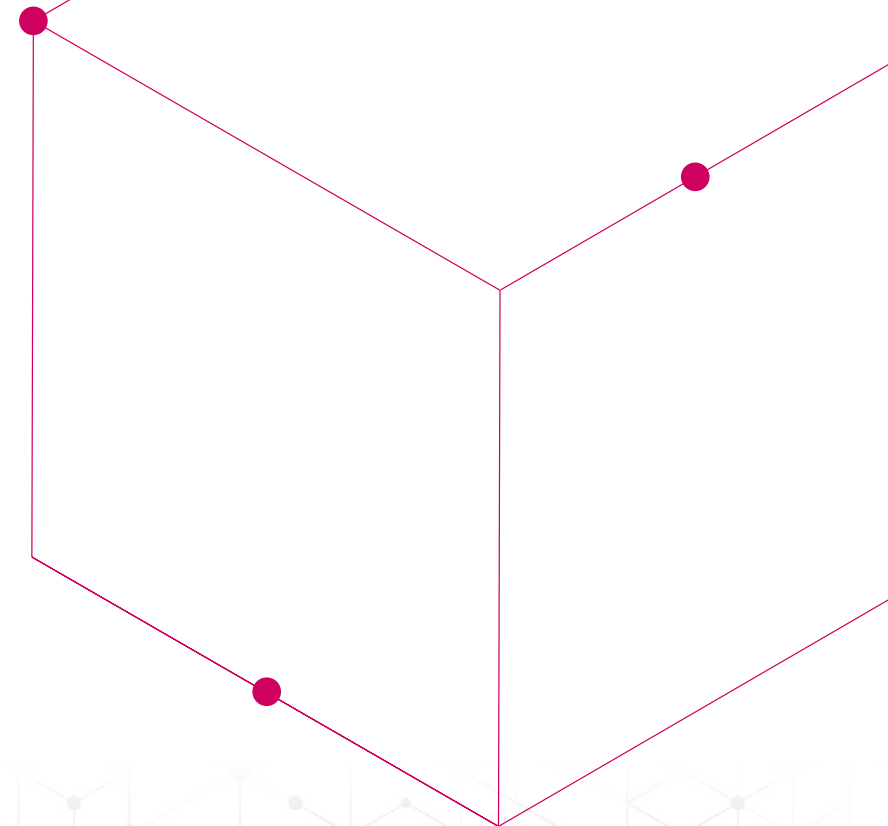
allocating an aggregate amount of c. EUR 23 billion to projects aligned with the five European Union strategic priorities: a smarter, greener, more connected, more social, and more citizen-focused Europe.

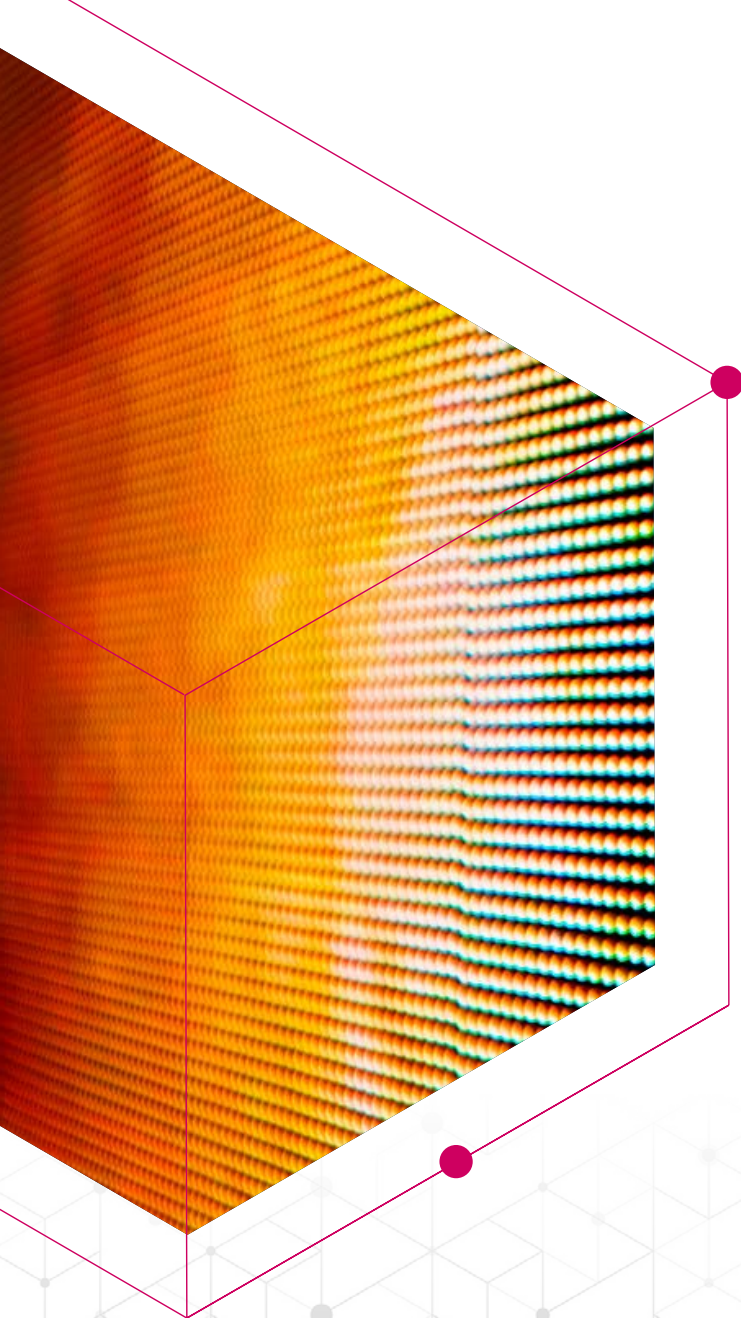
Within this program, c. EUR 3,1 billion are intended to be allocated to projects that foster the green transition, responding to climate emergencies and focusing on decarbonisation, energy efficiency, renewable energy, innovation, circular economy, and sustainable mobility. BESS projects may be eligible projects to benefit from these subsidies.

### Bankability

Financial institutions and typical investors in Iberia are generally interested in funding renewable energy projects in Portugal, including BESS projects as part of the energy transition, and are willing to finance them on a project finance basis. The stage of development and the subsidies granted are deemed critical.

The aspects which would be key to the banks correspond, in general, to the legal/operational risks identified in the ‘Obstacles to further deployment’ section.





Spain





# Spain

## Key regulatory aspects

Commercial scale batteries are considered electricity generation facilities and, therefore, the same regulatory requirements must be met for the development, construction and operation of these projects.

The commissioning and energisation of commercial scale batteries, as well as their evacuation infrastructure, require the following three different yet parallel main procedures:

- (i) transmission/distribution grid level.
- (ii) administrative/sectorial level
- (iii) municipal/local level.

## Special authorisations or licences needed

The owner of a battery storage asset does not need to obtain any special authorisation/licences. The permitting process is exclusively focused on the asset.

From a permitting perspective, developing a commercial scale battery requires:

- > Obtain the relevant grid access and connection capacity from the electricity distribution or transmission system operator. If the battery will be hybridised with an existing project this permit will exclusively cover the right to load electricity into the grid. However, standalone facilities also require obtaining an electricity demand permit to primarily procure the relevant energy to the asset. This also requires providing certain guarantees to the authorities which would be enforced if the facilities are not developed within certain milestones.

- > The facilities must be granted with a prior administrative or authorisation *autorización administrativa previa* (“**AAP**”). As part of this approval, the authority assesses the environmental implications of this infrastructure and the requirements to be met in order to be authorised (these are simplified in some cases for storage facilities). This is followed by the construction authorisation or *autorización de construcción* (“**AAC**”). Both the AAP and AAC must be secured before any construction work can start.

After the plant has been built, the final step is to obtain the commissioning authorisation or *autorización de explotación* (“**AAE**”).

- > Works and activities to be initiated within the territory of a particular town or city must obtain the relevant licences from the city council (except for those minor works or certain activities that are subject only to a previous communication regime). In particular, batteries and the interconnection infrastructure shall be granted by the relevant city council with the works license (*licencia de obras*) and the activity or environmental license (*licencia de actividad o ambiental*), before the initiation of the construction works municipal licenses, as well as the first occupancy license (*licencia de primera ocupación*) and the opening license (*licencia de apertura o funcionamiento*), once the construction work is completed.

## Revenue streams for grid scale battery assets

In general, sources of revenues of commercial scale batteries come from:

- (i) the sale of electricity in the pool market (electricity prices are set daily for the twenty-four hours of the following day (day-ahead market) according to a marginal pricing model)
- (ii) bilateral power purchase agreements (“**PPAs**”).

Capacity markets, which will be designed to allow commercial-scale batteries to participate, are currently being developed in Spain. These markets are expected to be implemented in late 2025, or early 2026.

## Obstacles to further deployment

One of the main barriers is the absence of a comprehensive regulatory framework.

Although significant progress has been made in recent years (such as the publication of the “*Energy Storage Strategy*” by the Ministry for Ecological Transition and Demographic Challenge, as well as the approval of various regulations containing explicit references to battery storage) the regulatory landscape remains incomplete. Legal references are dispersed across multiple regulations, there is no remunerated market for the flexibility services these assets can provide, and administrative procedures remain complex.

Despite these issues, there is a clear intention from policymakers to make the sector more stable. For example, Royal Decree-Law 7/2025 included an entire chapter focused on storage and flexibility (regarding hybridize battery projects). This regulation recognised the importance of accelerating permitting processes for energy storage facilities to ensure the security and stability of the electricity system. However, since Royal Decree-Law 7/2025 was not ratified and was subsequently repealed, the measures it contained did not enter into force. In response, the Government is now processing, under the urgent procedure, a draft Royal Decree (specifically, the “Draft Royal Decree approving certain urgent measures to strengthen the electricity system”) with the aim of incorporating some of the measures that were originally envisaged in Royal Decree-Law 7/2025.

### Government support schemes or subsidies

In addition to the already mentioned capacity payments which are expected to be passed soon, Spain offers a range of incentives and funding schemes to support the development and deployment of battery storage projects. Most current support falls under the Recovery, Transformation and Resilience Plan (*Plan de Recuperación, Transformación y Resiliencia*), which is supported by the European Union through the NextGenerationEU initiative. These incentives are aimed at accelerating the energy transition and decarbonisation of the economy.

Key recent initiatives include:

- > **IDAE grants for hybridised storage (December 2023)** On 28 December 2023, the “Instituto para la Diversificación y Ahorro de la Energía” (“IDAE”) published the definitive resolution for awarding grants to innovative energy storage projects hybridised with renewable energy generation facilities. This funding forms part of the Recovery, Transformation and Resilience Plan and is regulated by Order TED/1177/2022 of 29 November 2022. It targets projects that combine storage and renewable generation to boost integration and flexibility.
- > **Order TED/535/2025** – New funding opportunities (May 2025) Order TED/535/2025 of 28 May 2025 approved the regulatory basis for grants to innovative energy storage projects that may be co-financed with European Union funds. The first call for applications, published on 29 May 2025 and funded by the *European*

*Regional Development Fund* (“**FEDER**” 2021-2027), earmarks approximately EUR 700 million for large-scale and innovative storage initiatives (including stand-alone battery storage, thermal storage, reversible pumped hydro, and hybridised systems with renewables). The scheme aims to finance more than 100 installations with a combined storage capacity of 2.5 to 3.5 GW.

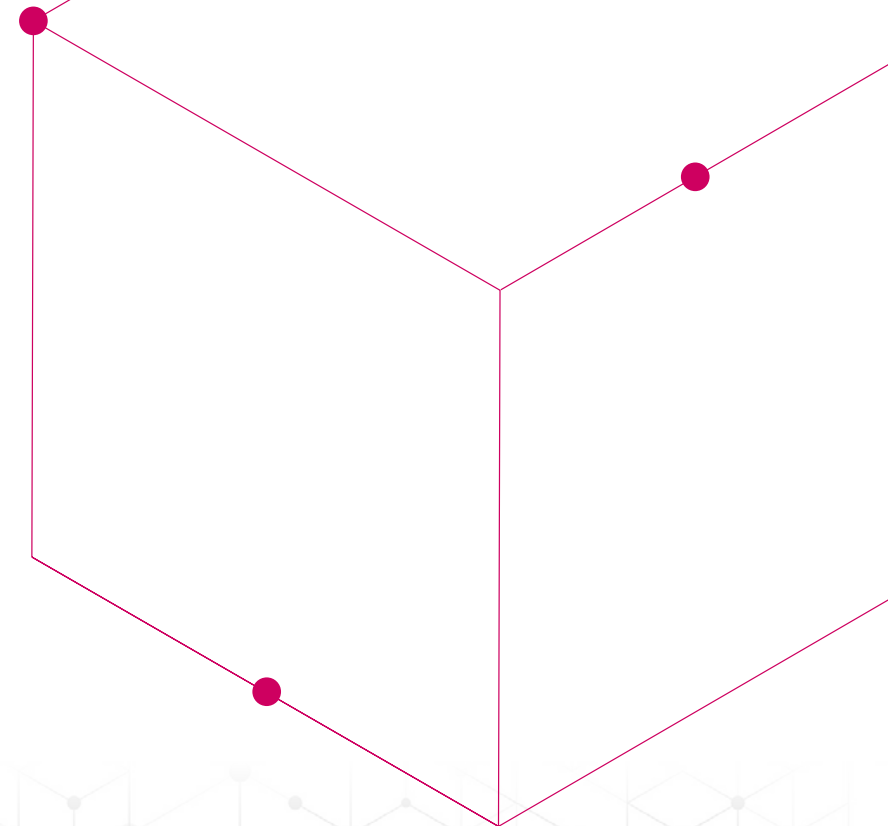
- > **Royal Decree 477/2021** – Support for self-consumption and storage Approved on 29 June 2021, Royal Decree 477/2021 establishes direct subsidies to regional governments (autonomous communities) and the cities of Ceuta and Melilla to implement incentive programmes for self-consumption and associated storage systems. This measure supports the integration of renewables through distributed battery storage, promoting resilience and energy autonomy at local level.

### Bankability

The bankability of BESS projects in Spain – similar to those in Italy – depend on several key factors that lenders and investors use to assess risk and project viability.

These are the principal considerations:

1. Predictable and diversified revenue streams
2. Robust regulatory and market frameworks
3. Proven technology and warranty coverage
4. Permitting and grid connection certainty
5. Project sponsors and contractual strength
6. Financial structure and risk allocation.





Sweden







### Key regulatory aspects

In Sweden, battery energy storage systems (“**BESS**”) do not have a specific legal or regulatory classification. Authorities generally treat BESS as either generation, when they inject electricity back into the grid, or as consumption, when they draw electricity from the grid. This approach means there are currently no standalone licensing requirements or market rules that apply specifically to BESS.

Sweden has implemented Directive (EU) 2019/944, which requires member states to ensure that energy storage facilities are not subject to double grid fees (ie, network charges for both injection and withdrawal of electricity). Although Swedish law does not explicitly prohibit the application of double grid charges, it requires network owners to integrate new electricity producers and BESS into their networks in a cost effective and standardised manner.

In practice, this means that BESS operators are charged the consumption tariff based on the net import and export of electricity between the BESS and the grid. However, as tariff structures are determined by each *distribution system operator* (“**DSO**”), the application of these charges may vary in practice.

Electricity grid operators in Sweden function as regulated monopolies, while electricity trading companies and electricity generation (ie, BESS operators) operate in a competitive market. To prevent cross-subsidisation, there are restrictions implying that DSOs are not allowed to engage in the energy storage business without specific permission from Svenska kraftnät.

### Special authorisations or licences needed

#### Building permit

A new building permit is generally required for larger, standalone BESS sites and must be submitted to the municipality; this process covers site planning, fire safety, environmental impact, and compliance with local zoning. However, if a BESS is integrated into an existing facility with a valid building permit (such as a solar or wind park), a separate permit may not be required if the BESS is covered by an existing permit.

#### Subcontractor for electricity work

The company responsible for the construction on-site must be registered at the Swedish Electrical Safety Agency classified as “Electrical Production Sites.”

#### Grid connection

Before installing a BESS, the relevant DSO must be notified. The DSO will review the notification and decide if any measures in the electricity grid are necessary to be able to connect. The DSO shall, on objective and non-discriminatory terms, connect the installation to the grid if the BESS operator requests that it be connected.

#### Network concession

If the BESS project involves constructing a grid, a network concession from the Swedish Energy Markets Inspectorate (Sw. *Energimarknadsinspektionen*) is required before building or operating the grid. However, a network concession is not needed for an internal grid connecting multiple BESS units with a shared grid connection.

### Ancillary services

The *Swedish transmission system operator* (“**TSO**”) Svenska Kraftnät procure ancillary services such as *frequency restoration reserves* (“**FRR**”) and *frequency containment reserves* (“**FCR**”). Ancillary services are procured openly through competitive bidding in the respective market. To obtain permission to provide ancillary services, a potential supplier must first demonstrate that the technical requirements for the ancillary service are met by completing a prequalification process with a satisfactory result.

As part of market participation, the BESS operator must either register as a *Balance Responsible Party* (“**BRP**”), or they must have a contract with an existing BRP (a balancing party agreement). The BRP is responsible for handling any imbalance costs that may result when the asset provides ancillary services and ensures proper settlement with Svenska kraftnät.

### End-of-life

BESS operators that handle waste that contains or consists of batteries must ensure that such waste is managed properly and in accordance with Swedish law, ie, batteries must be stored and handled safely to prevent environmental risks, with fluids and acids removed before disposal or recycling. Operators must also take suitable measures to meet national recycling and treatment targets.

### Producer responsibility for batteries

Before placing batteries on the Swedish market, a producer must register in the national producer register managed by the Swedish Environmental Protection Agency (*Naturvårdsverket*). In addition, producers are required to report annually the types and quantities of batteries placed on the market, as well as information on collection, recycling, and disposal of batteries, including those exported for processing. Note that this is only applicable if the BESS operator produces or places the battery on the market.

### Environmental permit

While BESS itself typically do not require a standalone environmental permit, projects may be subject to permitting requirements if they are part of a larger development – such as integration with a major power generation facility. In these cases, the overall project may trigger environmental assessment and permitting obligations under Swedish law.

## Revenue streams for grid scale battery assets

### Ancillary services

One of the most established revenue streams for BESS operators in Sweden are ancillary services such as frequency and balancing markets. The Swedish TSO, the public service company Svenska Kraftnät, operates several markets for ancillary services where BESS operators can participate:

- > **FRR:** there are two different products, one that is activated automatically (“**aFRR**”) and one that is activated manually (“**mFRR**”).
- > **FCR:** this includes frequency response under normal conditions (“**FCR-NI**”) and higher response during severe frequency deviations (“**FCR-D**”).

To participate in the market, a BESS operator must either register as a BRP or contract with an existing BRP.

### Wholesale market trading (Nord Pool and EPEX Spot)

BESS projects can also trade electricity on the Nord Pool power exchange by shifting between charging (buying electricity at low prices) and discharging (selling at higher prices).

Note that there is no full-scale capacity market in Sweden as of today, but rather a targeted, temporary capacity reserve managed by Svenska kraftnät.

## Obstacles to further deployment

### Changing regulations

The Swedish energy sector is currently experiencing ongoing regulatory changes at both the national and European Union levels. As a result, there may be some uncertainty until it becomes clear how these changes will be implemented.

### Grid connectivity limitations

Access to grid capacity is essential. In recent years, parts of Sweden (especially the south) have faced congestion and lack of available connection points, which could delay or restrict new assets. Long lead times for transmission upgrades can add uncertainty.

### Local opposition

Community acceptance can affect building permitting and timelines, especially for larger projects or those near residential zones.

## Government support schemes or subsidies

### Credit guarantees for green loans

Through this programme, the Swedish National Debt Office (Sw. *Riksgälden*) can guarantee a portion of a bank loan used to finance projects that contribute to the green transition, such as energy storage investments. If the borrower fails to repay the loan, the Debt Office covers the lender's loss up to the guaranteed share. This reduces credit risk for lenders, making it easier or more affordable for companies to secure financing for projects such as BESS, provided the project meets the required environmental and sustainability criteria.

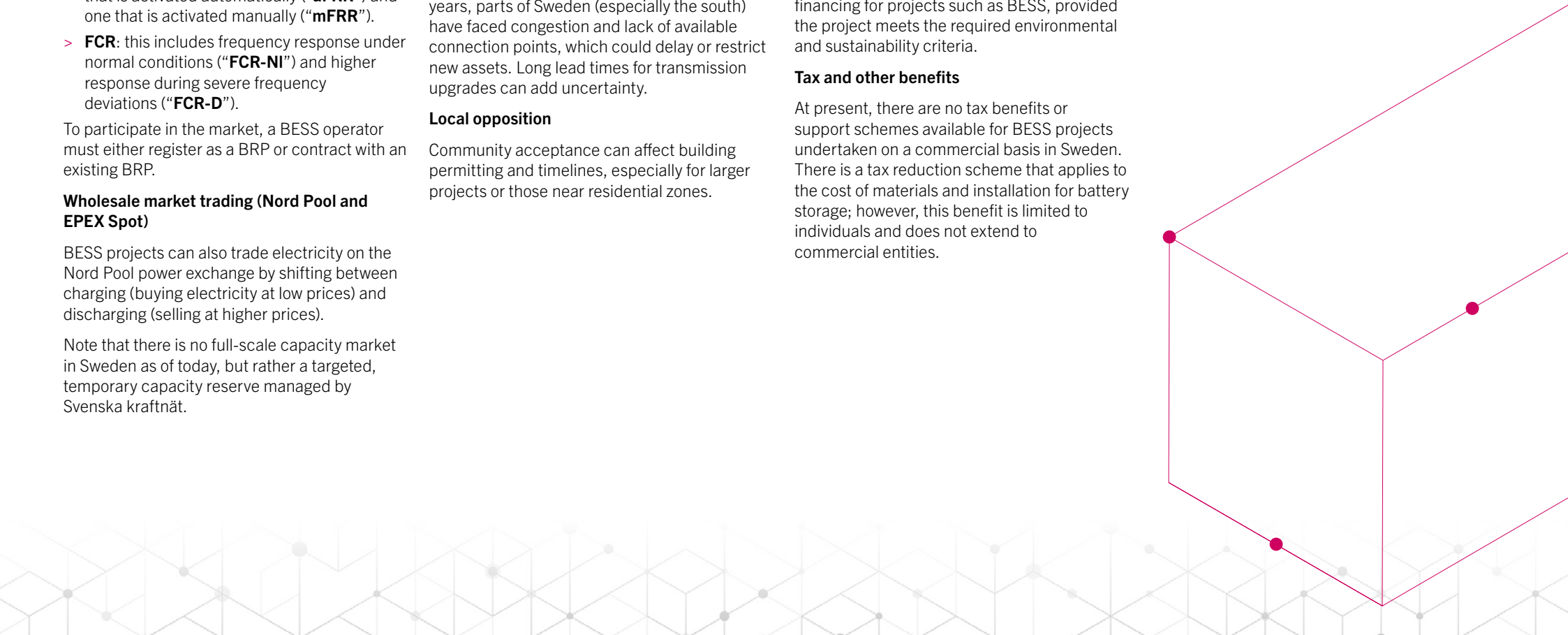
### Tax and other benefits

At present, there are no tax benefits or support schemes available for BESS projects undertaken on a commercial basis in Sweden. There is a tax reduction scheme that applies to the cost of materials and installation for battery storage; however, this benefit is limited to individuals and does not extend to commercial entities.

## Bankability

The bankability of BESS projects in Sweden depends on a combination of predictable revenues, transparent regulation, proven technology, and credible stakeholders.

Lenders and investors typically look for projects with reliable revenue streams, often secured through commercial energy contracts or participation in grid support services, alongside a robust permitting and grid connection process that minimises regulatory risk.





# United Kingdom





# United Kingdom

## Key regulatory and licensing aspects

Historically, the legal framework governing the generation, transmission, supply and distribution of electricity did not explicitly recognise electricity storage technologies as a discrete activity or asset class. This had resulted in a level of uncertainty as to the applicable regulatory regime. More recently, however, electricity storage has been added to the definition of electricity generation for the purpose of the electricity generation standard licence conditions. Unless an exemption applies, therefore, electricity storage assets will require a generation licence pursuant to the Electricity Act 1989 and the Energy Act 2023. Small generators which produce no more than 10 MW from any one generating station, or 50 MW in the case of a generating station with a declared net capacity of less than 100 MW, are exempt from the licence requirement.

If the storage asset is connected to the transmission system, the operator will need to accede to and comply with the Grid Code which governs the relationship between users of the transmission system, the transmission operator (the National Grid) and the *National Energy Systems Operator* (“**NESO**”). There are also several other industry codes and agreements which may be applicable, depending on the nature of the asset. These include the *Connection and Use of System Code* (“**CUSC**”), the *Balancing and Settlement Code* (“**BSC**”) and, for smaller-scale generators connected to the distribution system, the *Distribution Connection and Use of System Agreement* (“**DUCSA**”).

## BESS sector overview

The UK is a leader in the deployment of grid-scale BESS capacity.<sup>1</sup> The promising pipeline corroborates the UK’s continued attractiveness to BESS investors. The growth of BESS has been market driven, without the need for a dedicated revenue support mechanism. It is the potential to access diverse revenue streams, supported by stable regulatory and governmental frameworks, which has been a crucial facilitator for the industry.

In the UK market, BESS assets can participate across most wholesale electricity markets, ancillary services and through private contracts, maximising revenue by “stacking” different revenue streams. Innovation in battery technology is enabling assets to store more power for longer meaning that the opportunities for diversifying revenue are becoming greater. The lack of subsidy scheme has, however, left BESS assets exposed to an element of revenue volatility. This affects the type of investor who can put money into these projects. We discuss the elements of the BESS revenue stack below.

## 1. Capacity Market

The Capacity Market can provide BESS assets with a stable revenue stream. The market is designed to ensure that there is always sufficient generating capacity to meet the demand requirements on the UK electricity system. It offers fixed monthly payments to encourage investment in new generators or to incentivise existing generators to make capacity available when needed. BESS assets are playing an increasingly important role in the Capacity Market and recent auctions have seen substantial BESS participation.

Storage is subject to a de-rating factor of up to 90% in Capacity Market auctions, however. The de-rating figure is designed to reflect the security of supply which an asset brings during the auction target years (either one or four years), notwithstanding that many assets secure contracts of up to 15 years. A percentage of the headline auction tariff is paid in accordance with the applicable de-rating factor. Following consultation during 2024, changes to the methodology for calculating de-rating factors for storage assets were implemented for the T-1 auction for delivery in 2025/26 and the T-4 auction for delivery in 2028/29. The *Scaled Equivalent Firm Capacity* (“**Scaled EFC**”) change adds an extra step to the de-rating methodology to more closely reflect the actual reliability of the relevant storage asset. The change means that BESS assets are likely to see an increase in Capacity Market contract value due to an increase in de-rating factors. This is a significant, positive development for the sector given the importance of the Capacity Market as a secure, long-term revenue stream.

## 2. Ancillary grid services

### Frequency and reserve services

BESS assets can participate in frequency services which provide the initial response to times of system imbalance. Reserve services are then deployed to replace the energy delivered by frequency response. NESO has been in the process of reforming its reserve products to enable it to more efficiently access sources of extra power in a renewables-dominated clean power mix. The reforms have created additional complexity for the BESS industry as products change and competition increases.

The new Quick Reserve product, comprising Negative Quick Reserve (requiring generators to increase demand) and Positive Quick Reserve (requiring generators to increase supply), initially went live in December 2024, with phase 2 live from Summer 2025. BESS assets (along with certain LDES technologies) are uniquely placed to secure these contracts as they can provide this service in either direction, which renewable assets cannot. This new product puts into focus the value BESS assets can bring to the energy system as recognised by NESO’s focus on reform to adapt the system to maximise this potential.

The final procurement framework and design for a new Slow Reserve product aimed at reacting to post-fault disturbances to restore energy imbalances to +/- 0.2Hz within 15 minutes of a loss event (replacing the legacy STOR service) has also been finalised. The first operational day for Slow Reserve was

<sup>1</sup> See European Energy Storage Inventory | JRC SES

anticipated to be in October 2025 but the complexity of implementation into NESO's system has resulted in a delay until early 2026. Once on foot, access to this product will help provide greater certainty to UK BESS assets and investors of the potential cashflows available through participation in reserve services going forward.

This is the last of the reserve reform products to be implemented, providing greater certainty to UK BESS assets and investors of the potential cashflows available through participation in reserve services going forward.

The reserve reform package, along with wider system and operational improvements, will enable NESO to unlock cost savings in reserve capacity and, it is hoped, improve the "skip rate" which occurs when a non-economic dispatch decision is made, often where a smaller number of traditional assets have been prioritised by the system over newer assets like BESS.

### Balancing Mechanism

The Balancing Mechanism can offer higher returns than the wholesale market as energy is bought or sold at a premium. Improvements in NESO's visibility of capacity across the system as well as in whole system operational efficiency is building confidence in BESS assets' participation in the Balancing Mechanism, driving more opportunities for the sector to effectively leverage it as an increasingly important component of the BESS revenue stack.

### Stability and restoration services

Although NESO has historically favoured procurement of stability and restoration services from thermal generators which provide

physical inertia to the system, progress in battery technology means batteries can now provide virtual inertia. Access to such "green inertia" is important for NESO given it is cheaper for consumers and increases low-carbon operation of the energy system. This is evidenced by the world's first BESS project to provide stability services, the Blackhillock BESS project in Scotland, coming online in March 2025. Other BESS projects have secured similar contracts in recent years and will be deployed in due course.

### 3. Wholesale trading/energy arbitrage

The share of energy arbitrage in the BESS revenue stack has increased significantly over recent years and is expected to grow further. The changing mix of renewable energy in the UK system (which leads to lower prices on windy days, for example) and the UK's reliance primarily on gas for dispatchable power (resulting in high price peaks) continues to present opportunities for arbitrage for BESS assets. Co-location of BESS with wind and solar generation presents another tranche of opportunity. Using the same point of connection to the grid optimises grid use but also provides direct opportunities for arbitrage.

### 4. Tolling and floor agreements

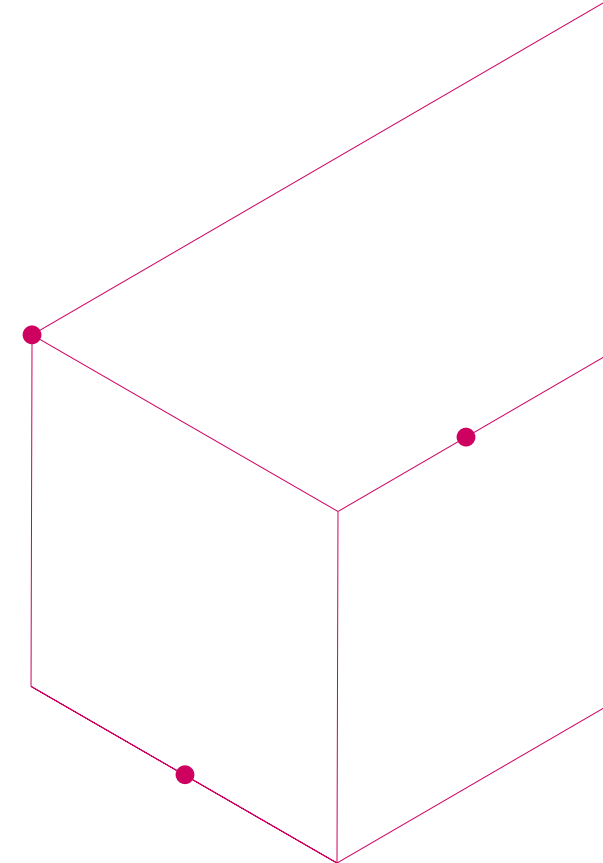
Floor agreements are a useful tool for BESS assets to ensure minimum revenue generation through a private contract. Tolling Agreements are an evolution of this product; they provide fixed contracted revenues by shifting market revenue risk onto the offtaker. These types of arrangements are still relatively new to the BESS sector but have become more attractive in the light of greater saturation of the ancillary grid services market and wider uncertainty around revenue levels. They are a useful means

of shoring up guaranteed revenue to support bankability on BESS assets. Flexibility in the arrangement can be retained through short contract terms, allowing assets to adjust the composition of the revenue stack over time as other revenue streams change.

### Long Duration Energy Storage ("LDES")

Pumped hydro is the most well-established form of LDES but new technologies such as liquid air and compressed air are coming to the fore. The UK has not built any LDES since the 1980s. Long lead times, risk of cost overruns, supply chain risks and nascent technology risk (when applicable) all mean that these large-scale projects can be difficult to finance. In particular, the complexity of supply chains for technology like pumped hydro, with relevant suppliers globally mobile, has a negative bearing on investment decisions.

In recognition of the unique benefits LDES can bring to the energy system and the scale of investment needed to bring these projects to fruition, in 2024 the UK Government announced that it would support LDES assets through a new cap and floor scheme, based on the successful interconnector regulatory framework. LDES is seen as particularly important for the GB energy system's longer-term flexibility and additional operability needs. By enabling the storage of electricity when there is over supply and releasing it over sustained periods of high demand or cost, LDES can help reduce waste, lower prices and strengthen energy security.





As different technology types face different barriers to deployment, the scheme will run in two 'streams':

- > Stream 1 will include established technologies such as pumped hydro storage and *liquid air electricity storage* ("**LAES**").
- > Stream 2 will include novel technologies such as *compressed air electricity storage* ("**CAES**") and flow batteries.

The eligibility requirements for each stream will differ, with established technologies requiring a higher *Technology Readiness Level* ("**TRL**").

### Cap and floor regime

The cap and floor regime works by offering a minimum revenue guarantee (the "floor") to protect against low returns, while placing an upper limit (the "cap") to protect consumers and share excess profits. The mechanism is intended to help developers recover all economic and efficient capital and operational costs (subject to compliance with their licence obligations and any incentive mechanism) by using the gross margin for both the cap and floor levels. The Government has clarified that it considers gross margin to be the difference between revenues earned from dispatching energy and services of the asset and the costs of buying the energy to charge the asset. The proposed cap will be a "soft" cap, meaning that if revenues exceed the agreed cap, any upside or additional revenue will be shared between the project and the consumer.

The standard period of the cap and floor regime will be 25 years, but the Government has acknowledged that this it may be subject to change as project-specific characteristics may warrant consideration of alternative durations in certain circumstances.

The first LDES cap and floor application window opened in April 2025. Ofgem is consulting on the Project Assessment Framework, with the final version to be published in Q3 2025. Decisions on projects successful in the first window will be made in Q2 2026, with a view to deployment of assets between 2030 and 2033.

For more information on the LDES cap and floor regime, see our Sustainable Futures blog post [Super-batteries – a look at Ofgem's new cap and floor regime](#)

### Outlook for BESS and LDES in the UK

There is a clear direction from Government on the need for a huge ramp up in electricity storage capacity, both long- and short-duration. The successful story of BESS deployment so far looks set to continue and with innovation in technology also bringing down the cost of LDES, now supported by the cap and floor, Government is hoping for further success. NESO's recently reformed grid connections process also prioritises connection for battery projects which align with the Government's Clean Power 2030 strategy.

NWF has stated its intention to continue to support both BESS and LDES assets amidst revenue volatility in the case of the former and high capex and lead times in the case of the latter. Support from NWF for financing of these projects can take the form of debt, equity or guarantees. There is confidence in the availability of private finance to facilitate these

projects, in the context of the renewed certainty of policy direction, regulatory support and subsidy input which Government has set out.

Investors and developers must, however, continue to be alive to the dynamics affecting the revenue streams available for BESS projects. In the same way that the potential for revenue stacking is one of the key attractions for BESS investors in the UK, it also presents unique challenges. Each revenue stream may be subject to change over time, which complicates modelling for future scenarios. If stakeholders put in place mechanisms to ensure they stay informed of the changes, however, and maintain business processes which allow the asset to be nimble and pivot between revenue streams as opportunities arise, prospects remain attractive. The impact of the subsidy for LDES assets on the BESS market has also yet to play out, with some industry participants expressing concerns that allowing subsidised LDES assets to compete with unsubsidised BESS assets in ancillary grid services markets could distort pricing and bidding behaviour.

The importance of BESS and LDES to the UK energy system is clear. The path forward may be more complex, but opportunities for growth and innovation in the markets remain substantial.

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