Whitepaper

Charging Ahead: Showcasing the Attractiveness of Standalone BESS Investments in Austria

Vienna, 16th April 2026

Jonas Puck, Jim Lefebre, Konrad Graf, Jannik Wiegert

DEPARTMENT FÜR WELTHANDEL
DEPARTMENT OF GLOBAL BUSINESS AND TRADE

Institute for International Business
Welthandelsplatz 1, Gebäude D1
1020 Wien, Österreich

Table of Contents

List of figures

List of tables

Table of abbreviations

Abbreviation	Definition
aFRR	Automatic Frequency Restoration Reserve
APG	Austrian Power Grid
BESS	Battery Energy Storage System
BOP	Balance of Plant
CAPEX	Capital Expenditure
CEE	Central and Eastern Europe
COD	Commercial Operation Date
DACH	Region including Germany, Austria and Switzerland
DSCR	Debt Service Coverage Ratio
DSO	Distribution System Operator
EAG	Erneuerbaren-Ausbau-Gesetzespaket
ElWG	Elektrizitätswirtschaftsgesetz
ElWOG	Elektrizitätswitschafts- und -organisationsgesetz
EPC	Engineering, Procurement and Construction
FPA	Flexibility Purchase Agreement
FCR	Frequency Containment Reserve
GW	Gigawatt
GWh	Gigawatt-hour
IDA	Intraday Auction(s)
IPP	Independent Power Producer
mFRR	Manual Frequency Restoration Reserve
MW	Megawatt
MWh	Megawatt-hour
NEP	Austrian Network Development Plan
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer
OPEX	Operating Expenditure
PV	Photovoltaic
RTB	Ready-to-Build
SDAC	Single Day-Ahead Coupling
SNE-GV	Systemnutzungsentgelte-Verordnung für netzdienliche Speicher
SoC	State of Charge
TSO	Transmission System Operator
VPP	Virtual Power Plant

Executive Summary

Austria's power system is entering a phase where flexibility is becoming critical for both system operation and investment planning. Rapid growth in photovoltaics and wind increases forecast uncertainty and volatility patterns. In this environment, front-of-the-meter standalone Battery Energy Storage Systems (BESS) are increasingly relevant to address these changing system needs. However, system value does not automatically translate into bankable projects: investment viability depends on whether flexibility can be monetised under Austrian market rules and whether project execution risks are sufficiently controlled.

This whitepaper assesses the attractiveness of standalone BESS in Austria through a practitioner lens. It is based on 19 expert interviews across the Austrian BESS ecosystem (utilities, developers, banks and equity investors, optimisation providers, regulators/legal advisors, and TSOs) and complemented by targeted desk research.

The analysis finds that Austria can offer an attractive near-term earnings environment for BESS through revenue stacking across wholesale markets (day-ahead and intraday) and ancillary services (FCR and aFRR). Market participants are already pursuing a range of routes-to-market that reflect different preferences for dispatch control and merchant risk: fully merchant models, tolling/fixed offtake arrangements, and hybrid structures combining downside protection with partial upside participation. At the same time, interviewees consistently caution that revenues are not "structural free money." As more projects reach commissioning, competitive pressure is expected to increase and margins are likely to compress.

A central message is that real-world revenue potential is constrained by two binding layers: the technical operating envelope (e.g., power/energy limits, state-of-charge boundaries, degradation) and market design constraints (e.g., gate closures, prequalification). Because revenues are not additive, credible underwriting requires co-optimisation modelling that explicitly captures opportunity costs between markets and produces lender-grade downside cases rather than extrapolating recent market conditions.

Execution risk is a decisive determinant of bankability. Austrian projects frequently face critical-path uncertainty in grid connection and permitting, with timelines varying significantly by municipality and state. Long-lead electrical components and grid-side equipment can add further schedule risk. As a result, project outcomes depend heavily on early, site-specific diligence and on converting "theoretical dispatch" into dispatch that is actually deliverable under connection constraints.

The single most important sensitivity remains regulatory implementation, especially the practical treatment of network charges and the operationalisation of "system-serving" criteria under the ElWG and the recently delivered draft of the SNE-GV. While the reform could improve the legal basis for BESS, profitability and bankability depend on whether fee exemptions and flexible access translate into auditable, predictable, financeable project-level connection terms.

For developers and investors, the implication is clear: standalone BESS in Austria can be attractive, but outcomes are execution-driven. Project success depends on rigorous site selection, conservative and transparent revenue-stack modelling, and robust contracting that allocates dispatch, performance, and pass-through risks in a way that withstands downside scenarios and evolving market conditions.

1. Introduction

1.1. Motivation and objective

Austria's electricity system is entering a phase where short-duration flexibility becomes a requirement for both system operation and investment planning. Renewable generation continues to expand, particularly photovoltaics (PV) and wind (Biermayr et al. 2025). Because their output is weather- and daylight-dependent, it is inherently variable, leading to intraday ramps and increasing forecast uncertainty. As a result, imbalances occur more frequently and distribution-level operational constraints become more common in Austria.

Front-of-the-meter standalone Battery Energy Storage Systems (BESS) offer a technical response to these changing system needs. A BESS is a grid-connected battery plant that operates as an independent, market-facing asset, charging and discharging at a dedicated connection point to deliver short-duration flexibility over minutes to a few hours. BESS can absorb energy when generation exceeds demand or local network hosting capacity and deliver energy when residual load rises. BESS can also provide ancillary services with fast response times, subject to market prequalification and operational compliance. This makes BESS commercially relevant in wholesale and ancillary energy markets.

However, systemic value to the Austrian electricity system alone does not automatically translate into bankable projects. The investment case for standalone BESS in Austria depends on whether a project can translate flexibility into cash flows under Austrian market rules, while accounting for constraints such as round-trip efficiency, battery degradation, state-of-charge limits and grid connection constraints.

The Austrian market for standalone BESS is developing quickly, yet outcomes still depend on execution quality. Developers, utilities, and optimisation providers are building pipelines, but the Austrian BESS ecosystem has a shorter operational track record than more mature neighbouring markets such as Germany or Italy. Project-level uncertainty remains material. Grid connection processes often drive timelines and can constrain feasible dispatch after commissioning. Permitting timelines vary by municipality and province and can change the critical path of a BESS project even when the technical concept is straightforward. Revenue stacking assumptions must align with market access conditions, fees, and compliance obligations, and they need to remain financeable under conservative downside cases. Location matters: Local network conditions and price formation differ across regions and voltage levels. Long asset lives and high upfront capital expenditure (CAPEX) amplify the cost of overestimating feasible operation or underestimating delivery risk. Investors and lenders therefore need modelling that links technical design, market access, and contracting to the Austrian context, rather than importing generic business cases from other jurisdictions.

This whitepaper seeks to address that need with an Austria-specific, practitioner-oriented lens. It focuses on standalone BESS connected to the grid and operated as market-facing assets (front-of-the-meter). Unless stated otherwise, the analysis refers to a predominantly fully merchant case. The evidence base combines expert interviews across the Austrian BESS ecosystem with targeted desk research. The document does not restate generic storage theory. It provides an account of how stakeholders in Austria actually structure routes-to-market solutions and assess financeability under real constraints.

1.2. Methodological approach and structure

This whitepaper applies a mixed-method approach with a strong emphasis on expert interviews across the Austrian BESS ecosystem. Interviews were selected as the primary evidence base to capture operational practice, market frictions, and decision logic as applied in the Austrian context, rather than relying solely on stylised assumptions. The interview insights are complemented by desk research to anchor the discussion in technical and economic concepts and to supplement interview statements.

The study focuses on the firm-level attractiveness of front-of-the-meter standalone BESS in Austria. It therefore evaluates technical parameters, revenue mechanisms, and market access conditions alongside decision-relevant constraints such as contracting structures and financing requirements. The scope is intentionally limited to standalone assets connected to the grid. Co-located configurations, for example PV plus storage, and behind-the-meter applications are excluded as they introduce materially different regulatory, metering, and dispatch boundary conditions.

In total, 19 expert interviews were conducted. The sample includes five Austrian utility companies (e.g., EVN, Verbund, Wien Energie), four representatives from Austrian financial institutions (e.g., Raiffeisenlandesbank Niederösterreich-Wien, Raiffeisenlandesbank Steiermark), three project developers and independent power producers (e.g., Scale Energy, Voltida), three academic representatives (e.g., from the Austrian Institute of Technology and the WU Vienna), two battery trading and optimisation providers (e.g., Enspired), a network operator, and a legal advisor. For sectoral and regional context, the study reviews relevant economic and energy data. These inputs are used to support descriptive context and triangulation, while the core findings and implications are derived from the interview synthesis and the targeted review of relevant studies and market documentation.

Drawing on this evidence base, the whitepaper provides a structured view of the market as it stands today and assesses the attractiveness of front-of-the-meter standalone BESS for Austrian companies. It aims to provide decision-relevant insights for project development and investment assessment, and to inform policy discussions on a framework that supports system stability under increasing shares of variable renewable generation.

It is structured as follows: Chapter 1 outlines the motivation and objectives of this whitepaper and sets out its methodological approach. Chapter 2 sets the scene for Austria's evolving flexibility needs in the energy system and defines the scope on front-of-the-meter standalone BESS. Chapter 3 maps Austria's BESS market environment, including key player groups, business models and routes-to-market, enabling stakeholders, and the regulatory frameworks that shape investment attractiveness. Chapter 4 focuses on the revenue side of a BESS project, outlining addressable market segments (wholesale, intraday, imbalance and ancillary services), the practical technical and market constraints that limit feasible dispatch, and how these constraints affect real-world revenue stacking. Chapter 5 summarises the cost side, covering the main CAPEX and OPEX components (including commercial optimisation costs) that determine all-in economics. Chapter 6 provides an Austria-focused lifecycle view of project execution, highlighting typical sequencing, interfaces, and critical-path risks. Chapter 7 synthesises the market outlook and derives actions to improve market conditions and reduce delivery friction. Chapter 8 concludes with the key implications for investment decisions for BESS in Austria.

2. Austrian market context for standalone BESS

Chapter 2 provides the Austrian market context required to assess front-of-the-meter standalone BESS as investable flexibility assets. It defines the scope and reference configuration used throughout this whitepaper and summarises the system and market characteristics that create value pools for short-duration flexibility. Building on this context, the chapter then explains the specific system role of standalone BESS in Austria to set out where and why batteries complement existing flexibility and which practical constraints shape real-world contribution.

2.1. Scope and definition of BESS in this Whitepaper

This whitepaper focuses on front-of-the-meter standalone battery energy storage systems as investable, market-facing flexibility assets in Austria. Standalone BESS are grid-connected battery plants operated at a dedicated connection point and dispatched to earn revenues in wholesale and ancillary markets, subject to technical limits and market rules. The analysis centres on short-duration flexibility over minutes to a few hours (typically ~0.5–4h), where batteries can respond quickly to changing system conditions and market signals.

Clear scope boundaries are essential because metering, dispatch control, and regulatory treatment differ materially across storage configurations. The scope therefore excludes behind-the-meter and residential batteries, which primarily optimise local consumer needs and sit under different tariff and settlement regimes. It also excludes co-located configurations (e.g., PV plus storage), because co-location changes the operational perimeter, contractual structures, and dispatch constraints in ways that are not comparable to standalone assets. Unless stated otherwise, “BESS” in this report refers to front-of-the-meter standalone BESS.

To keep quantitative examples concrete, this whitepaper uses a representative reference configuration while keeping conclusions broadly applicable. Unless stated otherwise, illustrative calculations are anchored in a typical Austrian project scale of roughly 10 MW / 20 MWh (2 hours) at distribution-level connections (network level 4). The qualitative logic and framework apply more broadly across standalone BESS but also depend on project-specific factors such as site conditions, connection terms, and dispatch strategy.

2.2. What makes Austria an attractive market for standalone BESS

Austria offers a renewables-heavy electricity system where short-duration flexibility is increasingly valuable, even though the broader energy balance remains fossil-import dependent. Domestic primary energy production covered roughly 38% of total primary energy supply in 2024, while imports covered about 62%, and domestic production itself is characterised by a high renewable share (BMWET 2025). For front-of-the-meter standalone BESS, the investment relevance sits most directly in the power sector, where volatility, balancing needs, and grid constraints determine which flexibility can be monetised.

The Austrian electricity sector is distinctive in Europe because a hydro-dominated generation fleet delivers a very high renewable share while still leaving meaningful room for short-term variability. The share of renewable electricity consumption in gross electricity consumption reached 87.8% in 2023, placing Austria among the leading EU countries on this metric (see Figure 1 – source: (BMWET 2025). This outcome primarily rests on a structurally hydro-dominated generation fleet. Hydropower covered between 54% and 67% of domestic electricity generation in recent years, depending on hydrological conditions. At the end of 2024, Austria had 3,260 hydropower plants with more than 15 GW installed capacity, including 117 storage plants (BMWET 2025).

At the same time, wind and photovoltaics are now material contributors and continue to grow, shifting the system towards stronger intraday ramps and a higher need for fast flexibility. Wind's contribution to domestic electricity generation rose to 11.8%, and installed wind capacity reached 4.03 GW in 2024. PV reached 9.1% of domestic electricity generation, and cumulative installed capacity rose to almost 9.4 GW peak by 2024, after annual additions of 2,603 MWpeak in 2023 and 2,510 MWpeak in 2024 (BMWET 2025). Together, these trends reinforce the core Austrian feature: a renewables-heavy system where dispatchable hydro remains central, but variable renewables are growing fast enough to materially shape volatility, spreads, and operational constraints that matter for flexible assets.

The resulting value pools for standalone BESS are created by a set of interacting operational drivers. First, PV growth increases the frequency of low-price periods and steepens sunrise and sunset ramps, while forecast updates increase intraday re-optimisation needs. Second, hydrological conditions and reservoir strategy influence price levels and intraday spread patterns, which can expand or compress arbitrage opportunity over time. Third, electrification reshapes demand and can tighten peak and balancing conditions in cold periods, even when annual energy balances remain comfortable. For BESS, these drivers matter because they directly affect the frequency and magnitude of tradable spreads, balancing scarcity, and the feasibility of revenue stacking. Based on practitioner interviews for this paper, experts state that the Austrian BESS market has low maturity but many projects are currently in the pipeline; several experts estimate that the market is approximately two years behind Germany in commercial deployment.

Whether these opportunities can be captured in practice depends on grid feasibility at the connection point. Grid constraints increasingly act as the real-world filter that determines whether the operational drivers described above translate into monetisable flexibility. As power flows and connection demand rise, congestion and operational interventions become more relevant for commercial operation (Wiedner et al. 2025). For standalone BESS, the implication is straightforward: a price signal may indicate "charge" or "discharge," but import/export limits or local congestion at the connection point can prevent the intended operation. This can create locational value, but it can also introduce curtailment risk and reduce the deliverability of contracted services. Project-specific grid studies and early connection assessment therefore define the feasible operating window and are central to whether a revenue stack is bankable.

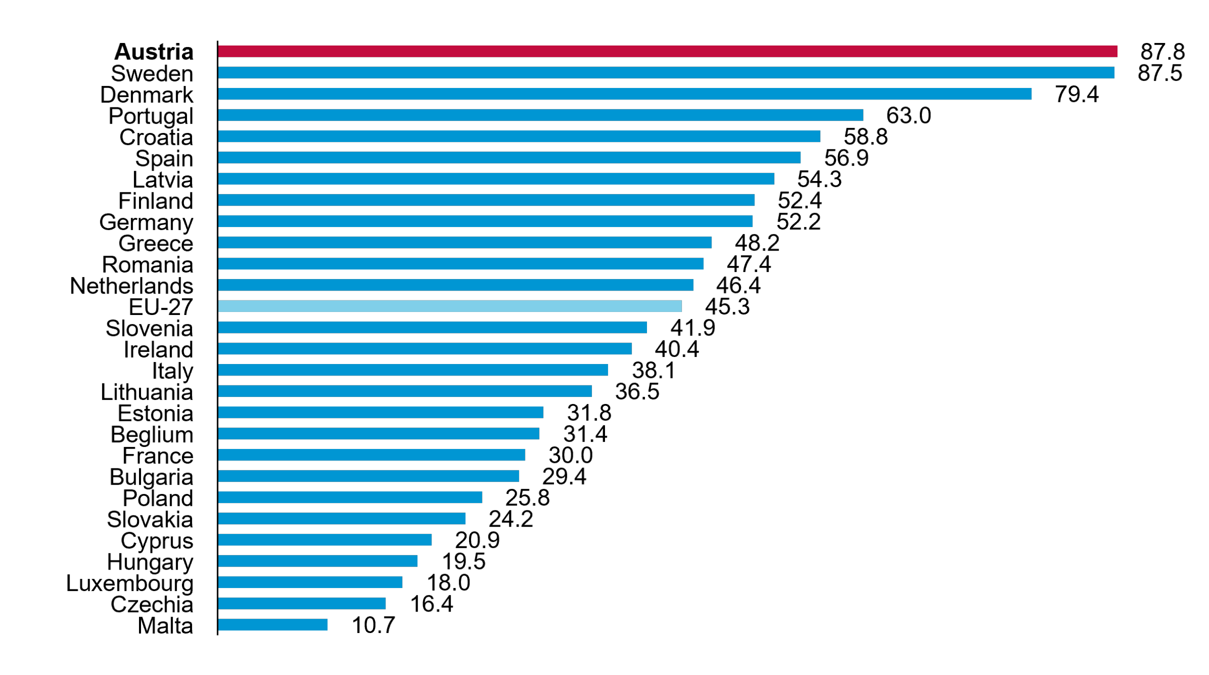

Figure 1: Share of renewable energy in gross electricity consumption, 2023 (%)

In parallel, Austria's integration into the European power system shapes how volatility and congestion are reflected in tradable prices and hedging options. Austria participates in coupled European day-ahead markets and operates cross-border market coupling at multiple borders. Since 2018, Austria and Germany have separate bidding zones, which affects local price formation and congestion patterns and therefore matters for BESS dispatch and hedging. This separation, at this point, costs Austria approximately €200-€500 million in grid costs compared to Germany (APG 2025).

In summary, Austria combines strong structural drivers for short-duration flexibility with a market context where outcomes depend on execution quality, especially grid connection feasibility, operational strategy, and the ability to stack revenues under Austrian rules. The following section builds on this market context by describing the specific system role and operational contribution of BESS.

2.3. Role of standalone BESS in Austria's energy system

Standalone BESS are emerging as a core enabler of Austria's next phase of renewable integration because they provide fast, modular, and location-flexible short-duration flexibility. Building on the market context described, batteries are particularly relevant where intraday ramps, forecast updates, and local congestion patterns require flexibility that can respond within seconds to minutes and be deployed at the grid nodes where constraints occur. This reveals a structural feedback loop: every new megawatt of renewables heightens system volatility and thus amplifies the need for fast, modular, and scalable balancing solutions, for which BESS are particularly well suited (Sayer et al. 2024).

BESS complement Austria's existing flexibility, especially hydropower, by addressing the "fast and local" part of the flexibility problem. Hydropower reduces structural scarcity risk and remains the backbone of dispatchable renewable generation and reserve provision. However, hydropower flexibility is shaped by hydrological conditions, reservoir strategy, and the time value of water across seasons. As PV and wind expand, the system more frequently experiences short-lived ramps, forecast errors, and constraint-driven patterns that benefit from rapid response and modular siting.

Operationally, the system value of BESS in Austria is driven by three core capabilities:

- **Fast frequency and balancing response**. Subject to prequalification and operational compliance, BESS are well suited to providing ancillary services such as Frequency Containment Reserve (FCR) and Automatic frequency restoration reserve (aFRR) because they combine fast ramping with precise setpoint tracking. This supports system stability.
- **Intraday flexibility and ramp management.** BESS can absorb energy during surplus periods and deliver energy during peak residual load, supporting ramp management and short-term peak shaving. This is particularly relevant in a system with growing PV, where net load ramps and forecast updates increasingly shape intraday dispatch decisions.
- **Local constraint management (where feasible).** When deployed at the right nodes and operated within grid limits, BESS can help manage local congestion and reduce curtailment risk by shifting energy across constrained hours. At the same time, grid and market rules determine what can be monetised in practice; feasibility at the connection point therefore remains the binding condition for both system contribution and project economics.

For the Austrian energy transition, the practical contribution of BESS is therefore less about bulk energy shifting and more about enabling reliable system operation under higher shares of variable renewables. Batteries provide a scalable option to add short-duration flexibility without the geographic constraints that apply to many conventional storage solutions. Their modularity allows deployment along the transmission–distribution interface and in regions where grid constraints are most binding, provided connection capacity and permitting allow.

For investors and system stakeholders, the implication is that BESS are moving from a "nice-to-have" to a financeable flexibility asset class, provided projects are executed well and operated with robust optimisation and risk management. As the pipeline scales, value will increasingly depend on execution quality (grid connection feasibility, availability concepts, and compliance), as well as on commercial setup (market access arrangements, dispatch strategy, and the ability to stack revenues under Austrian rules). This is moving BESS from a supplementary role to a systemic necessity, underpinning national goals for supply security, grid resilience, and decarbonisation. Utility-scale projects such as NGEN's Arnoldstein-Gailitz BESS (NGEN 2025a) illustrate this shift, showcasing grid-support applications and congestion relief.

In summary, standalone BESS support Austria's ability to integrate more variable renewables by providing fast, short-duration flexibility at scale. Their role is strongest where intraday volatility, balancing needs, and local constraints intersect and where grid connection and market access translate flexibility into bankable cash flows.

3. BESS market environment in Austria

Austria's rising need for fast flexibility creates the underlying demand for standalone BESS. However, demand alone does not create investable projects. This chapter therefore examines how Austria's standalone BESS opportunity is currently translated into actual projects. It maps the key market participants, commercial structures, enabling stakeholders, and regulatory conditions that together determine whether standalone storage moves from pipeline opportunity to bankable and executable investment.

3.1. Market-active players

Austria's market for standalone BESS remains early-stage in terms of commissioned capacity but has now entered a period of active market entry and competitive build-up. Interviewees describe a market that is no longer characterised mainly by abstract interest in storage, but by a growing race to secure grid access, site control, and viable project pipelines before the most attractive development positions are taken. As a result, the market remains small in terms of completed standalone BESS assets yet already shows much stronger momentum in the volume of projects being screened, originated, permitted and currently under construction. In practice, this creates a pronounced first-mover dynamic in which market players seek to lock in scarce development positions early, increasingly professionalise screening and development processes to identify suitable locations and often use smaller initial projects to build execution and operating experience before scaling into larger portfolios.

Within this emerging market environment, the Austrian standalone BESS market can be usefully structured around three investor "archetypes". These differ mainly in their investment motivation and risk appetite, in how they originate projects and secure scarce grid and land positions, and in how they structure route-to-market and operations. Austrian market experts consistently identified three core groups as the most relevant market participants: utility companies, IPP/platform-style investors, and pure-play developers. The following section examines these three groups in more detail, focusing on how they differ in their investment logic, financing and ownership approach, execution model, and route-to-market setup within the Austrian standalone BESS market.

3.1.1. Utility companies

Utilities are among the most visible and credible market participants in the Austrian standalone BESS market because they combine long-horizon capital, project-development capability, grid-interface know-how, established compliance processes, and often direct access to trading and optimisation functions. For this archetype, BESS are typically not only viewed as stand-alone "trading machines", but as strategic infrastructure assets that sit at the intersection of renewable integration, system stability, and commercial flexibility monetisation. Utility investment logic therefore tends to combine strategic system positioning with a return-based infrastructure case: batteries can complement existing flexibility portfolios, support the integration of growing renewable generation, and create a market-facing asset class that fits naturally into broader utility decarbonisation and network strategies. Public examples illustrate this positioning. EVN explicitly frames utility-scale battery storage as part of its Strategy 2030 investment agenda alongside networks and renewables and has publicly stated a battery-storage expansion target capacity of 300 MW by 2030 (EVN 2025).

In practical terms, utilities usually approach standalone BESS as infrastructure investors with strong execution capabilities and balance-sheet support. Utilities tend to predominantly finance BESS projects via corporate financing rather than project finance. Their relative advantage lies less in any formal privilege in the grid-connection process than in their ability to manage existing interfaces more effectively: they often already control relevant sites, understand grid and permitting workflows, and can use public network-capacity information to identify promising nodes. At the same time, utilities may benefit indirectly from their installed renewables base, legacy infrastructure, and existing site footprints, which can make it easier to identify feasible locations or repurpose existing industrial and thermal sites.

A recurring utility pattern in the interviews is a “learn-and-scale” rollout logic. Utilities often begin with smaller pilot or first-of-a-kind projects in order to build internal confidence on supplier selection, commissioning routines, control systems, and operating procedures and then scale into larger assets once internal execution confidence improves. This staged approach is also visible in public disclosures. EVN’s battery rollout combines smaller operating capacity today with larger projects already announced, including a 70 MW battery at Theiß and a 10 MW battery at Dürnrohr, while EVN had 12 MW of installed battery capacity as of December 2025 (EVN 2026). Verbund illustrates a related variant of the same archetype: its battery build-out has so far been more advanced in Germany than in Austria, with 110 MW already in operation across the two markets as of September 2025, 195 MW under implementation, and more than 300 MW in development (Verbund 2025; 2026b). This supports the broader interview insight that utilities sometimes transfer execution templates from more mature neighbouring markets into Austria once local conditions become sufficiently clear.

Another characteristic of the utility archetype is that route-to-market and optimisation capabilities are often internalised more strongly than for other investor groups, even if hybrid models with external partners also exist. Some utilities rely on in-house optimisation platforms or group subsidiaries, while others combine internal commercial steering with specialist external support. Publicly, EVN points to its ownership of CyberGrid and the CyberNoc software platform for trading flexible assets such as batteries (EVN 2024), while VERBUND states that battery marketing is carried out on its in-house Volery optimisation platform and highlights its own trading algorithms, lifecycle modelling, and around-the-clock market operation (Verbund 2026a). This internal or hybrid optimisation capability matters because utility investors typically assess BESS over longer holding periods and place greater emphasis on degradation, availability, and lifecycle economics than on short-term upside alone. Overall, the utility archetype is therefore defined by patient capital, infrastructure integration, and a preference for controlled scaling rather than rapid merchant expansion for its own sake.

3.1.2. Independent power producers and platform investors

Independent power producers (IPPs) and platform investors approach standalone BESS less as a system asset embedded in a broader utility portfolio and more as a scalable infrastructure product. Their investment logic is typically driven by repeatability, portfolio economics, and capital efficiency.

Accordingly, the objective is to build a pipeline of projects that can be developed, financed, delivered, and operated under a relatively standardised template while capturing early-market value pools in a still-forming market. Interview evidence suggests that these players are generally less motivated by "system stewardship" than utilities and more by risk-adjusted returns, bankability, and the ability to scale. In that sense, they tend to underwrite standalone BESS as a replicable asset class rather than as a strategic extension of an existing generation or network footprint.

In practical terms, this means that IPPs and platform investors usually apply a stricter filter to project selection than utilities. They screen for sites where the project can be industrialised: a credible grid-connection pathway, manageable permitting risk, a standardisable technical configuration, and a route-to-market setup that can be replicated across a wider portfolio. They also tend to think more explicitly in portfolio and capital-recycling terms. Interviewees described a build-scale-operate-and-refinance, or ultimately build-and-sell, logic rather than a pure long-term hold model. This does not make long-term operability less important warranty design, degradation assumptions, and repowering options still matter over a 15- to 20-year asset life. Yet ownership itself is often treated more flexibly than for utilities. Financing is therefore often organised at platform or HoldCo level during the build-out phase, with portfolio governance and refinancing optionality playing a more visible role than in the case of balance-sheet-driven utility investors.

Compared with utilities, these players also tend to rely more often on external or hybrid route-to-market arrangements during the early phase of portfolio build-out, at least until sufficient scale exists to justify a fully internal trading and optimisation setup. At the same time, the boundary is not rigid: some platform-style players actively build proprietary optimisation capabilities or combine internal commercial steering with specialist partners. Public examples help illustrate the range within this archetype. Blackvolt presents itself as an Austrian first mover with an integrated model spanning project development, financing, and operations, while also highlighting algorithm-supported trading and optimisation strategies and access to capital partners (Blackvolt 2026). NGEN reflects a more cross-border platform logic: it presents itself not only as a battery-storage developer and operator, but also as an aggregator, electricity supplier, and provider of grid services, and has explicitly positioned Austrian battery projects within a wider DACH expansion strategy (NGEN 2025b; 2026).

Overall, the IPP/platform-investor archetype is defined by standardisation, speed, and portfolio scalability. Relative to utilities, these players are less anchored in existing infrastructure footprints and more focused on identifying repeatable project opportunities that can be executed under a disciplined and repeatable investment template. Where grid access, permitting, and technical scope are sufficiently predictable, they can move quickly; where those conditions are less clear, they tend either to price execution risk more conservatively or to partner with local developers who can bring projects to ready-to-build (RTB) status. In Austria, this makes them particularly relevant as accelerators of market build-out: they bring specialised capital, a portfolio mindset, and an execution model designed to scale once the first wave of projects proves bankable.

3.1.3. *Pure-play project developers*

Pure-play project developers are market-relevant because they address what Austrian interviewees repeatedly describe as the central scarcity in standalone BESS: originating suitable sites and converting early-stage development inputs into bankable, transaction-ready projects. Their core value proposition is therefore not primarily long-term asset ownership, but early-stage de-risking. In practice, this means securing site control, advancing grid-connection processes as early as possible, structuring the technical concept, and building a documentation package that later-stage investors, utilities, or lenders can evaluate and finance. In that sense, developers monetise the conversion of fragmented local opportunities into investable projects.

Within this archetype, two commercial variants can be observed. The first is the classic RTB-focused developer, whose business model is to originate, de-risk, and sell projects at or close to ready-to-build stage. The second is a developer-owner hybrid model which shares some features with the IPP model. The model begins from the same development logic but aims to retain ownership, roll equity, or participate in asset-level value creation once financing and operating capabilities are sufficiently established. Interview evidence suggests that both variants are present in Austria, but the RTB-sale model remains particularly relevant because many developers can finance early-stage work, but not necessarily full construction and long-term ownership. This gives the project developer archetype a distinctive financing posture: early development is often funded through corporate capital, venture or family-office backing, and project-specific special purpose vehicles are typically capitalised more fully only once grid terms, land rights, and permitting pathways have become sufficiently robust.

Operationally, pure-play developers are often highly selective and strongly grid-driven in how they build their project pipelines. Interviewees described a development logic centred on locations where existing or underused grid access can be unlocked, including industrial sites, legacy energy or industrial locations, and other areas where grid connection prospects are structurally more favourable. This reflects a clear preference for sites with a more credible connection pathway over purely greenfield projects that depend on scarce new substation capacity. This helps explain why developers tend to place such a strong premium on speed in origination: site control and grid progress are often the decisive value drivers in the Austrian market. Their business model is therefore closely linked to process standardisation. Screening tools, repeatable leasing structures, permitting workflows, and modular technical concepts all help turn local project sourcing into a scalable pipeline. Public examples showcase this logic. Voltida illustrates the developer–owner hybrid variant: it presents itself as Austria's pioneer in BESS project development, reports more than 150 MWh in development, and positions its offering as a one-stop development model covering site search, feasibility assessment, planning and approval through to implementation and commissioning (Voltida 2026). Scale Energy reflects a more industrial-site-focused developer model: it emphasises battery deployment at industrial locations using existing grid connections, highlights streamlined digital execution processes, and states that it had more than 1 GW of decentralised BESS projects under development across Europe by July 2025, with activity spanning Germany and Austria (Scale Energy 2025; 2026).

Overall, the pure-play developer archetype is defined by origination capability, local execution, and value creation through de-risking rather than immediate long-term ownership. Relative to utilities and IPPs, these players are typically closer to the bottlenecks of land, permitting, and grid access, and they play a critical role in translating early-stage market momentum into investable project inventory. At the same time, the boundary to the other archetypes is becoming more fluid: some developers remain focused on RTB monetisation, while others are beginning to extend into ownership, operating models, and route-to-market capabilities as the Austrian standalone BESS market matures.

Having outlined the key investor groups active in Austria, the next section examines how these players monetise standalone BESS through different commercial structures and route-to-market models.

3.2. Commercial structures and route-to-market models for standalone BESS

Commercial structures for standalone BESS are best understood as risk-allocation and revenue-stabilisation frameworks rather than as technology choices. At their core, two questions determine how a project earns money and how financeable it becomes: who controls dispatch and who bears merchant market risk. Across our interviews, Austrian market participants consistently converged on three dominant archetypes that are also reflected in broader European market practice: fully merchant, tolling / fixed offtake, and hybrid structures that combine downside protection with partial upside participation. Public market-facing descriptions by Enspired and Esforin use a very similar distinction (Enspired 2025; Esforin 2024).

No single standard commercial model has yet emerged in the Austrian market. Instead, route-to-market arrangements are typically negotiated bilaterally between asset owners and optimisers, aggregators, or offtakers, and are shaped by investor profile, financing strategy, project size, and the evolving regulatory and market environment. A recurring financing insight from the interviews is straightforward: merchant exposure may be attractive from a returns perspective, but bankability generally improves once at least part of the revenue stream is fixed or otherwise contractually stabilised. This section therefore examines the three main structures in terms of how they work operationally, why sponsors choose them, and what they imply for underwriting and bankability in the Austrian context.

3.2.1. Fully merchant

In a fully merchant structure, the asset owner retains full upside participation but also remains directly exposed to market volatility. Revenues are earned directly from wholesale and ancillary-service markets, while dispatch is either executed in-house, typically by utilities or larger IPPs with trading capability, or outsourced to a specialist optimiser under an optimisation agreement. In practical terms, this is a route-to-market model in which the optimiser trades and dispatches the battery on behalf of the owner, while the owner retains the underlying market risk and most of the upside.

Operationally, the optimiser co-optimises the battery across the available revenue stack, typically including day-ahead, intraday, balancing, and imbalance-related opportunities, subject to technical constraints such as state of charge, cycling limits, efficiency, warranty limits, and asset availability (see in more detail chapter 4.2 on constraints). Commercially, remuneration is usually structured as a revenue or profit share rather than a fixed fee. Interview evidence in Austria points to optimiser remuneration often being discussed as a share of net revenues, frequently in the broad range of roughly 6–10%, although levels depend on negotiation, asset size, and the service scope.

Austrian market participants described the merchant model as attractive in three situations. First, where sponsors are willing to accept higher volatility in exchange for full upside participation. Second, where balance-sheet-backed owners or experienced investors do not require a heavily contracted base case. And third, where early projects are used as a deliberate “test-and-learn” phase before moving toward more structured contracting. At the same time, the interviews also suggest that fully merchant structures are the hardest to finance with debt, because revenue volatility remains with the owner and the debt case must rely more heavily on forecasts, downside cases, and confidence in operational delivery. This is consistent with broader market commentary that merchant revenue tends to offer higher upside but also materially higher risk than contracted alternatives (Enspired 2025; Electrical Energy Storage 2025).

3.2.2. *Tolling / fixed offtake*

In a tolling or fixed-offtake structure, the asset owner reduces merchant exposure by securing a contracted payment stream, typically expressed as a fixed or availability-style payment over a defined period. The commercial attraction of this model lies in its ability to create stable and plannable cash flows, making it the structure that is generally most supportive of financing. In exchange, an offtaker or tolling counterparty receives dispatch rights over all or part of the battery and captures most of the upside from wholesale and ancillary markets (Enspired 2025; Electrical Energy Storage 2025).

Operationally, tolling can be structured in different ways, but the core logic remains the same: the owner gives up commercial control in exchange for revenue certainty. Contract design therefore focuses less on upside sharing and more on availability requirements, performance obligations, metering and settlement rules, pass-through costs, and the allocation of non-performance and compliance risk. In financing terms, the key value of tolling is that it creates a more stable cash-flow profile and clearer debt-service visibility than a pure merchant case. This aligns closely with Austrian interview evidence from lenders, who repeatedly emphasised that BESS becomes bankable once sufficiently fixed and defensible cash flows are available to support debt service.

Interviewees described tolling as particularly relevant where project finance is targeted, where lenders require stronger visibility on DSCR, or where investment committees want a more contracted base case. The structure is especially attractive where the counterparty is better placed than the owner to manage market risk and cross-market trading complexity. The trade-off is equally clear: tolling reduces volatility and supports leverage, but it also transfers a large share of upside economics to the toller. As the Austrian market matures, several market participants expect stronger competition among offtakers and optimisers, which could put pressure on tolling margins and improve terms for asset owners.

3.2.3. Hybrid structures (floors, capped floors and related variants)

Hybrid structures sit between fully merchant and full tolling. Their central purpose is to provide downside protection without fully surrendering upside participation. In practice, these structures include floor arrangements, capped floors, and other revenue-sharing or swap-like mechanisms in which the owner receives a minimum level of revenue while still participating in upside above that level, either fully or up to a cap. In that sense, hybrid models are designed as a middle ground between pure merchant exposure and fully contracted tolling, combining a more protected downside profile with continued participation in favourable market outcomes (Enspired 2025; Esforin 2024).

Operationally, hybrids require more detailed settlement design than either of the two polar models. The contract must specify which revenue streams are covered by the floor, how upside is shared, whether a cap applies, which costs remain pass-through, and how outages, constraint-driven non-delivery, or optimisation underperformance are treated. Because BESS revenues are not fully additive across services, hybrids also need clear rules for dispatch priorities across wholesale and ancillary markets and for the management of state-of-charge constraints and availability commitments.

Market participants describe hybrid structures as a pragmatic compromise in two situations. First, where sponsors want to preserve upside during a favourable market phase but still need a downside anchor for internal approval or lender comfort. Second, where the project is expected to evolve over time from an initially more merchant setup toward a more structured cash-flow profile without locking into a fully fixed tolling agreement from day one. This logic is also consistent with broader market-facing positioning, where floor structures are characterized as balancing downside protection with continued upside participation, while contracted revenue more generally is seen as easier to finance than pure merchant exposure (Enspired 2025; Pexapark 2026).

Aspect	Fully merchant	Hybrid / floor[1]	Tolling / fixed offtake
Dispatch control	Owner or optimiser on owner's behalf	Usually optimizer / offtaker within agreed sharing logic	Offtaker / toller
Merchant risk borne by	Owner	Shared	Offtaker / toller
Revenue visibility	Low	Medium	High
Downside protection	None	Floor / partial protection	High / fixed payment
Upside retained by owner	Full	Partial to substantial	Limited
Typical owner remuneration	Net market revenues less optimiser share	Minimum payment plus upside share	Fixed / availability-style payment
Debt friendliness	Low	Medium	High
Typical fit	High risk appetite, balance-sheet-backed, learning phase	Balanced risk-return, financing support with upside retention	Debt-focused, contracted base case, cash-flow stability

None **Merchant exposure / upside retained by asset owner** **Full**

Full **Revenue certainty for asset owner** **None**

1. Note: *"Hybrid / floor" can include floor-without-cap and floor-with-cap variants. The exact structure depends on how downside protection, upside sharing, and dispatch rights are contractually defined.*

Figure 2: Comparison of commercial structures for standalone BESS

3.2.4. *Implications for the Austrian market*

Taken together, the Austrian evidence suggests that the choice between merchant, tolling, and hybrid structures is driven less by a rigid market standard than by the interaction of investor type, financing objective, and risk appetite. In practice, the decisive distinction is not necessarily project size alone, but whether the owner is seeking full upside capture, minimum revenue certainty, or an intermediate structure that supports both financing and upside retention. Merchant models tend to fit stronger balance sheets and early market learning, tolling fits cases with high emphasis on debt bankability and cash-flow stability, and hybrids fit sponsors seeking a compromise between the two. From a bankability perspective, the recurrent message from Austrian lenders is simple: the more revenue uncertainty can be converted into contractible and operationally deliverable cash flow, the easier the project becomes to finance.

However, choosing a commercial structure is only part of the equation. Whether merchant, tolling, or hybrid models are actually investable and scalable depends on the availability of capital, credible market analytics, route-to-market capabilities, and execution support. The following section therefore turns to the key enablers behind standalone BESS bankability and scaling in Austria.

3.3. Key enablers for BESS project inception, bankability and scaling

In Austria, the key enablers around front-of-the-meter standalone BESS are not secondary stakeholders, but the practical interfaces through which projects become financeable, executable, and scalable. Across interviews, a consistent picture emerges: projects fail less on the technical viability of battery storage itself than on whether they can secure capital, build a bankable revenue case, establish a credible route-to-market, and progress reliably through grid, permitting, site-control, and regulatory processes. The following section examines these enabling functions across debt, equity, analytics, optimisation, and execution-related gatekeepers.

3.3.1. *Debt financiers (banks / infrastructure lenders)*

On the debt side, key actors in Austria are primarily regional and national commercial banks (notably institutions such as Raiffeisenlandesbanken and Sparkassen), specialist infrastructure lenders, and, in some cases, public or supranational financing institutions. Debt is one of the decisive scaling levers for standalone BESS. In the Austrian context, the debt discussion must be differentiated by financing model. Corporate-backed utilities may finance batteries on balance sheet or through general financing lines, whereas standalone project financings are typically assessed on a non-recourse or quasi-non-recourse basis and therefore require the project to carry its own debt service from contracted or otherwise sufficiently defensible cash flows. Interview evidence suggests that this distinction matters in practice: banks are materially more comfortable where revenues are fixed or partially stabilised, while fully merchant structures tend to imply lower leverage, tighter covenants, or a need for stronger sponsor support. This is consistent with broader European market practice. In Germany, recent financings such as the €86.5 million Stendal transaction and the Schuby financing were structured around multi-year tolling agreements, illustrating how predictable revenue streams can support bankable BESS debt structures even without direct subsidy support (Osborne Clarke 2025; 2026).

A central friction point in Austria is that many lenders still treat standalone BESS as a comparatively new asset class. Interviewees repeatedly stressed that banks are generally willing to take risks they can underwrite, e.g., construction risk, counterparty credit, contractual revenue cover, and technology performance within a defined warranty envelope. However, they are rather reluctant to absorb open-ended electricity trading risk. This makes standalone BESS materially different from more mature project finance asset classes such as PV. In PV, the core lending question often centres on whether the plant is built and performs as expected against more standardised and often more predictable revenue assumptions; in standalone BESS, by contrast, lender comfort depends much more heavily on the interaction between revenue model, optimiser or offtaker quality, operational deliverability, and contractual risk allocation.

What lenders focus on is correspondingly consistent across interviews and wider market guidance. In broad terms, lender assessment revolves around three dimensions:

Sponsor strength and capital support. Sponsor quality, management know-how, and implementation track record matter disproportionately, because many standalone BESS sponsors, optimisers, and counterparties are still comparatively new to lenders. In practice, banks place strong weight on whether the sponsor has credible delivery capability, sufficient financial substance, and enough equity to absorb risk ahead of debt. Interview evidence also points to indicative underwriting reference points, although these are better understood as lender-specific guideposts than as fixed market standards. Equity contributions are generally expected to be materially higher than in utility-scale PV and often fall in a broad range of roughly 20–35%, with the upper end becoming more relevant for larger or more merchant-exposed standalone BESS projects.

Cash-flow visibility and route-to-market credibility. Lenders test whether the revenue stack is sufficiently robust under downside assumptions, including stress cases on spreads, balancing-market participation, utilisation, and regulatory cost items. In practical terms, a central lending requirement is that debt service must be covered on the basis of sufficiently secured revenues, rather than relying primarily on open merchant upside. Typical debt service coverage requirements often range in the 1.15x–1.30x range on sufficiently secured cash flows, with stronger cushions required where revenue visibility is weaker. This is also why lenders increasingly want not just a forecast, but a credible explanation of how revenues will actually be realised in day-to-day operation, by whom, and under which contractual incentives. The quality of the route-to-market setup therefore becomes a core credit issue, including the identity and quality of optimisers, offtakers, and other contractual counterparties. Interview evidence further suggests that Austrian lenders frequently rely on external revenue studies and market reports from specialist providers to benchmark or plausibilise business plan assumptions, often combining such third-party inputs with internal credit analysis and conservative backtesting approaches. A recurring theme in the interviews is that tolling or floor structures are most supportive of debt sizing where their tenor covers a substantial share of the financing period, whereas purely merchant tails are more readily treated as upside than as the primary basis for repayment.

Execution readiness. Banks also place strong weight on whether the project is sufficiently advanced and technically robust to support a credible execution path. This includes the maturity of grid connection and permitting, as well as the strength of the execution and technology package more broadly. Lenders therefore scrutinise EPC and OEM credibility, warranty package, availability guarantees, degradation assumptions, and replacement strategy, alongside the degree of certainty on grid-connection terms and permitting status (DNV 2026; Zenobe 2023). Debt tenors, in turn, are usually shorter than the technical life of the asset and tend to cluster in the 7–10-year range, occasionally extending somewhat beyond that where contractual revenue visibility, sponsor quality, and warranty coverage are particularly strong. Put differently, debt becomes available once revenue uncertainty can be translated into a sufficiently contractible and operationally deliverable cash-flow profile that remains resilient under lender downside cases.

3.3.2. Equity providers

Equity in the Austrian standalone BESS market remains heterogeneous, with different investor groups entering at different points on the risk curve and for different strategic reasons. In practice, the main buckets observed are strategic balance sheets (especially utilities and energy corporates), infrastructure funds and institutional capital pursuing platform and repeatability logic, family offices and private capital that are often willing to move earlier and decide faster, and developer or sponsor equity that evolves from RTB origination into retained ownership as track record builds. Across these groups, a recurring Austrian insight from the interviews is that route-to-market design and grid feasibility are equity questions as much as technical ones: merchant-heavy exposure may be attractive in early market phases, but it becomes harder to underwrite at scale without robust modelling, operational proof points, and credible market-access arrangements.

Compared with debt providers, equity investors can absorb a wider range of risks, but they are also more differentiated in what they are willing to take. Strategic balance sheets may accept lower near-term yield in exchange for system positioning, portfolio synergies, and long-duration optionality. Institutional and platform-style investors tend to focus more on repeatability, governance, and a pathway toward scalable portfolios with refinancing potential. Family offices and private capital, by contrast, are often relevant where projects still require speed, flexibility, and higher risk tolerance before full institutional bankability has been established. Interview evidence further suggests that equity remains particularly important in Austria because many projects reach technical plausibility before they reach a capital structure that is financeable: developers may have site control, know-how, or a viable concept, but still lack sufficient sponsor equity to leverage debt. In that sense, equity often acts not only as risk capital, but as the bridge between project origination and bankability.

Public examples illustrate the diversity of equity backing. Voltida explicitly presents itself as part of the Gasser+Partner group and highlights support from the Kollitsch Group as shareholder, alongside group companies spanning asset management, energy supply, and flexibility marketing (Voltida 2026). This points to a sponsor-capital model in which industrial know-how, family-office-style capital, and route-to-market capability are bundled within one platform. Blackvolt, by contrast, emphasises a strong capital base through cooperation with capital partners and positions financing capability as a core part of its development model (Blackvolt 2026). These examples do not define the whole market, but they illustrate a broader Austrian pattern: equity is often closely tied to strategic partnerships and sponsor ecosystems rather than coming from a single standardised investor profile.

Overall, equity is the capital layer that gives Austrian standalone BESS projects their initial momentum. It absorbs early-stage uncertainty, enables project development before debt becomes available, and determines how much merchant risk, execution complexity, and route-to-market exposure a project can carry. As the market matures, contracted structures and stronger operating track records are likely to broaden the investor base further; for now, however, equity remains highly selective and closely linked to sponsor credibility, project maturity, and the ability to translate early market opportunity into a finance-able ownership case.

3.3.3. Market analytics, forecasting and commercial benchmarking providers

As Austrian standalone BESS moves toward more institutional financing, market analytics, forecasting, and commercial benchmarking are becoming a prerequisite rather than a “nice-to-have”. These providers form part of the enabling infrastructure that helps translate an emerging and partly merchant revenue opportunity into a business case that investors, lenders, and sponsors can assess, challenge, and structure. In practice, their role spans three closely linked functions: investment screening, revenue underwriting, and commercial benchmarking.

At the screening stage, such providers help assess whether a project is attractive not only from a grid and permitting perspective, but also in terms of price-formation logic, flexibility value, and likely market access. At the underwriting stage, they support merchant-case assessment through downside sensitivities, scenario analysis, and long-term market views that can be used to benchmark sponsor assumptions. At the commercial stage, they provide reference points for the structuring and pricing of tolling, floor, swap, and other partially contracted arrangements. In that sense, these providers do not replace investor or lender judgement, but they help reduce one of the central frictions in the Austrian BESS market: the gap between a plausible commercial opportunity and a financeable revenue case.

This function is particularly relevant in Austria because the standalone BESS market still has a limited operating track record, while bankability increasingly depends on whether merchant assumptions can be explained and defended in a disciplined way. Their outputs are therefore often used not only by sponsors, but also by banks and investment committees to benchmark business plans, test downside resilience, and challenge overly optimistic assumptions. More broadly, benchmark products and market-facing contract commentary can also help standardise how market participants discuss commercial structures and key risk allocations in a market that is still maturing.

Across interviews, Aurora Energy Research was explicitly referenced as a “gold standard”, especially where sponsors seek to justify merchant exposure to investors or lenders. AFRY was also mentioned as a relevant alternative, particularly in the context of market analysis and long-term revenue forecasting. In addition, market participants pointed to Inercomp as another provider used in Austrian financing and underwriting contexts. Taken together, these examples illustrate a broader point: in the Austrian standalone BESS market, credible external analytics are increasingly part of the enabling infrastructure for project bankability, contract structuring, and capital allocation.

3.3.4. Route-to-market, optimisation and aggregation providers

Route-to-market, optimisation, and aggregation providers are commercially central to Austrian standalone BESS because the revenue case is not created by market access alone, but by the ability to convert flexibility into executable and compliant dispatch across multiple market layers. In practice, these providers sit at the intersection of value creation and deliverability: they translate market opportunities into bids and dispatch schedules, manage state-of-charge and cycling under technical and warranty constraints, and ensure that telemetry, activation, and product-specific obligations are met in day-to-day operation. Market participants highlight that the “spreadsheet business case” only becomes real if commercial optimisation and operational compliance work reliably in practice.

The role of optimisers typically spans four linked functions:

- **Market operations and bidding.** They place bids and manage dispatch across day-ahead, intraday, and balancing markets, including position updates close to delivery, imbalance exposure, and the continuous adjustment of market positions as prices, forecasts, and system conditions change.
- **Cross-market co-optimisation.** They allocate power and energy across markets under both technical and commercial constraints, including state of charge, cycling limits, efficiency, degradation considerations, availability, product definitions, gate closures, and prequalification constraints. In practice, this is the core function that determines whether a battery’s flexibility is monetised efficiently rather than sub-optimally fragmented across individual markets.
- **Compliance and technical interfaces.** They ensure that telemetry, activation performance, control systems, and product-specific availability commitments are met in day-to-day operation. This is particularly relevant for participation in FCR and aFRR, where Austrian market access depends not only on commercial readiness but also on successful interaction with APG processes such as prequalification, framework agreements, and ongoing operational compliance.
- **Bankability support.** Optimisers are increasingly drawn into financing processes to help plausibilise forecasts, explain operational feasibility, and demonstrate how projected revenues can actually be delivered in practice. In a market where standalone BESS is still relatively new for many Austrian lenders, optimisers are therefore not only commercial service providers, but also part of the broader bankability narrative around risk allocation, route-to-market credibility, and lender-facing reporting.

Commercially, these providers can sit in different positions within the value chain. In fully merchant structures, they often act as external optimisers remunerated through revenue- or profit-sharing arrangements. In more stabilised structures, the same provider may also act within a floor or tolling framework, effectively taking on a larger share of market risk in exchange for contractual rights over dispatch. A useful practitioner distinction is therefore less the brand name than the operating role: some providers act primarily as optimisers and traders for single assets or portfolios, while others provide the aggregation or virtual-power-plant layer that enables market access and operational control across multiple assets. In Austria, both models are relevant.

Three differentiators between different providers were mentioned repeatedly by market experts: first, multi-market capability and automation maturity, especially the ability to optimise across wholesale and balancing markets in real time; second, balancing-market and qualification experience, including how turnkey the provider is in APG-facing processes; and third, bankability and reporting quality, meaning transparent performance evidence, lender-friendly reporting, and clearly defined contractual risk allocation. Public examples illustrate the range of models in the Austrian market. Enspired positions itself as an AI-based optimiser for battery storage across wholesale, ancillary-services, and imbalance markets and explicitly offers fully merchant, floor, and tolling-style revenue models (Enspired 2026). Larger utilities, by contrast, may internalise parts of the route-to-market function. EVN illustrates this through its ownership of CyberGrid, whose FlexRegler platform represents the aggregation and VPP route into Austrian balancing markets and is publicly described as enabling ancillary-services participation through a highly automated flexibility platform (Cybergrid 2026). VERBUND, in turn, markets battery optimisation through its in-house Volery platform (Verbund 2026a).

Overall, route-to-market, optimisation, and aggregation providers form part of the enabling infrastructure that makes Austrian standalone BESS investable and operable. They do not merely improve revenues at the margin; they shape whether forecast revenues can be captured in practice, whether balancing-market participation is technically deliverable, and whether investors and lenders view the commercial model as credible enough to scale.

3.3.5. Further grid, permitting, site and legal execution enablers

Beyond financing, analytics, and route-to-market, Austrian market participants consistently point to a set of execution and market-access gatekeepers that often determine whether a BESS pipeline actually converts into commercial operation date (COD). In the Austrian context, these are not secondary enablers, but core project interfaces: even where the commercial case appears attractive, projects can still stall if grid access, permitting, site control, or regulatory implementation remain unresolved. Across interviews, a recurring message is that execution quality matters at least as much as business-case logic.

Grid operators and market gatekeepers are central because they determine both physical project feasibility and access to monetisation pathways. On the one hand, the relevant transmission system operator (TSO) or distribution system operator (DSO) determines whether and under which conditions a BESS project can be connected to the grid. On the other hand, participation in balancing markets requires additional technical and contractual admission, especially via APG. This makes grid access more than a pure infrastructure issue: connection terms, operational constraints, and telemetry requirements directly shape dispatch feasibility, market participation, and ultimately the bankability of the project.

Permitting authorities, municipalities, and landowners form a second critical gatekeeper group. In practice, many projects are delayed less by battery technology than by local planning and land-use realities. Municipal zoning, rezoning, building procedures, and stakeholder management can dominate timelines even where the technical concept is straightforward. At the same time, landowners and site-control counterparties are often the first practical interface in project origination: securing leases, options, or easements early is what allows credible parallel progress on grid connection and permitting and reduces the risk of losing a viable site late in development.

A further enabling layer is provided by legal advisors and specialist consultancies, particularly in a market where contracting standards and regulatory implementation are still evolving. Their role is not limited to documentation; they often help structure projects across multiple interfaces, including permitting, site selection, contractual design, financing, and ownership transitions.

Additional delivery-side actors such as EPC contractors, OEMs, and O&M providers are also critical to project outcomes because they shape construction risk, performance guarantees, and long-term availability. These roles are addressed primarily in the lifecycle and cost chapters, but they remain essential context here: in the Austrian standalone BESS market, project success depends not only on whether value can be identified, financed, and modelled, but also on whether the full execution chain can be coordinated reliably from site origination to operation.

3.4. Regulatory Frameworks

Austria's regulatory framework for front-of-the-meter standalone BESS has shifted from a structural "bankability blocker" under the legacy regime to a modernised setup that is now increasingly defined by implementation details in 2026. This section focuses on the elements that most directly affect project economics and execution risk: network charges and levies, grid connection and access terms, metering and settlement requirements, and the practical pathway for qualifying as "system-serving."

3.4.1. ElWG as statutory framework for electricity storage

Under the legacy framework, ElWOG 2010 *(Elektrizitätswirtschafts- und -organisationsgesetz)*, the central economic hurdle was the "double burden" effect created by storage being treated as a final consumer when charging (Parlament Österreich 2010). Legally, BESS were treated as "final consumers" during charging and functionally as producers when discharging. This triggered full network usage and loss fees as well as levies, including levies linked to renewable support schemes such as the EAG 2021 *(Erneuerbaren-Ausbau-Gesetzespaket)* (Parlament Österreich 2021), while value realisation occurred only on discharge. This logic often led to costs being borne twice in the value chain, directly or indirectly, materially eroding arbitrage economics and constraining revenue stacking in practice. In parallel, grid connection costs were frequently described as less predictable for storage projects, because cost allocation was expense-based (rather than standardised), adding CAPEX uncertainty and raising the hurdle rate for early-stage development decisions (E-Control 2025). Outside of Austria, policy developments in neighbouring countries increasingly incentivised grid-scale energy storage through remuneration schemes for ancillary services and exemptions from certain network charges, thereby catalysing investment and market growth in this segment (Neon Energy 2025).

A decisive shift occurred with the introduction of ElWG 2025 (*Elektrizitätswirtschaftsgesetz*, also labeled *“Günstiger-Strom-Gesetz”*). The process began in earnest with the ministerial draft in July 2025 and culminated in the law being passed in December 2025. The consolidated ElWG as of 07.01.2026 recognizes energy storage facilities *("Energiespeicheranlagen")* as a dedicated legal category (§ 6) and removes the legacy default that treated storage as an end consumer by design. Key grid-integration tools relevant for constrained nodes include Peak Curtailment *(Spitzenkappung)* (§ 101) and Flexible Netzwork Access in the distribution and transmission network (§§ 103–104). These instruments are aimed at unlocking capacity at constrained nodes by enabling more dynamic specifications of injection and withdrawal based on actual grid use. In the current ElWG text, flexible network access in the distribution network is explicitly framed as contractually agreed (“kann vertraglich vorgesehen werden”), which makes the quality and clarity of the connection contract a central bankability driver (Rechtsinformationssystem des Bundes 2026; Parlament Österreich 2025).

For investors and developers, the key relevance of this reform is not semantic – it is that the new framework provides a legal foundation for differentiated treatment of storage in network-charge logic and grid integration. In practical terms, this is widely perceived as a prerequisite for financeability, because it reduces structural cost frictions that previously made “merchant” storage difficult to underwrite under conservative cases.

For current investors, the most critical "in-motion" topic in 2026 is the implementation of fee exemptions. While the ElWG 2025 provides the basis for removing the double burden, these exemptions (§§ 119–125) are scheduled to be further regulated through an act by the Energy regulator E-Control (2026) to take effect from the 1st of 2027 and are strictly conditional upon **"**system-serving operation**"** (*systemdienlicher Betrieb*). To qualify for reduced or exempted network charges, a BESS must satisfy a checklist of three primary criteria defined in § 6:

- The provision of verifiable flexibility services;
- Locational suitability as identified within the national network development plan; and
- Compliance with the specific operational requirements of the network operator.

Despite this progress, the industry remains cautious regarding certain "gold-plating" provisions. The **"**15-minute rule" (§ 6), which restricts grid-operator-owned storage to assets with charging/discharging times shorter than a market interval, is criticized for preventing cost-efficient grid reinforcement by distribution system operators (Österreichs Energie 2025). Furthermore, developers must still navigate the complexities of provincial laws (*Landesgesetze*), including nine different construction and nature-protection frameworks, which continue to result in divergent local procedures for permits and zoning.

As we move through 2026, the "so-what" for developers and financiers has shifted from fighting for legal recognition to proving systemic value. Projects that can demonstrate clear "system-serving" benefits are now positioned to benefit from a much-improved revenue profile. While the legacy of the "end-consumer trap" is fading, success in the current environment requires meticulous attention to the evolving criteria set by E-Control and a strategic approach to evidencing system-serving operation and translating grid access into bankable, auditable connection terms (import/export limits, curtailment logic, and deliverability of contracted services).

Close to the planned publication date of this Whitepaper the draft for the regulation by the Energy regulator “E-Control” was published in February 2026. The following chapter takes note of that and delivers a summary view of the content shared in the regulatory draft.

Dimension	Status Quo (ElWOG 2010)	ElWG 2025
Legal Status	Storage largely treated like an end consumer	Storage as separate legal category ("Energiespeicheranlage“); definition as “system-serving”
Grid Fees	Double burden on charging (full grid charges/levies)	Double burden reduced; conditional exemptions
Connection Costs	Based on actual expenses	Introduction of connection rights and accounting points
Incentive Logic	Connection costs based on actual expenses - no tie to systemic benefits	Reliefs/incentives conditional on "system-serving" criteria
Grid Access	Often rigid; restricted at constrained nodes	Flexible access and Peak Curtailment

Table 1: Regulatory overview of ElWOG vs. ElWG

3.4.2. Draft regulation on system-serving storage (SNE-GV)

While the ElWG establishes the legal recognition of electricity storage as an independent asset class and removes certain structural disadvantages previously faced by storage operators, the practical implementation of system-serving storage is now further specified through the draft *Systemnutzungsentgelte-Verordnung für netzdienliche Speicher* (SNE-GV) published for consultation by the Austrian regulator E-Control (2026).

The draft regulation represents the first detailed regulatory framework defining under which conditions electricity storage installations may qualify for reduced or exempted grid charges when operating in a system-serving manner. While the proposal confirms the regulator’s intention to create a dedicated regulatory regime for grid-supportive storage assets, it also introduces a structured qualification framework with several cumulative requirements.

At the core of the draft regulation is the category of *system-serving storage* (*systemdienliche Speicher*), which may benefit from a full exemption from demand-side grid usage charges and grid loss charges for a period of up to twenty years. However, eligibility is tied to a set of specific criteria that must be fulfilled simultaneously.

Key requirements for qualifying as system-serving storage include in particular:

- **Locational requirement:** The storage facility must be located in a grid area identified as relevant for congestion management in the Network Development Plan (NEP or V-NEP), thereby aligning the project with system planning priorities.
- **Minimum capacity threshold:** The storage system must provide a minimum connection capacity of at least 1 MW.
- **Provision of flexibility services:** The storage operator must conclude a contractual arrangement with the transmission system operator for the provision of flexibility services in the context of congestion management (E-Control 2026).
- **Operational control rights of the grid operator:** The distribution system operator may define operational boundaries for the storage asset, including charging and discharging envelopes or similar dispatch constraints designed to ensure system-supportive operation.
- **Technical grid support requirements:** The storage installation must comply with additional technical specifications, including reactive power provision and other operational constraints defined by the grid operator.
- **Allocation through competitive procedures:** Access to the preferential regulatory regime may be granted through competitive procurement procedures organised by the respective grid operator.

Beyond the fully system-serving storage category, the draft regulation also introduces several additional mechanisms intended to facilitate the integration of electricity storage into grid operations. These include, inter alia:

- **Reduced grid tariffs** for storage installations providing contractually agreed flexibility services to the grid operator.
- **Permanent flexible grid connection arrangements**, allowing grid operators to impose operational limitations in exchange for improved connection conditions.
- **Time-variable grid tariffs**, designed to better reflect grid congestion patterns and incentivise system-supportive charging behaviour.

These additional instruments broaden the regulatory toolbox available to network operators, although their economic relevance for standalone merchant storage projects will depend on the detailed tariff design and future market practice.

From an investment perspective, the consultation draft suggests a regulatory approach that prioritises targeted system relief rather than a broad-based tariff incentive for storage operation. While the framework confirms the regulator's willingness to grant substantial grid fee exemptions for projects that demonstrably contribute to grid stability, the cumulative eligibility criteria imply that such benefits will likely remain limited to projects that align closely with identified network constraints and procurement processes led by grid operators.

In this sense, the draft SNE-GV operationalises the concept of system-serving storage in a comparatively selective manner. While this approach may allow regulators to target storage deployment to areas with the highest system value, it may also reduce the number of projects able to access the full regulatory incentive scheme. As highlighted in early legal commentary on the consultation, the draft framework therefore represents a structured but relatively narrow implementation of the system-serving concept within the Austrian electricity market.

At the time of writing, the regulation remains in consultation. The final design of the SNE-GV and its practical implications for the bankability of standalone battery storage projects will therefore depend on the outcome of the consultation process and subsequent regulatory refinement.

4. Revenue side of a BESS project

The preceding section outlines the regulatory changes that affect standalone BESS economics in Austria. This section now shifts to the business case and examines how technical capability and grid access conditions translate into investable revenue and cost profiles under Austrian market practice. Unless stated otherwise, the revenue levels and market opportunities discussed in this chapter refer to a predominantly fully merchant standalone BESS case. Contracted structures such as tolling or floor arrangements do not eliminate the underlying market opportunity but convert part of it into greater revenue certainty and bankability at the expense of upside participation.

Battery Energy Storage Systems are increasingly treated as enabling infrastructure in power systems with high shares of variable renewables. Yet, systemic value does not automatically translate into bankable projects. Investment viability thus depends on whether front-of-the-meter standalone BESS can secure contracted revenues and/or earn market-based revenues in multiple revenue streams under defined rules, and whether these revenues are sufficiently predictable to support financing.

In Europe, grid-scale BESS revenues typically come from wholesale energy trading, ancillary services, capacity mechanisms where they exist (Brown et al. 2025), and a growing set of network-related services procured by TSOs and DSOs (e.g., congestion management or local flexibility products). The economic outcome depends on market design and market maturity. Key determinants include product definitions and prequalification requirements, procurement volumes and price formation, metering and settlement rules, and constraints on simultaneous participation across services. These parameters differ materially across European jurisdictions and over time, which limits direct transferability of business cases between countries and requires location-specific modelling and regulatory due diligence.

The remainder of this chapter therefore moves from market access to bankability logic in a structured way. It first maps the addressable Austrian market segments for standalone BESS, with emphasis on the wholesale and ancillary markets. It then sets out the feasibility constraints that bound revenues, separating the asset's technical operating envelope from market-design constraints such as time granularity, gate closures, and participation rules. Building on this, it defines revenue stacking as a co-optimisation problem that converts these constraints into dispatchable cash flows suitable for underwriting. Finally, it complements the revenue discussion with the cost side, summarising the main CAPEX and OPEX components that determine all-in project economics and financing resilience.

4.1. Overview of addressable energy markets

According to our interviews with industry experts, the most relevant revenue opportunities for BESS in Austria at present lie in wholesale electricity markets (day-ahead and intraday, including continuous trading and auctions) and in ancillary services, especially FCR and aFRR, while mFRR currently plays only a marginal role. This chapter therefore focuses on these market segments.

Market participants mention that the market entry for new players usually takes place first via the intraday market, essentially as a way of "learning the ropes", while participation in balancing markets typically follows only at a later stage and is also subject to additional system prequalifications with the transmission system operator Austrian Power Grid (APG).

Market segment	Energy market	Description
Wholesale	Day-ahead auction	Electricity trading one day ahead for fundamental dispatch and schedule planning
Wholesale	Intraday auction	Short-term trading in fixed-time auctions to rebalance positions
Wholesale	Intraday continuous	Continuous, very short-term trading for fine optimization close to delivery
Ancillary Services	FCR (Frequency Containment Reserve)	Very fast frequency stabilization; BESS provides power to immediately dampen deviations
Ancillary Services	aFRR (Automatic Frequency Restoration Reserve)	Automatic system regulation to restore frequency and system balance to target levels
Ancillary Services	mFRR (Manual Frequency Restoration Reserve)	Manually activated reserve to secure the system and correct larger or persistent imbalances

Table 2: Markets in scope for BESS standalone

4.1.1. Wholesale markets

Wholesale electricity markets enable the purchase and sale of electrical energy across multiple time horizons, most commonly day-ahead and intraday, under defined scheduling and settlement rules. In these markets, BESS can capture value through temporal arbitrage: charging when prices are low, often during renewable surplus periods, and discharging when prices are high, typically during demand peaks.

Arbitrage profitability depends mainly on the distribution of prices over time, in particular the frequency and magnitude of price spreads. Higher volatility generally increases the theoretical arbitrage opportunity, but realised revenues depend on constraints such as round-trip efficiency, degradation, cycling limits, and trading and imbalance costs. Growing shares of variable renewable energy can increase price volatility and create negative price events that widen potential spreads. At the same time, increasing BESS deployment tends to reduce volatility by flattening peaks and troughs, which can compress arbitrage margins over time.

In Austria, the most relevant wholesale segments are typically the day-ahead market, the intraday auction, and intraday continuous trading. The day-ahead market serves as the binding schedule for each delivery hour of the following day and often forms the planning baseline for BESS charge and discharge schedules. Intraday trading then allows updates as forecasts and system conditions change. The intraday auction supports re-optimisation in shorter time granularity, commonly quarter-hour products, while intraday continuous trading enables near-real-time adjustments up to shortly before delivery, which is operationally important for managing forecast errors in variable renewables.

In the Austrian bidding zone, day-ahead trading is executed primarily via EXAA, EPEX Spot, and Nord Pool. Reported annual volumes by venue can be used as a liquidity indicator. For 2025, the reported day-ahead trading volume on EPEX Spot was about 48.2 GWh per day (EPEX SPOT 1/19/2026). The reported day-ahead trading volume on Nord Pool was about 2.2 GWh per day (Nord Pool 2026). EXAA volume data for Austria were not available from publicly accessible sources at the time of writing. Based on EPEX Spot and Nord Pool only, this implies a combined day-ahead volume of about 50.4 GWh per day, accumulating to 18,400 GWh in 2025, which should be treated as a lower bound for the full market turnover.

Intraday auctions in Austria are executed mainly via EPEX Spot and Nord Pool. For 2025, the reported intraday auction volume on EPEX Spot was about 2.37 GWh per day (EPEX SPOT 1/19/2026). The reported intraday auction volume on Nord Pool was about 0.99 GWh per day (Nord Pool 2026). This implies a combined intraday auction volume of about 3.36 GWh per day, accumulating to 1,225 GWh in 2025.

Intraday continuous trading in Austria is also executed mainly via EPEX Spot and Nord Pool. For 2025, the reported intraday continuous volume on EPEX Spot was about 24.4 GWh per day (EPEX SPOT 1/19/2026). The reported intraday continuous volume on Nord Pool was about 32.7 GWh per day (Nord Pool 2026). This implies a combined intraday continuous volume of about 57.1 GWh per day, accumulating to 20,840 GWh in 2025.

Day-ahead trading is usually the larger baseline market and it sets the initial position for the delivery day. For BESS operations, intraday trading often becomes the decisive optimisation layer. It allows the operator to react to forecast updates, short lived price spikes, and state of charge constraints close to delivery. The volumes above describe total market turnover in the Austrian bidding zone and therefore include all market participants. In practice, BESS participation can be skewed towards shorter time horizons (intraday and balancing), as storage is well suited for rapid re-optimisation and fast response.

4.1.2. Ancillary markets

Ancillary services are markets through which transmission and distribution system operators procure reserve capacity and, where applicable, activated energy to stabilise system frequency and restore the real-time power balance. In practice, these products pay for availability (capacity) and, depending on the product design, for the energy delivered when the reserve is activated. Standalone BESS can participate in the different parts of balancing services shown in Figure 3 since they combine fast ramping with precise setpoint tracking, which matches the technical needs of frequency control and balancing.

Across Europe and in Austria, grid-scale BESS most commonly provide Frequency Containment Reserve (FCR), automatic Frequency Restoration Reserve (aFRR), and manual Frequency Restoration Reserve (mFRR). The specific revenue logic depends on procurement rules, including product symmetry, time-slice structure, prequalification requirements, and settlement for capacity and activation. In Austria, APG organises participation through a two-step process consisting of technical prequalification and a framework agreement (APG 2026d).

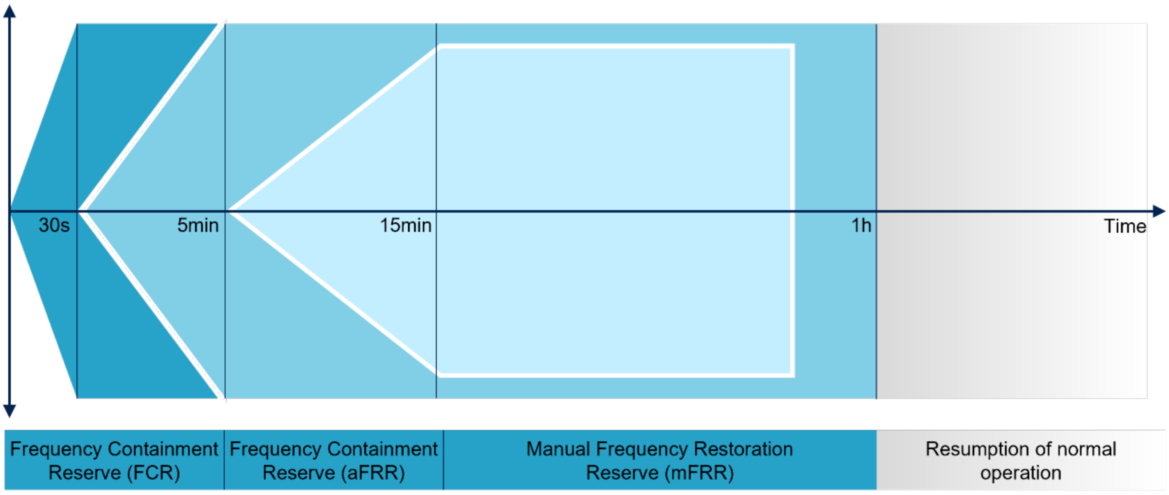

Figure 3: Time availability for balancing services

FCR (Frequency Containment Reserve): FCR stabilises frequency automatically within seconds and is procured as a symmetric product, meaning the provider must be able to deliver the same contracted capacity in both upward and downward directions (±MW). In the APG control area, FCR is tendered daily in six 4-hour products, with a required volume of ±75 MW for 2026 that must be constantly held. FCR must reach full activation within 30 seconds and remain available for at least 30 minutes per incident. Settlement is capacity-based, and APG states that there is no separate energy price for FCR (APG 2026b).

aFRR (automatic Frequency Restoration Reserve): aFRR is activated automatically to restore the control area balance and to relieve FCR once deviations persist. Unlike FCR, aFRR is procured in separate positive and negative products, which makes bids and awards direction-specific rather than symmetric. APG structures aFRR into two stages: a balancing capacity tender and intraday balancing energy tenders. The tendered aFRR capacity is ±225 MW, procured daily in six 4-hour blocks with separate positive and negative products. APG describes pay-as-bid settlement for the capacity tender and an additional energy price for activated aFRR energy, with 15-minute energy products and intraday bid adjustment up to shortly before delivery (APG 2026e).

mFRR (manual Frequency Restoration Reserve). mFRR is activated manually to address larger or longer-lasting imbalances and to supplement aFRR. Similar to aFRR, mFRR is procured in separate positive and negative products, so providers can be contracted in one direction only rather than committing to a single ±MW obligation. APG procures mFRR via a two-step design consisting of a capacity tender and an intraday energy tender. The tendered quantity is +255 MW (positive mFRR) and −170 MW (negative mFRR), procured daily in six 4-hour capacity products; energy is tendered in 15-minute resolution with intraday updates. The interviewed industry experts attribute only a subordinate role for mFRR in the revenue stack because realised activation volumes are low. Industry experts generally expect no material change in this pattern in the near term (APG 2026g).

From a BESS investment perspective, ancillary service revenues depend on the feasible revenue stack between capacity payments and activation exposure, and on operational constraints such as state of charge management, degradation, and compliance with delivery obligations. Market participants in Austria increasingly expect spreads and clearing prices in ancillary services to compress over time as more BESS providers enter these markets and competitive bidding increases. This implies cannibalisation risk: as the installed BESS base grows, the marginal value of fast response capacity tends to fall, which can reduce risk adjusted returns even if technical performance remains unchanged. Some stakeholders describe current conditions as unusually favourable because capacity revenues can, in certain periods, resemble low risk income with limited activation exposure. They also expect this profile to weaken over a 5-to-10-year horizon since procurement volumes remain stable while the supply of qualified BESS is expected to increase.

Several Austrian market participants also report a seasonal pattern in the revenue mix, with ancillary services contributing a larger share in summer than in winter. They attribute this to seasonal changes in the energy market opportunity set and in the renewables generation mix, which can affect day-ahead and intraday price spreads and therefore arbitrage revenues.

4.1.3. Other (non-relevant) markets

Capacity mechanisms remunerate resources for being available to deliver electricity during scarcity conditions, irrespective of whether they are ultimately dispatched. For BESS, the commercial relevance lies in the potential to add a capacity payment to the revenue stack, which can reduce cash flow volatility relative to pure energy and balancing exposure. In several European jurisdictions, capacity market designs have been implemented that allow BESS participation, including Great Britain, France, and Italy. Austria, by contrast, is generally described as operating under an energy only market framework, meaning that scarcity remuneration is expected to be reflected through energy and balancing prices rather than an explicit capacity payment. Accordingly, this whitepaper does not treat capacity mechanisms as an addressable revenue stream for Austrian BESS under current market design.

4.1.4. *Gross revenue potential and outlook*

Austrian BESS standalone market participants generally expect the current merchant earnings environment for Austrian standalone BESS to remain relatively stable through around 2030. Beyond that, increasing cannibalisation and additional market entry are expected to compress spreads, reduce revenue potential, and move the market toward a more mature earnings profile.

Indicative gross revenue levels currently cited in the Austrian market range mostly from €180,000 to €240,000 per MW per year, with many references clustering around €200,000 per MW per year. In the short term, revenues may be somewhat higher, especially for well-optimised assets. For project underwriting, this implies that base cases should not extrapolate current interview-based levels without a downside path and explicit sensitivity cases.

4.1.5. *Revenue mix outlook*

Interviews with Austrian market participants indicate that ancillary services can still support attractive near-term revenues, but that this phase is time limited. The addressable reserve volumes are structurally capped, with aFRR around 225 MW and FCR around 75 MW in the APG control area. At the same time, respondents describe a sizeable development pipeline for grid scale BESS. If a meaningful share of these projects reaches commissioning, competitive bidding is expected to intensify and clearing prices to decline, even if APG procurement volumes remain broadly stable.

Over a 10-to-15-year assessment horizon, interviewees therefore expect a gradual shift in the revenue mix. Wholesale markets, particularly day-ahead and intraday, are viewed as the likely base layer for earnings, while ancillary services increasingly represent an incremental component that depends on clearing conditions and operational fit. Market participants also expect seasonality in the revenue stack to persist, with ancillary services contributing a higher share in summer than in winter. They attribute this to seasonal shifts in the generation mix.

Importantly, these revenue references describe gross market opportunity rather than the realised owner cash-flow profile under all contracting structures. In tolling or fixed-offtake arrangements, a larger share of market upside is transferred to the offtaker in exchange for greater revenue certainty and debt friendliness. Hybrid floor structures sit between these cases, preserving part of the upside while improving downside protection relative to a fully merchant setup. Revenue outlook should therefore be interpreted not only in terms of gross market potential, but also in terms of how that potential is contractually allocated between owner and counterparty.

4.2. Constraints for revenue potential

Revenue potential for BESS is not determined by prices and product availability alone. It is constrained by two layers of feasibility. First, the asset's technical operating envelope limits which dispatch trajectories are physically and contractually deliverable. Second, market design sets the permissible actions in time, including product definitions, market time units, bidding formats, and gate closure rules that determine when positions can still be adjusted. A robust revenue stack assessment therefore needs to combine both layers: it must translate technical parameters into feasible schedules and then map these schedules onto the specific Austrian market sequence that governs commitment, re-optimisation, and settlement. In practice, these constraints interact: reserving capacity for ancillary services reduces the headroom available for wholesale trading, and gate closures determine whether forecast updates can still be monetised.

4.2.1. Technical constraints

In a BESS revenue stack analysis, the technical operating envelope must be represented explicitly, since it constrains feasible dispatch and therefore achievable revenues. At minimum, the model should include the following parameters.

- **Energy storage capacity (MWh).** This defines the maximum amount of energy that can be shifted over time and sets the duration at a given power level.
- **Maximum charging and discharging rates (MW).** These limits determine how quickly the battery can change its state of charge and whether it can meet power requirements for specific products.
- **Charging and discharging efficiency.** These parameters, often expressed as round-trip efficiency, determine energy losses and reduce the net energy available for arbitrage and activation.
- **State-of-charge limits (minimum and maximum SoC).** These bounds reflect technical and warranty constraints and reduce usable capacity relative to the nameplate rating.
- **Initial state of charge.** This condition sets the starting flexibility at the beginning of the optimisation horizon and can materially affect early dispatch decisions.
- **Final state of charge.** This constraint prevents unrealistic end effects and ensures the battery remains in a defined condition at the end of the horizon, which is important for day-to-day operational continuity. In practice, this is often implemented as a target value or band (or via a penalty term) to avoid end effects while preserving operational flexibility.
- **Mutual exclusivity of charging and discharging.** The BESS cannot charge and discharge simultaneously; the dispatch model should enforce this constraint to avoid physically infeasible schedules and overstated revenues.
- **Self-discharge.** Even when idle, the battery's stored energy declines over time due to self-discharge (and auxiliary consumption, if modelled separately). The optimisation should

represent this as a standing loss over time, because it reduces available energy and can affect the profitability of long holding periods between charging and discharging events.

- **Availability and outage scheduling.** Forced outage rates and planned maintenance reduce sellable hours. For bankability, an availability assumption is usually applied, sometimes with seasonal patterns.

4.2.2. Market constraints

In addition to technical constraints, a BESS revenue stack is bounded by market design constraints. These constraints define which products can be traded, the time granularity of delivery, the relevant gate opening and gate closure times, and the sequencing between markets. A dispatch and revenue model should represent these rules explicitly, because they determine when a BESS can still change its position and how forecast updates can be monetised. Participation constraints may also require capacity reservation and can restrict simultaneous bidding across services, which is why revenues are not fully additive across markets.

Day-ahead (SDAC for Austria): Austria participates in the Single Day-Ahead Coupling (SDAC), where cross-border capacities are allocated implicitly together with electricity trading. In Austria, day-ahead trading is offered by EPEX SPOT, EXAA, and Nord Pool (APG 2026a). The coupled day-ahead auction is executed on D-1, with a standard order book gate closure at 12:00 CET (EPEX SPOT 2025). Historically, Austrian day-ahead modelling for 2021–2024 can therefore be represented with an hourly market time unit and 24 hourly products per delivery day. (EXAA 2022) SDAC switched from a 60-minute to a 15-minute Market Time Unit on the trading day of 30 September 2025 for delivery day 1 October 2025, so post-go-live day-ahead schedules should be represented at 15-minute granularity (APG 10/1/2025).

Intraday auctions (IDA): As of 13 June 2024, three pan-European implicit intraday auctions complement continuous intraday trading for Austria (Implicit here means that cross-zonal capacity is allocated together with the energy trade). IDA 1 runs at 15:00 (D-1) and IDA 2 at 22:00 (D-1), both covering the 00:00–24:00 delivery day. IDA 3 runs at 10:00 (D) and covers the 12:00–24:00 delivery window. (APG 2026a) For modelling, the key implication is that IDAs create discrete re-optimisation points with auction-based price formation. In addition, cross-zonal capacity allocation in continuous intraday trading is suspended around intraday auctions on the affected borders, which can matter for cross-market sequencing assumptions (Nord Pool 2024).

Intraday continuous (IDC): European continuous intraday trading is implemented within the Single Intraday Coupling framework (APG 2026a). For Austria on the EPEX intraday continuous market, 15-minute contracts have been available since 1 October 2015; intraday continuous product sets also include 30-minute and 60-minute contracts (EPEX SPOT 10/2/2015). Gate closure is product- and border-dependent. For Austria on EPEX intraday continuous, intrazonal trading is commonly specified with a 5-minute gate closure. (EPEX SPOT 2022) For cross-zonal intraday trading at Austrian borders, Austrian Power Grid reports that cross-border intraday trading is possible up to 30 minutes before the start of delivery (implementation announced 14 January 2026). (APG 1/14/2026) A model should therefore distinguish at least between intrazonal versus cross-zonal timing constraints when describing "latest" re-dispatch opportunities in intraday.

Frequency containment reserve (FCR): In Austria, the FCR market is organised as a capacity tender only, with no energy price settled. FCR is transacted daily via six four-hour products, and it is symmetric (positive and negative are not offered separately). The minimum bid is ±1 MW in 1 MW increments. The tendering window typically opens at D-7 10:30 and closes at D-1 08:00 (APG 2026c).

Automatic frequency restoration reserve (aFRR): aFRR procurement in Austria separates capacity and energy. Capacity is procured daily in six four-hour blocks, with separate positive and negative products; the minimum bid size is 1 MW in 1 MW increments. The aFRR capacity tender gate opens at D-7 10:30 and closes at D-1 09:00, with results published by D-1 09:30 (latest). aFRR energy products have a 15-minute validity period. Energy bidding opens with the publication of capacity tender results (D-1 09:30 at the latest), and bids can be adjusted until 25 minutes before the relevant delivery interval (T-25 minutes) (APG 2026e).

Manual frequency restoration reserve (mFRR): mFRR is procured via a daily capacity tender and an intraday energy tender. The mFRR capacity tender gate opens at D-7 10:30 and closes at D-1 10:00. Capacity is procured daily in six four-hour products with separate positive and negative products; the minimum bid size is 1 MW in 1 MW increments. mFRR energy is tendered in 15-minute products. Bidding opens after publication of capacity results (after D-1 10:30) and closes at T-25 minutes for each product time slice (APG 2026f).

4.3. Revenue stacking: functioning and example

Taken together, the addressable markets and feasibility constraints define the economic operating space of a BESS project. A BESS revenue stack is the mechanism that links both: It describes the combined set of revenue streams that a single battery asset can earn in combination across multiple markets, products, and time windows. The asset is not operated for a single purpose, such as pure energy arbitrage, but is dispatched to monetise complementary opportunities while maintaining clear technical and regulatory separation between services. In practice, this separation is implemented through product specific availability commitments, state of charge management, and metering and settlement logic that avoids double counting. Importantly, revenues are not additive: reserving capacity for one service reduces the feasible volume and timing for others. This is illustratively displayed in Table 3 for an example day structure that maps time windows to revenue sources and operational actions.

Time	Revenue source	Description
02-06h	**FCR**	Primary control reserve
06-14h	**Arbitrage spot market**	Discharging at peak prices
14-18h	**aFFR active**	Commercialization as positive balancing energy
18-22h	**Discharge (Spot)**	Covering evening demand
22-02h	**Charging**	Low-cost electricity procurement for night-time operations

Table 3: Illustrative day structure of BESS revenue stack

A revenue stack can be treated as a modular earnings model. It answers which products a BESS can offer, at what power and energy levels, and how often, and then aggregates the resulting cash flows under binding constraints. A robust assessment accounts for four constraint groups:

- **Technical constraints.** These include power and energy limits, efficiency, state-of-charge boundaries, ramping, availability, and non-simultaneous charging and discharging.
- **Degradation and cycling cost.** These translate throughput into value loss, for example via warranty limits, cycle life assumptions, or a marginal cost per MWh of throughput.
- **Market rules.** These include prequalification, metering concepts, restrictions on simultaneous participation, and activation logic that affects state of charge and imbalance exposure.
- **Operating strategy.** This is the co-optimisation problem that prioritises the product with the highest contribution margin at each time step, net of cycling cost and opportunity cost.

A revenue stack is required for investment and financing decisions as it formalises the business case, supports DSCR and covenant modelling, and allows stress tests against price and regime risk. It also improves asset utilisation since many products reserve capacity only for parts of the day, leaving residual flexibility that can be monetised if constraints are respected. Finally, it provides the basis for dispatch and bidding logic and by forcing an explicit comparison between expected revenues, activation risk, and cycling cost.

In Austria, revenue stacks typically combine wholesale trading in the day-ahead and intraday markets with ancillary services, most commonly FCR and aFRR, subject to the applicable prequalification and market participation rules.

Figure 4 shows an example decomposition of cross-market revenues, splitting monthly outcomes into contributions from day-ahead trading, intraday auction and intraday continuous trading, and ancillary service capacity products. The showcased example uses data from the German market from EERA Consulting (2025) for illustration; the conceptual takeaway applies to Austria, while absolute levels and the realised market mix depend on Austrian market conditions and on the asset's specific dispatch and bidding strategy, and may change over time.

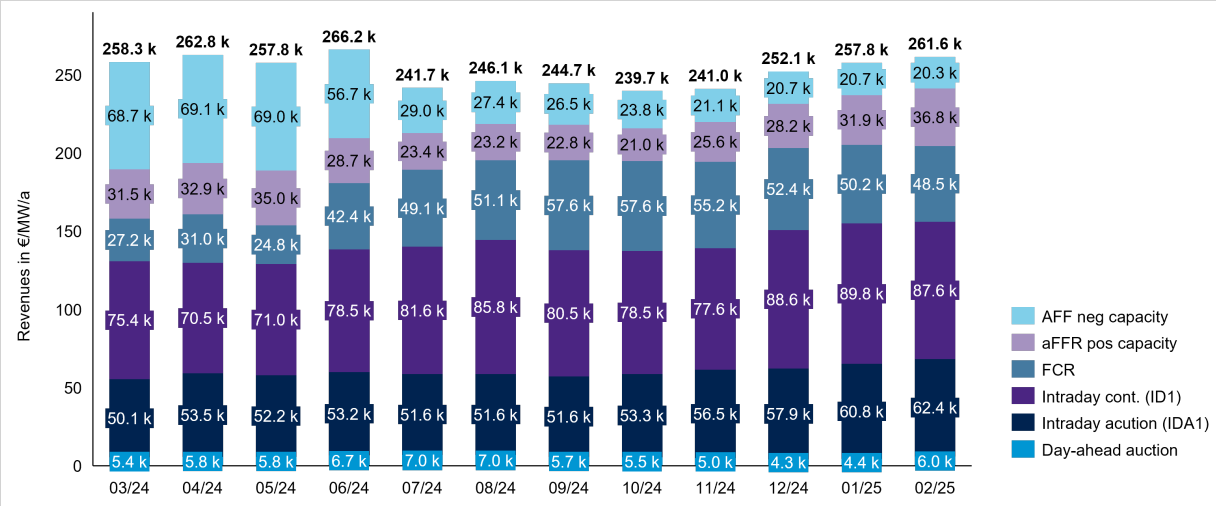

Figure 4: Illustrative cross-market revenues for revenue stack

5. Cost side of a BESS project

5.1. CAPEX: overview of the most important CAPEX components and cost indication

CAPEX cover the full, up-front investment required to deliver a BESS to commercial operation. For a standalone BESS, this includes procurement, delivery, construction, installation, commissioning, and all grid-connection works required for energisation.

In practice, standalone BESS CAPEX is primarily driven by five blocks: the battery package and energy subsystem, the power conversion system and onsite electrical infrastructure, plant construction and balance-of-plant including site works and safety systems, grid connection and metering, and installation, indirect, and owner's costs (NREL 2025).

Austrian market participants report indicative CAPEX levels that centre in the range of €500,000 to €600,000 per MW for a 2-hour system with a size of approximately 10 MW. However, CAPEX can also be lower – down to €400,000 per MW – or higher – up to €700,000 per MW – depending on factors such as site selection and existing infrastructure or supplier relationships. Respondents attribute 50-60 % of this CAPEX to the battery package alone. Unless stated otherwise, these figures refer to total installed (turnkey-equivalent) CAPEX at the grid connection point and exclude financing costs.

Moving from shorter to longer storage durations (power to energy ratio), unit CAPEX increases but not proportionally: most additional spend is in the energy (battery) portion while the power block and much of the plant infrastructure remain largely unchanged, so the incremental cost per added hour declines. Unit CAPEX also tends to decrease with project scale because design, permitting, owner's engineering, and parts of the grid-connection scope do not increase linearly with MW. However, this effect can be constrained where higher-voltage connections, extensive substation works, or long cable routes dominate the cost structure. Major CAPEX components for standalone BESS (NREL 2025):

- **Battery package and energy subsystem (battery pack, container, racking, Battery Management System).** This scope delivers the energy capacity and drives performance limits through usable state of charge windows, thermal boundaries, degradation behavior, and warranty conditions. It typically includes the battery pack, containerized enclosure, racking, and the battery management system.
- **Power conversion system and electrical infrastructure (inverter, DC cabling, wiring, switchgear, transformers, controls).** The power electronics convert between DC and AC, while the onsite electrical scope covers DC cabling, wiring and conduits, switchgear, transformers, and protection functions. It also includes monitors, controls and communications, and often an energy management system that enables dispatch, telemetry, and market participation. Sizing and redundancy depend on the MW rating, grid code compliance requirements, and the chosen availability concept.
- **Plant construction, site works, and balance of plant (foundations, buildings, utilities, thermal and fire protection).** This scope covers plant construction activities such as foundations for batteries and inverters, inverter housing, site preparation, underground utilities, access roads, fencing, and buildings for operations and maintenance. It also includes thermal management and fire detection and suppression; the cost impact of safety requirements is project specific and depends on local authority expectations and the selected technical concept.
- **Grid connection and metering (spur line, substation works, network upgrades, integration studies, fees).** The connection scope can include distance driven spur line costs, substation bay extensions or upgrades, protection and control integration, telecommunications, and revenue grade metering, supported by connection studies and associated fees. In Austria, the dominant cost drivers are often the connection voltage level, distance to the point of connection, and the extent of substation works and network upgrades required.
- **Installation, indirect, and owner's costs (labour, engineering, commissioning, permitting, insurance, legal, taxes, contingencies).** Installation and indirect items include distributable labour and materials, engineering services, and start up and commissioning. Owner's costs typically cover feasibility and engineering studies, development activities, environmental studies and permitting, legal fees, insurance up to commissioning, property taxes during construction, and contingencies. These costs depend strongly on schedule risk, permitting complexity, and contracting strategy.

CAPEX varies materially across projects, and the scope does not always include all components, for example where an existing grid connection can be utilised or where project development and engineering costs are lower due to prior experience and established processes. Each project should therefore be assessed on its own merits rather than applying a fixed default set of cost items and percentage shares. In addition, Battery pack pricing has fallen significantly over the last decade, which has reduced overall system costs. Turnkey BESS CAPEX has also decreased over the same period, including installation, grid connection, and project development costs. Regional cost differences are primarily driven by local site conditions and cost bases, in particular land and civil works, labour and construction rates, grid-connection charges, and the maturity of the local supply chain and contractor market.

When it comes to repowering, interviews with Austrian market participants indicate that it is typically not priced explicitly in base-case CAPEX and financial models. Projects are sometimes discussed with a 30-year operating horizon, but participants expect battery replacement to be required after roughly 10 to 15 years. Given current market uncertainty, investment decisions and dispatch economics are often assessed primarily over the next five years, while repowering is handled qualitatively rather than through a quantified mid-life reinvestment plan.

5.2. OPEX: overview of the most important OPEX components and cost indication

Operating expenditures (OPEX) for a standalone BESS cover the recurring costs required to keep the asset available, compliant, and dispatchable. Many techno-economic datasets represent BESS OPEX primarily as fixed O&M. In practice, fixed OPEX typically includes a long-term service agreement, preventive and corrective maintenance, monitoring and cybersecurity tooling, insurance, land lease and local taxes, spare parts logistics, and periodic compliance testing. Austria-specific grid-related OPEX items can include metering, telecommunications, and grid operator charges and depend on connection level, location, and the agreed connection concept. Austrian market participants report indicative OPEX levels in the range of 2-4 % of CAPEX per year for a 2-hour system, excluding fees for optimisation software. These figures are typically understood as fixed operating costs and exclude major mid-life reinvestments such as battery replacement or augmentation. Practitioners note that more intensive predictive maintenance and battery management can increase OPEX but can improve availability and battery life cycles.

In addition to technical and site-related operating costs, many projects incur recurring commercial OPEX for route-to-market and dispatch optimisation. Where an external optimizer or aggregator manages trading and scheduling, remuneration is often structured either as a profit-share deducted from gross margins or, under tolling-style contracts, embedded in a fixed capacity payment that reallocates market upside between the parties. In both cases, these fees affect net revenues in a way that is economically equivalent to OPEX and should be modelled explicitly as a separate line item, distinct from maintenance, insurance, and other fixed O&M costs. Austrian market participants report that fees in the range of 6-10% of net revenues are typically paid for optimisation services, with several interviewees expecting this range to trend towards the lower end and potentially below the current range as competition among optimisation providers increases and fee structures become more price-competitive.

6. Overview of the BESS project lifecycle

For standalone BESS, bankability is shaped not only by market revenues and project costs but also by execution risk. Factors such as permitting, grid connection, and market qualification determine when a project can reach Commercial Operation Date (COD), what it can dispatch at the node, and which revenue streams are accessible. A lifecycle view therefore provides the practical “map” that links the chapters on revenues, costs, and regulatory frameworks to real delivery constraints and critical-path risks in Austria.

This chapter presents an Austria-focused, simplified process framework that reflects common practitioner sequencing for Standalone BESS projects. It is grounded in expert interviews across the Austrian BESS ecosystem and captures the "typical" execution logic described by developers, utilities, financiers, and optimisation providers. The framework is intended as an illustrative reference: actual steps, timelines, and overlaps vary by project configuration, site conditions, the chosen route-to-market and qualification pathway, and, critically, the speed and predictability of administrative processes such as grid connection and permitting.

In this whitepaper, the lifecycle is structured into five phases that translate a market opportunity into an operating asset: Screen → Develop → Structure → Deliver → Operate (see Figure).

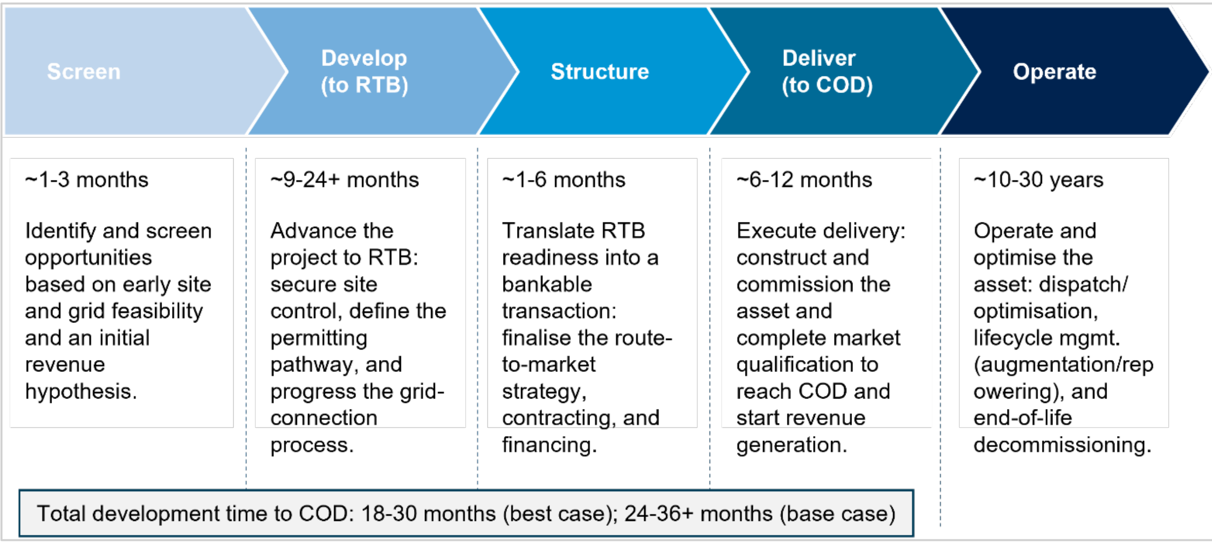

Figure 5: Archetypical standalone BESS project lifecycle

As a rough practitioner range, an Austria-based standalone BESS can reach COD in ~18–30 months in favourable cases, although ~24–36+ months is common when grid connection availability is limited, network reinforcement works are required, or permitting and zoning extend the critical path. In practice, project delivery is often shaped less by the technical characteristics of the battery than by these framework conditions, above all access to the grid which frequently represents the main bottleneck and the availability of suitable sites, which is becoming increasingly constrained.

The following sections discuss each phase in more detail, highlight typical Austrian timing ranges, and summarise the main bottlenecks and decision points that repeatedly shape project outcomes in practice.

6.1. Screen

Screening turns a "battery idea" into a prioritised development pipeline by testing whether value potential survives early site and grid reality checks. In Austrian practice, Screen is explicitly designed to avoid expensive false starts for BESS projects. Market participants often describe early prioritisation as "Land > Grid > Planning": first confirm that site control is realistically achievable, then test whether a plausible grid connection pathway exists, and only then invest time into a deeper permitting and stakeholder pathway assessment. The logic is pragmatic: although land, grid, and permitting progress in parallel during development, this ordering reflects the most common early deal-breakers observed in practice.

What happens in this phase:

- **Opportunity identification and strategic use-case definition.** The sponsor defines where a standalone BESS could create value (portfolio role, grid node logic, target market participation) and formulates a first revenue hypothesis (wholesale, ancillary-heavy, mixed revenue stack).
- **Feasibility screening across site, grid, and concept assumptions.** The team performs early plausibility checks on site suitability, likely grid constraints, and whether the operating concept is feasible enough to justify development effort. Indicative sizing is often iterated with an optimisation provider to ensure the concept matches expected market participation.
- **Selection and prioritisation for development entry.** Candidate opportunities are ranked on risk-adjusted value potential, complexity, and execution fit. Projects that pass the screen enter formal development workstreams with a defined plan and budget.

A typical Screen duration reported by market participants is **~1–3 months**, with iterative loops rather than a linear checklist. Common early “kill criteria” include an implausible grid connection path (available capacity, voltage level, distance and likely scope of grid works), unresolved land/control constraints (including municipal constraints), or an operating concept that cannot be reconciled with likely connection constraints and market access requirements. Key actors typically include the developer/sponsor, early technical advisors (or internal engineering). Where a site looks promising, early touchpoints with the relevant TSO or DSO may already begin to test grid feasibility.

6.2. Develop

Development converts a screened concept into a de-risked, buildable project by securing site control, progressing the grid connection process, and maturing the design to RTB. This is usually the longest and most execution-sensitive phase in Austria. Market participants consistently point to the grid connection process as the most frequent critical path, while permitting and zoning can become equally decisive depending on site and municipality. The practical objective is not only progress, but clarity: bankable connection terms, a credible permitting pathway, and an execution-ready technical basis.

What happens in this phase:

- **Land access, site control, and permitting pathway development.** The project secures land rights (lease/option/easements), validates site readiness, and develops the permitting strategy, including zoning/rezoning where required. Authority and stakeholder interfaces are set up early to reduce late-stage surprises.
- **Grid connection process and network integration development (often critical path).** The sponsor submits and manages the connection request, progresses network studies and technical interface discussions, and negotiates the connection pathway, timeline, and cost

implications. The bankability-relevant outcome is explicit clarity on import/export limits, operational restrictions, curtailment logic, and protection/telecom requirements, because these define feasible dispatch and contracted-service deliverability.

- **RTB preparation through technical design maturation and integrated project readiness.** The technical design is matured from concept to implementation-ready basis (e.g., battery, power conversion systems, transformer/substation interface, energy management system), and the project consolidates schedule, CAPEX baseline, and key risks into an RTB package.

A typical duration to RTB is **~9–18 months, but 18–24+ months is common** when grid connection availability is limited, network reinforcement works are required, or zoning/permitting extend the critical path – Austrian market experts indicate that re-zoning can potentially take years, thus early stakeholder management is needed. Development is typically run as parallel workstreams across land and permitting, grid connection, and technical design maturation. Austrian market participants repeatedly highlight that the dominant critical path is often the grid connection process, although in specific municipalities or provinces zoning and permitting can become equally decisive. Across interviews, three recurring sources of delay are cited most often: limited grid capacity and long study/approval timelines; late clarification of node constraints that force redesign; and municipal level permitting and zoning variability. RTB marks the end of this phase and the point at which the project is sufficiently de-risked to move into final commercial closure and execution mobilisation. For pure-play developers, RTB often also represents the main monetisation point, as projects may be sold once grid connection, land rights, and permitting are sufficiently secured. Key actors commonly involved include the sponsor/developer, landowners, municipal and provincial authorities, the relevant TSO/DSO, owner's engineers, and advisors.

6.3. Structure

Structuring turns a near-RTB project into a bankable and executable commercial package. In Austria, this workstream typically starts during late Develop (as soon as the grid connection path and permitting trajectory become visible), but it usually reaches final closure only once RTB-grade certainty is achieved – often around RTB or shortly thereafter. The purpose is to align the route-to-market setup, contracts, and funding with what the asset can realistically deliver under Austrian connection constraints and market rules.

What happens in this phase:

- **Route-to-market and operating model.** The sponsor defines how revenues will be realised (merchant, optimiser-based, tolling-style, or hybrid) and clarifies who is responsible for dispatch, market access, and compliance.
- **Contract package.** The project puts the key contracts in place so everyone knows who delivers what, by when, at what price, and what happens if something slips. Milestones, handover tests, grid-interface responsibilities, and long-stop dates are defined to reflect Austrian schedule risks.
- **Funding and approvals.** The funding route (corporate, project finance, or hybrid) is finalised and the project is brought to investment decision and financing readiness.

Because much of the preparation happens in parallel with late Develop, the incremental time for Structure after Develop is often limited. In straightforward cases it can be **near-zero to ~1–3 months**, while **~3–6 months** is more common when grid terms, permitting certainty, or contract interfaces need additional time to reach lender-grade clarity. Market participants most often cite two causes of delay: insufficient clarity on feasible operation at the connection point (which undermines confidence in revenue stacking), and unresolved interface responsibilities (especially around controls/telemetry, market qualification, and optimiser obligations). The deliverable is a contract and funding package ready for mobilisation, typically linked to Notice-to-Proceed. Key actors typically include the sponsor, lenders/equity partners, an Engineering, Procurement and Construction (EPC) contractor, core Original Equipment Manufacturers (OEMs), optimisation providers, and legal/technical advisors.

6.4. Deliver

Deliver converts a de-risked project into a commissioned, revenue-generating asset and completes the steps needed for the intended market participation. Deliver is not only about building the plant. Market participants emphasise that the timeline is often shaped by how smoothly grid energisation, testing, and market enablement come together. Depending on the go-live strategy, projects may start generating revenues at COD while some qualification steps, especially for ancillary services, are finalised in parallel.

What happens in this phase:

- **Construction and installation.** The site is built and the core equipment is installed, including the electrical infrastructure required for connection and safe operation. Lead times from manufacturers depend by component type. Market participants report that battery cells are usually available relatively quickly and often in stock, but system integration and corresponding execution capacity tend to be scarce, especially if the project developer needs to rely on external providers.
- **Commissioning and energisation.** The plant is energised, tested with control system tests, and stabilised to demonstrate reliable operation and meet technical acceptance requirements.
- **Market enablement and qualification.** The project completes the operational and data interfaces needed for market participation and, where relevant, performs the required prequalification to access ancillary service markets.

A typical duration from mobilisation to COD is **~6–12 months**, but projects can extend beyond this range if grid energisation is delayed, if commissioning uncovers integration issues, or if market qualification depends on additional testing and stable connectivity. Market participants also flag long-lead or temporarily scarce components, particularly grid-side electrical equipment in projects requiring more extensive grid works, as an additional schedule risk. COD marks the start of revenue-generating operation; however, market participants often note that ancillary-service access can lag COD, which is why go-live strategies and ramp-up assumptions should be reflected conservatively in the business case. Key actors typically include the EPC/Balance of Plant (BOP) contractors, OEMs, commissioning teams, the relevant TSO/DSO, and the market access/optimisation counterparties.

6.5. Operate

Operations determine realised value by sustaining availability and optimising dispatch under degradation, compliance obligations, and evolving market conditions. For Austrian market participants, Operate is where theoretical economics become realised performance. As competition increases and revenues become more execution-driven, disciplined asset management and optimiser performance become decisive. Operational practice must also manage the technical lifecycle: degradation, warranty constraints, and potential mid-life reinvestment decisions.

What happens in this phase:

- **Operational asset management and performance monitoring.** Day-to-day operations, maintenance planning, incident response, and key performance indicator monitoring are institutionalised to sustain availability and warranty compliance.
- **Commercial optimisation and market participation enhancement.** Dispatch and bidding strategies are refined over time, often via an optimiser, to co-optimise across accessible markets while managing state of charge, cycling costs, and product-specific obligations.
- **Degradation and lifecycle management.** The operator manages degradation and evaluates augmentation or repowering strategies, and plans recycling/decommissioning pathways as the asset matures. Owners track asset health and adjust operating aggressiveness when incremental revenues no longer justify the implied wear. Mid-life actions, augmentation and/or repowering, are typically considered once the system approaches end-of-life thresholds defined by state-of-health (commonly cited around ~70% remaining capacity). At the same time, Austrian market participants highlight uncertainty around repowering strategies and residual values, including limited quantitative evidence on second-life outcomes, which can make operating longer at lower State of Health a plausible strategy in some future conditions.
- **End-of-life: Decommissioning and recycling.** The end-of-life phase covers safe de-energisation, removal of equipment, and recycling/disposal under the applicable compliance framework and any contracted take-back schemes, followed by site restoration per lease and permitting conditions. Austrian market participants emphasise that large-scale end-of-life cases are still limited, so second-life options, residual values, and the level and allocation of recycling costs remain uncertain and are usually only qualitatively included in business models.

Operate begins at COD and continues over the full asset life. Market participants often describe a ramp-up and stabilisation period of ~3–12 months, while **lifecycle horizons are commonly framed as ~10–30 years** depending on augmentation/repowering strategy. Recurring operational risks cited by market participants include underperformance against availability targets, restrictive operating constraints at the connection point, degradation and cycling costs that reduce net upside, and intensifying competition, particularly in ancillary services, which is expected to reduce spreads and revenue potential. The outcome of this phase is sustained commercial operation, ongoing optimisation, and lifecycle value preservation under Austrian technical, market, and regulatory constraints.

7. Market outlook and actions to improve market conditions

Despite the challenges outlined earlier, such as declining revenues over time due to market cannibalisation, industry participants remain broadly optimistic about the Austrian BESS outlook. Based on current sentiment, near-term market momentum is expected to stay stable or even strengthen. At the same time, stakeholders stress that further upside depends primarily on improving the regulatory framework: they want a shift from regulatory anticipation to operational certainty as projects are currently paced around how the new Elektrizitätswirtschaftsgesetz (ElWG) will be implemented. In their view, the next phase will be shaped less by technology choices and more by whether the regulatory framework for standalone BESS meaningfully reduces execution friction, especially in grid connection, permitting, and commercial bankability. Against this backdrop, BESS market participants articulated five priority demands to unlock investment and accelerate delivery:

1. **System-serving definition:** A clear, enforceable definition under the ElWG, with predictable criteria and documentation, is needed to create planning certainty on status, fees, and operational obligations. Uncertainty on interpretation increases project risk and raises financing frictions.

2. **Grid connection process:** A transparent, non-discretionary process with earlier, reliable information is critical. Grid access is seen as the main bottleneck; developers and financiers need clearer signals on available capacity, expected timelines, connection costs, and any operational constraints that may apply after commissioning, aligned with updated TSO/DSO guidance.

3. **Network charges for standalone BESS:** A coherent, non-distortive fee regime is viewed as central to viability, as charges can dominate arbitrage margins and limit revenue stacking. Reductions or exemptions for qualifying assets would improve bankability and lower risk premiums, depending on ElWG implementation and system-serving criteria in practice.

4. **Permitting:** A more consistent and streamlined permitting approach – especially clearer allocation of responsibility across electricity law vs. trade/construction law – is needed. Divergent state-level zoning and building procedures add complexity; reforms should reduce fragmentation via federal guidance or harmonised state practice.

5. **Allocation of scarce capacity:** Rules-based, transparent allocation of limited connection capacity is needed to ensure fair competition and reduce first-mover advantage. Stakeholders prefer clear criteria and mechanisms over informal, node-specific negotiations, particularly if activity accelerates once the legal framework settles.

8. Conclusion

This whitepaper assesses the attractiveness of front-of-the-meter standalone BESS in Austria through a practitioner lens. It is grounded in 19 expert interviews across the Austrian BESS ecosystem (including utilities, developers, banks and equity investors, optimisation providers, regulators, and grid stakeholders) and supplemented by targeted desk research. The objective was to give an overview in the Austrian context, how short-duration flexibility can (or cannot) be converted into bankable cash flows once technical constraints, market access, contracting structures, and real-world delivery risks are accounted for.

Overall, the analysis indicates that Austria can offer an attractive near-term earnings environment for standalone BESS, particularly through revenue stacking across wholesale markets (day-ahead and intraday) and ancillary services (most notably FCR and aFRR). At the same time, the Austrian market is still at an early stage: there are relatively few operational reference assets “in the field,” but a fast-growing development pipeline and increasing activity across investor and developer types. Market participants are already deploying a range of commercial models, such as fully merchant, tolling/fixed offtake arrangements, and hybrid floor or revenue-share structures. At the same time, this attractiveness is not structural “free money.” As the pipeline of projects converts into operating capacity, competitive dynamics are expected to intensify and compress margins. Over time, this shifts the value proposition from early-mover rents toward execution excellence: high availability, strong optimisation performance, and cost discipline.

The single most important sensitivity for Austrian standalone BESS is regulatory implementation, in particular the practical treatment of network charges and the operationalisation of “system-serving” criteria under the ElWG. The operational details in 2026 (eligibility, evidence requirements, and the real-world application of fee exemptions) remain under development and could lead to a window of opportunity for BESS project developers. As a result, bankability depends on whether these provisions translate into clear, auditable project-level connection terms. The investment case remains dependent on whether fee exemptions and flexible access mechanisms translate into auditable, predictable, and financeable connection terms at the project level. In other words, the key question is increasingly not whether the battery can technically deliver, but whether the project can secure a stable and bankable rule set at its specific grid node, covering import/export limits, curtailment logic, metering and settlement requirements, and the fee regime that ultimately determines net margins. This uncertainty is a primary driver of downside cases, higher risk premia, and a growing preference for partially or fully contracted structures where financing is sought.

In parallel, the Austrian market is constrained by practical scarcity: there are only so many “top sites” for BESS project development where grid access, existing infrastructure, permitting feasibility, and an economically favourable network-charge interpretation align. As a result, competition for premium locations is increasing. On the cost side, continued declines in battery cell prices are widely expected and could improve the relative attractiveness of longer-duration systems (e.g., 4-hour configurations). However, project timelines remain exposed to execution risks that often dominate economics in practice, including grid-connection processes, or permitting which can shift the critical path and delay COD.

The core implication for developers, investors, and lenders is that bankability in Austria is primarily created through rigorous, site-specific grid and fee due diligence, lender-grade revenue-stack modelling that explicitly captures technical constraints, degradation and availability, and a clear contractual allocation of dispatch and pass-through risks between owners, optimisers, and offtakers. In sum, the opportunity for standalone BESS in Austria is real and can be attractive, but outcomes are not automatic: they are shaped decisively by regulatory implementation and execution quality, and by whether projects can secure high-quality sites and translate market opportunity into deliverable and financeable cash flows.

Acknowledgements

We would like to express our sincere gratitude to all interview participants. Your openness, engagement, and thoughtful contributions were invaluable to the development of this white paper and played an important role in shaping its insights and conclusions. Without your willingness to share your perspectives and experiences, this publication would not have been possible in its present form.

We would also like to extend our special thanks to the WU Vienna staff members Michal Zavadil, Sarah Stumpp, Patrick Voigt, and Qiang Chen for their dedicated support throughout the preparation of this whitepaper. Their assistance in organizing, analysing, and refining the material was greatly appreciated and contributed significantly to the completion of this publication.

9. Publication bibliography

APG (2025): Stromzukunft 2040: Wie kann das gelingen? Presentation by DI Mag. (FH) Gerhard Christiner - Spokesman APG. Austrian Power Grid. Graz, 2025.

APG (10/1/2025): SDAC: Go-live of 15-minute Market Time Unit in Day Ahead Market Coupling successful as of September 30, 2025. Available online at https://markt.apg.at/en/news-press/sdac-go-live-of-15-minute-market-time-unit-in-day-ahead-market-coupling-successful-as-of-september-30-2025/, checked on 2/2/2026.

APG (2026a): European internal electricity market. Austrian Power Grid. Available online at https://markt.apg.at/en/electricity-market/european-internal-electricity-market/, checked on 2/2/2026.

APG (2026b): Primary control - Frequency containment reserve (FCR). Austrian Power Grid. Available online at https://markt.apg.at/en/power-grid/balancing/primary-control/, checked on 2/2/2026.

APG (2026c): Primary control - Frequency containment reserve (FCR). Austrian Power Grid. Available online at https://markt.apg.at/en/power-grid/balancing/primary-control/, checked on 2/2/2026.

APG (2026d): Requirements for participation in tenders for balancing services. Austrian Power Grid. Available online at https://markt.apg.at/en/power-grid/balancing/requirements-for-participation/, checked on 2/2/2026.

APG (2026e): Secondary control - Automatic Frequency Restoration Reserves (aFRR). Austrian Power Grid. Available online at https://markt.apg.at/en/power-grid/balancing/secondary-control/, checked on 2/2/2026.

APG (2026f): Tertiary Control - Manual Frequency Restoration Reserves (mFRR). Austrian Power Grid. Available online at https://markt.apg.at/en/power-grid/balancing/tertiary-control/, checked on 2/2/2026.

APG (2026g): Tertiary Control - Manual Frequency Restoration Reserves (mFRR). Austrian Power Grid. Available online at https://markt.apg.at/en/power-grid/balancing/tertiary-control/, checked on 2/2/2026.

APG (1/14/2026): SIDC: Successful go-live of the 30-minute gate closure time in cross-zonal intraday trading. Available online at https://markt.apg.at/en/news-press/sidc-successful-go-live-of-the-30-minute-gate-closure-time-in-cross-zonal-intraday-trading/, checked on 2/2/2026.

Biermayr et al. (2025): Innovative Energietechnologien in Österreich - Marktentwicklung 2024. Biomasse, Photovoltaik, Solarthermie, Wärmepumpen und Windkraft. Available online at https://nachhaltigwirtschaften.at/de/publikationen/schriftenreihe-2025-23-marktentwicklung-energietechnologien.php#downloads.

Blackvolt (2026): Website. Available online at https://www.blackvolt.at/.

BMWET (2025): Energie in Österreich 2025 - Zahlen, Daten, Fakten. Bundesministerium für Wirtschaft, Energie und Tourismus. Available online at https://www.bmwet.gv.at/dam/jcr:9f01a85a-206d-4c0e-

8e4b-9a32eec372f5/BMWET_Energie_in_OE2025_250917_barrierefrei_final.cleaned.pdf, checked on 2/2/2026.

Brown, Claudia; Salmon, Katrina; Jansen, Malte; Grubb, Michael (2025): Banking on Batteries: A Dynamic Financial Appraisal of Utility-Scale. In *University College London Institute for Sustainable Resources*.

Cybergrid (2026): FlexRegler: enhancing grid stability and market participation in Austria. Available online at https://www.cyber-grid.com/knowledge/flexregler-enhancing-grid-stability-and-market-participation-in-austria.

E-Control (2025): Diskussionspapier: Elektrische Energiespeicher und Hybridanlagen. Available online at https://www.e-control.at/documents/1785851/1811582/Diskussionspapier+Speicher+und+Hybridanlagen+-+E-Control.pdf.

E-Control (2026): Systemnutzungsentgelte-Verordnung (SNE-V). Available online at https://www.e-control.at/bereich-recht/verordnungen-zu-strom/-/asset_publisher/tiRyh5zzUOU7/content/systemnutzungsentgelte-verordnung-sne-v-1.

EERA Consulting (2025): Battery Beats Februar 2025: Erlöse von stand-alone Batteriespeichern (BESS). Available online at https://www.eera-consulting.de/battery-beats/battery-beats-februar-2025-erloese-von-stand-alone-bess.

Electrical Energy Storage (2025): Aus Investition wird Rendite: Wie lohnt sich der Stromhandel für BESS? Available online at https://www.ees-europe.com/markttrends/stromhandel-mit-batteriespeichern.

Enspired (2025): BESS revenue models: tolling, floor & fully merchant. Available online at https://www.enspired-trading.com/blog/bess-revenue-models-toll-floor-fully-merchant.

Enspired (2026): Website. Available online at https://www.enspired-trading.com/.

EPEX SPOT (10/2/2015): 15-minute contracts on Austrian Intraday market launched with success. 108.75 MWh of power traded on first day. Paris / Vienna.

EPEX SPOT (2022): Trading at EPEX SPOT.

EPEX SPOT (2025): Single Day-Ahead Coupling (SDAC).

EPEX SPOT (1/19/2026): Page 1/13 Annual Trading Results of 2025 – Overall record across all market segments. Amsterdam, Berlin, Bern, Brussels, London, Paris, Vienna.

Esforin (2024): Optimisation of battery storage systems: Price models in volatile markets. Available online at https://www.esforin.com/en/optimisation-of-battery-storage-price-models-in-volatile-markets/.

EVN (2024): The Future of Energy Transition - Innovation - Mid-term Targets. Investor Webcast, 2 October 2024. Available online at https://www.evn.at/getmedia/e390f607-12e0-4269-bb41-6bf821e41654/EVN_Investor_Webcast_20241002.pdf.

EVN (2025): Business development in the 2024/25 financial year. Available online at https://www.evn.at/en/home/investor-relations/news/ir-news/geschaftsverlauf-im-ersten-halbjahr-2024-25?

EVN (2026): Designing the future. Letter to Shareholders Q.1 2025/26. Available online at https://www.evn.at/getmedia/b9d971a7-91d7-4274-bf41-11a7b31705bc/AB_Q1_2025_26_EN.pdf.

EXAA (2022): Rules for the Trading of Spot Market Products for Electric Power on the Vienna Stock Exchange in its Function as a General Commodity Exchange. In *Trading Rules Spot Market Products Electric Power*.

Neon Energy (2025): Netzdienlichkeit von Großbatterien. Netzwirkung von Großbatterien heute und Instrumente zur Entlastung der Stromnetze. Available online at https://neon.energy/Neon-Netzdienlichkeit-Gro%C3%9Fbatterien.pdf.

NGEN (2025a): Austria’s Largest Battery Storage Stabilizes the Grid from Carinthia. Available online at https://www.ngen-group.eu/en_es/latest-news/austrias-largest-battery-storage-stabilizes-the-grid-from-carinthia-1-46.

NGEN (2025b): NGEN celebrates the commissioning of Austria's largest battery storage facility. Available online at https://www.ngen-group.eu/en_es/latest-news/ngen-celebrates-the-commissioning-of-austrias-largest-battery-storage-facility-29.

NGEN (2026): NGEN Products. What we do? Available online at https://www.ngen-group.eu/en_si/what-we-do.

Nord Pool (2024): Intraday Market Regulations. Available online at https://www.nordpoolgroup.com/49f00c/globalassets/download-center/rules-and-regulations/intraday-market-regulations-september-2025.pdf?, checked on 2/2/2026.

Nord Pool (2026): Markets Yearly Volumes 2025.

NREL (2025): Cost Projections for Utility-Scale Battery Storage: 2025 Update. In *National Renewable Energy Laboratory*.

Osborne Clarke (2025): Osborne Clarke advises NORD/LB on EUR 86.5 million German BESS financing. Available online at https://www.osborneclarke.com/news/osborne-clarke-advises-nordlb-eur-865-million-german-bess-financing?

Osborne Clarke (2026): Osborne Clarke advises NORD/LB on the tolling-based financing of one of the largest battery energy storage projects in Germany. Available online at https://www.osborneclarke.com/news/osborne-clarke-advises-nordlb-tolling-based-financing-one-largest-battery-energy-storage.

Österreichs Energie (2025): Stellungnahme von Oesterreichs Energie zur E-Control Austria-Konsultation Elektrische Energiespeicher und Hybridanlagen. Available online at https://oesterreichsenergie.at/fileadmin/user_upload/STN_ECA-Konsultation_Speicher_Oesterreichs_Energie.pdf.

Parlament Österreich (2010): Elektrizitätswirtschafts- und -organisationsgesetz, Energie-Control-Gesetz. Available online at https://www.parlament.gv.at/gegenstand/XXIV/I/994.

Parlament Österreich (2021): Erneuerbaren-Ausbau-Gesetzespaket – EAG-Paket. Available online at https://www.parlament.gv.at/gegenstand/XXVII/I/733.

Parlament Österreich (2025): Günstiger-Strom-Gesetz. Available online at https://www.parlament.gv.at/gegenstand/XXVIII/I/312.

Pexapark (2026): What Are BESS Offtake and Optimization Agreements? Available online at https://pexapark.com/what-are-bess-offtake-and-optimization-agreements/.

Rechtsinformationssystem des Bundes (2026): Elektrizitätswirtschaftsgesetz § 0, Fassung vom 17.01.2026. Available online at https://www.ris.bka.gv.at/NormDokument.wxe?Abfrage=Bundesnormen&Gesetzesnummer=20013066&FassungVom=2026-01-17&Artikel=&Paragraf=0&Anlage=&Uebergangsrecht=.

Sayer, M.; Ajanovic, A.; Haas, R. (2024): Scenarios on future electricity storage requirements in the Austrian electricity system with high shares of variable renewables. In *Smart Energy* 15, p. 100148. DOI: 10.1016/j.segy.2024.100148.

Scale Energy (2025): Scale Energy reaches Over 1 GW of Decentralized BESS in Development. Available online at https://www.scale-energy.eco/post/scale-energy-reaches-over-1-gw-of-decentralized-bess-in-development.

Scale Energy (2026): Reduce Energy Costs. Available online at https://www.scale-energy.eco/industry.

Verbund (2025): Interim Report Quarters 1-3/2025. Available online at https://www.verbund.com/media/rsdn5pa1/verbund-interim-report-q1-3-2025-englisch.pdf.

Verbund (2026a): Battery storage marketing with VERBUND Power-Flex. Available online at https://www.verbund.com/en/business/trading-portfolio/storage-marketing.

Verbund (2026b): Kooperationsmodelle Großbatteriespeicher. Die Energiewende gemeinsam sicher gestalten. Available online at https://www.verbund.com/de/business/batteriespeicher.

Voltida (2026): Website. Available online at https://www.voltida.com/en/ueber-uns/; https://www.voltida.com/en/projekte/.

Wiedner, V.; Schreiner, S.; Immitzer, V.; Alam, T.; Janisch, F.; Gaugl, R. et al. (2025): Flexibilitäts- und Speicherbedarf im österreichischen Energiesystem.