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## Energy Storage as an Investment Opportunity

How the Energy Transition is Driving Grid Expansion and the Battery Storage Market



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### Foreword

#### Dear readers

The energy transition is rewriting the fundamental rules of our energy systems. As a global megatrend, it is profoundly transforming the energy sector — technologically, structurally, and economically. At its core lies a paradigm shift from centralized, fossil-fuel-based energy systems toward decentralized, flexible, and sustainable solutions.

The shift to renewable energy has become one of the most significant investment themes of our time. Rising energy demand — driven by electrification, digitalization, and population growth — is colliding with the urgent global need for decarbonization. This dual challenge requires massive investments in modern energy infrastructure and places high demands on system stability, flexibility, and frequency regulation.

Battery storage systems are increasingly becoming a key success factor in this transformation. As the share of renewable energy in power generation grows, the temporal asymmetry between energy production and consumption continues to widen. Battery Energy Storage Systems (BESS) can absorb surplus electricity from wind and solar installations and feed it back into the grid during peak demand periods. In doing so, they enable a stable balance between generation and consumption, creating the flexibility needed to integrate renewable energy sources into the electricity market. The energy storage market is currently experiencing exponential growth.

What You Can Expect in This Whitepaper:

- The key drivers behind structural changes in the energy market
- The economic potential of battery storage systems
- Concrete investment opportunities in the battery storage fund sector

### Management Summary



#### Renewable Energy – Key to Climate Transition

Achieving global climate goals requires an eightfold increase in electricity generation from renewable energy sources by 2050.

#### Shift in the Energy Mix

Starting in 2025, renewable energy will generate more electricity than coal-fired power plants for the first time.



#### Volatile Power Generation

Electricity production from renewable sources is inconsistent and subject to significant fluctuations.



#### Growing Demand for Storage Capacity

The increasing asymmetry between production and consumption is driving strong demand for battery storage solutions.



#### Market Development in Switzerland

Large-scale battery storage systems with a total capacity of 126 MWh are already in operation; a further doubling is expected by 2025.



#### Value Creation Through Intelligent Management

Smart management significantly enhances the efficiency and economic returns of battery storage systems.



#### Battery Storage Funds – Diversification and Revenue Streams

Battery storage funds offer access to various market segments and enable multiple sources of income.

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### 01 Infrastructure as a Megatrend

#### Demand Trends in Energy Infrastructure

The growth of the global economy, the rise in population, and increasing wealth across large segments of the population - particularly in China and other BRICS countries - have led to a significant increase in global energy consumption since the turn of the millennium. According to forecasts, this trend is expected to continue, with energy consumption projected to rise by over 50% by 2050 compared to 2020. For 2025 alone, the International Energy Agency (IEA) anticipates a 4% increase in electricity demand, driven by demographics, economic development, electrification, and digitalization.

Against the backdrop of the energy transition, this growing demand must not only be met but must also be increasingly supplied by renewable sources. In 2015, the international community made a legally binding commitment under the Paris Climate Agreement to limit global warming and set country-specific targets and measures to achieve this goal.



Figure 1: Global Primary Energy Consumption by Source

Quelle: Hannah Ritchie and Pablo Rosado, 2020, Energy Mix, online auf OurWorldinData.org<sup>2</sup>

<sup>1</sup> Source: U.S. Energy Information Administration, October 2021, International Energy Outlook 2021 Narrative <sup>2</sup> https://ourworldindata.org/energy-mix

#### Significant Investments in Renewable Energy Required

To achieve climate goals, the world must generate eight times more electricity from renewable sources by 2050 than it does today. However, the resulting volatility in energy production presents enormous challenges for power grids. Traditional energy systems have relied heavily on fossil fuels such as coal, oil, and gas (see Figure 1). These resources are versatile and relatively easy to store, but their combustion releases various greenhouse gases, which are a major driver of global warming.

The transition to renewable energy requires trillions of dollars in investments for the maintenance and expansion of energy infrastructure. As shown in Figure 2, annual expenditures related to the energy transition have increased significantly since the turn of the millennium. In just the past five years, they have more than doubled, reaching a record high in 2024. The largest share is being invested in the rapidly growing transportation subsector, followed by renewable energy and power grids. China leads global investments by a wide margin, followed by the United States. Despite these significant efforts, a considerable investment gap remains. A meta-study conducted by ETH Zurich indicates that annual investments in green infrastructure in Europe alone must increase by at least one-third as quickly as possible to meet climate targets.



Quelle: Cheung, Zhand, Annex, Januar 2025, Energy Transition Investment Trends 2025, Bloomberg NEF 5

<sup>3</sup> Source: Entrix, 2025, available online at www.entrixenergy.com

<sup>4</sup> Source: Christoph Elhardt, 2023, Net Zero Targets Require Accelerated Investments, available online at www.ethz.ch/en/news

<sup>5</sup> Energy Transition Investment Trends 2025

### Structural Shift in the Energy Mix on the Supply Side

Given the rising energy demand and the call for a greater share of renewable energy, the energy industry faces a dual challenge: ensuring a reliable supply while simultaneously increasing the generation of energy from renewable sources.

This structural shift toward renewables is already well underway. As shown in Figure 3, the energy mix has been

shifting since 2014, with the share of electricity generated from renewable sources steadily increasing.

By 2025, renewables are expected to generate more electricity than coal-fired power plants for the first time.



This presents a major challenge for the energy industry. While fossil fuels can be relatively easily stored and used as needed, an energy supply with a higher share of weather-dependent renewable sources becomes significantly more volatile. The availability of renewable energy fluctuates not only throughout the day but also seasonally. Solar power, for instance, is primarily available during midday hours in the summer months, whereas wind power tends to generate higher yields during the winter months. As the share of renewables in electricity generation increases, the asymmetry between energy production and consumption continues to grow. However, a stable balance between generation and consumption is essential to ensure a reliable power supply.

<sup>6</sup> Global Electricity Generation by Source, 2014–2025 — Charts — Data & Statistics — IEA

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### 02 Battery Storage Market Overview

#### Battery Storage – The Backbone of a Decarbonized Power Supply

Against the backdrop of the energy transition, an unprecedented demand has emerged for energy storage systems that can balance fluctuating electricity supply with consumption. Battery Energy Storage Systems (BESS) are capable of temporarily absorbing surplus electricity and storing it for periods when wind and solar energy are unavailable. These capabilities are making storage systems increasingly critical components of a renewable energy system. Utilities around the world are increasingly relying on BESS to absorb large amounts of electricity within seconds and release it back into the grid when needed. Storage capacity is becoming an indispensable part of strategic infrastructure, enabling the successful integration of renewable energy sources into the power grid.

#### Battery Energy Storage Systems (BESS)

A Battery Energy Storage System (BESS) is a stationary energy storage unit that uses lithium-ion batteries to store electrical energy and rapidly release it when needed.

BESS help stabilize the power grid by balancing the fluctuating generation of electricity from renewable sources, thereby contributing to overall grid stability.

Accordingly, the global battery storage market is currently experiencing exponential growth. In 2024, 30 GW of new battery storage capacity was installed worldwide. Analysts at Bloomberg project that this figure will more than quintuple by 2030 (see Figure 5). In China, the amount of newly installed storage capacity in 2023 "Batteries are the backbone of a decarbonized power supply. Their role in ensuring energy security and grid integration is growing rapidly – worldwide." – Fatih Birol, Executive Director of the International Energy Agency (IEA)



was approximately four times higher than the previous year, while in the United States, installed battery capacity nearly doubled. The European battery storage market is also expanding rapidly, particularly in Germany. In Switzerland, the first battery storage facility was inaugurated in Ingenbohl in May 2024.

#### 02 Battery Storage Market Overview



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### 03 Business case for battery storage

### From niche to mainstream – how BESS can become economically competitive

BESS are increasingly becoming a solid business case. The spread of renewable energies is increasing demand for storage capacity, while the competitiveness of storage systems is further supported by government intervention and falling costs.

Today, China leads the way with a share of more than three quarters of global storage production. The government offers financial incentives and specifically promotes research and development. In the USA, BESS benefit from tax breaks and in some states from subsidy programs. Europe also offers such programs and wants to strengthen battery production. In Switzerland and Germany, BESS receive grid fee exemptions. As Figure 5 shows, the costs per kilowatt hour of storage are falling sharply. The International Energy Agency expects this trend to continue and the cost of lithium-ion batteries to fall further by 2030. On the one hand, this is because the price of the important raw material lithium has come back after a high in 2022. On the other hand, it is also due to more efficient production thanks to economies of scale from the industrialization of lithium-ion production in the automotive sector. The International Energy Agency assumes that the combination of photovoltaics and battery storage will be cheaper than building new fossil fuel power plants in just a few years. At the same time, further technical innovations are likely to extend the performance and service life of the systems.



#### 03 Business Case for Battery Storage

Optimized marketing systems enable investors and project developers to maximize the returns of BESS across the entire lifecycle, providing access to diversified revenue streams.

"Battery storage is central to the energy transition – but system performance must keep pace with the growth of solar. Only those who invest strategically will benefit from the transformation."

 David Hostert, Global Head of Economics & Modeling at BloombergNEF To succeed in the expanding BESS market, it is essential to understand the energy market, the regulatory environment, and the technical and financial frameworks specific to each region.

From an energy security perspective, it is critical that the performance capabilities of storage systems keep pace with the growth rate of renewable energy sources (see Figure 6).

Battery average discharge duration, Economic

**Transition Scenario** 

#### Figure 6: Flexibility of Battery Storage Systems in Global Comparison

Share of solar generation, Economic Transition Scenario



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### 04 Practical Perspectives on the Battery Storage Market

CKW's perspective: Battery storage as a key technology for the energy transition and an investment opportunity

CKW's Perspective: Battery Storage as a Key Technology for the Energy Transition and an Investment Opportunity. This development is driven by declining technology costs and increasing price volatility in the electricity and ancillary services markets, both of which enhance the economic viability of battery storage systems.

Damian Zurmühle, Senior Originator at CKW

Switzerland's energy future is defined by decentralization, volatility, and a strong focus on renewable energy. With the rapid expansion of renewables – particularly solar energy – price fluctuations in the electricity market are increasing, including a rise in negative electricity prices during periods of overproduction. At the same time, there is a growing need for short-term grid stability. Large-scale battery storage systems offer a market-ready solution: they provide flexible capacity within seconds – both during electricity surpluses and shortages. This capability positions them as the backbone of a stable, renewable energy system.

The Swiss market for large-scale battery storage is experiencing dynamic growth. While only three facilities with a total capacity of around 21 MW were installed in 2018, the number of projects has since grown exponentially. By the end of 2024, 22 large-scale battery storage systems with approximately 123 MW of power and 126 MWh of storage capacity have been commissioned. By 2025, including projects currently under construction, another doubling of installed capacity is expected.



Large-scale battery storage is evolving from pilot projects into a critical pillar of the national energy infrastructure. They generate value through parallel use in multiple markets – an approach known as "revenue stacking."

The main revenue streams include:

- Ancillary Services: Participation in high-value frequency regulation and ancillary services markets
- Peak Shaving: Reducing peak loads to lower grid usage costs
- Voltage Support: Providing reactive power at critical grid nodes
- Electricity Market Arbitrage: Exploiting price differences in spot and intraday markets

As a successful operator of both owned and customer battery storage systems, CKW combines these applications through intelligent multi-market optimization, maximizing returns for its clients.

Large-scale battery storage systems are much more than energy storage – they are a strategic element of the energy transition. The combination of technological maturity, increasing market dynamics, and favorable regulatory conditions makes them an attractive investment.

"Those who invest in large-scale batteries today are laying the foundation for a stable, renewable energy system — and securing early access to a rapidly growing infrastructure segment." — Damian Zurmühle, CKW

Those who act now will not only secure a competitive advantage but also play an active role in shaping Switzerland's energy future.

#### Entrix's Perspective: Return Optimization Through Intelligent Management

Entrix is a full-service flexibility marketer for battery energy storage systems (BESS) and enables partners to achieve the best possible revenues in electricity trading - thanks to market-leading, Al-based trading algorithms. The trading solution is developed entirely in-house and continuously optimized to remain competitive in a volatile market environment.

Lars Löhle, Chief Commercial Officer at Entrix

By 2050, the majority of Germany's energy supply is expected to come from renewable sources. Achieving this goal requires a significant expansion of installed generation capacity. As a result, fluctuations in electricity feed-in to the grid will increase substantially — supply will vary more frequently and with greater intensity. This drives a growing need for flexibility within the system. Battery storage systems make a decisive contribution here, as they can absorb or discharge energy at short notice. Their importance is already noticeable today and will grow even more as the share of renewables continues to increase.

As an end-to-end partner, Entrix supports investors from system design through commissioning to operational marketing. Deep expertise in automated trading, energy markets, and battery technology is critical to fully maximizing the revenue potential of storage assets.

Intelligent management is the key to value creation. Those who can flexibly respond to market conditions and provide capacity exactly when it is most needed achieve the highest prices – in the day-ahead, intraday, and an-



cillary services markets. Entrix's intelligent, Al-driven multi-market optimization adapts individually to the warranty parameters, available capacity, and degradation constraints of each asset – and can increase project returns by up to five percentage points in IRR.

The algorithm continuously makes the best trading decisions. In addition to trades with physical delivery, it systematically closes positions before delivery – so-called virtual cycles – generating additional revenues without stressing the battery. This careful operation extends battery lifespan and reduces OPEX. Precise forecasting and automated dispatch also minimize revenue volatility and risk. Through active participation in industry associations, political processes, and market committees, regulatory developments are detected early and translated into additional revenue opportunities – a benefit that is fully passed on to partners.



The system's performance is evident in practice: Aquila Capital is deploying Entrix technology for the first time in two storage projects, each exceeding 100 MW. Encavis is integrating battery storage systems with wind and solar parks, and Entrix is optimizing Europe's largest residential virtual power plant (VPP), consisting of thousands of home storage units.

"Intelligent management transforms volatile storage revenues into sustainable, attractive returns – precisely meeting the requirements of modern infrastructure investors." – Lars Löhle, Entrix

This creates attractive returns for investors. Fixed remuneration models can be strategically combined with flexible market revenues, complementing individual risk profiles. Volatile storage revenues are transformed into a stable and attractive investment case that meets the requirements of modern infrastructure investors.

#### **Conclusion: Two Perspectives, One Common Goal**

Whether through robust grid stabilization or data-driven optimization, battery storage is a future-oriented and economically viable sector. Those who understand the interplay between storage systems and electricity markets have the opportunity to invest today in one of the most exciting infrastructure segments of the energy transition.



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### 05 Investment Outlook

#### New Investment Perspectives in the Growing Battery Storage Market

The structural transformation of the European energy sector offers a wide range of opportunities for investors in energy storage and grid flexibility. Especially in times when equities and bonds are facing uncertainty and volatility, these investments can provide valuable portfolio diversification. Historically, the energy sector has shown strong performance within infrastructure investments, offering stable and attractive returns.

"System flexibility is the new gold of the energy economy. Those who invest in storage today secure access to a critical lever in the electricity market of the future." – PwC Energy Transition Outlook 2024

It offers stable, long-term, and predictable returns, along with strong diversification benefits. With the expansion

of battery storage systems, the variety of investment models in this sector is also increasing. Given the complexity of market mechanisms, revenue models, rapid technological progress, and regulatory developments, collective investment vehicles provide an attractive entry point for institutional investors. Energy storage funds allow them to invest in a diversified portfolio of projects, significantly reducing risk compared to direct investments. Battery storage funds offer access to various market segments and enable investors to tap into multiple revenue streams. While short-term income can be generated in the ancillary services markets, BESS can simultaneously purchase electricity at low prices on the wholesale market and sell it when prices are higher. The intraday market offers an additional revenue opportunity.



#### Figure 7: Typical Revenue Streams and Market Segments for Battery Storage Systems Worldwide

Source: Wood Mackenzie, PwC Analysis

#### Strategic Access to Sustainable Infrastructure — Investing with Foresight

In certain regions, cash flows are also secured over the long term through government or industrial Power Purchase Agreements (PPAs).

"Battery storage is a strategic growth market – but not a guaranteed success. Investors need experience, strong partners, and access to the relevant markets." – David Michael Lincke, Head of Asset Management

For sustainability-focused investors, battery storage also offers the opportunity to contribute to the energy transition and energy security. However, due to the raw material requirements in battery production, a thorough analysis of the entire lifecycle and global supply chains is essential — from raw material extraction and system manufacturing to recycling.

Storage funds provide investors with targeted, diversified access to the energy markets. Selecting the right market, investment model, and partners are critical success factors. Those who take a structured approach can achieve above-average returns in one of the most dynamic sectors of the energy transition while simultaneously contributing to energy security and climate protection.



#### 05 Investment Outlook

### Why Battery Storage Is Not a Traditional Infrastructure Investment?

The MW Storage Fund continues Swiss KMU Partners' long-standing track record of success in the construction and operation of large-scale Battery Energy Storage Systems (BESS). The fund's portfolio focuses on premium locations across Europe to make a decisive contribution to advancing the energy transition.

Bernhard Glück, Finance Manager at Swiss KMU Partners

Investing in battery storage differs significantly from traditional infrastructure investments.

The key differences include:

Battery storage is not a typical infrastructure investment – it requires active management, technological flexibility, and deep market understanding. This is exactly where the MW Storage Fund positions itself: with its in-house project development team, years of experience in constructing and operating battery storage systems, technical expertise, and targeted market access, the fund invests not only in infrastructure but also in the operational value creation of the energy transition. Through a growing portfolio of large-scale European battery storage projects, the fund combines long-term sustainability with attractive return potential – designed for professional investors looking to explore new avenues in infrastructure financing.

íí.l	Market Risk Instead of Regulation	Revenues are generated from volatile energy mar- kets – without predictable, government-regulated compensation.
٩	Dynamic Business Models	Revenue streams such as arbitrage and peak sha- ving are constantly evolving. Active management is essential.
Ę	Technological Change	Storage technologies are subject to rapid innovation cycles – unlike the stability of traditional grid infras- tructure.
000	Active Operation Instead of Passive Ownership	Success depends on operational management, tra- ding, and technical optimization – not passive asset ownership.
	Political Uncertainties	Inconsistent regulations across Europe complicate planning and market access.
X	No Long-Term Guarantees	Often, there are no government-backed purchase agreements – leading to higher capital commitment and increased risk.

# Key facts about the MW Storage Fund

Name	MW Storage Fund
Currency	EUR
Launch Date	November 8, 2022
Performance	+7.20% since launch (NAV 1,071.95 as of June 30, 2024) 2025: approx. +8.21% (preliminary)
Management Fee	0,9 % p.a.
	– 100 MW / 200 MWh (Arzberg/Wunsiedel, under construction, COD 07-2025)
Projects	$-2 \times 20$ MW (Finland, under construction, commissioning Q3/Q4 2025)
	- Additional sites under acquisition

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### 06 Conclusion and Recommendations for Investors

#### Outlook

Battery storage systems are the key to a resilient, decarbonized energy system. Their ability to make volatile renewable energy sources available on demand makes them an indispensable building block for a successful energy transition. Accordingly, their economic potential is growing rapidly – driven by falling costs, regulatory incentives, new business models, and increasing awareness of energy security and grid stability.

Those who understand the market, anticipate regulatory developments, and partner with experienced players can not only participate in this growth but also secure early competitive advantages. In combination with renewable energy, BESS form a business model that will become even more competitive in the future due to improved battery economics and technological advancements in cell and system design.

Battery storage funds offer institutional investors access to this promising market segment. They enable participation in tangible infrastructure projects, combining stable cash flows with positive climate impacts and creating a new investment opportunity at the intersection of energy, technology, and sustainability.

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#### Content Responsibility

Agnes Rivas

#### Contact

info@picardangst.com +41 55 290 50 00 www.picardangst.ch

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