

ENERGY STORAGE

Global Conference

Brussels, 14-16 October 2025

2025



Session 2.4 How to Manage Merchant Risk?



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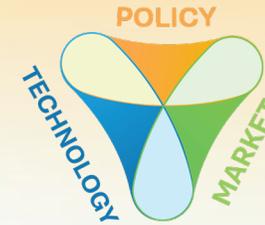


Moderator:

Patrick Clerens

Secretary General / Energy Storage Europe

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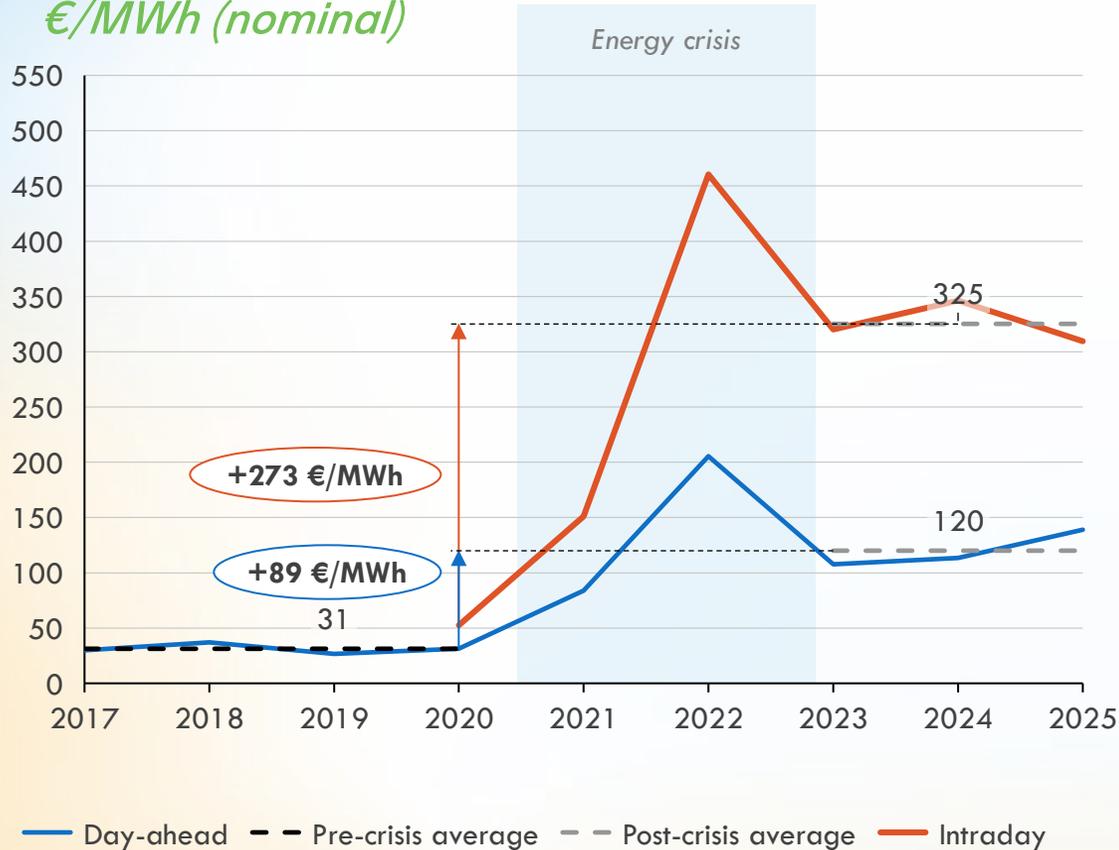


AUR  RA

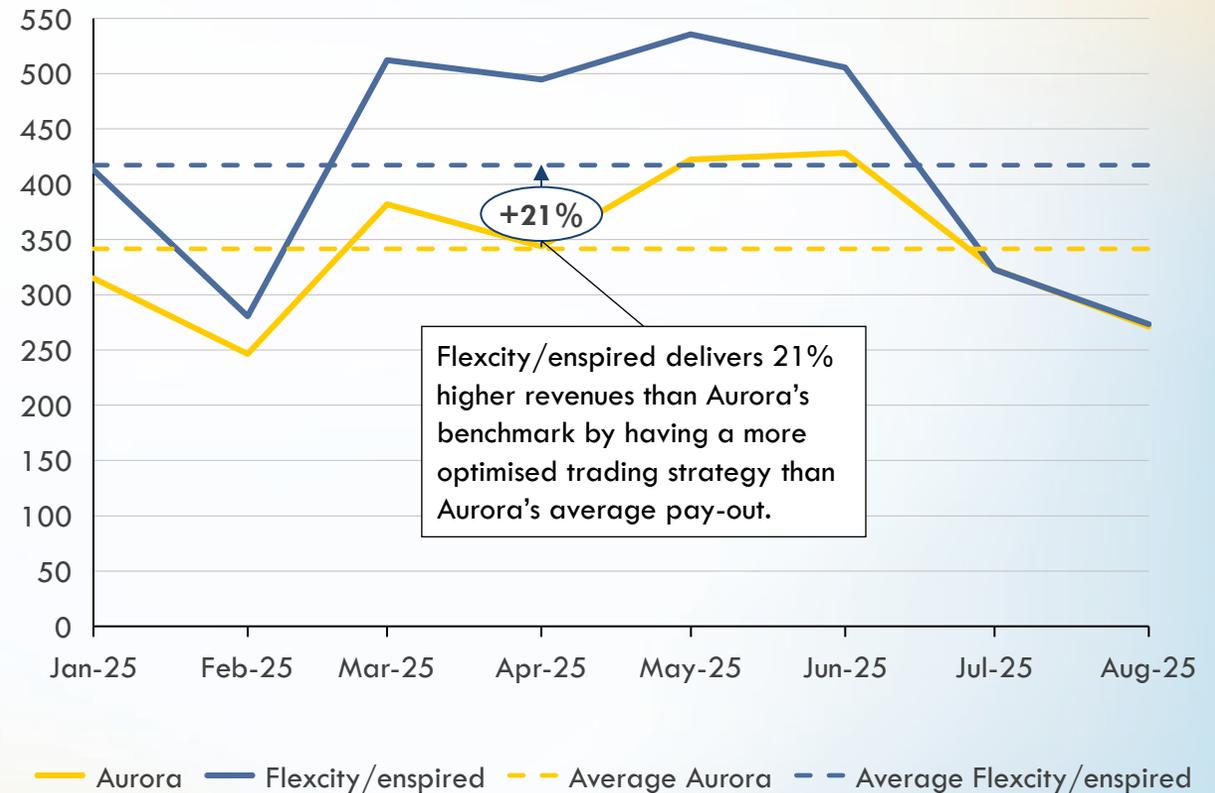
ENERGY RESEARCH

Wholesale markets offer high revenue opportunities, with significantly higher price spreads since the energy crisis

Average daily Intraday and Day-ahead 1h price spread¹
 €/MWh (nominal)



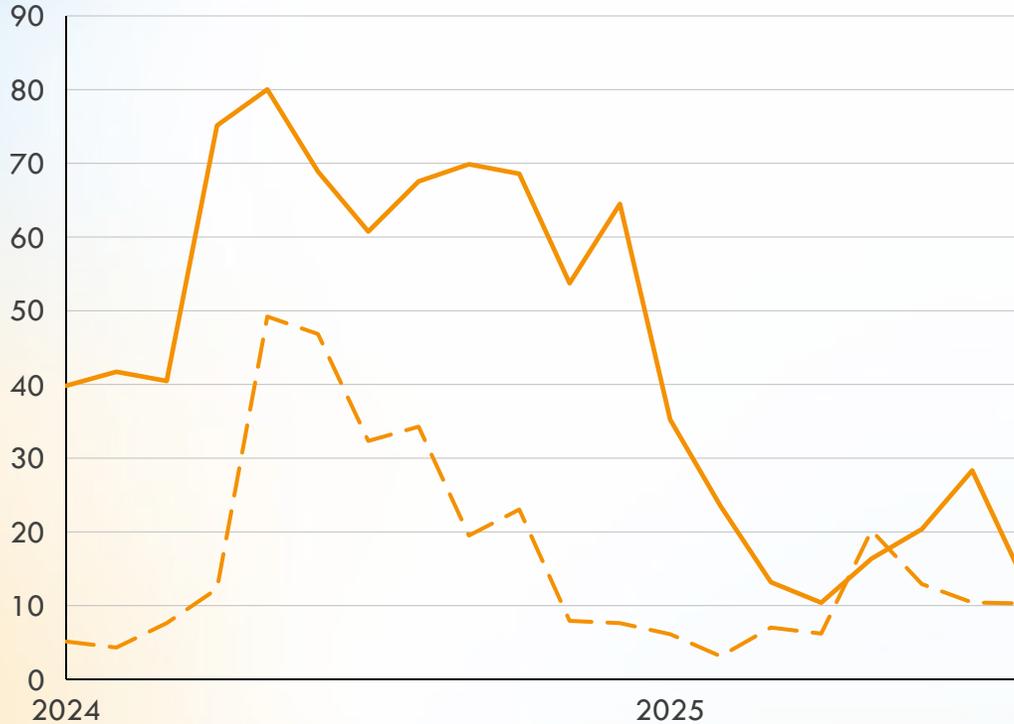
Monthly annualised gross margins of a 4h battery
 €/kW annualised per month (nominal)



1) The ID spread is calculated as the difference between the average price of the four highest and four lowest 15-minute blocks within a single day; the selected blocks do not need to be consecutive.

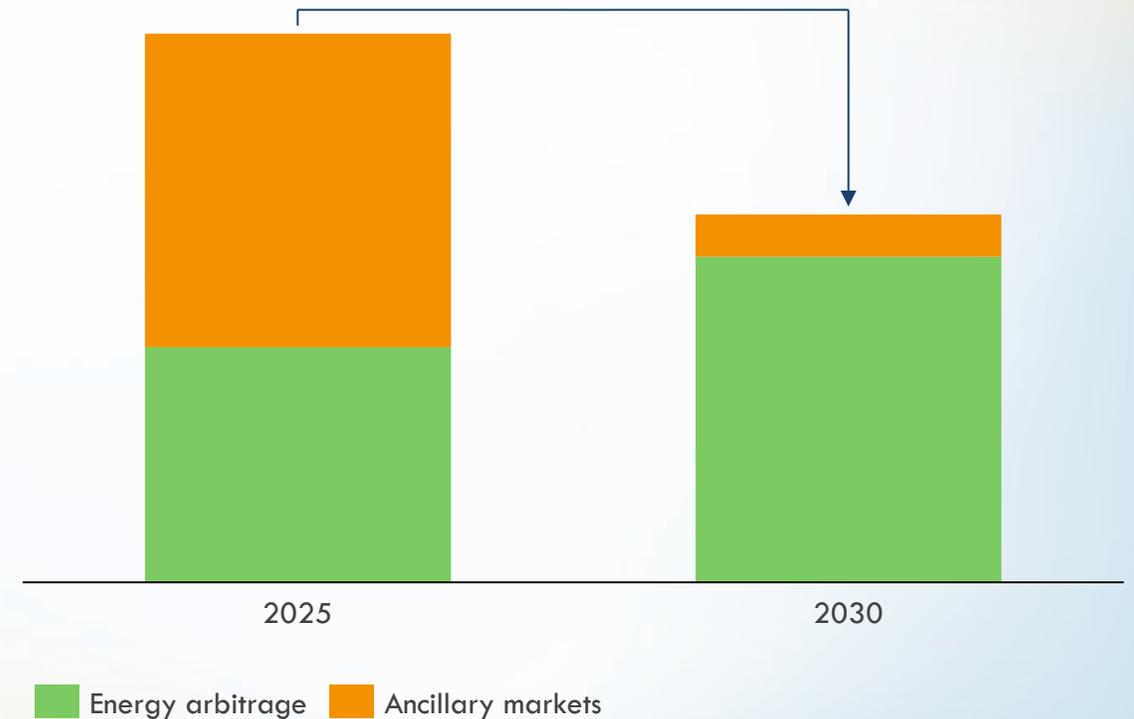
High volatility and market saturation create uncertainty on revenue potential

Monthly average aFRR capacity prices¹ in Belgium
€/MW/h (nominal)



— aFRR capacity up - - aFRR capacity down

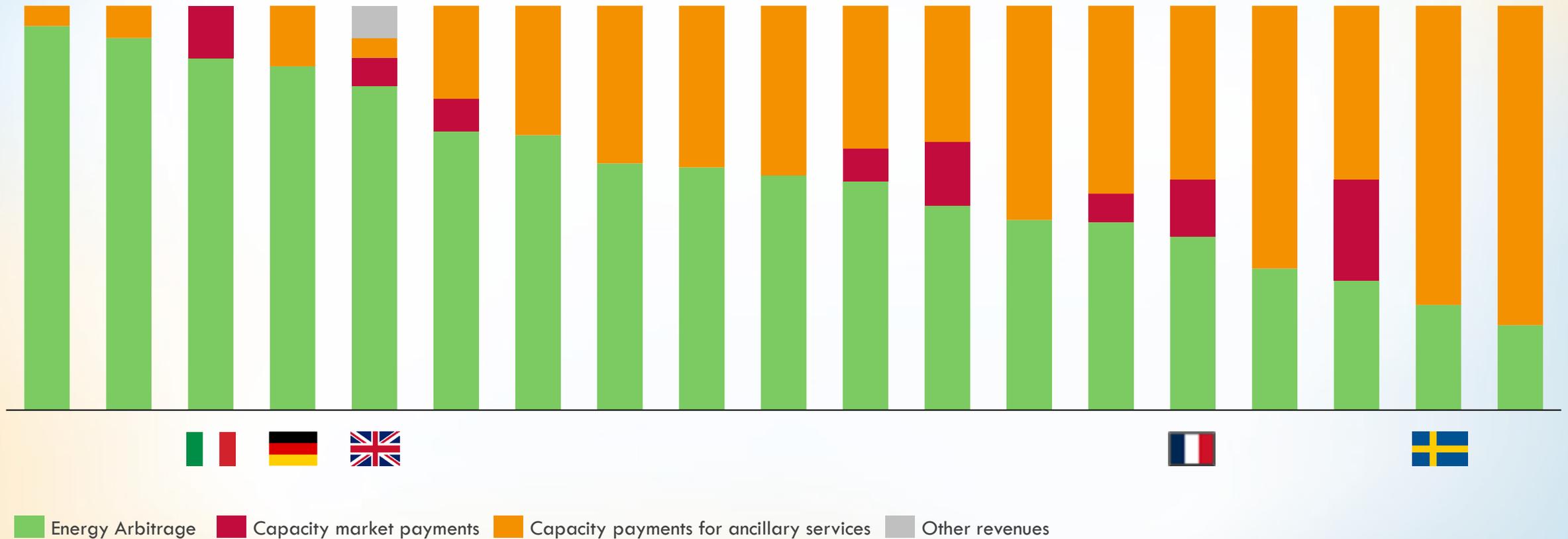
Gross margins for a 4h battery system – Illustrative
€/kW



1) Data up to and including 31 August 2025.

Moreover, battery revenues across Europe are fully exposed to merchant risk

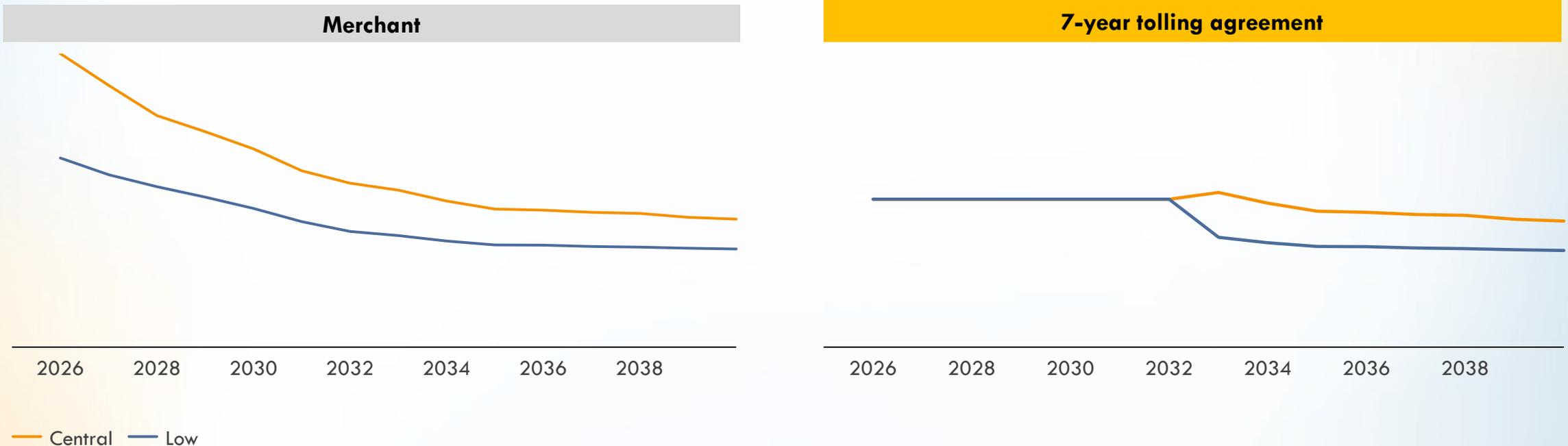
Average composition of gross margin stack for 2h duration battery¹
% of 2027/28 – 2041



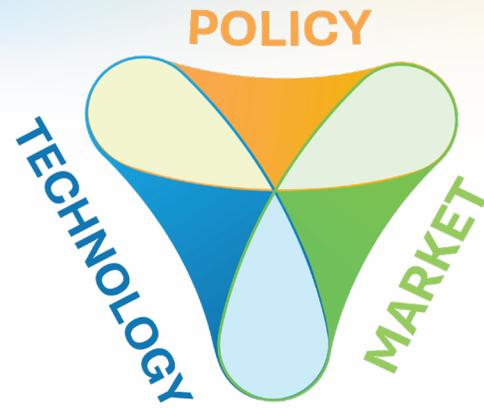
1) Shown for a representative standalone battery with 2027/28 entry year.

Tolling agreements are emerging as a financing vehicle to reduce merchant exposure

Annual gross margins in the merchant case compared to a 7-year tolling agreement - Illustrative
€/kW/year, nominal



The equity IRR in a Low scenario is higher for a tolling agreement compared to the merchant case.
This comes **at the expense of a lower equity IRR in the Central case** as merchant margins outperform the fixed tolling price.



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THANK YOU!



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Augustin Levassort

Beyond Capacity: Rethinking Value in BESS Design

— Chris Wu

Managing Director – Europe, at Cubenergy

EMBA Candidate

- London Business School & Colombia Business School

A Long Termist in Battery Energy Storage Industry



5MWH BESS DC BLOCK In the Market

CATL	20ft, 5MWh + Liquid Cooling
CRRC	20ft, 5MWh + Liquid Cooling
CHINT	20ft, 5MWh + Liquid Cooling
SCETL	20ft, 5MWh + Liquid Cooling
SUNWODA	20ft, 5MWh + Liquid Cooling
HTHIUM	20ft, 5MWh + Liquid Cooling
CORNEX	20ft, 5MWh + Liquid Cooling
TrinaStorage	20ft, 5MWh + Liquid Cooling
SERMATEC	20ft, 5MWh + Liquid Cooling
SYL	20ft, 5MWh + Liquid Cooling
REPT BATTERO	20ft, 5MWh + Liquid Cooling
CALB	20ft, 5MWh + Liquid Cooling

Next

2024

6.25
MWh
@20'ft

7
MWh+
@20'ft

8
MWh+
@20'ft

10MWh?
100MWh?@20'ft

Any risk on increasing energy density?

HOMOGENEITY

In BESS Product Development

From a buyer's perspective, homogeneity means that they can expect the same quality and characteristics from a product, regardless of where or when they buy it. Therefore, the market can determine their value based on supply and demand, and this leads to efficient pricing.

" In a world created by natural selection, homogeneity means vulnerability."

– Edward O. Wilson

" When companies are too similar, customers suffer because they get fewer choices, less innovation, and they end up paying higher prices as competitive pressure diminishes "

- Clayton Christensen

" Markets thrive on difference and diversity. Homogeneity breeds complacency, stifles innovation, and ultimately leads to economic stagnation. "

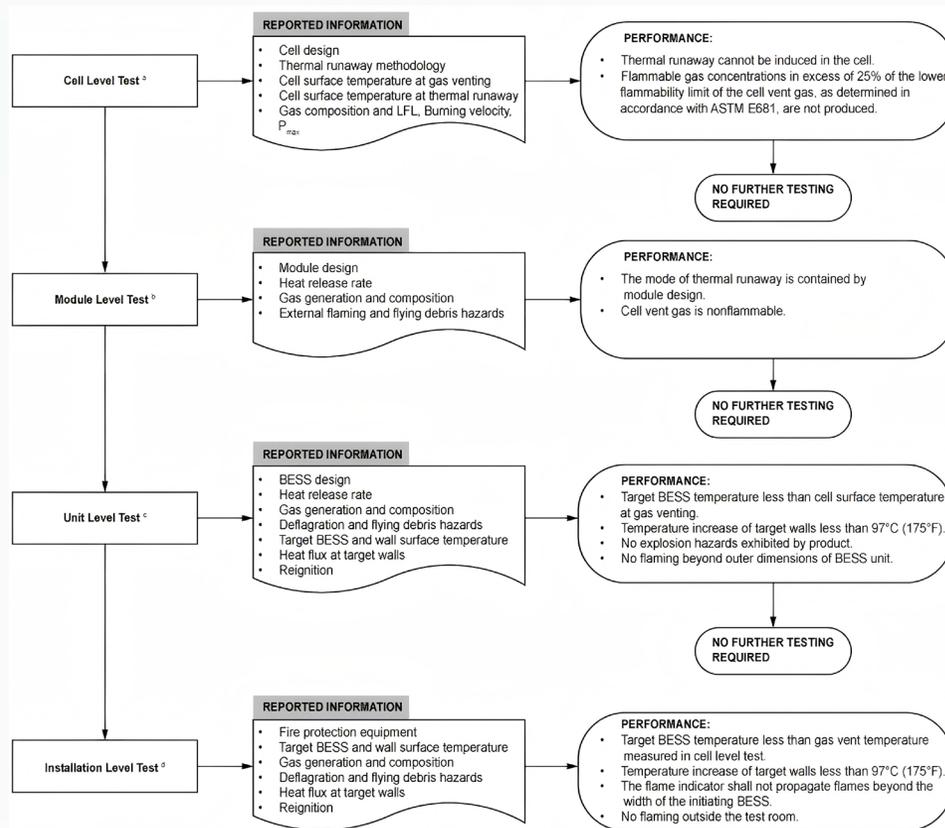
- Niall Ferguson (British Economist)

" The superior person seeks harmony without uniformity. "

– Confucius

UL9540A TESTS

A Main Criterion for the Safety Evaluation



Thermal runaway examination
and tests on design
& function of target unit

CELL TO INSTALLATION

CONSTRAINS

On UL9540A Tests

- Cubenergy achieved UL9540A certification at the string level in 2021;
- All battery strings of Cubenergy have been certified according to UL9540A standards;
- While the UL9540A test is rigorous, the repeatability of test results cannot be guaranteed.



SINGLE TEST LIMITATION

The UL9540A test is performed only once on the target sample. As it is not a repeatable experiment, it cannot guarantee a consistent effect in preventing energy storage systems (ESS) from thermal runaway.



DESIGN REGULATION LIMITATIONS

While the UL9540A test evaluates safety, it does not serve as a design regulation. Consequently, it cannot ensure consistent protection against thermal runaway across different ESS designs.

LIMITATIONS ON NFPA 855

NFPA 855 is a standard currently under development, providing comprehensive guidance for a wide range of energy storage systems (ESS) on complex issues



Irreversible Reaction

Once thermal runaway begins, it is an electrochemical reaction that cannot be halted electrically. It remains uncontrollable by any electronic or switchgear interventions.

Limitations of Existing Protection

The current protection design, aimed at isolation and fire resistance, can only reduce the damage but cannot eliminate the inherent threat of thermal runaway.

RISK ON HIGH ENERGY-DENSITY BESS

Illustrative Scenario



A 100kWh Battery Energy Storage System (BESS) experiencing thermal runaway can be compared to an electric vehicle catching fire and exploding.

A 5MWh BESS housed in a 20ft container is comparable to having 50 electric vehicles on fire and exploding within a space measuring 20ft x 8ft x 8ft. The electrochemical energy released during thermal runaway, along with the chemical energy from explosions or conventional fires involving flammable gases, can be up to 100 times greater than the energy stored in the system.

HIDDEN BURDEN

Transportation & Site Integration



Dimension of 5MWh DC Block:
20' HC Container;
43MT approximately.

> 45MT:

Battery packs must be partly delivered to the site:

- Additional cost on transportation:
45MT with additional 50% cost against <32MT ESS, and only base port allowed;
Additional cost on 10MT battery pack transportation;
- Additional cost on site integration + SAT;
- Additional lead time on site integration + SAT.

< 32MT:

Integrally transportable to the site:

- Plug-and-play at the site;
- No site integration needed;
- FAT instead of SAT;
- Saving on lead time.

COST OF CONTINUITY

Operation & Maintenance

Around 5,000 battery cell of 314Ah in one 5MWh DC block;

Central system that 12 battery strings in one container connected at one DC busbar;

Passive-balancing of BMS;

Manual calibration.



RETHINKING The Road Ahead



Cautious on increasing the unit energy density



CSA TS-800:2024 for Large Scale Fire Testing (LSFT)

RETHINKING BESS DESIGN

From Units to Infrastructure

- **Plant-Level Design:** Comprehensive site-wide planning including layout optimization, electrical topology, and centralized control architecture to ensure scalable, resilient infrastructure.
- **Safety & Compliance Engineering:** Designed to meet site-level fire propagation testing requirements under CSA TS-800:2024, addressing regulatory expectations and insurance standards.
- **Grid-Connection Readiness:** Infrastructure-level modeling, simulation, and interconnection planning to streamline grid compliance and accelerate commissioning.

RETHINKING BESS DESIGN

From DC Block to Lifecycle Services

- Modular String Architecture enables streamlined O&M across the entire lifecycle, with simplified fault isolation and faster serviceability.
- All-in-One AC Block Design ensures rapid, low-complexity site installation, reducing labor intensity and integration risk.
- Integrated Grid-Connection Services accelerate commissioning and secure a prompt COD for the BESS plant.
- Supplier-Backed Performance Guarantee ensures maximum uptime and predictable output, securing long-term ROI through contractual service commitments.



Renewable Energy Never Stops



Global cooperation contact



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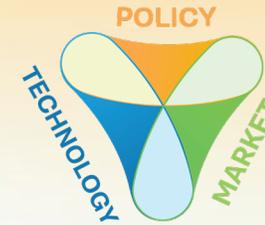
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**AVAILABLE
RELIABLE
ACCOUNTABLE**

How to manage merchant risk?



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Lars Löhle

Chief Commercial Officer @Entrix



About Entrix



Customer spotlights



Aquila works with us on their **first two storage projects in Germany (>100MW)**



For Encavis, we optimise **batteries together with renewables**



We're the exclusive partner for **Europe's largest residential VPP**



For MEAG, the **asset manager of MunichRe**, we optimise their inaugural storage site in Germany (93MW/231MWh)

Further project references



First project live since
2022

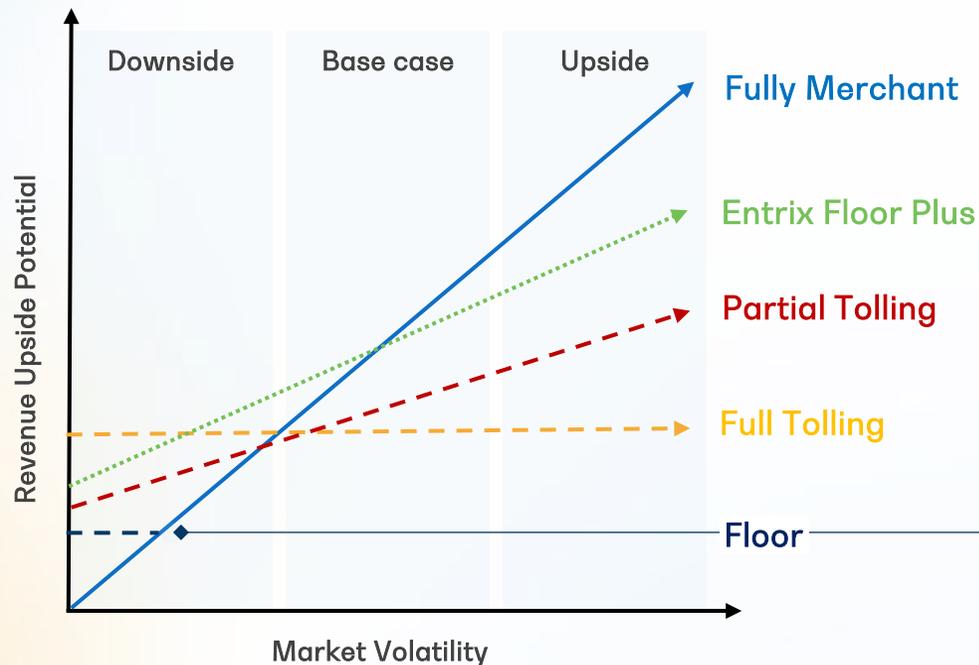
~2 GW
under management

400 MW
going live in 12 projects in 2025

Entrix is active in
5 countries



Tailored revenue models exist to match risk-return-profile and ensure best financing options for BESS projects



Fully Merchant

Full exposure to market volatility → high risk, high return

Entrix Floor Plus

Base case equal to fully merchant paired with downside protection → medium risk, medium-high return

Partial Tolling

Combination of fully merchant and tolling, typically strictly lower return and downside protection than Entrix Floor Plus → medium risk, medium-low return

Full Tolling

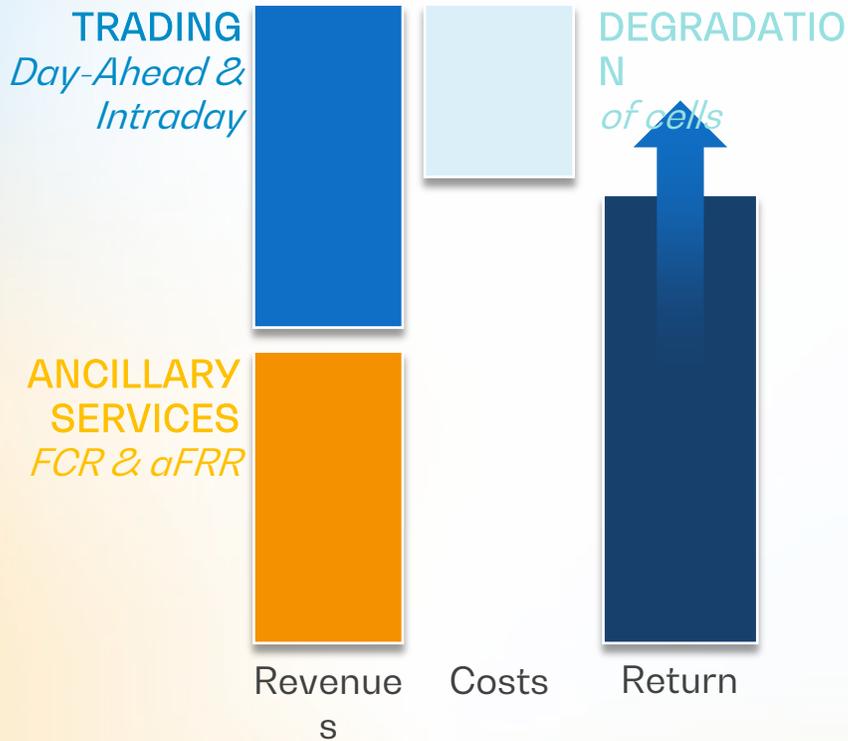
All revenues pre-contracted and full handover of asset to third party → low risk, low return, low visibility on asset operations

Floor

Minimum revenues guaranteed and merchant beyond this. Typically, rather expensive and/or with low level of guaranteed revenues → high risk, medium-high return

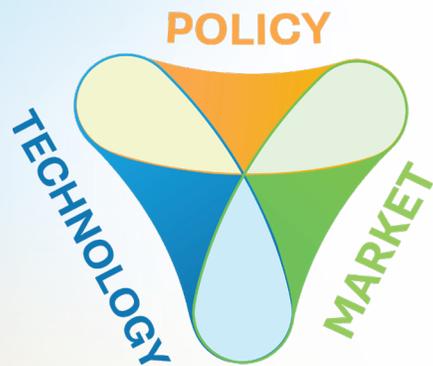
Batteries are a unique asset class that requires specialised optimisation approaches to maximise return

Holistic optimisation of battery storage assets



Revenue for 2024-2025 YTD based on different asset durations





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Bringing together the
world of **energy storage!**

**Value trap:
Costly and
poorly
executed
revenue
hedging**

Before contracting revenues, understand your true demand and the “cost iceberg”

Carefully assess your fixed revenue demand

- ❓ **What’s the risk of BESS revenues in your portfolio?**
BESS and renewables tend to naturally hedge each other (think: days with negative power prices) – check which further risk mitigation is needed
- ❓ **Which share of revenues really needs to be fixed?**
Contracting is not a binary decision as you can tweak the share of contracted revenues granularly – check what’s the optimum for your individual business case and investor profile (debt & equity!)

Be mindful of the fixed revenue “cost iceberg”



Explicit costs
Swapping merchant returns with fixed returns

Implicit costs
Lack of performance in daily optimisation

“Contractual costs” (e.g., penalties for unavailabilities)

Young & dynamic market environment paired with under-estimation of BESS-inherent “option value”

If you need contracted revenues on your project, make sure you select players according to their strengths

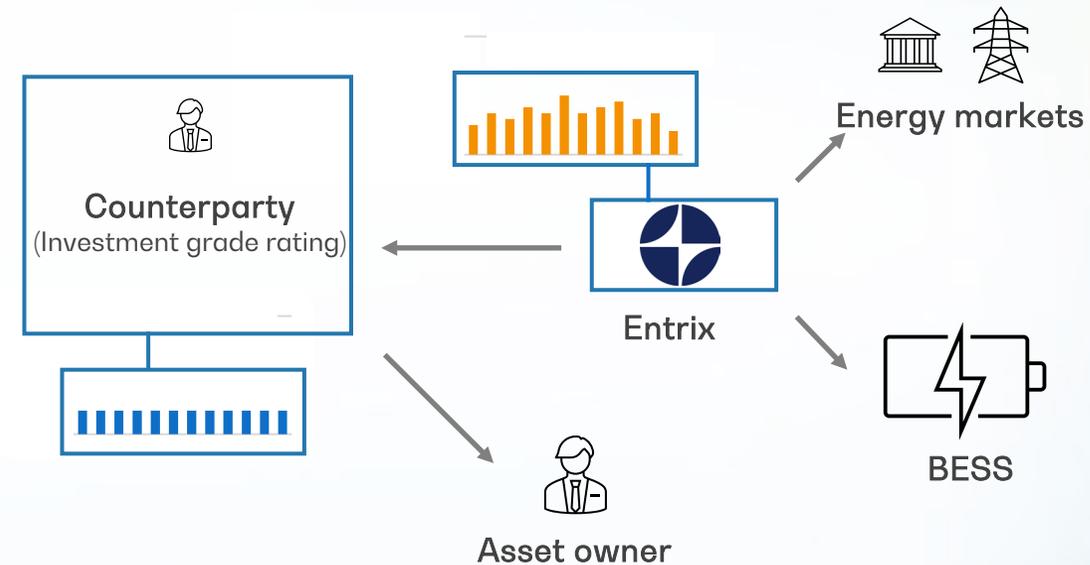
“Strength-based” revenue contracting

Offering contracted revenues requires two distinct competencies:

1. Being able to price flexibility **long-term** and having the balance sheet to back this up
2. Being able to capture the maximum value of BESS in the **day-to-day**

Our suggestion: work with a combination of (i) counterparty backing revenues and (ii) flex optimizer – ideally in a purely financial setup

→ Both players act according to their strengths & financial setups allow for great flexibility



Entrix is already executing such structures across Europe

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Entrix startet neues Vermarktungsmodell für Batteriespeicher

Das „Entrix FloorPlus-Modell“ wird erstmals gemeinsam mit der Deutschen Bahn und der Energieversorgung Beckum eingesetzt. Es sieht erstmals feste Erlöszahlungen mit vollständiger Marktoptimierung vor.

23. JULI 2025 SANDRA ENKHARDT

HIGHLIGHTS DER WOCHE SPEICHER DEUTSCHLAND



Der Spatenstich ist gesetzt und die Vermarktungsstrategie klar: Jeremias Heinrich (Entrix), Daniel Dierich (evb), Arian Ukiqi (BBS), Benedikt Richter (Westenergie), Steffen Schülzchen (Entrix).

Foto: evb/Westenergie/Entrix

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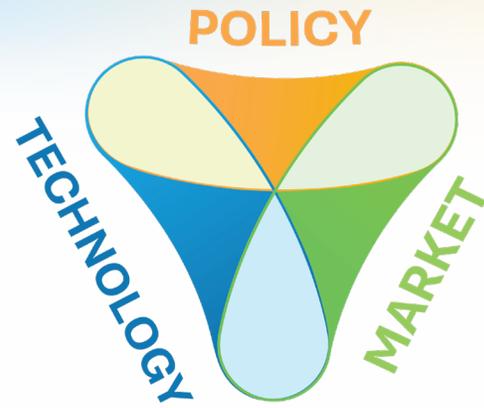
Projects & Applications Markets Industry Technologies Products & Services

Revenue streams Distributed Grid-scale Offgrid Second-life batteries

REVENUE STREAMS

Entrix offers new revenue model for battery storage

The ‘Entrix FloorPlus’ approach is being implemented for the first time, with Deutsche Bahn and Energieversorgung Beckum (evb). It incorporates fixed revenue payments with AI-powered multi-market optimization for the first time.



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THANK YOU!



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