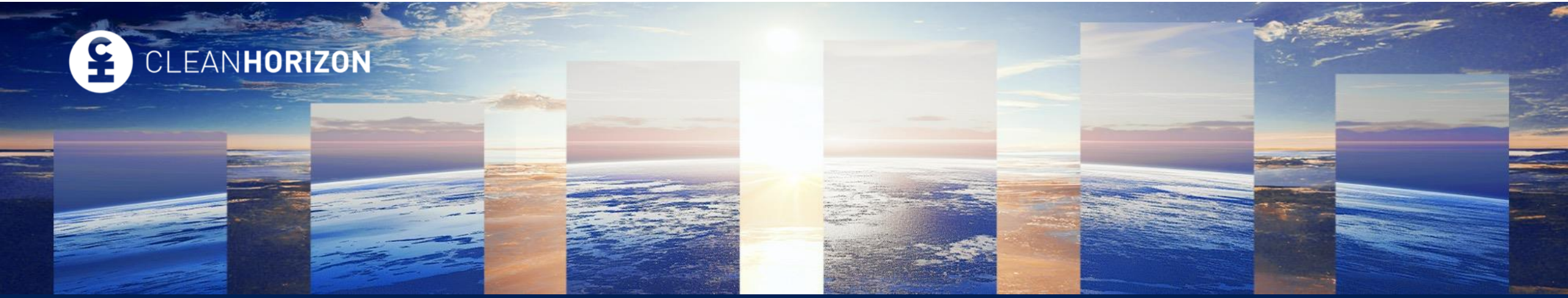

Insights on the French storage market

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Get Enspired

10th September 2025

Agenda

1. Introduction to Clean Horizon
2. French storage market overview
3. French grid congestion management scheme through grid fees

CLEAN HORIZON'S EXPERTISE

Since 2009, Clean Horizon has been a one-stop shop energy storage consultancy

MARKET ADVISORY

Deep expertise in providing energy storage market studies worldwide.

Our experts have technical, economic and regulatory knowledge, covering different geographies and constantly tracking market evolutions.

TECHNICAL ADVISORY

We act as owners' engineers and lenders' technical advisors for IPPs, utilities and lenders worldwide.

We support our clients at all stages of development, from feasibility studies and design, to procurement, construction and commissioning.

OUR UNIQUE OFFERING	We accompany projects from design to commissioning	Realistic assumptions & accountability for results	Reliable forecasting

Geographical coverage for electricity and ancillary services price forecast & COSMOS

COUNTRIES COVERED AS OF Q3 2025

France

Germany

Belgium

Spain

Portugal

Finland

Baltic states: Lithuania, Latvia and Estonia

Poland

Sweden

Denmark

Italy

Romania

Long-term forecast based on market fundamental parameters

The following assumptions are used as inputs to the model:

- Country load evolution and flexible assets
- Installed thermal capacity (gas, nuclear, coal, etc.)
- Installed wind & solar capacity
- Future electricity mix of neighbouring countries
- Fuel prices: gas, oil, coal and CO2 price

Assumptions applied during the post-treatment phase:

- Electricity and storage market knowledge
- Storage deployment
- Market depth evolution
- Weather scenarios
- Regulatory changes
- Opportunity cost of energy storage on other markets (Day Ahead, mFRR, and aFRR)

Clean Horizon's dedicated in-house expertise

- Expertise in energy storage
- Critical view of storage experts on inputs and obtained scenarios
- AI algorithm tailored for storage
- Mathematically reliable algorithm simulating scenarios
- Multiple iterations and data post-treatment to verify accuracy of results

Forecast provided	Granularity
FFR	1h
FCR-N	1h
FCR-D Up and Down	1h
aFRR reservation Up and Down	1h
mFRR reservation Up and Down	1h
mFRR activation Up and Down	15 min
Day ahead market	1h
Intraday Continuous revenue	15 min

Simulation tool for project sizing, performance analysis and optimisation

COSMOS BY CLEAN HORIZON

Clean Horizon optimises the economic model, based on the quantitative factors

ECONOMIC PARAMETERS

Storage / PV/ WIND CAPEX
Storage / PV/ WIND OPEX

TECHNICAL PARAMETERS

MW of storage
MWh of storage
MWp of PV
MW of WIND
MW of grid connection & limitations

MARKET PARAMETERS

Forecast of ancillary service prices
Forecast of wholesale prices
Forecast of balancing mechanism prices

This tool allows

1

To determine optimal sizing for different configurations of the storage system

2

To calculate the cashflows, NPV and IRR

3

To easily generate sensitivity analyses

4

To optimise dispatch and to find an optimum scenario

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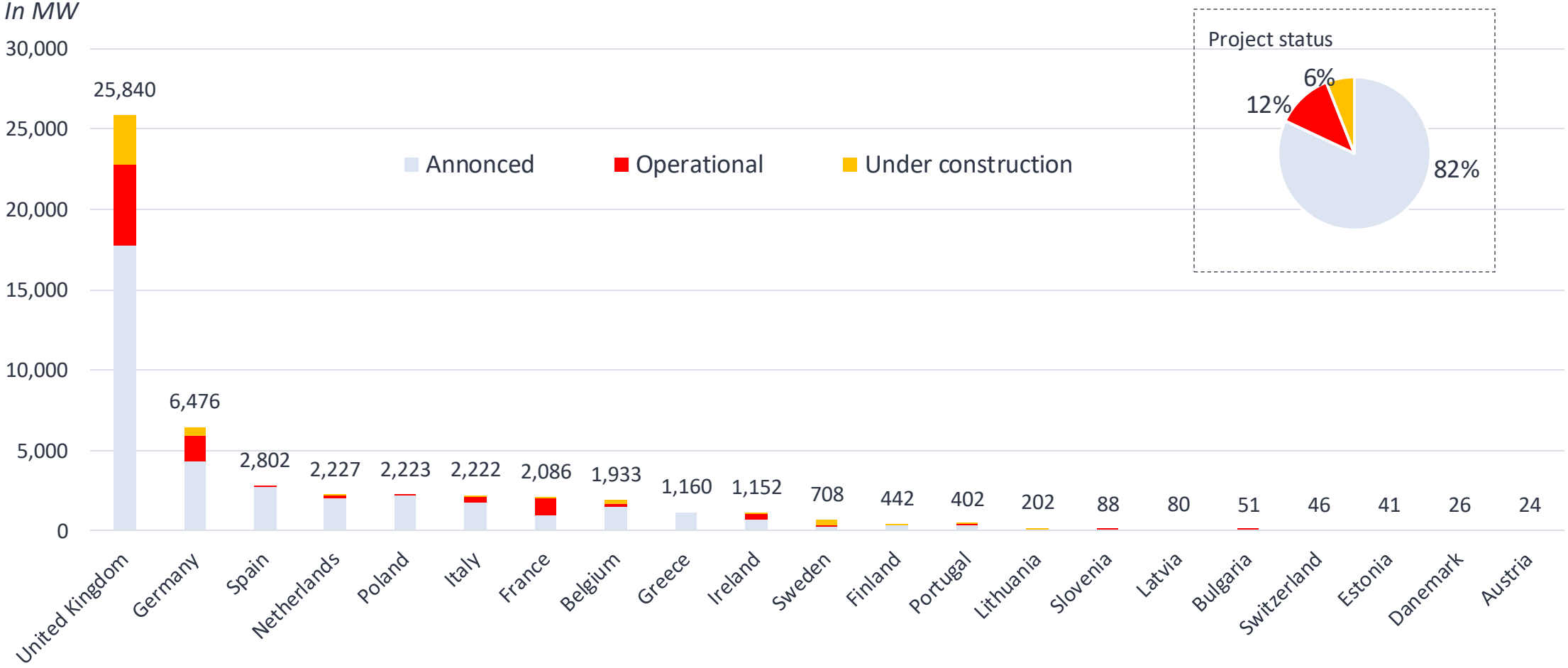
Leading storage markets in Europe

Stationary storage projects installed, operational, and announced (over 500 kW excluding pumped hydro)

In MW

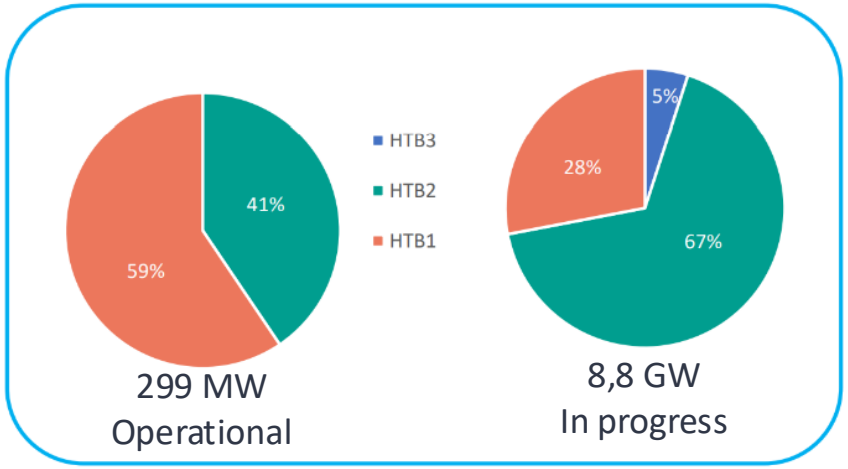


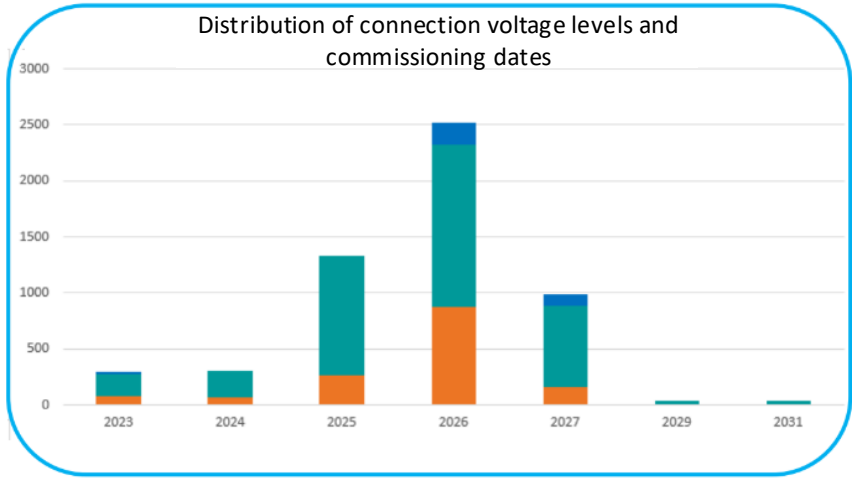
Source : Clean Horizon Energy Storage Source (CHESS) - june 2025

1.2 GW storage built and 10 GW under development in France

As announced by RTE, **8.8 GW of storage** projects have signed Technical and Commercial Proposal

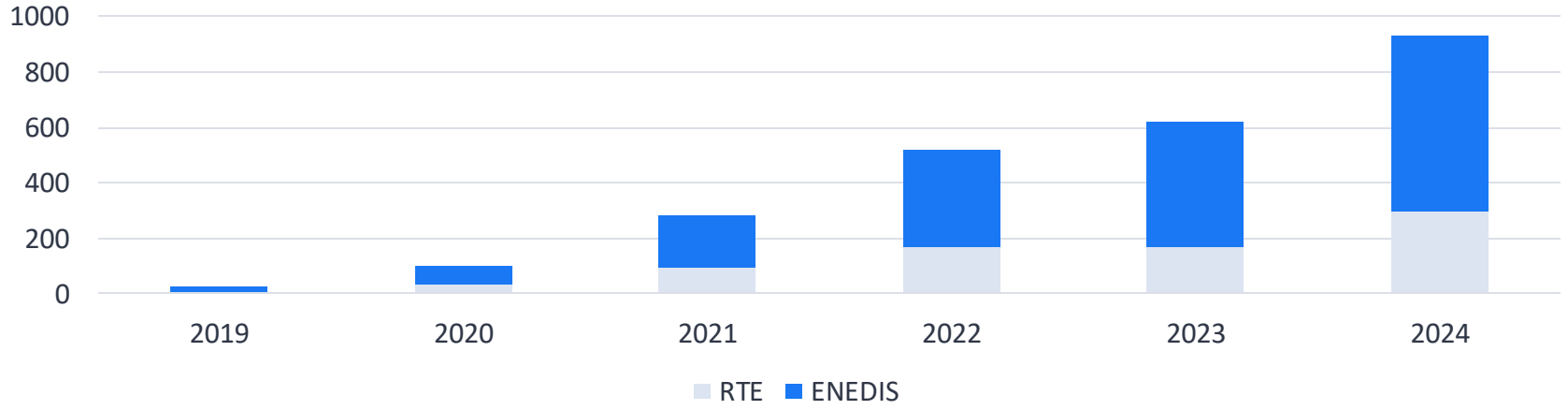
Projects operational by the end of 2024:
299 MW on RTE
633 MW on ENEDIS





Storage projects connected to ENEDIS and RTE (Q4 2024)

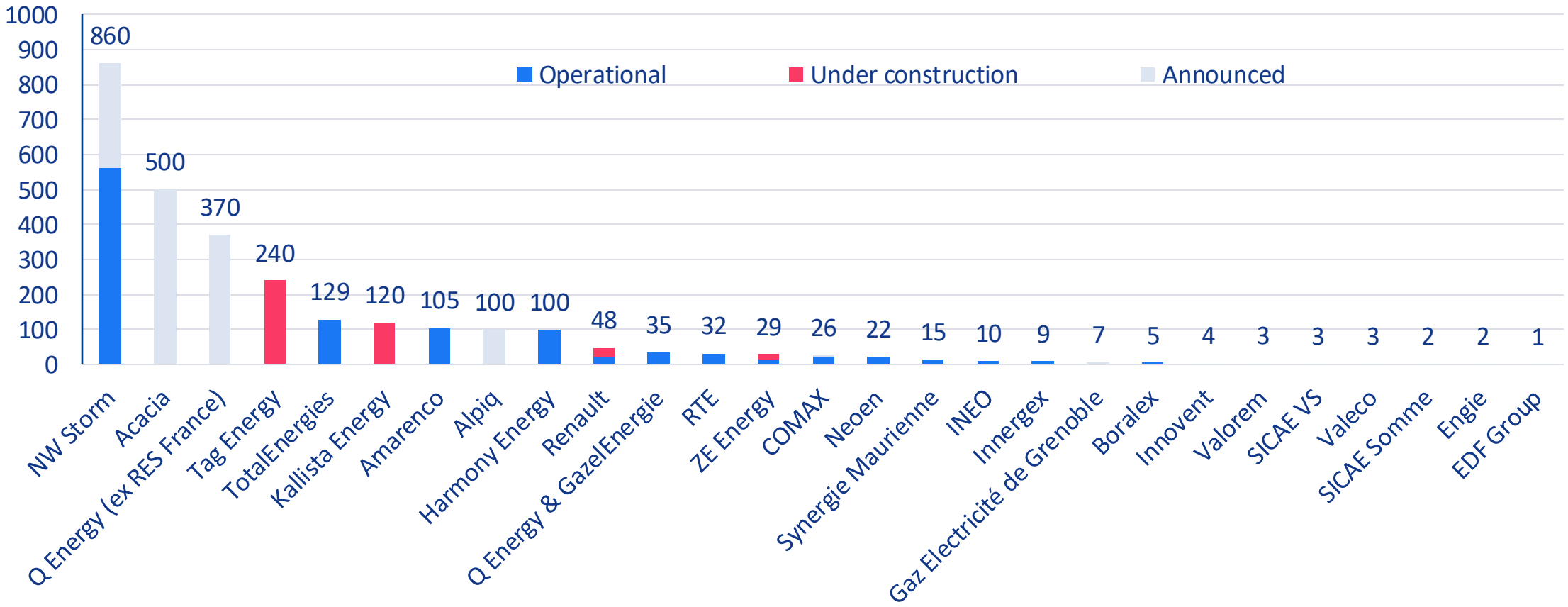
In MW



Leading developers in France

Battery storage projects (>500kW) in France - June 2025

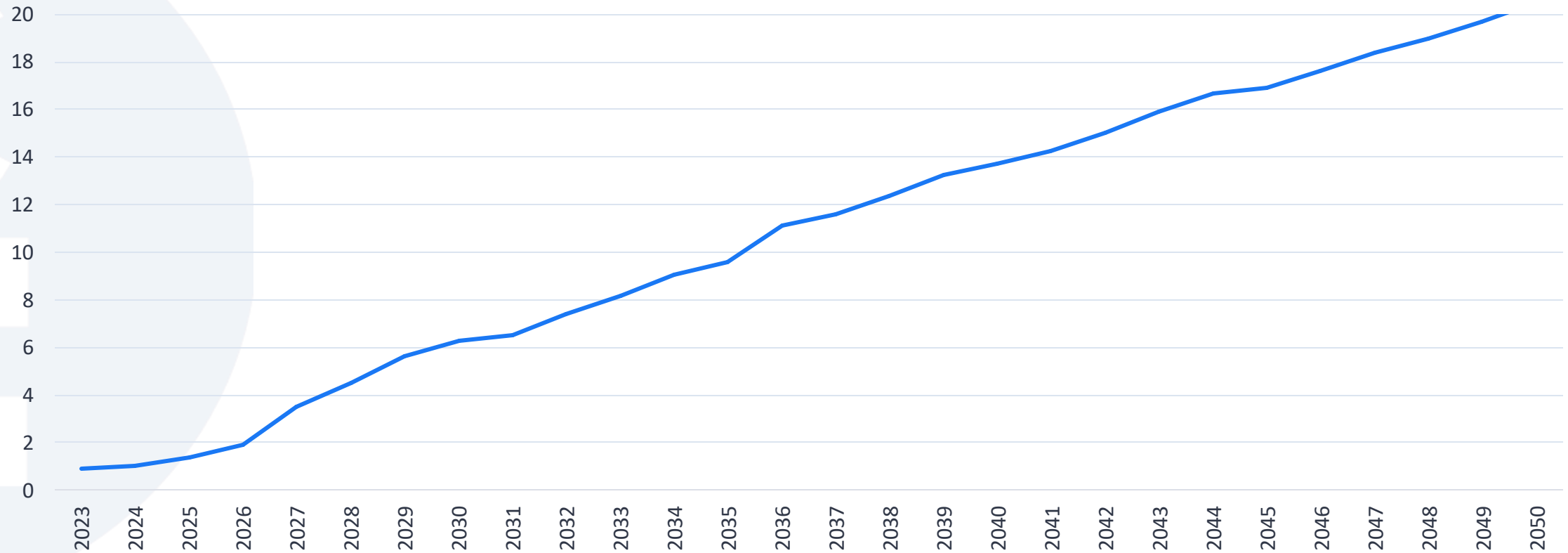
In MW



Clean Horizon expects 6.3 GW of batteries to be installed in France by 2030

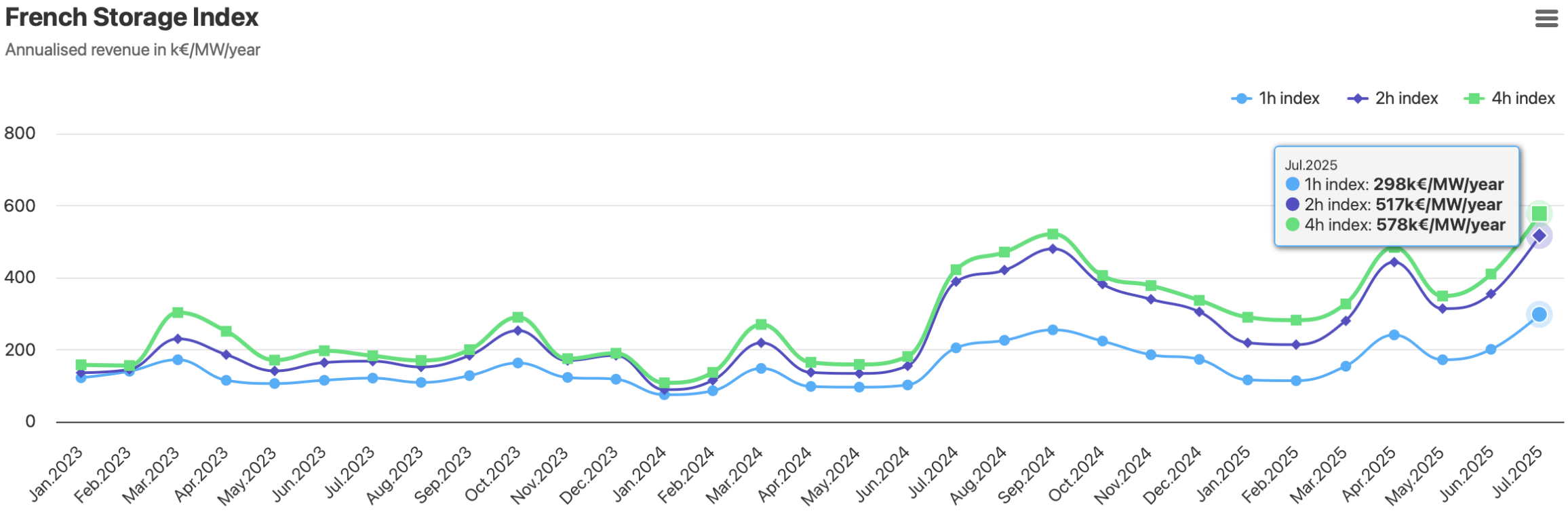
Forecasted cumulative battery storage volumes in France in Clean Horizon central scenario

In GW



Our online index of battery-related revenues in Europe

Belgium | Denmark DK1 | Denmark DK2 | Finland | **France** | Germany | Italy | Poland | Spain | Sweden

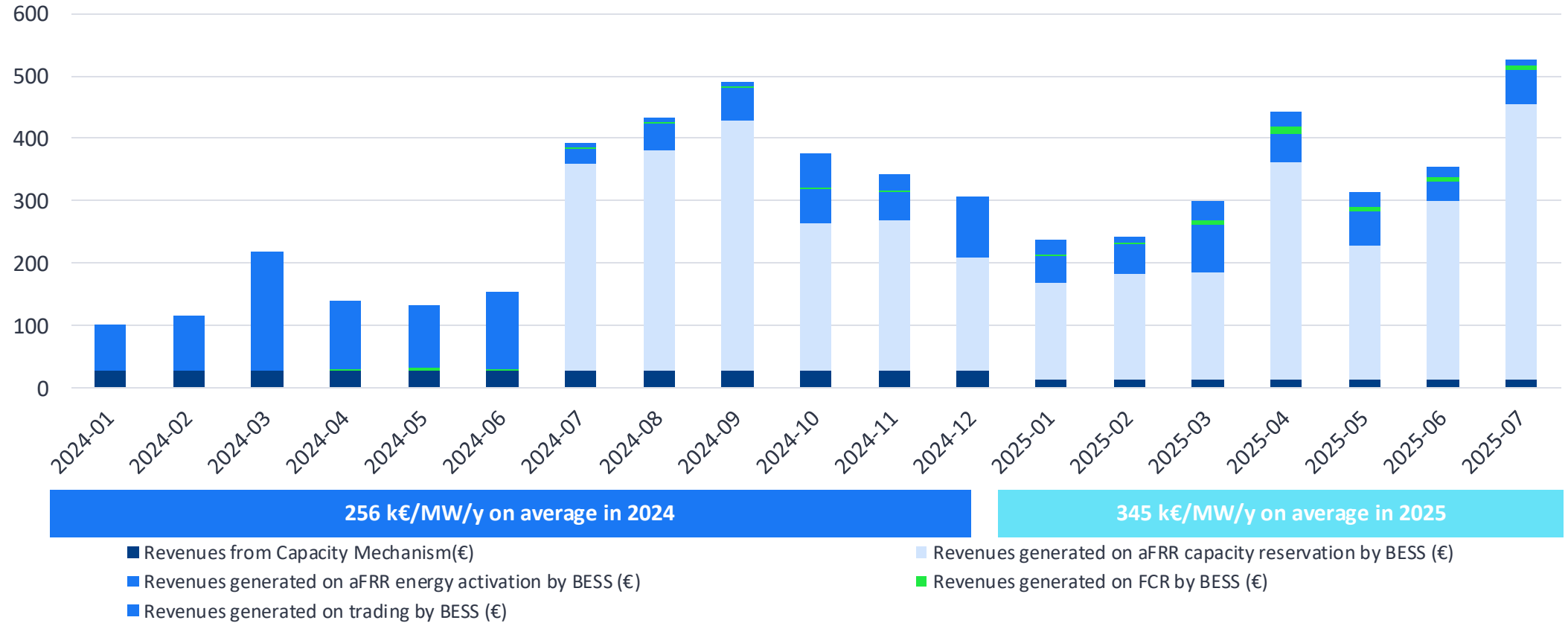


Source : Clean Horizon Storage Index

The aFRR reservation market has offered very high revenues

Historical revenues by market for 50 MW / 100 MWh storage in France

In k€/MW/an



1: Note for a 2-hour battery costing €500,000, performing 1.5 cycles per day, with a lifespan of 18 years, a discount rate of 8%, and 10% OPEX per year.

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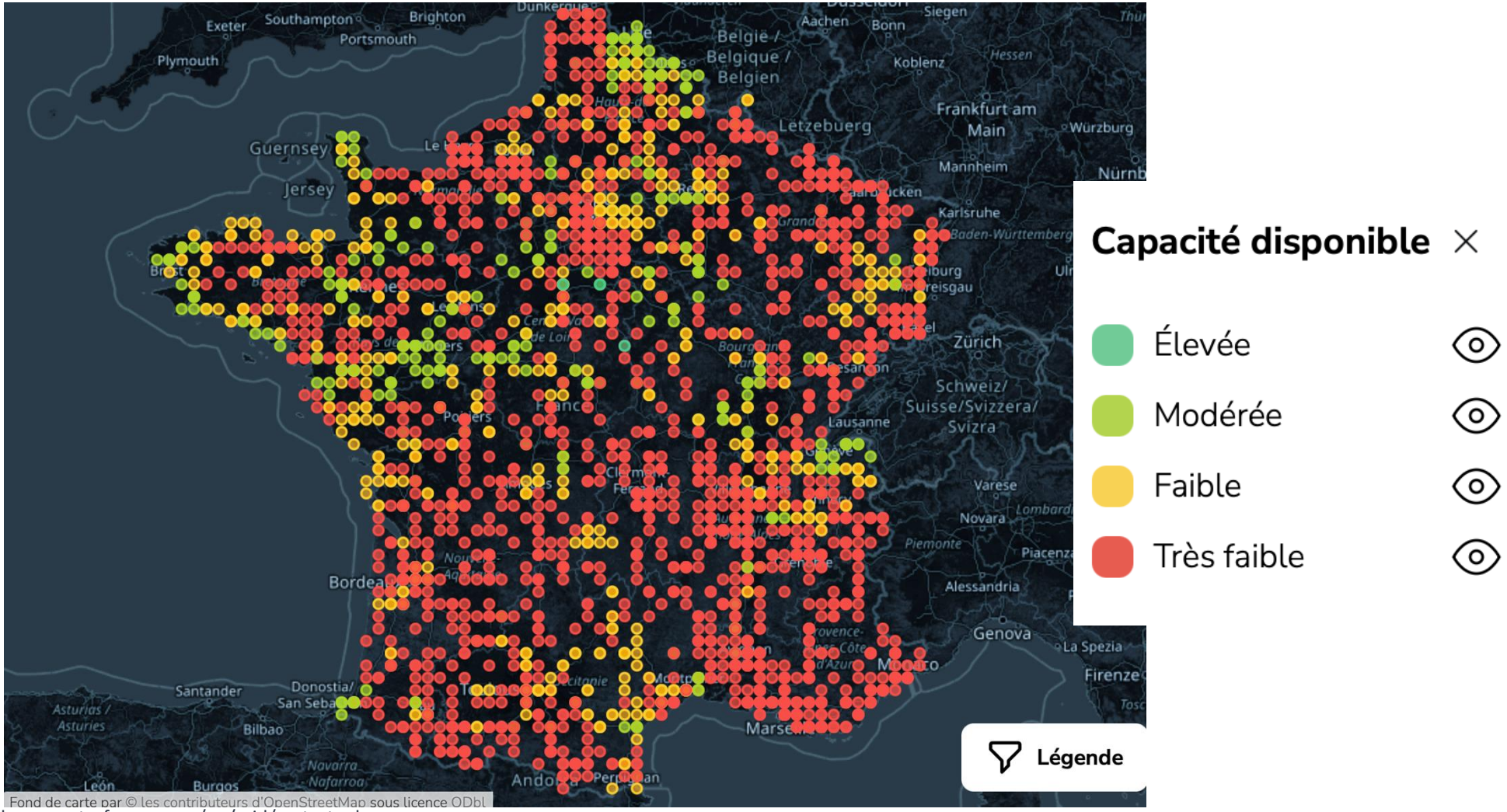
Bottom line: French grid is very congested, new batteries will only connect with limitations



Source: https://analysesetdonnees.rte-france.com/en/grid/cartostock

Grid operators want to foster storage development to deal with congestions

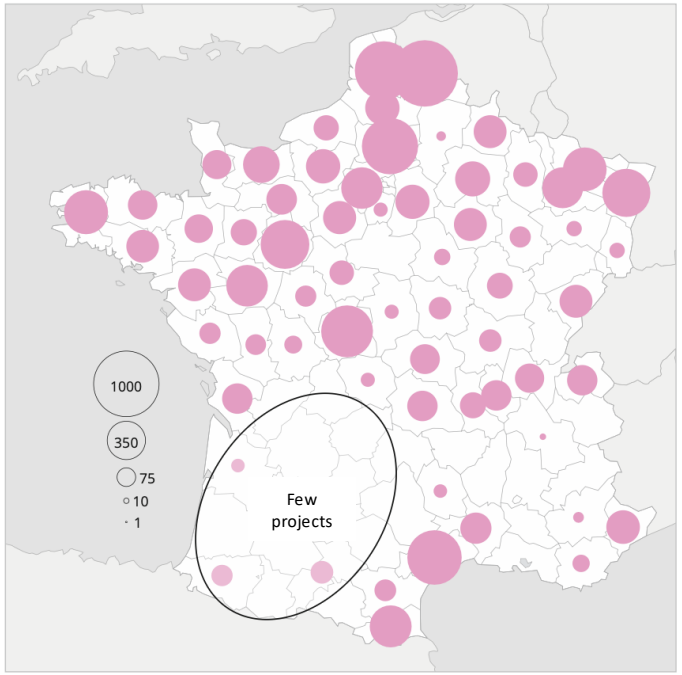


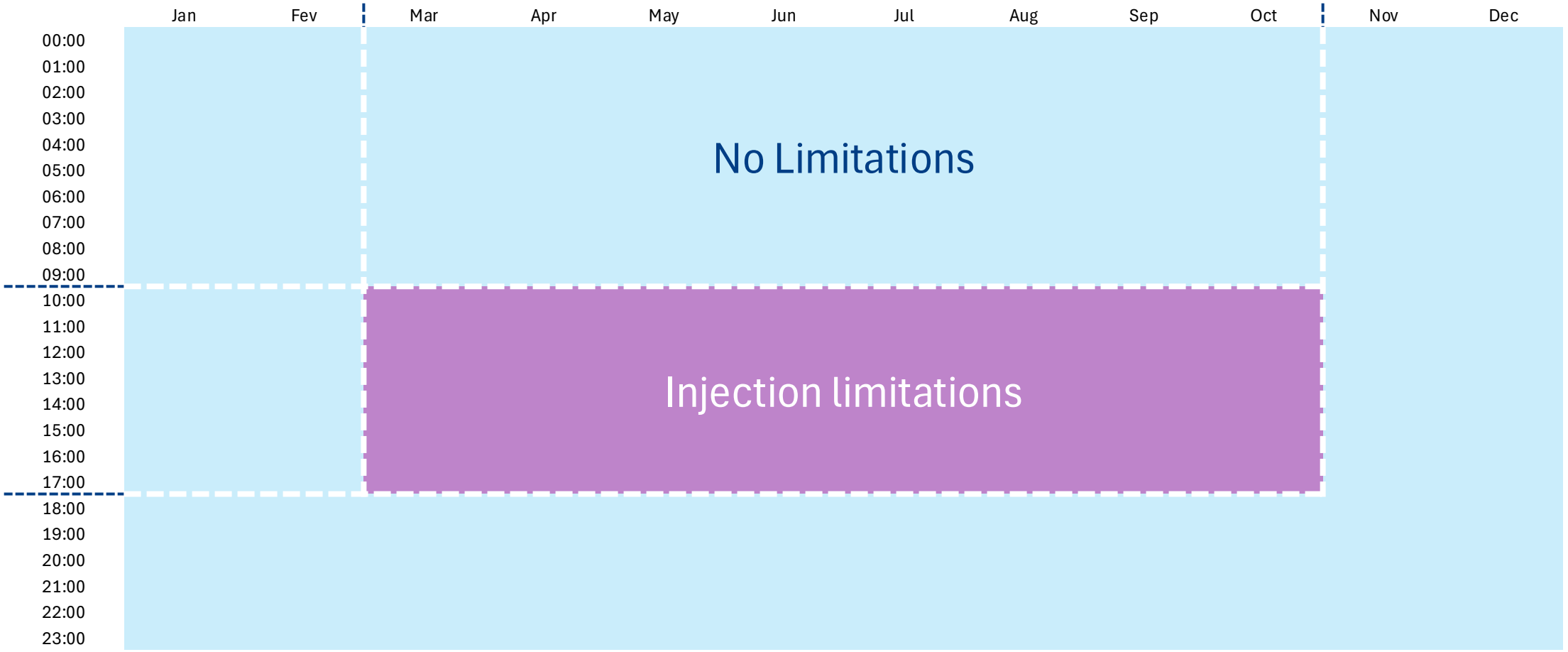
Figure : Location of stationary batteries that have applied for connection to the public electricity transmission grid (Technical and Commercial Proposal application) status at the end of 2024

Type of grid connection mold	Definition	Maximum annual restriction period
Solar grid conection mold	Free operation except when injection is prohibited: every day between 10 a.m. and 6 p.m. from March to October inclusive.	~1950 hours

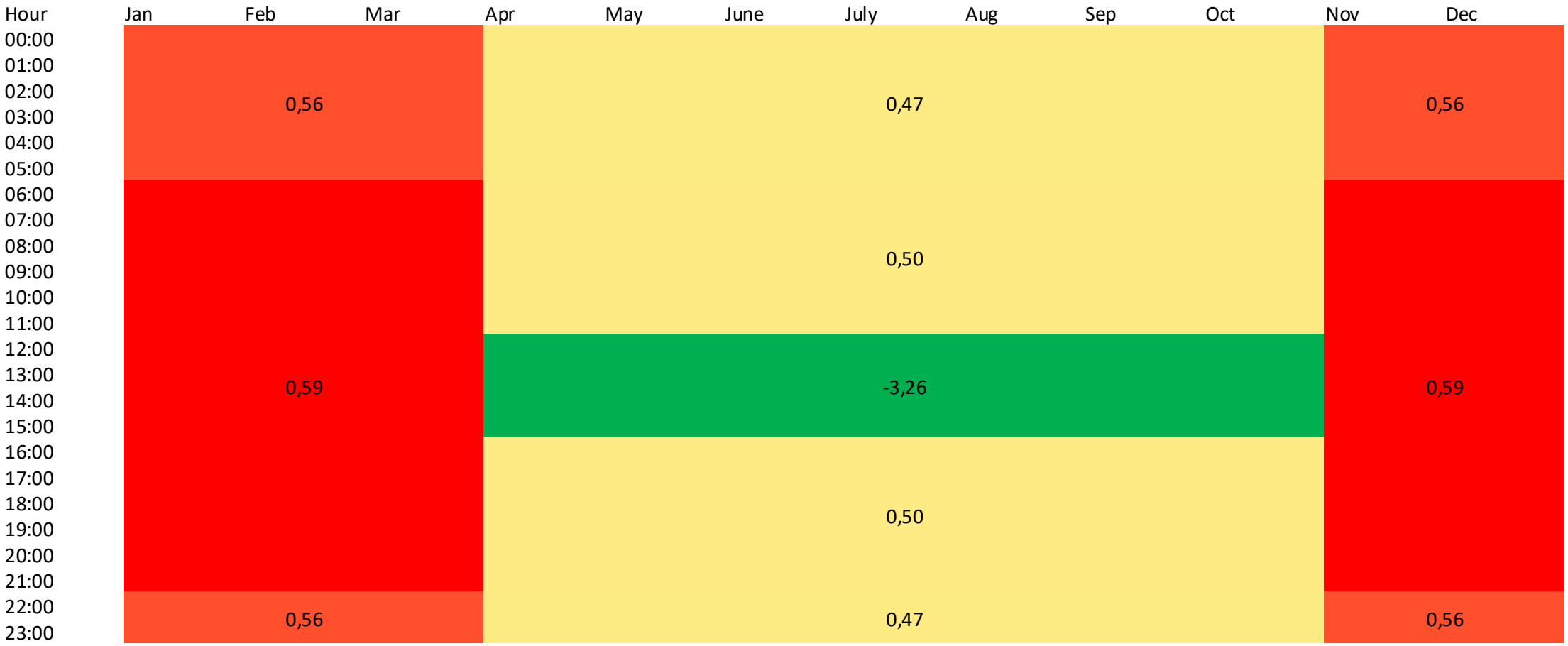
Up to 1.5 GW of storage capacity that could be connected in these formats

Please note: in areas outside the standard dimensions, there will still be limitations: there will no longer be any projects without limitations!

Within the solar grid connection mold, batteries cannot inject during solar hours



The latest grid fee tariffs (TURPE 7) has a negative component in solar zones

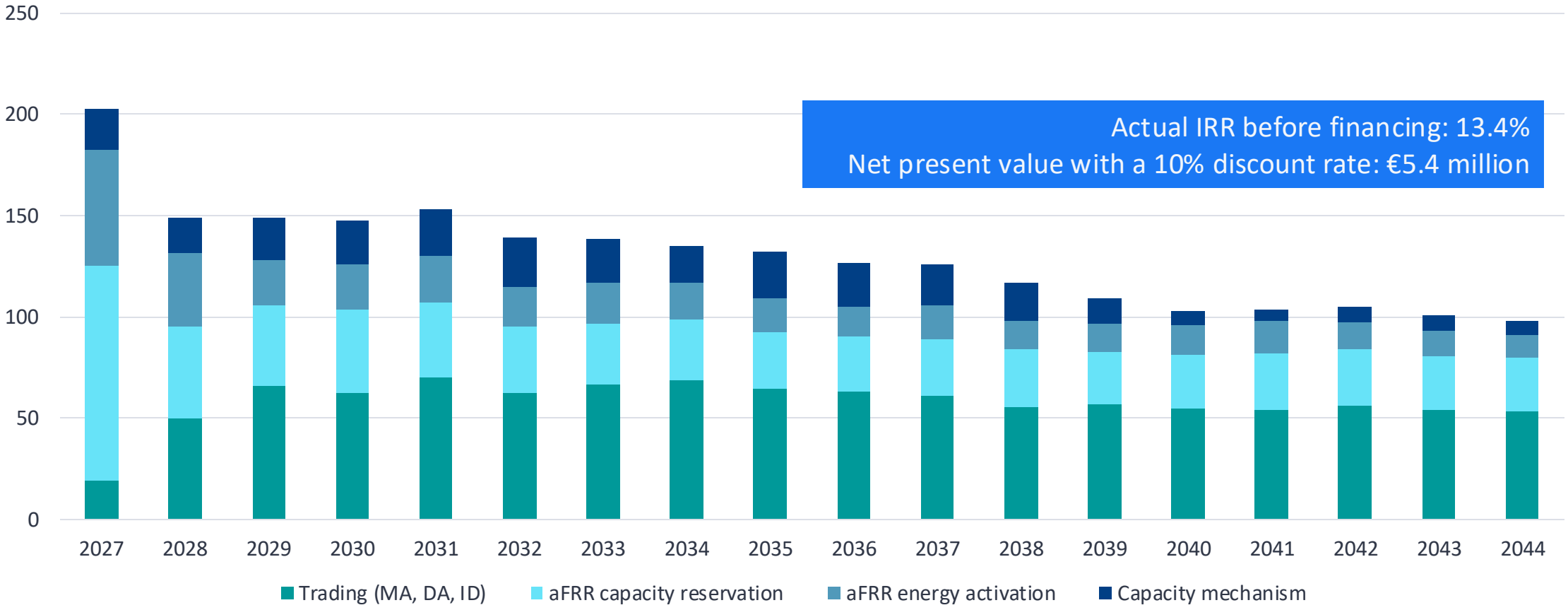


Grid fee for energy withdrawn (cts€/kWh) – HTB2

Revenue stack associated with a standard storage project (no limitations)

Revenues for a 2-hour storage project connected to the TSO, without limitations– central scenario

In k€/MW – real 2025



Let's compare two projects connected on the same date in France: one without limitations and one with solar grid connection mold

50 MW/100 MWh BESS without limitations Central scenario

- Project without limitations
- TURPE 7 standard

50 MW/100 MWh BESS with solar connection mold and TURPE 7 injection Central scenario

- Project with solar grid connection mold
- Project withTURPE 7 congestion management option

Economic model for a standalone storage project without limitations and with solar grid connection mold

Discounted costs and revenues for a 50 MW/100 MWh BESS battery without limitations Central scenario

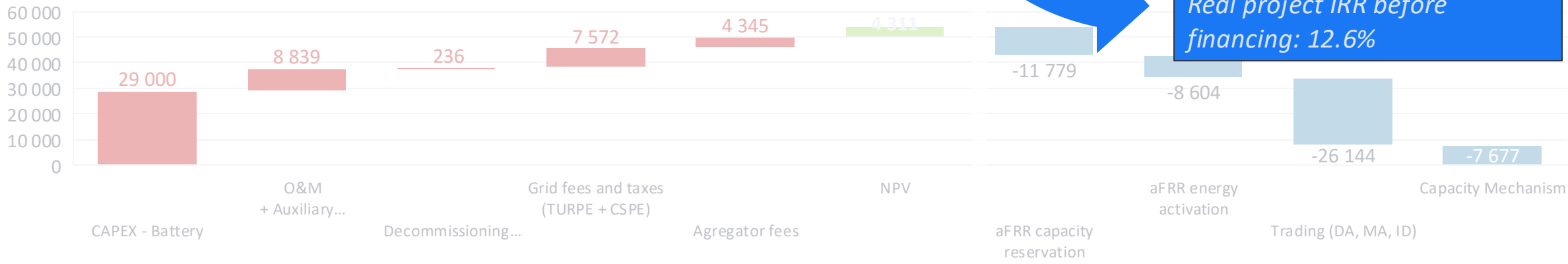
In k€/MW – real 2025

Only 0.8 points less IRR for the project, assuming both projects have the same COD

Real project IRR before financing: 13.4%

Discounted costs and revenues for a 50 MW/100 MWh BESS with solar grid connection mold and 1[illegible]7 injection Central scenario

In k€/MW – real 2025



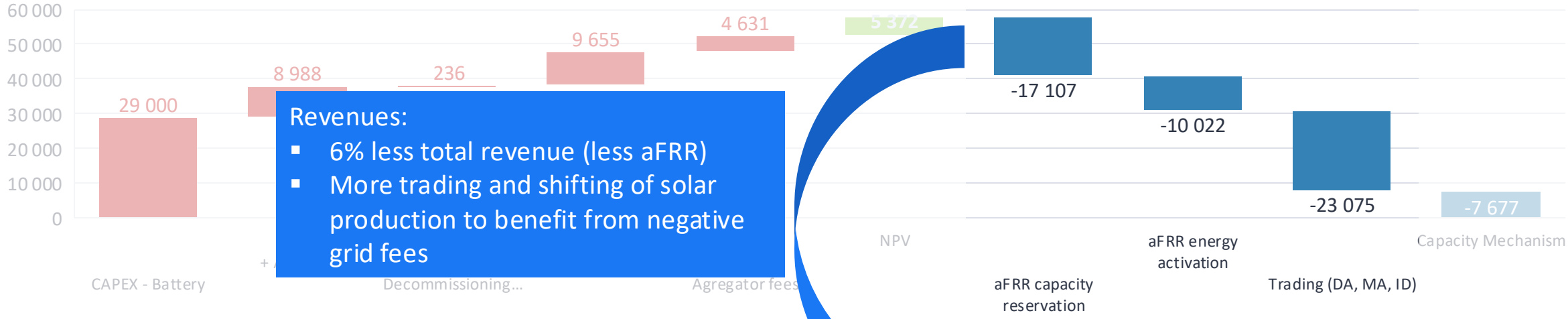
Real project IRR before financing: 12.6%

Costs Revenues NPV

Economic model for a standalone storage project without limitations and with solar grid connection mold

Discounted costs and revenues for a 50 MW/100 MWh BESS battery without limitations Central scenario

In k€/MW – real 2025

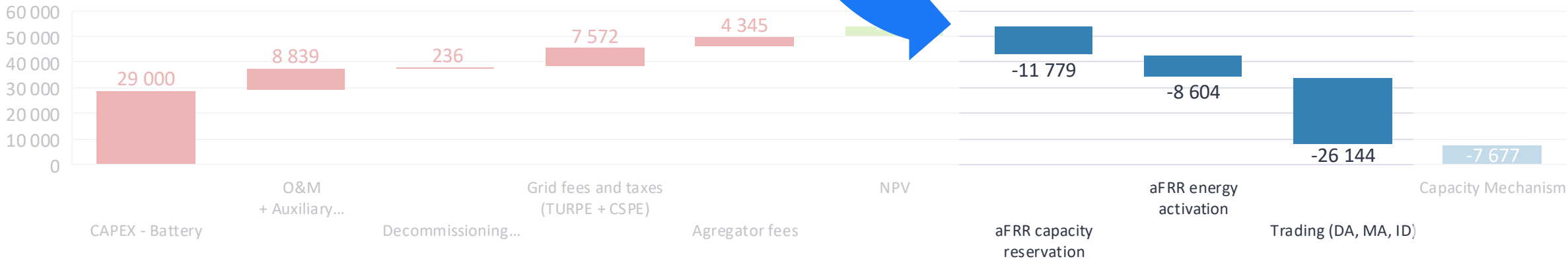


Revenues:

- 6% less total revenue (less aFRR)
- More trading and shifting of solar production to benefit from negative grid fees

Discounted costs and revenues for a 50 MW/100 MWh BESS with solar grid connection mold and TURPE 7 injection Central scenario

In k€/MW – real 2025

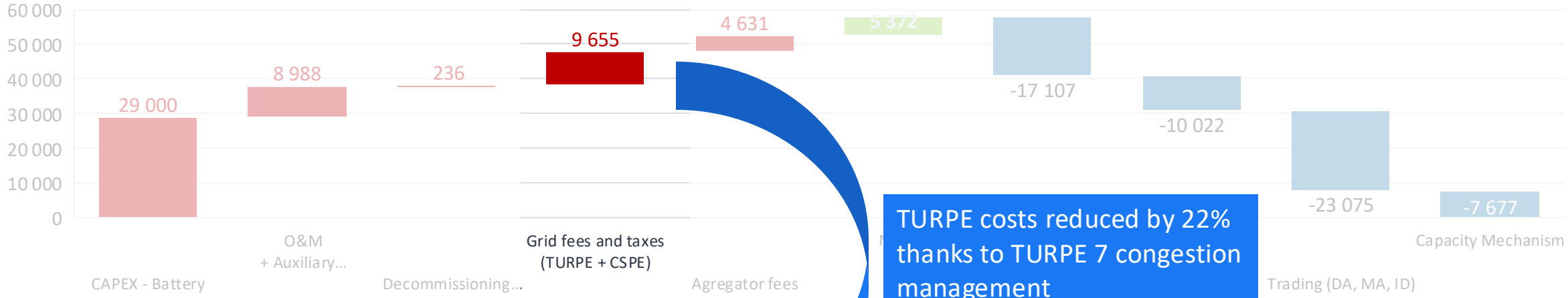


Costs Revenues NPV

Economic model for a standalone storage project without limitations and with solar grid connection mold

Discounted costs and revenues for a 50 MW/100 MWh BESS battery without limitations Central scenario

In k€/MW – real 2025



TURPE costs reduced by 22% thanks to TURPE 7 congestion management

Discounted costs and revenues for a 50 MW/100 MWh BESS with solar grid connection mold and TURPE 7 injection Central scenario

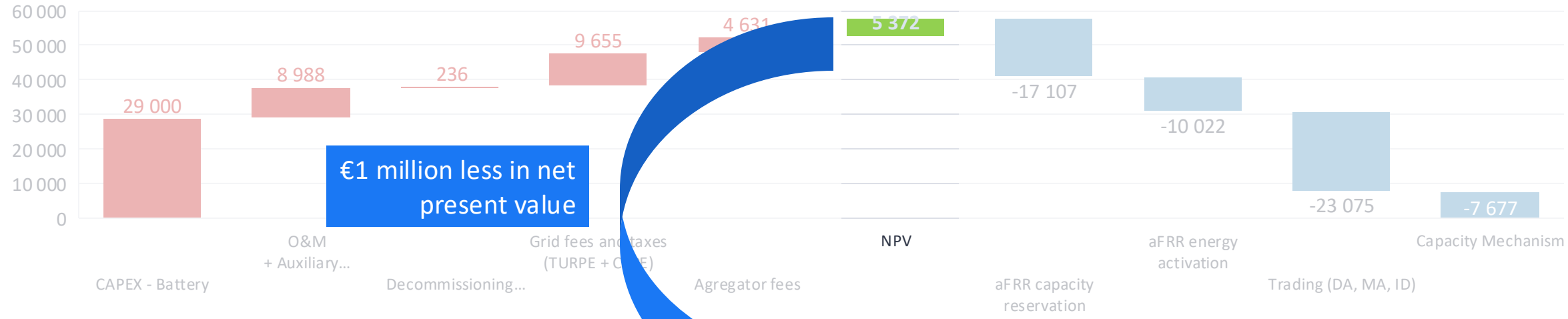
In k€/MW – real 2025

Costs Revenues NPV

Economic model for a standalone storage project without limitations and with solar grid connection mold

Discounted costs and revenues for a 50 MW/100 MWh BESS battery without limitations Central scenario

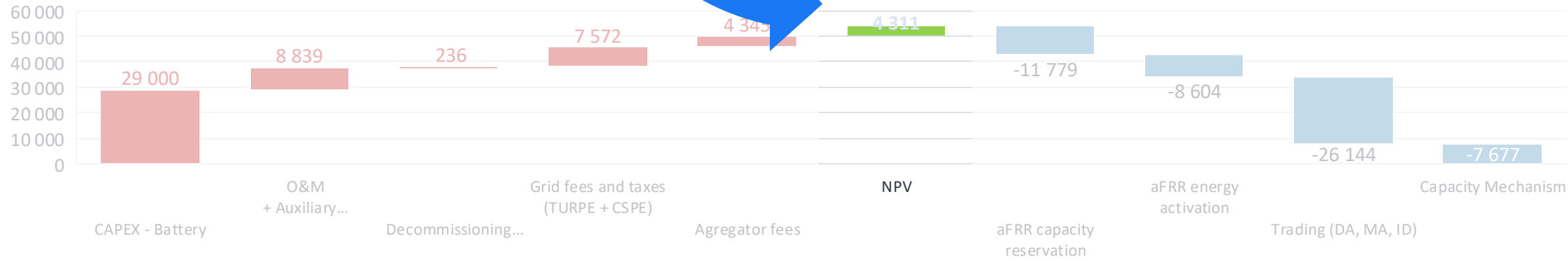
In k€/MW – real 2025



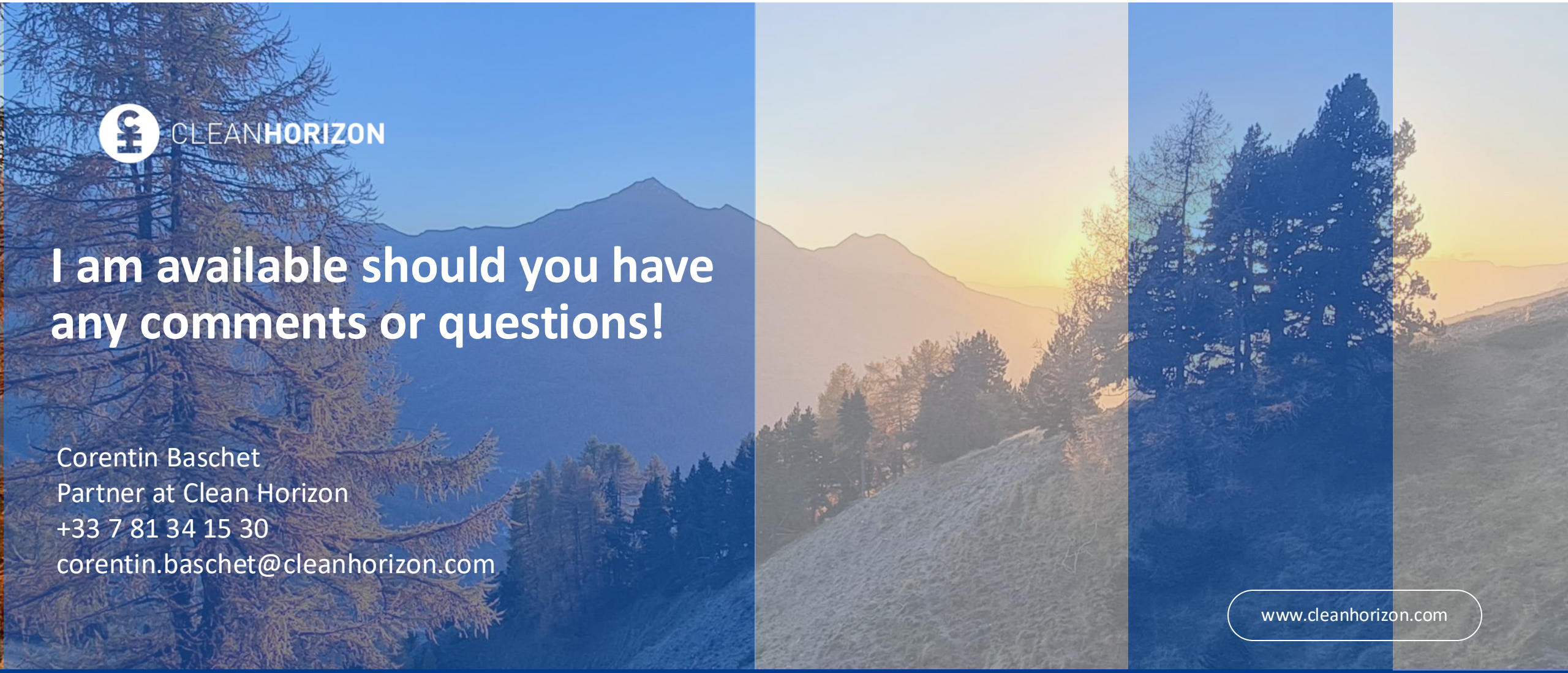
€1 million less in net present value

Discounted costs and revenues for a 50 MW/100 MWh BESS with [illegible] grid connection mold and TURPE 7 injection Central scenario

In k€/MW – real 2025



Coûts Revenus VAN



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I am available should you have any comments or questions!

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