VEIL ENERGY

Prosumer and BESS system optimisation simulations

- Cartiere Saci
- Agrirocca

Cartiere Saci

Self-consumption and Storage Capacity Optimisation

CLIENT

Cartiere Saci is an Italian manufacturer of 100% recycled packaging paper that has been investing for years in technologies to maximise energy efficiency, self-consumption and sustainability. With cogeneration, photovoltaics and energy-intensive processes, it is a concrete example of an industry where the optimisation of energy flows generates immediate value.

PROBLEM

The company uses a 7 MW thermal tracking cogeneration plant that covers most of its needs, but generates a constant surplus of about 1 MW fed into the grid. The recent addition of a 1.6 MW photovoltaic plant has increased the complexity of managing energy flows and maximising self-consumption.

OBJECTIVE

The customer's objective was:

- ➔ To maximise economic savings
- ➔ To optimise the use of the energy produced
- ➔ To identify the optimal size of a storage system

Simulation scenarios

The Veil Energy team used E-BOOST to conduct advanced energy simulations to assess the behaviour of the system as battery capacity varied from 250 kWh to 5 MWh in three distinct operating scenarios:

1. **No Capacity Market** with the battery used solely to balance production and consumption.
2. **'Ideal' Capacity Market** assuming optimal charge and discharge management with full predictability of power demands.
3. **Conservative Capacity Market management** (minimum guaranteed SOC) to ensure two hours of discharge at the committed power.

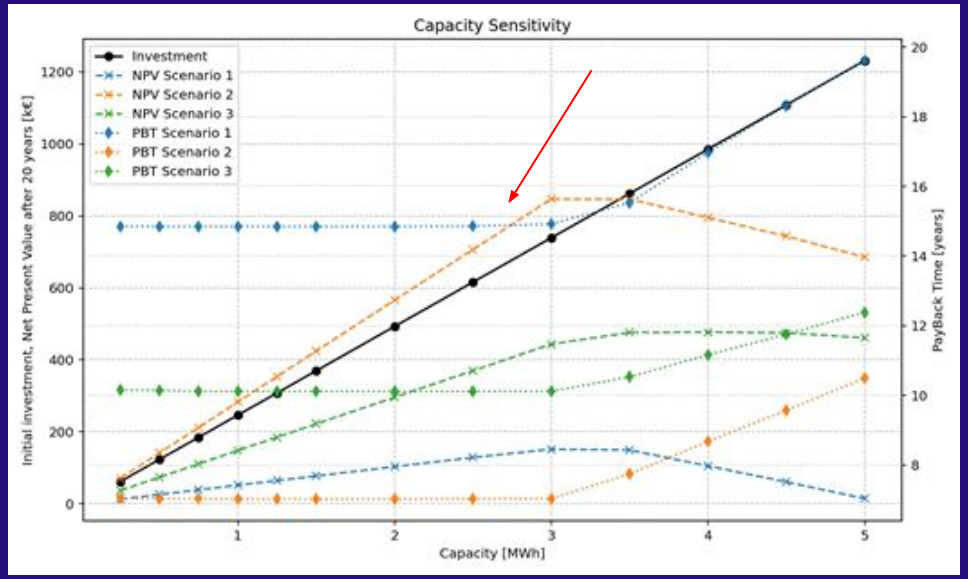
For all three cases, the cost of battery degradation was considered in the objective function in order to obtain realistic and sustainable results over time. At the same time, various scenarios for the use of the photovoltaic system were simulated — including the scenario of total sale of the energy produced — to assess the overall economic impact.

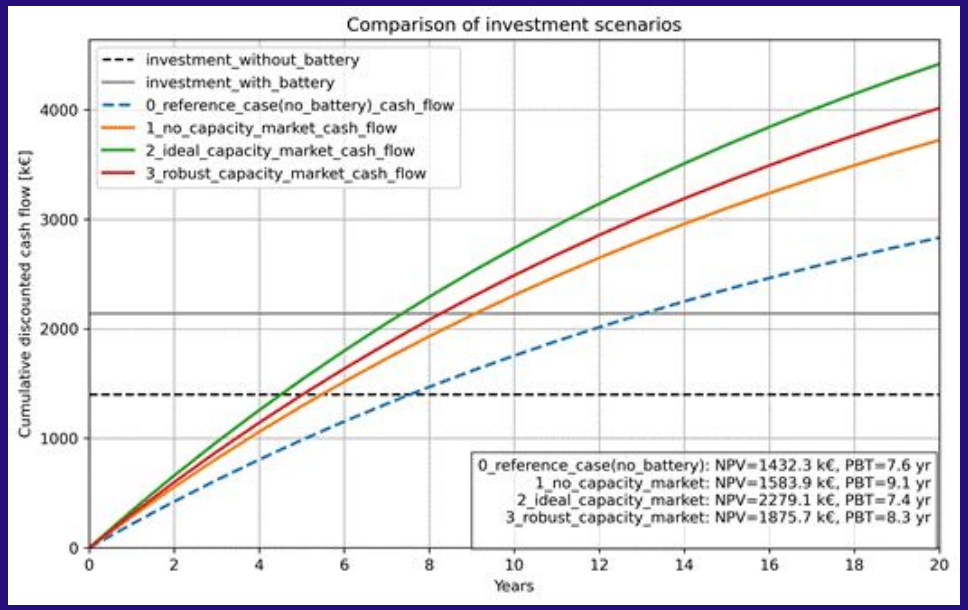
Conclusions

Thanks to E-BOOST simulations and Veil's support, the company was able to effectively integrate photovoltaic production with cogeneration and accurately assess the economic and operational impact. The analysis conducted made it possible to define:

- **OPTIMAL SIZE OF THE BESS SYSTEM**: 3 MWh (with a discharge of 0.5 C)
- **PAYBACK**: 7-8 years (considering photovoltaics and batteries and depending on the management scenario and market conditions)
- **NPV**: increasing up to 3 MWh

The results show a significant increase in net present value in all three scenarios with BESS, compared to a minimal increase in the overall return time compared to investing in photovoltaics alone.





Agrirocca

Self-production and Storage Capacity Optimisation

CUSTOMER

Agrirocca is a farm in the North of Italy equipped with a 1 MW photovoltaic system, with significant production. The company was interested in evaluating the integration of a storage system (BESS) to increase the value of the energy produced. In view of a new energy contract, the company wanted to objectively analyse the economic viability of a BESS in different market scenarios.

PROBLEM

Agrirocca wanted to understand whether integrating a storage system into its 1 MW photovoltaic plant was really cost-effective. The challenge was to identify the optimal size of the BESS and assess its profitability in different market scenarios — arbitrage, modulation and Capacity Market — to understand under what conditions the investment could generate real value.

OBJECTIVE

The customer therefore requires a comprehensive economic analysis simulation and alternative scenarios that can accurately indicate if, when and at what scale the BESS could become profitable in order to support future PV integration with storage technologies.

Simulation scenarios

Veil Energy has carried out a multi-scenario simulation based on historical data for 2024–2025 and updated market models, analysing:

- Energy arbitrage + PV modulation
- Arbitrage + Modulation + Capacity Market
- Sensitivity to market prices (spread 0–8 c€/kWh)
- Economic analysis as BESS size varies
- Integration of technical constraints (DoD, efficiency, annual cycles, degradation)

Simulation results

Without Capacity Market

Very low margins

Optimal size: ~150 kWh (1C).

Payback: +19 years

NPV: ~0

Investment not recommended

With Capacity Market

(75 k€/MW/year)

Optimal size: ~1.8 MWh / 0.8 MW (0.5C)

Investment: ~462 k€

Payback: 11.6 years

NPV: +206 k€ (in 20 years)

Approximately **247 cycles/year**, compatible with the useful life of the BESS.

Optimal investment

Sensitivity to Spread

(2 MWh, 1 MW BESS)

At 0 spread:

Payback: **8.9 years**

NPV: 386 k€

At 8 c€/kWh spread

Payback: 13 years

NPV: 163 k€

Cycles/year between **514** → **234**, depending on arbitrage intensity.

Analysis of size variation

Without Capacity Market:

NPV: ~0

With Capacity Market:

Payback: 11 years (0.5 MWh)

NPV: 202 k€ (2 MWh)

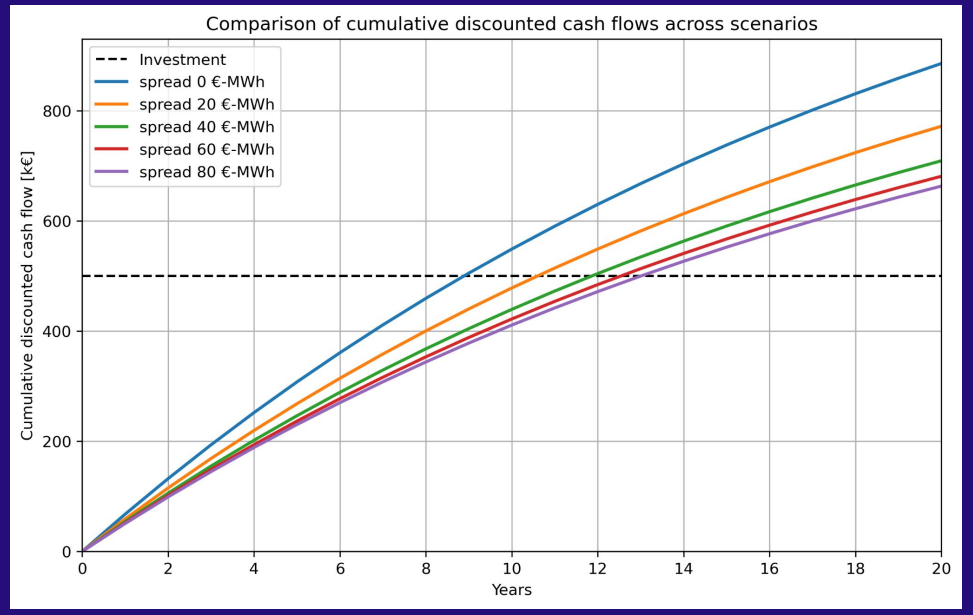
Optimal size: 2 MWh

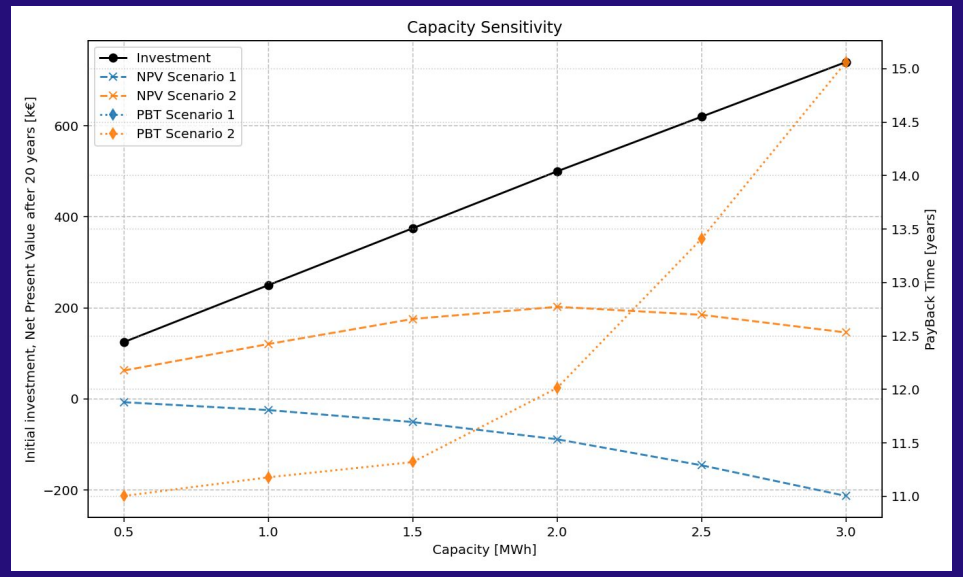
Conclusions

Thanks to the advanced simulation conducted by Veil Energy, Agrirocca obtained a clear, numerical assessment of the cost-effectiveness of the BESS, identifying the combined PV + BESS + Capacity Market scenario as an economically sustainable and profitable solution.

- **OPTIMAL SIZE OF THE BESS SYSTEM**: 2 MWh (with participation in the Capacity Market)
- **PAYBACK**: 11-12 years
- **NPV**: positive
- Without the Capacity Market, the investment is not cost-effective under current market conditions.

Veil thus provided the customer with a solid basis for decision-making, complete with economic analysis, alternative scenarios and recommendations for future integration with storage technologies.





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