

Enabler or Barrier? The Role of FCAs for BESS in Germany

Strommarkttreffen Speicher – Aurora Energy Research

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Today, the German battery business case is highly profitable...

Project economics for a 2h battery, market entry 2027¹
Project IRR (%)²

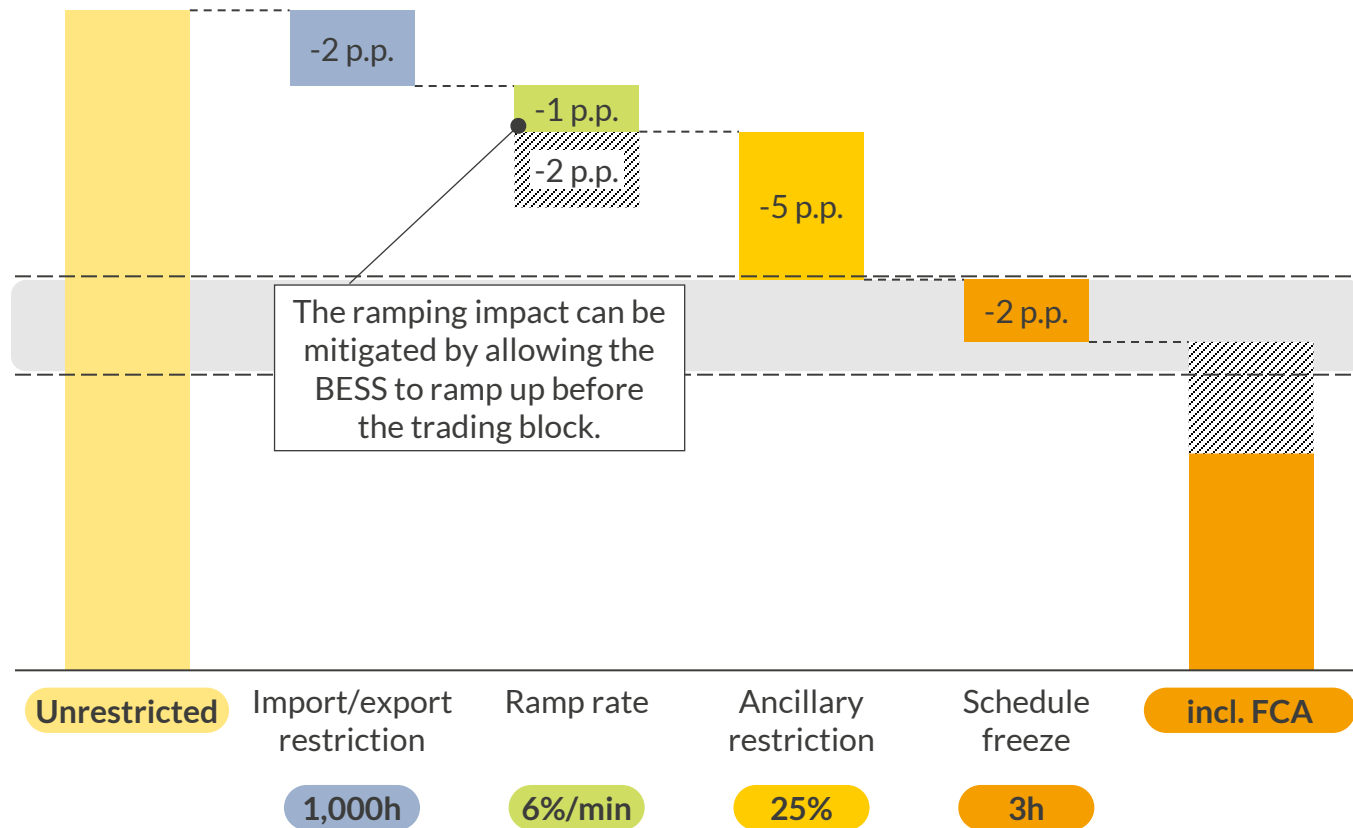


Industry-standard hurdle rate

1) Including degradation, repowering at 66% state-of-health, 1.5 cycles/day, 84% average RTE. 2) Real IRR, Pre-tax.

...however, FCAs could strongly reduce IRRs, with a combination of different constraints challenging the business case...

Project economics for a 2h battery, market entry 2027¹
Project IRR (%)²



Restrictions applied

- **Import/export restriction:** Import restriction during 500h with highest demand, and an export restriction during 500h of highest solar generation.
- **Ramp rate:** 6%/min ramp rate.
- **Ancillary services:** Ancillary participation capped to 25% of nominal capacity.
- **Schedule freeze:** Schedule frozen 3h before delivery, reducing Continuous Intraday revenues.

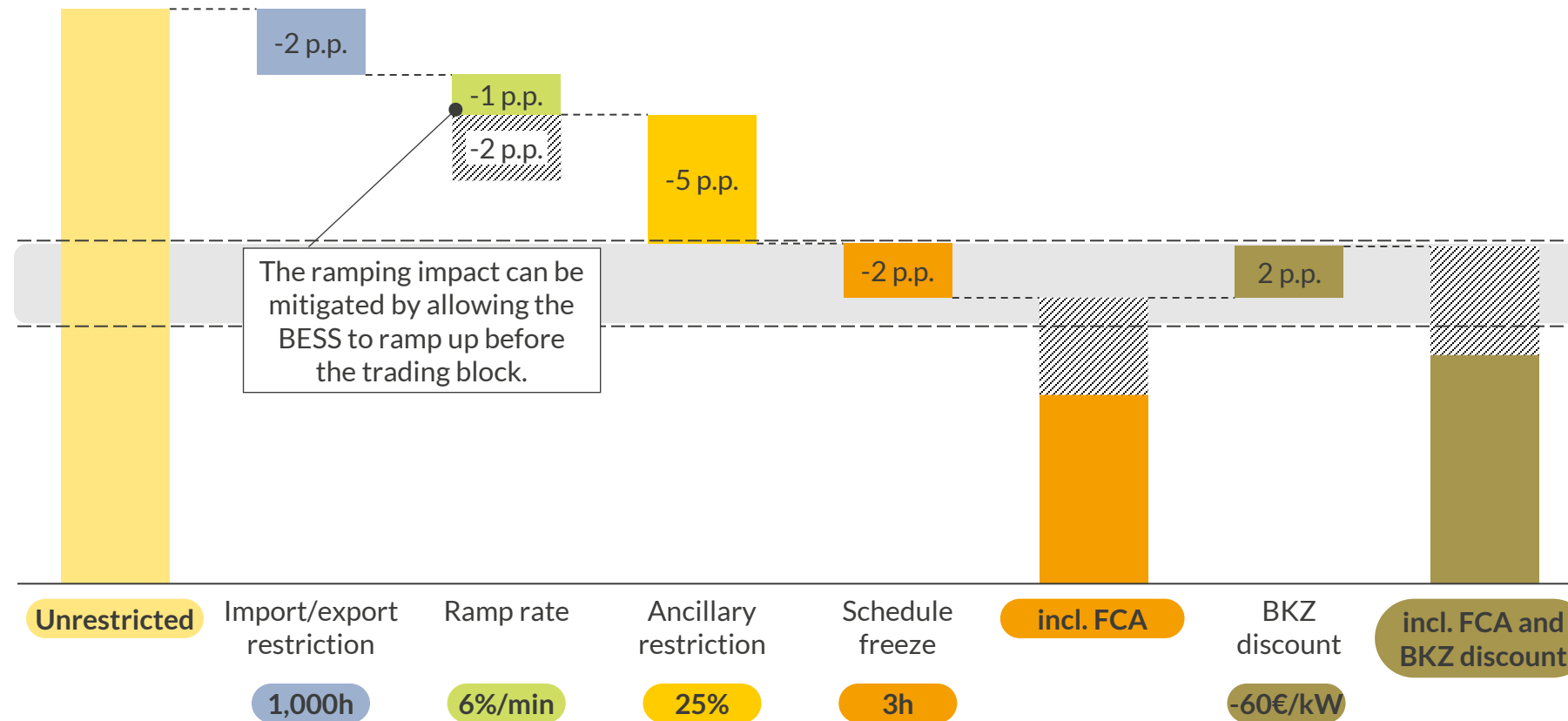
Industry-standard hurdle rate Ramping mitigation range

1) Including degradation, repowering at 66% state-of-health, 1.5 cycles/day, 84% average RTE. 2) Real IRR, Pre-tax.

BKZ discounts can help partially mitigate the impact, but are often only observed for the most restrictive FCAs

Project economics for a 2h battery, market entry 2027¹

Project IRR (%)²



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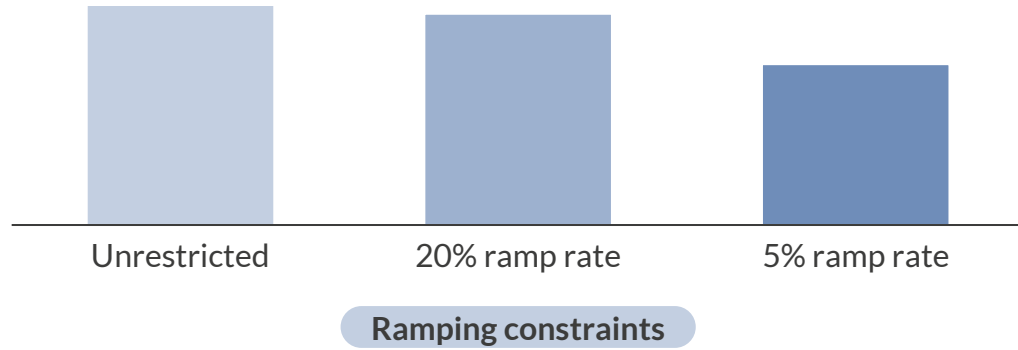
Legend: Industry-standard hurdle rate (grey bar), Ramping mitigation range (hatched bar)

1) Including degradation, repowering at 66% state-of-health, 1.5 cycles/day, 84% average RTE. 2) Real IRR, Pre-tax.

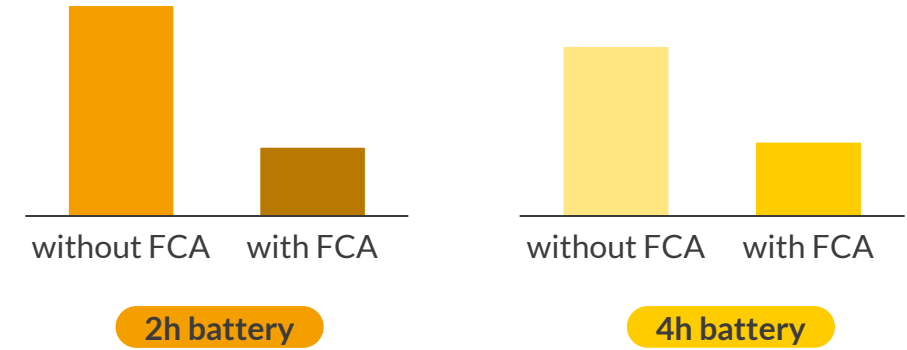
FCA impacts can be reduced by identifying restrictions early and integrating them into decisions on location, voltage level, and duration



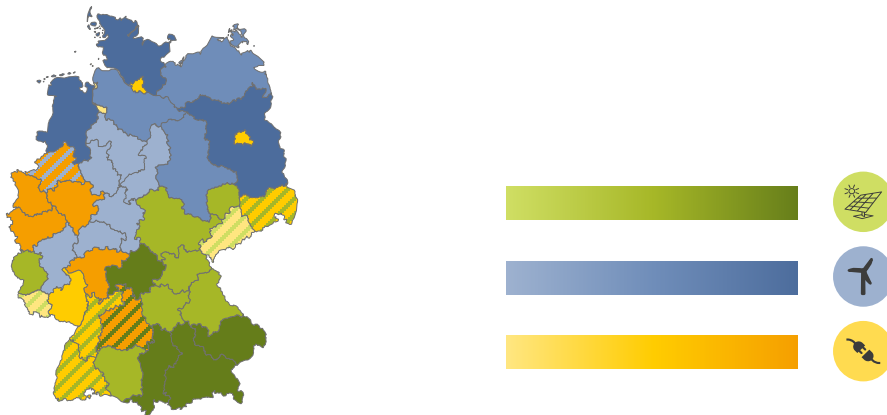
Proactively engage with network operators to get clarity on the range of the restrictions and be able to analyse and negotiate them
Project IRR (%)¹



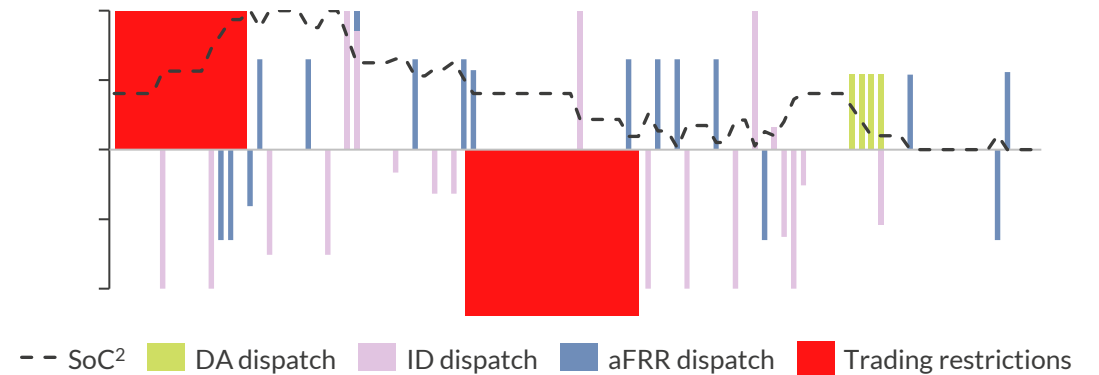
Longer battery durations are less affected by FCAs because they rely less on ancillary markets and offer greater operational flexibility
Project IRR (%)¹



FCAs are highly driven by local grid constraints – choosing the right location could reduce the impact strongly



FCAs complicate trading, which makes it even more important to choose the right traders



1) Real IRR, Pre-tax.

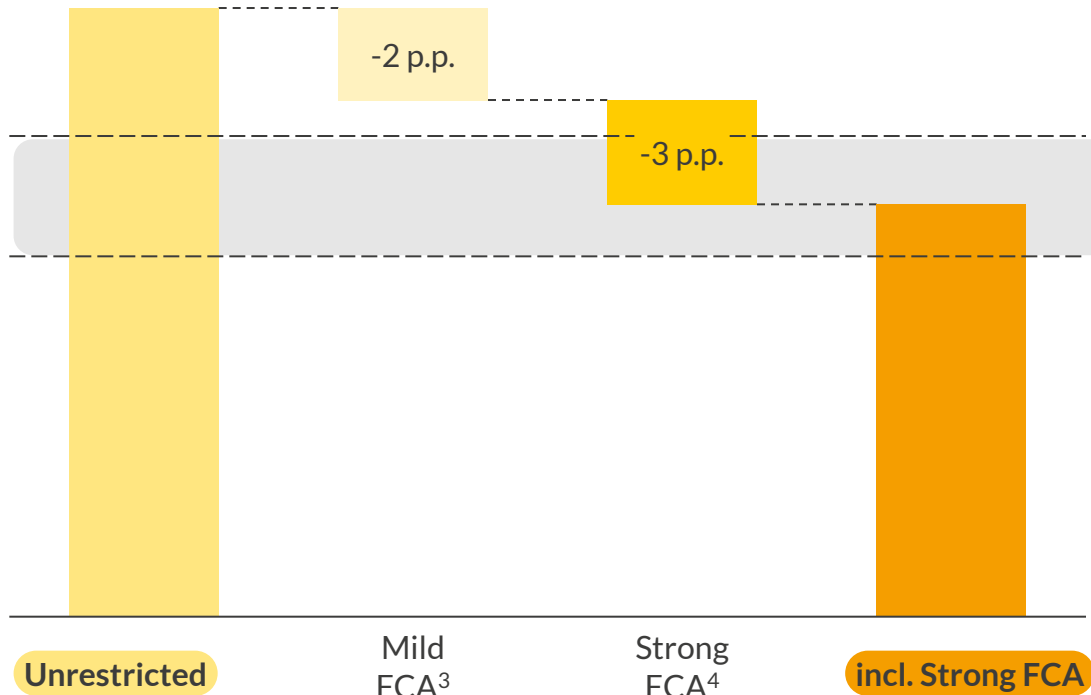
The combined burden of grid fees and FCAs can easily push battery returns below the hurdle rate, making a holistic and coordinated approach essential

1 Widely varying FCA designs create significant business-case uncertainty, with strong FCAs capable of reducing IRR by more than 5 p.p.

2 With restrictive FCAs, there is almost no room for grid fees: charges above 10 €/kW/year could push the business case below hurdle rates

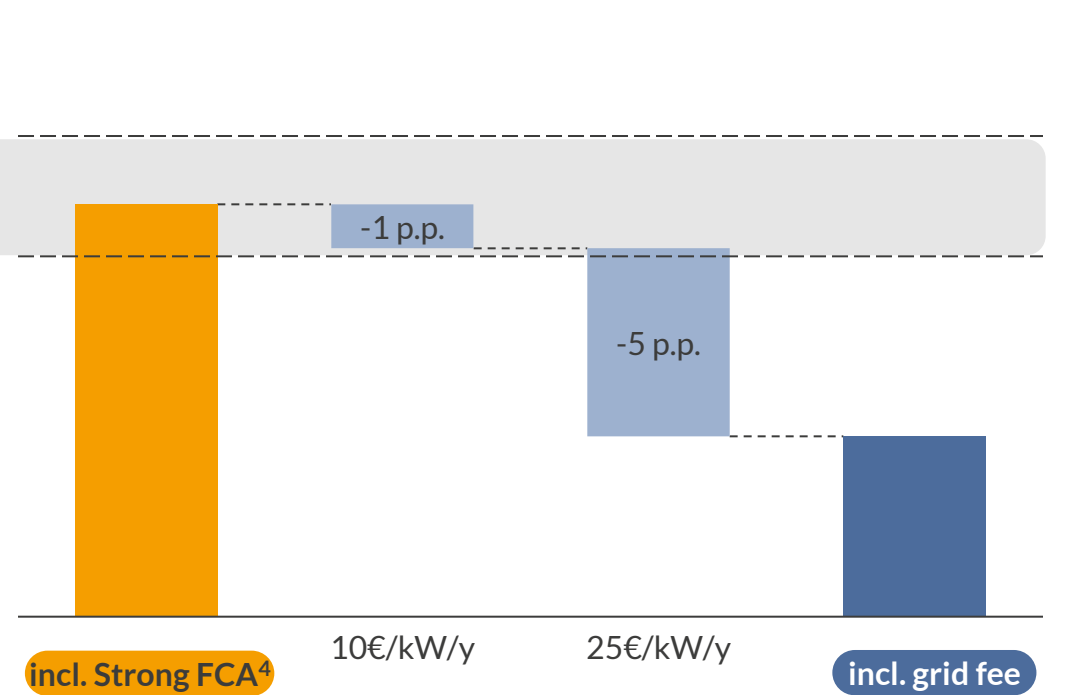
Project economics for a 2h battery with COD 2029¹
Project IRR² (%)

FCAs



Project economics for a 2h battery with COD 2029¹
Project IRR² (%)

FCAs and grid fees



Capacity-based grid fee level, €/kW/y

1) Including degradation, repowering at 66% state-of-health, 1.5 cycles/day, 84% average RTE. 2) Real IRR, Pre-tax. 3) Assuming ancillary service restriction, schedule freeze and ramping restriction of 20%. 4) Import / export restriction; 6% ramp rate including mitigation; ancillary service restriction and schedule freeze.

- 1** While individual FCA constraints are manageable, **stacked restrictions can undermine project economics, with the project IRR of a 2h battery with entry year 2027 dropping up to 13.5 p.p.**
- 2** The business case impact of FCAs can be reduced by **identifying potential restrictions early and incorporating them into decisions about location, voltage level, and duration.** Adapting trading strategies to FCA constraints can further mitigate their impact.
- 3** Next to FCAs, Germany is also planning to introduce **new grid fees for batteries.** The financing fees could cut IRRs by over 6 p.p. if they're not designed carefully.

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