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Impact of grid fees and FCAs on battery business cases

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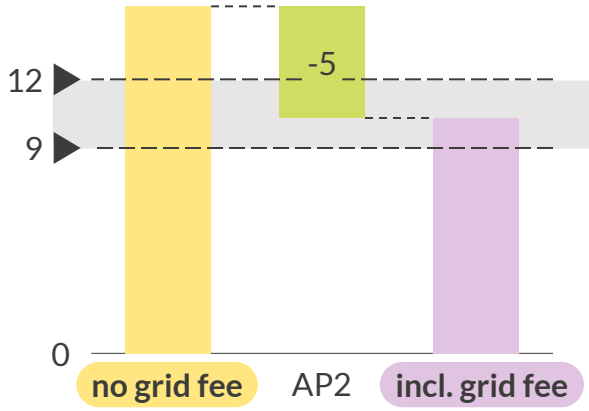
Capacity grid fees of 24€/kW/year would reduce the project IRR below standard hurdle rates, even without considering FCAs

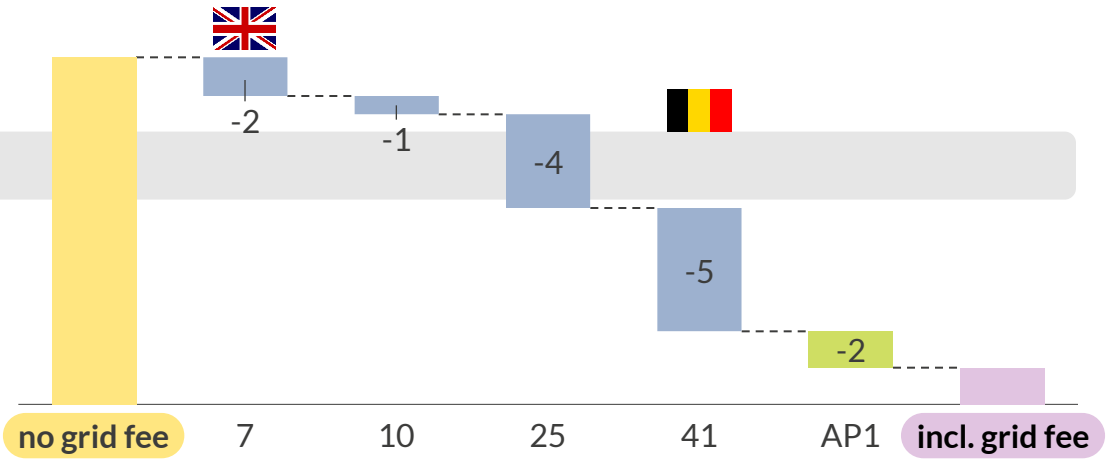
Project economics for a 2h battery, including degradation, market entry in 2029[1]
Project IRR (%)

Grid fees for an unrestricted case (no FCA)

Energy-based grid fees (AP2)[2]



Capacity and energy-based (AP1)[2] grid fees



Capacity-based grid fee level, €/kW/y

- Without any FCA restrictions, an AP2 of up to 14.6ct/kWh would keep the project IRR over the lower-end hurdle rate of 9%, assuming the operator opts out of paying capacity fees completely.
- With an unrestricted grid connection, capacity grid fees[3] of 24€/kW/y and above would cause project IRRs to fall below the hurdle rate of 9%.
- Capacity-based grid fees of 16€/kW/year and above together with AP1 would incentivise the operator to opt for a purely AP2-based grid fee without any capacity component.

Base Case: Unrestricted Grid Connection | Industry-standard hurdle rate | Energy-based grid fee | Capacity-based grid fee[3]

1)The battery participates in the wholesale market, Continuous Intraday, FCR and aFRR capacity and energy. 2) AP1: TenneT's 2026 *Arbeitspreis* at <2,500h/a of grid use; AP2: (5 x AP1); both applied on energy losses. 3) Without AP1.
Source: Aurora Energy Research, TenneT TSO

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Grid fees assumptions

- **Capacity-based:** The fee is incurred annually. The operator can decide what proportion of the BESS capacity is to be covered. We assume that the operator will either choose to cover the full capacity or nothing at all.
- **Energy-based:** Grid fees to be paid on energy losses. The energy component can be distinguished between:
  - *Arbeitspreis (AP) 1:* 2.36ct/kWh
  - AP2: 11.80ct/kWh[2]

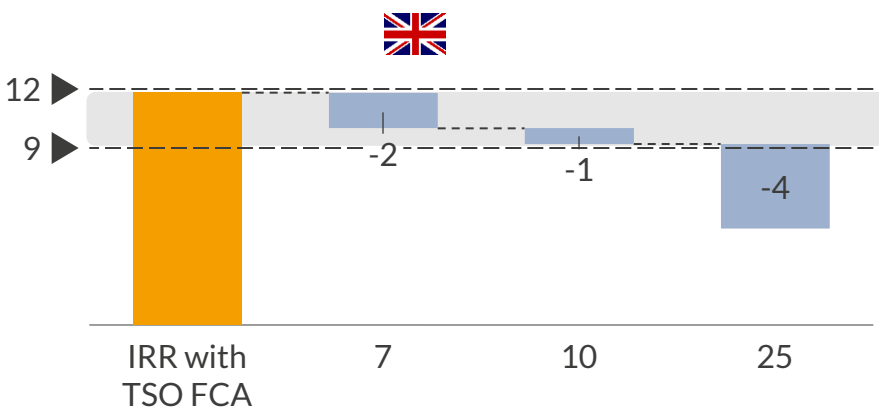
The price which applies depends on the operation within a capacity range that is covered by the capacity-based fee, or not.

Under a TSO-level FCA, BESS business cases could still be profitable if grid fees do not exceed 10€/kW/a, but not under DSO-level FCAs

Project economics for a 2h battery, including degradation, market entry in 2029[1]
Project IRR (%)

Capacity- and energy-based (AP1)[2] grid fees

TSO FCA

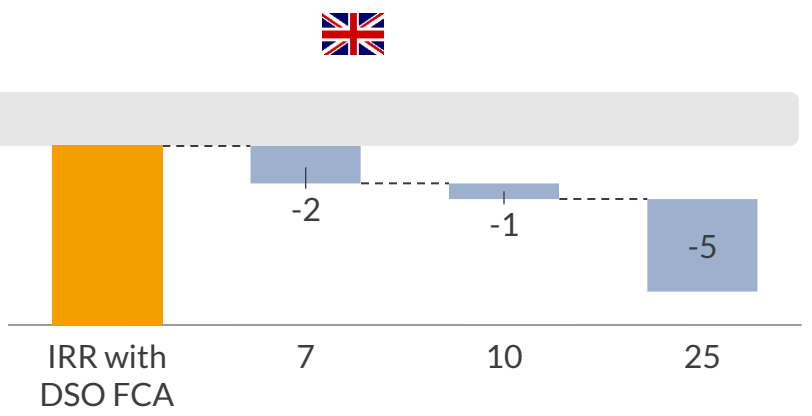


Capacity-based grid fee level, €/kW/y

- Under an FCA, already a capacity-based grid fees of **11€/kW/y** would push the business case below the hurdle rate of 9%[3].

Capacity- and energy-based (AP1)[2] grid fees

DSO FCA



Capacity-based grid fee level, €/kW/y

- Capacity grid fees above **~27€/kW/y** would bring down the IRR to **below zero**[3], making the business case impossible.

Base Case: Unrestricted Grid Connection | Industry-standard hurdle rate | Energy-based grid fee | Capacity-based grid fee[3]

1) The battery participates in the wholesale market, Continuous Intraday, FCR and aFRR capacity and energy. 2) AP1: TenneT's 2026 *Arbeitspreis* at <2,500h/a of grid use; AP2: (5 x AP1); both applied on energy losses. 3) Without AP1.
Source: Aurora Energy Research, TenneT TSO

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TSO FCAs assumptions

- **Ancillary services:** aFRR and FCR participation are capped to 25% of nominal capacity.
- **Schedule freeze:** A 3-hour pre-delivery trading stop effectively forbidding trading on the Continuous Intraday market.
- **Ramping:** Change in power input/output restricted to 20% of capacity/min.

DSO FCAs assumptions

- **Ancillary services:** aFRR and FCR participation are capped to 25% of nominal capacity.
- **Capacity:** Import and export restrictions during the 500h of each highest demand and wind generation (1,000h total).
- **Ramping:** Change in power input/output restricted to 6% of capacity/min.

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