

Beyond the Buzz: Winning Cases for BESS Investments in the Netherlands

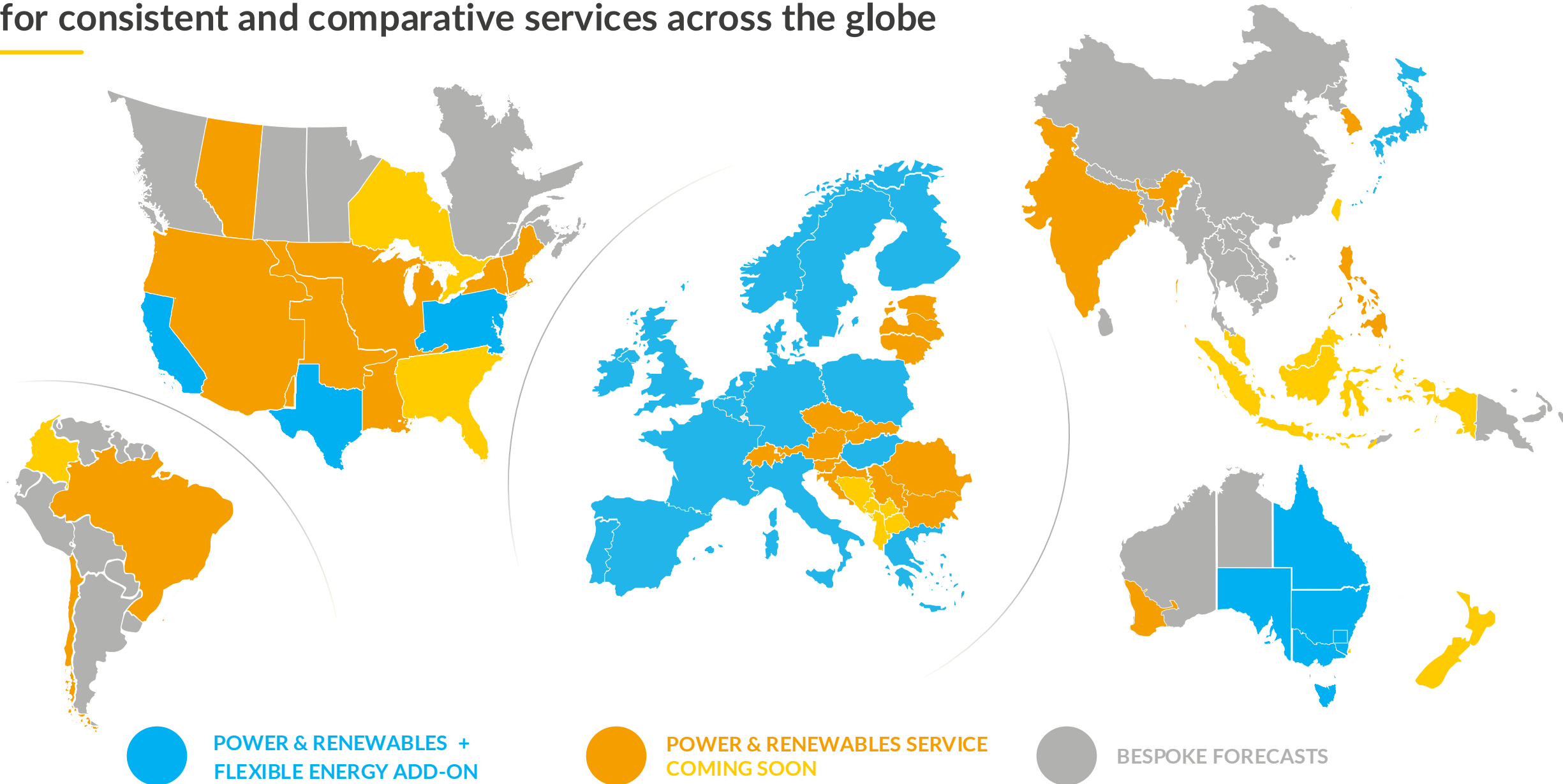
20 March 2025

Public Webinar

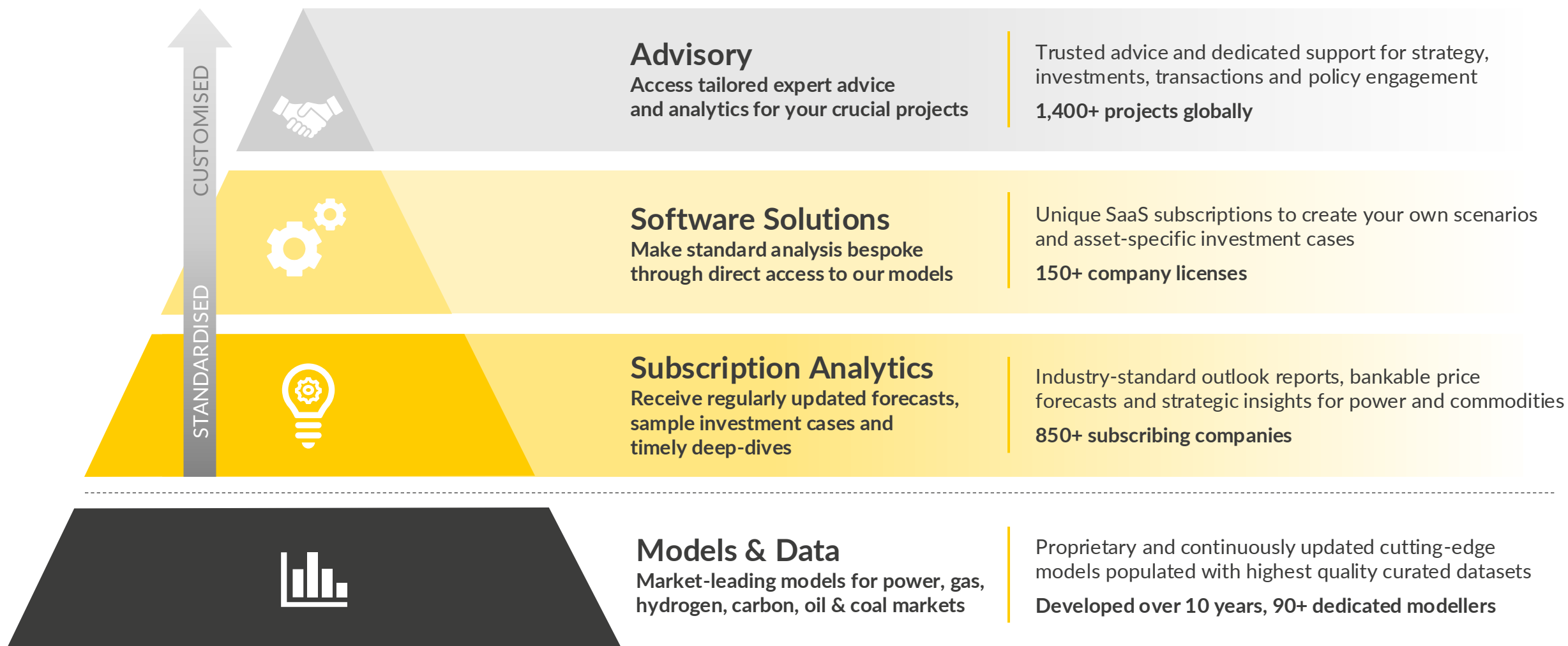


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Introducing the speakers

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North-West Europe**



Simon De Clercq

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Netherlands & Belgium**



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**Associate
Advisory**



Arnaud Oltramare

**Senior Analyst
Netherlands & Belgium**

I. Introduction

II. Battery business cases

III. Battery co-location with Solar PV

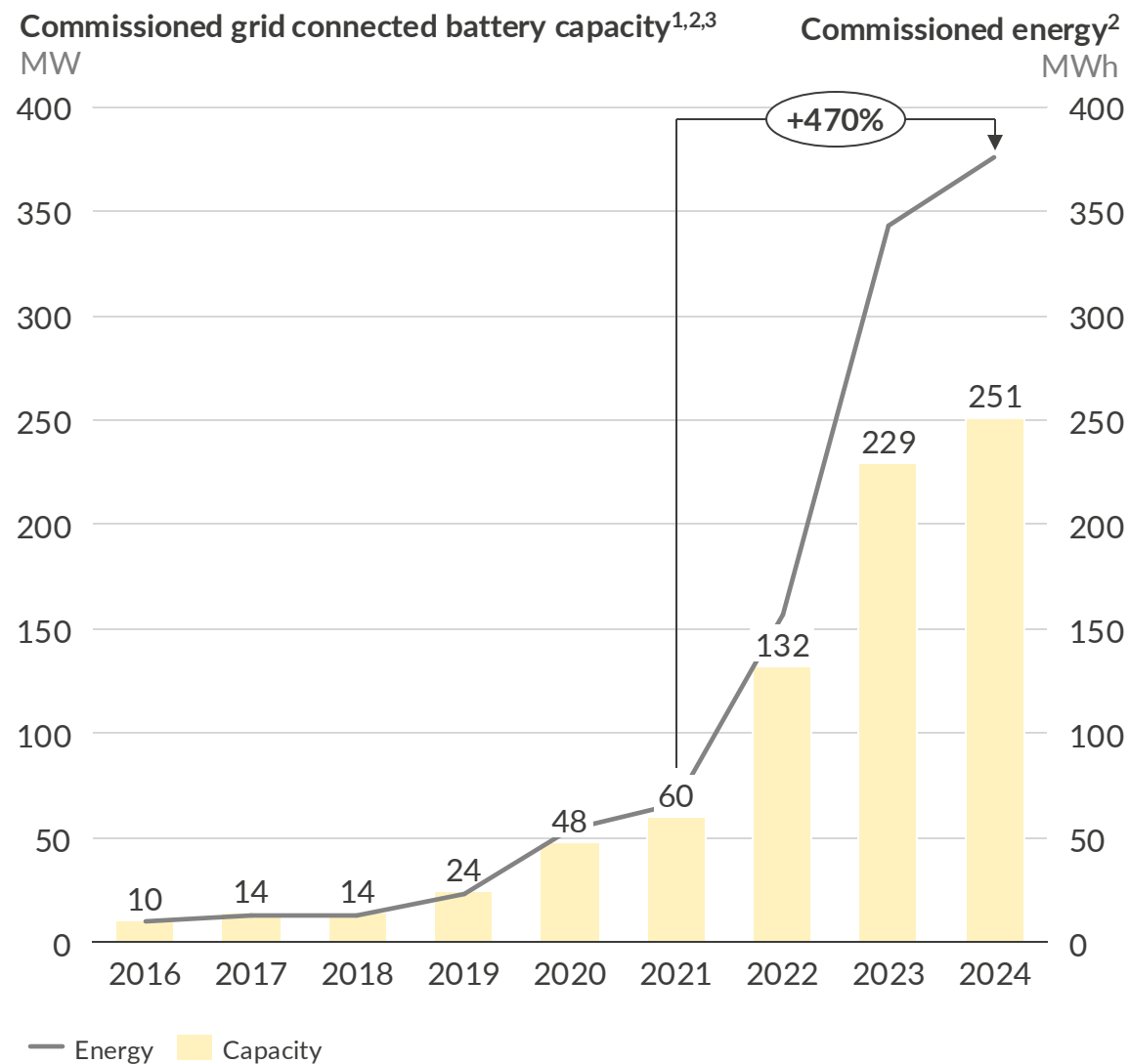
IV. Key takeaways



For more information, please contact
Tim Vandenbroucke

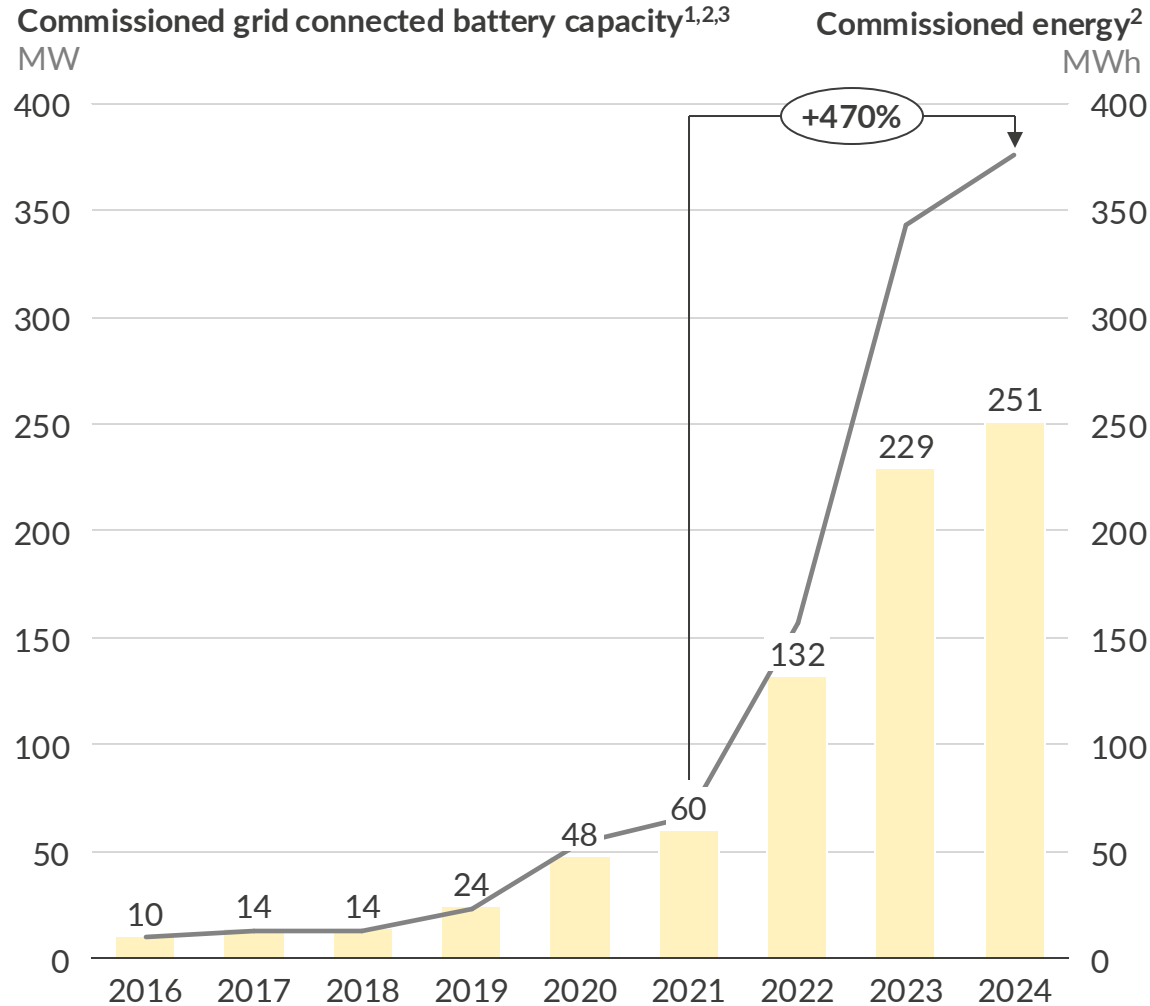
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Utility-scale battery capacity in the Netherlands has grown almost six-fold since 2021, with a 2.4 GW pipeline set for deployment in the coming years



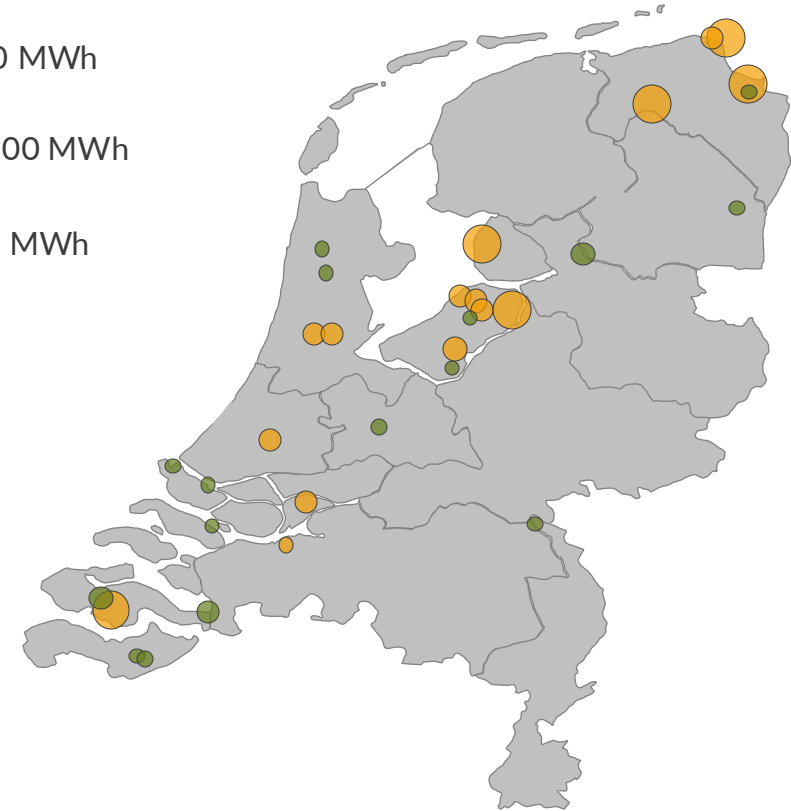
1) Grid-connected utility scale battery capacity. 2) Cumulative. 3) Capacities for the year 2022 and 2023 based on Centraal Bureau voor de Statistiek (CBS)

Utility-scale battery capacity in the Netherlands has grown almost six-fold since 2021, with a 2.4 GW pipeline set for deployment in the coming years



Battery projects in the Netherlands by status and project size

- 3 - 30 MWh
- 30 - 100 MWh
- > 100 MWh



Total pipeline > 2.4 GW

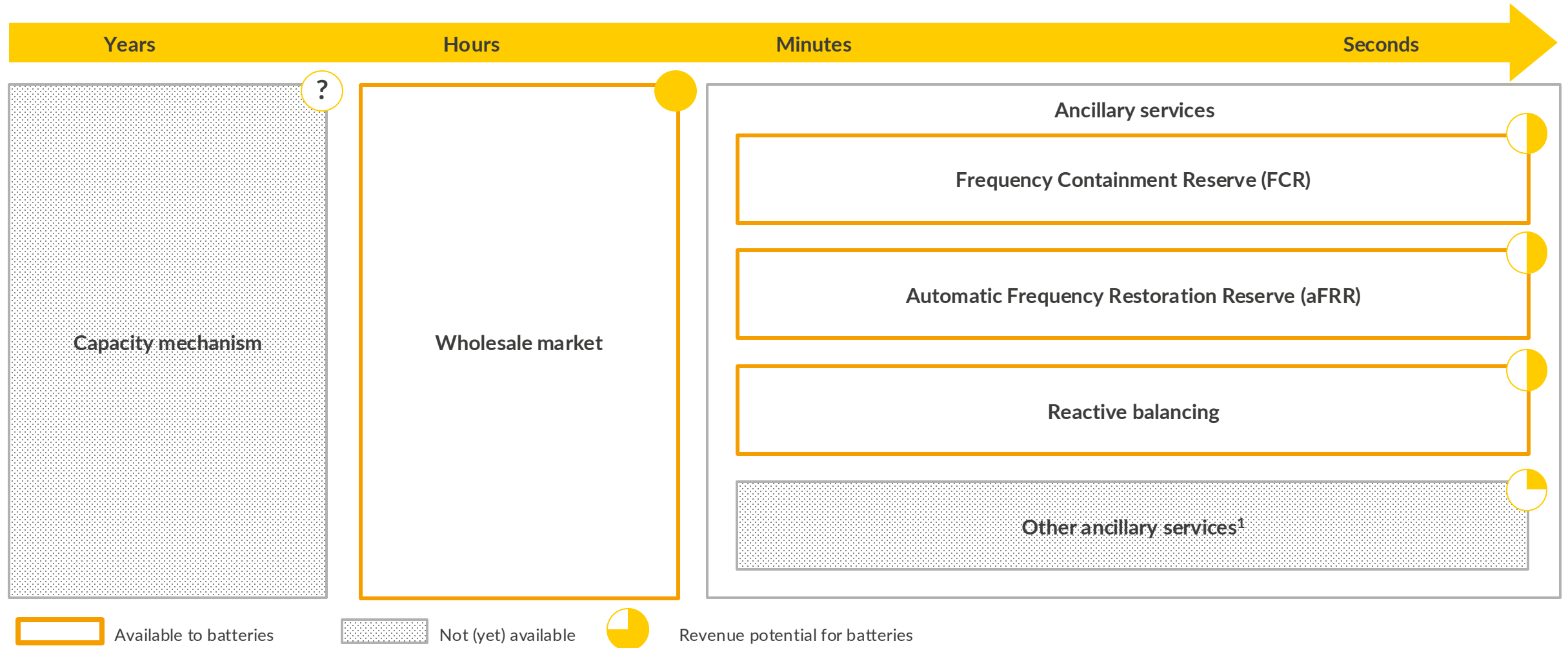
● Operational ● Pipeline

1) Grid-connected utility scale battery capacity. 2) Cumulative. 3) Capacities for the year 2022 and 2023 based on Centraal Bureau voor de Statistiek (CBS)

Batteries can simultaneously participate in diverse markets, offering opportunities for revenue stacking under different trading strategies

Response time

Delivery



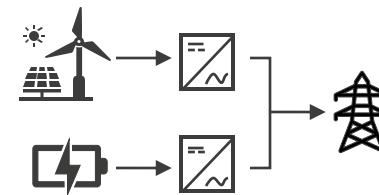
1) Next to the mentioned ancillary services, there is also mFRR which is less attractive for batteries with expected lower prices and low activation rates. Additional to these markets, TenneT is also procuring and tendering reactive power.

While stand-alone battery investments enable flexible dispatch, co-located solutions offer cost savings and potential grid fee reductions



I Stand-alone

The battery asset has its own site, which is metered and managed individually



II AC co-location

RES and battery assets require separate inverters to connect to the grid

While stand-alone battery investments enable flexible dispatch, co-located solutions offer cost savings and potential grid fee reductions

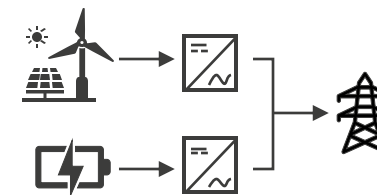


I Stand-alone

The battery asset has its own site, which is metered and managed individually

No shared costs

Can offer benefits when managed as part of a larger portfolio



II AC co-location

RES and battery assets require separate inverters to connect to the grid

Cost savings on development, balance of system, and OPEX

Directly reduces revenue risks for renewable generation asset

Costs
CAPEX & OPEX

Portfolio diversification
Diversification of risk and revenue

Full benefit

Partial benefit

Neutral

Partial downside

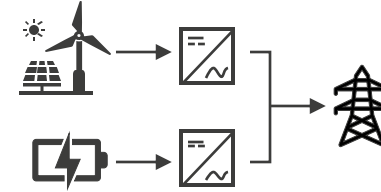
Full downside

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RES and battery assets require separate inverters to connect to the grid

Costs
CAPEX & OPEX

Portfolio diversification
Diversification of risk and revenue

Asset oversizing
Oversize renewable asset relative to grid connection

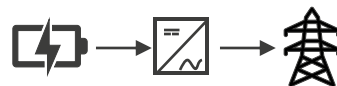
Battery dispatch
Charging/discharging profile of the battery asset

No shared costs
Can offer benefits when managed as part of a larger portfolio
-
Full asset flexibility

Cost savings on development, balance of system, and OPEX
Directly reduces revenue risks for renewable generation asset
Energy that would otherwise be curtailed can be stored, this depends on the inverter capacity
Asset output is constrained by inverter and grid connection

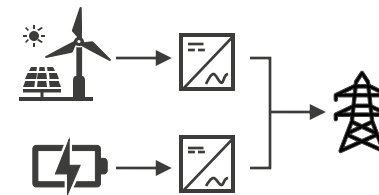
Full benefit	Partial benefit	Neutral	Partial downside	Full downside
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While stand-alone battery investments enable flexible dispatch, co-located solutions offer cost savings and potential grid fee reductions



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Costs

CAPEX & OPEX

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Diversification of risk and revenue

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Oversize renewable asset relative to grid connection

Battery dispatch

Charging/discharging profile of the battery asset

Grid fees

Grid fees applicable for import capacity

Grid connection access

Point of interconnection with to the grid

No shared costs
Can offer benefits when managed as part of a larger portfolio
-
Full asset flexibility
Battery is subject to grid fees
Battery has an individual grid connection

Cost savings on development, balance of system, and OPEX
Directly reduces revenue risks for renewable generation asset
Energy that would otherwise be curtailed can be stored, this depends on the inverter capacity
Asset output is constrained by inverter and grid connection
If the battery doesn't charge from the grid, grid fees can be avoided
Grid connection is shared between the assets

Full benefit

Partial benefit

Neutral

Partial downside

Full downside

In this session, we will discuss investment cases for stand-alone batteries and batteries co-located with solar PV in the Netherlands



Battery business cases

Deep dive into battery business cases:

- Stand-alone battery business case
- Impact of different grid fee tariffs
- Trading on the continuous Intraday market

Battery present value €/kW



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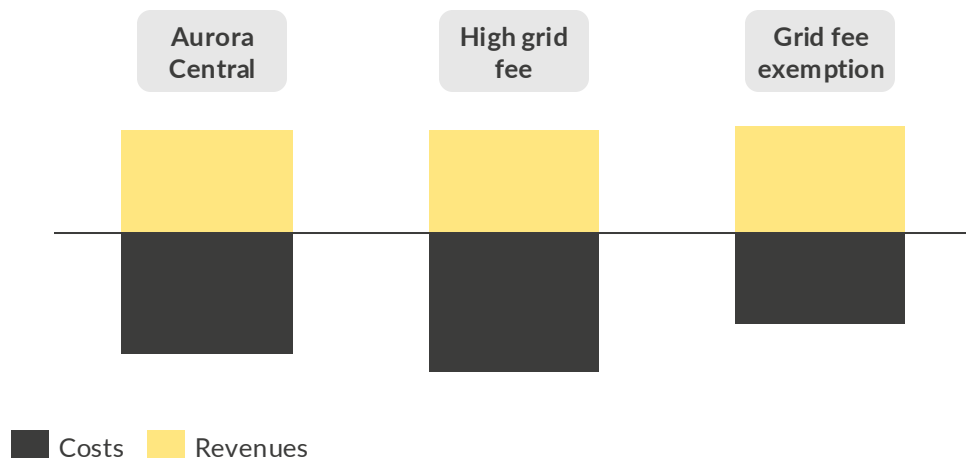
II

Battery business cases

Deep dive into battery business cases:

- Stand-alone battery business case
- Impact of different grid fee tariffs
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Battery present value €/kW



III

Battery co-location with solar PV

Deep dive into co-location with solar PV:

- Drivers for co-location with solar PV
- Advantages for co-location with solar PV
- Co-located battery business cases:
 1. Retrofit without grid charging.
 2. Retrofit with grid charging.

Project IRR for different configurations %



Agenda

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III. Battery co-location with Solar PV

IV. Key takeaways

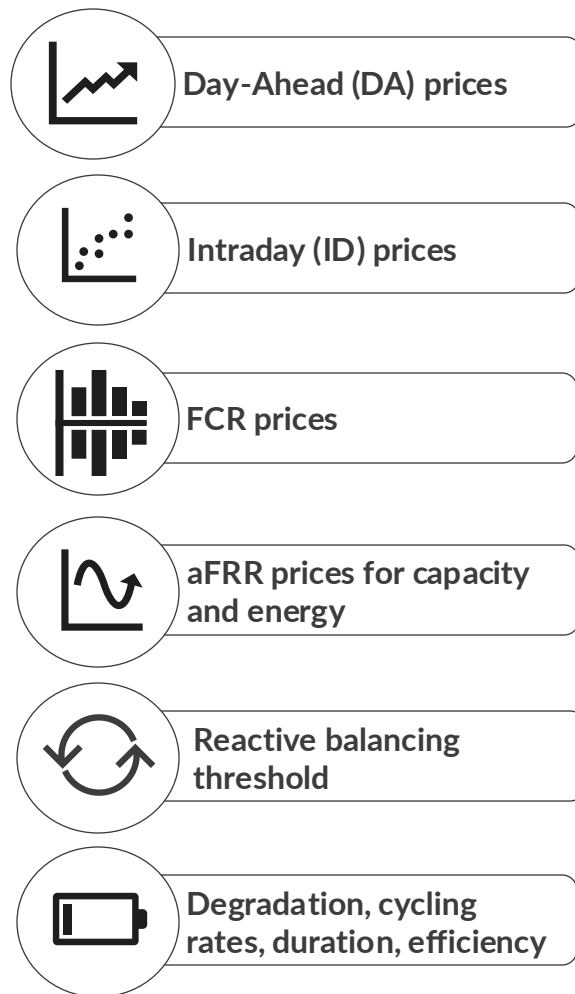


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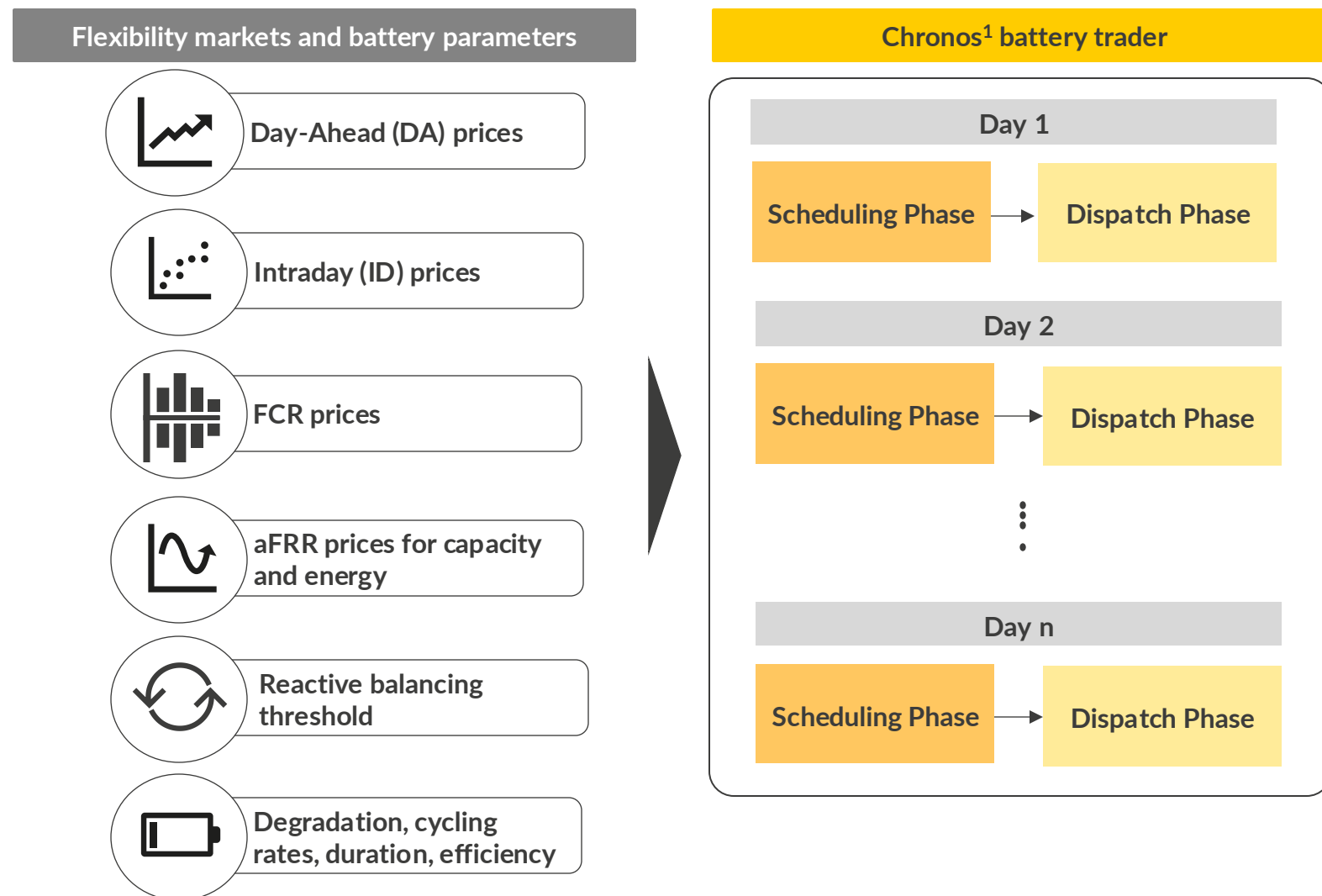
With Chronos, our in-house dispatch software, we model investment cases using our price forecasts, considering market rules and asset characteristics

Flexibility markets and battery parameters



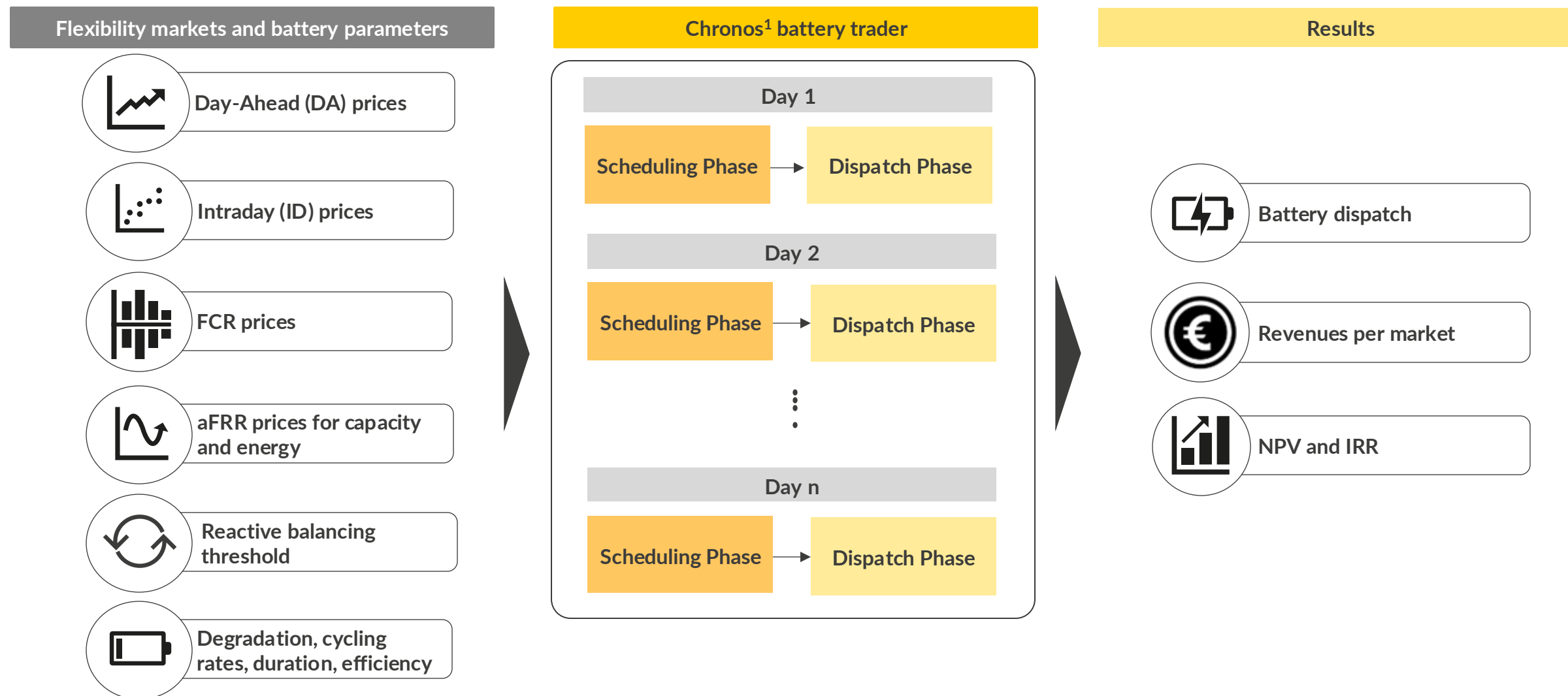
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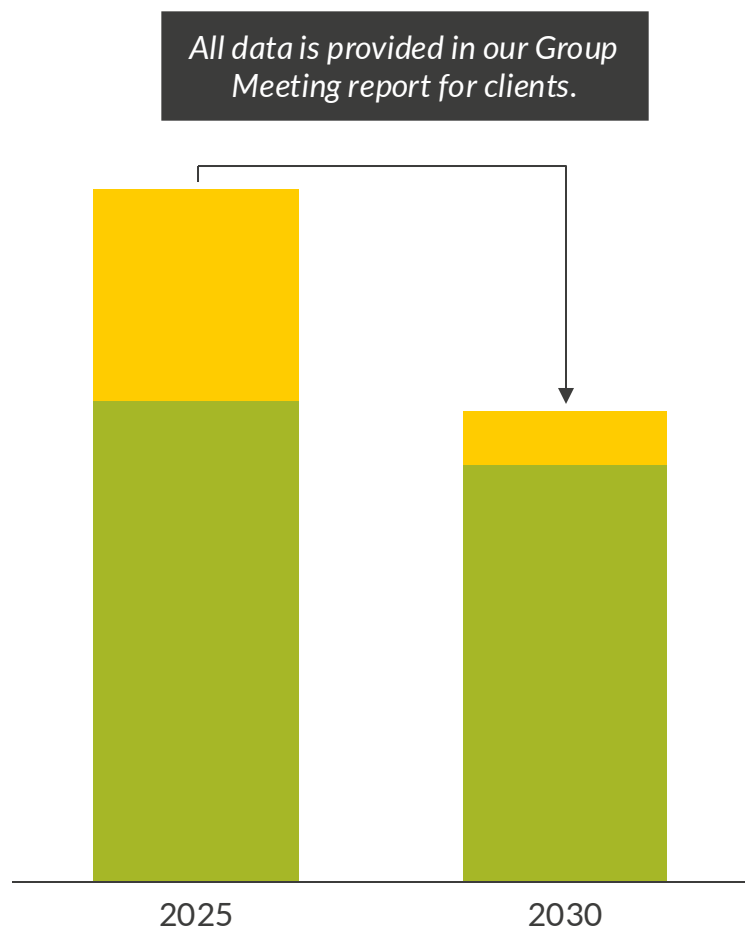
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Dutch batteries can capture attractive wholesale and ancillary market revenues, but high grid fees lead to low project returns

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



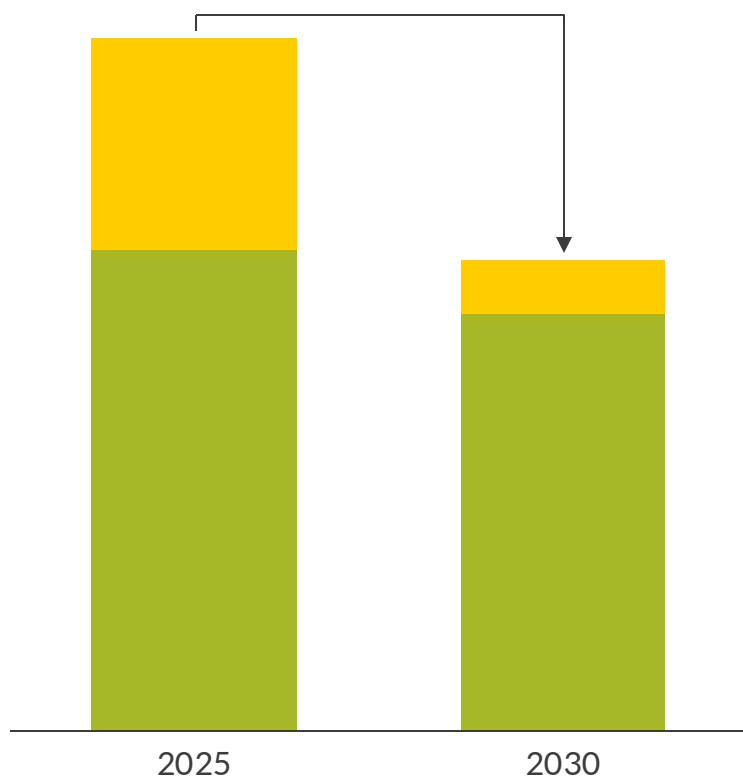
■ Energy arbitrage¹ ■ FCR and aFRR capacity markets

1) Energy arbitrage include Day-Ahead and Intraday market revenues 2) Calculated based on a 30MW battery with 2h duration, 1.5 cycles per day with a firm connection 3) Non-firm connection and transmission agreement 4) Time of Use (ToU).

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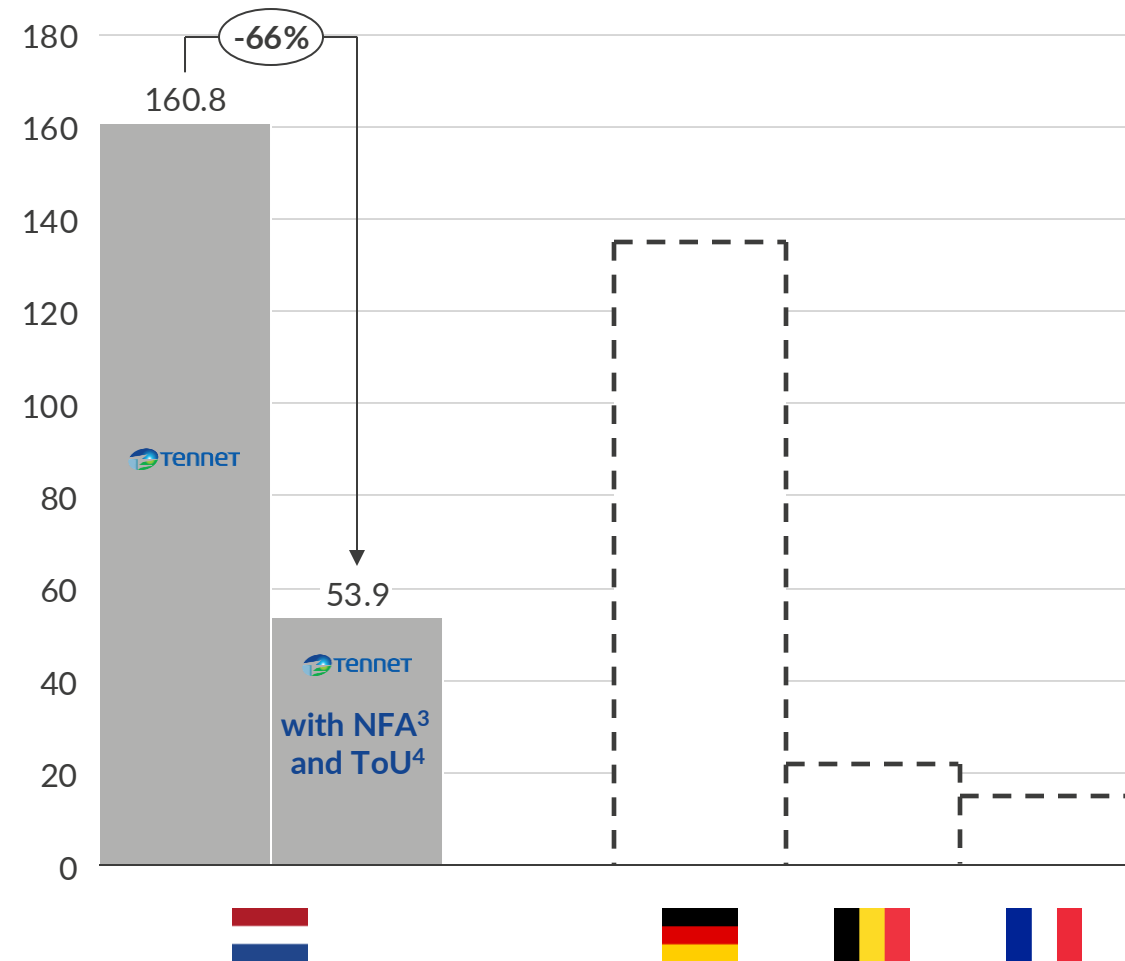
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■ Energy arbitrage¹ ■ FCR and aFRR capacity markets




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Yearly grid fees for the year 2024²
€/kW (real 2023)



The recent grid fee proposals offer attractive discounts but also restrict battery dispatch




Grid fee structures in the Netherlands

		 Grid operator	 Restriction on	 Status
Flexible contracts	1 Non-firm ATO ¹	All networks	Import and export	Available from 1 February 2024, and mandatory from 1 February 2025 in congested areas
	2 Fixed duration ² (e.g. TDTR ³)	TSO (contracted capacity)	Import and export	Effective from 1 April 2025, available at all sites by 1 October 2025 at the latest
	3 Fixed time block (TBTR ⁴)	DSO (contracted capacity)	Import and export	Effective from 1 April 2025
Rates	4 Time of use (TSO)	TSO (peak offtake)	Import	Effective from 1 January 2025
	5 Time of use (DSO)	DSO (peak offtake)	Import	In preparation

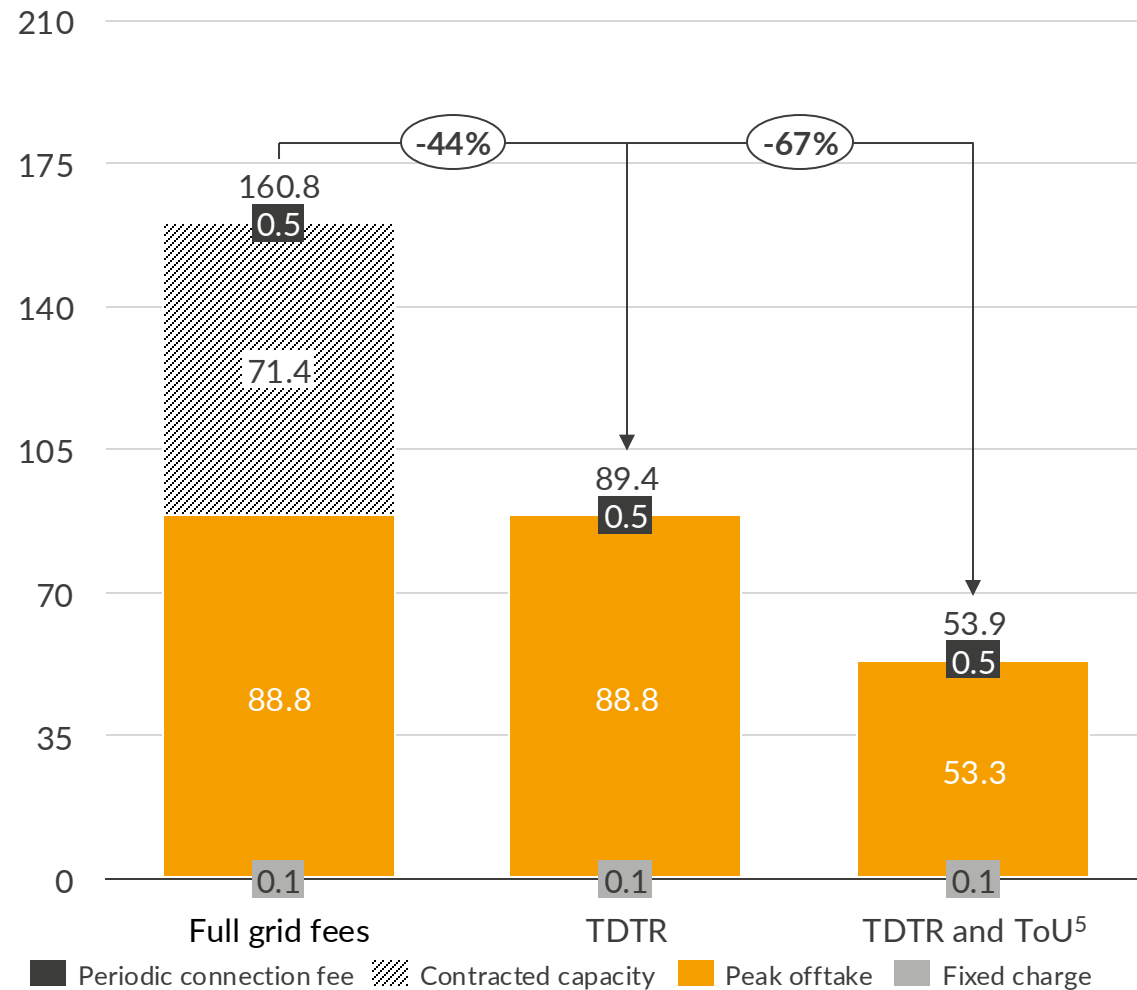
1) Contract without a fixed (firm) transport capacity are called non-firm ATO (Aansluit- en transportovereenkomst) 2) We assume that TenneT will only make use of the restrictions during 5% of the year. Calculated based on a 30MW battery with 2h duration, 1.5 cycles per day 3) Time dependent transport right (TDTR) 4) Time block transport right (TBTR)

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Tennet (TSO) 2024 grid fees under different structures €/kW/year (real 2023)

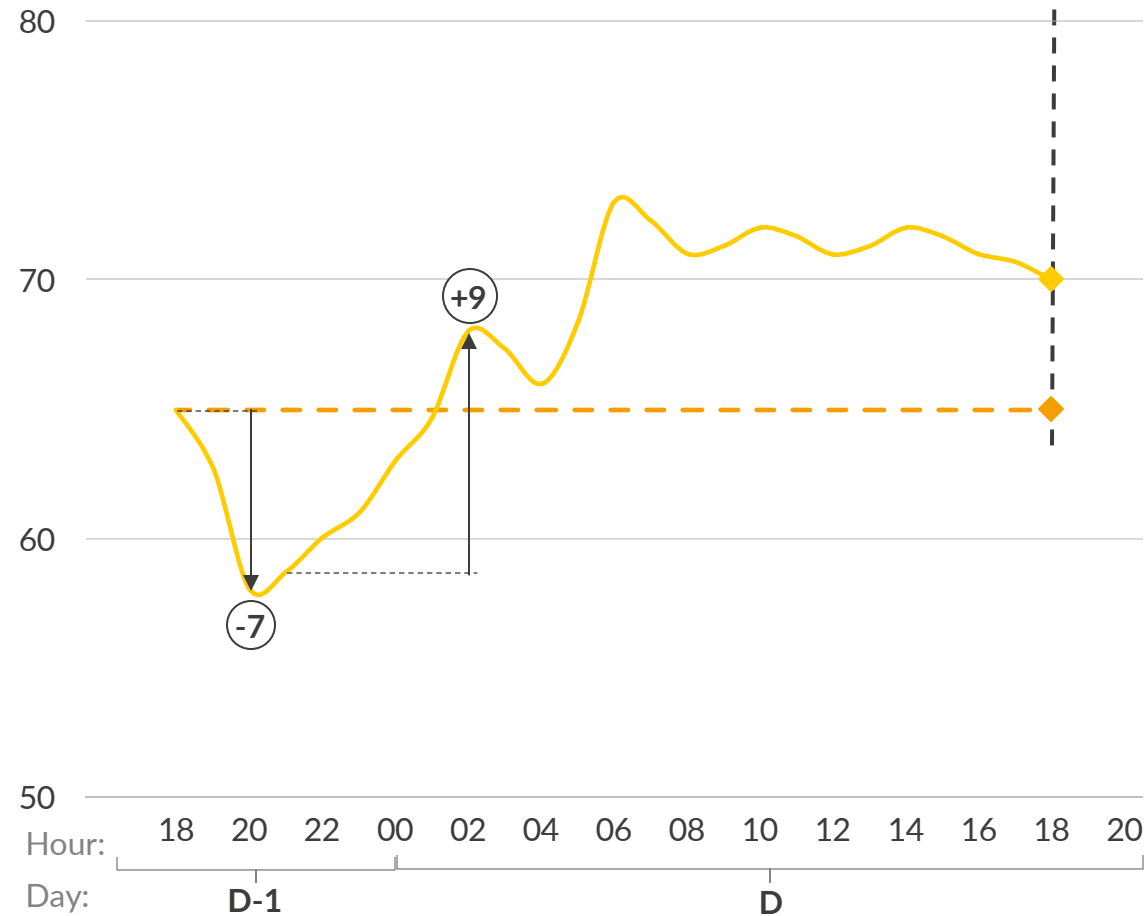


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Financial asset backed trading on the Intraday market can improve the battery business case, but cannibalisation of the upside is expected

Day-Ahead and continuous Intraday price – sample day

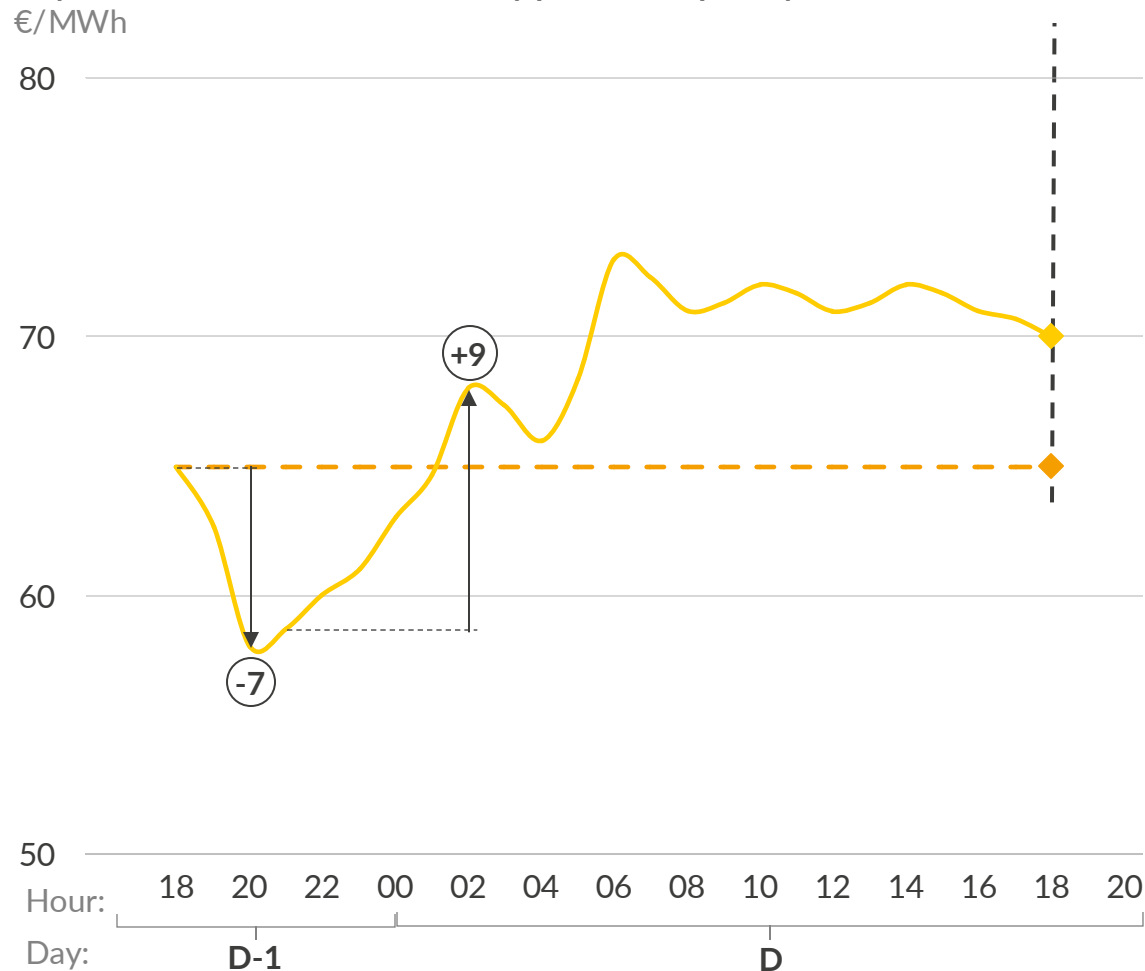
€/MWh



— ♦ — Day-Ahead Price — Continuous Intraday Price - - - Delivery time

Financial asset backed trading on the Intraday market can improve the battery business case, but cannibalisation of the upside is expected

Day-Ahead and continuous Intraday price – sample day



Present value of battery revenues – Illustrative

€/kW

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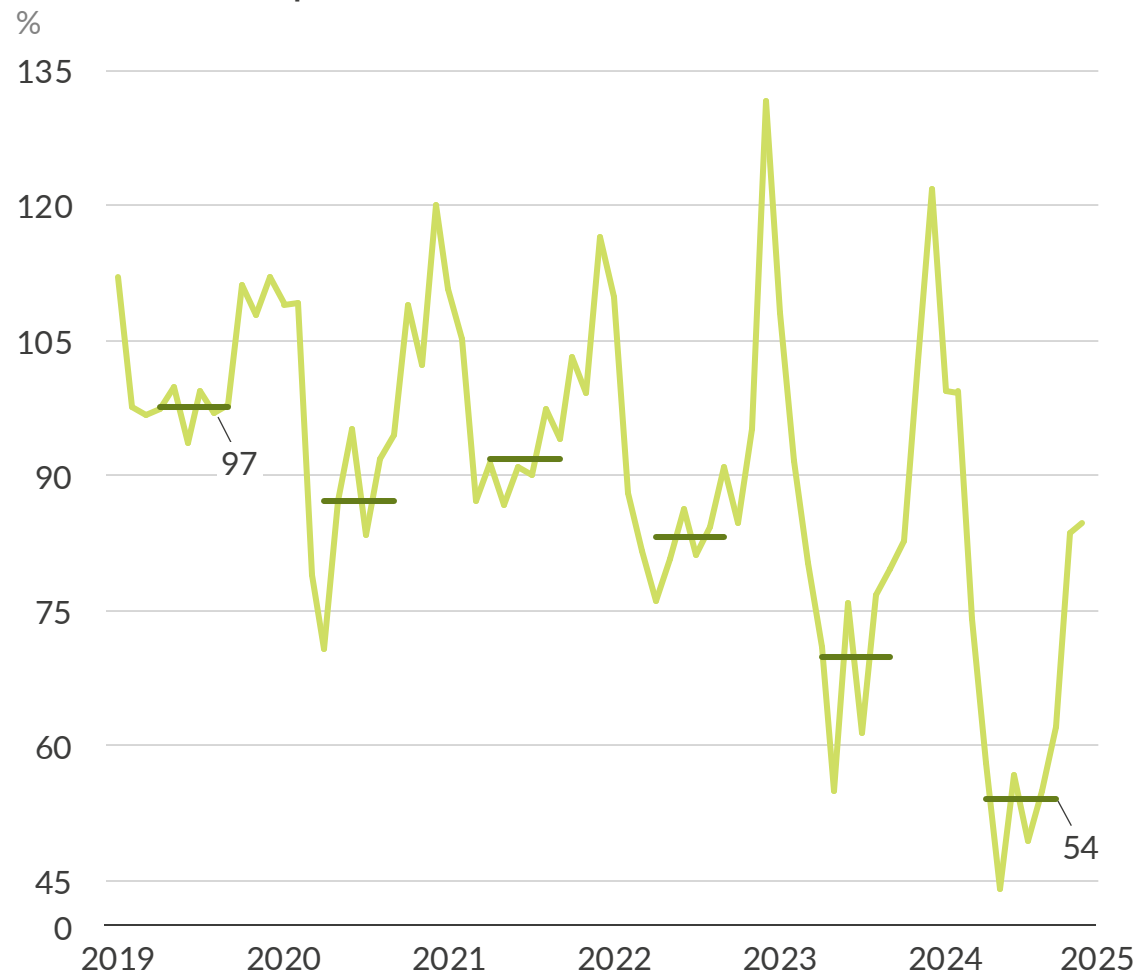


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The growing interest in co-location in the Netherlands has been driven by decreasing capture rates for solar and grid access constraints

Historic solar PV capture rate

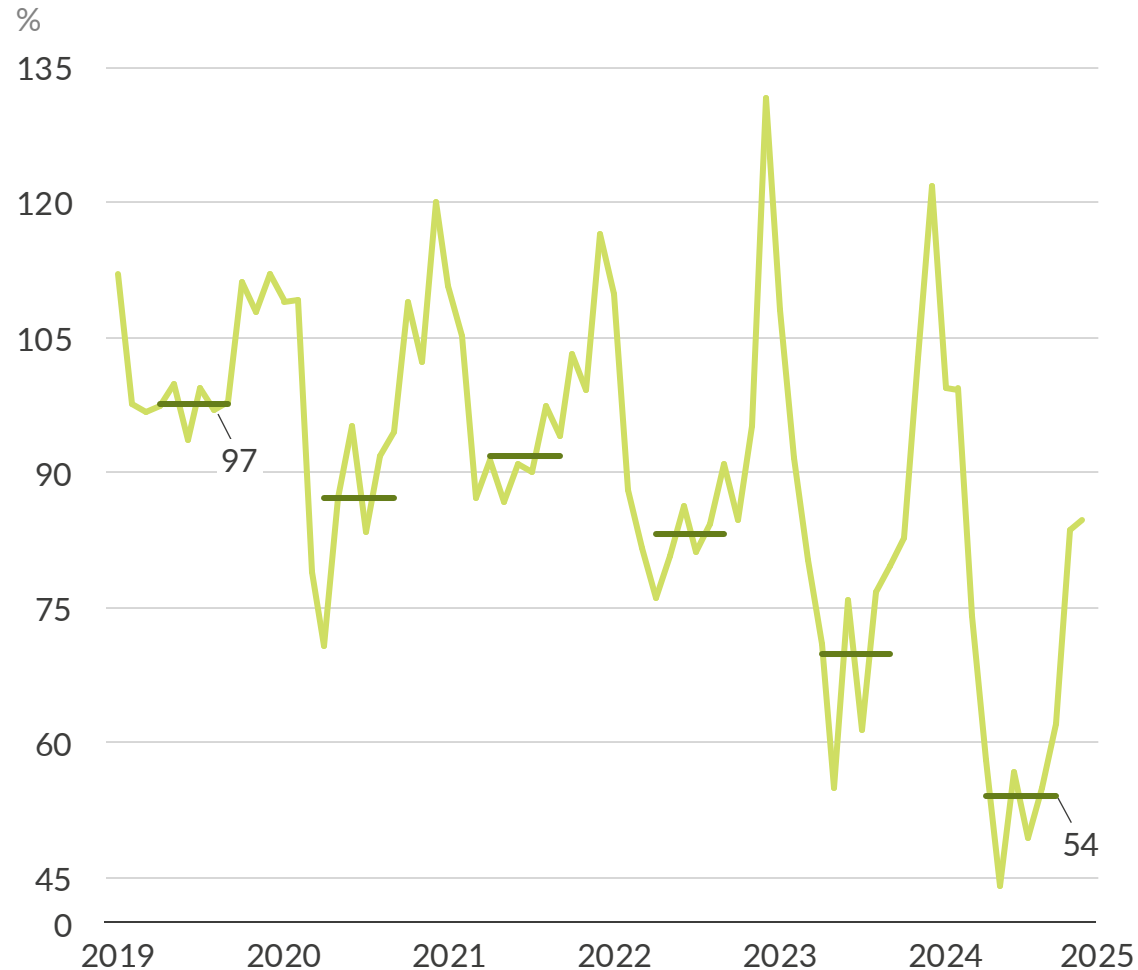


— Discount to baseload — Average April to September

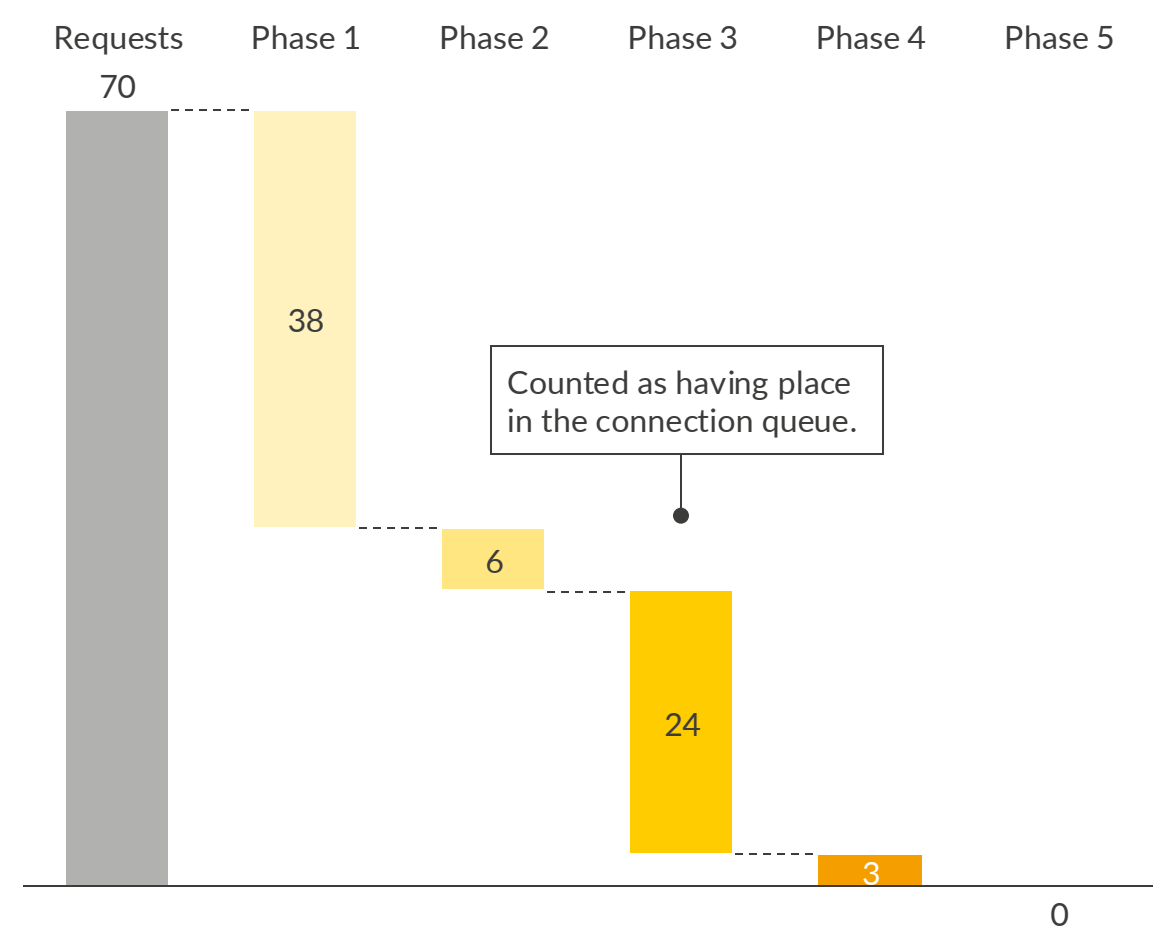
1) Presented by TenneT in August 2024. 2) According to Liander, more details can be found under: [Maatschappelijk prioriteren | Liander](#)

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Historic solar PV capture rate



Battery grid connection access requests – TenneT¹

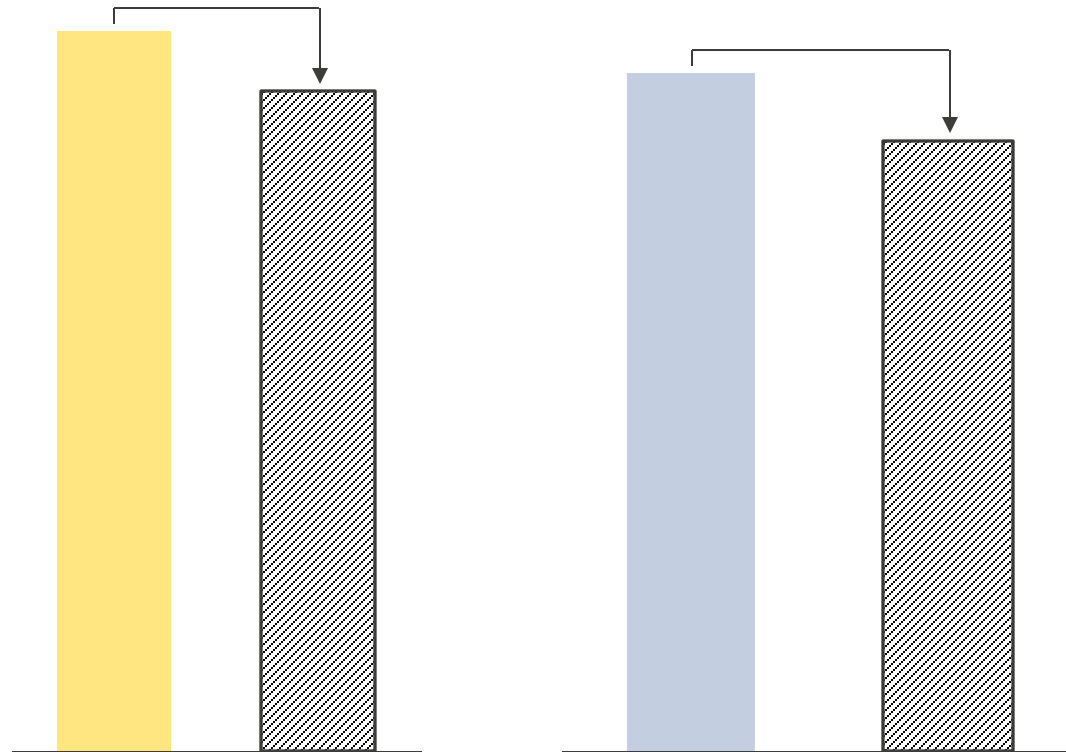


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Retrofitting a battery to a solar PV asset can lead to cost savings and significantly reduces solar PV curtailment

Retrofit battery CAPEX
€/kW

Retrofit battery OPEX
€/kW/year

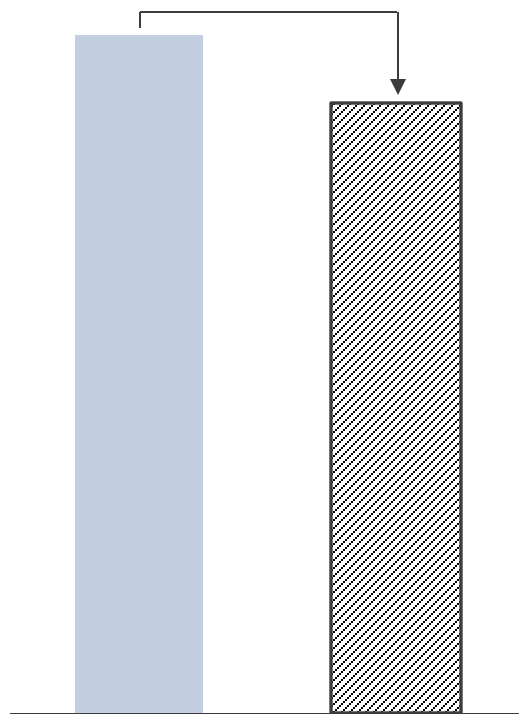
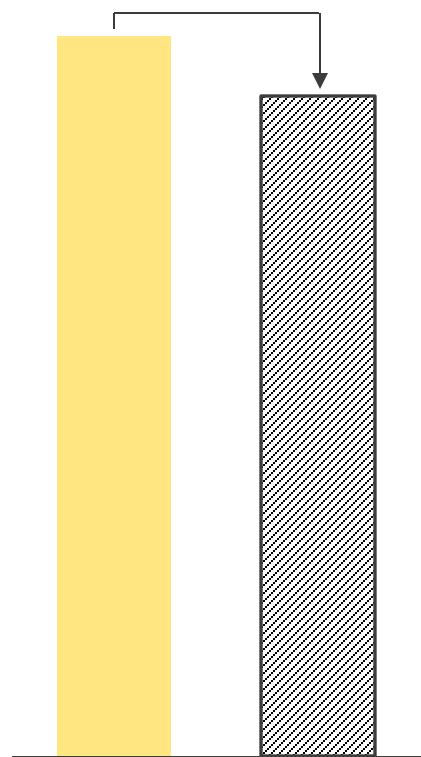


 Stand-alone battery  Retrofit battery - Co-located

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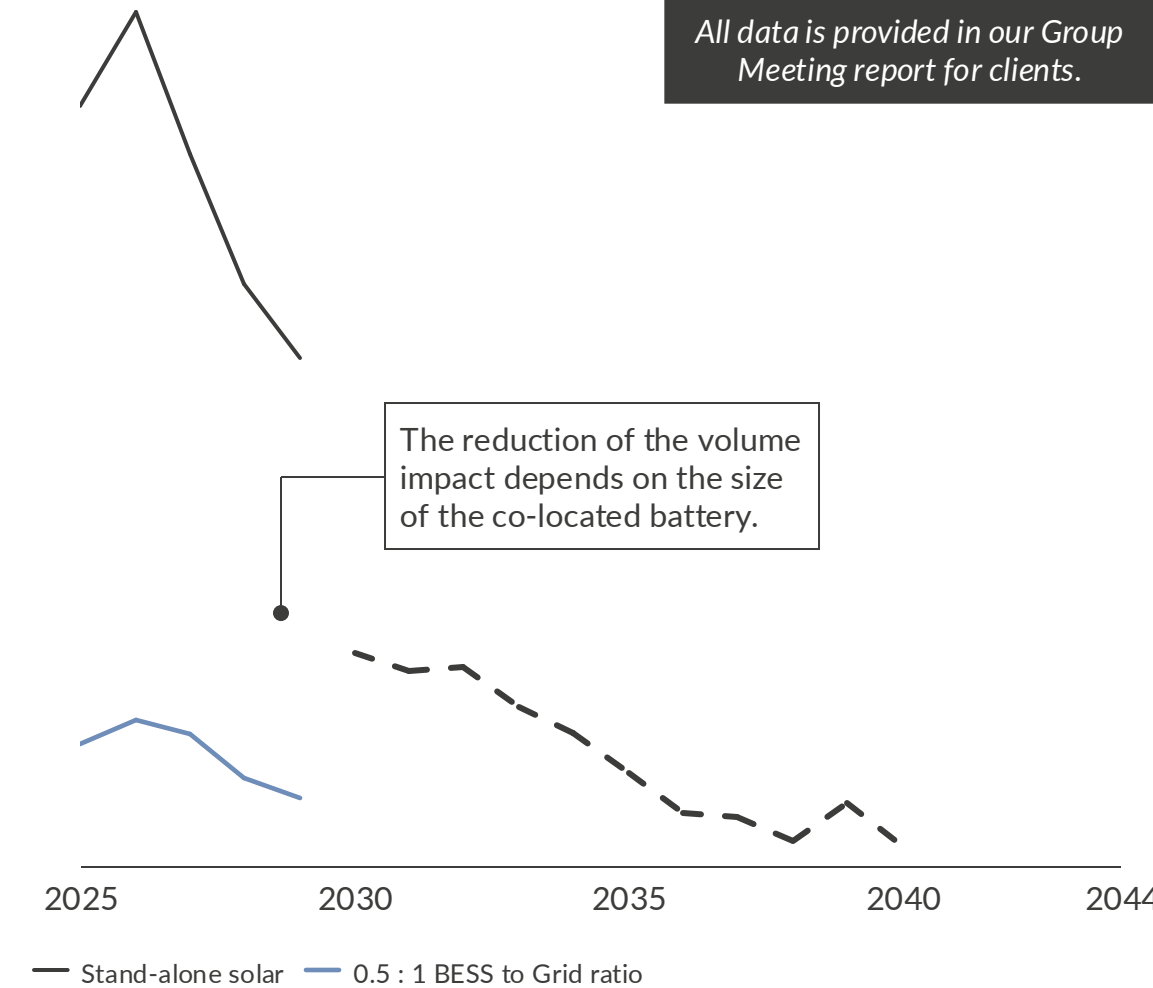
Retrofit battery CAPEX
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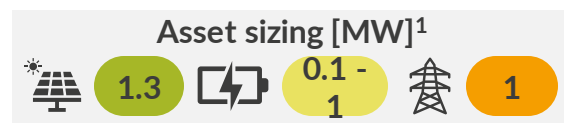
1h-rule volume impact for the solar PV asset with a retrofit battery
%



However, retrofitted batteries are not profitable without grid charging; when charging from the grid they can achieve higher IRR

Revenues for a retrofit battery - Illustrative

Present value k€

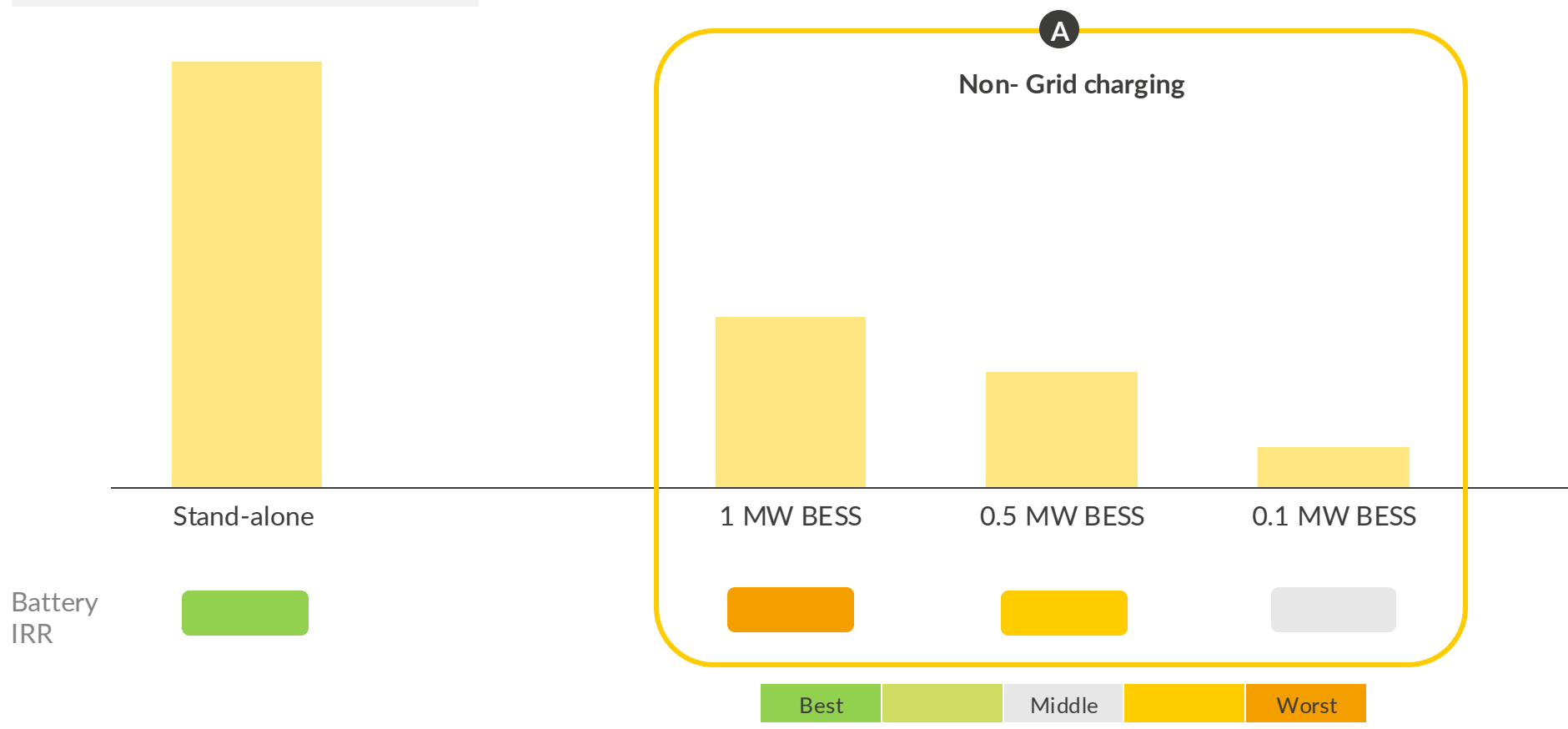
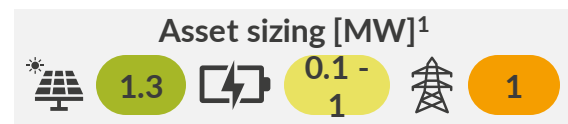


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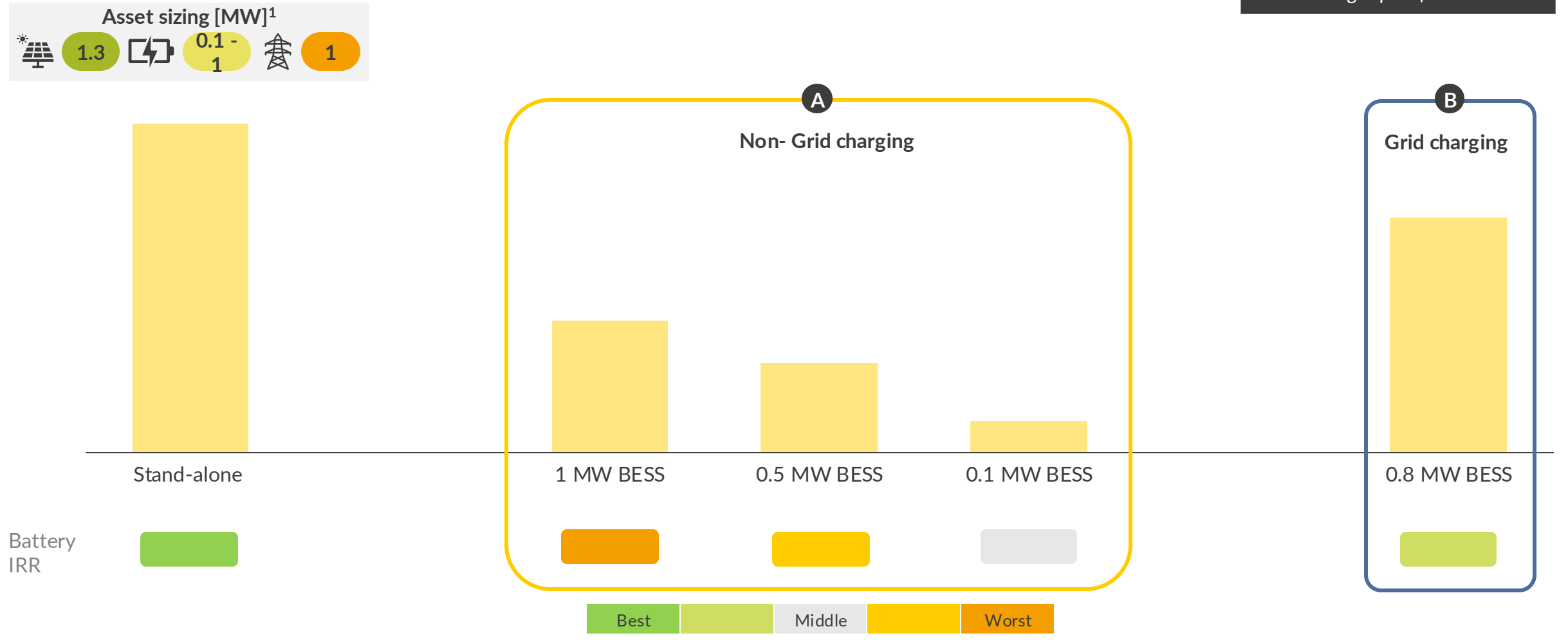


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1

The Dutch market presents high revenue opportunities for stand-alone batteries, but also imposes significant grid fees, even under the new grid fee proposals. As a result, IRRs for batteries built in the coming years remain below the assumed WACC. As a result of the saturation of ancillary service markets, batteries will make most of their revenues on wholesale markets after 2030. Looking ahead, further increases in grid fees could pose a serious risk to the economic viability of battery projects.

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2

Advanced trading strategies, particularly in the continuous intraday market, can significantly enhance battery revenues, by financially trading the same product several times. This highlights the importance of active trading and market participation in maximising returns. However, participation of additional batteries is likely to cannibalise this upside in the future.

- 1** The Dutch market presents high revenue opportunities for stand-alone batteries, but also imposes significant grid fees, even under the new grid fee proposals. As a result, IRRs for batteries built in the coming years remain below the assumed WACC. As a result of the saturation of ancillary service markets, batteries will make most of their revenues on wholesale markets after 2030. Looking ahead, further increases in grid fees could pose a serious risk to the economic viability of battery projects.
- 2** Advanced trading strategies, particularly in the continuous intraday market, can significantly enhance battery revenues, by financially trading the same product several times. This highlights the importance of active trading and market participation in maximising returns. However, participation of additional batteries is likely to cannibalise this upside in the future.
- 3** Co-locating a battery with an existing PV installation is only a financially interesting option if the battery is allowed to charge from the grid. Relying only on excess solar generation limits the revenue potential significantly, especially during winter. The financial returns for co-located batteries with grid charging are similar to those of stand-alone batteries.

Explore upcoming and recent topics for the Dutch Power & Renewables Service

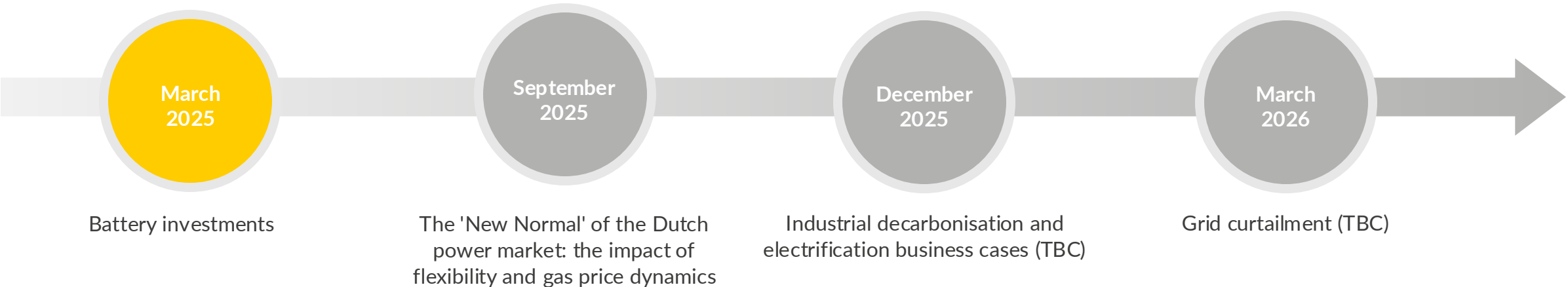


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LONDON 2025

COMPETING VISIONS OF PROGRESS:
THE ENERGY TRANSITION
IN A POLARISED WORLD

WEDNESDAY 21 & THURSDAY 22 MAY

For more information, please contact our Events team:
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Publication

Beyond the Buzz: Winning Cases for BESS Investments in the Netherlands – Public Version

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