AURORA ENERGY RESEARCH

Corporate PPAs on the rise: A European market overview

9 July 2024

Agenda

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I. Overview of European PPA markets

II. Corporate PPAs

III. Demand & supply balance, willingness to pay

After a dip in 2022, PPA volumes are expected to grow in 2024, due to continued growth in demand from corporate offtakers

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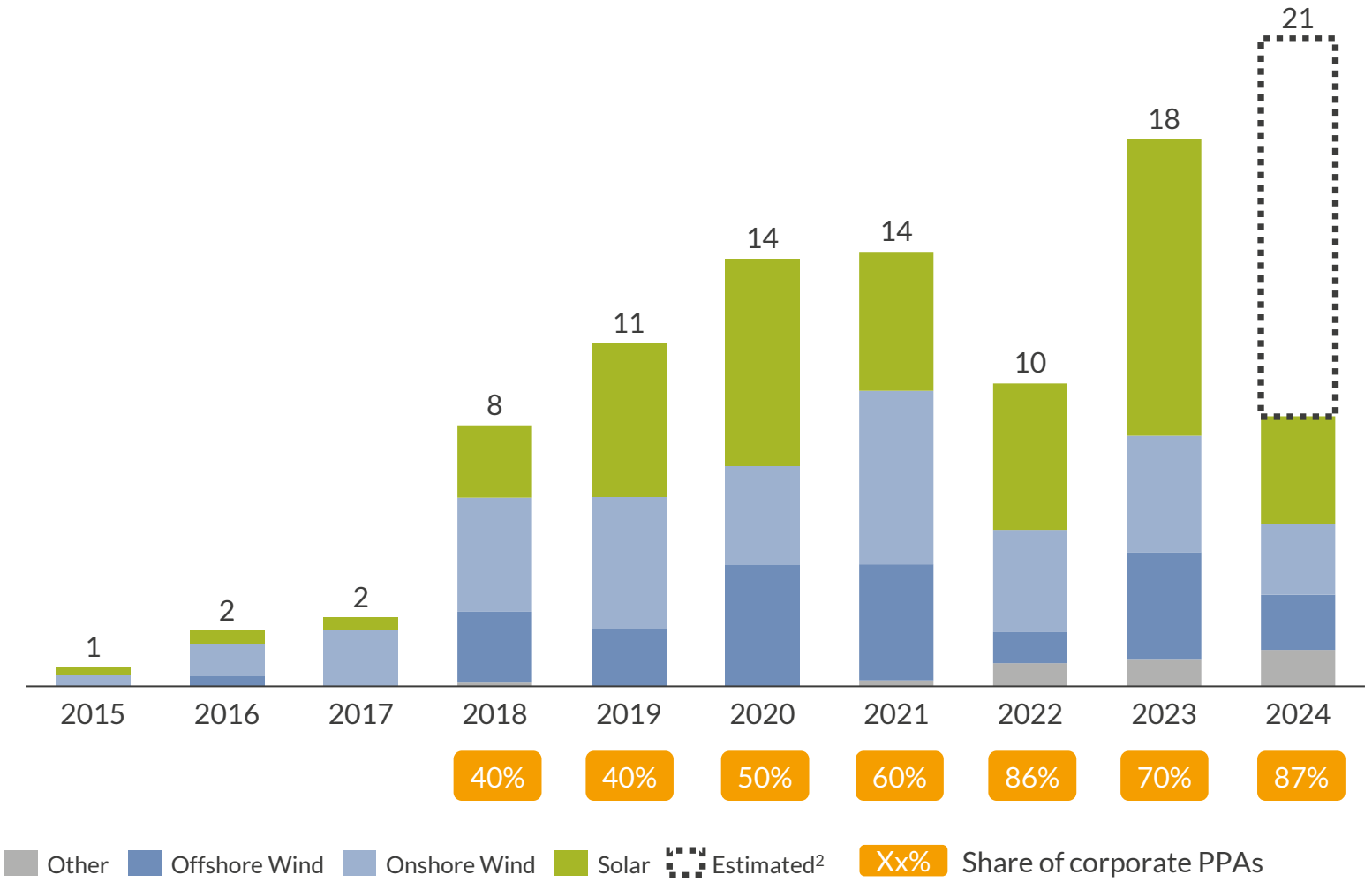
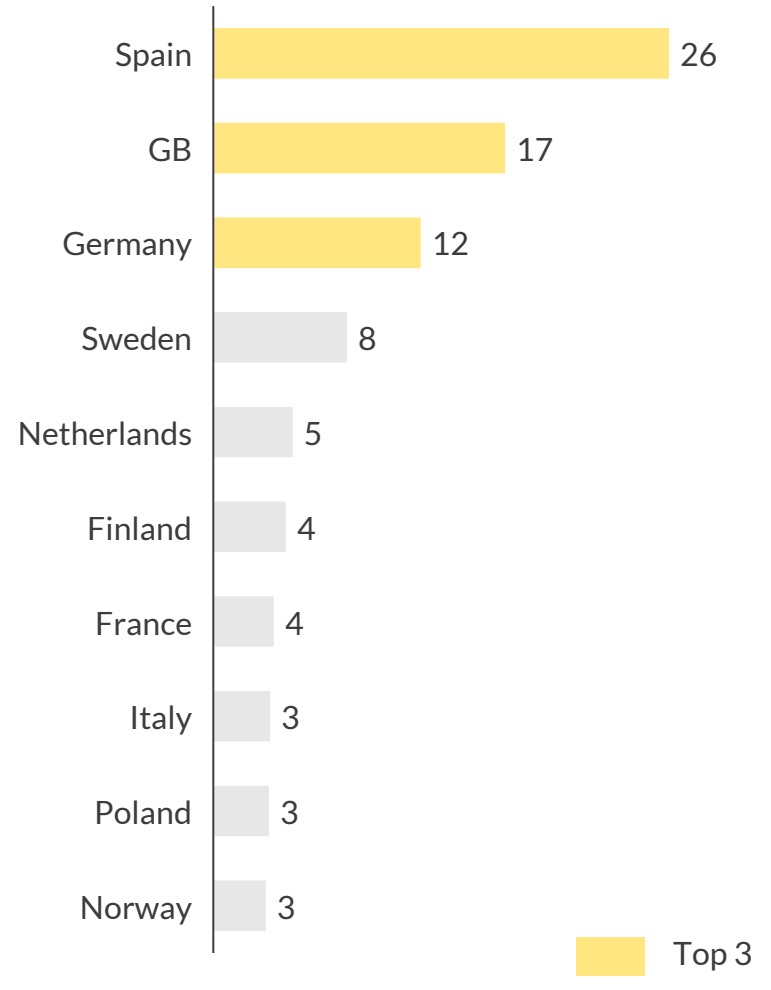
Public PPA transaction volumes by announcement year in Europe[1]

GW



Total public signed contracts per market of interest

GW

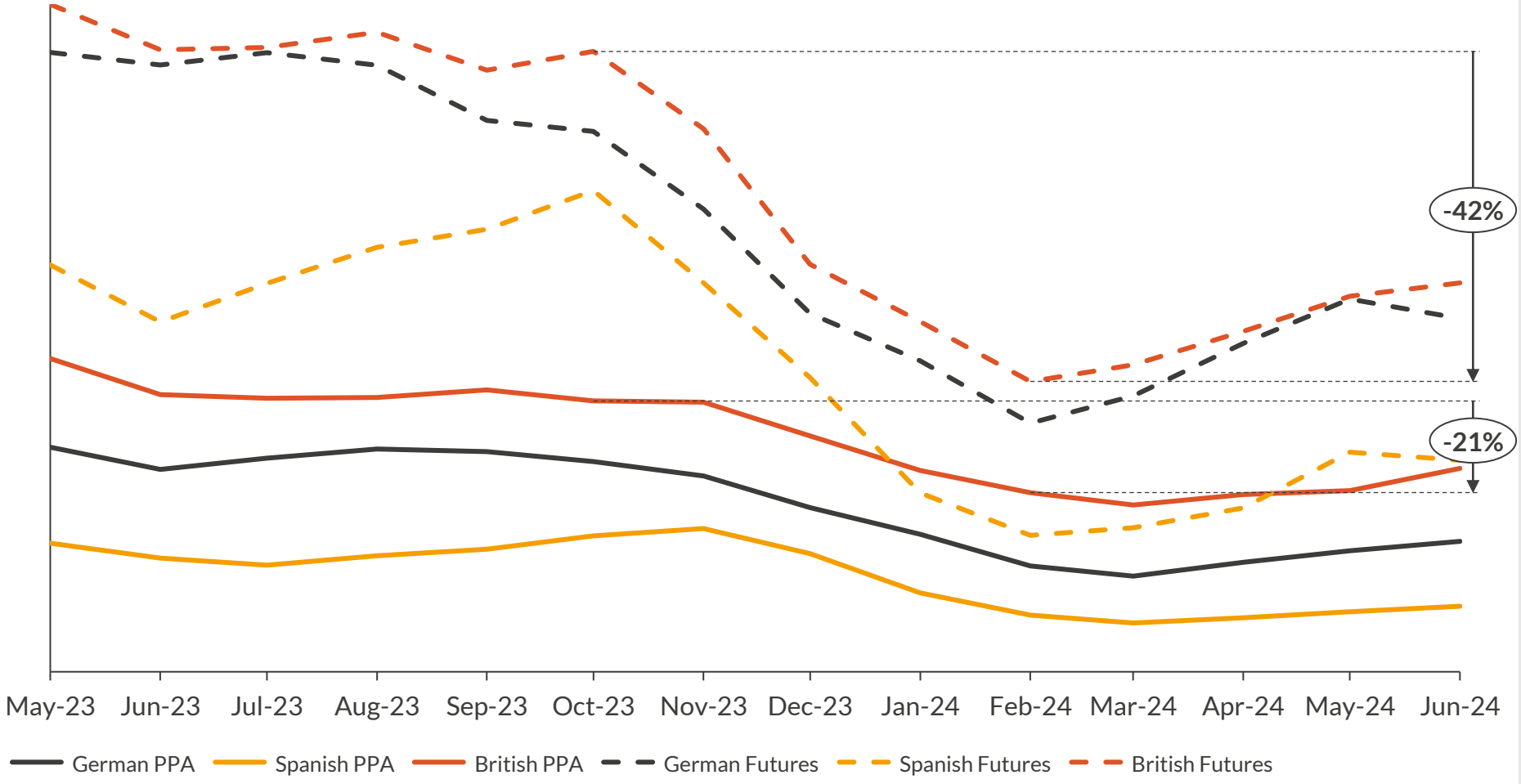


1) Includes EU-27 countries, UK, Norway and Switzerland. Undisclosed data points were calculated based on internal assumptions based on average data points. 2) Estimate based on extrapolation from Q1 2024.

Source: Aurora Energy Research

With the recent bearish movement of gas prices and power futures, utility PPA prices went down significantly over the last 12 months

Solar utility PPA prices[1] over the last twelve months compared to front year futures contract
€/MWh



1) Refers to a 10 year pay-as-produced contract with delivery start in fron year

Source: Aurora Energy Research

Comments

- Since the relaxation of the gas market, power futures have decreased over the last twelve months across all European countries
- Consequently, solar PPA prices offered by utility offtakers have decreased in all European countries
- The attractivity of utility PPAs has hence decreased for developers, who are now focusing more on direct corporate PPAs
- Estimating a corporate premium above the utility PPA prices is therefore necessary for power producers

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Corporate PPAs are direct contracts between a developer and a corporate offtaker, skipping the need of a utility as counterparty

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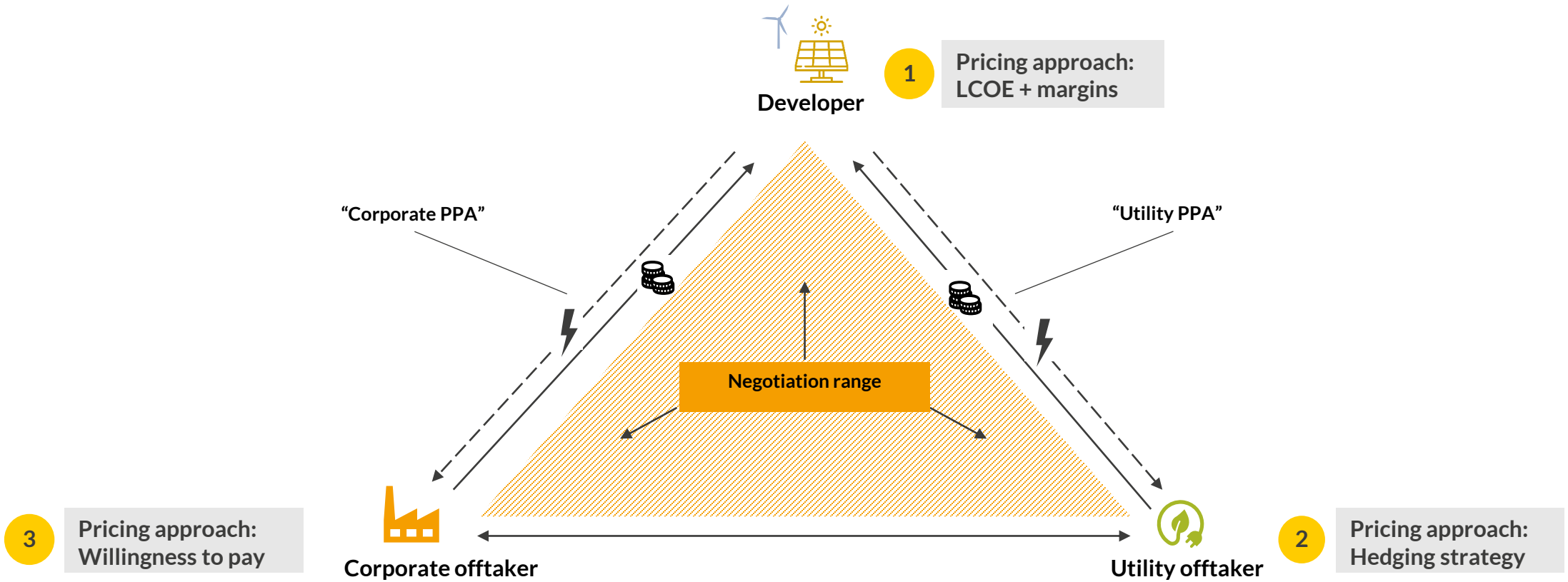
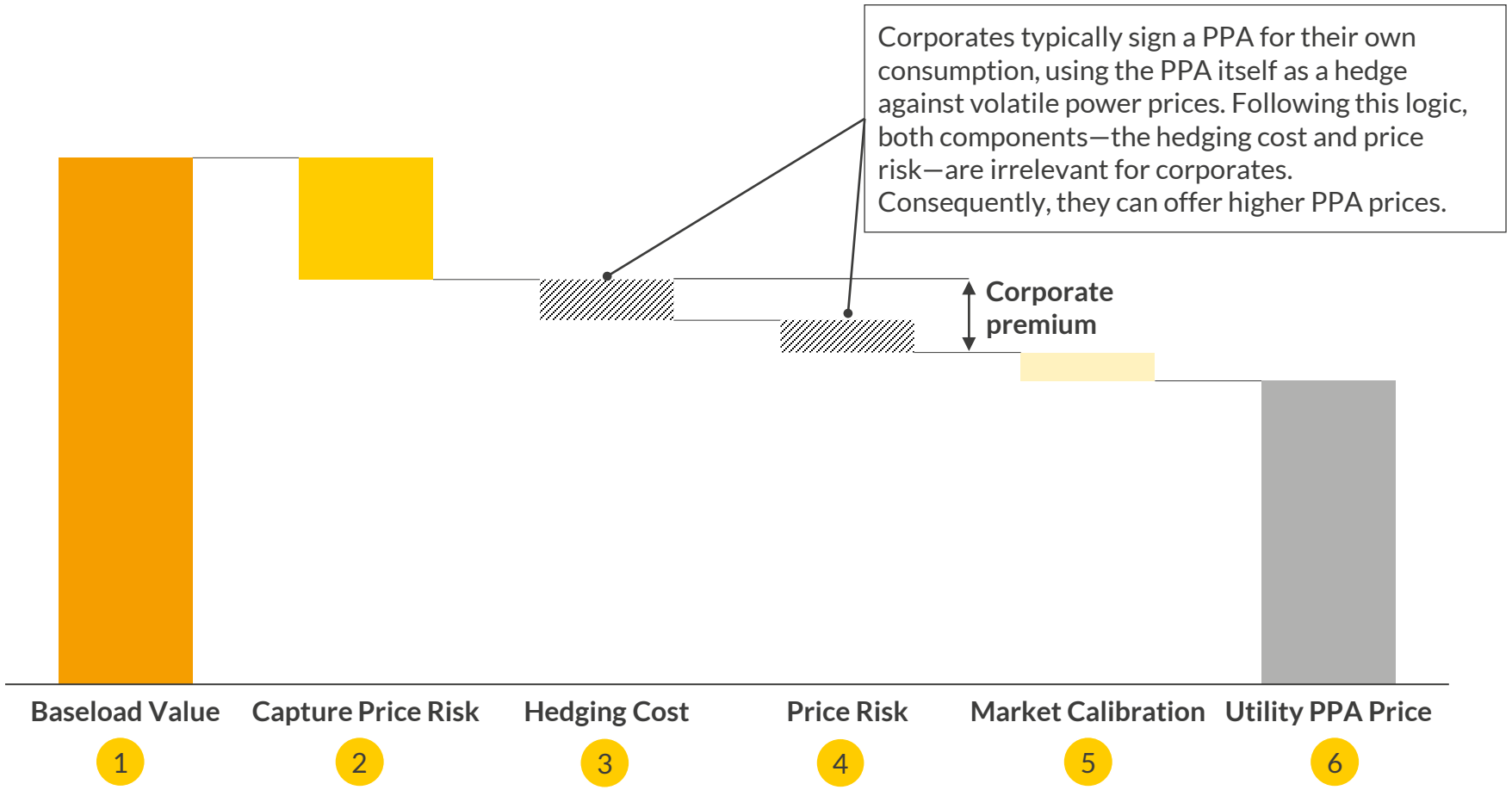
The corners of the simplified PPA market triangle represent the edges of the negotiation range for PPA prices:



Source: Aurora Energy Research

The corporate premium stems from the fact that unlike utilities, corporates do not hedge their PPA contracts

Utility PPA Price Calculation: waterfall components
EUR/MWh



Source: Aurora Energy Research

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Comments

1. Baseload value of the contracted power throughout the PPA tenor
2. Difference in value of asset specific generation profile vs. baseload profile, including weather driven deviations from expected asset profile
3. Expected rolling losses given the market liquidity, following a stack and roll hedging strategy
4. Risk discount reflecting uncertainty in BL price realisation relevant for a utility hedging approach
5. Risk discount reflecting other risk factors not explicitly priced into risk factors above, calibrated with market price quotes
6. PPA Price result

note: balancing and GoO costs may be added dependent on contract specifications

By varying the confidence level of the underlying price distribution, we can derive an upper range for PPA prices from the view of corporate offtakers

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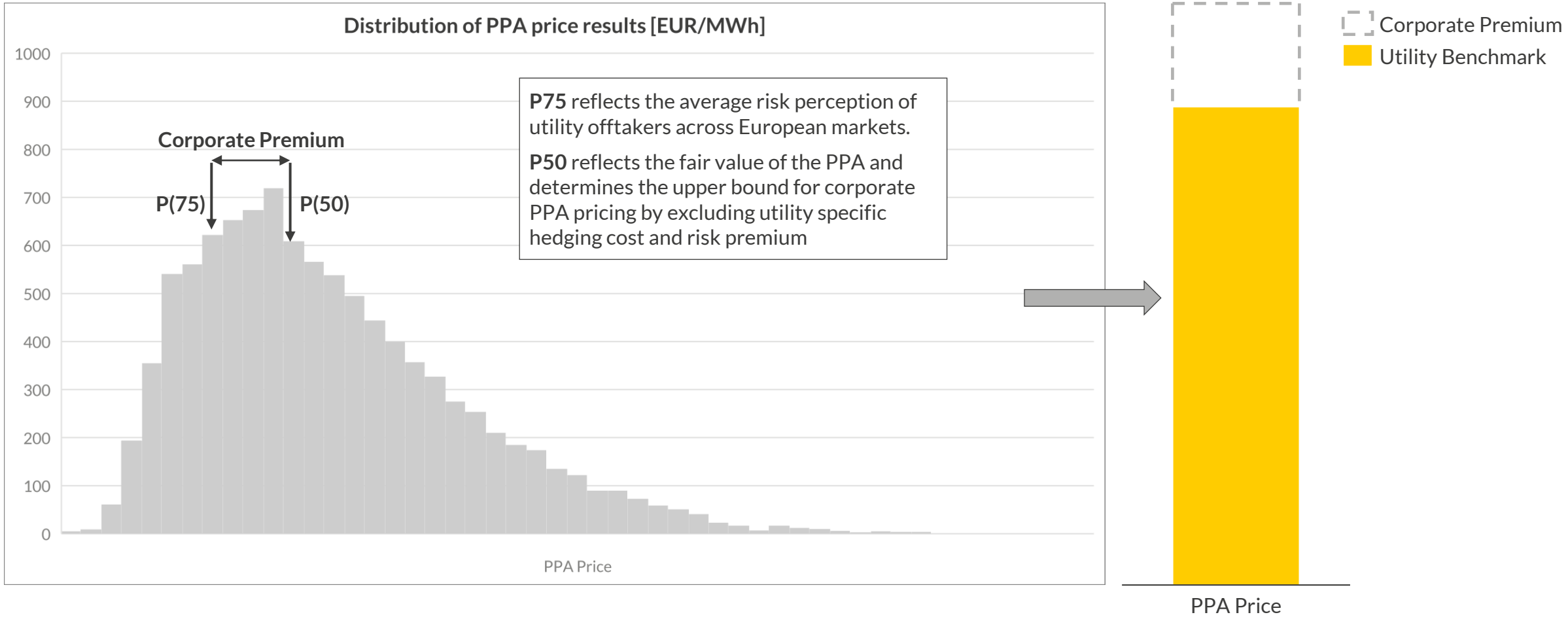
Estimation of corporate premium compared to utility PPAs



Sources: Aurora Energy Research, Novartis press release

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We consider PPA demand to be driven by corporates, utilities, EV charging and electrolysis, while PPA supply is driven by unsubsidised RES generation

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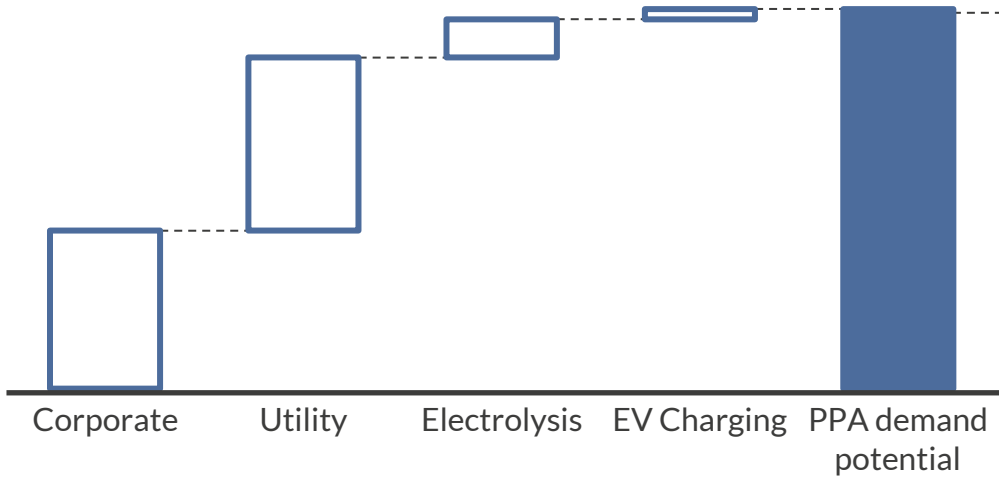
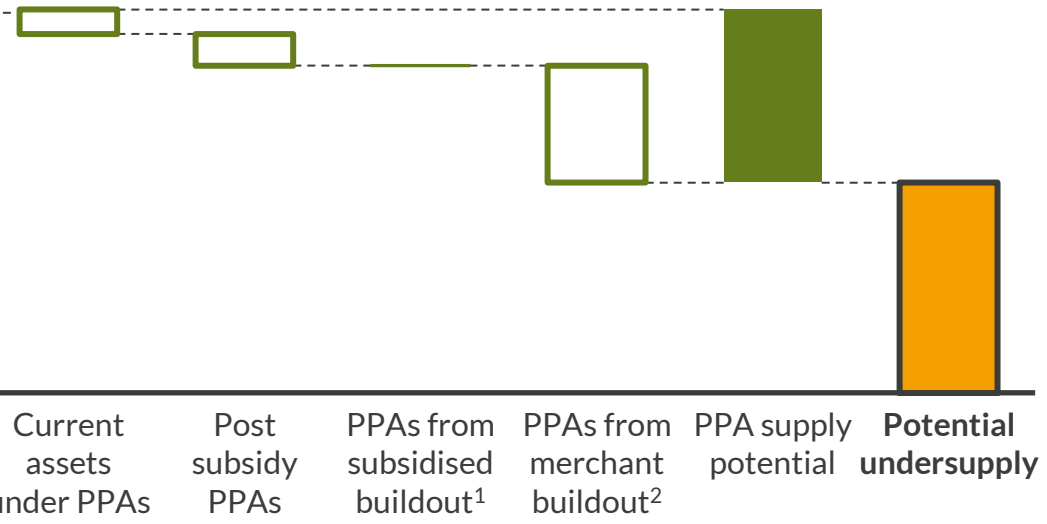
Illustrative annual PPA demand potential
TWh



Illustrative annual PPA supply potential
TWh



PPA demand

Upward drivers include electrolyser buildout and increased demand for GOs[3].

Downward drivers include alternative sources of GOs and alternative instruments for hedging.

PPA supply

Upward drivers include restrictions for entering subsidies, GO prices and decreasing LCOE.

Downward drivers include alternative financing options through EEG.

1) Assets built under subsidy support cannot sign a PPA in most countries unless they forego subsidy support. 2) We classify projects that are auctioned off at 0 Cent bids under subsidy as merchant projects in Germany. 3) Guarantees of Origin.

Source: Aurora Energy Research

We observe different PPA market dynamics across Europe today and in the future, depending on national subsidy schemes and RES targets

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State of PPA supply demand balance in Europe by 2030
% of over- or undersupply to PPA demand

Cross-border PPAs as a tool to balance out European PPA markets?

Germany

- Strong uptake in PPA demand driven by ambitious decarbonisation targets from corporates and high electrolyser demand
- Limited PPA supply from wind onshore and solar PV build out due to EEG subsidy scheme

Great Britain

- Increased PPA demand driven by electrolyser project
- Subsidised assets are eligible for REGOs driving up the total PPA supply, but overall merchant buildout is expected to stay low until 2030

Spain

- Strong uptake of renewables build out until 2030, driven by solar PV
- Higher share of merchant buildout expected as recent auctions have been undersubscribed
- Total demand not fully recovered since energy crisis, low price levels putting downward pressure on the PPA market

Source: Aurora Energy Research

Poll: Cross-border PPA activities

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	Would you consider a cross-border PPA?	Results
A	Yes, I would consider competitive cross-border options	34.8 %
B	Yes, I would consider a cross-border PPA only if the other party takes on the basis risk	36.6 %
C	No, because of complex accounting requirements	13.4 %
D	No, because of other reasons	15.2 %

	Do you reflect the view of an offtaker or seller?	Results
A	Offtaker	36.6 %
B	Seller	63.4 %

We adjust the potential corporate premium range based on the demand & supply balance in 2030 and put it in context with the sectoral willingness to pay

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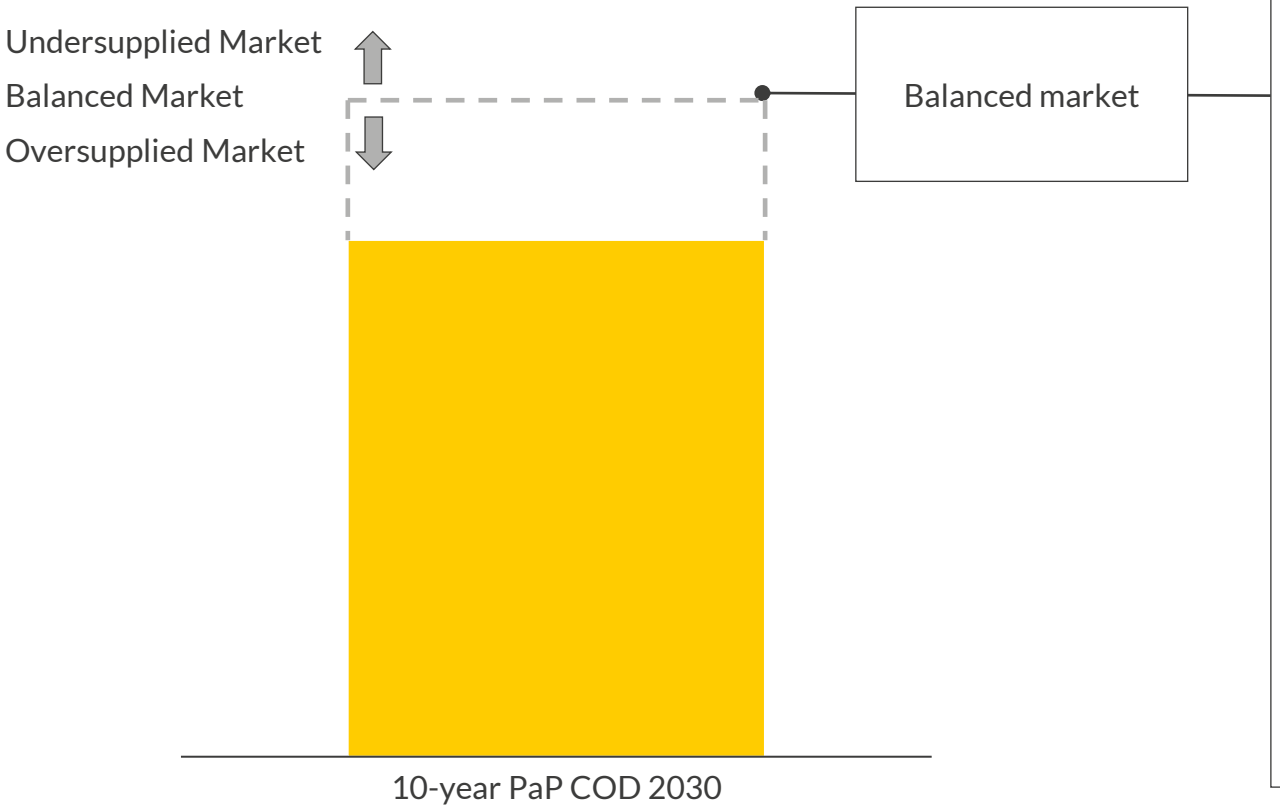
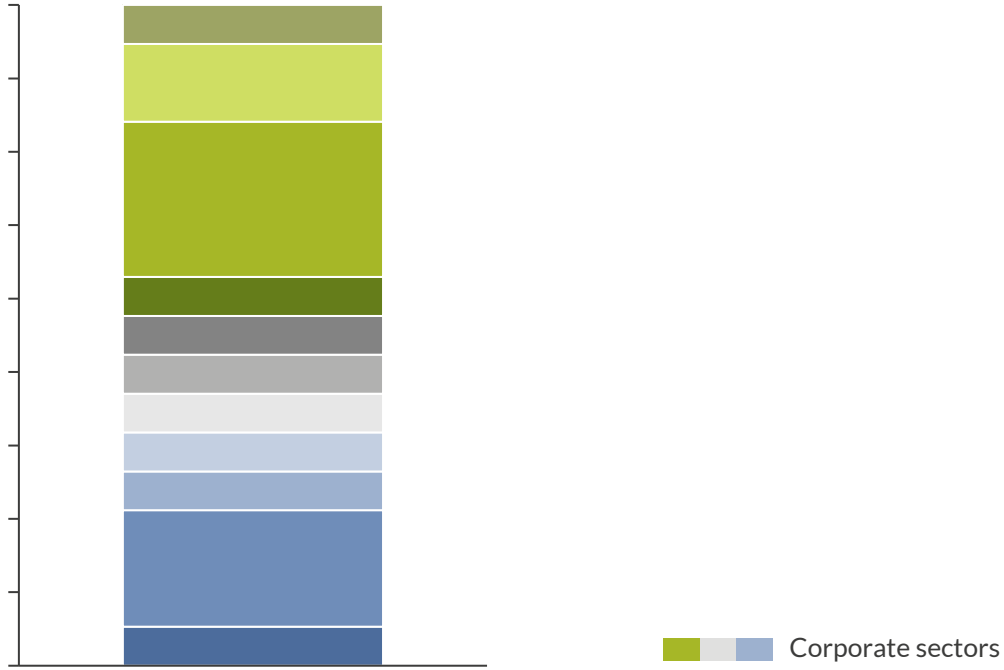
Corporate Premium in 2030 based on demand and supply balance
€/MWh, nominal



Corporate Premium in 2030 split in sectors by willingness to pay
€/MWh, nominal

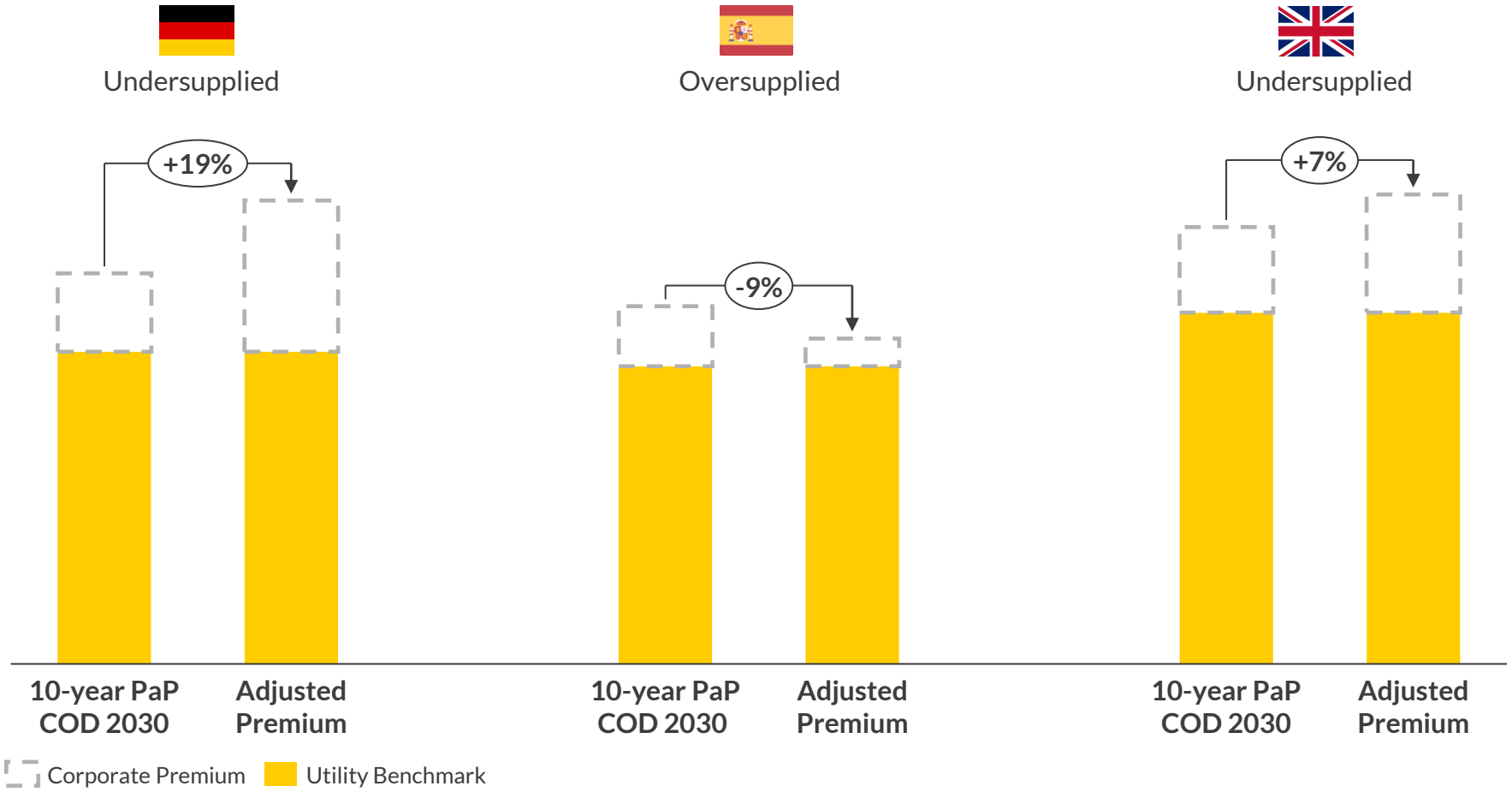


Corporate Premium Utility Benchmark

1) Reflects the utilities' willingness to pay a premium driven by pressure to decarbonise and high competition in an undersupplied market

Corporate premiums are substantial and depend on the state of supply demand balance across PPA markets

Illustrative Solar PPA prices with adjusted corporate premium[1]
€/MWh, nominal



1) Pricing based on April-24 PRMF and trading date as of 8th of March 2024.

Source: Aurora Energy Research

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Comments

- As Germany is highly undersupplied, a significant adjustment is applied on the corporate premium
- Great Britain presents also an increased corporate premium as the PPA market is undersupplied
- As Spain is an oversupplied PPA market, the corporate premium is reduced
- Renewable developers have hence more incentives to target corporates instead of utilities, at the conditions of enough credit worthiness, power procurement experience and willingness to pay from the targeted corporate

Key takeaways

1. The European PPA market is growing with an increasing share of corporate PPAs. The top 3 PPA markets based on volume of PPA signed to date are Spain, the UK and Germany

2. Differences in renewables build out and demand growth lead to different supply-demand balances, notably Germany which is undersupplied, and Spain which is oversupplied, which in turn affects the prices developers are able to realise

3. Due to these different market dynamics, we expect cross-border PPAs to play an increasing role to balance out European PPA markets

4. Willingness to pay of individual sectors can be evaluated based on their pressure to decarbonize and energy intensity. Our methodology allows to identify most attractive players from the view of a developer

5. We expect to see corporate PPA prices vary by -9 to +20%, depending on demand and supply balance and willingness to pay of the respective offtaker sector

Source: Aurora Energy Research

We are launching the Early Adopter Programme of our upcoming PPA Software

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Available now: The PPA Early Adopter Programme

Access Aurora's PPA Reference Prices

Gain insights into a set of PPA valuations across common contract configurations.

Receive Monthly Pricing Updates

Pricing information is curated and updated every month by our local Research teams.

Shape our Software Roadmap

Enjoy the opportunity to engage with our PPA Team in dedicated monthly sessions.

Uncover our PPA Methodology

Gain insights into Aurora's proprietary PPA pricing methodology.

Available in the following markets:

Now: DEU

Next: ESP POL NLD SWE DNK (more coming…)

Launch later this year: Our PPA Software

Be among the first to access our PPA pricing engine, enabling you to price and analyse your custom PPAs.

First release: DEU

% As an Early Adopter, you will enjoy reduced rates for the 1st year of your subscription.

Available → **By earliest: October 2024**

Source: Aurora Energy Research

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Source: Aurora Energy Research


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