

Aurora Keynote:

# The new normal: Exploring the future of the German PPA Market in a shifting energy landscape



**Ryan Alexander**

Research Lead,  
European Power Markets, Aurora

AURORA

# Renewables Summit

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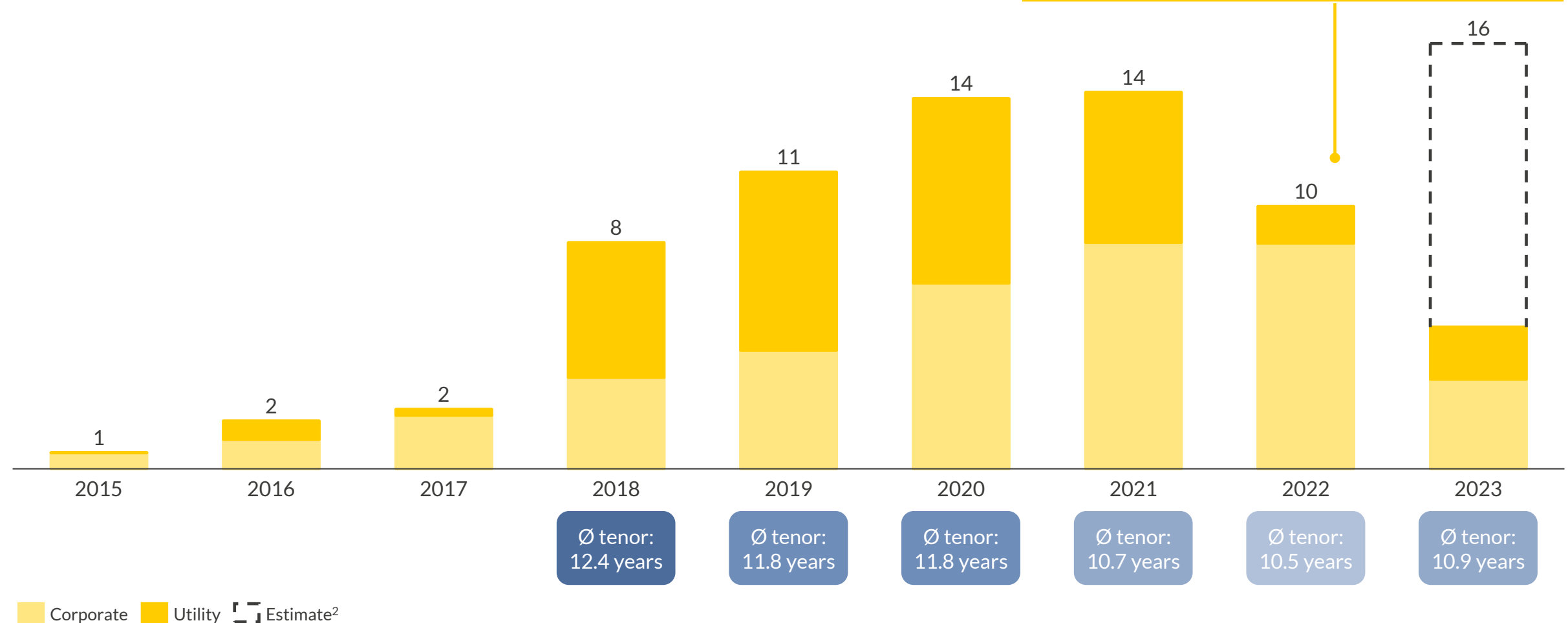


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BACKGROUND**

# After a slowdown in 2022, we expect PPA transaction volumes to reach new a new high in 2023



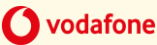

PPA transaction volumes by announcement year in Europe<sup>1</sup>  
GW



1) Includes EU-27 countries, UK, Norway and Switzerland. Undisclosed data points were calculated based on internal assumptions in line with Aurora's central scenarios from April 2023. 2) Estimate based on extrapolation from Q1 2023.

# The German PPA market is expected to grow in 2023 with big offshore deals showing the way



I

RWE’s Nordsee Ost and Amrumbank West offshore wind farms will supply **eleven German industrial customers** and one large municipal utility with green electricity.

II

Iberdrola and Amazon announced a **co-operation on new wind and solar power** in Europe, the US and APAC. As a start, they announced a PPA from two large German offshore wind farms.

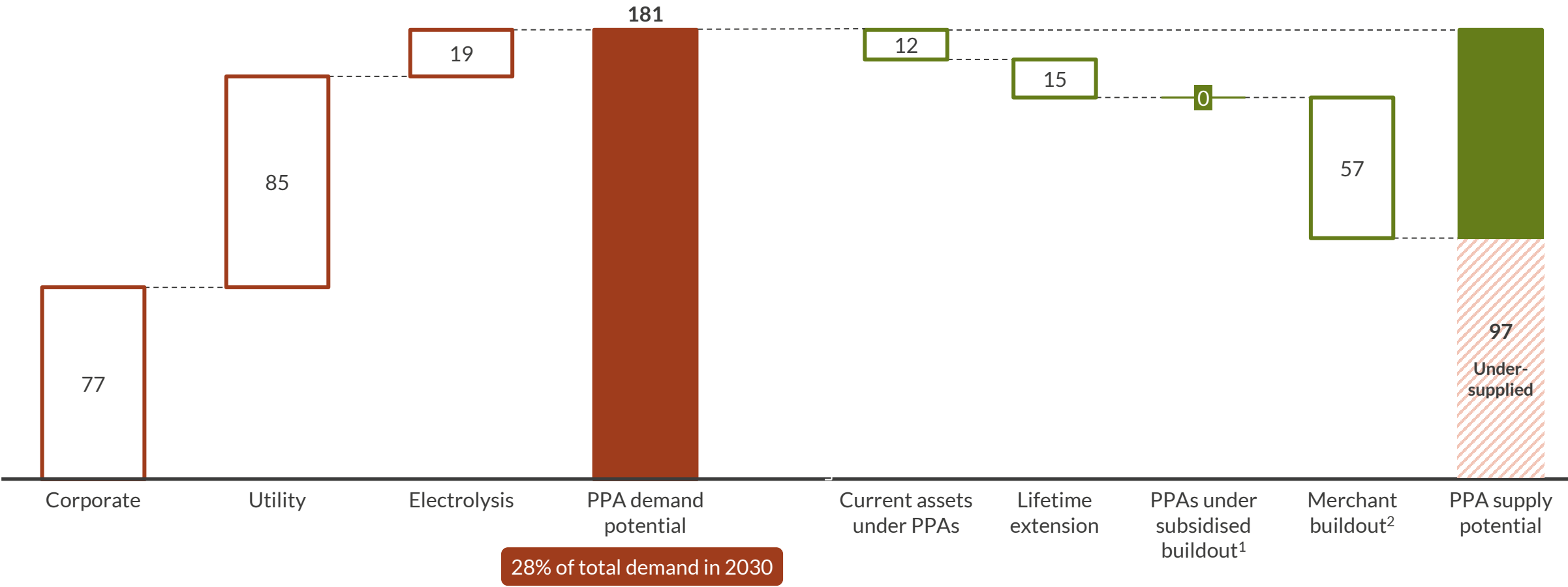



Details	I	II
Start Year	2025 and 2026	2024 and 2026
Tenor	10 Years	N/A
Capacity	597 MW <sup>1</sup>	776 MW <sup>2</sup>
Developer	RWE	Iberdrola
Offtaker(s)	Vodafone, Freudenberg, Schott and others <sup>3</sup>	Amazon
Offtaker Industry	Telecomms, Utility, Glass, Chemicals, Steel, Services, Automotive,	Technology

1) Nordsee Ost (295 MW) and Amrumbank West (302 MW). 2) Baltic Eagle (476 MW) and Windanker (300 MW). 3) Badische Stahlwerke, Infracore Höchst, Mainova, Messer, Schott, Telefónica, Verallia, Wacker and ZF.

# We expect the German PPA market to be undersupplied in 2030 due to strong demand from corporate and utility offtakers

German PPA demand potential (2030)  
TWh



1) Assets built under the EEG with subsidy support (bids > 0 cents) cannot sign a PPA unless they forego subsidy support. 2) We classify projects that are auctioned off at 0-cent bids under the EEG as merchant projects.

# However, imminent regulatory developments at European and German level may yet alter the trajectory of the local PPA market

## Lowering obstacles to PPA market entry



Member States should design policies to address PPA offtaker default risk, including a guarantee scheme for companies that face market entry barriers to the PPA market

Effect



## Reserve generation for public auctions



Renewable developers should be allowed to reserve a share of the generation for sale through a PPA in a public auction scheme, and PPAs should be encouraged via tender criteria

Effect



## Promoting PPAs as hedging instruments



National regulators shall impose requirements on utilities in relation to their hedging strategies, where PPAs could or potentially should be used as part of the hedging strategy

Effect



## Industrial offtakers



The German Ministry for Economic and Climate Affairs has proposed to supply energy-intensive industries at EUR 60/MWh for 80 per cent of their consumption until 2030

Effect

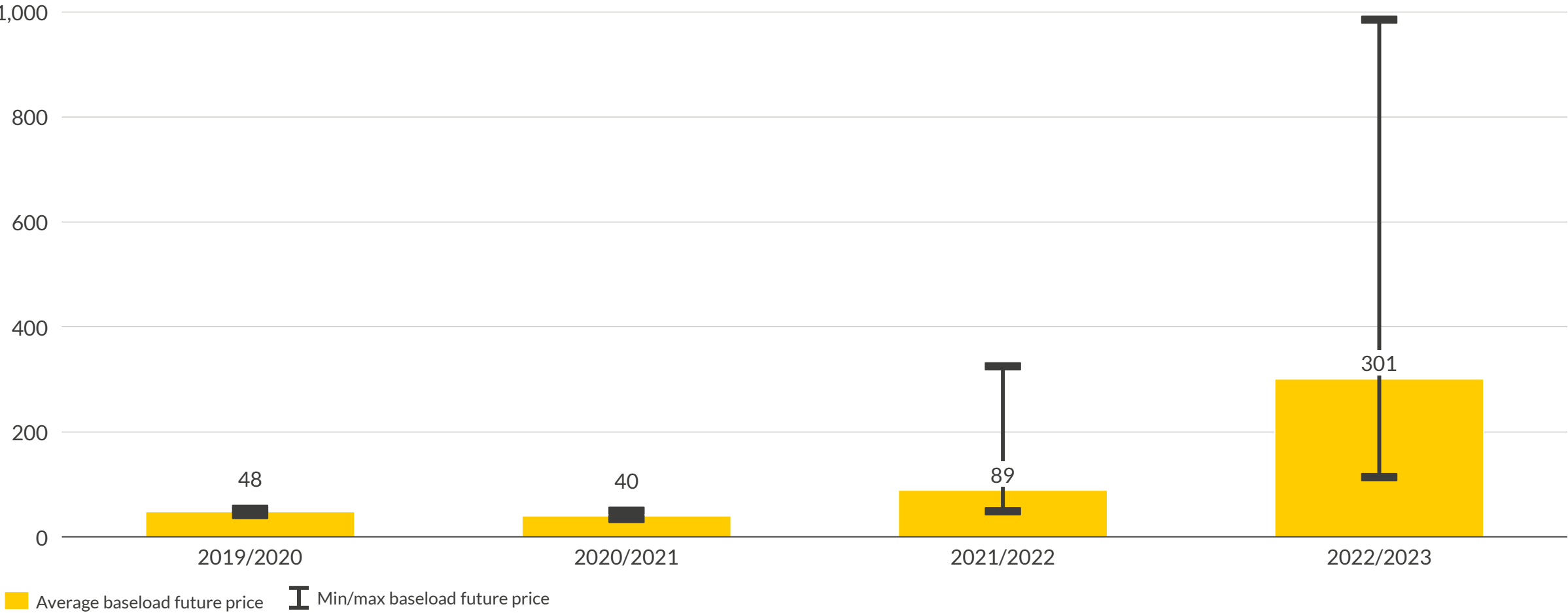


The ministry discusses measures to facilitate the closing of PPAs by industrial offtakers, including a reduction in risk premiums, exemption of lenders from liability and better access to PPAs for medium-sized enterprises



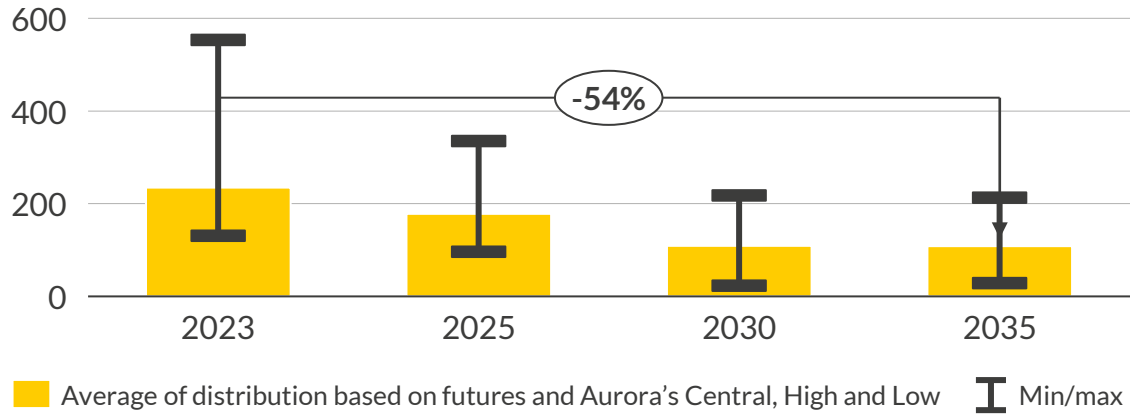
# Extreme volatility in futures prices in 2022 made closing PPAs with utilities very difficult last year

Front year German baseload futures prices (trading year/delivery year)  
€/MWh

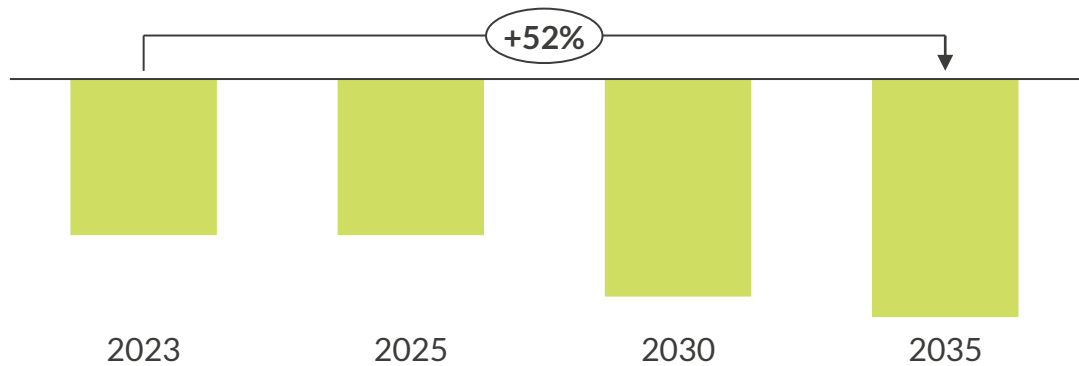


# Besides futures, fundamentals on baseload and capture price discount are key value drivers for PPAs

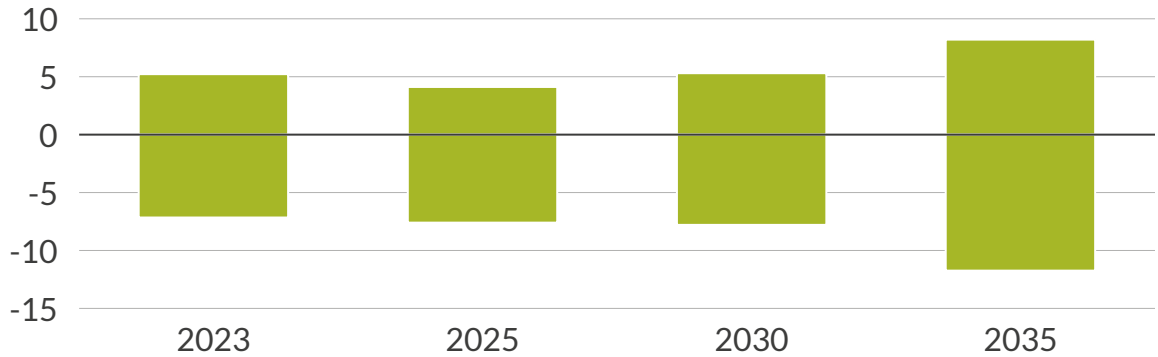
German baseload futures price development<sup>1</sup>  
€/MWh (real 2022)



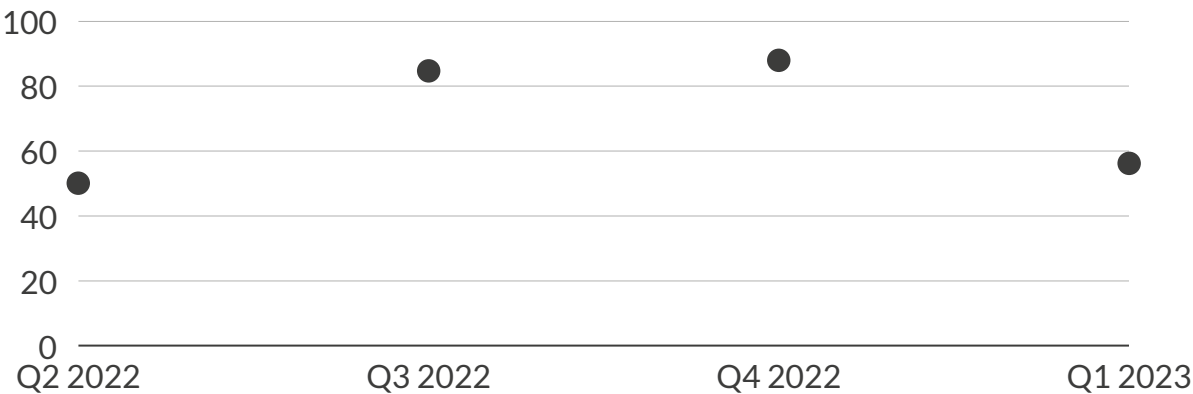
German solar capture price discount to baseload  
€/MWh (real 2022)



German solar capture price variance due to volume risk  
%



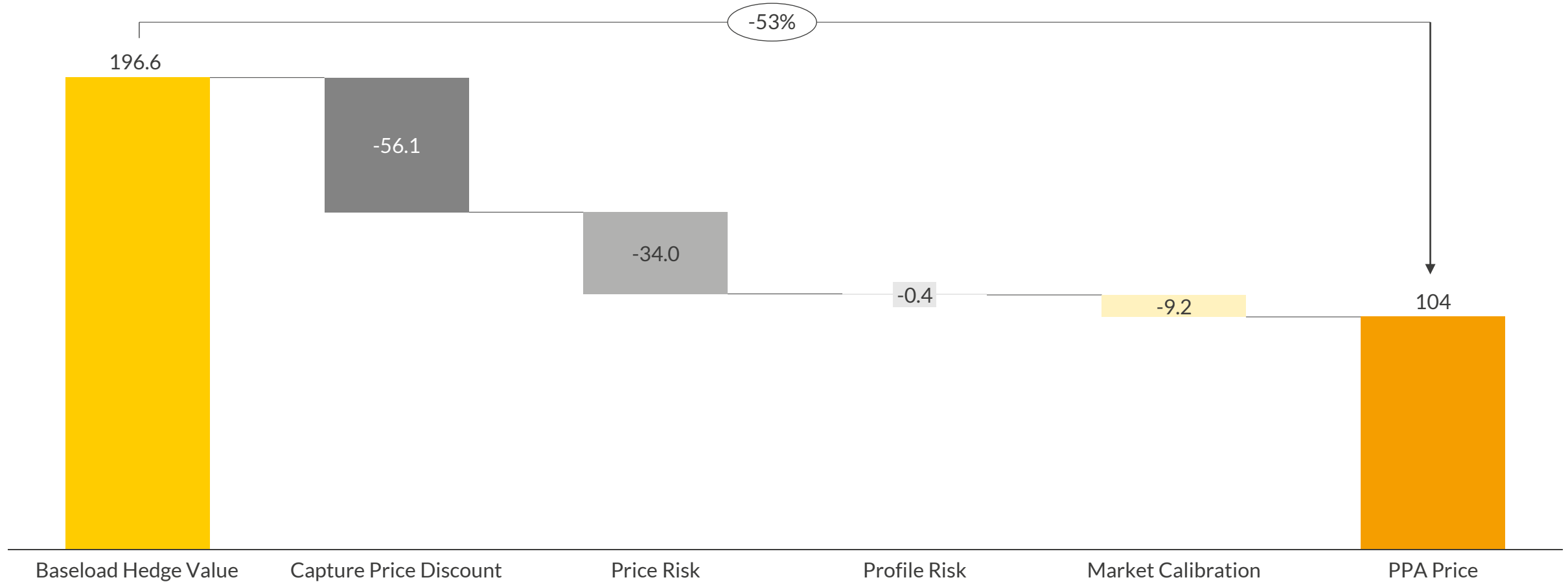
German market calibration for solar PPAs  
Inferred offtaker risk tolerance (Pr(x))



1) Trading day 28 December 2022 for 1 January 2023 COD.

# A German solar pay as produced PPA commencing in 2023 is priced at a 53% discount from the baseload hedge value

German 10 year solar pay-as-produced PPA commencing January 1 2023<sup>1</sup>  
€/MWh (nominal)

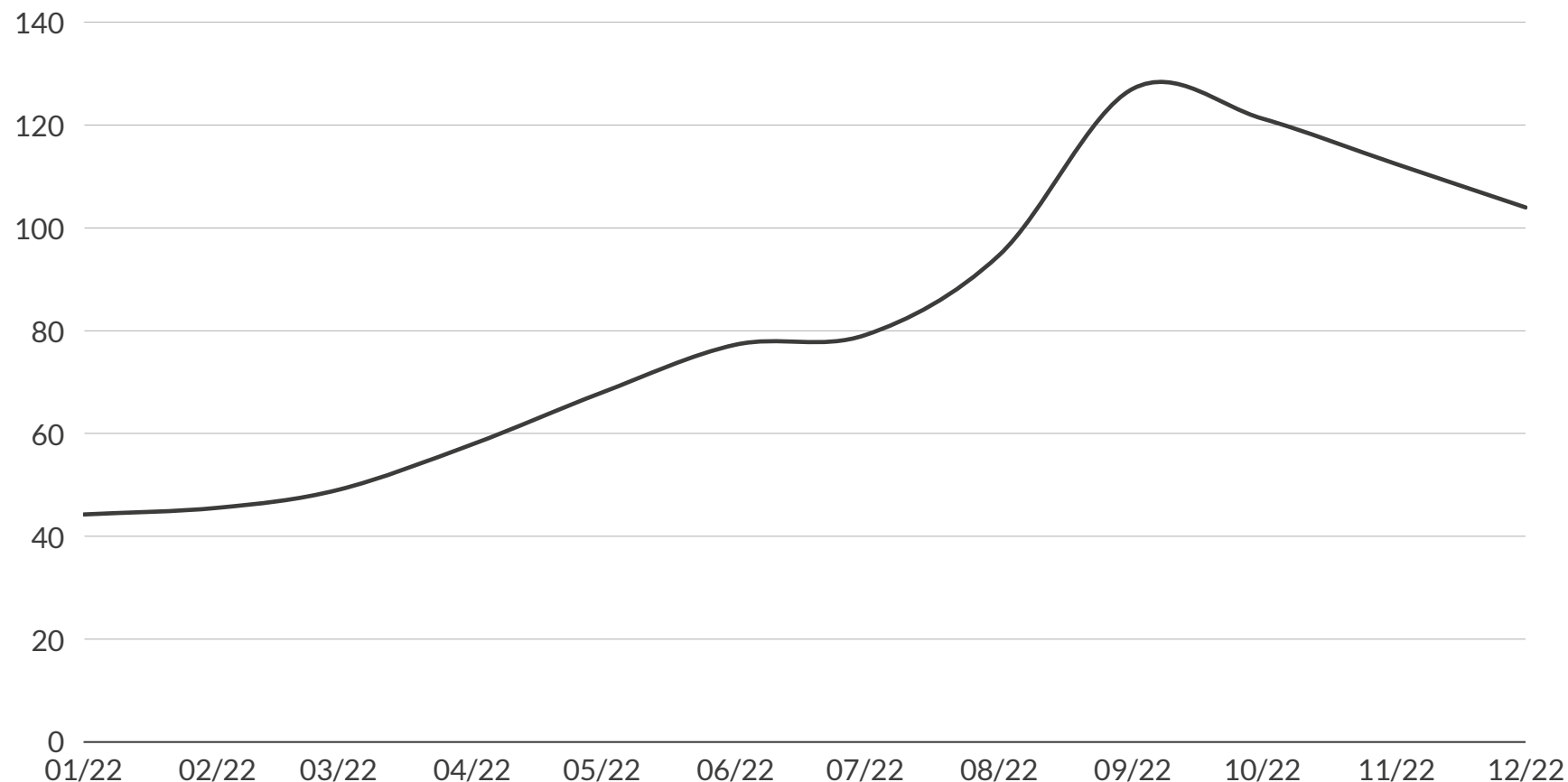


1) Trading day as of 28 December 2022.



# Using Aurora's valuation approach in 2022 reduced the volatility in the price of a German PPA by a factor of 10 compared with futures

German 10-year solar pay-as-produced PPA commencing 1 January 2023<sup>1</sup>  
€/MWh (nominal)

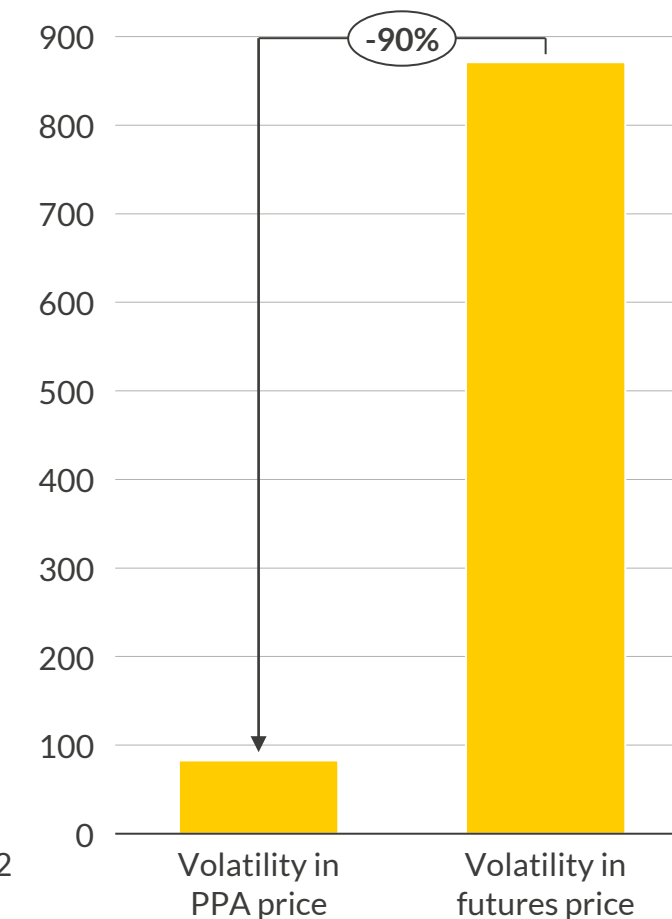


— Historical Aurora PPA valuations

1) For trading days on 1<sup>st</sup> of each calendar month in 2022.

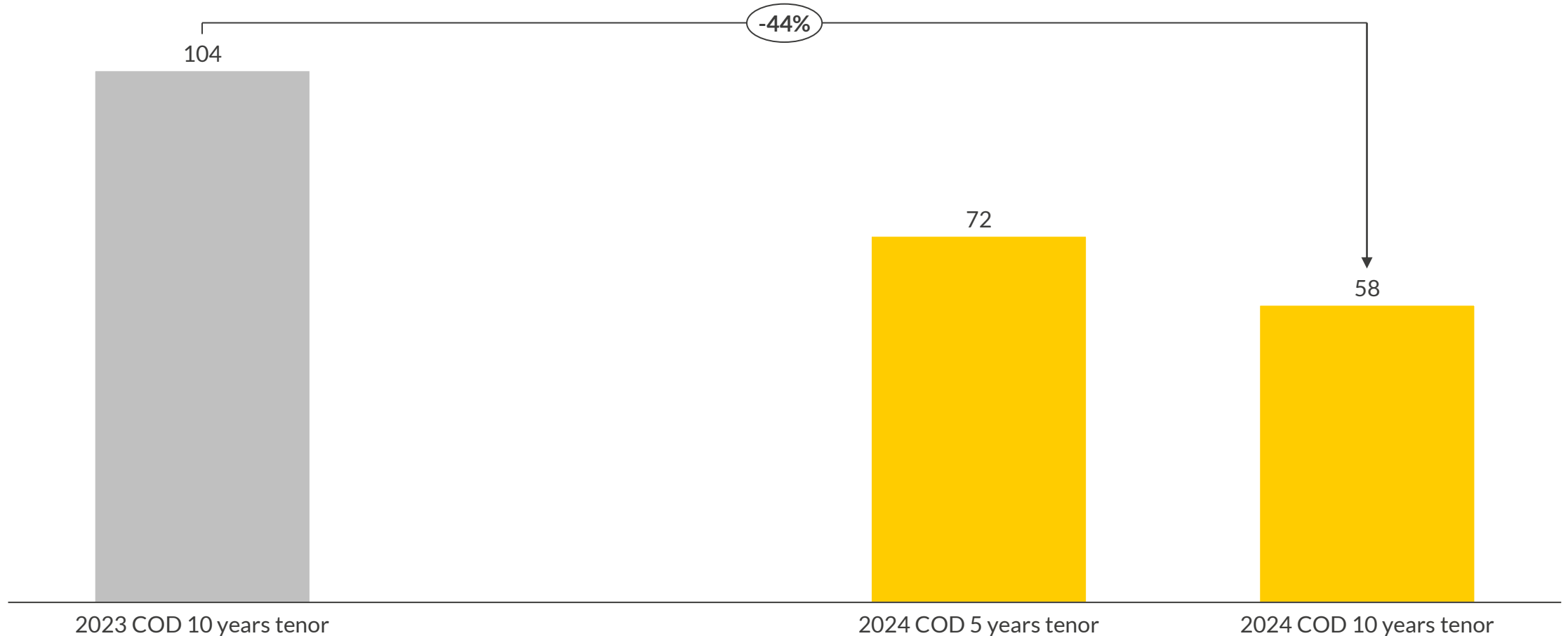
Price volatility during 2022

€/MWh variance between max and min prices



# The price of a German solar pay-as-produced PPA has almost halved since the beginning of the year

German solar pay-as-produced PPA<sup>1</sup>  
€/MWh (nominal)



1) Trading day 28 December 2022 and 28 April 2023 respectively.

# AURORA PPA VALUATION

## Transparent and fundamentals-based PPA pricing methodology

**AURORA'S PPA VALUATION** approach offers a reliable and market-tested way to benchmark PPA prices

**Reliable:** Combining short term futures market developments with Aurora's market standard on long term PPA price forecasts

**Timely:** Continuous calibration of PPA prices with client-sourced market price benchmarks

**Precise:** Location and technology specific

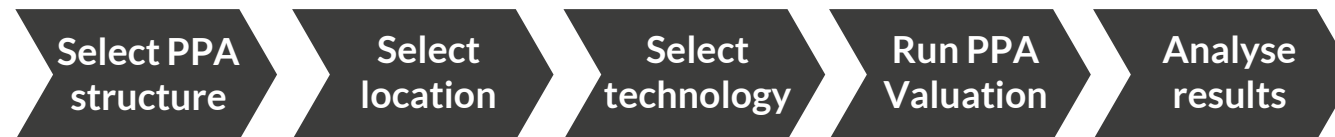
**Clear:** Transparency on price components and risk factors

**Detailed:** Hourly generation profile, price forecasts and weather scenarios as well as different market scenarios (e.g. Aurora Low, High and Central)



Where is our PPA valuation applied?

Five step process



PPA  
Transactions



Strategy



Risk analysis

AURORA



ENERGY RESEARCH