

# PPAs – What industrial offtakers need to know

4 November 2021



I. Intro to Aurora

II. EU PPA Demand and Supply

III. PPA pricing

# Aurora provides data-driven intelligence for the global energy transformation

Power markets



Renewables



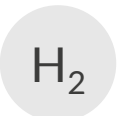
Storage



Electric vehicles



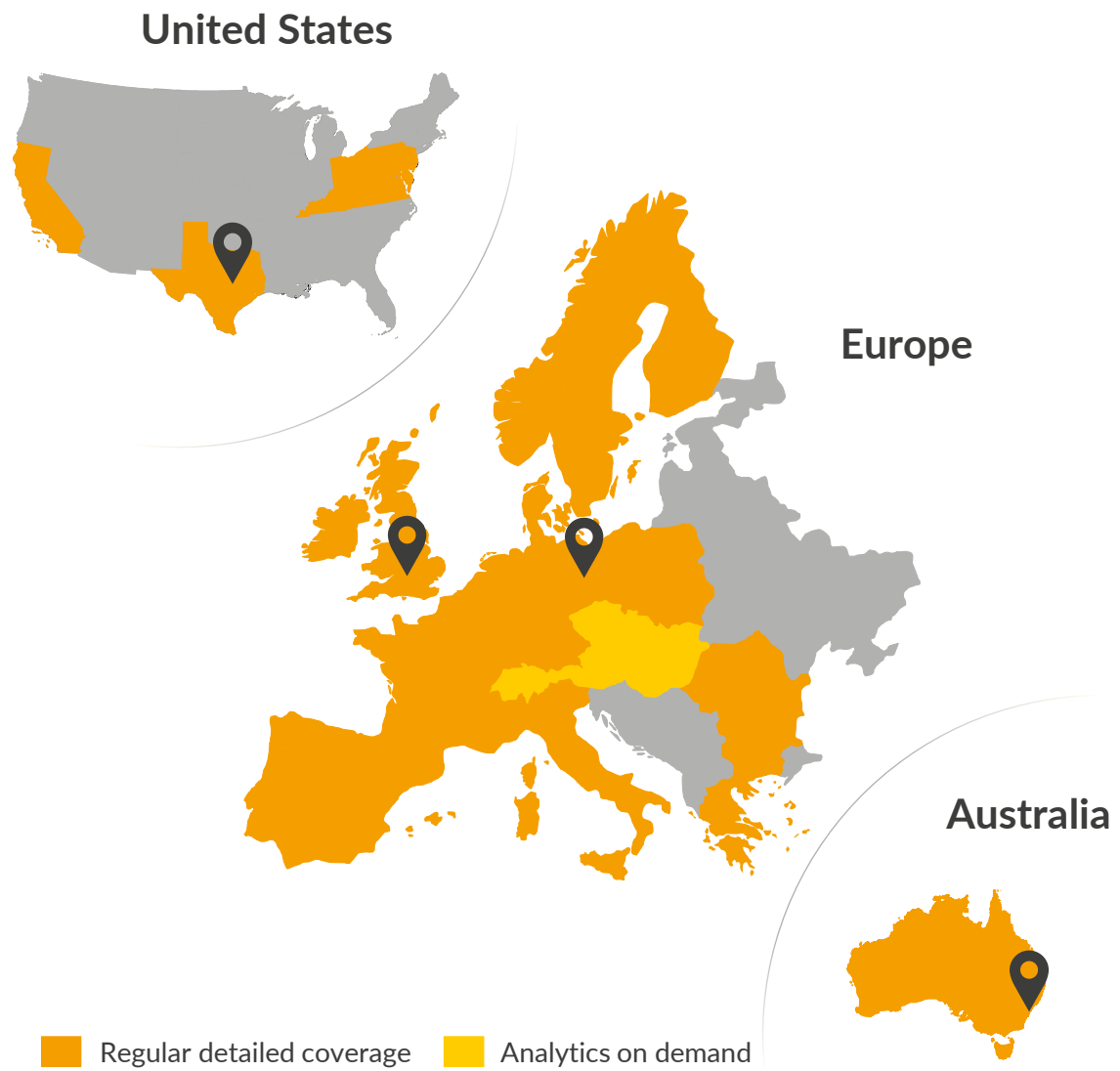
Hydrogen



Carbon



Natural gas



**4 Offices**

Oxford | Berlin | Sydney | Austin



**180+**

market experts



**350+**

subscribing companies



**100+**

transactions supported in 2020

# Aurora brings a sophisticated approach to the provision of analysis and insight to the energy industry

## Research & Publications

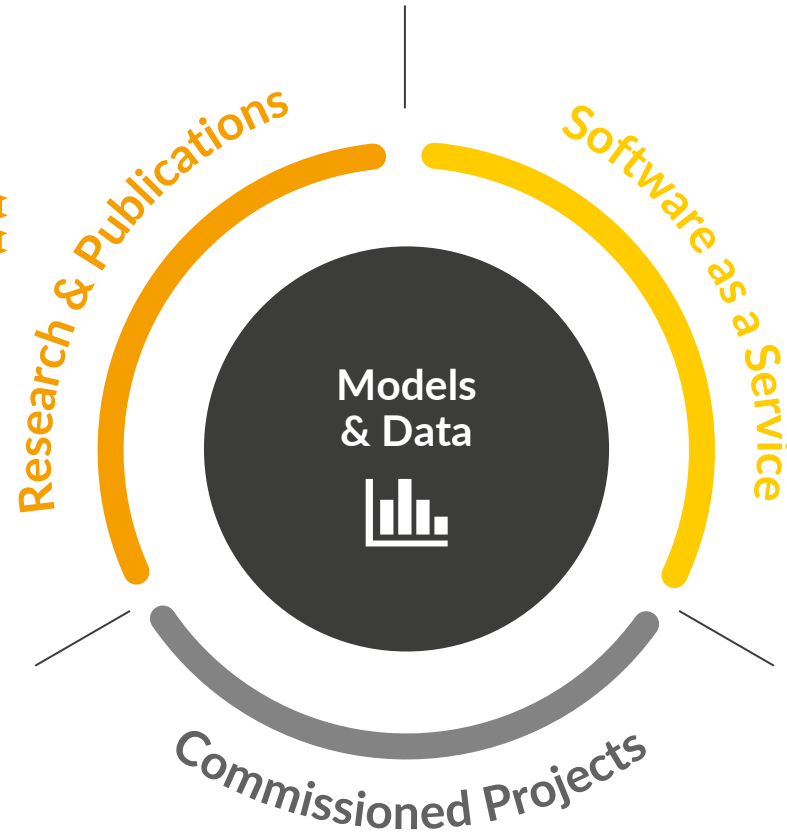
- Industry-standard market outlook reports and price forecasts for power, gas, carbon and hydrogen markets
- Strategic insights into major policy questions and new business models
- Read and constantly challenged by 350+ subscribers from all industry sectors



- Bespoke analysis, drawing upon our models and data
- Trusted advice for all major market participants proven in 400+ projects: transaction support, valuations, strategy & policy engagement



## Commissioned Projects



## Software as a Service

- Cloud-based tools for quick, accurate, asset- and site-specific valuations using Aurora's trusted forecasts
- First-of-a-kind wind valuation tool launched in 2019 and already widely adopted in GB, Germany, Ireland, France, Iberia, Poland and Australia



## Models & Data



- Market-leading long-term models for power, gas, hydrogen carbon, oil and coal markets
- Continuous model improvements through client feedback

# The approach has succeeded – we are working with the industry’s biggest players

“Aurora Energy Research is, I think, one of the smartest energy modelling companies around, and helped us on this Energy Outlook and continue to help us”

Spencer Dale, Chief Economist, BP



“Aurora’s ability to forecast all the revenue streams relevant to UKPR’s business model in a joined-up way sets them apart from their peers and has been very helpful to us in investment and business planning”

Tim Emrich, CEO, UKPR



## Power & utilities



## Oil & gas



## Energy consumers



## Project developers



## Financial sector & investors



## Policy & regulation



# Agenda

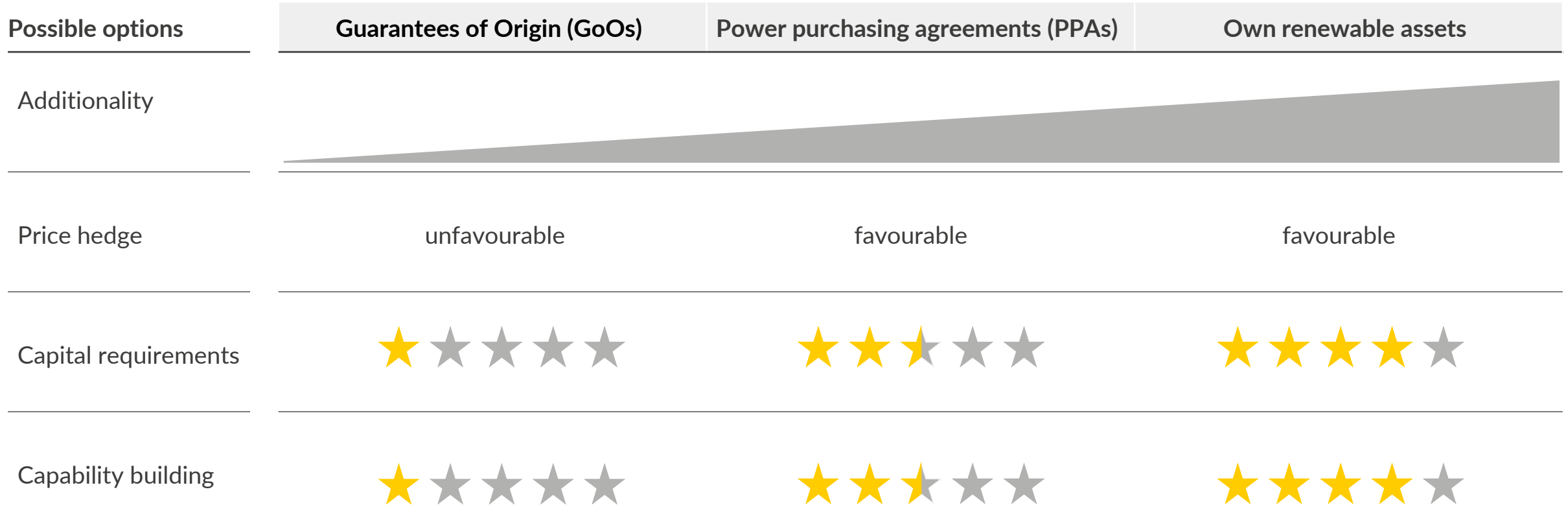
---

I. Intro to Aurora

II. EU PPA Demand and Supply

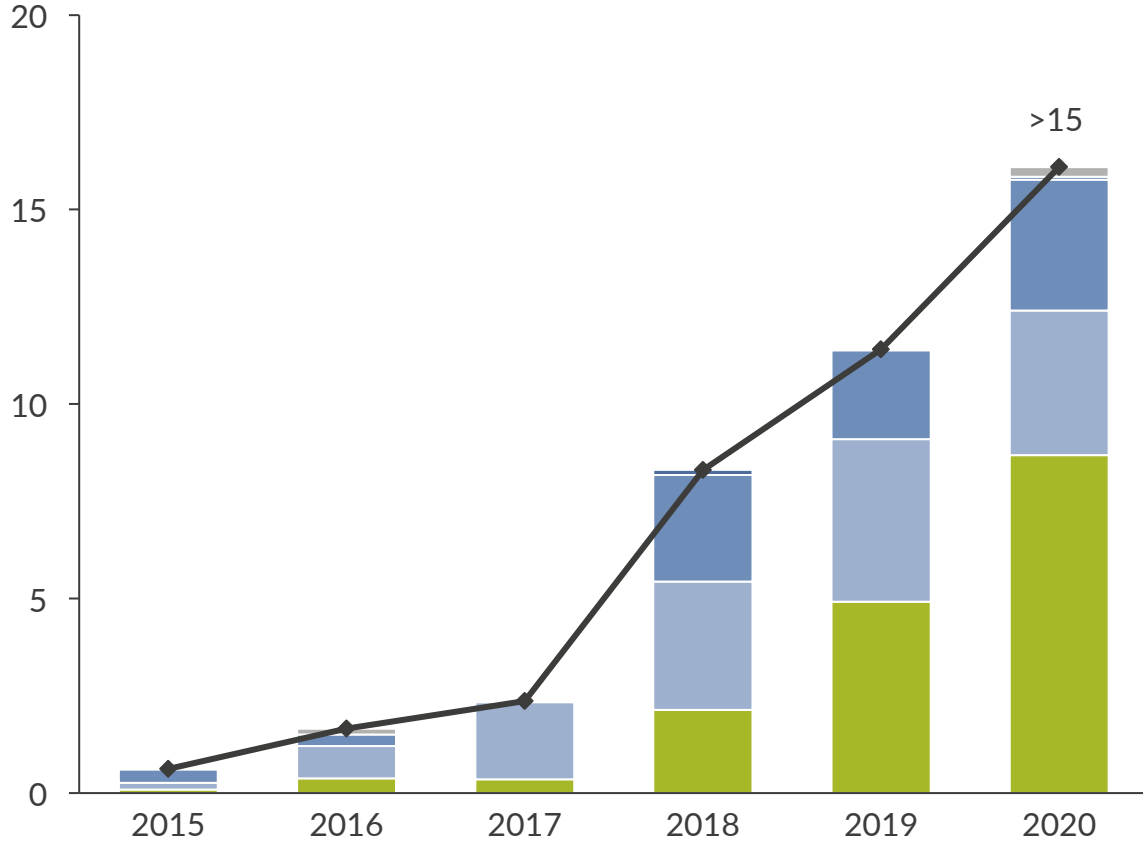
III. PPA pricing

# PPAs are a good instrument to help corporates decarbonize their scope 2 emissions

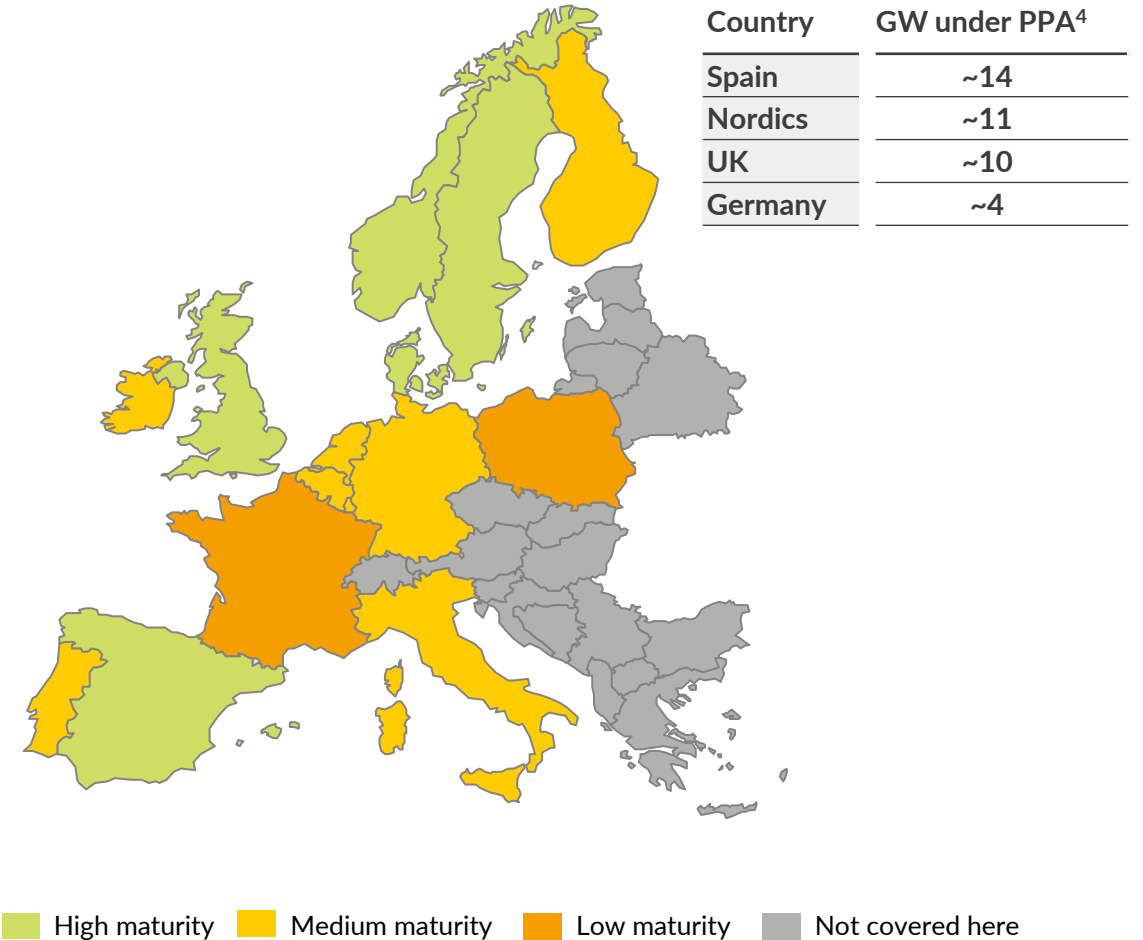


# Number of PPAs closed rises strongly and continuously with record capacities signed in 2020 – market maturity differs strongly between markets

Annual capacity announcements<sup>1</sup>  
GW



European PPA markets<sup>3</sup> – Overview of activity



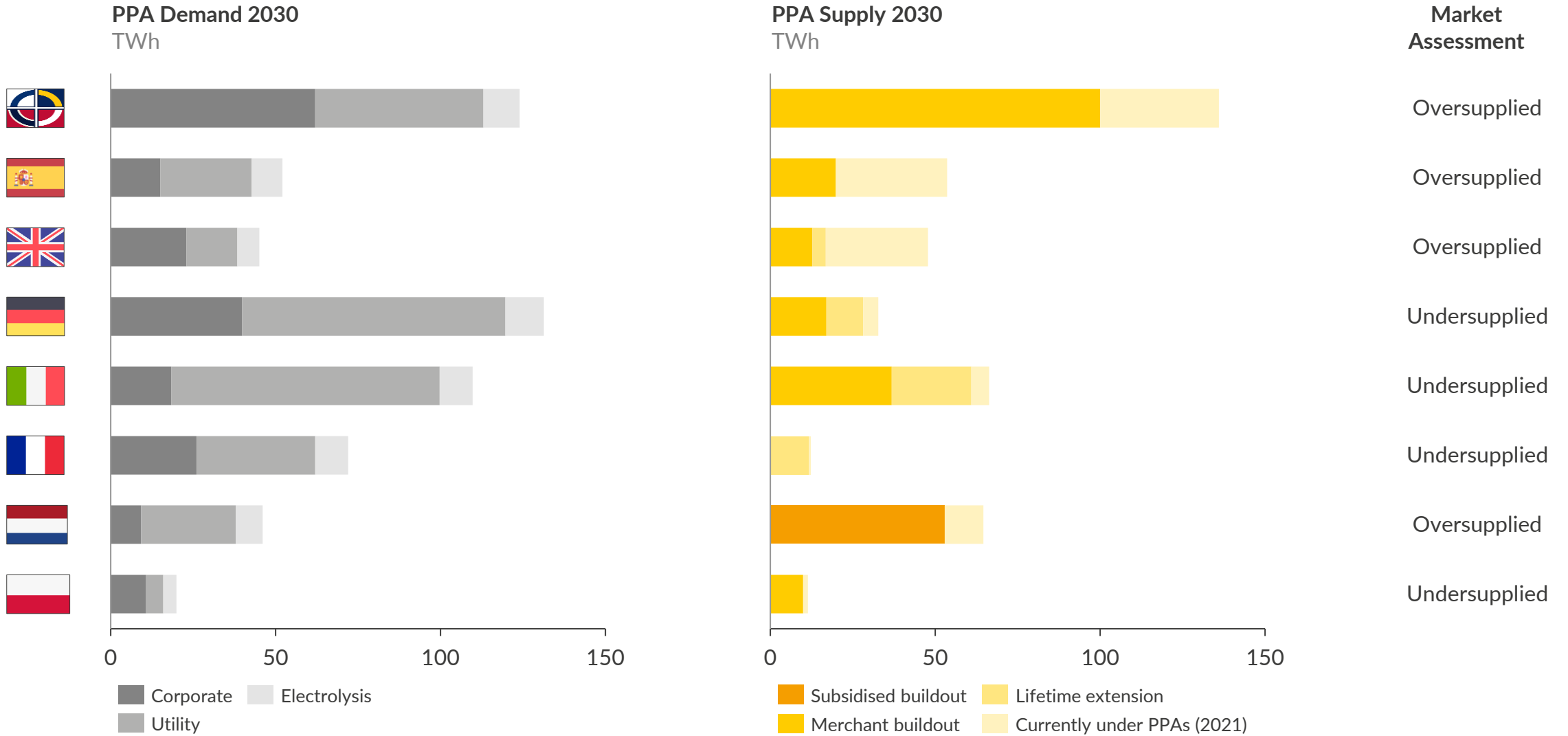
■ Solar 
 ■ Onshore Wind 
 ■ Offshore Wind 
 ■ Hydro 
 ■ Other<sup>2</sup>
◆ Total

■ High maturity 
 ■ Medium maturity 
 ■ Low maturity 
 ■ Not covered here

1) Not cumulative; based on Aurora's PPA database for countries covered for this webinar (see map on the right); 2) Includes mostly PPAs from mixed RES, e.g. onshore wind + solar, and biomass; 3) Focus markets for this webinar; 4) As of 2021; selection of countries with highest capacities



# By 2030 we expect slight oversupply in the Nordics, Spain and the UK, strong oversupply in the Netherlands – other markets undersupplied

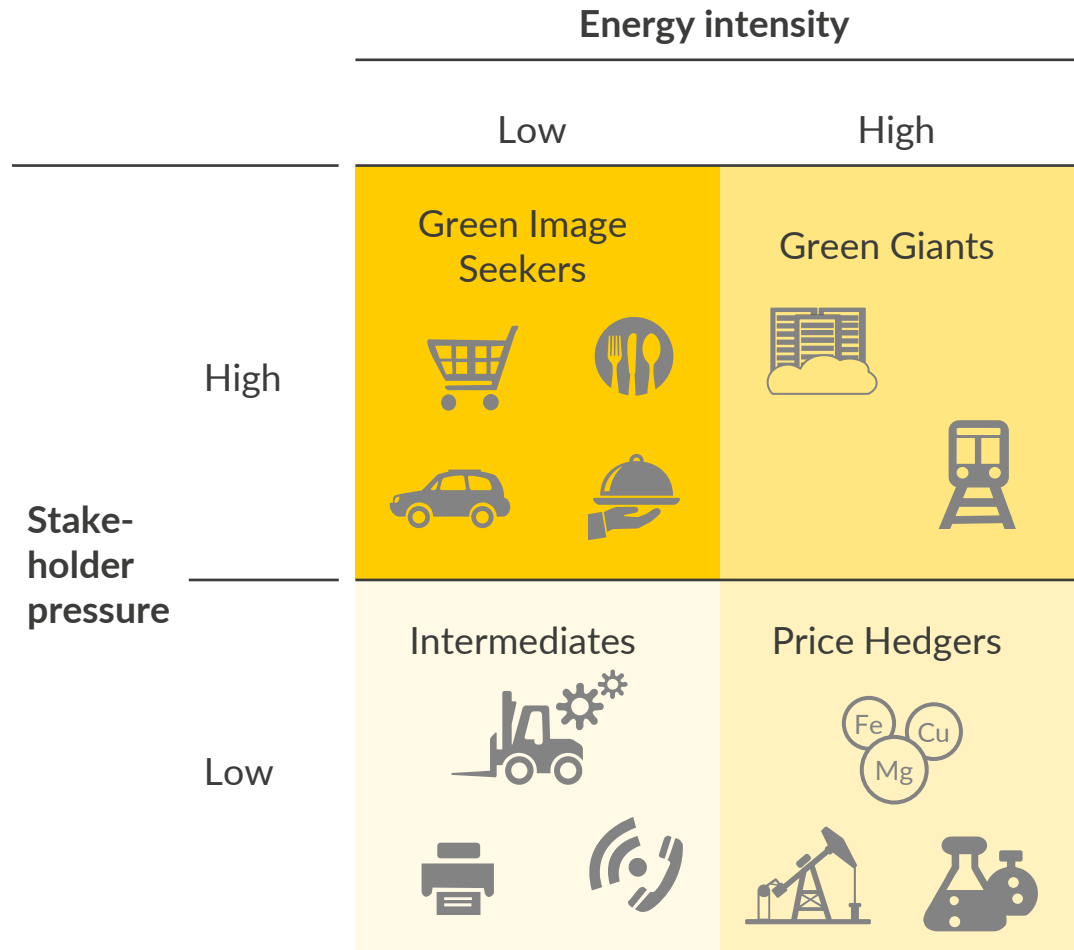


Note: Nordics comprising Sweden, Norway, Finland, Denmark

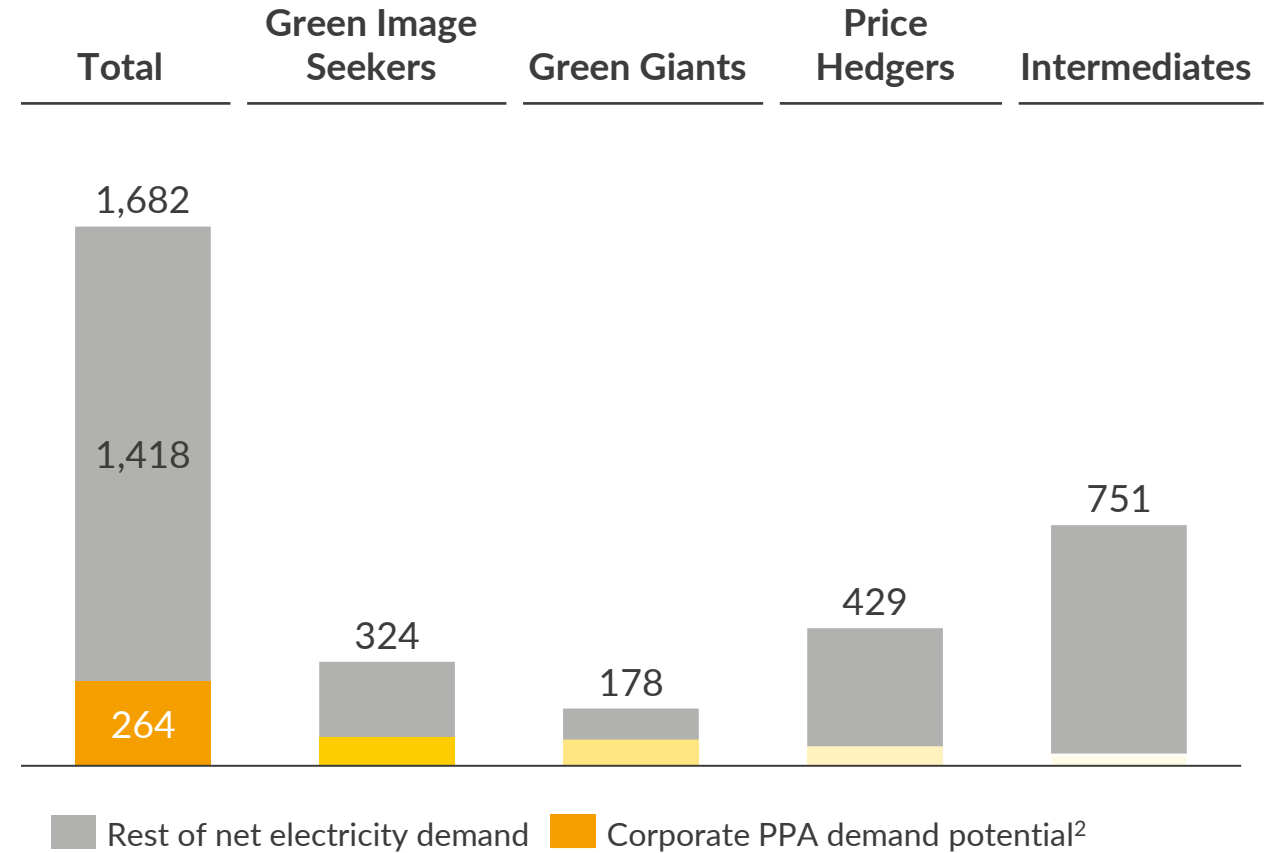


# Stakeholder pressure and price incentive drive industrial decarbonization - more than 15% of corporate demand could be for PPAs by 2030

## Corporate PPA demand segmentation



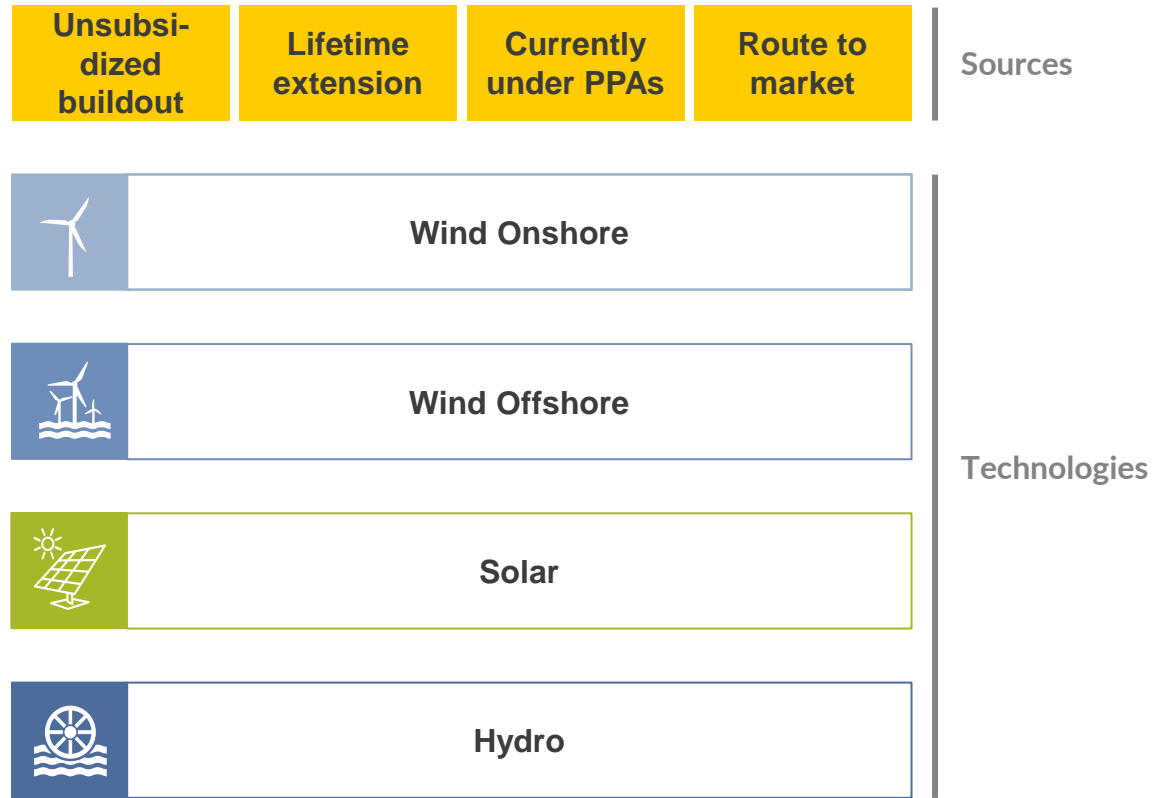
## Net industry electricity demand (2030 estimate)<sup>1</sup> TWh



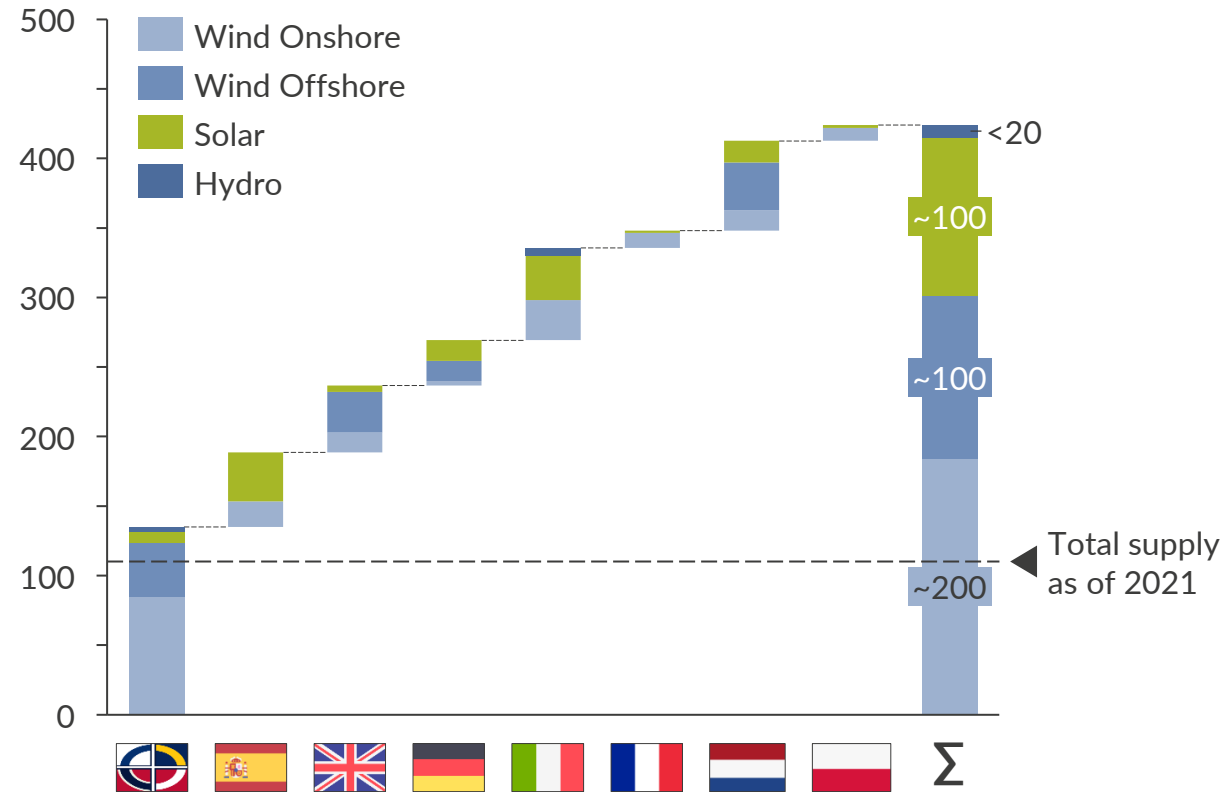
1) Countries in scope: Nordics, Spain, UK, Germany, Italy, France, Netherlands, Poland; 2) Additional demand will arise from utilities and hydrogen electrolysis

# PPA supply potential considers the sources of assets as well as different technologies – increase >4x expected until the end of the decade

## PPA Supply Potential – Sources and technologies



PPA Supply Potential 2030  
TWh



# Agenda

---

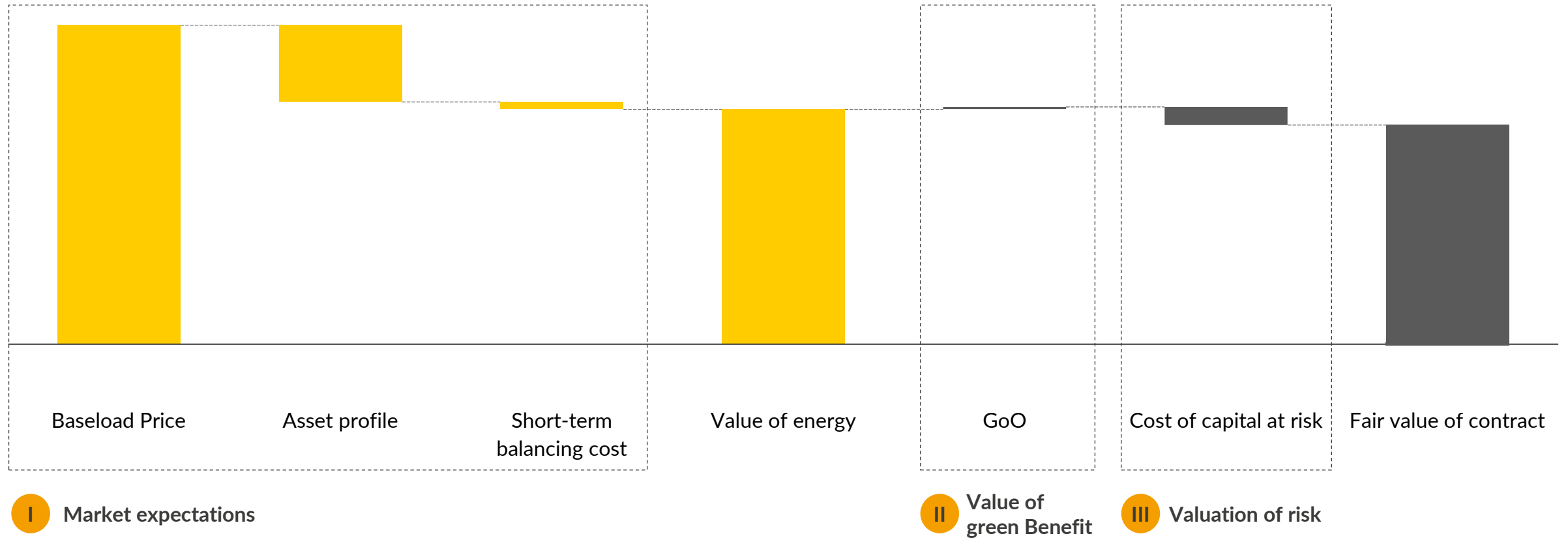
I. Intro to Aurora

II. EU PPA Demand and Supply

III. PPA pricing

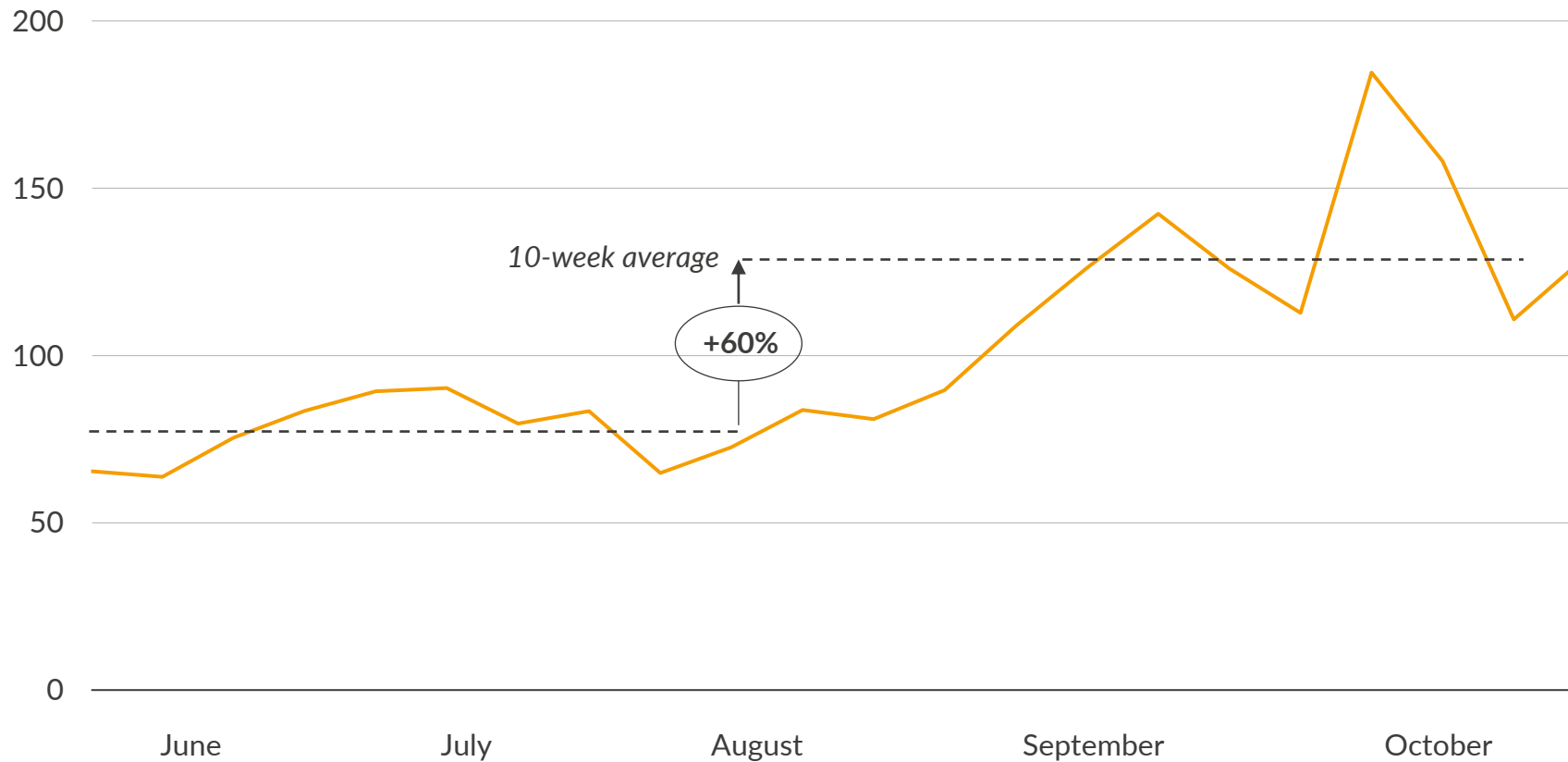
# The fair market value of a PPA long is driven by power prices, asset profile discount, value of green benefits and cost of risk transfer

Fair price calculation – approach overview  
€/MWh



## However, spot power prices are very volatile – baseload power price in Germany peaking in fall, reaching >180 EUR/MWh

Baseload prices Germany Summer/Fall 2021 - Weekly resolution<sup>1</sup>  
EUR/MWh (real 2020)



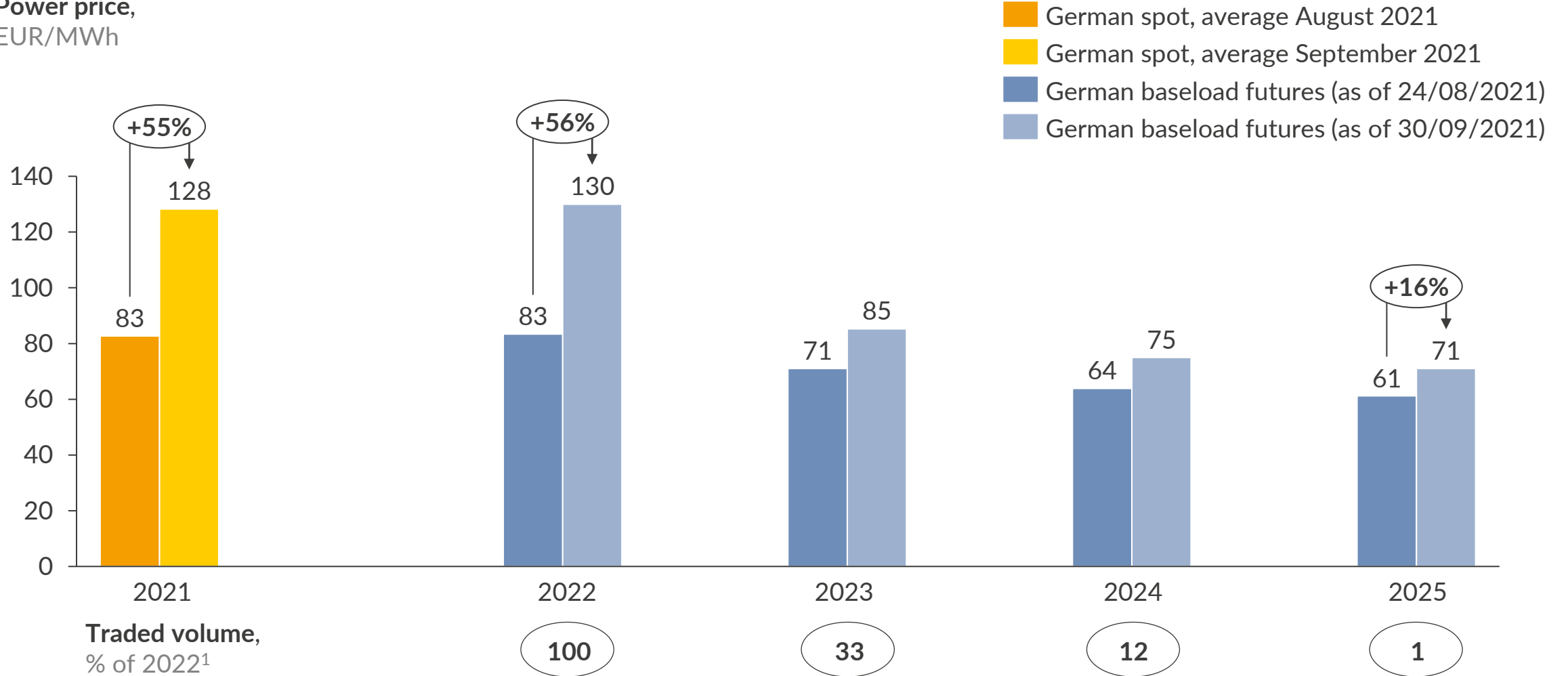
### Comments

- Following the price spike throughout Europe, wholesale power prices in Germany started to rise strongly starting August 2021
- They reached values > 180 EUR/MWh early October, representing an increase by 3x compared to early June
- Daily peaks even reached values of ~300 EUR/MWh (Oct 7), after a brief drop to ~40 EUR/MWh just few days before, emphasizing volatility at spot markets

1) June 1 – Oct 31

# **Long-term forecast quality of Futures is limited as they correlate strongly with volatile spot prices and suffer from low liquidity beyond 3 years** A U R R A

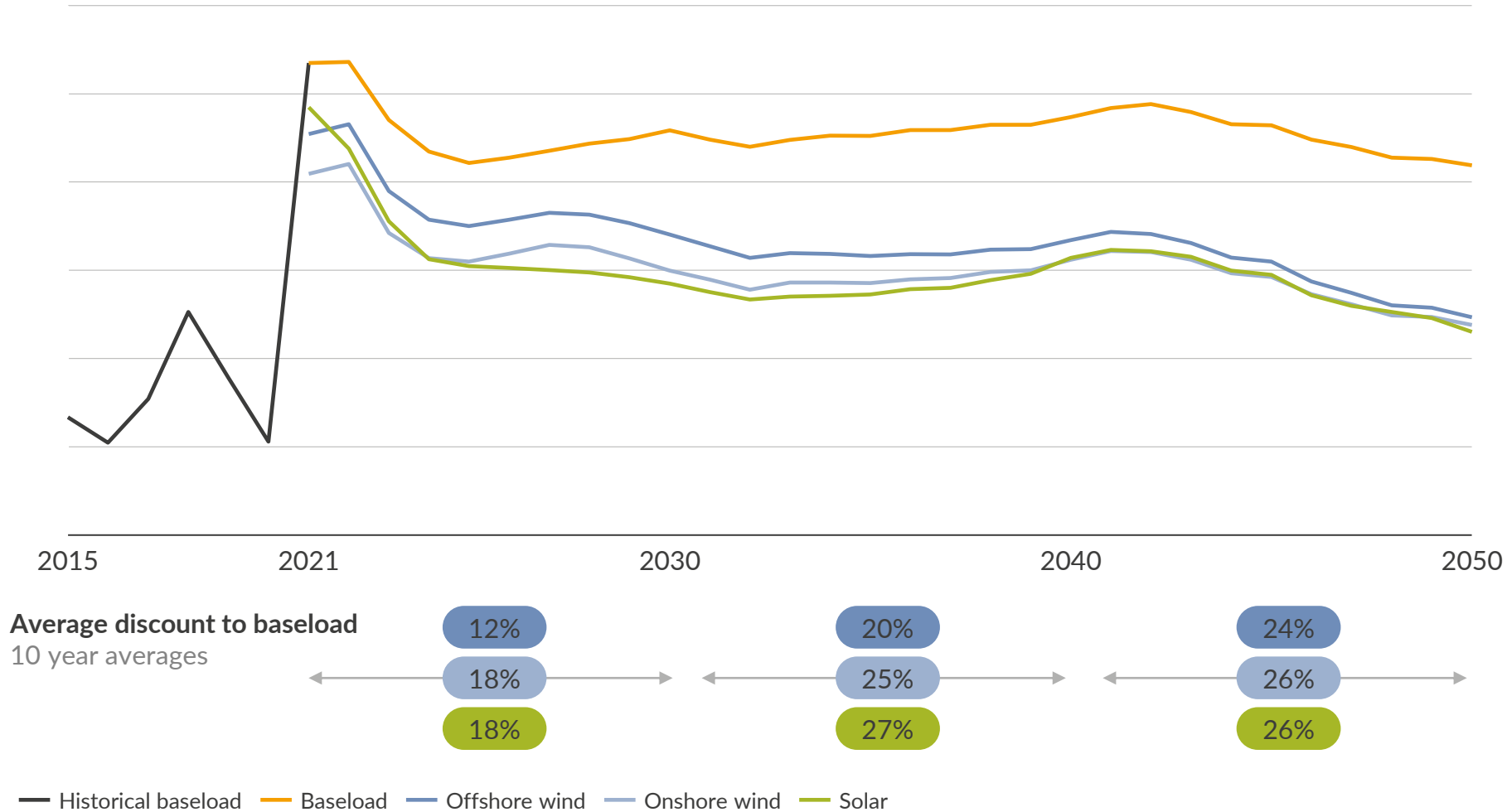
Power price,  
EUR/MWh



<sup>1</sup> As of 30 September 2021, trade volume for 2022 yearly baseload future was 5.3 TWh

# Valuation of long term PPA's should incorporate fundamentals, e.g. we see capture prices discounts being highest for solar

Baseload and renewables capture prices<sup>1</sup>  
EUR/MWh (real 2020)



1) Capture prices are uncurtailed generation-weighted average across all regions.

## Outlook for renewables

### Offshore wind

- Offshore wind capture prices show lowest average discount to baseload prices due to the more homogenous production profile and later buildout

### Onshore wind

- The discount of onshore wind capture prices to baseload prices is more stable than the other RES technologies as buildout potentials are exhausted earlier

### Solar

- Solar capture prices show the largest discount to baseload prices after 2024 as increasing capacities amplify price cannibalisation – particularly in the 2040s when merchant risk buildout intensifies



# Agenda

---

- I. Intro to Aurora
- II. EU PPA Demand and Supply
- III. Power market dynamics
- IV. Teaser PPA Multi-Client-Study

# We are launching Multi-Client-Study for corporate PPA offtakers starting mid November 2021

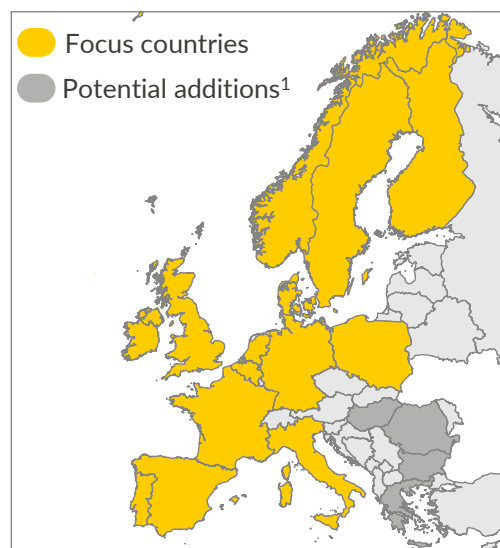
## Logistics

- Duration: 3-months (Mid November 2021 to mid February 2022)
- Includes 3 workshops, interactive format, 15-20 participants

## Summary

- After a first successful Multi-client-study (MCS) on PPAs in 2019, Aurora is launching a second Multi-Client-Study
- Focus of this year's MCS will be on requirements and challenges for PPA offtakers (especially corporates)
- The ambition of the MCS is to provide a full-blown comparative report on PPA trends, potentials and prices in all main European markets based on Aurora fundamental market forecasts as well as providing case-studies on the practical implementation of PPAs in the green power procurement of companies

## Focus countries and techs



## PPA MCS content

### 1 PPA market overview

#### Country-by-country analysis

- Power price forecasts, renewable energy sources (RES) build-out
- RES capture prices (technology specific)
- Overview of current PPA markets (volumes, PPA structures)
- RES subsidy schemes and their impact on merchant build-out
- PPA supply/demand potentials 2030 incl. cross-border PPA potentials
- Country specific LCOEs (Onshore wind, Offshore Wind, Solar)
- Balancing costs
- GoO price forecasts
- Offtaker WACCs
- Fair value assessments (“as produced”, “fixed price”)
- Charges, taxes and levies on power prices (e.g. surcharge exemptions)

### 2 PPA contracts and transactions

#### Case study approach

- Update and discussion on common PPA price & volume structures in Europe
- Extension of Aurora PPA fair value assessment to incorporate innovative pricing structures (baseload, indexation, collar, tranching)
- Deep-dive on cross-border PPA pricing based on exemplary 2-country-analysis (NLD – GER)
- Case study on integration of power procurement via PPA in existing power procurement (based on exemplary industrial demand profile)
- PPA termsheet template incl. main primary and secondary clauses
- Excursus on trends around PPA standardisation and tradability
- PPA accounting considerations for offtakers

Note: LCOE = Levelized Cost of Electricity; GoO = Guarantees of Origin; 1) Depending on participant preferences

# Contact

---



**Thekla von Bülow**  
Principal, Commissioned Projects  
Head of PPAs  
E: [thekla.buelow@auroraer.com](mailto:thekla.buelow@auroraer.com)  
T: +49 (0)1708053016



**Manuel Köhler**  
Managing Director Germany  
E: [manuel.koehler@auroraer.com](mailto:manuel.koehler@auroraer.com)  
T: +49 (0) 1579 2351967

AURORA



ENERGY RESEARCH