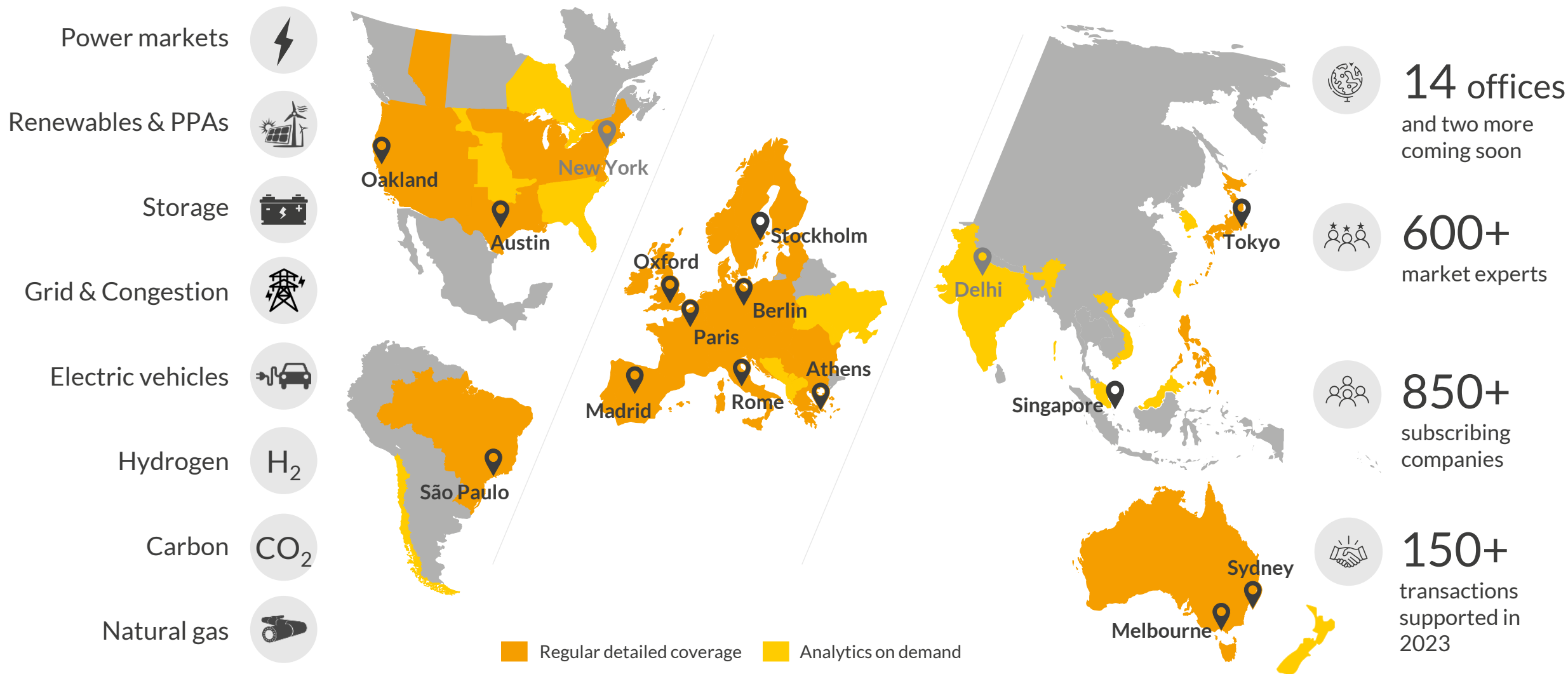


# Price sensitivity of the German GHG quota

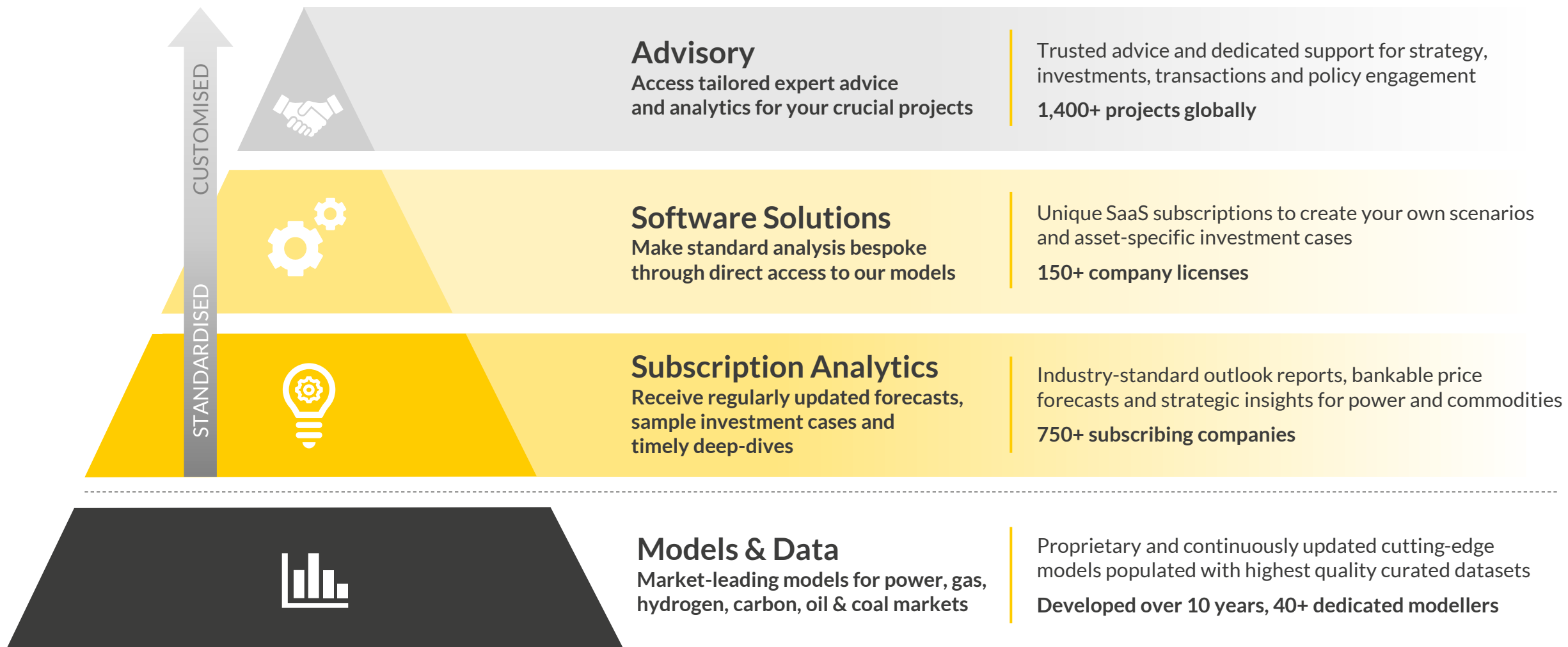
Prepared by Aurora Energy Research for Strommarkttreffen  
18 October 2024



# Aurora provides market leading forecasts & data-driven intelligence for the global energy transition



# Our market leading models underpin a comprehensive range of seamlessly integrated services to best suit your needs



# GHG quota in a nutshell: Cap-and-trade system to decarbonize the German transport sector

Goal of the German GHG quota market: Reduce carbon emissions in the transport sector by issuing tradable GHG reduction certificates for alternative fuels.

## GHG quota demand

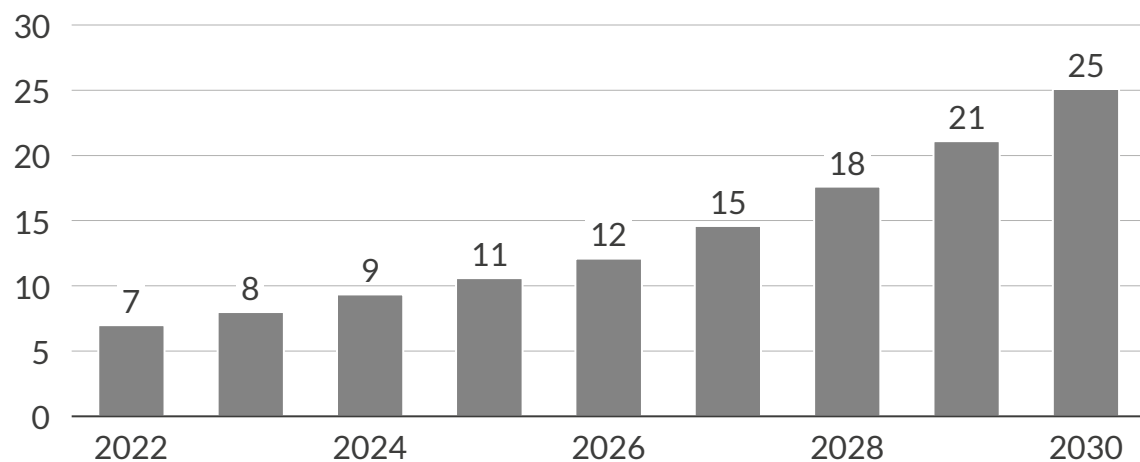
- Oil companies have to reduce fossil fuel emissions by a predefined quota.
- They can either reduce emissions or purchase quotas on the market.
- The required emission reductions are calculated by multiplying a base value by the amount of fuels used in transport.

## GHG quota supply

- The quota obligation can be supplied by three main types:
  - Biofuels used in transport sector
  - Electromobility
  - RFNBOs<sup>1</sup> (e.g. hydrogen) in transport sector or refineries

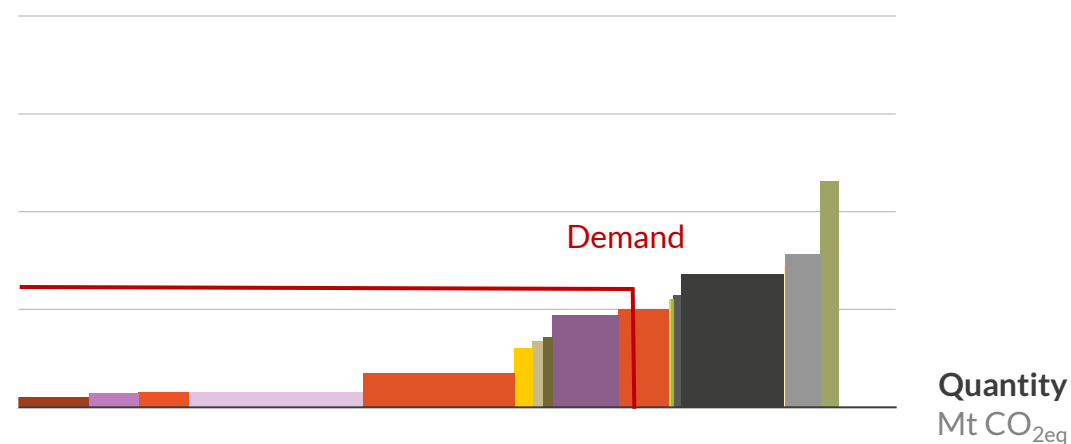
## Regulation for GHG reduction determines the demand for “GHG Quotas”

% of reference value<sup>2</sup>



## GHG quota price

€/t CO<sub>2eq</sub>



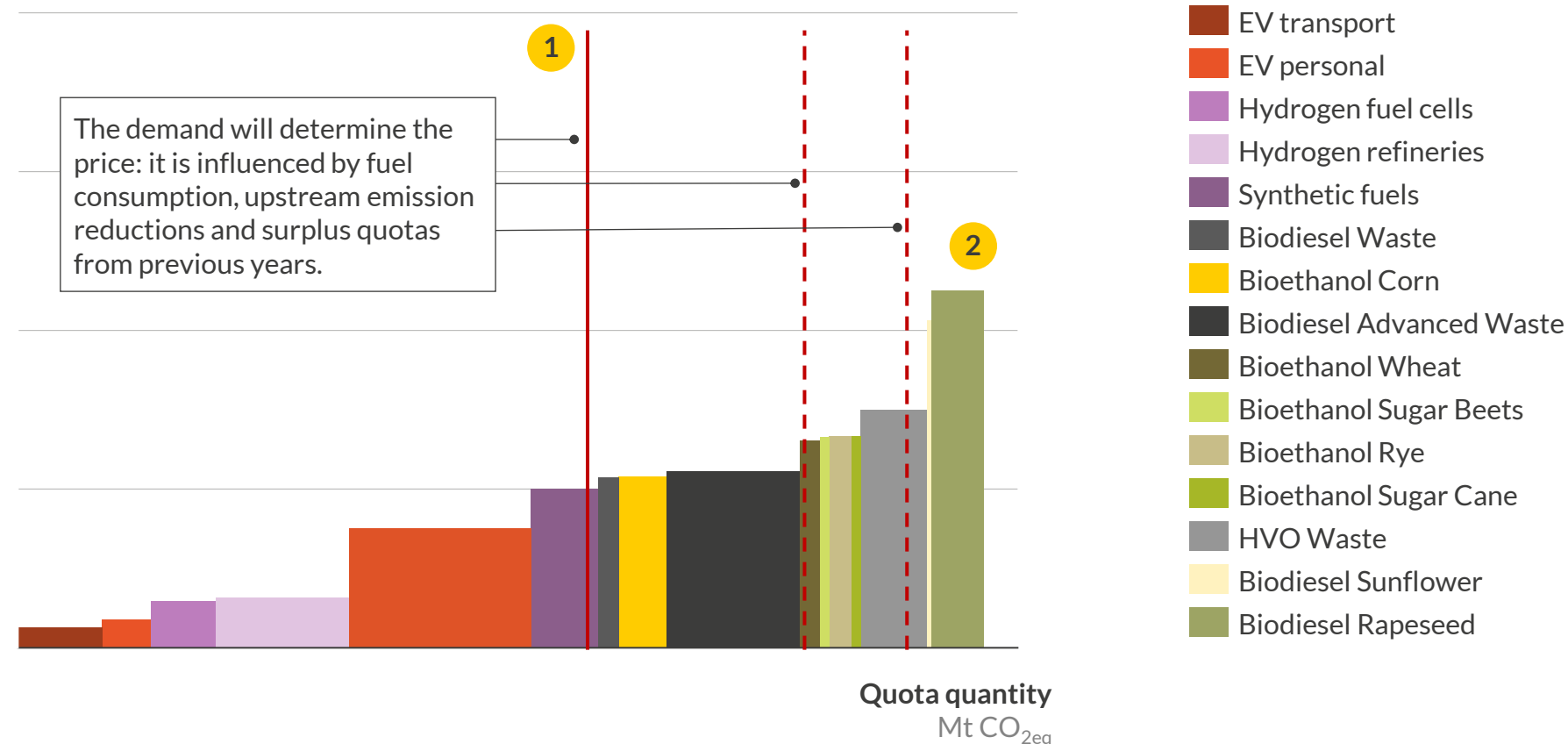
1) Renewable fuels of non-biological origin, the electricity used to produce the fuels needs to be produced from non-biofuel renewables 2) The reference value is defined as the base value (94.1 kgCO<sub>2eq</sub>/GJ) multiplied by the energy content of fuel used in the transport sector.

# We model the GHG quota market based on a demand-supply balance and the short-run marginal costs of different supply options

## Illustrative merit-order for forecasting the fulfilment of the GHG quota

### Quota price

€/t CO<sub>2eq</sub>



## Forecast methodology

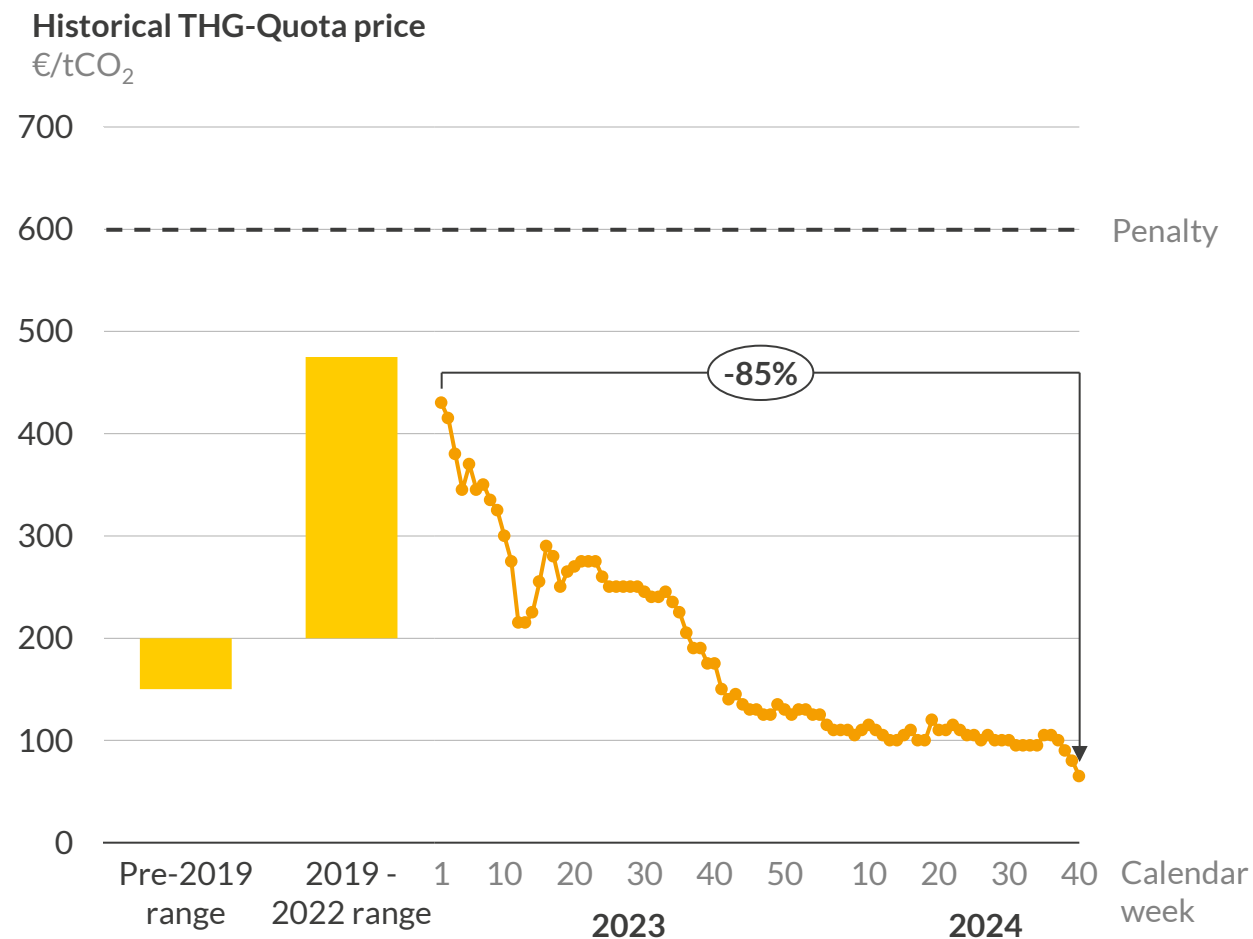
### 1 Demand

- Starting point is historic consumption of Diesel & Gasoline; Forecast based on assumptions about vehicle stock
- Upstream emission reductions (until 2024) and surplus quotas reduce the demand

### 2 Supply



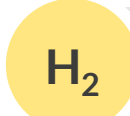
- Biofuels:
  - based on feedstock prices, input intensity, specific emission reductions and min./max. shares of biofuels
- EVs:
  - Based on EV stock assumptions and Aurora's forecast on emission intensity of electricity
- Hydrogen/SynFuels:
  - Based on refinery demand and Aurora's expectation of H<sub>2</sub> production and SRMC

# The GHG quota price sensitivity is an insightful measure to identify risks and opportunities for policymakers and market actors



## Price sensitivity of the GHG quota

- Questions to target:
  - How sensitive is the GHG quota price to changes in the supply of fulfilment options?<sup>1</sup>
  - What does this price sensitivity imply for policymakers, regulators, and GHG quota market participants?
- We measure GHG quota price sensitivity of three key fulfilment options:

-  Number of registered EVs
-  Supply of biofuels
-  Hydrogen use (refineries, fuel cells, synthetic fuels)

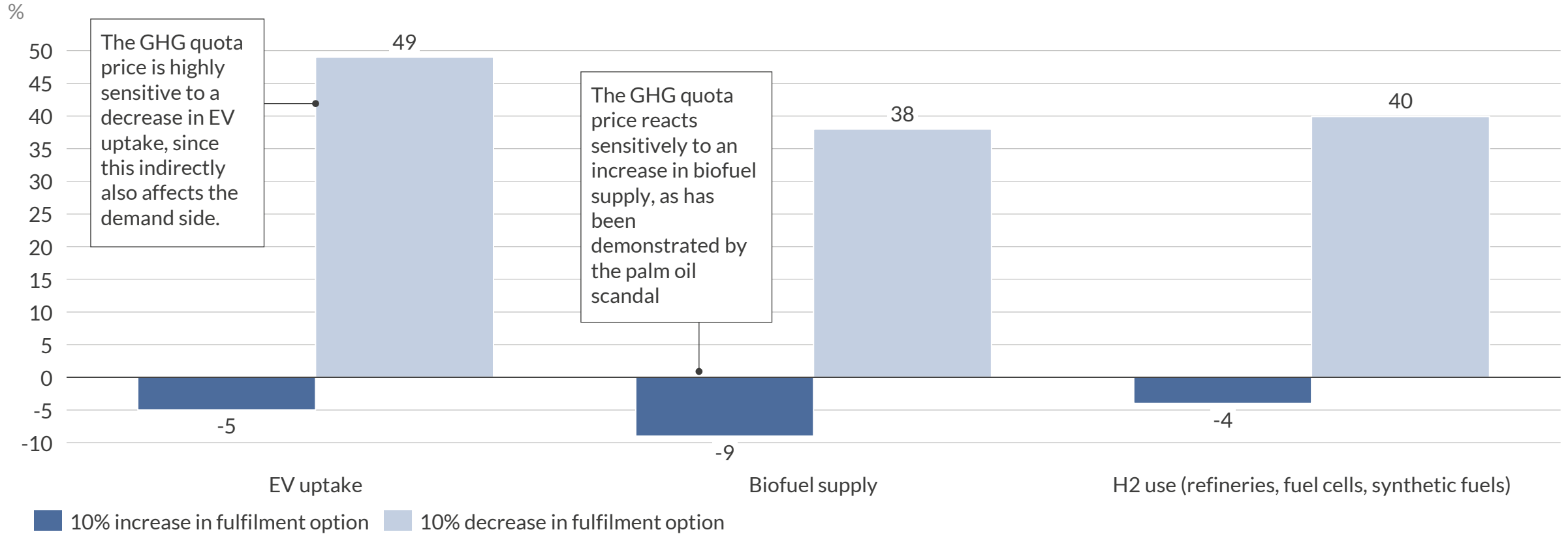
1) The supply of fulfillment options refers to the various sources through which oil companies can obtain GHG reduction quotas to meet their emission reduction obligations, e.g. quotas from EV owners, biofuel and hydrogen producers or direct emission reduction projects.

# The GHG quota price is more sensitive to supply decreases than increases and reacts most to a decrease in EV uptake

## Approach to compute GHG quota price sensitivity

1. Increase/decrease fulfilment option by 10%.
2. Compute average price effects covering all years from 2024 until 2030.

## Average GHG quota price sensitivity, 2024-2030





# Policy changes should be carefully designed and implemented for the GHG quota to set the right incentives for market participants

## Implications of the GHG quota price sensitivity



### Policymakers

Careful design in GHG quota instruments –especially regarding EV related fulfillment options



### Regulators

Dedicate more resources to adequate monitoring to maintain trust in the system and avoid volatility



### Suppliers of fulfillment options

Potential business upsides from selling quotas can be high but are likewise risky given the sensitivity of the GHG quota price



### Fuel producers

The high sensitivity of the GHG quota leading to high prices strengthens incentives to decarbonize



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