

Outlook on SDE++ 2022: what can be expected from the upcoming round

February 1st, 2022



In five minutes

The third round of the Dutch subsidy auction SDE++ will take place in June 2022.

For the analysis we used Aurora's SDE++ analytics suite that was developed to assess scenario's and provide outlooks on the Dutch SDE++ auction.

Certain key auction parameters have not been officially announced yet, so preliminary values had to be used in the analysis. Also, since the SDE++ 2021 results were not available at the date of publication, its outcomes had to be estimated.

The report has been commissioned by NVDE to explore the outcome of the upcoming SDE++ auction in 2022. It contains the following sections:

Introducing the SDE++

- 1
 - The SDE++ awards subsidies to projects based on their costs of abating CO₂ emissions
 - It succeeds the SDE(+), which was aimed at renewable energy generation from 2008-2020

Functioning of the SDE++

- 2
 - Under the SDE++, projects are ranked based on their subsidy intensity for one tonne of CO₂ abatement

Outlook on SDE++ 2022

- 3
 - Based on our research, we expect a total volume of €8.5 to €16.6 bln of subsidy requests in 2022, with our Central scenario at €12.3 bln requested
 - With an auction budget of €11 bln projects from most technology categories have a decent chance of success in the auction in our Central scenario
 - If development is more aggressive than expected (i.e. the High volume scenario) or the auction budget is set at a lower €9 bln, heat and molecule categories are expected to be pushed out of the merit order and receive only a minor share of the total budget

Budget vs expenses SDE++ 2022

- 4
 - The price scenario used by the government to estimate expenses (i.e. KEV 2021) uses outdated short term prices and has a conservative long term outlook on gas and electricity prices
 - Using Aurora's most recent price scenario, expected expenses go down, meaning a larger budget can be allocated at the same expenses

I. Introduction

II. Functioning of the SDE++

III. Outlook on SDE++ 2022

IV. Budget vs expenses SDE++ 2022

The SDE is one of the key policy tools in the Netherlands to meet the ambitious decarbonisation targets set out in the 2019 Climate Law

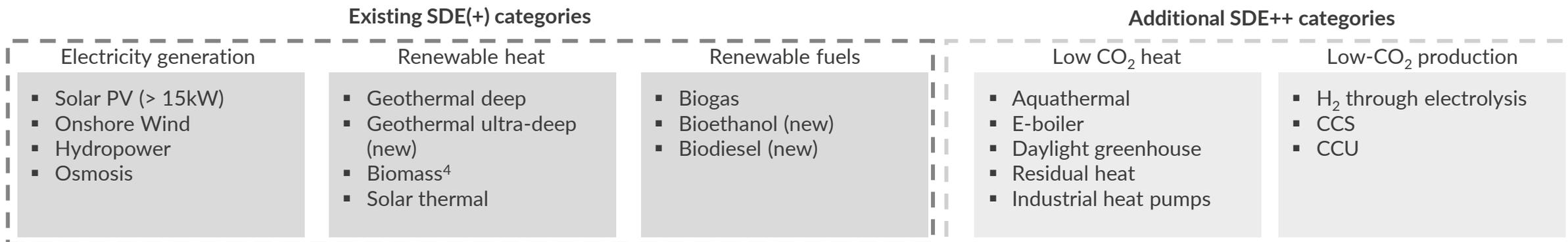
The Netherlands has ambitious decarbonisation targets until 2030

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 - Climate Law and Climate Agreement (2019) targets:
 - 49% CO₂ emissions reduction by 2030 compared to 1990¹
 - Large scale Solar PV and Onshore Wind generation should reach 35 TWh per year by 2030, compared to ~10 TWh in 2019

- 
 - Following increased European decarbonisation ambitions, a new Dutch government is expected to follow suit
 - Raising EU's climate target to 55% (net) greenhouse gas emissions compared to 1990 levels²

Since 2008, the Netherlands has subsidised renewable energy projects through the SDE(++)

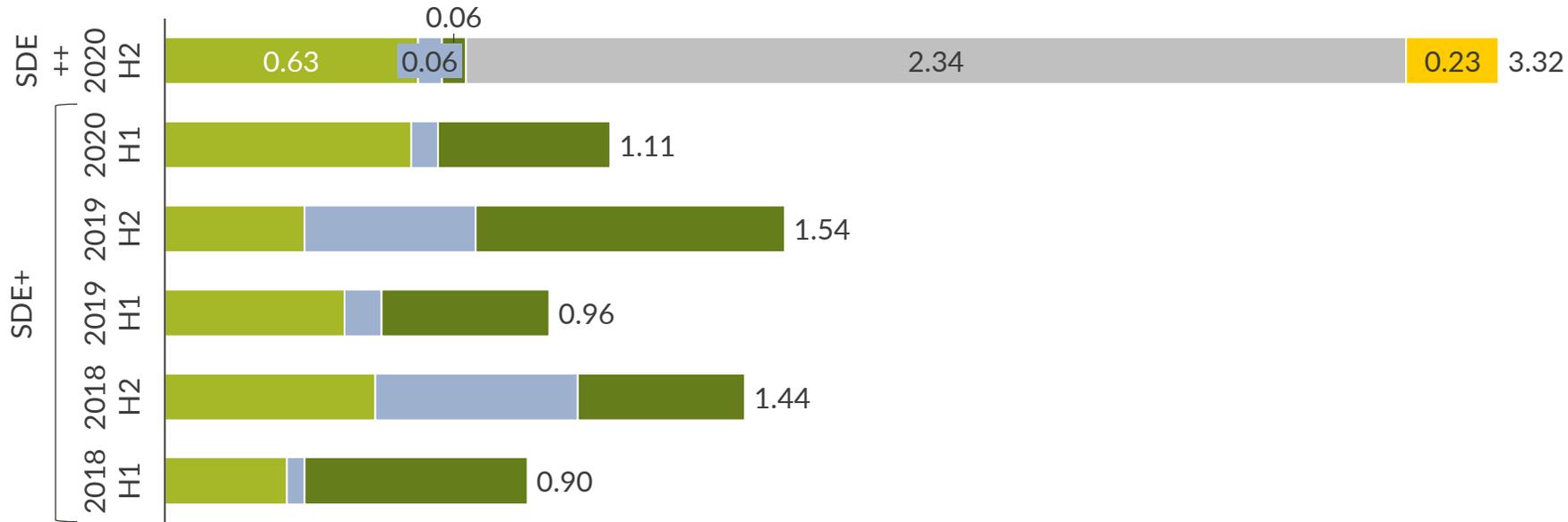
- Between 2008-2020 the SDE(+)³ subsidised renewable energy generation through compensating the unprofitable margin (*onrendablele top*) of projects – thereby promoting indirect CO₂ abatement
- Since November 2020, the subsidy mechanism also subsidises direct CO₂ abatement by including subsidies for technologies such as CC(U)S
- For each new round of the SDE++, the Dutch government publishes the technologies that are eligible to participate in the upcoming auction



1) The government has stated support for increasing the EU targets to 55% emission reduction by 2030; 2) See our previous [Strategic Insight Report](#) on the likely effects of the increased ambitions on CO₂ prices and the Dutch Power market; 3) The Stimulating Duurzame Energieproductie (SDE) was the main subsidy mechanism from 2008-2012. It was replaced by the SDE+ (2012-2020), which has since been replaced by the SDE++; 4) Including biomass CHP's that also generate power.

Including CCS into the auction has tripled the amount of CO₂ abatement, but fewer subsidies left for ‘conventional renewables’

Subsidised CO₂ reduction per year¹
Mt CO₂ p.a.



Total awarded subsidies (in billion €)

	2017	2018	2019	2020
Onshore wind	4.9	2.0	1.7	0.2
Solar PV	5.1	5.3	4.3	4.1
Total	10.0	7.3	6.0	4.3

■ Solar PV
 ■ Wind
 ■ Other RES
 ■ CCS
 ■ Electric boilers & low CO₂ heat

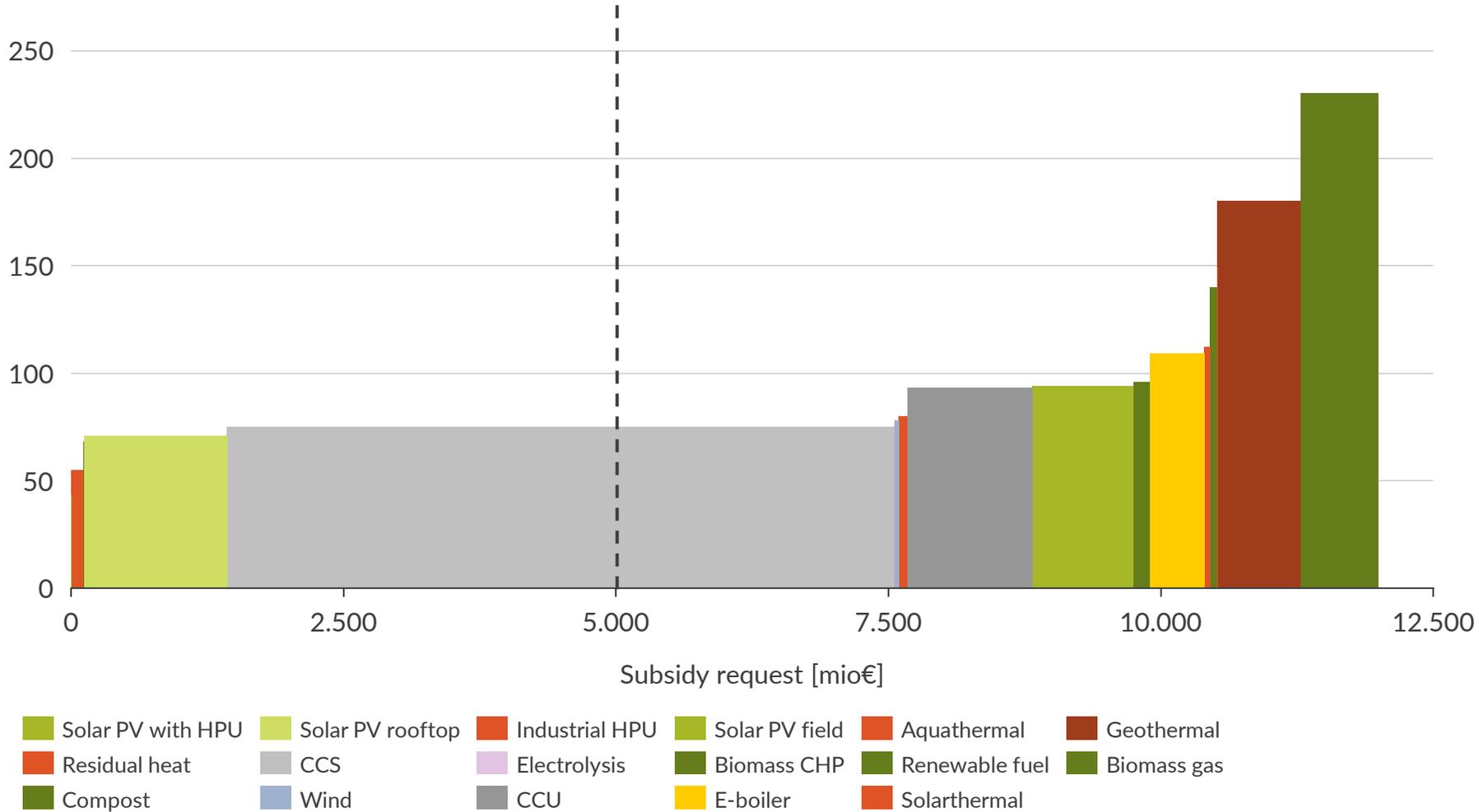
1) Given emission factors used in SDE++ 2020 auction; 2) Refers to the number of projects that have been awarded subsidies, not capacity. On capacity they are more equal in size, due to the larger average size of ground-mounted projects.

SDE++ 2020

- In the SDE++ 2020 round, Solar PV and CCS were awarded a maximum of €4.1 bln in subsidies (out of a total €5 bln)
 - The 6 CCS projects that were awarded subsidies are part of the ‘Porthos’ project in the Port of Rotterdam, they receive a maximum of €2.1 bln
 - Meanwhile, 3,426 Solar PV projects (97% on rooftops²) secured €2.0 bln in subsidies
- Renewable and low-CO₂ heat were not successful in securing subsidies: only 19% of the requested €1.2 bln was awarded
- On hydrogen, only one project of 2 MW requested subsidy and did not receive it

The 2021 SDE++ will likely have cleared at around 75 €/tCO₂ due to high levels of CCS requesting subsidies

SDE++ 2021 Auction subsidy request
€/tCO₂



Outlook on the SDE++ 2021: Results

- As projected, large scale Solar PV projects at risk of missing out on subsidies due to large volume of CCS bidding into the auction
- With a requested volume of 5.4 Mt CO₂ reduction per year, CCS has bid in aggressively, it is unknown if all have receive the necessary permits, and not all projects will be cleared in the SDE++ 2021 round
- With 4.1 GW of requests for subsidies for Solar PV, capacity requests are in line with individual 2019 and 2020 SDE+ / ++ rounds
- Final results and awarded subsidies may change as projects do not have required permits or withdraw

Agenda

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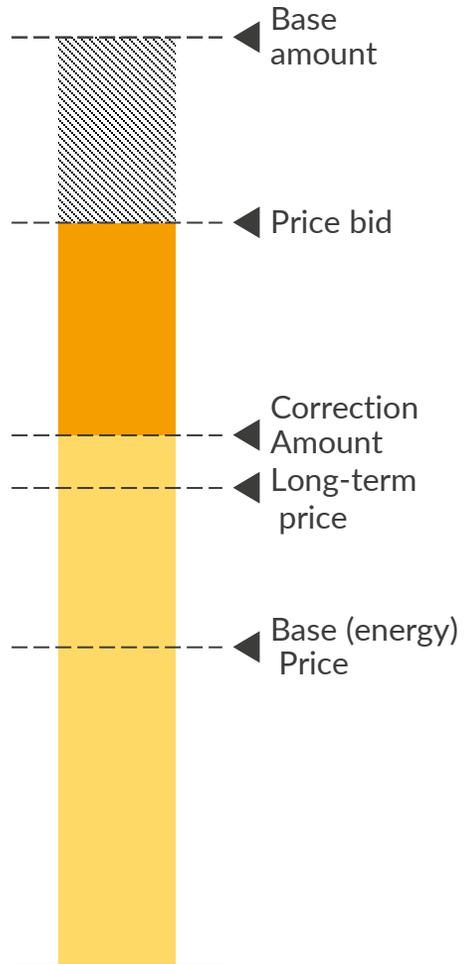
II. Functioning of the SDE++

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IV. Budget vs expenses SDE++ 2022

The SDE++ is a sliding feed-in premium, subsidising the difference between a price bid and the market income

Schematic example subsidy pay-out
€ / unit produced



Area	Definition	Set by
Base amount	<ul style="list-style-type: none"> Estimated integral cost price of technology and also the maximum subsidy amount calculated and set by government 	
Price bid	<ul style="list-style-type: none"> The price level of a project developer's bid into the auction (subsidy awarded pay-as-bid) 	
Correction amount	<ul style="list-style-type: none"> Estimated realised market value of unit produced, determined annually 	
Long-term price	<ul style="list-style-type: none"> The long-term expected market value of the unit a project produces, used to calculate a project's cost of CO₂ abatement 	
Base (energy) price	<ul style="list-style-type: none"> Subsidy floor set at 2/3 the value of the long-term price of a unit produced 	

All subsidies are awarded for a 15 year period (except for subsidies for biomass which are awarded for 12 years)

Government or government affiliated organisation Project developer

Projects are ranked on their estimated subsidy intensities; the 5 bln€ is apportioned based on projects' maximum subsidy

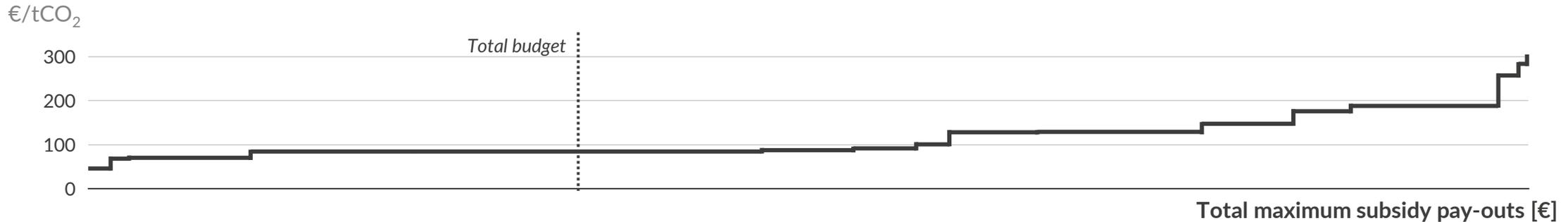
Formula to calculate subsidy intensity – subsidy ranking (y-axis)



Formula to calculate a projects' maximum subsidy pay-out (x-axis)



Subsidy intensity



Determined by developer

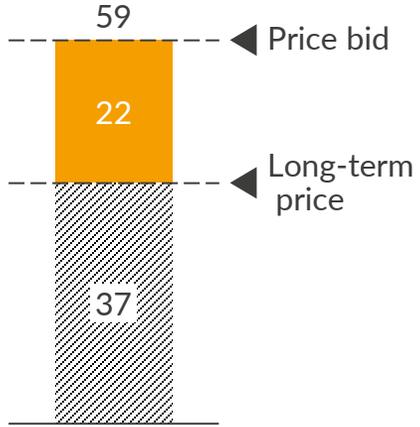
Set/calculated by government

1) Emission factors are set by the government, to estimate the net effect on CO₂ emissions

In a direct comparison, some CCS categories score better on subsidy intensity than large-scale solar

ILLUSTRATIVE

Subsidy requirement - PV field
€/MWh



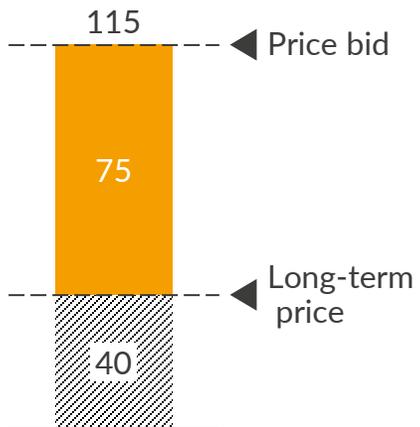
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Emission factor - PV field
tCO₂/MWh



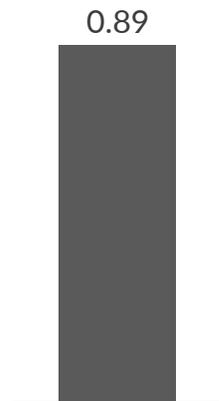
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Subsidy requirement - Pre-combustion CCS Liquid
€/tCO₂

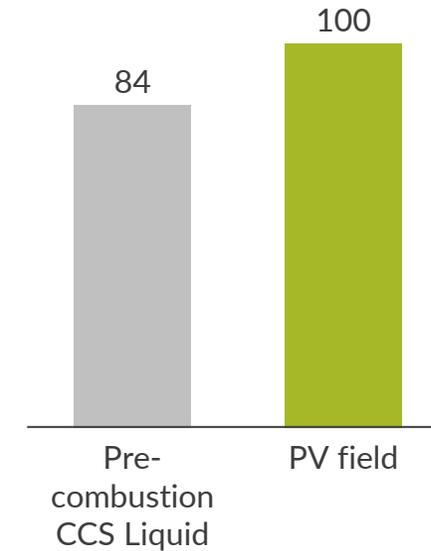


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Emission factor - precombustion CCS liquid
tCO₂/tCO₂



Subsidy intensity ranking
€/t CO₂



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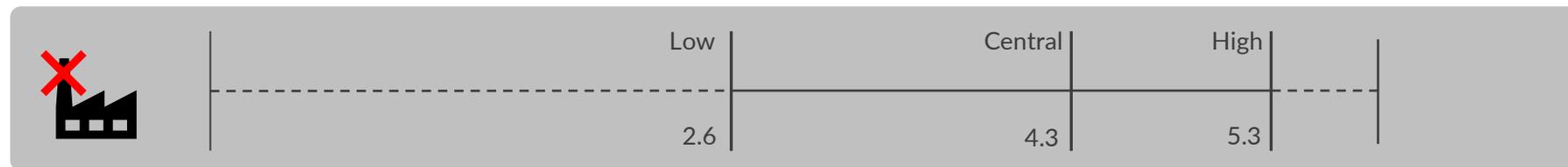
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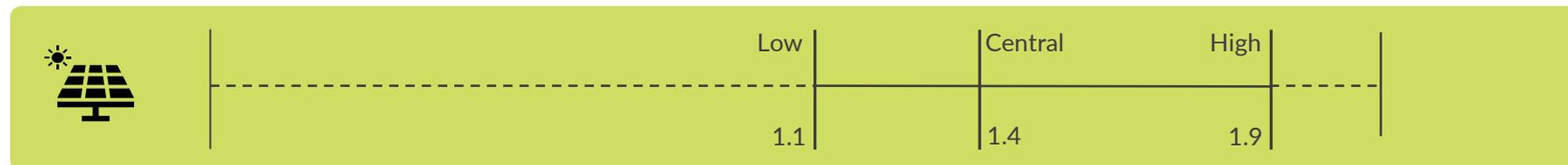
IV. Budget vs expenses SDE++ 2022

To explore SDE++ 2022 outcomes, three scenarios for the volume of budget were assessed, ranging from Low to High volume

Expected CCS volume – SDE++ 2022
bln € subsidies requested



Expected Solar PV volume – SDE++ 2022
bln € subsidies requested



Expected other volume – SDE++ 2022
bln € subsidies requested

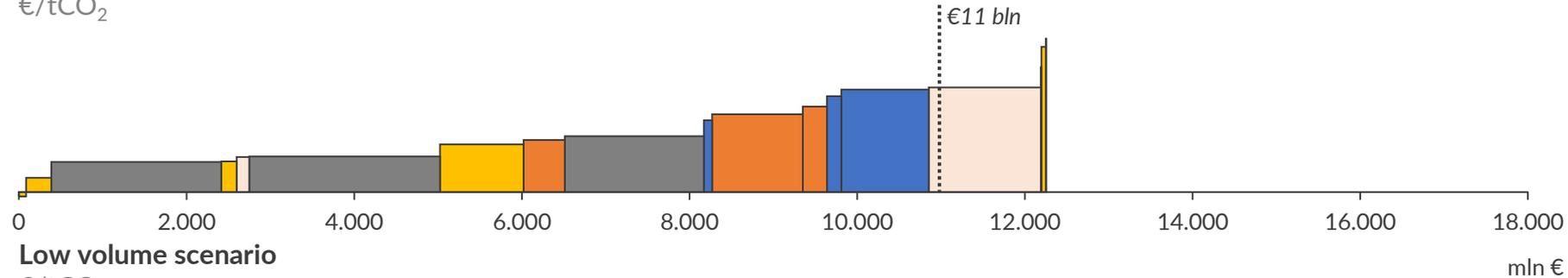


- The volume assessment of the technologies bidding in has been determined by Aurora’s desk research and benchmarked with key industry players.
- CCS continues to be the largest source of uncertainty. In our Central case, we expect CCS to request €4.3 bln (~3.7 Mt/year), whereas in a High volume scenario it could go up to €5.3 bln¹.
- Solar is expected to request much less budget than CCS, as development (3-6 GW²) seems to be slowing down.
- New technologies that might be added to the SDE++ 2022, as well as possible changes to methodologies have not been included in this analysis.

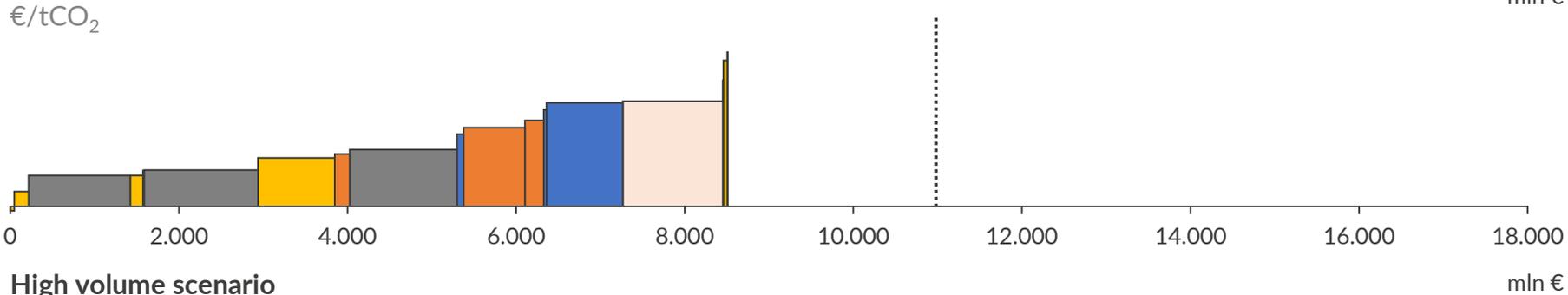
1) Restricted by the CCS ceiling of 9.7 Mt/year for the SDE++; 2) With our Central scenario at ~4 GW;

Most SDE++ categories are expected to receive subsidies in our Central outlook at a budget of €11 bln, based on KEV2021 prices

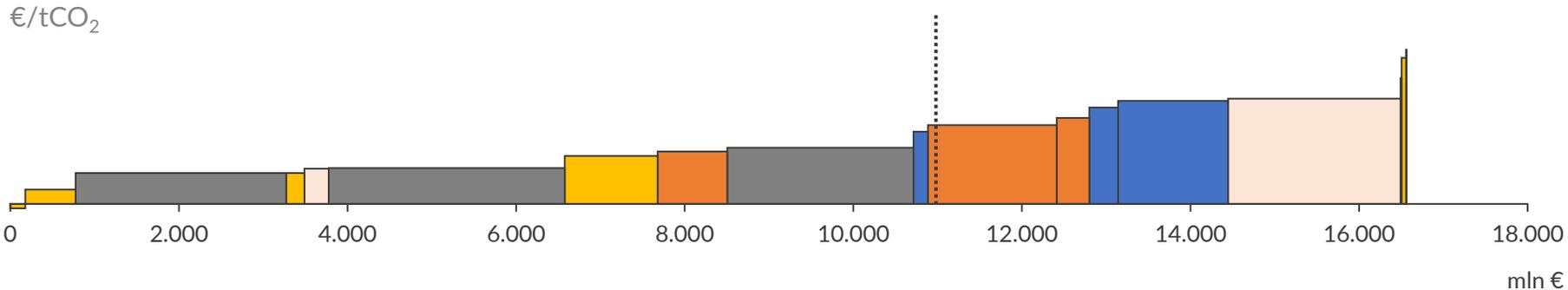
SDE++ 2022 Auction forecast – KEV 2021 – Central outlook
€/tCO₂



Low volume scenario



High volume scenario



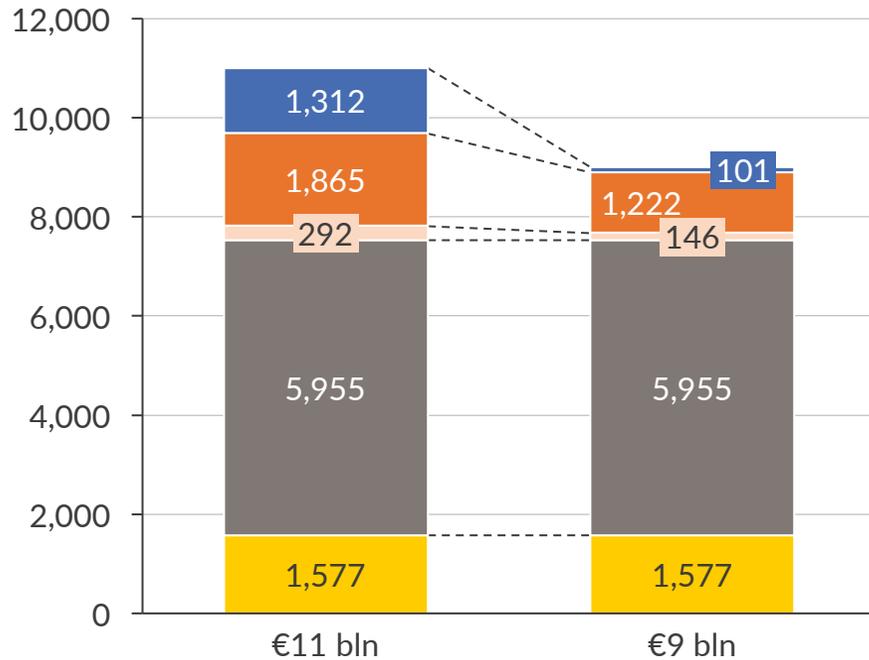
■ Electricity³
■ CCS & CCU⁴
■ Low temperature heat⁵
■ High temperature heat⁶
■ Molecules⁷

3) Solar PV, Onshore Wind, Hydropower; 4) CCS and CCU projects; 5) Even though no official qualification has been announced we include: residual heat, geothermal and solar thermal; 6) Biomass, (Industrial) Heat Pumps and E-boilers; 7) Biofuels, Biomass gas, Electrolysis H₂.

- The exact auction budget has yet to be announced, but the government has communicated a maximum of €6 bln extra, translating to €11 bln
- In Central, the maximum budget would be enough to cover projects from most categories, whereas in High volume the larger CCS volumes push most of molecule and heat categories out of the merit order

In case subsidies are set at a lower €9 bln, heat and molecule categories receive ~60% less subsidy allocation in Central

Budget request¹ – Central
mln € (real 2020)



■ Electricity
 ■ Low temperature heat
 ■ Molecules
■ CCS & CCU
 ■ High temperature heat

1) Difference between expected price bid and base price

- Many projects in low and high temperature heat, as well as green molecule categories are at the risk of missing out on SDE++ subsidies if the budget would be set lower than €11 bln
- CCS and CCU as well as most electricity generation (solar PV and onshore wind) face much less risk, and would take up an even higher share of the total at lower auction budgets

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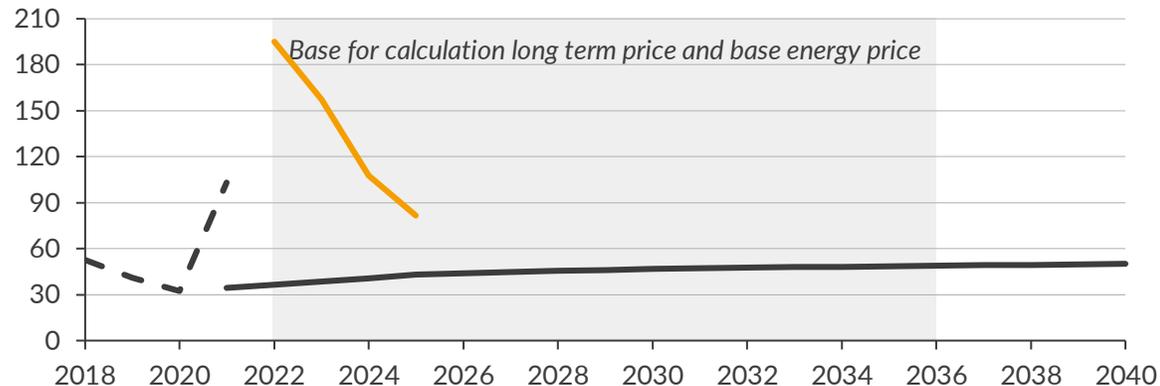
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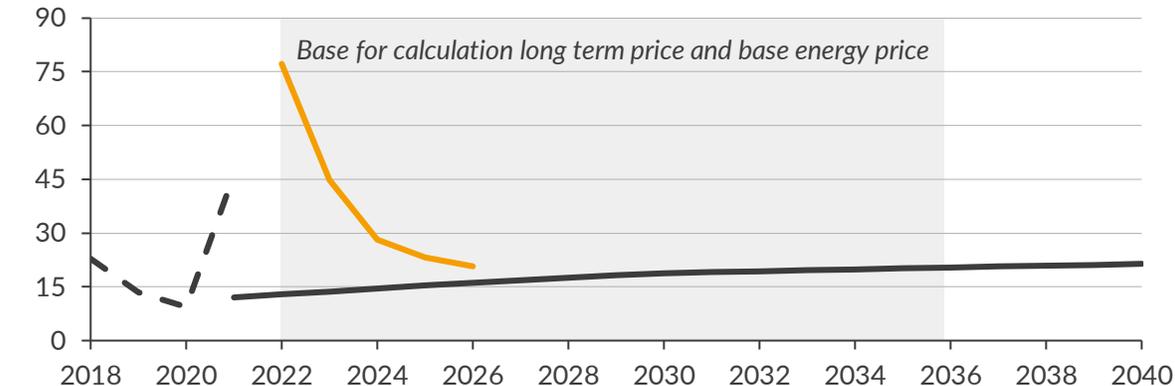
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The KEV 2021 uses outdated short term prices and has a conservative long term outlook on gas and electricity prices

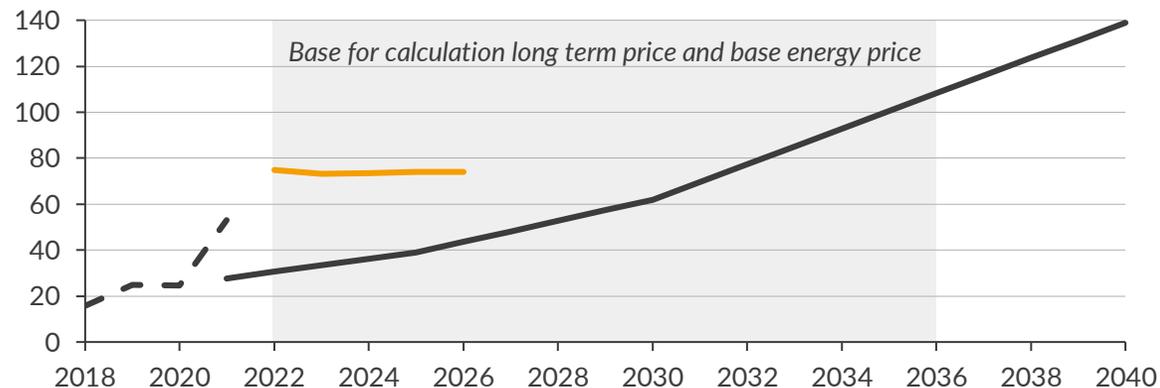
Electricity baseload price
€/MWh, € (real 2020)



Gas price (TTF)
€/MWh, € (real 2020)



EUA price
€/tCO₂, € (real 2020)



— KEV 2021 - - Historical — Futures¹

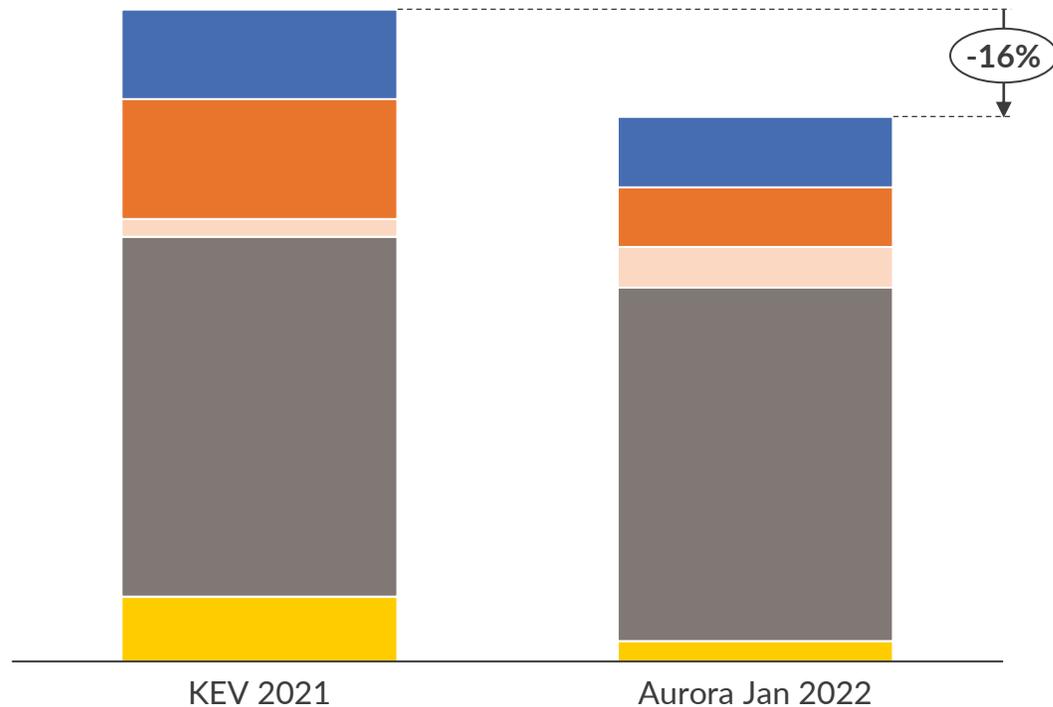
Comments

- The KEV 2021 outlook will most likely be used to determine the long term prices and base energy price in the SDE++ 2022. The higher the estimate of the long term price, the more volume can be contracted for the same budget.
- For the first five years, prices are mostly driven by commodity price futures. The KEV 2021 outlook uses futures from the first half of 2021, which are much lower than they currently are, meaning the long term price is underestimated.
- On the long term, the KEV 2021 also seems to be conservative on especially gas and electricity prices, compared to Aurora's own view on these markets, whereas the outlook on CO₂ prices is more bullish than Aurora's by 2040.

1) Futures from 27/01/2022, based on 30 or 60 day average, converted to real 2020 euros

Using Aurora's most recent price scenario, expected expenses go down, meaning a larger budget can be allocated at the same expenses

Expected expenses¹ – Central outlook
mln EUR 2020



- When moving from KEV 2021 to Aurora Jan 2022, the total expected expenses go down, as most long term prices go up.
- The largest difference lies in the electricity category, which requires less subsidy due to the higher electricity prices.
- Low and high temperature heat also have much lower subsidy intensities, due to higher gas prices, but are still expected to come after the CCS/CCU categories.
- CCS is pretty similar in subsidy intensity in Aurora Jan 2022, due to similar average CO₂ prices. CCU also does not change a lot.

1) Difference between expected price bid and long term price

Details and disclaimer

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