AURORA
ENERGY RESEARCH

SDE++: 2020 results and upcoming 2021 round

Policy note I Aurora Energy Research

Agenda

AURORA

I. SDE++

II. About Aurora

The new SDE++ subsidy scheme functions like its predecessor (SDE+), but subsidises abated CO_2 emissions and includes more technologies

AURORA

Key aspects of SDE++

In response to the ambitions of the *Klimaatakkoord*, the Dutch government replaced the SDE+ in fall 2020 with the SDE++, to run until at least 2025.

Broadening of scope

The SDE++ functions in much the same way as the SDE+ — as a sliding feed-in premium — but now subsidises each unit of abated CO_2 emissions instead of each unit of renewable energy generated.

This allows the subsidy to extend to new technologies, most notably carbon capture and storage (CCS) (although only for non-power purposes) and 'green' hydrogen production by electrolysis.

Subsidies awarded based on lowest cost per unit abated CO_2 emissions

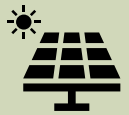
- Subsidy is paid out for a period of up to 15 years
- Budget for 2021: 5 billion EUR[1]
  - Total budget until 2025: 25 billion EUR[1]
- Subsidies for onshore wind and solar generation capped at 35 TWh/y (*Klimaatakkoord* target) over all rounds, incl. past SDE(+)
  - As renewable energy becomes cheaper, the Dutch government expects to phase out RES subsidies from 2025[1]

Subsidy pay-out structure is analogous to the SDE+

Eligible technologies fall 2020

Renewable electricity

- Onshore wind
- Solar
- Hydropower
- Osmosis
- Biomass[2]



Renewable heat

- Geothermal (deep)
- Biomass[2]
- Solar thermal

Renewable gas

- Biogas

Low-CO_2 heat

- Aquathermal
- E-boiler
- Daylight greenhouse
- Geothermal (not deep)
- Residual heat
- Heat pumps

Low-CO_2 production

- H_2 through electrolysis
- CCS

New categories can be added every round. The Dutch ministry plans to publish the list of eligible technologies for 2021 before summer.

1) *Rijksvisie marktontwikkeling voor de energietransitie, Kamerbrief*, 22/6/2020. 2) In July 2020 EZK announced an end to subsidies for electricity generation from wood-based biomass; heat generation needed to be looked at in more detail. In early 2021, the ministry announced it needed more time to make a decision.

Sources: Aurora Energy Research, RVO, ECN

Solar PV and CCS receive 87% of subsidies in SDE++ 2020 round with a total of €4.7 bn awarded

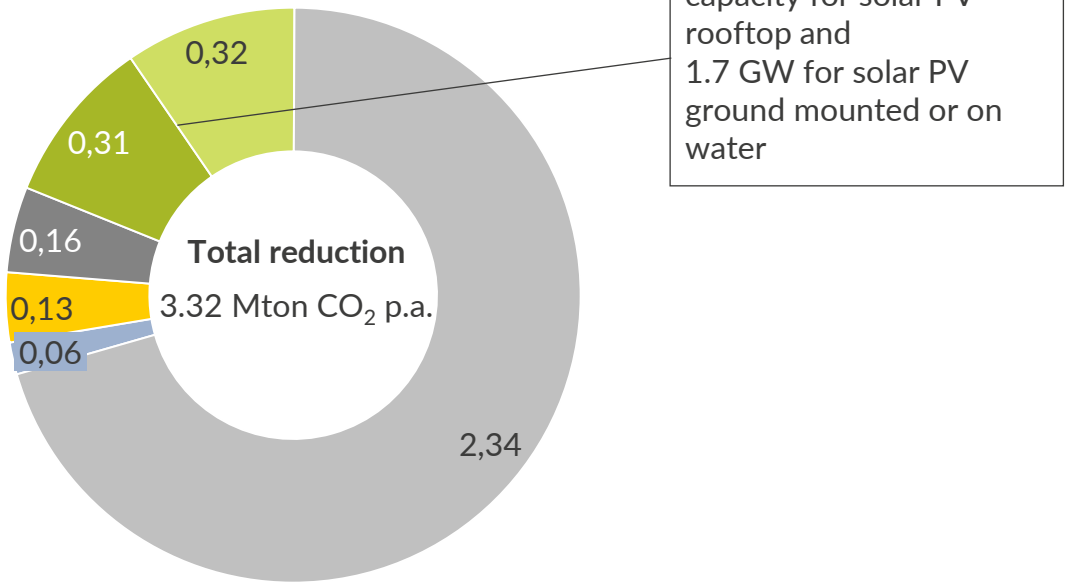
AURORA

The Dutch government released the preliminary results for the 2020 SDE++ round with €4.7 bn of €5 bn subsidies awarded to 3,486 projects out of 4,112 applications.

Solar PV and CCS emerge as the technologies with the highest allocated subsidies, receiving €4.1 bn of the €4.7 bn allocated subsidies.

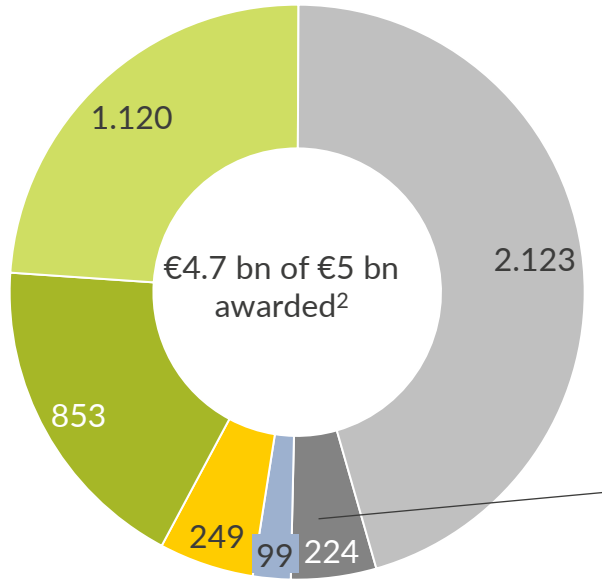
- A total of 3,426 Solar PV projects (of which 97% on rooftops[1]) will receive a maximum of €1,973 million subsidies.
- The 6 CCS projects that were awarded subsidies are part of the 'Porthos' project in the Rotterdam port. They receive a maximum subsidy of €2,123 million.

CO_2 reduction per year
Mton CO_2 p.a.



1.8 GW subsidised capacity for solar PV rooftop and
1.7 GW for solar PV ground mounted or on water

Awarded maximum subsidies
million EUR



Of the €224 million for 'other' heat, the largest share is for heat pumps (55%), followed by biomass (29%), waste heat (9%) and biogas (7%).

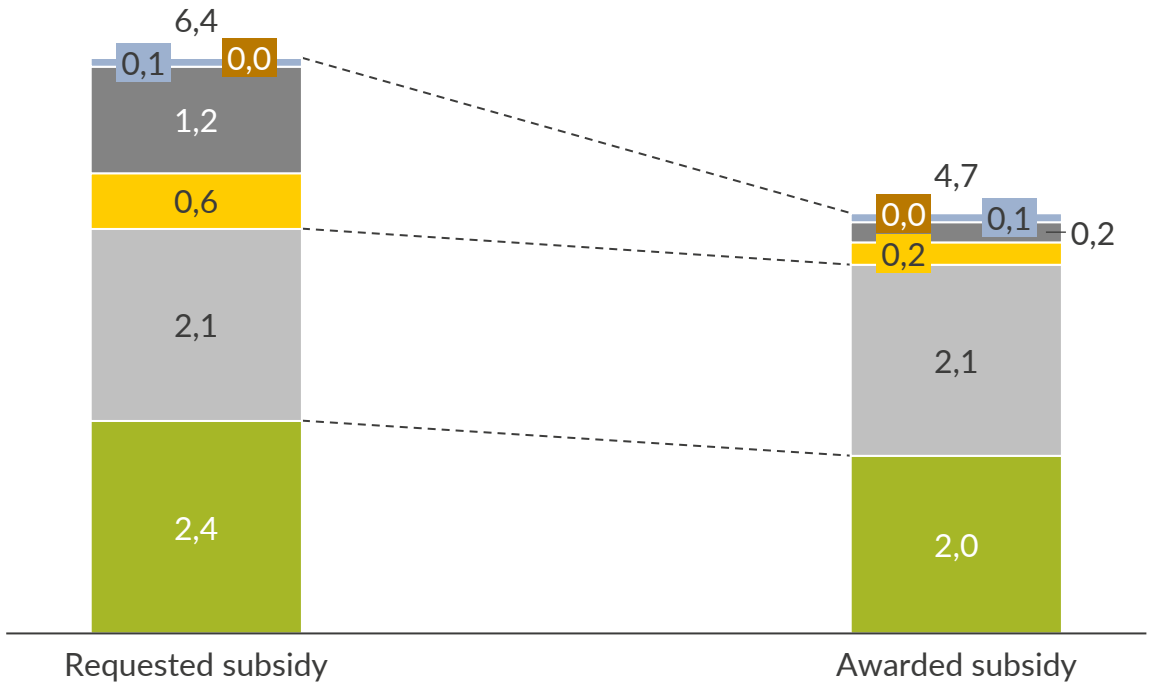
CCS | Solar PV rooftop | Solar PV ground mounted or on water | Electric boilers | Wind | Other renewable & low-CO2 heat[3]

1) 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. 2) The remaining €0,3 bn subsidies will be awarded to projects in renewable heat generation, e.g., electric boilers and heat pumps. 3) Includes geothermal, heat pumps, biomass, residual heat, solar thermal and aquathermal. Only heat pumps, biomass, residual heat and solar thermal (<<1%) were awarded subsidies.

Sources: Aurora Energy Research, Ministerie van Economische Zaken en Klimaat

Compared to the requested subsidies, Solar PV and CCS outperformed renewable heat and electric boilers

SDE++ 2020 round
billion EUR



Solar PV | CCS | Electric boilers | Other renewable & low-CO2 heat[1] | Wind | Hydrogen

1) Includes geothermal, heat pumps, biomass, residual heat, solar thermal and aquathermal, but excludes electric boilers. Only heat pumps, biomass, residual heat and solar thermal were awarded subsidies.

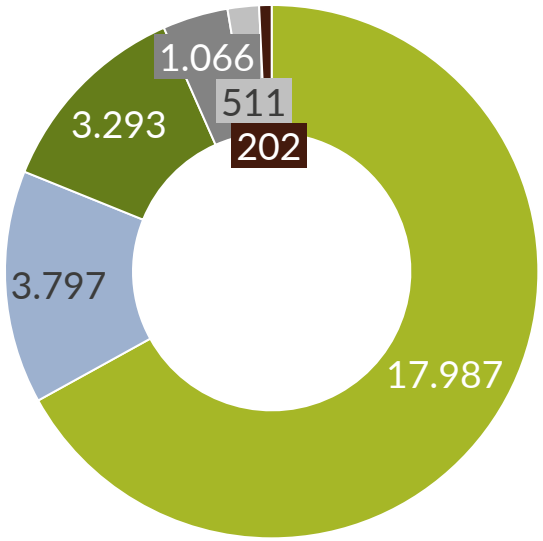
Sources: Aurora Energy Research, RVO

AURORA

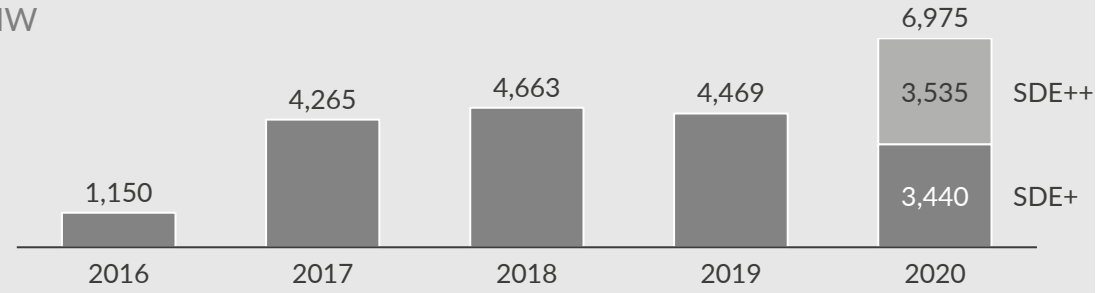
- While **solar PV** requested 37% of the subsidies of the subsidies, it received 43%.
- Similarly **CCS** requested 33% and was awarded 45% of the 2020 SDE++ round.
- **Wind onshore** requested only 107 MW of which all projects were awarded subsidies, totalling €99 million, indicating wind is very competitive in the auction, but limited in earlier phases of development.
- Renewable and low-CO_2 heat received only 19% of the requested €1,183 million, with **geothermal** not receiving any subsidies while requesting €355 million. **Heat pumps** received approx. half of its requested €240 million and **biomass** (incl biogas) only €80 million of €354 million requested. This shows these categories are not very competitive in the SDE++.
- On hydrogen, only one project of 2 MW requested subsidy and did not receive it.

The success of solar PV in the SDE++ continues the upward trend of the past years under the old SDE+ scheme

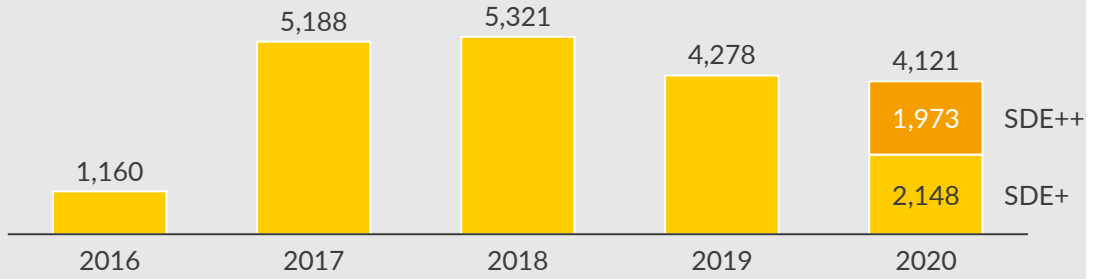
Subsidised capacities 2016-2020 (*excluding SDE++ 2020*)
MW



Added subsidised capacity solar PV
MW



Awarded maximum subsidies for solar PV projects
million EUR



In the SDE+, Solar PV has seen the most subsidised capacities of any technology over the past 5 years.

In 2020, solar PV saw a rise to almost 7 GW approved projects, while the maximum subsidies awarded declined for the third consecutive year. This indicates that solar PV needed much less subsidy per MW in 2020 than before.

Solar PV · Biomass · Green Gas · Wind onshore · Geothermal · Others

Sources: Aurora Energy Research, RVO

The next SDE++ round starts in Oct 2021 with €5 bn funding and will see a further broadening of eligible technologies

AURORA

The Dutch government aims to expand the eligible technologies in 2021 and 2022

- The 2021 SDE++ round will accept applications for renewable fuels for transport, a wider range of CCS applications, and other technologies such as biomass fermentation
- The final decision on eligible technologies is to be published before summer and depends on approval by EU Commission
- 2022 will see a further expansion of eligible technologies, possibly including 'delayed delivery' (battery storage)

SDE++ 2021	Dates	CO_2 intensity limit 2021 (€/tCO_2)	CO_2 intensity limit 2020 (€/tCO_2)
Phase 1	▪ 05 Oct –11 Oct 2021	▪ 60	▪ 65
Phase 2	▪ 11 Oct – 25 Oct 2021	▪ 80	▪ 85
Phase 3	▪ 25 Oct – 8 Nov 2021	▪ 115	▪ 180
Phase 4	▪ 8 Nov – 11 Nov 2021	▪ 300	▪ 300

- The SDE++ 2021 round will see a reduction in the maximum CO_2 intensity for the first three phases
- The reduction is strongest for phase 3 from 180 €/tCO_2 to 115 €/tCO_2
- The intensity limit of 300 €/tCO_2 for the last round will remain unchanged

Sources: Aurora Energy Research, Ministerie van Economische Zaken en Klimaat

Aurora will provide essential insights to help you determine your bidding strategy for the upcoming SDE++ auction

AURORA

Aurora CO_2 GM

- We will organise a round table session on the effects of the EU Green Deal on the EU ETS price and the fundamental development of the price, which has an important effect on the baseload price in the Netherlands

Aurora SDE++ GM

- We will organise a round table discussion on the SDE++ answering your questions
- Do you have a specific question you would want to see addressed: contact here

SDE++ 2021 round

- Auctions are scheduled to take place in four different rounds starting on October 5th
- Auction participants will be checked and contacted throughout clearing process in H1 2022

Aurora July Power Market Report

- Our next report on the fundamental development of the Dutch power and renewables market will be published in July giving you an up-to-date view of the market

Bespoke bidding strategy

- Our consulting team can help you with bidding support running additional client-specific scenarios

- For more questions, contact Felipe.vandekerkhof@auroraer.com

Sources: Aurora Energy Research

Agenda

AURORA

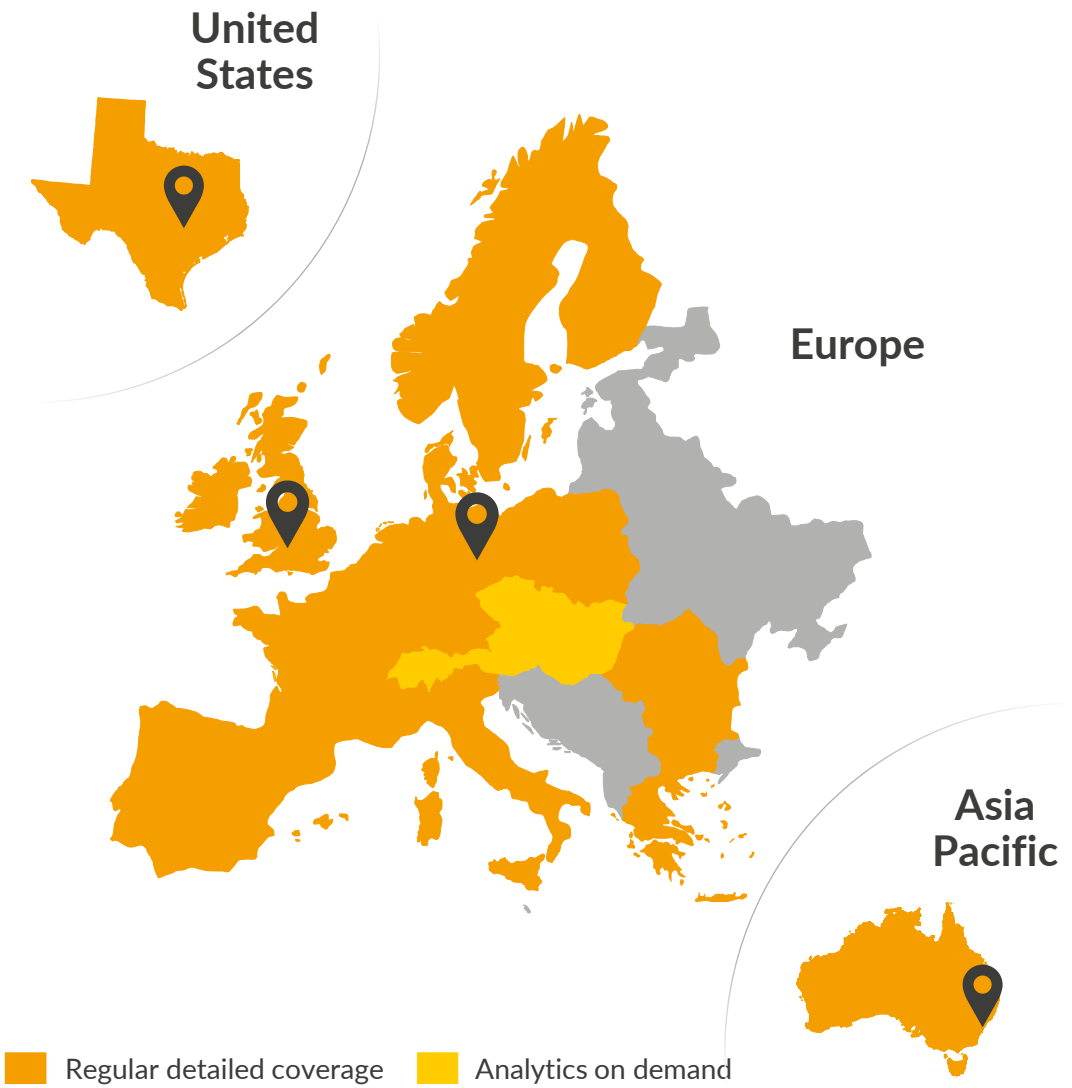
I. SDE++

II. About Aurora

Aurora provides data-driven intelligence for the global energy transformation

AURORA

- Power markets
- Renewables
- Storage
- Electric vehicles
- Hydrogen H_2
- Carbon CO_2
- Natural gas



4 Offices
Oxford | Berlin | Sydney | Austin

180+
market experts

350+
subscribing companies

100+
transactions supported in 2020

Source: Aurora Energy Research

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

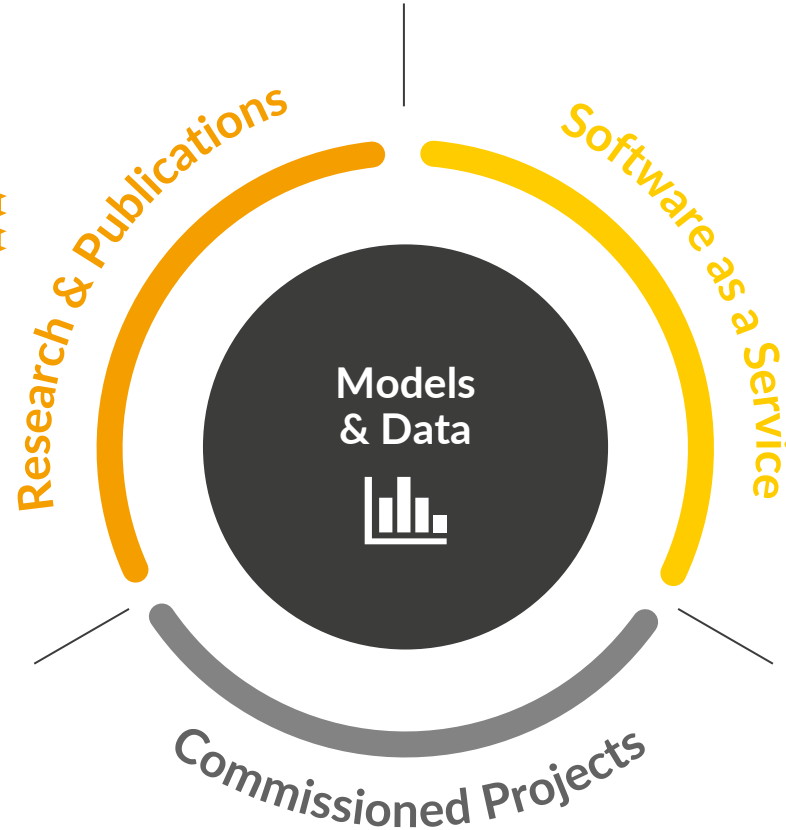
AURORA

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

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



Commissioned Projects

- 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

Models & Data

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

Source: Aurora Energy Research

Our Research and Publications team offer Power & Renewable Market Intelligence Services across key markets

AURORA

	Power market	Renewable power	Flexible and distributed power	Gas market	H_2 market
	GB Power Market Service	GB Renewables Service	GB Distributed & Flexible Energy Service	European Gas Market Service	Hydrogen Market Service
	Ireland Power & Renewables Market Service		Ireland Flexibility Service		
	German Power Market Service	German Renewables Service	North-West European FCR Forecast		
	French Power & Renewables Market Service				
	Dutch Power & Renewables Market Service				
	Belgian Power & Renewables Market Forecasts				
	Iberian Power & Renewables Market Service				
	Italian Power & Renewables Market Service				
	Nordics Power & Renewables Market Service				
	Polish Power & Renewables Market Service				
	Romanian Power & Renewables Market Forecasts				
	Bulgarian Power & Renewables Market Forecasts				
	Greek Power & Renewables Market Forecasts				
	ERCOT Power & Renewables Market Service				
	Australian Power & Renewables Market Service		Australian Flexibility Service		

Source: Aurora Energy Research

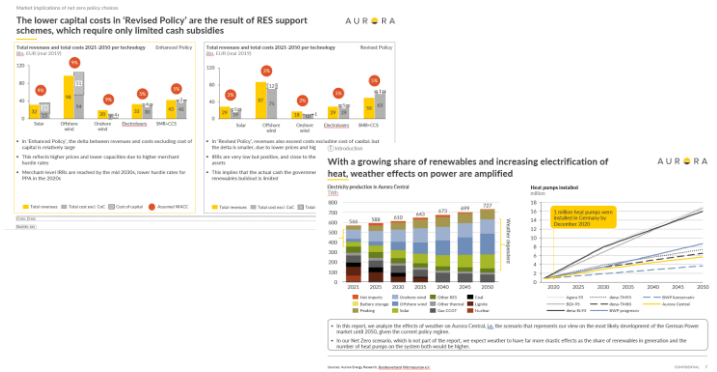
Dutch Power Market and Renewables Service: Key market analyses and forecasts for all participants in the Dutch power market

Quarterly data and bi-annual market reports to assess business models

- **Yearly forecasts of wholesale market prices** till 2050 in three scenarios: central, high and low
- **Net Zero scenario until 2050** detailing capacity mix, generation mix, capture prices and wholesale market prices
- **Price distributions**, dark and spark spreads
- **Capacity development**, generation mix, interconnector capacity, capacity buildout, exports
- **Capture prices** of key technologies (onshore, offshore, solar) in three scenarios: central, high and low
- **Utilisation rates** of key thermal technologies along different efficiencies
- EU-ETS carbon price forecasts
- ***Global Energy Market Forecasts*** *on oil, gas and coal*

Group Meetings and Strategic Insight Reports

- **In-depth thematic reports** on topical issues
- **Three multi-client roundtable discussions** per year in Amsterdam to discuss reports with actors across the Dutch power market (utilities, developer, investors, project finance, government, regulation)



Interaction through workshops and ongoing support

- **Bilateral workshops** at your office discuss specific issues on the Dutch market
- **Ongoing availability** (calls, access to market experts, modellers) to address any questions across European power markets
- Discounted invitations to Aurora's annual **Spring Forum**

All intelligence for a successful business, based on bankable price forecasts

For more information, please contact
Felipe van de Kerkhof, Commercial Associate
felipe.vandekerkhof@auroraer.com
+31 (0)6 219 73 618

Details and disclaimer

Prepared by:
Gero Roser
Jesse Hettema
(jesse.hettema@auroraer.com)
Felipe van de Kerkhof
(felipe.vandekerkhof@auroraer.com)


AURORA
ENERGY RESEARCH