

The RWE logo is displayed in a bold, dark blue, sans-serif font. It is positioned in the upper center of the slide, above the main title. The background of the slide is a photograph of an offshore wind farm with numerous white wind turbines on a dark blue sea under a clear sky. A series of green lines originate from the right side of the frame and curve upwards and then downwards, creating a sense of flow and connectivity across the scene.

RWE

Growing Green

RWE's Decarbonisation strategy

Chris Scheerder
Director Eemshaven Power Station

Biomass PowerON 2023, Stockholm

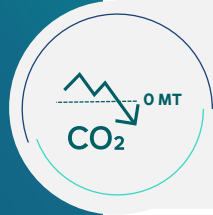
Agenda



RWE Growing Green Strategy



Current Biomass activities



BECCUS: the case for negative emissions



Biomass closing the circle

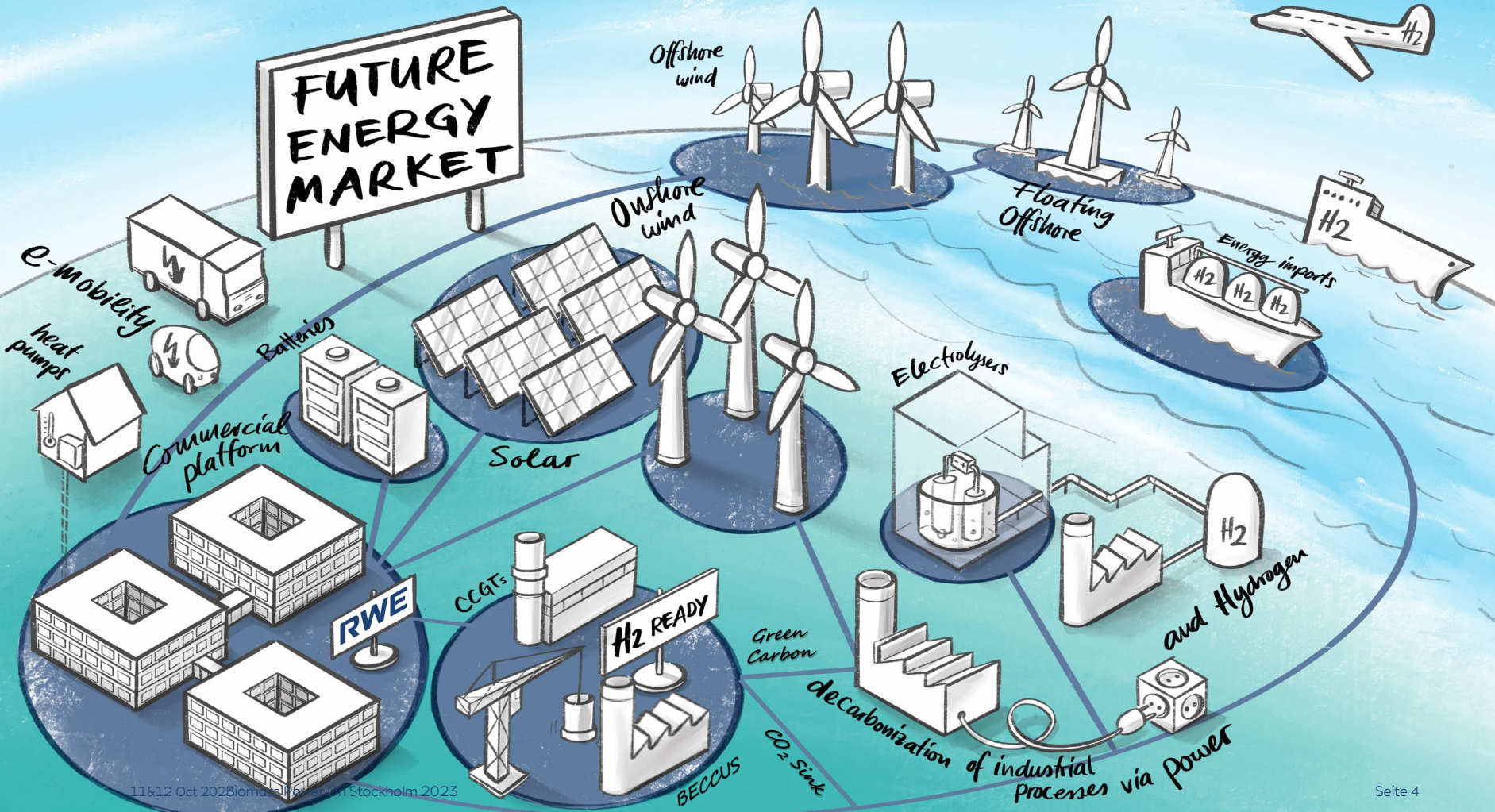


RWE Growing Green Strategy

“We will invest 50 billion euro before 2030 into the energy transition and will be carbon neutral in the decade after”

RWE

FUTURE ENERGY MARKET



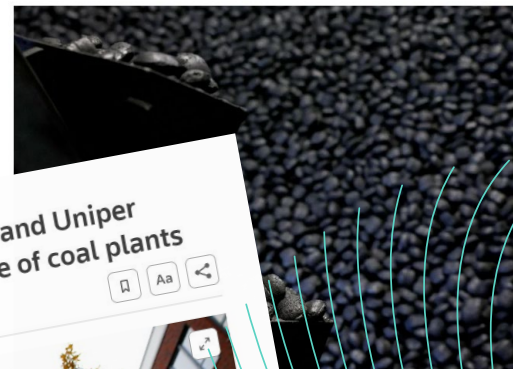
Never a dull moment...

Climate & Energy | Sustainable Markets | Coal | Climate Change

Dutch government to pay RWE \$355 m for not using coal

Reuters

September 18, 2023 6:44 PM GMT+2 · Updated 6 days ago



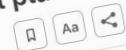
© REUTERS/Prochica van de Wouw/FILE photo: ALONZO LEE

Commodities

Dutch court denies RWE and Uniper compensation for closure of coal plants

Reuters

November 30, 2022 12:27 PM GMT+1 · Updated 10 months ago



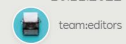
(1/2) The logo of the German power supplier RWE is pictured at the RWE headquarters in Essen, Germany, Tuesday, Nov. 22, 2022. The logo of the German power supplier RWE is pictured at the RWE headquarters in Essen, Germany, Tuesday, Nov. 22, 2022. The logo of the German power supplier RWE is pictured at the RWE headquarters in Essen, Germany, Tuesday, Nov. 22, 2022.

#Offshore

Hollandse Kust West VII: RWE succesvol in tender windpark op zee

Windpark op zee met een totale capaciteit van meer dan 760 megawatt toegekend

10.11.2022



RWE

RWE succesvol in tender windpark op zee Hollandse Kust West

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Dit vind je mogelijk ook interessant



Current Biomass activities

“From the 10-point plan to reduce dependency on Russia: point 5. Maximise generation from existing dispatchable low-emissions sources: bioenergy and nuclear”

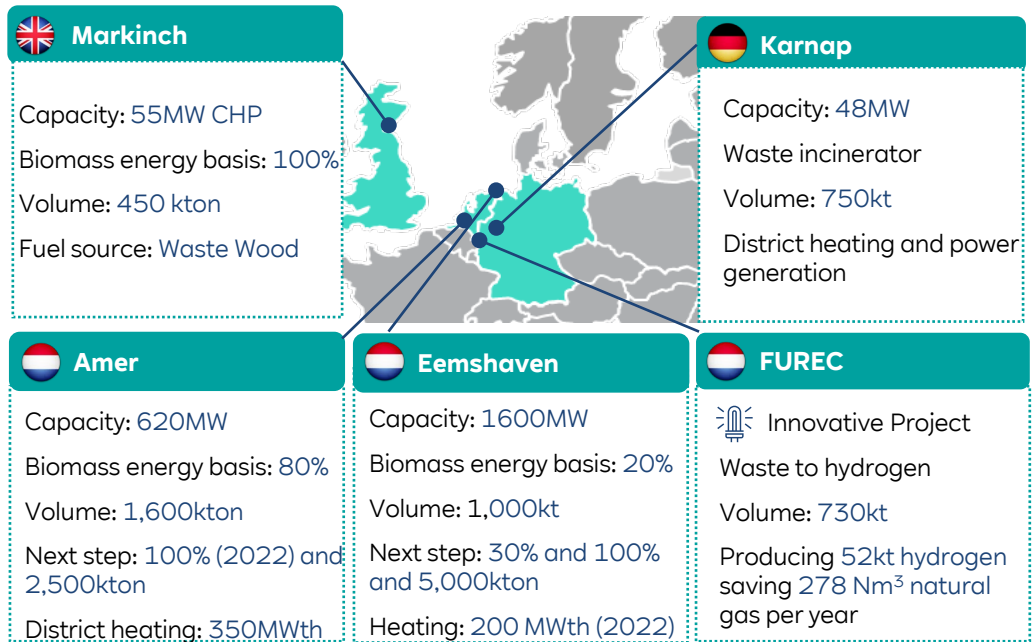
IEA

We have a portfolio of plants ranging from 100% biomass facilities to retrofitted coal stations and waste incineration

Amer & Eemshaven in the Netherlands



Biomass portfolio RWE



Biomass is still a relevant business within RWE...

We are investing billions of euros to drive forward the expansion of our sustainable portfolio. In the first six months of this year, we already invested €9 billion and expanded our capacity by 5.1 gigawatts through acquisitions and the commissioning of new plants. Thanks to our good results and our very solid financial position, we can keep up this fast pace: We are currently constructing more than 70 renewable energy projects in 12 countries with a total capacity of over 7 gigawatts – that's more than ever before.

Markus Krebber, CEO of RWE AG

RWE AG

RWE raises outlook for fiscal 2023

- Positive earnings trend in international core business leads to an increased earnings forecast for current fiscal year
- Adjusted EBITDA for RWE at Group level now expected to be between €7.1 billion and €7.7 billion
- In the core business, adjusted EBITDA now expected to be between €6.3 billion and €6.9 billion, in particular due to higher earnings from Hydro/Biomass/Gas and Supply & Trading
- RWE's German lignite and nuclear business weaker in the first half of 2023
- Dividend target of €1.00 per share confirmed

Essen, 25 July 2023

RWE 11&12 Oct 2023 Biomass Power.On Stockholm 2023

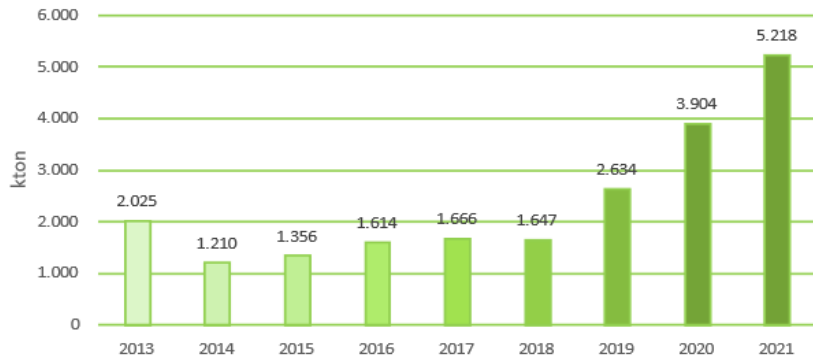
Outlook for fiscal 2023 and preliminary results for the first half of 2023

€ million	Outlook 2023 July 2023	Outlook 2023 March 2023	January-June 2023 preliminary	January-June 2022*
Adjusted EBITDA Offshore Wind	1,400-1,800	1,400-1,800	762	632
Adjusted EBITDA Onshore Wind/Solar	1,100-1,500	1,100-1,500	519	505
Adjusted EBITDA Hydro/Biomass/Gas	2,600-3,000	1,750-2,150	1,939	755
Adjusted EBITDA Supply & Trading	significantly above 600	300-600	799	-203
Adjusted EBITDA Core business	6,300-6,900	4,800-5,400	4,109	1,623
Adjusted EBITDA Coal/Nuclear	800-1,200	800-1,200	431	501
Adjusted EBITDA Group	7,100-7,700	5,800-6,400	4,540	2,124
Adjusted depreciation & amortisation	-2,100	-2,200	-1,034	-753
Adjusted EBIT	5,000-5,600	3,600-4,200	3,506	1,371
Adjusted financial result	-550	-550	-121	-124
Adjusted taxes on income	20%	20%	-677	-187
Adjusted minority interest	250	250	-76	-110
Adjusted net income	3,300-3,800	2,200-2,700	2,632	950

*Some prior-year figures restated.

Biomass is still the most important form of sustainable energy in the Netherlands with 54% market share

Total consumption of Biomass in the Netherlands



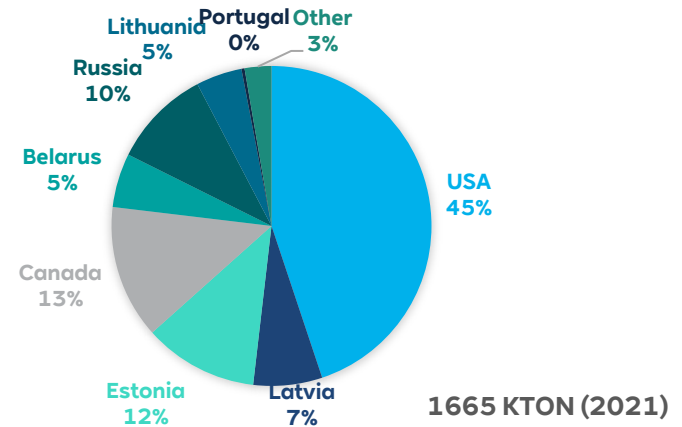
2013: Last year of MEP subsidy for co-firing

2015: Decrease minimum MW from 5 to 1MW

2019 Restart co-firing with SDE+ subsidy

Increase in the use of sustainable biomass in the Netherlands in line with the trend for a rapid increase of renewable energy

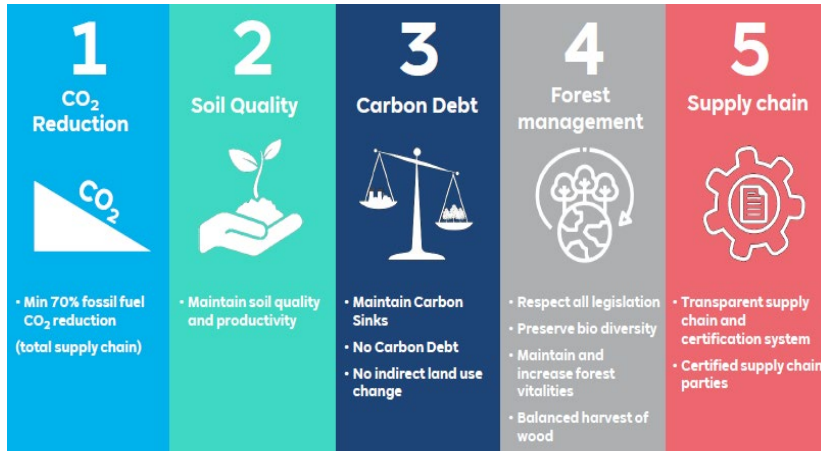
Origin and tonnage of Biomass used by RWE in 2021



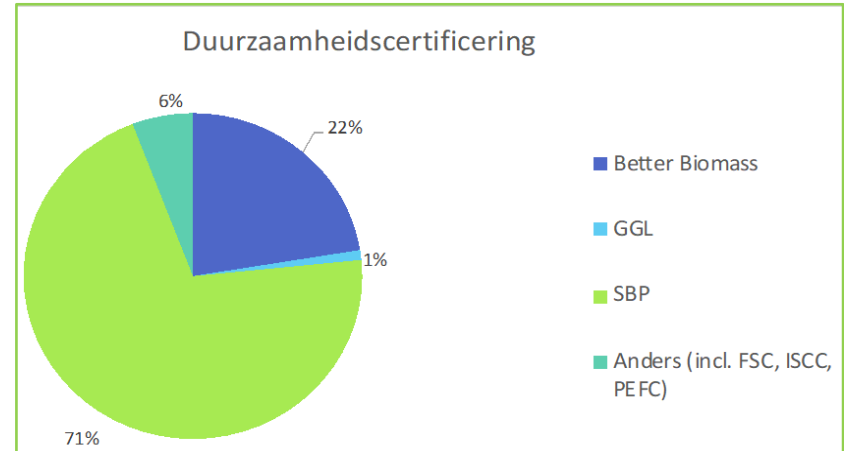
North-America and the Baltics account for 75% of used biomass After the invasion of the Ukraine we stopped importing from Russia and Belarus

Biomass is certified, and in the Netherlands, we have the most stringent sustainability framework of the world

Certification ensures sustainability of the entire value chain

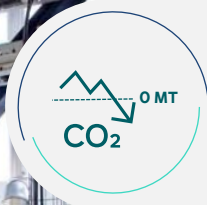


Sustainability certification in the Netherlands



There is no other commodity that has to apply such stringent regulations it is an example for other industries and the basis for sustainability & circularity

The sustainable biomass programme is the most common certification in the Netherlands All certifiers stopped working with Russia and Belarus



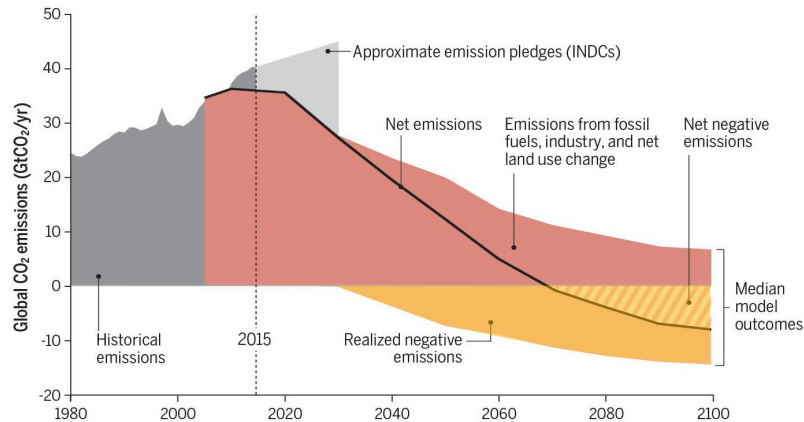
BECCUS: the case for negative emissions

“Without negative emissions, in the sense that we need to remove CO₂ from the atmosphere, the 1.5 degree target will be unachievable”

IPCC

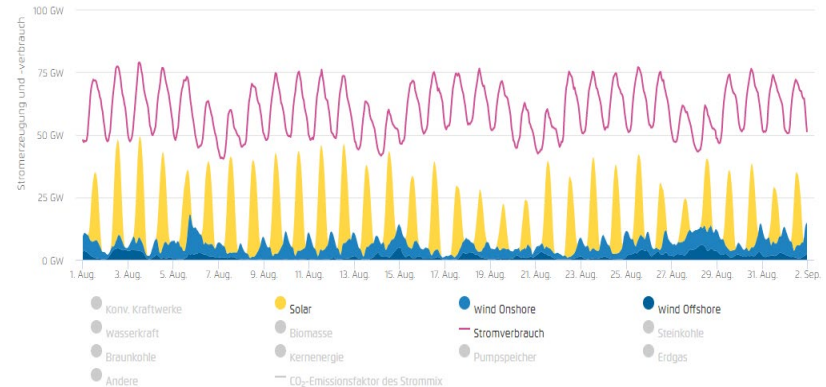
There are two unavoidable factors why Bio Energy Carbon Capture Storage and Usage is necessary

CO₂ reduction towards zero emissions is not enough...



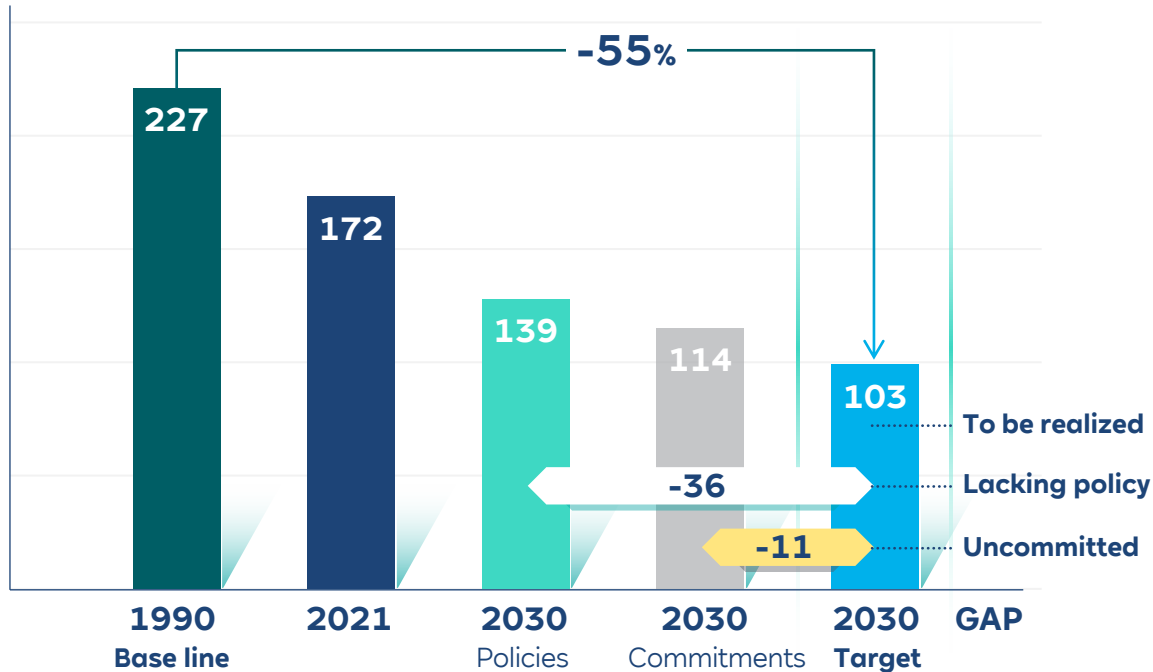
From 2035 onwards we see the need for negative emission Besides that all other measure are needed to stay on the <2 degree pathway

... Without 30% dispatchable power in the mix we cannot maintain the electricity grid



In the Netherlands alone the electricity consumption will grow from 120 to 200 TWh in 2030 after which we need to double it again towards 2050

CO₂ reduction efforts in the Netherlands need to step up while further reductions are more difficult to achieve

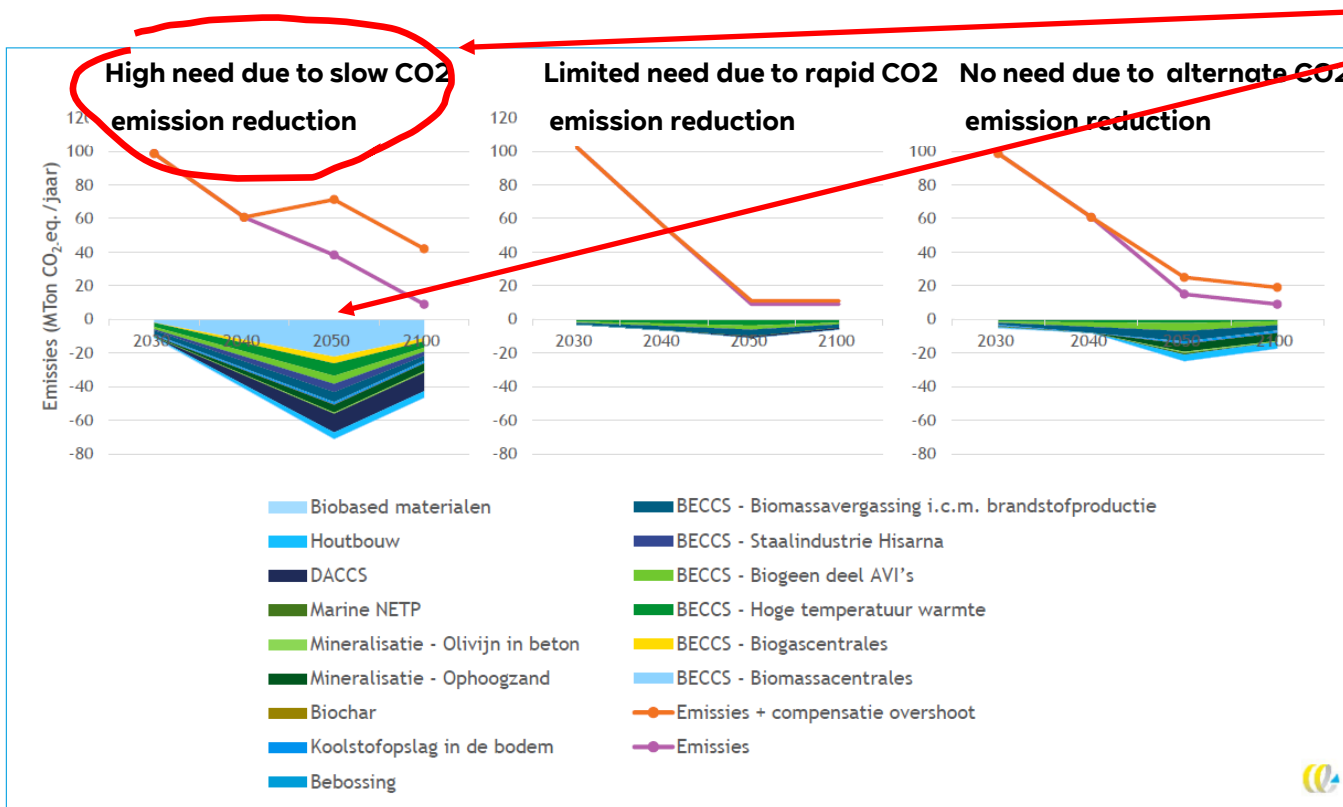


A minimum 11 Mton gap is still lacking in plans and policies

- The Netherlands has **committed to 55%** CO₂ reduction vs 1990
- According to the “Klimaat- en Energieverkenning 2022”, current policies will fall short of **11-36 Mtons/a** to reach 2030 coalition treaty target of -55%. (22-46 Mtons/a in case of the more “prudent” 60% target)

According to Klimaat- en Energieverkenning 2022, current policies will fall short of **11-36 Mtons/a** to reach 2030 target

The need for negative emissions in 3 scenario's

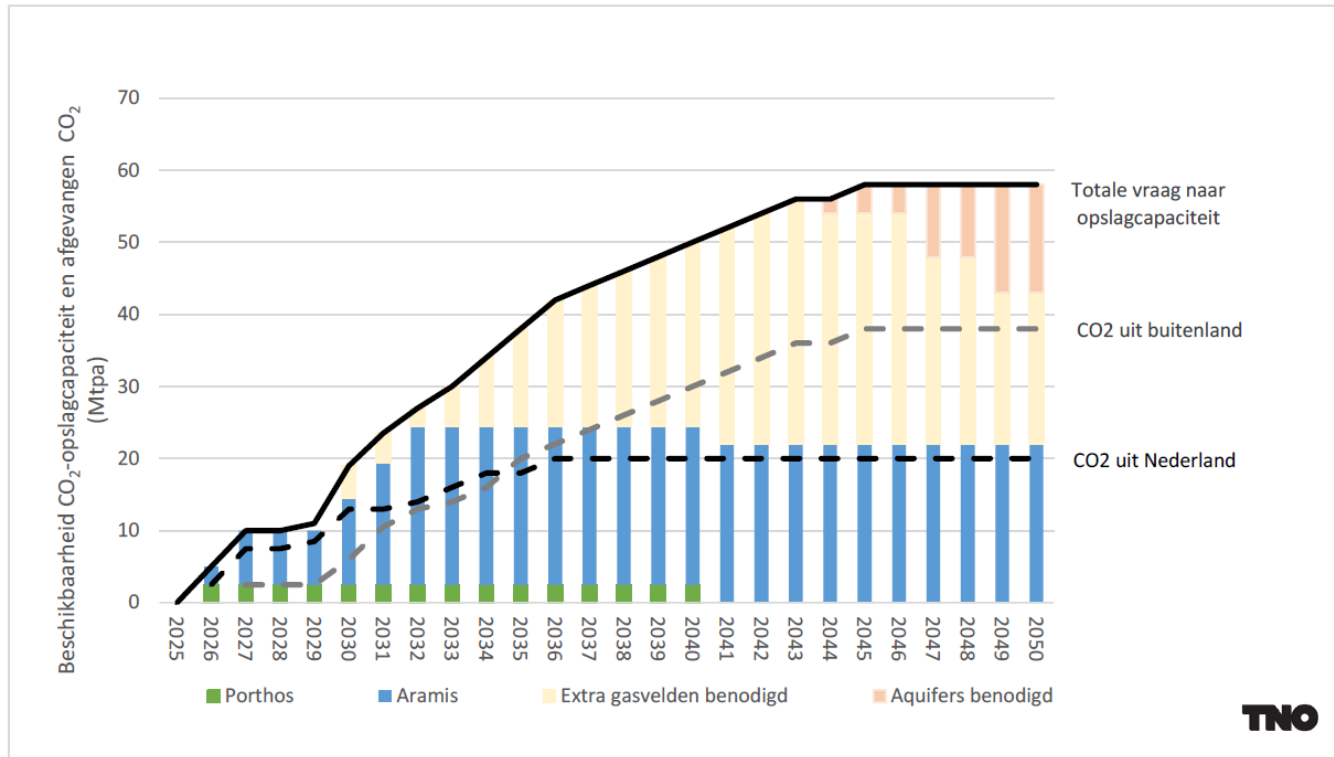


Most likely!



CE Delft, June 2023

Storage capacity being developed and projected 'supply' of captured CO₂ until 2050



TNO

RWE



11&12 Oct 2022 Biomass Power, On Stockholm 2022

What will Eemshaven look like in 2030



 **Other RWE developments in the area:**
NorthH2, Onshore Wind, Solar park >100MW

Hydrogen

- Eemshydrogen phase I + II 50MW /100MW
- HKW 600MW
- H2 innovation center: e.g. SOEC

Battery park

- >100MW Battery to be scaled up
- Battery innovation: e.g. redox flow + grid forming capacity

Biomass conversion

- InCofi Eemshaven 30%
- 100% Biomass conversion

Heat LNG Terminal

- 200 MWth sustainable heat
- Enough heat to supply northern part of the Netherlands

CO₂ capture & storage

- CO₂ capture for BECCUS 8 Mton CO₂ sink
- CO₂ compression & transport

Solar park

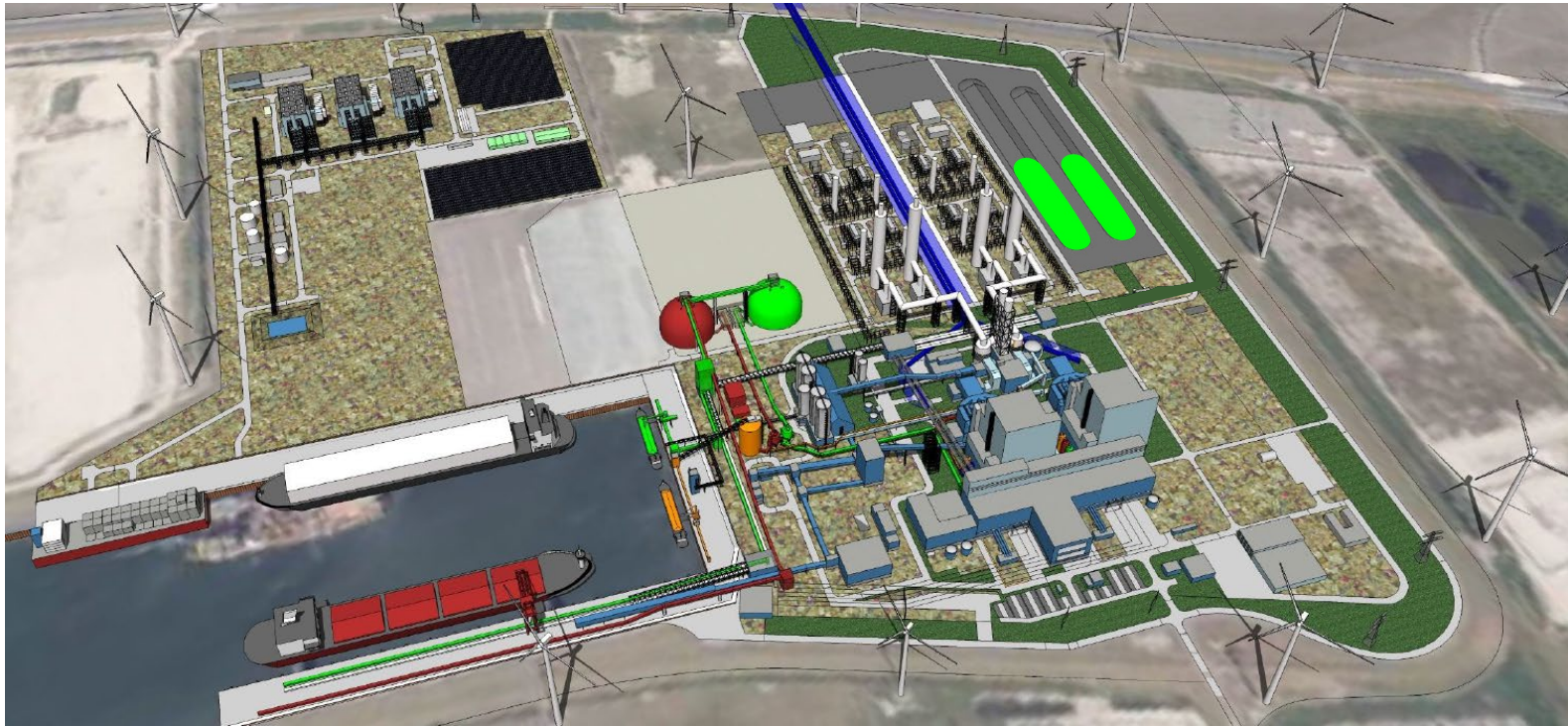
- 5 MW Solar
- Innovations: Battolyser

 **Development >2030:** Hydrogen, Batteries, and Green carbon usage



Carbon Capture conversion @ Eemshaven

Visualization – Situation in 2028+

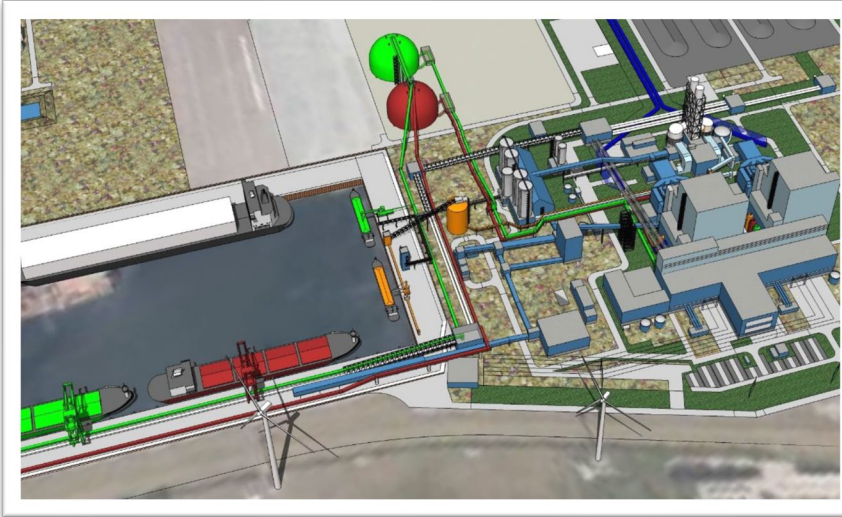


- Existing biomass equipment
- 50 % biomass conversion
- 100 % biomass conversion



Biomass conversion & Carbon Capture plant

Biomass conversion



~5 million tons biomass logistics

Carbon Capture



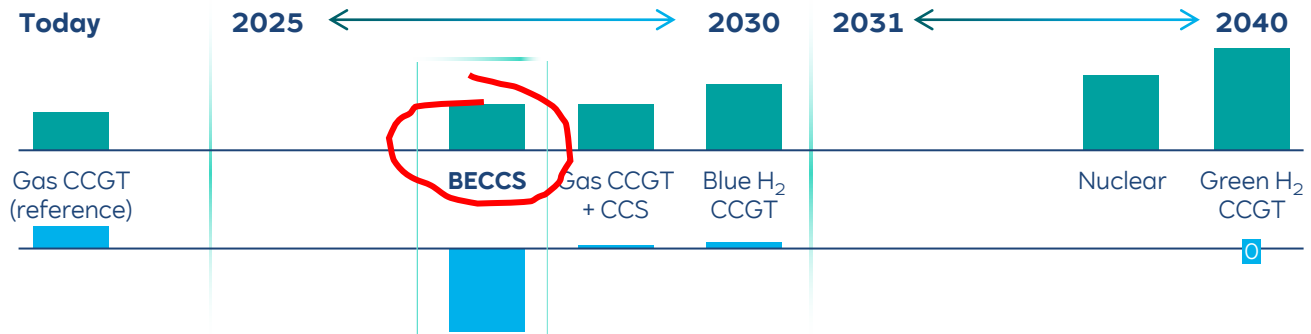
~10 million tons carbon capture plant

BECC(U)S is scalable towards 2030 and as a carbon sink can significantly contribute to 2030 targets and is necessary beyond

Decarbonization Options over time

LCOE @ 4500 FLH
[€/MWh]

CO₂-Emissions
[kg/MWh]

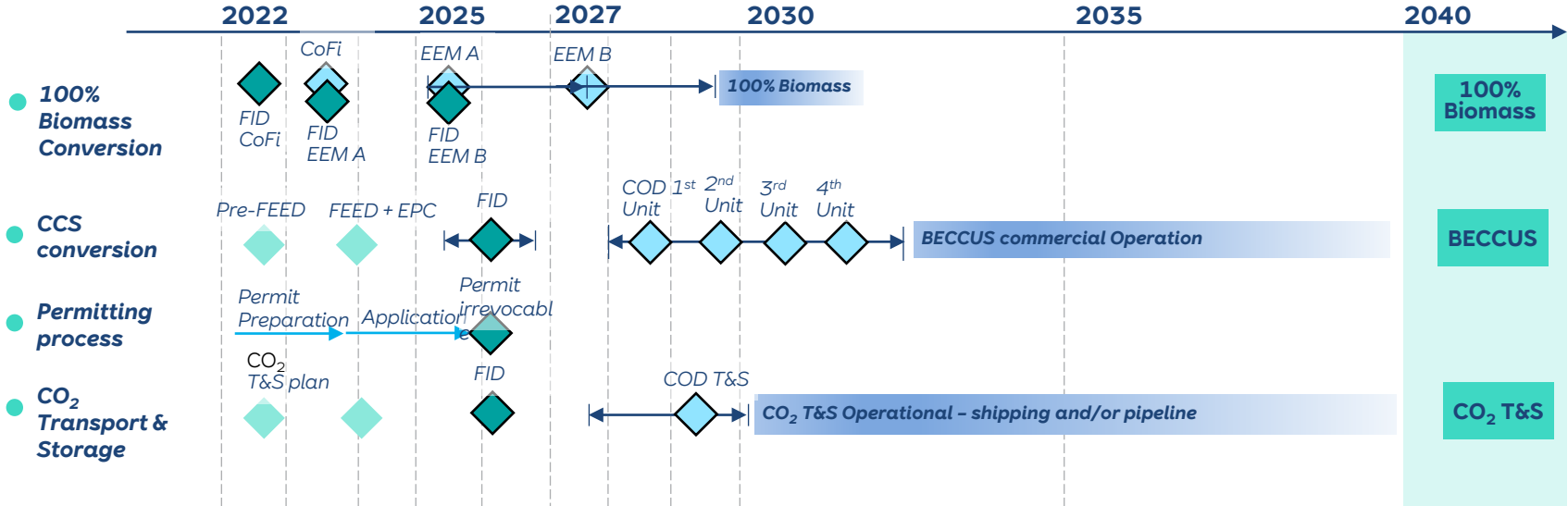


A mix of all available solutions required for a balanced portfolio and to meet target of increasing CO₂ free production by 70% only **a few can be realized before 2030**

Criteria	Icon	Today	2025	2030	2031	2040
CO ₂ effect	CO ₂	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
Sustainable	Recycling	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
Affordable	Wallet	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
Flexibility	Gears	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
Security of supply	Lock	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
Current base case		☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆

Planning for the BECCUS project: ambitious but realistic

Permitting and policy is crucial for the success of the project



- Major milestone
- Development

COD



Besides technical challenges and permitting there are several policy actions needed for example valuation of negative emissions as a product and capture the value of green CO₂



Biomass closing the circle

“You will die but the carbon will not; its career does not end with you. It will return to the soil, and there a plant may take it up again in time, sending it once more on a cycle of plant and animal life”

Jacob Bronowski

When summing everything up it becomes clear that we need to balance our goals and think in value chains connecting the dots



Neutral to Negative

The electricity sector needs to reach **net zero by 2040** and become **CO₂ negative** towards **2050**



Sustainable

The system needs to be **sustainable, circular** and something we can give to our **future generations**



Flexible

With wind and solar being the workhorse of electricity generation, we still **need 30% CO₂ free dispatchable power**



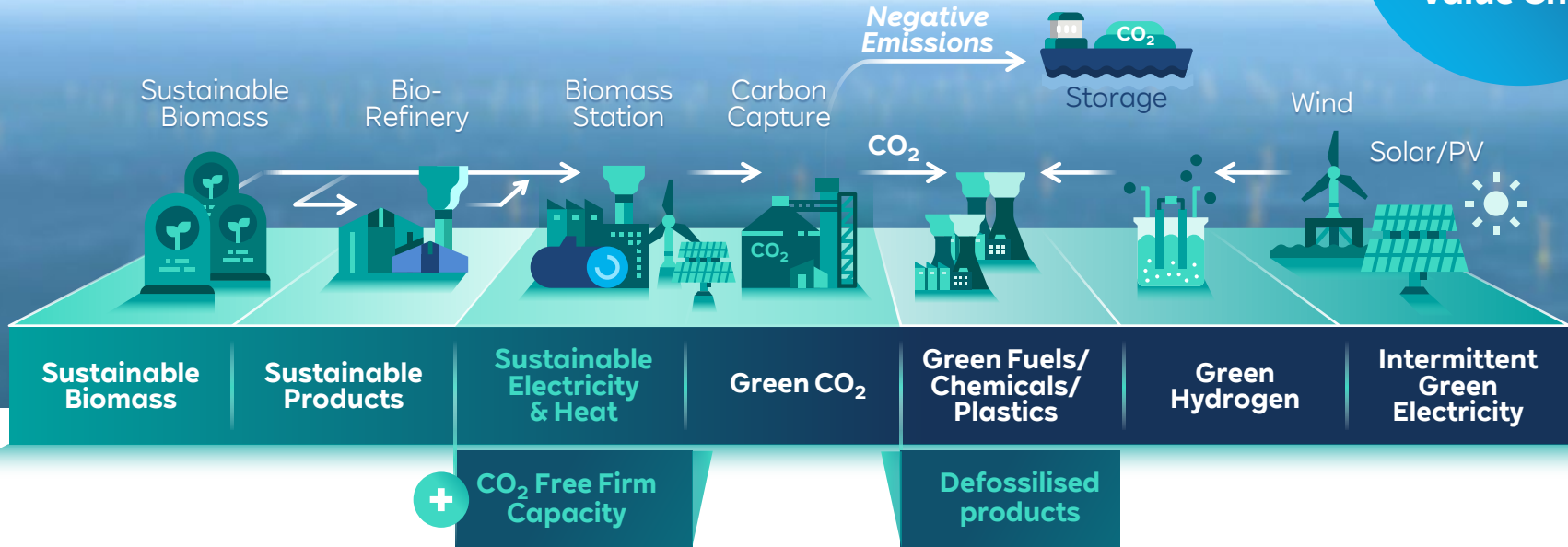
Secure & Affordable

Recent events show once more, that security of supply and affordability are **crucial for our prosperity**

Bottomline: deliver this whilst growing our electricity system 400 %

For us projects like BECCUS are more than a 100% biomass conversion and CO2 capture, it is part of a circular value chain

Example of Eemshaven Biomass Value Chain



“From Linear to Circular, the Factory as a Forest”

