



Towards Net Zero: Decarbonising flexible generation

2025 IERE-TPC Net-Zero Workshop | May 2025

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- 1. Growing Green**
2. Decarbonising RWE Generation
3. Project focus: BECCUS

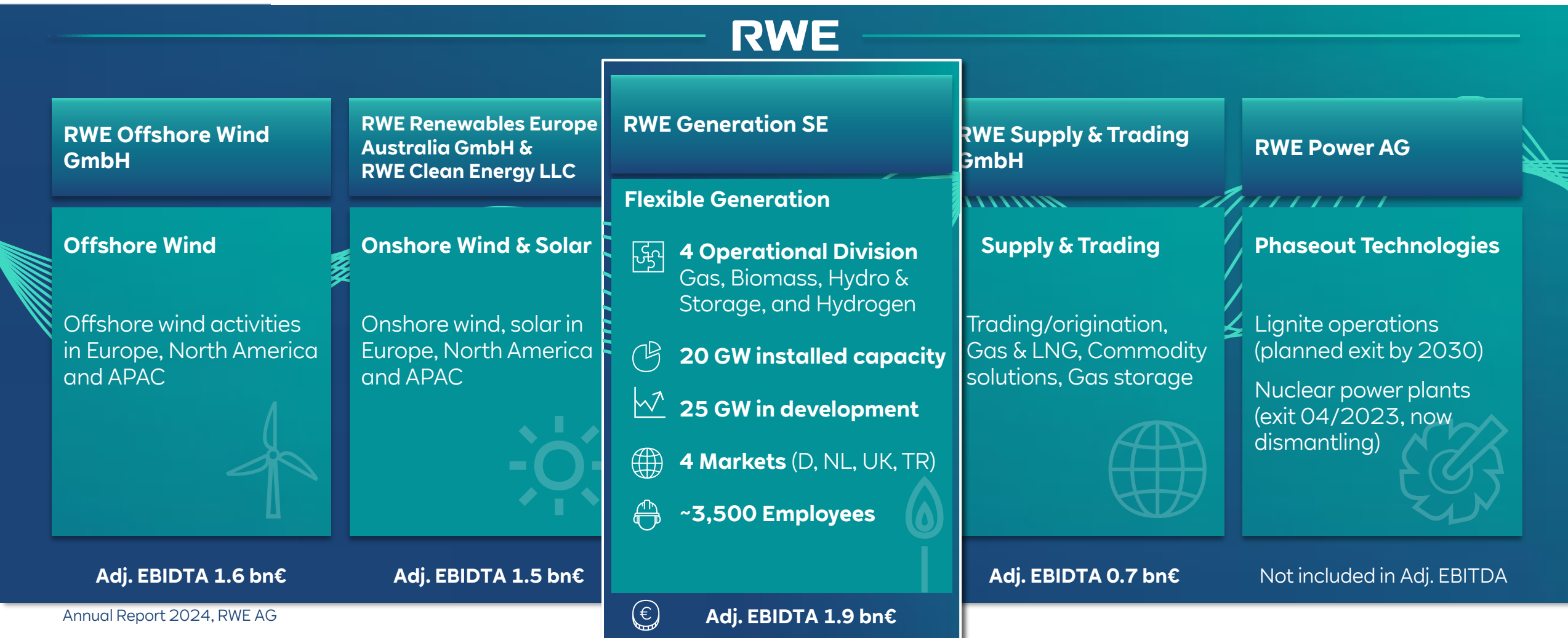
Growing Green

Our energy for a sustainable life

- RWE provides energy security; we ensure a secure supply of electricity;
- Through renewable solutions as wind, solar, hydro and green hydrogen when we can; and
- Through our conventional power stations when we must. Our flexible generation fleet is a core piece of our strategy, Growing Green;
- Growing Green outlines a 2040 net-zero target matched by an ambitious investment and growth programme.



Business model fully aligned with our strategic focus on the energy transition.



Annual Report 2024, RWE AG

1. Growing Green
- 2. Decarbonising RWE Generation**
3. Project focus: BECCUS

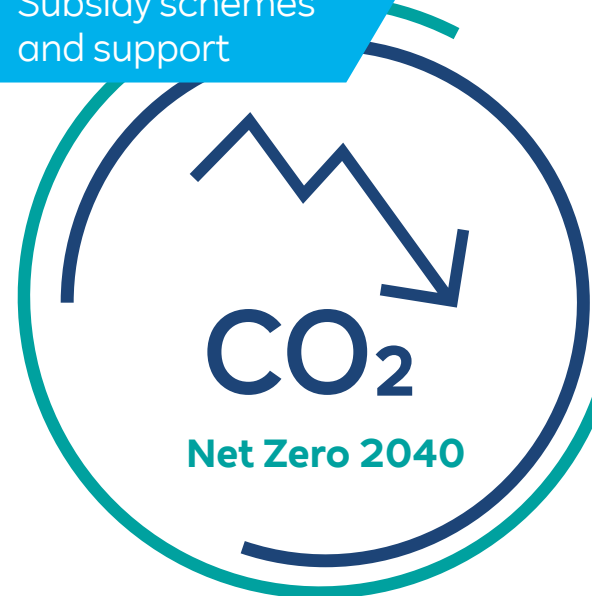
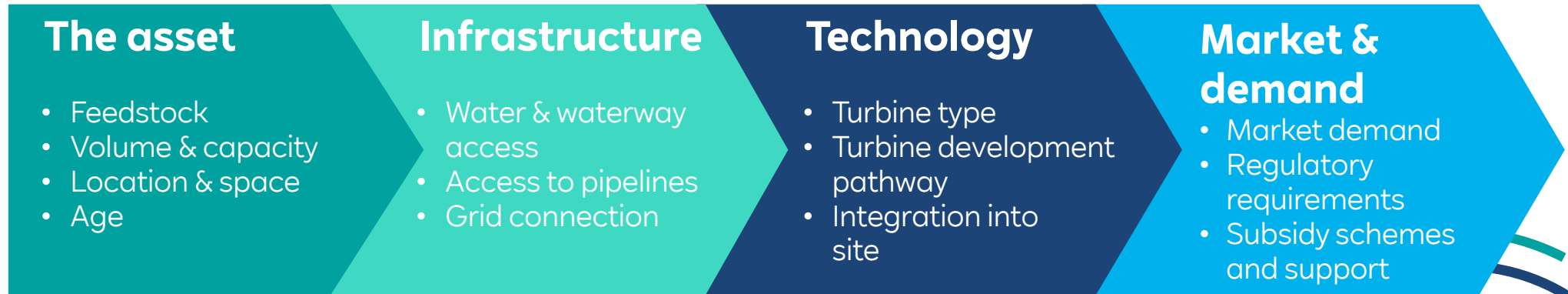
How to decarbonise?

Defining the best pathway

Flexible Generation



24 GW



* Source: RWE Factbook 2024

To deliver on our Net Zero 2040 target, we prepare to decarbonise our conventional fleet

Decarbonization measures implemented at RWE Generation sites

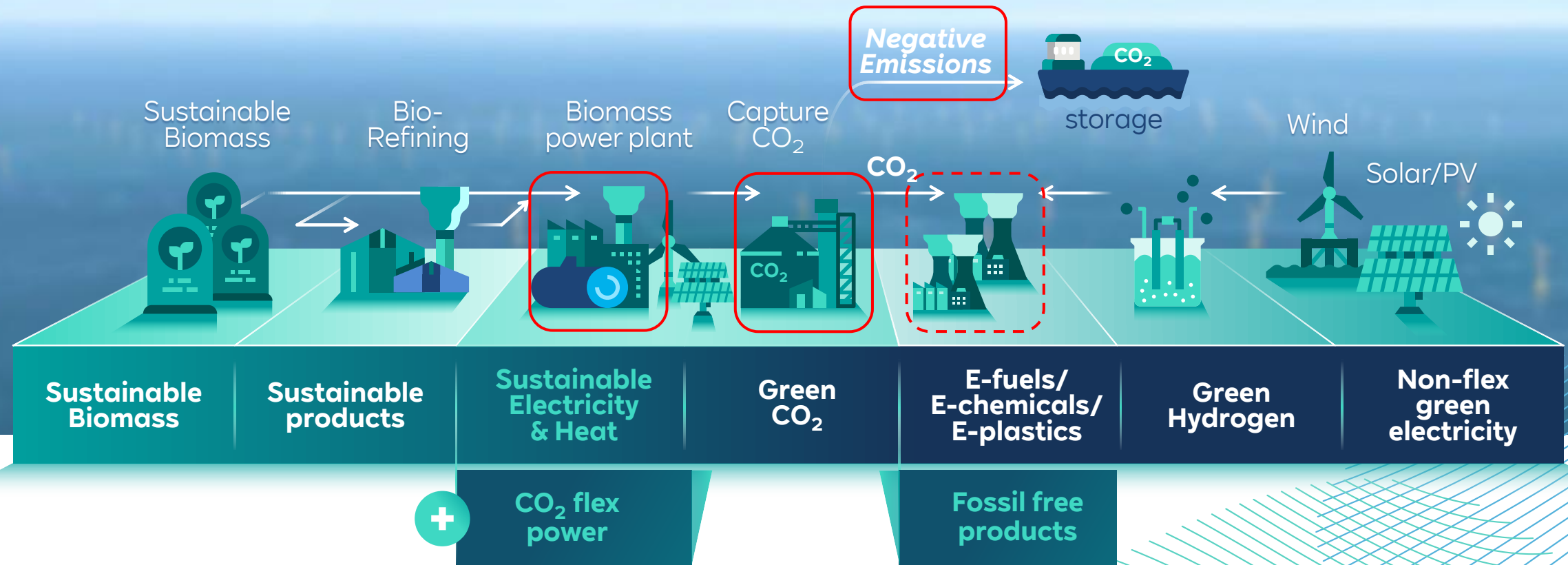


+ growth ambitions for 2030

-  Ramp-up of **Battery** activities
-  Construction of **new build Gas** in Germany and **operation as back-up**
-  Development and ramp-up **H2-electrolysers**

1. Growing Green
2. Decarbonising RWE Generation
3. **Project focus: BECCUS**

We need to start NOW and team up with Industry to make a real impact on CO₂ reduction and to create a sustainable future



The Eemshavencentrale



**RWE is a safe
operator**



**Key employer
in the area**

**Modern plant
(COD
2015)**



**1,560 MW
output**



**Future:
100%
biomass**



**Now: hard
coal and
biomass**



Decarbonising the Eemshavencentrale

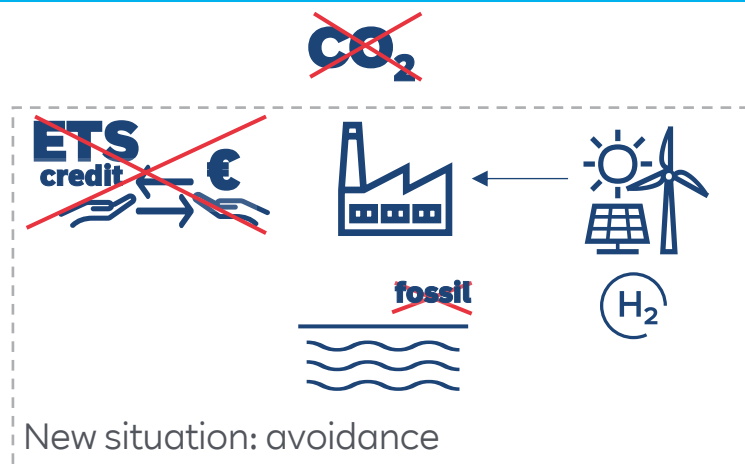
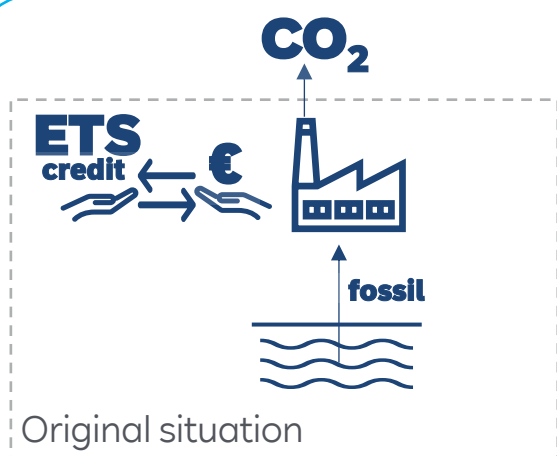
Bio-energy, carbon capture, utilisation and storage (BECCUS)

- RWE explores the possibility to apply BECCUS at the Eemshavencentrale
- Technical and economic feasibility is studied
- The Eemshavencentrale is expected to capture between 8 and 10 million ton of CO₂ yearly
- Sustainable biomass is CO₂ neutral, which means our BECCUS projects reduce the amount of carbon in the atmosphere → **Negative Emissions**



Carbon Dioxide Removal (CDR)

is different from avoidance of CO₂ emissions by ETS

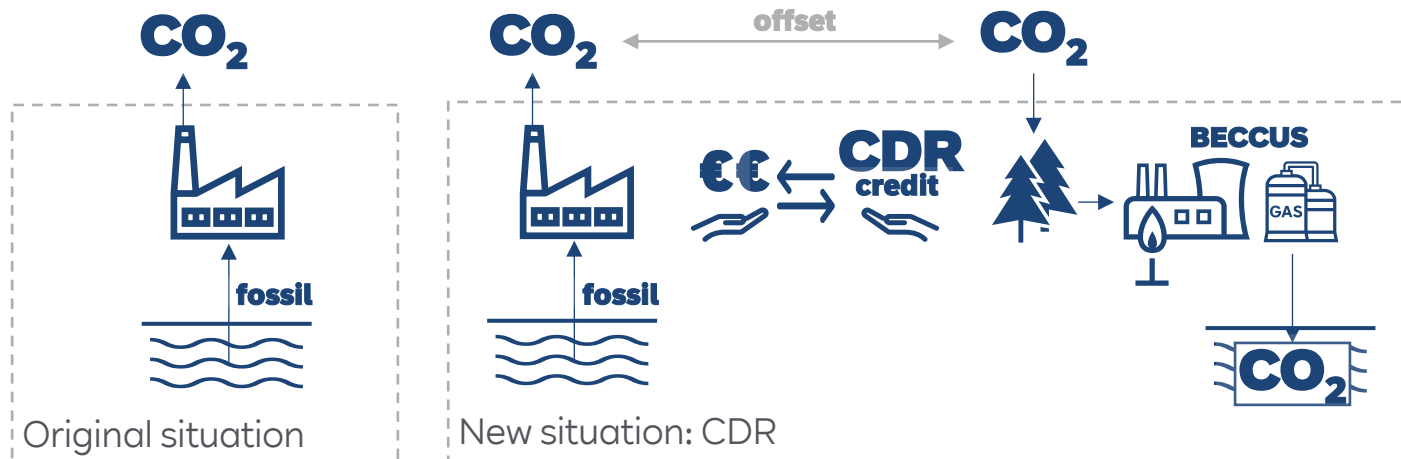


avoidance = ETS credit

- Original emissions are **replaced** by emission free technology
- avoidance exempts a company from buying ETS credits in an ETS market

Carbon Dioxide Removal (CDR)

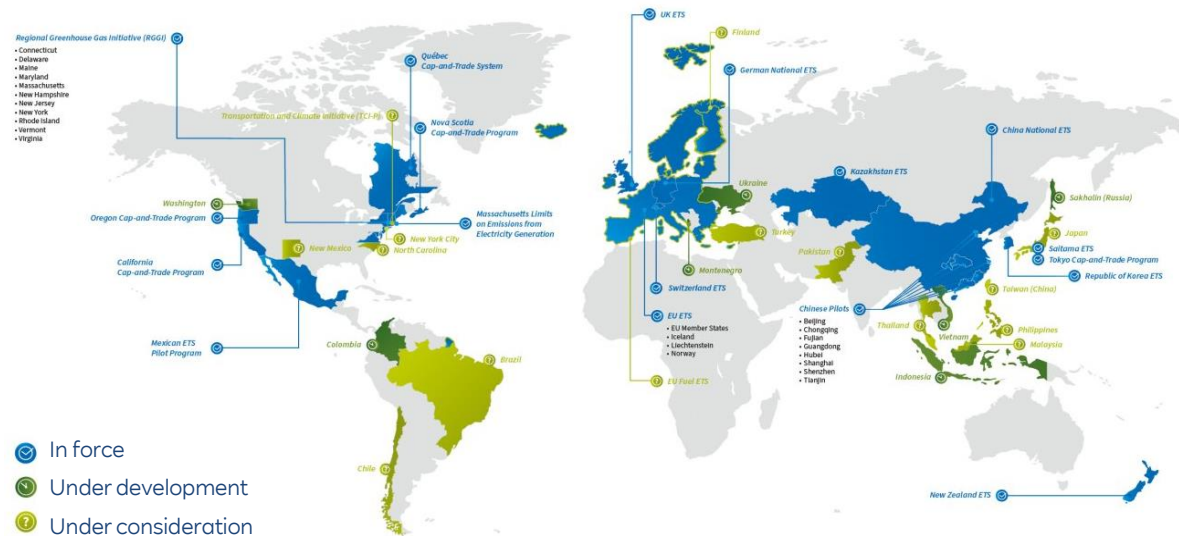
- Original emissions remain, but are **offset** by CDRs
- CDRs are needed for hard-to-abate emissions and provide a cost-effective solution
- For companies outside ETS



CDRs are traded on two types of markets

Voluntary market for CDRs

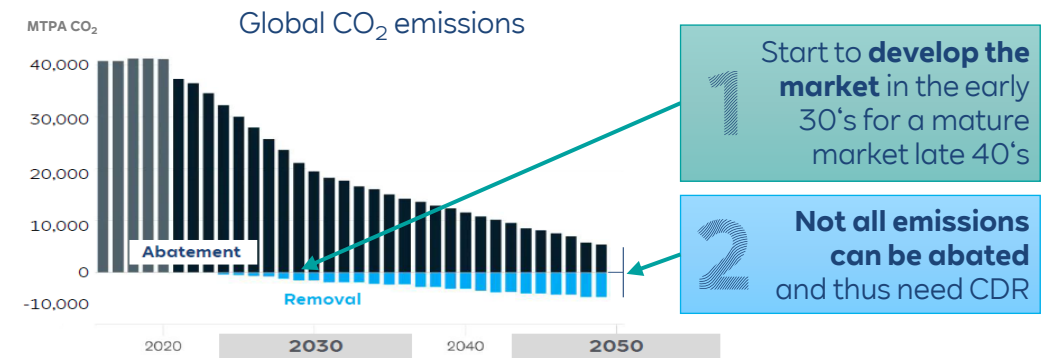
- Who: Companies that fall **outside an Emission Trading System** (EU ETS, South Korea, etc). Mainly US companies.



- Why: Companies are driven by **individual targets** on hard-to-abate emissions. Mostly, these individual green targets result in **license-to-operate, ESG-rating or value in sales**.
- Currently, majority of sales are non-permanent solutions
- CDR price is not linked to ETS price, as buyer operate outside of ETS

Compliance market

- Some ETS markets integrated CDRs, but EU ETS not yet
- Why: Integration of CDRs in EU ETS is driven by gov't to:

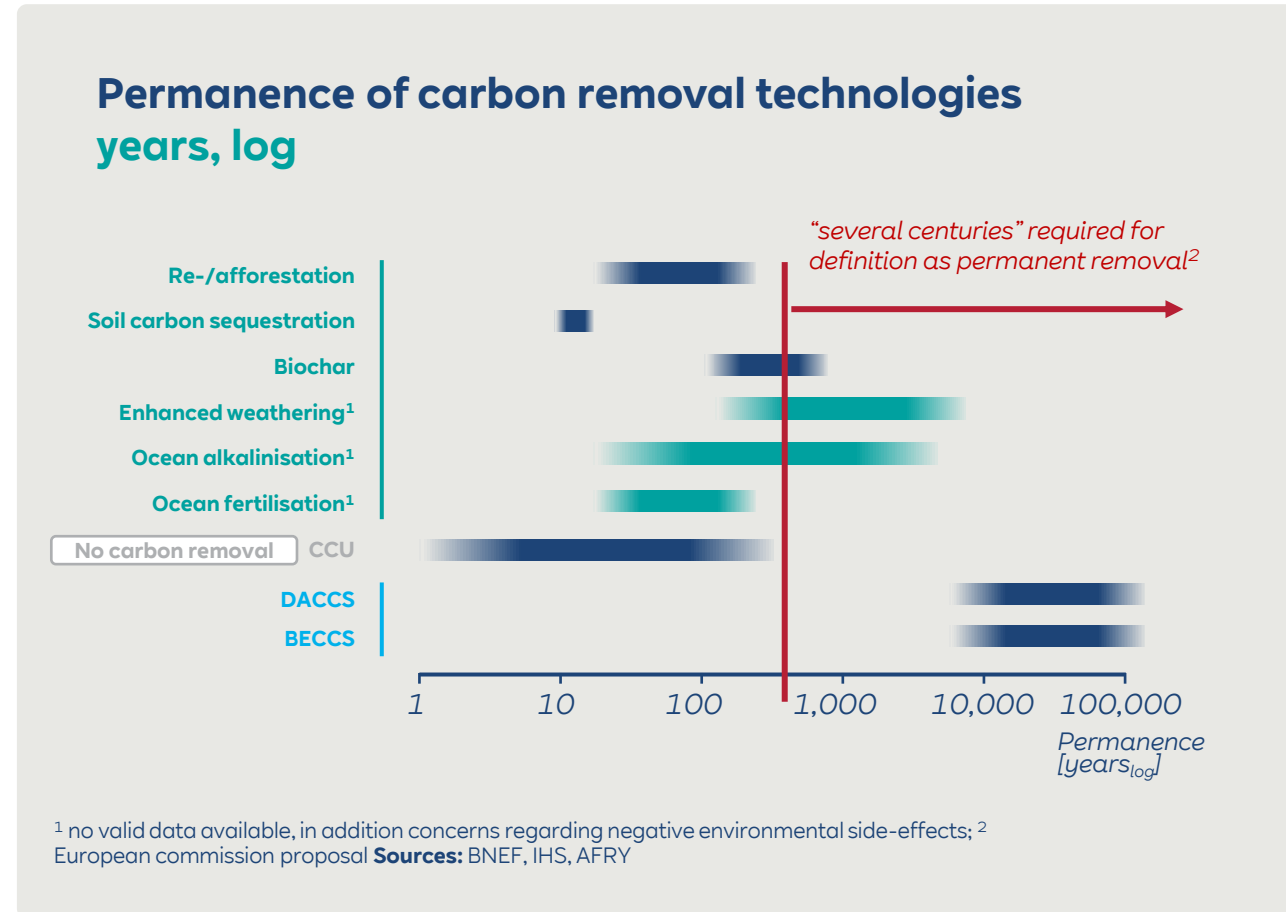


Source: IPCC 2021 & McKinsey 2021, adapted by RWE in RWE Carbon Removals Study, 2023

- EU works on integration of CDRs in the EU ETS. Market design is unknown, but some suggestions are:
 - Mandate a **volume percentage** for compliance through CDR credits, creating a stable demand
 - Create a **separate market** for CDRs
- Who: Target industries depend on market design

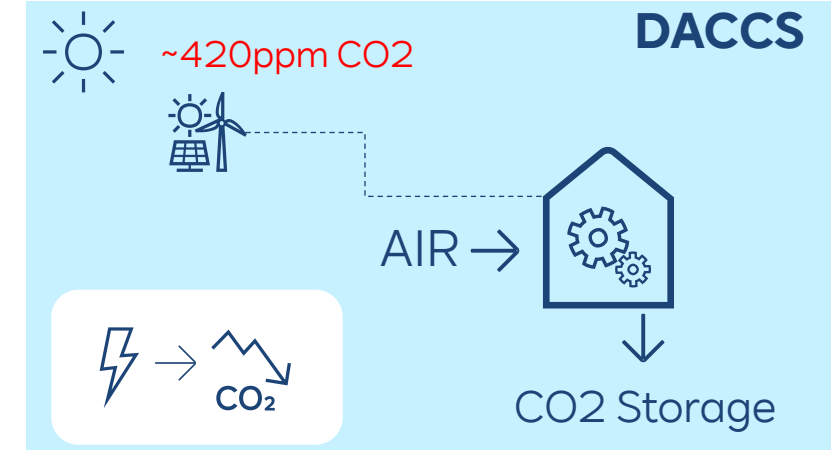
Global CDR market development

Demand for negative emissions requires capacity expansion

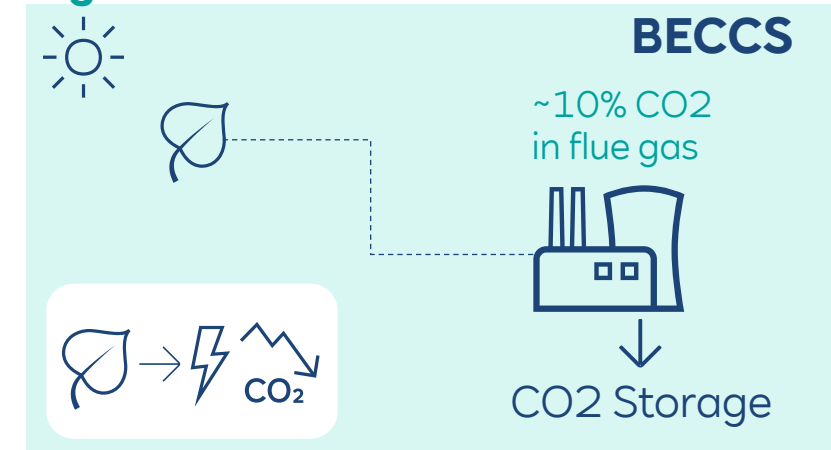


¹ calculated based on liquid DACCS and 4,000 MtCO₂ demand, ² Anderson and Peters 2016, 380–700 million hectares; 2050 breakdown shown for high scenario. **Sources:** McKinsey 2021, IPCC 2021, IEA 2022, Walton 2020, Friedmann 2020

Low concentration of CO₂



High concentration of CO₂



The future site

(Artist impression)



Lessons learned at Niederaußem power station

Lignite-
fired
power plant



Operational,
producing 2.2
GW

Home to the
Niederaußem
Research &
Innovation
Center

115,000+

Operating hours
of the CCS facility

Participated in
multiple EU &
national funded
R&D projects

(i.e. MefCO₂, Act Align
CCUS, Take-Off)

Studies focus
on capture rate,
solvent
degradation
and emission
reduction

7,2

Ton of CO₂
captured per
day

Decarbonising the Pembroke plant

Exploring H₂ conversion

Dual pathway

- Located in the South Wales Industrial Cluster
- Potential for both hydrogen conversion and application of CCS
- Currently, technical and economic viability of applying both is assessed

Hydrogen conversion

- Pathway depends on security of required H₂ volumes
- Studies into feasibility of conversion to high volume blends of H₂/Natural Gas, and pure H₂ combustion illustrate CO₂ savings achievable

Natural gas & CCS

- Focus on technical feasibility and site integration
- Exploring options with regards to transport of captured CO₂

Pembroke Power Station



**RWE is a safe
operator**



**Key employer
in the area**

**Modern plant
(COD
2012)**



**2,181 MW
output**



**Future:
gas & CCS or
H₂ conversion**



**Now:
100%
natural gas**



Research priorities



SCOUTING

- **(Alternative) Decarbonisation and Carbon Capture Technology Scouting**
- **Clean fuel Scouting**
- **Flex Power Generation and Demand Technology Scouting**



CARBON CAPTURE

- **Waste streams & emissions**
- **Solvent degradation processes**
- **Capture Process Modelling and Optimisation**
- **CO2 utilisation**



HYDROGEN COMBUSTION

- **H2 blending up to 100%**
- **Balance of plant**
- **Low NOx emission technologies**

RWE

**Thank you.
Questions?**

We play a key role in our core markets

Our renewables & flexible generation are needed to meet demand

Germany

- Ambition to reduce national CO₂ footprint by 65% in 2030 (compared to 1990), Net Zero by 2045;
- German electricity demand is expected to grow by circa 30% by 2050;
- The *Kraftwerksstrategie* prioritises (green) hydrogen conversion over CCS;
- Opening for CCS as (temporary) solution if hydrogen supply can't meet demand.

The Netherlands

- Ambition to reduce national CO₂ footprint by 55% in 2030 (compared to 1990), Net Zero by 2050;
- Electricity demand expected to skyrocket; the national grid operator's most conservative scenario forecasts demand to triple by 2050;
- Governmental focus on renewables, hydrogen and nuclear, but supports CCS infrastructure development

The United Kingdom

- Ambition for the power sector to be Net Zero by 2030;
- The national grid operator projects electricity demand to increase by circa 50% by 2036, and be doubled by 2050;
- The government acknowledges firm and flexible power plants will be needed beyond 2030;
- CCS is seen as part of the solution.