

**RWE**

# Factbook 2024



# Disclaimer

This document contains forward-looking statements. These statements are based on the current views, expectations, assumptions and information of the management, and are based on information currently available to the management. Forward-looking statements shall not be construed as a promise for the materialisation of future results and developments and involve known and unknown risks and uncertainties. Actual results, performance or events may differ materially from those described in such statements due to, among other things, changes in the general economic and competitive environment, risks associated with capital markets, currency exchange rate fluctuations, changes in international and national laws and regulations, in particular with respect to tax laws and regulations, affecting the Company, and other factors. Neither the Company nor any of its affiliates assumes any obligations to update any forward-looking statements.

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# RWE Group



# Energising the future. For 125 years.

## Now, RWE is shaping the new energy era.



**1898**  
The future starts today – more than 125 years ago.



Commissioning of RWE's first hydropower plant.  
**1905**



**1928**  
RWE builds the first cross-regional high-voltage transmission line.



Lignite is the key to affordable electricity.  
**1914**



Powering the economic miracle.  
**1950s**



**1970s**  
Security of supply thanks to nuclear power.



**1976**  
RWE researches, develops and tests renewables.



RWE commissions North Hoyle in the UK – one of the world's first commercial offshore wind farms.  
**2004**

**2016**  
Stock market launch for retail and grid business and foundation as generation-only company.



**2019**  
Transaction with E.ON.

RWE becomes one of the world's leading generators of renewable electricity.

**2023**  
RWE acquires Con Edison Clean Energy Businesses and becomes major solar player in US.



**125 years RWE**

# Company overview

## Key facts

- **HQ Location** Essen
- **Employees** ~20,135
- **Incorporation** 1898
- **Profile & Main activities** A leading operator of generation assets with strong commercial platform
- **Geographic footprint** Europe, North America and APAC

## Executive Board



**Dr. Markus Krebber**  
CEO

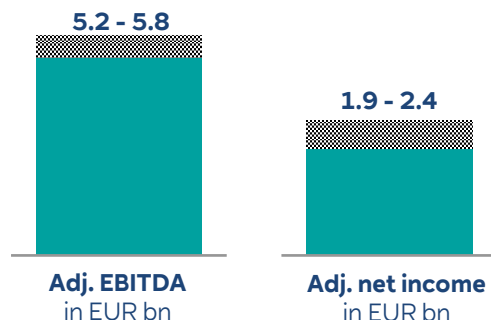


**Dr. Michael Müller**  
CFO



**Katja van Doren**  
CHO

## Guidance for FY 2024 in EUR bn



**Earnings expected  
to be at lower end  
of guidance range**

## Shareholders

### Ownership

Other institutional shareholders	73%
Private shareholders	11%
Qatar Investment Authority (QIA)	9%
BlackRock	6%
Employee shareholders	1%

### Market cap.

€25.6bn<sup>1</sup>




### Shares

~744mn

<sup>1</sup> As of 31 July 2024.

# RWE at a glance

## Driving force behind the energy transition – with a powerful position

<p><b>Well-established</b> robust company with strong financial performance</p> 	<p><b>125 years</b> track record</p>	<p><b>~20,135</b> employees</p>	<p><b>€25.6 bn</b> market cap</p>	<p><b>5 - 10% p.a.</b> dividend growth target</p>	<p><b>€3.1 bn</b> dividend payments past 5 years</p>
<p><b>Experienced</b> operator of power generation assets with strong commercial platform</p> 	<p><b>46.5 GW</b> installed capacity<sup>1</sup></p>	<p><b>~130 TWh</b> total power generation</p>	<p><b>~88 TWh</b> power generation excl. Phaseout technologies</p>	<p><b>70%</b> share of secured gross margin wind &amp; solar</p>	<p><b>Top 500</b> blue chip customers rely on RWE's commodity solutions</p>
<p><b>Enhanced</b> investment for energy transition</p> 	<p><b>€55 bn</b> Net cash investments 2024-2030</p>	<p><b>&gt;65 GW</b> Net capacity target by 2030</p>	<p><b>≤3.5x</b> Leverage factor post 2025</p>	<p><b>&gt;100 GW</b> Development Pipeline</p>	<p><b>Net Zero</b> by 2040</p>

<sup>1</sup> Pro rata view as of 31 December 2023.

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

## Offshore Wind



- Offshore wind activities in Europe, North America and APAC



Adj. EBITDA: €1,664 m

## Onshore Wind/Solar



- Onshore wind, solar and storage activities in Europe, North America and APAC



Adj. EBITDA: €1,248 m

## Flexible Generation



- Hydro, biomass, gas-fired power plants and storage solutions in Germany, UK, NL
- Hydrogen projects



Adj. EBITDA: €3,217 m

## Supply & Trading



- Trading/origination
- Gas & LNG
- Commodity solutions
- Gas storage



Adj. EBITDA: €1,578 m

## Phaseout Technologies

- German lignite operations (planned exit by 2030)
- German nuclear power plants (exit 04/2023, now dismantling)

Adj. cash flow: €117 m

Note: Pro forma figures as of 31 December 2023.



# RWE's Executive Board

## Chief Executive Officer (CEO)



### Dr. Markus Krebber

**Born 1973, with RWE since 2012,  
Member of the Executive board of RWE AG  
since 2016, CEO since 2021.**

#### Group departments

- Energy Transition & Regulatory Affairs
- Group Communications & Public Affairs
- Legal, Compliance & Insurance
- Mergers & Acquisitions
- Strategy & Sustainability

## Chief Financial Officer (CFO)



### Dr. Michael Müller

**Born 1971, with RWE since 2005,  
Member of the Executive board of RWE AG  
since 2020, CFO since 2021.**

#### Group departments

- Finance & Credit Risk
- Tax
- Accounting
- Controlling & Risk Management
- Investor Relations

## Chief Human Resources Officer (CHO) & Labour Director



### Katja van Doren

**Born 1966, with RWE since 1999,  
Member of the Executive board of RWE and  
CHO since 2023.**

#### Group departments

- Human Resources
- Information Technology
- Corporate Transformation
- Internal Audit & Security

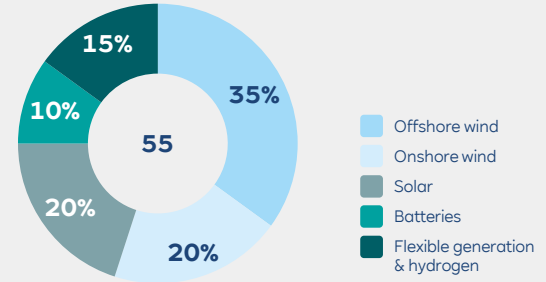
# We have accelerated our profitable growth across technologies and regions

## Net cash investments 2024 - 2030 EUR bn

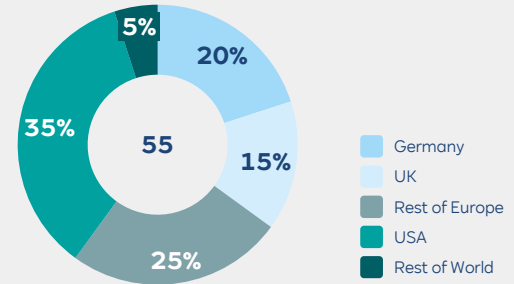
55  
EUR bn

~95%  
EU  
Taxonomy  
aligned

### Split by technology



### Split by regions

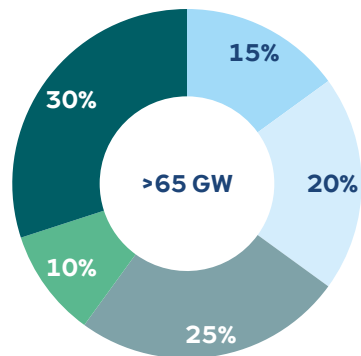


# We will operate a well diversified portfolio in 2030

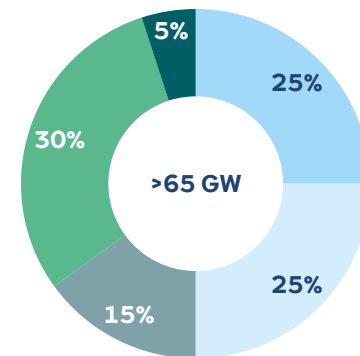
Installed net capacity target  
2030

>65  
GW

Diversified portfolio across  
technologies

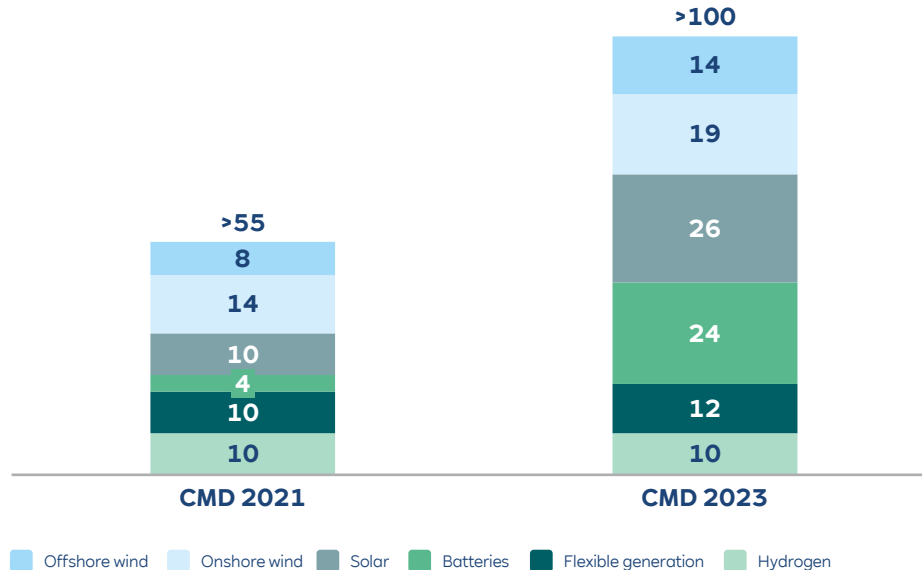


and regions

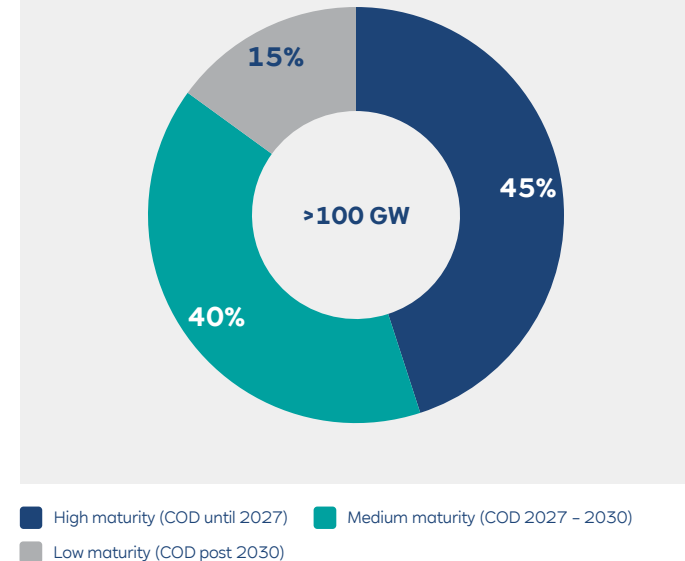


# Our extensive pipeline allows the selection of the most attractive investments

## Development pipeline GW, pro rata



## Pipeline maturity



# We are continuing our profitable growth on the back of excellent capabilities and favourable market fundamentals

## Favourable market fundamentals

**Strong positioning** in our core markets **with significant investment needs** in the energy system; **policy support for energy transition** will adapt to new market fundamentals

## Extensive pipeline

**Strong pipeline across technologies and regions** that allows us **to select and focus** on projects with the most **attractive risk-return profile**



8%  
average IRR for  
new projects

## Financial headroom

**Strong balance sheet** and high-cash generating business portfolio

## Experienced team

**Extensive inhouse know-how across technologies** and within **core markets**, as well as a **best-in-class commercial platform**

# We stick to strict investment criteria to ensure attractive returns

## IRR requirements for investments

### Offshore wind



Global

7% 11%

### Onshore wind, solar and batteries



Europe and USA

6% 10%

### Flexible generation and hydrogen



Europe

8% 12%

## EBITDA yields

~11%

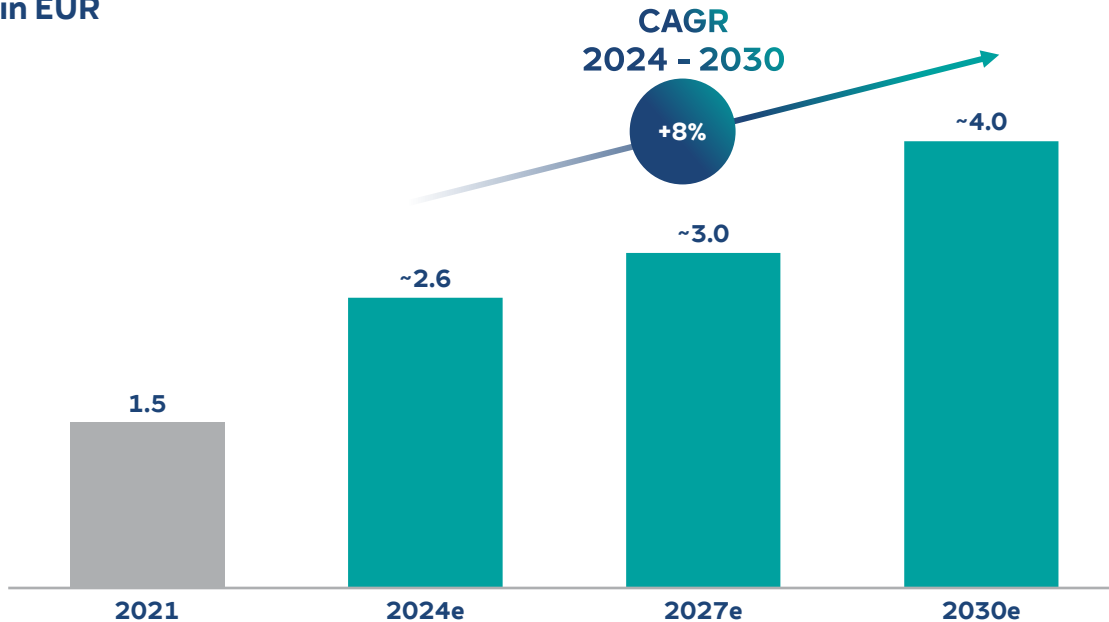
~10%

- ✓ IRR requirements reflect current interest rate environment
- ✓ Commitment to **100 – 300bps spread** above WACC
- ✓ Hurdle rates include **risk premiums** depending on project risk profile
- ✓ **Post completion reviews carried out regularly** for monitoring investment performance and lessons learned for future decisions

Note: IRRs post tax, unlevered, nominal.

# Our investments will drive strong bottom-line growth; capital allocation will be constantly reassessed

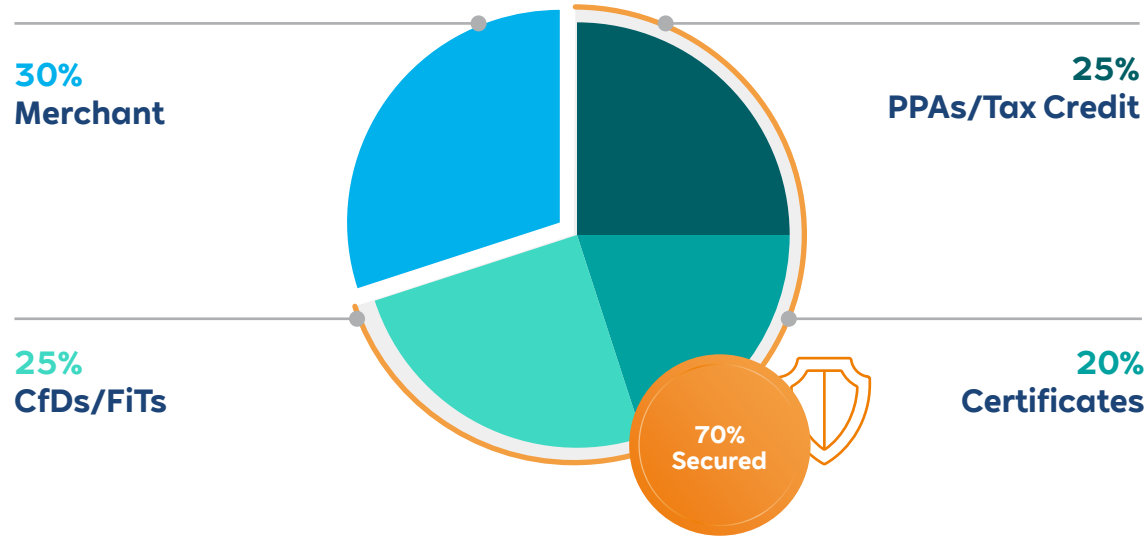
Adj. earnings per share  
in EUR



- **Strict monitoring** of investment environment with clear commitment to profitability
- **Capital allocation will be constantly reassessed** in light of changing risk-reward environment
- **Clear focus on bottom line earnings/EPS**

# High share of earnings from secured or regulated income streams in wind and solar business

## Gross margin split 2023 - 2025 Wind/solar






- **14 years** weighted average remaining support tenor<sup>1</sup> for wind/solar
- **70% secured share** also targeted in future

Note: Merchant includes volumes to be hedged. | <sup>1</sup> Considers the current operating asset base as well as committed projects with COD by 2025 (under construction or with FID).



# We are able to secure highly attractive offtake solutions in our core markets

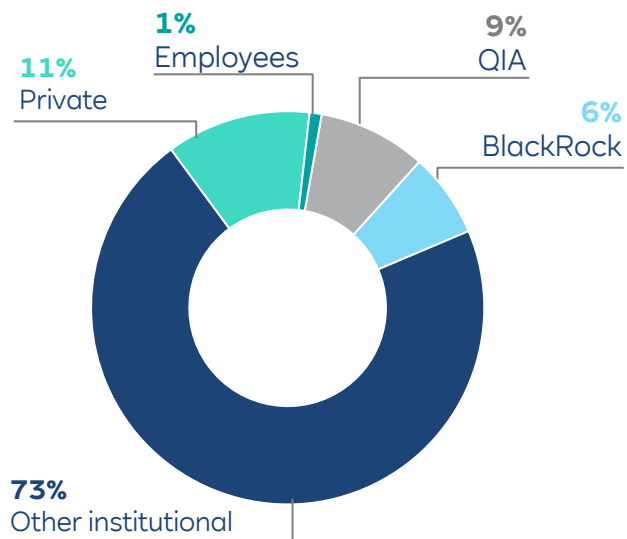
## Envisaged route-to-market

	USA	Germany	UK	Rest of Europe/World
<b>Offshore wind</b> 	Tax credits, CfD	CfD, PPA, Merchant <sup>1</sup>	CfD	CfD, PPA, Merchant <sup>1</sup>
<b>Onshore wind</b> 	Tax credits, PPA, Merchant <sup>1</sup>	CfD	CfD	CfD, PPA, Merchant <sup>1</sup>
<b>Solar</b> 	Tax credits, PPA, Merchant <sup>1</sup>	CfD	CfD, PPA	CfD, PPA, Merchant <sup>1</sup>

<sup>1</sup> to a limited extent.

# Shareholder structure of RWE AG

## RWE shareholders<sup>1</sup>

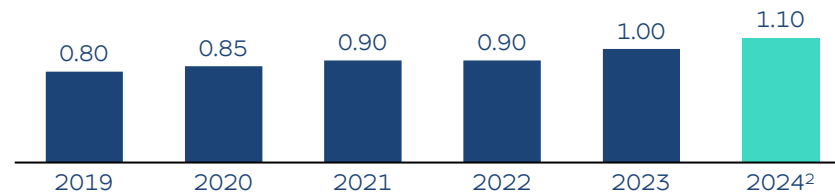


<sup>1</sup> As of the end of 2023. | <sup>2</sup> Management target.

## Share indicators

31 July 2024		
Number of shares	thousands	<b>743.841</b>
Share price	€	34.37
Market capitalisation	€ billion	<b>25.6</b>

## Dividend (in €)



# Net debt increases due to CEB acquisition, and the planned execution of our growth programme

## Development of net debt in EUR bn (+ net debt/- net assets)



## Main drivers of net debt development in FY 2023

<b>Adj. operating cash flow</b> cash flow driven by strong operational performance across all segments	<b>Acquisition of CEB</b>	<b>Net cash investments</b> Further net cash investments into growth
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# Solid investment grade rating on the back of strong and sustainable financial performance

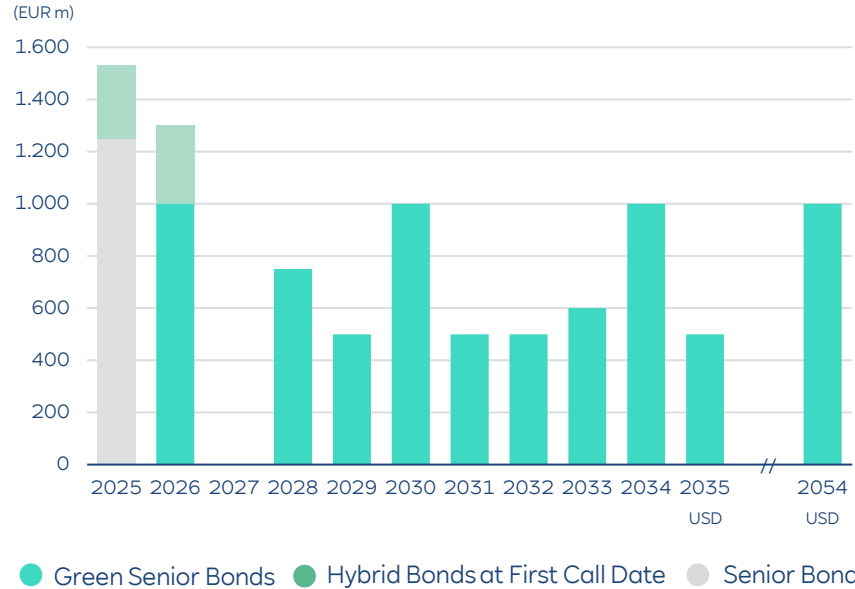
## Current rating

	MOODY'S	FitchRatings
<b>Long-term debt</b>		
Senior debt	Baa2	BBB+
Hybrid bonds	Ba1	BBB-
<b>Short-term debt</b>	P-2	F1
Outlook	stable	stable

- We pursue a **conservative financial policy strategy**, with proven access to liquidity and **diversified funding**
- **As of today**, max. leverage factor of net debt/adj. EBITDA of **≤3x**
- **Post 2025**, max. leverage factor of net debt/adj. EBITDA of **≤3.5x**
- We are committed to maintain a **strong investment grade rating**

# Maturities and historical issuances of bonds

## Our bond maturity profile with green bonds



## Historical issuances

	2021	2022	2023	2024YTD
<b>Green senior bonds</b> (across # of issuances)	<b>€1.85bn</b> (#3)	<b>€2.0bn</b> (#2)	<b>€1.0bn</b> (#2)	<b>€0.5bn</b> <b>\$2.0bn</b> (#2)
<b>Senior bond</b> (across # of issuances)		<b>€1.25bn</b> (#1)		

**USD and EUR debt capital markets will play an integral role in RWE's growth story going forward**

# We are a frequent issuer of green bonds



## Type

### Green Format

- Funding strategy serves RWE's transition to a green player
- Conventional bonds only on an exceptional basis

## Volumes

Avg. €3.0 - 3.5 bn p.a.

- Driven by financing requirements and market conditions

## Tenors

3 - 30 years

- Aiming to achieve a balanced maturity profile

## Currencies

EUR, USD, GBP

- Currencies based on RWE's asset base
- Other currencies used opportunistically

## Instruments

### Senior Bonds

- Public senior bonds as base instrument
- Private placements
- Special (bank) financings if available and beneficial for our green projects

# Green bonds foster our renewables investments

## Examples of allocated green projects from outstanding Green Bonds

### Offshore Wind

#### Sofia



1,400 MW

COD 2026

under construction

### Onshore Wind

#### Blackjack Creek



240 MW

COD 2022

in operation

### Solar & Storage

#### Fifth Standard



287 MW<sup>1</sup>

COD 2023

in operation

### Solar

#### Limondale



249 MW

COD 2021

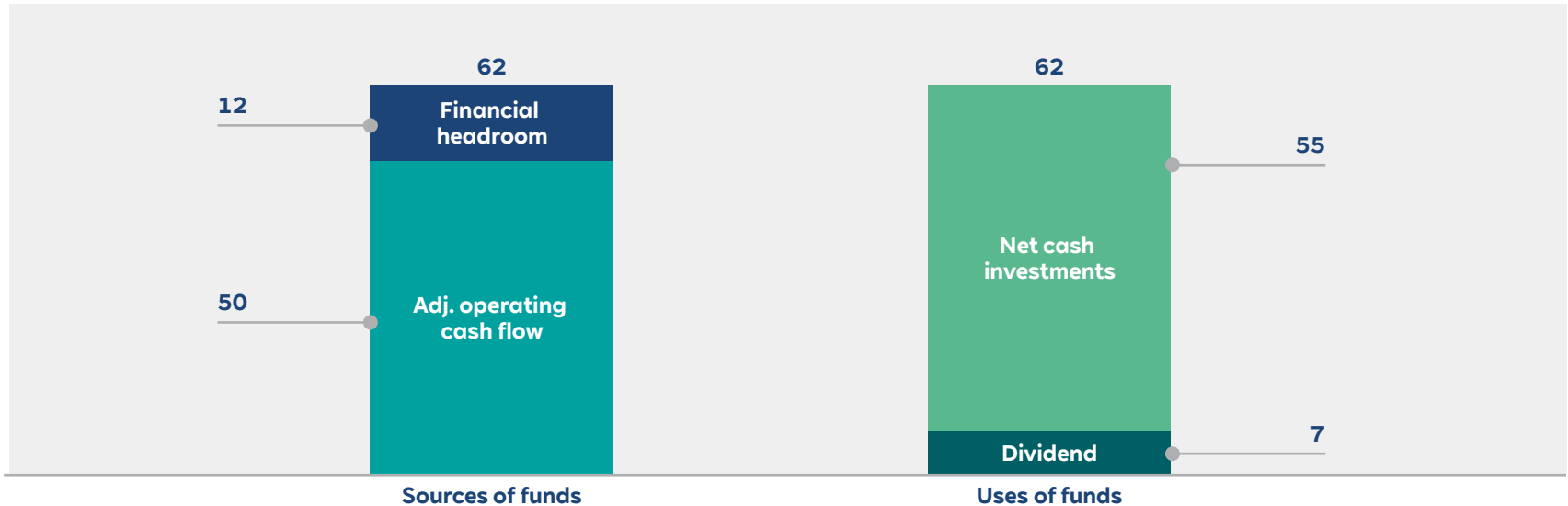
in operation



<sup>1</sup> Including storage (137 MW).

# Our Growing Green plan is fully financed

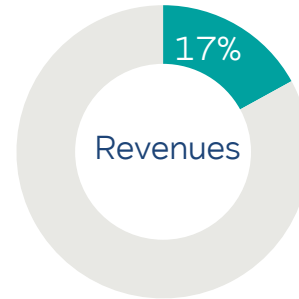
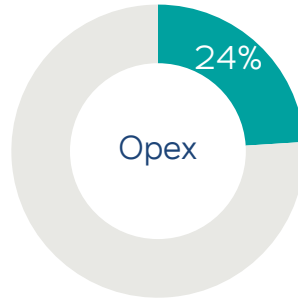
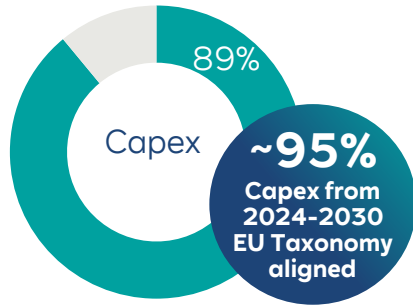
## Funding composition 2024 - 2030 EUR bn





# Sustainable Finance at RWE

## EU Taxonomy: share of RWE's aligned business activities (2023)<sup>1</sup>



## Sustainability-Linked Financing Instruments, Frameworks and Policies:

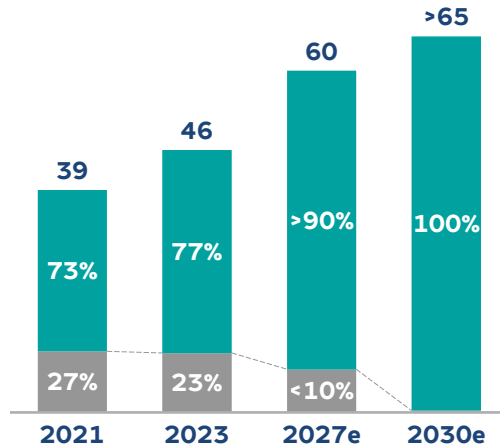
- Taxonomy-aligned KPIs integrated into RWE's **Revolving Credit Facility**
- RWE **Green Bond** Framework
- **Green Bonds** as preferred financing tool
- **ESG criteria** integrated into third-party processes and in financial investments



<sup>1</sup> Our taxonomy-aligned business activities primarily comprise electricity generation from onshore and offshore wind, solar and hydropower (run-of-river, pumped storage).

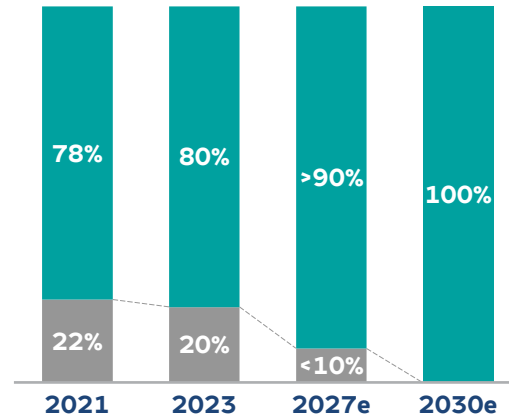
# We will rapidly decarbonise our portfolio

## Net installed capacity GW, pro rata



■ Non-coal ■ Coal-based

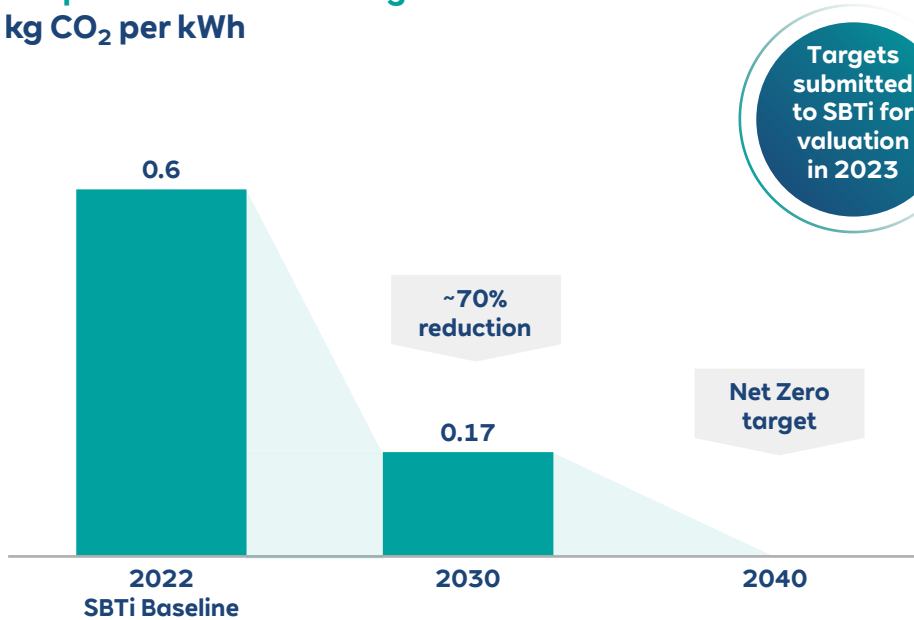
## Revenues split



- **Green portfolio growth accelerated** – more than 90% share of renewable and flexible generation capacity will be achieved in 2027
- **Coal to decline rapidly** – driven by closures and lower utilisation
- **Coal exit in 2030**

# We are committed to 1.5°C aligned emission reduction pathway

## Scope 1 & 2 emission targets kg CO<sub>2</sub> per kWh



- We reduced our **CO<sub>2</sub> emissions by more than 50% in the past decade**
- We are committed to reducing our relative **Scope 1 & 2 emissions by 70%** by 2030
- We are committed to reducing our **Scope 3 emissions by 42%** by 2030
- We will be **Net Zero in 2040 across Scope 1, 2 and 3** emissions
- Targets are **in line with the 1.5°C emission reduction pathway<sup>1</sup>**

<sup>1</sup> SBTi verification ongoing.

# RWE's approach to ESG contributes directly to the UN SDGs

## Seven SDGs were defined as material in relation to the business activities of RWE



# Continuous improvement and maintaining high level in major sustainability ratings



Note: Last shown rating scores based on the date of last comprehensive rating review.

# We grow, we act, we care:

## Nine priority topics constitute our RWE Sustainability Strategy

### WE GROW

We grow our green business and create sustainable value by investing in technologies leading the way to a green energy world. Our key focus is on sustainable investments and innovation.

**One example of our ambition:**  
~95% of our investments from 2024 to 2030 are aligned with the EU Taxonomy.

Sustainable investment

Innovation

### WE ACT

We preserve nature for future generations, taking scientific facts and methods into account. Our activities address climate change, biodiversity and recultivation as well as the circular economy.

**One example of our ambition:**  
Reducing our emissions in line with the 1.5-degree path.

Climate change

Biodiversity & recultivation

Circular economy

### WE CARE

We recognise the interests of our stakeholders and act responsibly wherever we operate. Our focus lies primarily on social and societal responsibility, diversity, compliance as well as occupational health and safety.

**One example of our ambition:**  
We make a positive contribution to the communities in which we operate.

Social responsibility

Occupational health & safety

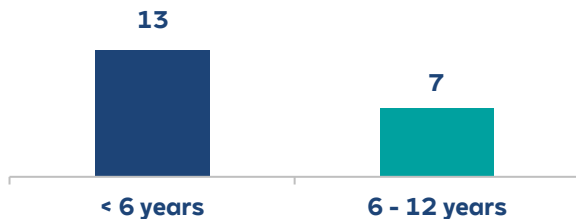
Diversity, equity & inclusion

Compliance & ethics

# Well balanced composition of our Supervisory Board members

Supported by  
**6** standing committees

## Board Tenure in years

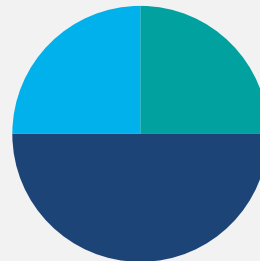


## Focus of competence

- ✓ Energy Sector
- ✓ Experience on Public Sector
- ✓ Corporate Strategy
- ✓ Sustainability
- ✓ International experience
- ✓ Accounting/Financial Audit
- ✓ Leadership experience
- ✓ HR-Expertise
- ✓ Digitisation

## Age

25%  
<55 yrs

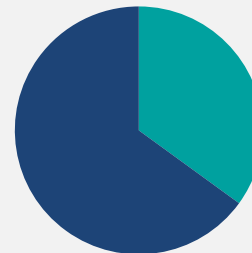


25%  
65+ yrs

50%  
55-65 yrs

## Gender

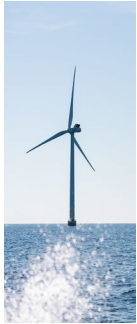
65%  
Male



35%  
Female\*

\*Shareholder representatives: 40%

# Driving the transition: How innovative solutions help us meet tomorrow's challenges today.



## Floating offshore wind power

In cooperation with renowned partners, we are entering completely new regions with wind power. This technology is gaining importance, especially in countries with coasts that drop away steeply, such as Japan, the USA and France.

## Recyclable blades

Almost half of our UK offshore wind farm Sofia will be equipped with special recyclable rotor blades. Our supplier Siemens Gamesa is manufacturing them using a new type of resin with a chemical structure that allows for the different materials to be separated. This makes it possible to reuse the individual components once the rotor blade has reached the end of its lifetime.

## Multi-fuel conversion

By heating sewage sludge, the phosphorus it contains is separated. The remaining gas mixture of hydrogen and carbon can be processed in further steps to produce basic chemicals or fuels.



## Floating solar farms

offer potential for power generation and climate protection, and the technology hasn't been widely adopted yet. In contrast to ground-mounted systems, the PV modules are mounted on floats, which are put out on bodies of still open water and on the sea.



## Battery storage

RWE operates battery storage systems in Europe and the USA and has experience in various lithium-ion battery technologies. The innovative areas also cover second-life electric-vehicle batteries and renewable energy as well as storage applications. RWE also has powerful, intra-company capacities to integrate systems and an in-house Energy Management System.

## Hydrogen – the energy source of the future.

Hydrogen is an all-rounder when it comes to the energy transition. Produced climate-neutrally and re-electrified if necessary; from an energy system perspective, this makes it an ideal storage medium for wind and solar power.



## First steps towards large-scale hydrogen production.

One of the first cross-sector hydrogen initiatives in Germany is GET H2 in which we work with companies and research institutes. By 2027, three electrolysers are set to be built on the site, each with a capacity of 100 MW and a 14 MW pilot plant.



# Regulations



# Regulatory regimes for renewables in the US

	Support regime	Remuneration
Offshore	<ul style="list-style-type: none"> <li>• <b>Investment Tax Credit (ITC)</b></li> <li>• <b>Offshore Renewable Energy Certificates (ORECs)</b><sup>1</sup></li> <li>• Mandatory procurement via <b>Renewable Portfolio Standards (RPS)</b>/clean energy goals</li> </ul>	<p>Various revenue streams depending on state and market:</p> <ul style="list-style-type: none"> <li>• <b>Tax credits</b> via PTC (\$28/MWh<sup>2</sup>) or ITC (30%<sup>2</sup> of capex). Certain bonus adders also may apply for Domestic Content and Energy Communities that can provide an additional 10% each, in absolute term for ITC and proportional on the (\$28/MWh) for PTC</li> <li>• <b>Energy revenues</b> via wholesale market or PPA (10-20 years)</li> <li>• <b>Capacity revenue</b> via market or part of PPA</li> <li>• <b>RECs</b> via market or part of PPA</li> </ul>
Onshore	<ul style="list-style-type: none"> <li>• <b>Production Tax Credit (PTC)</b> annually inflation-adjusted, paying out over 10 years. Full PTC value (including labor provisions) for projects that have begun construction after 2021.</li> <li>• <b>Renewable Energy Certificates (RECs)</b></li> <li>• Mandatory procurement via <b>Renewable Portfolio Standards (RPS)</b>/clean energy goals</li> <li>• <b>Modified Accelerated Cost-Recover System (MACRS)</b>: Accelerated depreciation for tax equity investors &amp; developers over 5 years, majority of capex can be expensed in year placed in service (bonus depreciation)</li> <li>• <b>Investment Tax Credits (ITC)</b> also possible, not inflation-adjusted</li> </ul>	
Solar	<ul style="list-style-type: none"> <li>• <b>Investment Tax Credit (ITC)</b></li> <li>• <b>Production Tax Credit (PTC)</b></li> <li>• <b>Renewable Energy Certificates (RECs)</b></li> <li>• Mandatory procurement via <b>Renewable Portfolio Standards (RPS)</b>/clean energy goals</li> <li>• <b>Modified Accelerated Cost-Recover System (MACRS)</b></li> </ul>	

<sup>1</sup> New York OREC functions as a two-sided CfD. | <sup>2</sup> assumes prevailing wage and apprenticeship requirement are met.

# Regulatory regimes for renewables in the UK

	Support regime	Remuneration
Offshore	<ul style="list-style-type: none"> <li>• <b>Renewable Obligation Certificate (ROC)</b><sup>1</sup> scheme no longer open to new projects</li> <li>• <b>Two-sided Contracts for Difference (CfD)</b>, awarded through a pay-as-clear auction. First <b>Contract for Difference (CfD)</b> allocation round was in 2015, auctions are now annual</li> <li>• <b>For the 2024 auction (AR6) offshore wind</b> has been moved back into its own pot (pot 3)</li> <li>• The 2024 auction opened in March and is expected to conclude in September</li> <li>• Offshore wind projects are also eligible for the Capacity Market (CM) Support Scheme</li> <li>• <b>For the 2023 auction (AR5) offshore wind was included in “pot 1” with onshore wind and solar.</b> Low ceiling prices for offshore, which were below economic levels, meant no offshore wind cleared in this round</li> </ul>	<p><b>ROC: Wholesale market + 0.9 or 1.0x ROC/MWh based on COD</b></p> <ul style="list-style-type: none"> <li>• <b>Current buy-out price per ROC:</b> £64.73 (2024/25)</li> <li>• <b>Term:</b> 20 years (indexed to RPI)</li> </ul> <p><b>CfD:</b></p> <ul style="list-style-type: none"> <li>• <b>Wholesale market + CfD top-up/payback to government entity</b></li> <li>• <b>Term:</b> 15 years (CPI inflation linked)</li> </ul> <p><b>Recent offshore wind average CfD clearing prices (2012 money):</b></p> <ol style="list-style-type: none"> <li>1. Allocation Round 4 (2022) = £37.35/MWh</li> <li>2. Allocation Round 5 (2023) = No projects cleared</li> </ol>
Onshore	<ul style="list-style-type: none"> <li>• <b>Renewable Obligation Certificate (ROC)</b><sup>1</sup> scheme no longer open to new projects</li> <li>• <b>Two-sided Contracts for Difference (CfD)</b>, awarded through a pay-as-clear auction. First <b>Contract for Difference (CfD)</b> allocation round was in 2015, auctions are now annual</li> <li>• The 2024 auction opened in March and is expected to conclude in September</li> <li>• Onshore wind was included in the first round in 2015 but then excluded until Allocation Round 4 (AR4) in 2022</li> <li>• <b>Onshore wind and solar PV are in “pot 1” of the scheme, separate from offshore (in pot 3).</b></li> <li>• <b>Onshore wind projects are also eligible for the Capacity Market (CM) Support Scheme</b> Generators cannot have both a CfD and a CM contract and must face a one-off choice between the two. Limited take-up of CM contracts from renewables assets, with the scheme far less lucrative than the CfD</li> </ul>	<p><b>ROC: Wholesale market + 1.0-2.0x ROC/MWh based on COD</b></p> <ul style="list-style-type: none"> <li>• <b>Current buy-out price per ROC:</b> £64.73 (2024/25)</li> <li>• <b>Term:</b> 20 years (indexed to RPI)</li> </ul> <p><b>CfD:</b></p> <ul style="list-style-type: none"> <li>• <b>Wholesale market + CfD top-up/payback to government entity</b></li> <li>• <b>Term:</b> 15 years (CPI inflation linked)</li> <li>• Generators with a CfD sell power into the wholesale market and receive the difference between the market price and the strike price level they received in the auction.</li> </ul> <p><b>Recent onshore wind average CfD clearing prices (2012 money):</b></p> <ol style="list-style-type: none"> <li>1. Allocation Round 4 (2022) = £42.47/MWh</li> <li>2. Allocation Round 5 (2023) = £52.29/MWh</li> </ol> <p><b>Route-to-market also via PPAs</b></p>
Solar	<ul style="list-style-type: none"> <li>• <b>Two-sided Contracts for Difference (CfD)</b>, awarded through a pay-as-clear auction. First allocation round was in 2015, auctions are now annual</li> <li>• Solar PV was included in the first round in 2015 but then excluded until Allocation Round 4 (AR4) in 2022. Future auctions will be annual. The 2024 auction opened in March and is expected to conclude in September</li> <li>• <b>Onshore wind and solar PV are in “pot 1” of the scheme, separate from offshore (in pot 3).</b></li> <li>• Solar PV projects are also eligible for the Capacity Market (CM) Support Scheme</li> </ul>	<p><b>CfD:</b></p> <ul style="list-style-type: none"> <li>• <b>Wholesale market + CfD top-up/payback to government entity</b></li> <li>• <b>Term:</b> 15 years (CPI inflation linked)</li> </ul> <p><b>Recent solar PV average CfD clearing prices (2012 money):</b></p> <ol style="list-style-type: none"> <li>1. Allocation Round 4 (2022) = £45.99/MWh</li> <li>2. Allocation Round 5 (2023) = £47.00/MWh</li> </ol> <p><b>Route-to-market also via PPAs</b></p>

<sup>1</sup> ROCs is a legacy scheme no longer open to projects, support will run for 20 years or to March 2037, whichever is sooner.

# Regulatory regimes for renewables in Germany

	Support regime	Remuneration
Offshore	<ul style="list-style-type: none"> <li>• Since 2023, two-pillar auction scheme for COD starting 2028 with centrally pre-investigated sites tendered via a set of 5 (price and non-price) award criteria and non-centrally pre-investigated sites via the known one-sided CfD. Both routes comprise a financial bid whereby for non-centrally pre-investigated sites the financial bid is determined in a dynamic bidding process and only applicable in case of 0 cent-bids in the CfD bidding-round</li> <li>• In 2021 and 2022 central auction system with one-sided CfD and COD in 2026 or 2027 with zero bids, lottery and subsequent step-in right execution from existing projects in some cases</li> <li>• Since 2017 transition to central auction system in form of 20-year one-sided CfD (for projects with COD after 2026)</li> <li>• Feed-in tariff (FIT) with direct marketing obligation until 2016</li> </ul>	<ul style="list-style-type: none"> <li>• Initial Feed-in tariff (FIT): €139 - 154/MWh for 12 years (standard) or €184-194/MWh for 8 years (compression model) depending on year of commissioning</li> <li>• Base Feed-in tariff (FIT): €39/MWh for residual term</li> <li>• One-sided CfD price in not centrally pre-investigated sites (and former interim and central auctions) determined in competitive pay-as-bid auctions (zero bids possible); CFD-price awarded for 20 years with price ceiling of 6.2 cents per kWh in 2024</li> <li>• In July 2023 €12,6 bn entry fees were paid for 7 GW determined in competitive bidding</li> <li>• No support scheme for centrally pre-investigated sites with focus on PPA market but auctions based on selected price and non-price criteria (of which 60% accounts for financial bid)</li> <li>• Route-to-market via PPAs for new German offshore assets (0 bid projects)</li> </ul>
Onshore	<ul style="list-style-type: none"> <li>• Pay-as-bid one-sided Contract for Difference (CfD) awarded through auctions since 2017</li> <li>• Feed-in tariff (FIT) with direct marketing obligation until COD 2016 (relevant for existing assets)</li> </ul>	<ul style="list-style-type: none"> <li>• One-sided CfD price determined in competitive auctions with Feb 2024 average €7.34c/kWh, subject to "reference yield" corrections</li> <li>• Term: 20 years</li> <li>• Pre-tender phase assets receive Feed-in tariff</li> </ul>
Solar	<ul style="list-style-type: none"> <li>• Pay-as-bid one-sided Contract for Difference (CfD) awarded through auctions since 2017 (after pilot auctions)</li> <li>• Feed-in tariff (FIT) with direct marketing obligation until COD 2016 (relevant for existing assets)</li> </ul>	<ul style="list-style-type: none"> <li>• One-sided CfD price determined in competitive auctions with March 2024 average €5.11c/kWh</li> <li>• Term: 20 years</li> <li>• Pre-tender phase and small-scale assets receive Feed-in tariff</li> </ul>

# Regulatory regimes for renewables in the Netherlands

	Support regime	Remuneration <sup>1</sup>
Offshore	<ul style="list-style-type: none"> <li>• <b>No support scheme</b>, but auctions based on <b>beauty contests</b> based on scoring criteria e.g. experience, risk mitigation, innovation</li> <li>• <b>Financial bid amount</b> included as part of scoring criteria</li> </ul>	<ul style="list-style-type: none"> <li>• Route to market via PPAs</li> <li>• Grid connection provided by TSO</li> </ul>
Onshore	<ul style="list-style-type: none"> <li>• <b>A safety net support scheme</b> for Solar and Onshore Wind is <b>under development, given that SDE++ is being phased out by 2025</b></li> <li>• <b>SDE++</b> (available since 2020): One-sided CfD support based on <b>auction for lowest carbon abatement cost</b> As such carbon abatement technologies other than renewables can apply for subsidy</li> <li>• <b>SDE+</b> (available from 2011-2019) a technology based one-sided CfD</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Term:</b> 12 or 15 years</li> <li>• Pay-as-bid <b>one sided CfD</b></li> </ul>
Solar	<ul style="list-style-type: none"> <li>• No specific support scheme for solar as primary support scheme is generic for all carbon abatement technologies on land (see Onshore)</li> </ul>	

<sup>1</sup> Not linked to inflation.

# Regulatory regimes for renewables in Italy

	Support regime	Remuneration <sup>1</sup>
Onshore	<ul style="list-style-type: none"> <li>• <b>Auction</b> system applicable since 2013</li> <li>• Assets with COD until 2013: <b>Feed-in premium</b> (FIP) to market price</li> </ul>	<ul style="list-style-type: none"> <li>• Avg CfD price (Feb 2024 auction): €74.76/MWh</li> <li>• <b>Auction design</b> Pay-as-bid <b>one-sided CfD</b> through auctions since 2013 and <b>two-sided CfD</b> since 2019 <b>Term:</b> 20 years</li> <li>• <b>Wholesale market</b> + premium <b>Premium for year t:</b> <math>(180 - \text{market price } t-1) * 78\%</math> <b>Term:</b> 12 years for pre-2008 COD, 15 years for post-2008 COD</li> </ul>
Solar	<ul style="list-style-type: none"> <li>• <b>Auction</b> system applicable since 2013</li> </ul>	<ul style="list-style-type: none"> <li>• Avg CfD price (Feb 2024 auction): €75.37/MWh</li> <li>• <b>Auction design</b> Pay-as-bid <b>one-sided CfD</b> through auctions since 2013 and <b>two-sided CfD</b> since 2019</li> </ul>
AgriPV	<ul style="list-style-type: none"> <li>• Assets with COD until June 2026</li> <li>• <b>Auction</b> system applicable since 2024</li> </ul>	<ul style="list-style-type: none"> <li>• Ceiling CfD price (Feb 2024 auction): €85/MWh + 4/MWh and + 10/MWh for respectively for projects located in the central and the northern regions of Italy.</li> <li>• <b>Auction design</b> Pay-as-bid <b>two-sided CfD</b> + <b>Capital grants on 40% of the capex</b> <b>Term:</b> 20 years</li> </ul>

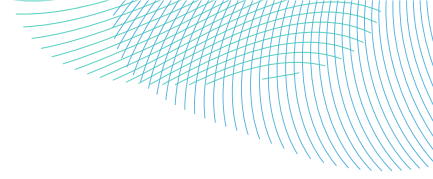
<sup>1</sup> Not linked to inflation.

# Regulatory regimes for renewables in Spain

	Support regime	Remuneration <sup>1</sup>
Offshore	<ul style="list-style-type: none"> <li>• <b>No support scheme yet in place</b>, but the following is expected from public consultation in March 2024:</li> <li>• "3 in 1" auction model, where the winners will be awarded a CfD contract, seabed lease and grid connection permits</li> </ul>	<p><b>Expected remuneration scheme (final approval planned during 2024):</b></p> <ul style="list-style-type: none"> <li>• Pay-as-bid, <b>two-sided CfD</b></li> <li>• <b>Term:</b> 15 - 20 years</li> </ul>
Onshore	<ul style="list-style-type: none"> <li>• Changes introduced (Dec 2023) to allow for <b>Non Price Criteria</b>, up to a maximum of 30%, but specific criteria have still to be defined.</li> <li>• <b>CfD auction</b> system applicable since 2020</li> <li>• <b>Market income plus investment retribution in €/MW</b> is the compensation scheme since mid 2013</li> </ul>	<p><b>Market income plus investment retribution (€/MW)</b></p> <ul style="list-style-type: none"> <li>• Each technology has a regulatory life to recover their regulated CAPEX.</li> <li>• For wind it is max. 20 years. The standard facility can recover the regulated CAPEX in a shorter period. Once CAPEX is recovered no more subsidy is paid</li> </ul> <p><b>Auction design:</b> Pay-as-bid, two-sided CfD auctions. Term: 12 years</p> <ul style="list-style-type: none"> <li>• Avg CfD price (November 2022 auction): €45.8/MWh (heavily undersubscribed only 45.5 MW awarded)</li> <li>• Avg CfD price (Oct 2021 auction): €30.2/MWh</li> </ul>
Solar	<ul style="list-style-type: none"> <li>• Changes introduced (Dec 2023) to allow for <b>Non Price Criteria</b>, up to a maximum of 30%, but specific criteria have still to be defined</li> <li>• <b>CfD auction</b> system applicable since 2020</li> <li>• <b>Market income plus investment retribution in €/MW</b> is the compensation scheme since mid 2013</li> </ul>	<p><b>Market income plus investment retribution (€/MW)</b></p> <ul style="list-style-type: none"> <li>• Each technology has a regulatory life to recover their regulated CAPEX.</li> <li>• For PV it is max. 30 years. The standard facility can recover the regulated capex in a shorter period. Once CAPEX is recovered no more subsidy is paid</li> </ul> <p><b>Auction design</b> Pay-as-bid, two-sided CfD auctions. Term: 12 years</p> <ul style="list-style-type: none"> <li>• No Solar awarded in November 2022 auction</li> <li>• Avg. CfD price (Jan 2021 auction): €31.6/MWh</li> </ul>

<sup>1</sup> Not linked to inflation.

# Regulatory regimes for renewables in Denmark & Sweden



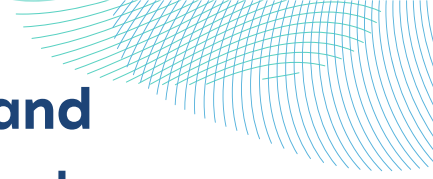
## Denmark

## Sweden

	Support regime	Remuneration	Support regime	Remuneration
Offshore	<ul style="list-style-type: none"> <li>• <b>Lease payments</b> derived through envelope bid process</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Wholesale market</b></li> <li>• <b>PPA</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>None</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Wholesale market</b></li> <li>• <b>PPA</b></li> </ul>
Onshore	<ul style="list-style-type: none"> <li>• <b>Merchant</b> – Will possible be reviewed in the future</li> <li>• <b>Only route to market is wholesale</b> and/or with a <b>PPA</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Wholesale market</b></li> <li>• <b>PPA</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>None</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Wholesale market</b></li> <li>• <b>PPA</b></li> </ul>



# Regulatory regimes for renewables in France & Poland



## France

## Poland

	Support regime	Remuneration	Support regime	Remuneration
<b>Offshore</b>	<ul style="list-style-type: none"> <li>Pay-as-bid two-sided indexed <b>CfD</b> awarded through a central, one step, auction system since 2015 for 20 years</li> </ul>	<ul style="list-style-type: none"> <li><b>Pay-as bid CfD</b></li> <li><b>Term:</b> 20 years</li> <li>Prices not public</li> <li>Last auction awarded for €44,9/MWh (1 GW site off Channel coast)</li> </ul>	<ul style="list-style-type: none"> <li>Competitive pay-as-bid auctions to award CfDs for 1.2GW in total planned in 2025, 2027, 2029 and 2031</li> <li>Administratively awarded <b>CfD</b> for mature projects, requiring individual EU state aid notification decision and final CfD level confirmation by Polish regulator</li> </ul>	<ul style="list-style-type: none"> <li>Two-sided, CPI indexed, EUR-denominated <b>CfD</b> strike price over 100k hours of full load generation</li> <li><b>Term:</b> not longer than 25 years</li> <li>Administratively granted initial strike price at €71/MWh, pending possible downward adjustment for each individual project at EU and/or national level</li> <li>Max. bid prices remain to be set</li> </ul>
<b>Onshore</b>	<ul style="list-style-type: none"> <li><b>Pay-as-bid two-sided CfD</b> at a price set by the regulator inflated yearly and granted through open window procedure for old contract on small scale projects (6 turbines max, 3MW/turbine max, tower height &lt;137m)</li> <li><b>Pay-as-bid two-sided CfD</b> awarded through tendering process since 2017</li> <li>3 specific onshore tenders and 1 technology-neutral tender per year</li> </ul>	<ul style="list-style-type: none"> <li><b>Pay-as bid CfD</b></li> <li><b>Term:</b> 20 years</li> <li>Avg price (2024): €87,23/MWh</li> </ul>	<ul style="list-style-type: none"> <li>Competitive auction based pay-as-bid</li> <li>Quota system with Green certificates until 2016 that will expire in 2031 for entitled assets</li> <li><b>Contract for Difference (CfD)</b> since 2018</li> <li>Two auction baskets: for projects up to 1 MW installed capacity and beyond 1 MW</li> </ul>	<ul style="list-style-type: none"> <li><b>Term:</b> 15 years</li> <li><b>CfD price</b>, annually CPI adjusted</li> <li>Dec '23 result: &lt;= 1 MW installed capacity: avg €76/MWh; &gt;1MW installed capacity: avg €74/MWh</li> <li>1 <b>green certificate</b>/MWh current 2024 market price: €10/MWh</li> </ul>
<b>Solar</b>	<ul style="list-style-type: none"> <li><b>Pay-as-bid two-sided CfD</b> awarded through tendering process</li> <li>3 invitations to tender are issued per year:                             <ul style="list-style-type: none"> <li>Technologically neutral</li> <li>Ground</li> <li>Shadehouse (in which we participate for some AgriPV projects awaiting a dedicated call for tenders)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>Pay-as-bid CfD</b></li> <li><b>Term:</b> 20 years</li> <li>Avg price on last session (2024): €81,90/MWh</li> </ul>	See onshore above	See onshore above

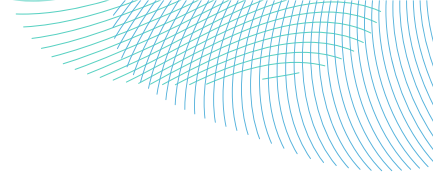
# Regulatory regimes for renewables in Norway & Greece

## Norway

## Greece

	Support regime	Remuneration	Support regime	Remuneration
Offshore	<p><b>Utsira:</b></p> <ul style="list-style-type: none"> <li>1st step <b>lease auction for acreage</b>. (3 winners)</li> <li>2nd step for support. (2 winners)</li> </ul> <p><b>2025 auction (Sørvest F):</b></p> <ul style="list-style-type: none"> <li>Expected pay-as-bid partly-indexed two-sided contract for difference (2-sided CfD)</li> <li>Unknown subsidy budget.</li> <li>CfD-strike price expected to be derived through an English auction process.</li> </ul>	<p><b>Utsira:</b></p> <ul style="list-style-type: none"> <li>Expected <b>pay-as-bid partly-indexed two-sided contract for difference (2-sided CfD)</b></li> <li>Yet unknown subsidy budget.</li> </ul> <p><b>2025 auction (Sørvest F):</b></p> <ul style="list-style-type: none"> <li><b>Pay-as bid CfD</b></li> <li><b>Reference period:</b> Monthly spot based</li> <li><b>Term:</b> 15 years</li> <li><b>PPA and green certificates</b></li> </ul> <p>Strikeprice for Sørlige Nordsjø 2 (2024-auction) approx. €9.8 cents with a total subsidy budget of €1.95 bn</p>	No support regime and Offshore market yet	-
Onshore	<ul style="list-style-type: none"> <li><b>Merchant</b></li> <li><b>Only route to market</b> is <b>wholesale</b> and/or with a <b>PPA</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Wholesale</b> market</li> <li><b>PPA</b></li> </ul>	<ul style="list-style-type: none"> <li><b>CfD</b> auctions for Grid allocation and tariff, following government planning and DG Comp approval</li> <li><b>PPA and merchant</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Expectation:</b> Competitive auction based pay-as-bid <b>CfD</b>. <b>To be announced soon. Projects will fall in separate "baskets" based on technology and capacity. Storage combination is a must.</b></li> <li><b>PPA and merchant</b></li> </ul>
Solar	Not active in this technology in Norway	-	See onshore above	See onshore above

# Regulatory regimes for renewables in Belgium



	Support regime	Remuneration
Offshore	<ul style="list-style-type: none"><li>• <b>Capacity based two-sided Contracts for Difference (CfD)</b>, awarded in competitive auction</li><li>• <b>Indexation Strike Price:</b><ul style="list-style-type: none"><li>• <b>Pre-FID indexation of 70%:</b> Between bid submission &amp; FID. Max 1 year based on material indexes (copper, steel, fuel, labour, consumption and production index) and swap rate loan</li><li>• <b>Post-FID indexation of 30%</b> of the Strike Price, reflecting the O&amp;M, based on consumption price index</li></ul></li><li>• <b>Bid submission:</b> PEZ I September 2025, PEZ II &amp; III in September 2026</li></ul>	<ul style="list-style-type: none"><li>• <b>Subsidy cap</b> of maximum strike price €95/MWh (will be indexed) and envelope of 80.000 Full Load Hours over 20 years</li><li>• <b>Active Available Power</b> to determine price premium</li><li>• <b>Correction Factor</b> for Imbalances</li><li>• <b>Duration CfD</b> 20 years, 24 months decommissioning, 40 years concession</li><li>• <b>Optional long-term fixed price PPA</b><ul style="list-style-type: none"><li>• Max 50% of E-output</li><li>• Extra option: up to 25% via direct citizen participation</li><li>• <b>Fixed Price cap:</b> max €3 above the submitted SP (excluded GoO's)</li><li>• <b>Guarantees of Origin:</b> issued both under 2-CfD and PPA</li></ul></li></ul>

# Regulatory regimes for renewables in Ireland & Australia

## Ireland

## Australia

	Support regime	Remuneration	Support regime	Remuneration
Offshore	<ul style="list-style-type: none"> <li><b>ORESS</b> – Pay As Bid two-sided CfD – first auction – ORESS 1 held in 2023</li> <li>Scheme requires mandatory €2/MWh community benefit funding</li> <li>Second ORESS auction is due to be launched end 2024 (<i>pending legislative approval of the seabed leasing zone area</i>).</li> <li>ORESS2.1 will be first centrally planned auction to be held</li> </ul>	<ul style="list-style-type: none"> <li><b>ORESS – average weighted bid price:</b></li> <li>ORESS 1 (2023) - €86.05/MWh</li> <li><b>Term:</b> 20 years</li> <li>Full indexation (capex and opex) up to FID, thereafter partial indexation for opex.</li> <li>Compensation available for oversupply/system-wide curtailment.</li> </ul>	<ul style="list-style-type: none"> <li>State of Victoria is planning a support mechanism for offshore projects with tenders expected to start late 2025</li> </ul>	
Onshore	<ul style="list-style-type: none"> <li><b>REFIT</b> (Feed-in Tariff) scheme, closed to new entrants in 2015. Tariffs set on a technology basis, with rates indexed with CPI</li> <li><b>RESS</b> – Pay-As-Bid two-sided <b>Contract for Difference (CfD)</b> introduced in 2020 for <b>all onshore</b> renewable technologies.</li> <li>Scheme requires mandatory €2/MWh community benefit funding.</li> <li>In RESS3 – compensation introduced to protect against over supply/system wide curtailment</li> <li>Next RESS auction due in Q3 2024</li> </ul>	<ul style="list-style-type: none"> <li><b>REFIT</b> – Current 2024 (indexed) price for onshore wind ≥5MW = €83.292/MWh</li> <li><b>Term:</b> 15 years</li> <li><b>CfD averaged weighted bid price – all project category:</b></li> <li>RESS1 (2020) – €74.08/MWh</li> <li>RESS2 (2022) – €97.87/MWh</li> <li>RESS3 (2023) – €100.47/MWh</li> <li><b>Term:</b> 15 - 16.5 years</li> </ul>	<ul style="list-style-type: none"> <li><b>Green Certificate System</b> for large scale renewables introduced on federal level in 1999 to facilitate 33 TWh target by 2020, phaseout until 2030</li> <li>Additional <b>support schemes on state level</b>, so far auctions in Australian Capital Territory, Queensland, Victoria and New South Wales</li> <li>2024 <b>new Federal support contract scheme (cap and floor) for 32 GW new capacity by 2030</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Wholesale market + 1 green certificate/MWh</b></li> <li><b>2024 certificate price:</b> ~50 AUD, decreasing trend (not linked to inflation), to be received until 2030</li> <li>New Federal <b>15-year</b> contracting scheme will <b>top up project revenues when below a floor</b>, with <b>profits above a cap shared with government</b></li> </ul>
Solar	See onshore above	See onshore above	See onshore above	See onshore above

# Regulatory regimes for renewables Japan & South Korea

## Japan






## South Korea

	Support regime	Remuneration	Support regime	Remuneration
Offshore	<ul style="list-style-type: none"> <li>• <b>Feed-in Premium (FiP)</b> for Offshore projects through auctions (50% qualitative and 50% price based assessment criteria)</li> <li>• Cap price and Zero-FIP standard price (bottom price) for the bid is set prior to the bid. At the second round auction which closed in June 2023, price range of bids was set from JPY 3 to 19/kwh</li> </ul>	<ul style="list-style-type: none"> <li>• <b>20 year pay as bid FiP strike price</b></li> <li>• Any bidders offered 3 yen as a bid price, can get the maximum points of price based assessment, so it pushes bidders to pursue CPPAs to secure certain revenues without FIP premium</li> <li>• Offshore wind projects can also create non-fossil certificates for each kWh generated, which can be sold as part of CPPA</li> </ul>	<ul style="list-style-type: none"> <li>• Mandated renewable quotas for state-owned generation companies and IPPs with over 500 MW installed capacity through <b>Renewable Portfolio Standards (RPS)</b>, to steadily increase the renewable energy mix</li> <li>• The RPS Obligors purchase <b>Renewable Energy Certificates (RECs)</b> to meet the RPS requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Differentiated <b>REC multiplier</b> is granted per technology while offshore wind receives the highest REC multiplier based on water depth and distance to the shore. (e.g. 2.5 - 4.72) The multiplier will be amended the second half of 2024, and no big change is expected in offshore wind. (amendment based on every 3 years)</li> <li>• Under the business-as-usual scenario, renewable electricity is sold to the state-owned utility, KEPCO, while RECs are sold to the RPS Obligors (e.g. state-owned GENCOs and IPPs over 500 MW) via long-term REC offtake contracts</li> <li>• On-going discussion on the power market liberalisation continues and corporate PPA is getting a growing momentum</li> </ul>

# Regulatory regimes for renewables - negative pricing rules (1/2)

## Country






## Negative pricing rules (= no FiTs/CFDs if more than defined consecutive hours of negative prices)

<b>Germany</b> 	<ul style="list-style-type: none"><li>• With EEG 2023 4-hour rule to be phased out until 2027 for new assets, i.e. from 2027 onwards no support payments for any hour with negative price, however foregone support payments are recorded for simple prolongation of 20 years support period</li><li>• Exemption for small scale installation (&lt;400 kW) and pilot installations</li><li>• For installations commissioned before 2023 (2021) or with auction award before 2023 (2021) the previous 4-hour (6-hour) rule is grandfathered</li></ul>
<b>France</b> 	<ul style="list-style-type: none"><li>• Onshore: Compensation in the event of 20 or more negative hours (consecutive or not) during a calendar year if installation has not produced during these hours</li><li>• PV: Compensation in the event of 15 or more negative hours (consecutive or not) during a calendar year if installation has not produced during these hours</li></ul>
<b>Netherlands</b> 	<ul style="list-style-type: none"><li>• 6-hour negative pricing rule</li></ul>
<b>Spain</b> 	<ul style="list-style-type: none"><li>• The incentive of the CfD contract is not paid in case the energy market price gets below a defined minimum threshold ("waiver price")</li><li>• Currently the waiver price is set to €0/MWh (government can also change this value)</li></ul>
<b>Greece</b> 	<ul style="list-style-type: none"><li>• Currently, no negative prices allowed. Bottom is 0. If price is 0 for more than 2 (consecutive) hours, projects with CFD will not get the subsidy part of the CFD</li></ul>

# Regulatory regimes for renewables - negative pricing rules (2/2)

## Country

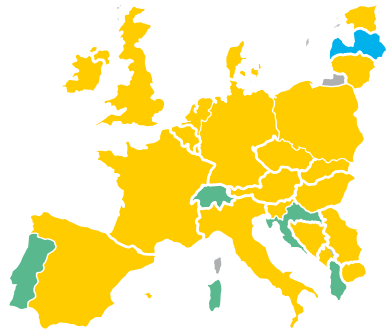
## Negative pricing rules

<b>Italy</b> 	<ul style="list-style-type: none"><li>• The incentive settlement of the solar and wind CfD is suspended only in case the energy zonal market price is 0 or negative for more than 6 consecutive hours and for AgriPV in case the energy zonal market price is 0 or negative .</li><li>• The CfD contract duration is prolonged at end of the contract (20 years) by the amount of the energy that didn't get the incentive.</li></ul>
<b>Denmark</b> 	<ul style="list-style-type: none"><li>• Negative prices = 1 hour rule, i.e. no subsidy payments in non-positive price hours</li></ul>
<b>Ireland</b> 	<ul style="list-style-type: none"><li>• 6-hour negative pricing rule</li></ul>
<b>UK</b> 	<ul style="list-style-type: none"><li>• 6-hour rule was implemented for CfD Allocation Round 2 in 2017 and Allocation Round 3 in 2019</li><li>• For contracts signed from Allocation Round 4 onward rules will be stricter, with new CfDs having top-up payments stopped at any time when reference prices turn negative</li><li>• The reference price is the hourly day-ahead market price</li></ul>
<b>Poland</b> 	<ul style="list-style-type: none"><li>• Settlement of the solar and wind CfDs is suspended only in case the energy market price is 0 or negative for more than 6 consecutive hours</li></ul>

# Controllable capacity in Europe significantly decreasing

## LOLE values for the central reference scenario without CM 2028<sup>1</sup>

(Loss of load expectation, LOLE<sup>2</sup>)

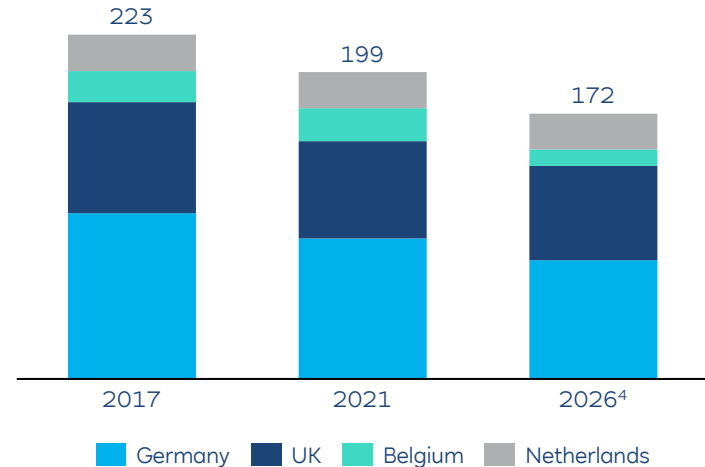


Central scenario without intervention / capacity mechanism

■ Null avg. LOLE ■ Avg. LOLE ≤ 0.1h ■ Avg. LOLE > 0.1h

## Installed controllable capacity in Central Western Europe<sup>3</sup>

(in GW)



<sup>1</sup> European Resource Adequacy Assessment 2023 of entso-e. | <sup>2</sup> Expected number of hours where load cannot be supplied by local resources and imports. | <sup>3</sup> Controllable capacity only, i.e. without PV and wind energy. For more historic data per country, please see local databases: BDEW for Germany, Digest of UK Energy Statistics (DUKE) for UK and Central Office for Statistics Netherlands (CBS). | <sup>4</sup> RWE analysis.



# Ancillary services<sup>1</sup>

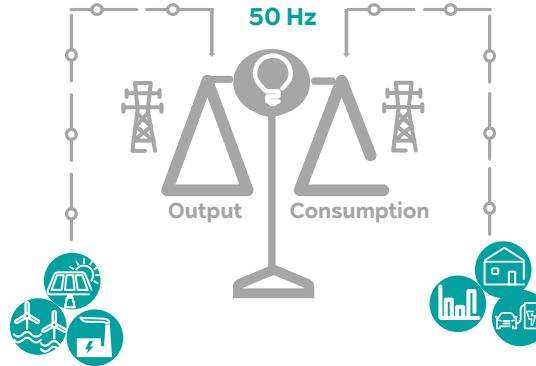
## Continuous balancing of power supply and demand

### The balancing market:

- A market operated by Transmission System Operators (TSOs) to maintain the power/frequency balance
- It is needed to ensure a continuous and stable frequency in the short term (e.g. when unexpected incidents occur - power plant outages)

### Ancillary services:

- Necessary tools/products which TSOs contract from generators in order to maintain system stability and security



## Maintains energy balance

### Energy products

- **Frequency Control & Reserves** – to maintain system frequency at 50Hz ± x% and to provide additional energy when needed
  - **UCTE/Germany:** primary, secondary, tertiary and time control levels (FCR, aFRR/mFRR, RR)
  - **UK:** frequency response (FFR, MFR, EFR) and reserve (Fast Reserve, STOR, BM start up)

## Maintains grid quality

### System products

- **Reactive power** (voltage support) provides the important function of voltage regulation

### Constraint Management

- **Countertrading** – grid operators deal on exchange or OTC (Continental)
- **(Regulated) Redispatch** – ramp-down or ramp-up power stations to relieve power flows from congested grid lines

## Dedicated to restarting the grid

### Security products/emergency

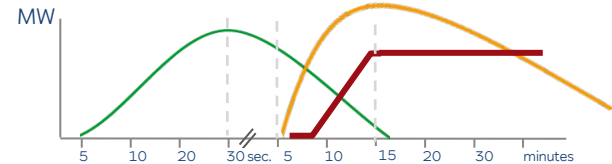
- **Blackstart** ability to restart a grid following a blackout
- **Intertrips** – automatically disconnect a generator
- **SO-SO trading** (system operator to system operator trades) – determines the direction of electricity flow

<sup>1</sup> Range of functions/products which Transmission System Operators (TSOs) contract from generators in order to maintain system stability and security.

# Overview of continental reserve category timescales

	Primary reserve	Secondary reserve	Tertiary reserve
<b>Reaction time</b>	<ul style="list-style-type: none"> <li>• 30 seconds (100%)</li> </ul>	<ul style="list-style-type: none"> <li>• 5 minutes (100%)</li> </ul>	<ul style="list-style-type: none"> <li>• 7 - 15 minutes (100%)</li> </ul>
<b>System</b>	<ul style="list-style-type: none"> <li>• UCTE<sup>1</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Control area</li> </ul>	<ul style="list-style-type: none"> <li>• Control area</li> </ul>
<b>Activation</b>	<ul style="list-style-type: none"> <li>• Automatic and decentralised activation via governor control</li> </ul>	<ul style="list-style-type: none"> <li>• Centralised (TSO); active call through IT</li> </ul>	<ul style="list-style-type: none"> <li>• Centralised (TSO); active call through phone/IT</li> </ul>
<b>Reserved capacity</b>	<ul style="list-style-type: none"> <li>• 3,000 MW in UCTE</li> <li>• 1,400 MW joint auction (DE, FR, NL, BE, CH, AU)</li> </ul>	<ul style="list-style-type: none"> <li>• Decided by TSO (+/-2,000 MW in Germany)</li> </ul>	<ul style="list-style-type: none"> <li>• Decided by TSO (+1,200 MW, - 700 MW in Germany)</li> </ul>
<b>Auction</b>	<ul style="list-style-type: none"> <li>• Daily</li> </ul>	<ul style="list-style-type: none"> <li>• Daily</li> </ul>	<ul style="list-style-type: none"> <li>• Daily</li> </ul>
<b>Remuneration</b>	<ul style="list-style-type: none"> <li>• Pay-as-cleared</li> </ul>	<ul style="list-style-type: none"> <li>• Pay-as-bid (Capacity)</li> <li>• Pay-as-cleared (Energy)</li> </ul>	<ul style="list-style-type: none"> <li>• Pay-as-bid (Capacity)</li> <li>• Pay-as-cleared (Energy)</li> </ul>
<b>Typical suppliers</b>	<ul style="list-style-type: none"> <li>• Synchronised generators; large-scale battery storage systems</li> </ul>	<ul style="list-style-type: none"> <li>• Storage and pumped storage hydro plants; gas turbine power plants; CHP; large-scale battery storage systems</li> </ul>	<ul style="list-style-type: none"> <li>• Storage and pumped storage hydro plants; gas turbine power plants; CHP; other thermal power plants</li> </ul>

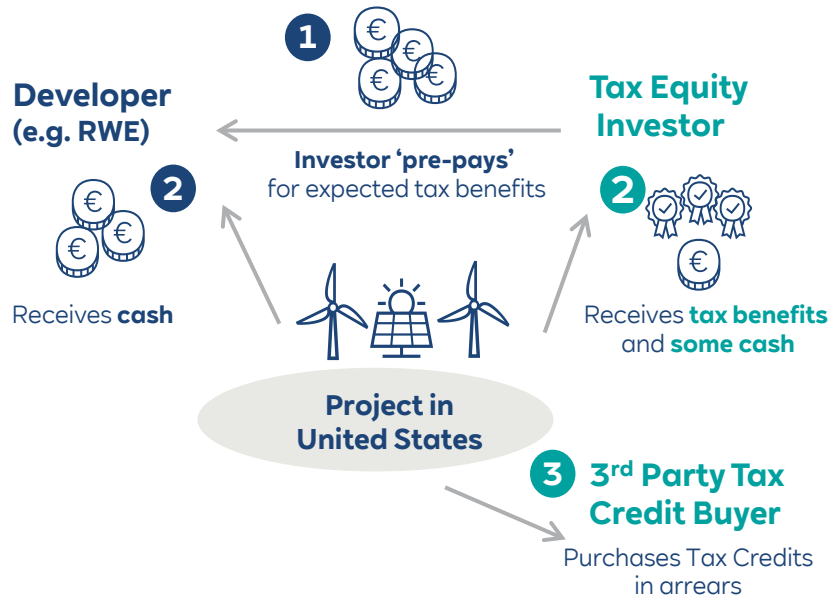
- A **sudden drop** in frequency triggers automated response to **correct the frequency**, followed by **manual interventions** by power system operators.



<sup>1</sup> The Union for the Coordination of the Transmission of Electricity.

# Tax Equity in the US - financing structure

## Inflation Reduction Act provides optionality for “Hybrid Structures”



- 1** • Tax Equity Investor invests into project **to capture tax benefits**, based on a pre-agreed financial return
  - The **developer continues to manage the project**
  - Tax Equity investment accounted as Debt under IFRS
- 2** • The **benefits** generated by the project will be **split between the developer and the investor** until the investor has reached a **specified return** on his investment (IRR)
- 3** • In a **Hybrid Structure**, a portion of the Tax Credits is **transferred (“sold”)** to a 3<sup>rd</sup> party in arrears. Depreciation benefits and the balance of tax credits is monetized with a Tax Equity investor (see 1 & 2 above)

- The developer repays the investor with a mix of tax items (production tax or investment tax credits and tax benefits from accelerated depreciation) and cash. In addition, the Tax Equity Investor maintains a small residual interest in the project after repayment.
- Hybrid Structures will allow non-traditional tax equity investors, such as large corporates, to broaden the tax equity market and provide more tax capacity in response to growing demands for tax capacity from Renewables.

# Inflation Reduction Act (1/2)

## Recap

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**President Biden signed the Inflation Reduction Act into law on August 16, 2022**

**Bill includes more than \$350B of climate and key energy provisions including:**

- Extension of the current PTC/ITC through 2024 at 100% value (\$28/mWh for 2023)
- Creation of a technology neutral PTC/ITC at full value starting January 1, 2025 through the later of 2032 or a 25% emissions reduction from the 2022 baseline
- Includes bonuses to the PTC/ITC for domestic content and energy communities
- Establishes an ITC for stand-alone storage applications
- Provides tax credits for hydrogen production over 10 years that can be coupled with the PTC/ITC for renewable energy production

## Labor Requirements for Bonus Credit Values

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**Prevailing wage requirements for construction or operations**

- Applies to any laborers or mechanics employed by the taxpayer or contractor in construction and employed for construction, alteration or repair of a similar character in the locality
- Penalties in statute for non-compliance

**Apprenticeships: must maintain a qualified apprenticeship program for construction workers on a project, with hours-worked requirements:**

- 12.5% of total hours for projects beginning construction in 2023
- 15% of total hours for projects beginning construction after 2023
- Penalties in statute for non-compliance, allows for good faith exemptions

# Inflation Reduction Act (2/2)

## Bonus Credit Value

### Domestic Content Bonus: 10% bonus value PTC and ITC if domestic content requirements met

- 100% of steel and iron structural products used to be produced in U.S.
- 20% (amount increases after 2025) domestic content cost requirement for OSW projects
- 40% (amount increases after 2025) domestic content cost requirements for onshore projects

### Energy Communities Bonus Credit Value

- 10% bonus adder to PTC/ITC for energy communities
- Energy Community criteria made up of the following requirements:
  - ❖ Brownfield sites;
  - ❖ MSA or non-MSA which had, after 12/31/2009, 0.17% or more direct employment or 25% or greater local tax revenues related to extraction, processing, transportation or storage of coal, oil or natural gas; and Unemployment rate at or above the national average for the previous year; OR
  - ❖ In a census tract (or adjacent tract) with closure of a coal mine or coal generation station

## Other Provisions

- **Stand-alone Storage ITC:** 6% base, 24% bonus for labor requirements as well as domestic content and energy communities bonus credit value, 2023+
- **Hydrogen PTC:** \$0.60/kg for zero-carbon resource, \$3.00/kg for zero-carbon resource meeting labor requirements, also may qualify for ITC, 2023+
- **EV Credit:** \$7,500 for commercial vehicles with weight rating less than 14,000lbs or \$40,000 for other qualifying commercial vehicles
- **EV Charging ITC:** maximum credit of 30% for expenses up to \$100,000, including bi-directional charging stations, but only 6% for items subject to depreciation
- **Advanced Manufacturing:** provides PTCs for solar components, inverters, wind turbine components, offshore wind foundations (fixed and floating), battery energy storage components, and a 10% ITC for offshore wind vessels and critical mineral production
- **Direct Pay:** only for tax exempt entities, except for Hydrogen PTC, Carbon Capture and Sequestration Credit, or Advanced Manufacturing Credit

## Transferability

- **Inflation Reduction Act** makes ITC, PTC, tech-neutral ITC, tech-neutral PTC, clean hydrogen PTC, and advanced manufacturing PTC eligible for transfer beginning for tax years after 2022 to an unrelated taxpayer or taxpayers
- **Does not allow for the transfer of tax losses** generated by accelerated depreciation
- **Compensation received by the taxpayer** transferring the credit would be tax exempt to transferor
- **In the case of partnerships and S corps**, the election would be made at the entity level, but the tax-exempt income from the sale would pass through to the owners
- **Allows for extended carryback** periods of 3 years

# Power Purchase Agreement (PPA) – tailored contract for long-term certainty

## Characteristics & benefits

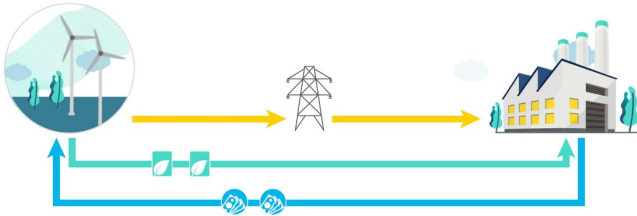


- A Power Purchase Agreement (PPA) is a **(long-term) power supply contract** between a power company and a customer/an offtaker for (green) electricity
- PPAs are normally concluded on a bilateral and **tailor-made** basis
- PPAs provide **financial certainty** to a project developer
- Customers can **avoid** long-term **commodity price risk**
- Customers can **achieve** their **carbon reduction** goal cost-effectively

# Power Purchase Agreement (PPA)

## PPA Type

### Physical PPA



## Main characteristics

- RWE delivers power **directly** to the customer and receives the PPA price
- The customer receives **guarantees of origin** (where available)

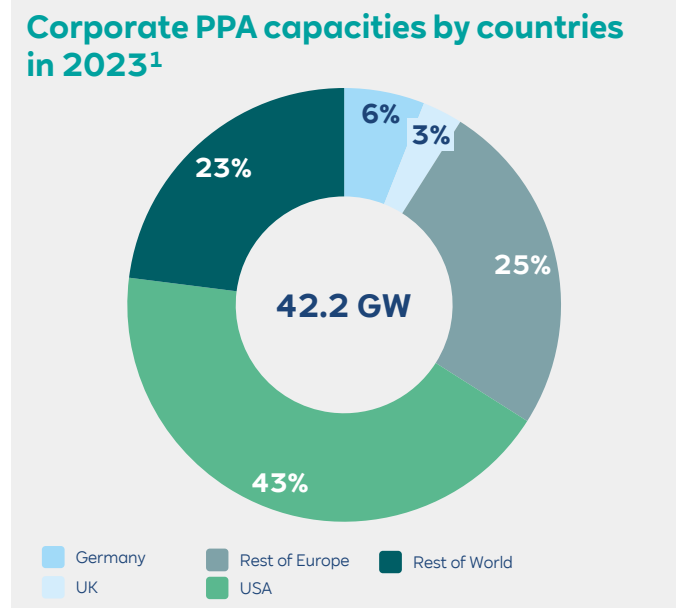
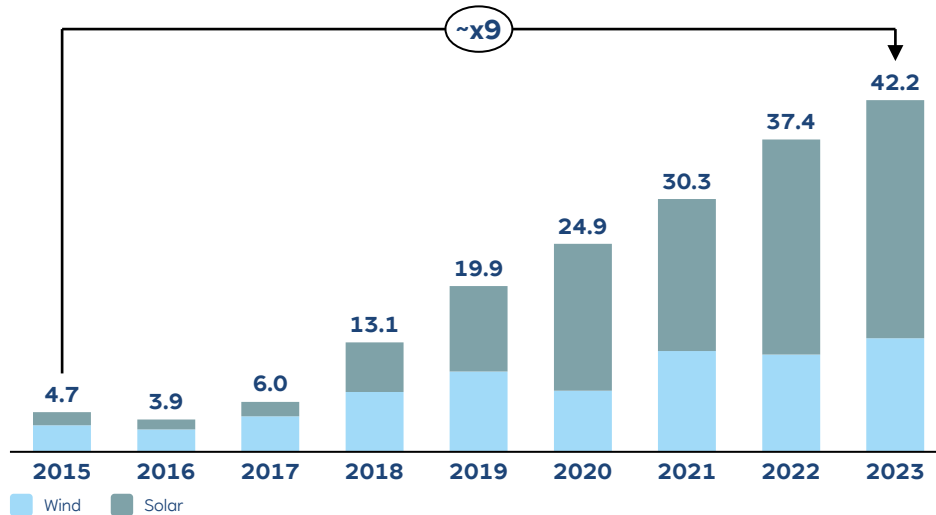
### Financial / Virtual PPA



- RWE sells power to the grid and is reimbursed via its existing market access (spot price)
- The customer buys power from the grid and pays the spot price
- RWE and the customer settle the difference between the spot price and PPA strike price
- The customer receives **guarantees of origin** (where available)

# Global corporate PPAs increased significantly over the last decade

## Corporate PPA capacities by Wind/Solar in GW

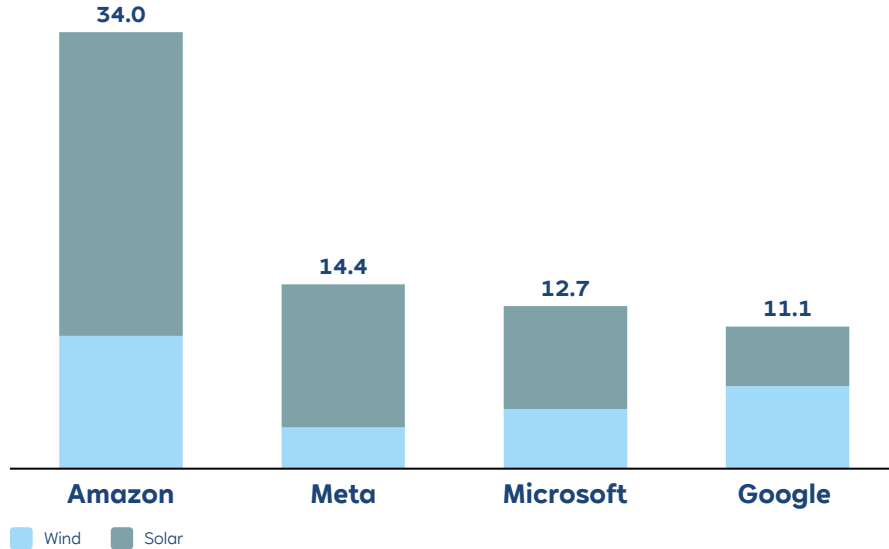


Source: BNEF 2024. | USA incl. Canada; Rest of Europe: Austria, Belgium, Bulgaria, Croatia, Denmark, Finland, France, Greece, Ireland, Italy, Latvia, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Turkey; Rest of World: Argentina, Australia, Brazil, Chile, China, Colombia, Guatemala, India, Indonesia, Israel, Japan, Mexico, New Zealand, Panama, Saudi Arabia, South Africa, South Korea. | Note: PPAs estimated signing years from 2000-2023.



# Top global oftakers are US tech companies

## Top global oftakers by capacity in GW



- **USA tech companies have publicly committed to sustainability**, driving their adoption of PPAs
- **Extensive data traffic and server infrastructure** create high energy demands, making them attractive partners for renewable energy providers
- **PPAs offer long-term and stable energy prices**

Source: BNEF 2024. | Note: PPAs estimated signing years from 2000-2023.

# RWE's successful PPA footprint across the globe (1/2)

Selected



Two 15-year PPAs with **Microsoft** from two onshore wind farms in Texas with a combined capacity of 446 MW ([link](#))



10-year PPA with **Volkswagen** on a German PV asset 170 GWh ([link](#))



15-year CfD PPA for 860 MW **Triton Knoll Offshore** Windfarm ([link](#))



15-year CfD PPA for 1.4 GW **Sofia** Offshore Windfarm ([link](#))



5–15-year agreements with **Deutsche Bahn** for offtake from Amrumbank and Nordsee Ost offshore wind farm ([link](#))



10-year PPA for an existing onshore wind farm in the UK with **Molson Coors**



13-year offtake PPA for power, ROCs & REGOs for 219 MW **Humber Gateway Offshore** Windfarm ([link](#))



10-year tailored PPA with **Freudenberg Group** for offtake from TrammGöthen, Mecklenburg photovoltaic park



20-year 150 MW renewable PPA with **TVA/Facebook** for a solar/storage asset in Tennessee ([link](#))



10-year PPA for a new onshore wind farm in Italy with **Sofidel** ([link](#))

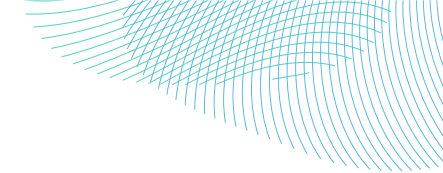


Route-to-market optimisation PPA for the first **RWE battery projects** in Europe ([link](#))







2-year tailored PPA of 100 GWh with **BMW** for offtake from run-of-river hydro power plants on the Isar and Lech rivers



# RWE's successful PPA footprint across the globe (2/2)







Selected



  
 10-year tailored PPA for 175 GWh per year with **SKW Piesteritz** for offtake from RWE's hydropower plants ([link](#))

  
 10-year PPA with **Górażdże Group** for 70 GWh per year from the 132 MW Windfarm Polska III ([link](#))


  
 10-year PPA with **SWM** for 180 GWh from Polish onshore wind farm Windfarm Polska III ([link](#))

  
 10-year PPA with **Lafarge Cement** for 110 GWh from the 132 MW Windfarm Polska III ([link](#))

  
 10-year PPA with **Asahi** for 80 GWh per year from wind farms in northern Poland including Lech Nowy Staw ([link](#))

  
 10-year PPA with **Sofidel** for 21 GWh per year from the 210 MWp photovoltaic plant Katerini along with PPC renewables ([link](#))

  
 10-year tailored PPA with **11 major German companies<sup>1</sup>** and a **large municipality<sup>2</sup>** for offtake from Amrumbank & Nordsee Ost offshore wind farm for 1,500 GWh per year ([link](#))

  
 15-year tailored PPA with **Honda** for a 120 MW wind farm in Oklahoma ([link](#))

<sup>1</sup> Badische Stahlwerke, Bosch, Freudenberg Group, Infraser Höchst, Messer, Schott, Telefónica, Verallia, Vodafone, Wacker, ZF. <sup>2</sup> Mainova.

# Successful signing of PPAs from our Kaskasi wind farm shows high industrial demand for green electricity<sup>1</sup>

## Power Purchase Agreements for ~1,000 GWh per year



- 10-year PPA with **Schwarz Group**
- 10-year PPA with **thyssenkrupp Steel**
- 10-year PPA with **DHL Group**
- 10-year PPA with **Vodafone**
- 10-year PPA with **Evonik**
- Long term PPA with **Ensinger**
- Long term PPA with **Infraserv Höchst**

First contract will start in **2026**, with further contracts to follow in **2027** and **2028**

<sup>1</sup> [Press Release](#)

# Europe and the US continue their green transition path



## European Green Deal

- **55% GHG** reduction target **by 2030** vs. 1990 levels
- **60 GW offshore** wind capacity installed **in 2030** with offshore wind to become **the largest single source** of electricity in Europe by 2040
- Also **promoting emerging ocean energy technologies**, e.g. floating solar and wind, and tidal energy
- **600 GW solar PV** capacity installed **in 2030**, 320 GW by 2025
- **40 GW electrolyser** capacity by 2030 producing up to 10 million tonnes of renewable **hydrogen**
- **€750bn** recovery package – 37% earmarked for climate **spending**
- **2050** target to reach **CO<sub>2</sub> neutrality**




## US Policy on Climate Change


- **50%** reduction in U.S. GHG emissions from 2005 levels **by 2030**
- **Carbon-free** power system **by 2035**
- **30 GW** offshore wind capacity target by 2030
- **Rejoining** the Paris agreement; administrative fast tracking and planned new seabed lease auction rounds

Source: Europa.eu; eur-lex.europa.eu; congress.gov; whitehouse.org.


# Major regulatory measures for the European utility markets (1/4)

	Market design	CO <sub>2</sub> reduction	Renewables	Conventional generation
	<ul style="list-style-type: none"> <li>Reform of Electricity Market Design: In mid-December 2023, the Parliament and the Council agreed on a revision. They stipulate that there will be no extension of revenue caps. In addition, two-sided "Contracts for Difference" (CfDs) should become inter alia the standard for new renewable energy and for repowering. Capacity Remuneration Mechanisms (CRM) shall no longer be only a "last resort" measure and the approval process shall be simplified.</li> <li>EU Commission proposed Hydrogen &amp; Gas Market Decarbonisation Package in December 2021. EP and Council adopted positions in February and March 2023 respectively</li> </ul>	<ul style="list-style-type: none"> <li>EU Emissions Trading Scheme: Emissions in the sectors covered by the EU ETS must be reduced by 62% by 2030; package formally adopted by end of April 2023</li> <li>European Climate Law: climate neutrality in 2050, -55% until 2030</li> <li>On 6 February 2024, the European Commission published a non-legislative communication in which it recommends reducing greenhouse gas emissions by 90% by 2040 compared to 1990 levels. A legislative proposal to adapt the climate law will follow in 2025</li> </ul>	<ul style="list-style-type: none"> <li>EU Renewable Energy Directive (RED): EP and Council agreed reform in March 2023: overall binding RES target of 42.5% by 2030 Subtarget for transport and industry (for the latter: share of green hydrogen in total hydrogen used should be 42% by 2030 and 50% in 2035.), faster RES permitting procedures and enhanced sustainability criteria for biomass</li> </ul>	<ul style="list-style-type: none"> <li>EU Action Plan "Zero Pollution for Air, Water and Soil" <ul style="list-style-type: none"> <li>❖ Industrial Emissions Directive: Proposal for revision presented on 5 April 2022. Council adopted position in Spring 2023, EP in July 2023. Trilogue discussions concluded in November 2023</li> <li>❖ Ambient Air Quality Directive: Proposal for revision presented in November 2022, EP adopt position in July 2023, formal adoption of Council still pending</li> <li>❖ Next BREF-LCP (rolling process) will not start before 2025</li> </ul> </li> </ul>

# Major regulatory measures for the European utility markets (2/4)


	Market design	CO <sub>2</sub> reduction	Renewables	Conventional generation
<b>DE</b> 	<ul style="list-style-type: none"> <li>Energy-only with strategic reserve components; with the political agreement for a power plant strategy a new market design (capacity mechanism) was announced as well</li> <li>Acceleration of grid expansion &amp; new provisions for redispatch</li> <li>CHP support until 2026, however, prolongation unclear</li> </ul>	<ul style="list-style-type: none"> <li>Climate Protection law               <ul style="list-style-type: none"> <li>– Climate neutrality by 2045</li> <li>– Minus 65% by 2030 based on binding sectoral targets, minus 88% in 2040</li> <li>– Cross-sector CO<sub>2</sub> reduction</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Existing wind areas declared as wind acceleration areas under RED III</li> <li>Parliamentary process for implementation of RED III for offshore wind and H2 as well as transmission grids underway</li> <li>Process for implementation of RED III for wind onshore and solar started</li> </ul>	<ul style="list-style-type: none"> <li>Coal phaseout by 2030 for Rhenish lignite area fixed by law in Dec. 2022, by 2038 for Eastern Germany (fixed by law in 2021, assessment for earlier phase out in Aug. 2026)</li> <li>Nuclear exit completed &amp; final storage regulation</li> <li>Power plant strategy with tenders for new H2 ready gas fired power plants with starting the first auction this year is announced</li> </ul>

# Major regulatory measures for the European utility markets (3/4)

	Market design	CO <sub>2</sub> reduction	Renewables	Conventional generation
<b>NL</b> 	<ul style="list-style-type: none"> <li>New Energy Law debated in Parliament and probably approved before Summer break 2024</li> <li>Execution of National Climate Agreement</li> </ul>	<ul style="list-style-type: none"> <li>Former coalition Agreement: 55% CO<sub>2</sub> reduction by 2030, aim for 60%, electricity sector fully decarbonised until 2035</li> <li>Climate fund of €34 bn</li> <li>Coalition is formed between four parties (PVV, VVD, BBB, NSC) but ambitions still not clear</li> </ul>	<ul style="list-style-type: none"> <li>SDE++ regulation (Stimulation Renewable Energy) since 2011 main instrument</li> <li>Road map offshore wind with annual tenders until 2030</li> </ul>	<ul style="list-style-type: none"> <li>Coal phaseout: end of 2024 for plants built in the 1990s and end of 2029 for plants built in 2000 and thereafter</li> <li>Government announced €1 bn for converting gas stations to H2 ready before 2030</li> </ul>



# Major regulatory measures for the European utility markets (4/4)

	Market design	CO <sub>2</sub> reduction	Renewables	Conventional generation
<p><b>UK</b></p> 	<ul style="list-style-type: none"> <li>Review of Electricity Market Arrangements (REMA) continuing through 2024 with second consultation closing for submissions on 7 May and implementation from 2025</li> <li>Considering fitness for purpose of current market arrangements – Capacity Market, Contract for Difference, locational and operational efficiency of wholesale markets &amp; balancing mechanism</li> <li>Acceleration of grid expansion and connection reform</li> </ul>	<ul style="list-style-type: none"> <li>Climate Change Act (Net zero target by 2050)</li> <li>6<sup>th</sup> Carbon Budget – 78% CO<sub>2</sub> reduction by 2035</li> <li>UK ETS with Auction Reserve Price</li> <li>CBAM to be implemented from 2027 subject to further consultation in 2024</li> <li>Ambition to decarbonise power sector by 2035, subject to security of supply</li> </ul>	<ul style="list-style-type: none"> <li>British Energy Security Strategy: 50 GW Offshore Wind &amp; 5 GW Floating Wind by 2030; 70 GW solar by 2035</li> <li>CfD main support instrument since 2014-annual auctions announced from 2023; future design under review</li> <li>Sustainable Industry Rewards (non-price factors) to grow more local and decarbonised supply chain from Allocation Round 7 in 2025</li> <li>CfD also for onshore wind but currently blocked through planning system in England</li> </ul>	<ul style="list-style-type: none"> <li>Coal Phase out by Oct 2024</li> <li>Legislative framework for CCUS and hydrogen business models now in place following passage of the Energy Act 2023</li> <li>Target to deploy four CO<sub>2</sub> T&amp;S clusters capturing 20-30 Mt CO<sub>2</sub> annually by 2030, and 50Mt CO<sub>2</sub> by 2035</li> <li>Call for evidence expected on non-pipeline transportation of CO<sub>2</sub> to facilitate CCUS without locational access to T&amp;S infrastructure</li> </ul>

# Emissions Trading System in the EU and UK as key tool for reducing greenhouse gas emissions

## EU ETS

- Established by the EU Emission Trading Directive; entered into force on 1 January **2005**. Covers ~40% of EU greenhouse gas emissions.
- Based on **'cap and trade' system**, whereby a cap is set on the total amount of greenhouse gases that can be emitted by installations covered by the system.
- The Fit-for-55-Package by EU commission to reach targets of EU Green Deal (climate neutrality 2050, 55% reduction by 2030 vs 1990) have entered into force. The revised changes for the EU ETS have started to apply from 2024.
- **Emissions** under the system are **capped** and expected to be reduced by 62% by 2030 vs 2005 under the new cap. This is an increase vs. the earlier target of 43% and will be consistent with the new 55% EU GHG reduction target.
- The cap is reduced over time in line with the **Linear Reduction Factor (LRF)**. Within the cap, companies receive or buy emission allowances which they can trade with one another as needed. The **LRF** will be increased to 4.3% for 2024 to 2027 and thereafter to 4.4% (from previously 2.2%). The increased LRF should be combined with two downward adjustments of the cap (rebasings) so that the new LRF has the same effect as if it had been applied from 2021.
- The **Market Stability Reserve (MSR)** as a rule-based mechanism that allows the supply of allowances to respond to market oversupply stays in place and the MSR intake rate will be kept at 24% until 2030.

Source: [https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets\\_en](https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en).

## UK ETS

- The UK Emissions Trading Scheme went live on 1 January 2021, **replacing the UK's participation in the EU ETS**. On 19th May, UK ETS auctions commenced. The first Compliance date was in Q1 2022 for 2021 emissions.
- The scheme largely **mirrors the operation of the EU ETS**, by introducing the supply of allowances via auctions which can subsequently be traded in a secondary market.
- UK government finished its review of the UK ETS to align the cap to its net Zero trajectory. The cap was set at 936 Mt for 2021-2030, a cap reduction of 30%.
- The **total number of allowances** available for auction in 2024 is ~69 million. This is more than half of the new UK ETS 2024 **cap** of ~92 million allowances.
- The Auction Reserve Price (the **minimum price** for bids in auctions) is set at £22. Auctions take place twice a month and are carried out by UK government at ICE.
- The Total Carbon Price that power sector emitters face is comprised of the Carbon Price Support (at £18) plus the price of UK ETS permits.
- Further, the UK has opened a public consultation on proposals for the design and administration of a **Carbon Border Adjustment Mechanism (CBAM)**. The UK CBAM will be introduced in 2027 and the consultation suggests it will apply to iron, steel, aluminum, fertilizer, hydrogen, ceramics, glass and cement sectors.

# Current regulatory developments in the core H2 markets



## European Union

- **RED III**
  - Formally adopted on 9 October, Published in the Official Journal of the European Union on 31 October, and entered into force 20 days after that date. Member States have 18 months after entry into force to transpose it into national legislation
  - It establishes sector-specific targets in transport, industry, buildings, and district heating and cooling.
  - It raises the share of renewable energy in the European Union's overall energy consumption to 42.5% by 2030, with an additional 2.5% indicative top-up to allow the target of 45% to be achieved
- **Hydrogen & Gas Markets Decarbonisation Package:** Consists of revisions of Gas Regulation and Gas Directive from 2009; central piece of the regulatory framework for hydrogen in the EU. Adoption in plenary of EU Parliament and Council. Publication in Official Journal of the EU still pending. The Regulation will be directly applicable in all Member States, the Directive requires implementation into national law within 2 years.



## Germany

- **Amendments to the Energy Industry Act (EnWG):**
  - **Grid fee exemption:** Extension of § 118 (6) EnWG: Electrolysers which are commissioned by 3 August 2029 will be exempted from electricity grid fees for 20 years.
  - **H2 core grid:** Introduction of provisions for the build-up of a H2 core grid. Within a second EnWG amendment (April 2024), the financing concept for the core grid was also introduced.
  - **13k EnWG** is aimed at reducing the curtailment of renewable energies due to grid bottlenecks. The TSO shall organize auctions. A participation on that market shall only be possible if defined criteria regarding location and additional demand are fulfilled. The criteria for additional demand have been set by the German regulatory authority (BNetzA) and the framework of the auction platform has been deployed by the TSOs. The platform is scheduled to go into operation in October 2024.
- **H2 Acceleration Act:** Government published draft with amendments to several legislations regarding an acceleration of permitting procedures for H2 infrastructure. Legislative process has started. Final Act expected Autumn 2024.



## Netherlands

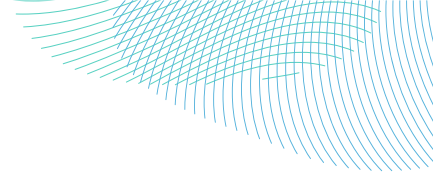
- **'Voorjaarsnota' & draft multi-year program Climate Fund 2025 (April 2024):** the NL government aims for 4 GW electrolysis capacity in 2030. In order to realize that, the government has reserved for 2025 a subsidy budget of 2.9 billion euro for onshore electrolysis, 1.4 billion for offshore electrolysis and an additional 100 million euro for the offshore H2 network development. These budgets need to be approved by the Parliament later this year.
- **OWE-subsidy scheme for onshore electrolysis:** first tender round (250 million euro) subsidy award in April 2024. Second tender round (~1 billion euro) opens after summer 2024.
- **Offshore H2 demonstration projects:** in 2023 the government announced the Demo 1 (380 million subsidy) and Demo 2 (1.4 billion euro subsidy) projects. From 15 December 2023 to 26 January 2024 an online Interest Poll on offshore H2 production was held; 56 reactions were submitted. More information is expected before summer.
- **Stimulation of hydrogen demand:** the government is preparing policy decisions with regard to RFNBO industry obligations, the 'refinery route' and H2 demand subsidies.


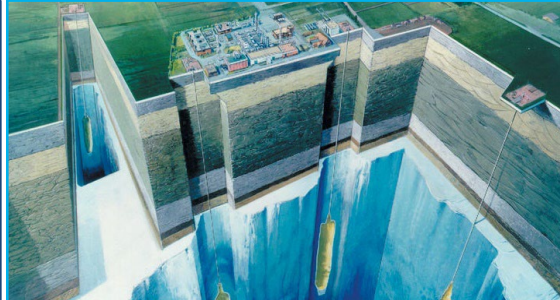




## United Kingdom

- **UK hydrogen strategy:** Target capacity doubled to 10GW by 2030 – of which at least 50% should come from electrolysis.
- **By 2025:** 2GW low-carbon hydrogen (green & blue), Certification Scheme & "business models" for transport & storage infrastructure.
- **Decisions on gas blending** (into distribution network) expected by government in 2024, following further work on safety & cost-benefit analysis.
- **Department for Energy Security & Net Zero (DESNZ)** announced outcome of 1<sup>st</sup> electrolytic H2 allocation round (HAR1) end 2023; 11 projects; 125 MW. HAR2 application window closed 19 April 2024.

# Use of natural gas infrastructure for hydrogen



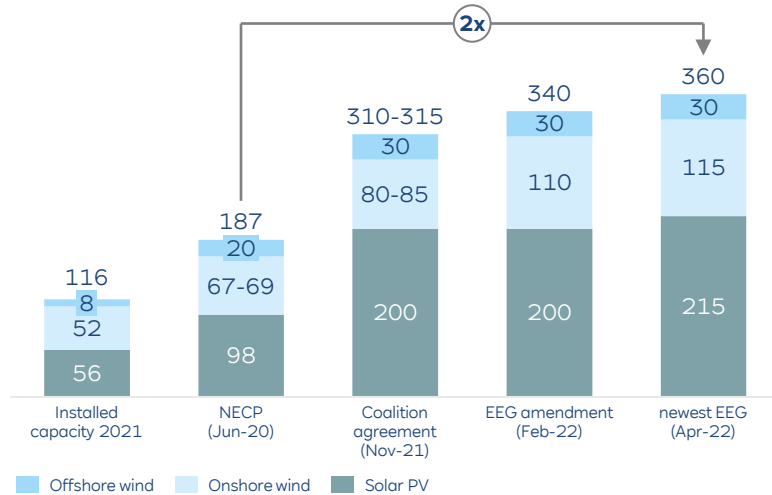
Gas pipeline hydrogen repurpose	Gas storage hydrogen repurpose	Hydrogen production from natural gas
<p>A large part of the <b>European long-distance gas network</b> can be <b>repurposed</b> for hydrogen transport</p>	<p><b>Salt cavern storage facilities</b> are considered <b>suitable</b> for hydrogen storage; suitability of other gas storage facilities still uncertain</p>	<p>Production of <b>natural gas-based carbon-neutral hydrogen</b> via methane pyrolysis could enable hydrogen supply far from coastal areas</p>
		
<p><b>80%</b> ...energy transport capacity of hydrogen vs. natural gas pipeline<sup>1</sup></p>	<p><b>25%</b> ...max. energy storage capacity of hydrogen vs. natural gas in a salt cavern</p>	<p> Part of the existing natural gas infrastructure remains necessary to transport natural gas</p>

Source: RWE AG. | <sup>1</sup> Capacity loss limited by hydrogen's higher flow speed.

# German 2030 renewables ambitions

## Germany has nearly doubled its 2030 renewables ambitions over the past two years

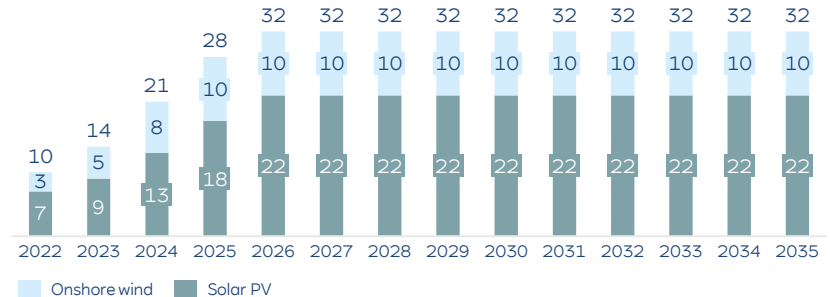
Installed capacity targets for 2030 (GW)



Source: European Commission, Federal Ministry for Economic Affairs and Climate Action and IHS.

## New addition targets

Targeted onshore wind and solar additions (GW)  
scenario for 600 TWh renewables electricity in 2030

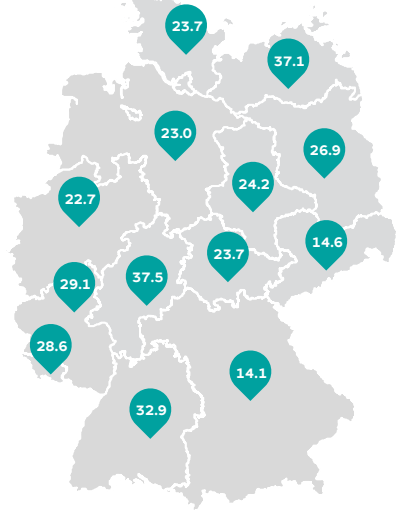


### Offshore wind

Based on the Wind Energy at Sea Act, the expansion targets for **offshore wind** will be significantly increased to at least **30 GW by 2030**, at least **40 GW by 2035** and at least **70 GW by 2045**. At the same time, the tender volumes will be increased and the WindSeeG revised in order to implement the accelerated expansion.

# Progress in permitting through faster approval procedures

## Permitting process duration for Onshore wind in Germany 2018-2024, month<sup>1</sup>



#1,020 of total processes

#2,984 of total approved plants

14.4 GW of total approved capacity

25.4 month of avg. duration

- **EU Emergency Regulation** (end of 2022) and **Renewable Energy Regulation RED III** (end of 2023) lays down framework to accelerate the deployment of renewable energy projects<sup>2</sup>
- **In June 2024, German Legislator passed the Federal Immission Control Act** to accelerate permit processes and to implement EU law<sup>3</sup>
- **Permitting process for new onshore and repowering projects streamlined and simplified, i.e.:**
  - Status “Completeness of the application documents” and beginning of process clarified
  - Issuing of preliminary planning approvals simplified
  - “Repowering” definition enlarged
  - Change of wind turbine type in case of minor deviations eased

<sup>1</sup>Duration of the procedure is defined as the period from the application to the official decision. Procedures completed in the period from January 2018 to May 2024 are considered for which both the date of application and the date of decision could be determined. Last data collection was on 29.5.2024 | <sup>2</sup> Press Release | <sup>3</sup> BMUV: Ein Beschleunigungspaket für Erneuerbare Energien und Industrie – Bundestag beschließt Gesetz zur Verbesserung des Klimaschutzes beim Immissionsschutz | Pressemitteilung

# Road Map of German Coal Exit

## Different approaches for lignite and hard coal

In July 2020 the German Parliament decided on the coal exit by 2038 with following milestones:

- **By 2022 reduction** to a total remaining capacity of **15 GW lignite** and **15 GW hard coal**
- **By 2030 reduction** to a total remaining capacity of **9 GW lignite** and **8 GW hard coal**
- **Reviews in 2023, 2026 and 2029** (climate protection, security of supply, power prices, regional development and employment)

In 2022, RWE, the German Federal and Northrhine-Westphalian Government agreed on termination of lignite power production in Rhenish lignite area already by 2030.

### Implementation of the recommendations differs between lignite and hard coal:

#### Lignite:

- Decision on **which lignite** power plants will be shut down at what point based on **Coal Exit Law (Kohleausstiegsgesetz)**
- **Compensation** for shutdowns of power plants including costs for open cast mines
- EU Commission approved our compensation in 2023

Link to all decommissioning dates for lignite plants.

[https://www.buzer.de/Anlage\\_2\\_KVBG.htm](https://www.buzer.de/Anlage_2_KVBG.htm)

#### Hard Coal:

- Decision on **which hard coal** power plants will be shut down at what point based on decommissioning **auctions** (basically voluntary). Results of already finished auctions:
  - 1<sup>st</sup> auction round 1 Dec, 2020: 4.8 GW
  - 2<sup>nd</sup> auction round 1 Apr, 2021: 1.5 GW
  - 3<sup>rd</sup> auction round 14 July, 2021: 2.1 GW
  - 4<sup>th</sup> auction round 15 Dec, 2021: 0.5 GW
  - 5<sup>th</sup> auction round 20 May, 2022: 1.0 GW
  - 6<sup>th</sup> auction round 14 Oct, 2022: 0.5 GW
  - 7<sup>th</sup> auction round 01 Jun, 2023: 0.3 GW (last auction round)
- No further auctions for target years 2027 onwards, but administrative prohibition of usage of coal based on age **without any compensation**

# New UK Labour Government targets 100% clean power by 2030

Following the 2024 General Election, the new Government has set a stretching target of achieving “clean power by 2030” – running the power system on 100% clean power<sup>1</sup> – five years earlier than the previous Government’s.

## Implications of the target

- **Clean power by 2030<sup>2</sup>** with a significant focus on enhanced and accelerated renewables deployment, and a “strategic reserve” of gas power stations.
- **Labour will also set up “GB Energy”<sup>3</sup>**, a new state-owned company which will partner with industry and trade unions to deliver clean power by co-investing in renewable technologies and deploy local energy production with communities across the country.

### Renewable deployment

- “Quadruple offshore wind” by 2030 (**60 GW incl. 5 GW Floating**)
- “Triple solar” by 2030 (**45 GW**)
- “Double onshore wind” by 2030 (**30 GW**)<sup>2</sup>

### Hydrogen use

- Production capacity ambition of **10 GW of green hydrogen by 2030<sup>1</sup>**
- Could increase depending on decision on hydrogen for heat, due to be taken in 2026

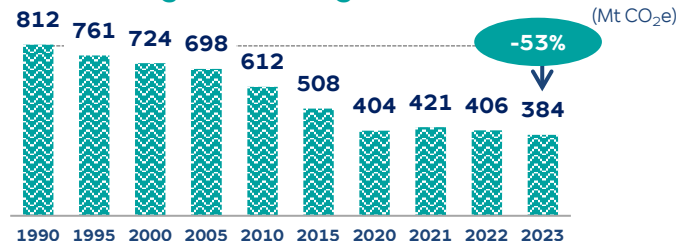
### CCS

- Commitment to invest in CCS to “ensure...long term energy storage”, with a “strategic reserve of gas power stations”<sup>2</sup> to guarantee security of supply
- Expectation of continued commitment to **deliver four carbon capture usage and storage clusters by 2030**, capturing 20-30 MtCO<sub>2</sub> across the economy, including 6 MtCO<sub>2</sub> of industrial emissions, per year

## The UK has been a leader in cutting emissions

- By **2023**, UK reduced its total **GHG emissions** by **~53%** vs 1990
- **Coal 1%** of power generation **compared to 65%** in 1990; Government wants to phase it out completely by Oct **2024**
- **~14GW offshore wind** currently deployed<sup>3</sup>
- **~15GW solar** currently deployed<sup>4</sup>

## Final annual greenhouse gas emissions in the UK<sup>5</sup>



<sup>1</sup> Make Britain a Clean Energy Superpower (Link) | <sup>2</sup> Change – Labour Party Manifesto 2024 (Link) | <sup>3</sup> RenewableUK (Link) | <sup>4</sup> Solar Power Portal (Link) | <sup>5</sup> UK half-way to net zero – GOV.uk (Link)



# GB capacity market

## Establishment

- **Adopted in 2013** as part of the Energy Act 2013 in the UK
- Provides generators with the ability to set the price at which they are willing to commit to keeping plant available

## Price

- Auction price can be between £0 – 75/kW
- Auction price is **determined by the marginal capacity**. All units receive the price of the highest successful unit ('descending clock' format)
- Units which leave the auction before it closes will not be offered a Capacity Market Agreement

- **Used to secure supply** since Q4 2017
- UK government determines amount of capacity needed for each delivery year (quantity-based-mechanism)

## Capacity quantities

- The largest part of the capacity is awarded in the first auction (T-4); a small part follows in another auction one year before the respective delivery year (T-1 auction)
- The 'agreement' terms are between 1 and 15 years – depending on whether it is existing plants or new plants
- Delivery year begins on the 1<sup>st</sup> October through to the 30<sup>th</sup> September

Delivery Year	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
T-1 Auction (£/kW)	6.95	6.00	0.77	1.00	45.00	75.00	60.00	35.79			
T-4 Auction (£/kW)		19.40	18.00	22.50	8.40	6.44 <sup>1</sup>	15.97	18.00	30.59	63.00	65.00

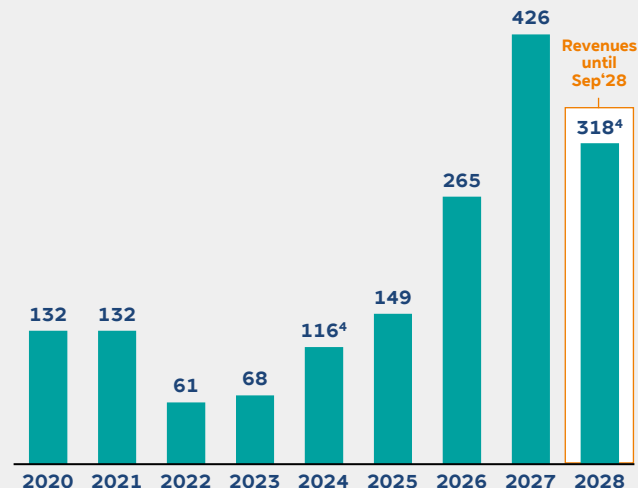
Source: RWE Analysis. | <sup>1</sup> In 2020 a T-3 auction replaced the T-4 auction, which was unable to take place in 2019 given the standstill in the GB Capacity Market following the legal challenge by Tempus Energy.

# GB capacity market

## Our plants in GB Capacity Market

Derated capacity (MW)	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25 <sup>5</sup>	2025/26	2026/27	2027/28
Aberthaw <sup>1</sup>	1490	1475	-	-	-	-	-	-	-
Didcot B (excl. OCGT)	1,380	1,395	1,395	1,395	1,395	1,395	1,409	1,416	1,351
Little Barford	691	699	699	699	699	699	706	709	678
Great Yarmouth	365	369	369	369	369	369	373	374	376
Staythorpe	1,652	1,670	1,670	1,670	1,670	1,670	1,687	1,695	1,605
Pembroke	2,114	2,138	2,138	2,138	2,138	2,138	2,159	2,169	2,014
King's Lynn	329	333	333	333	333	333	333	333	333
Hydro sites	-	-	-	-	-	-	-	-	44
Other <sup>2</sup>	382	348	385	335	426	352	331	331	342
<b>Total (successful capacity)</b>	<b>6,913</b>	<b>6,951</b>	<b>6,989</b>	<b>6,938</b>	<b>6,956</b>	<b>6,892</b>	<b>6,999</b>	<b>7,027</b>	<b>6,742</b>

## Revenue from capacity market<sup>4</sup> in £ million, pre inflation

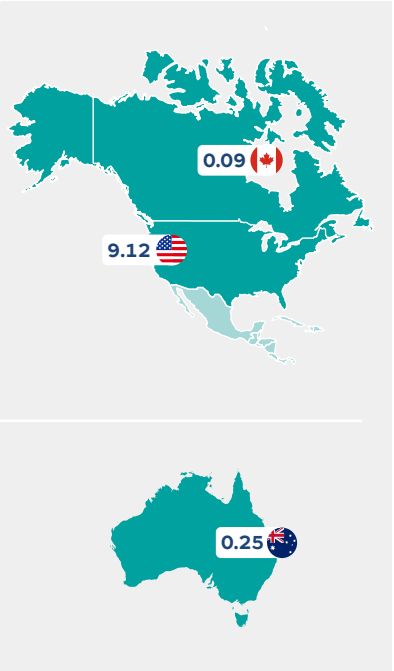
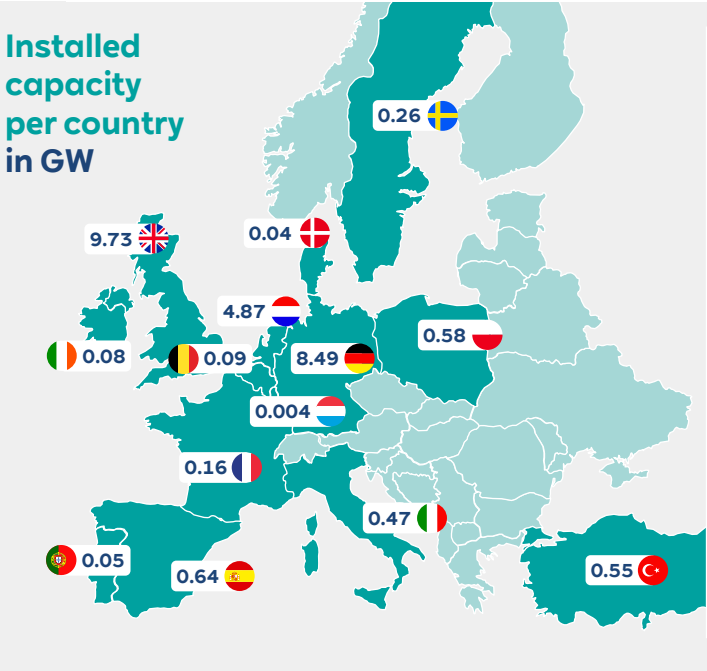
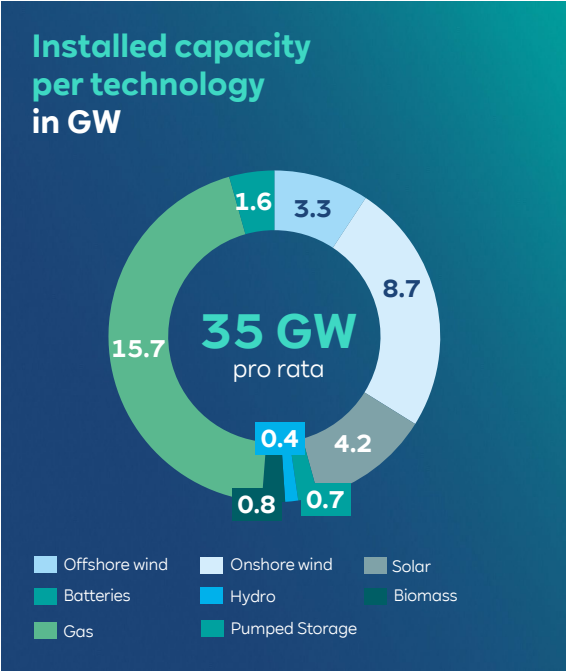


<sup>1</sup> Due to the closure of Aberthaw in 2020 its CM agreements for 2019/2020 and 2020/2021 were transferred to third parties and other units within RWE's fleet. <sup>2</sup> Includes Cowes OCGT, Didcot OCGT, Cheshire GT, Cheshire Recips Conoco Phillips, Hythe, Grimsby A, Grimsby B and co-located battery assets. <sup>3</sup> 2028 only includes full year revenue for assets with 15-year agreements, being - King's Lynn, Grimsby A, Cheshire and Grimsby B. All other units show revenue up to September 2028 due to end of the capacity market year. <sup>4</sup> Based on cleared capacity prices (nominal) and capacity contracts secured by RWE| Note: Rounding differences may occur.

# RWE Technologies



# RWE's installed capacity



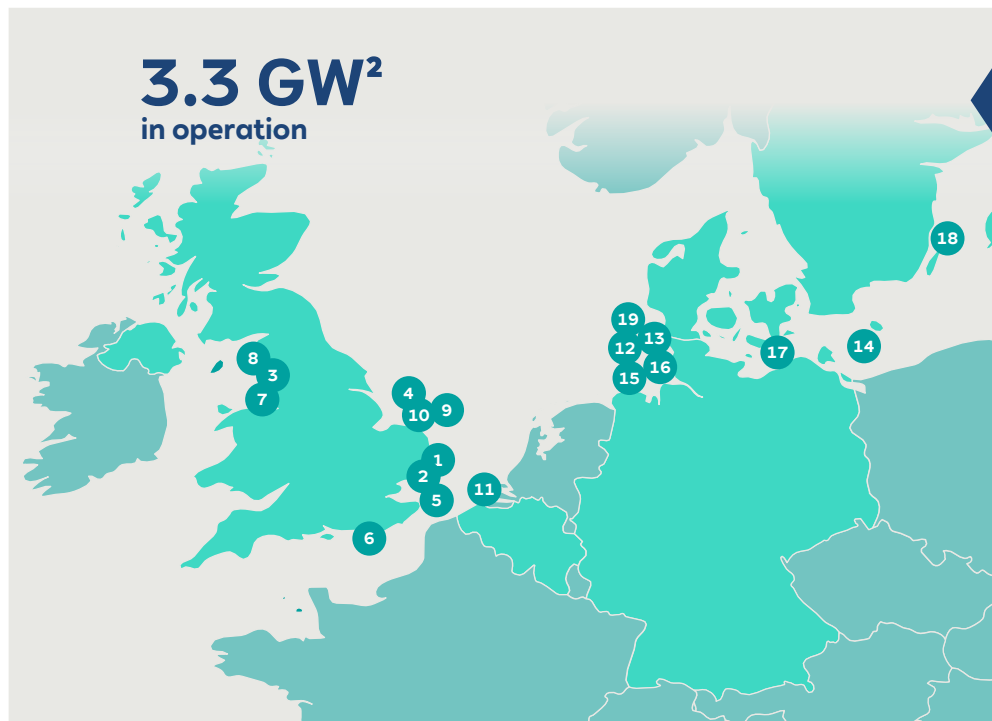
Note: Pro rata capacities as of 31 December 2023; rounding differences may occur. | Excluding Phaseout technologies.

# Offshore wind





# Strong market position in Offshore wind



## In operation

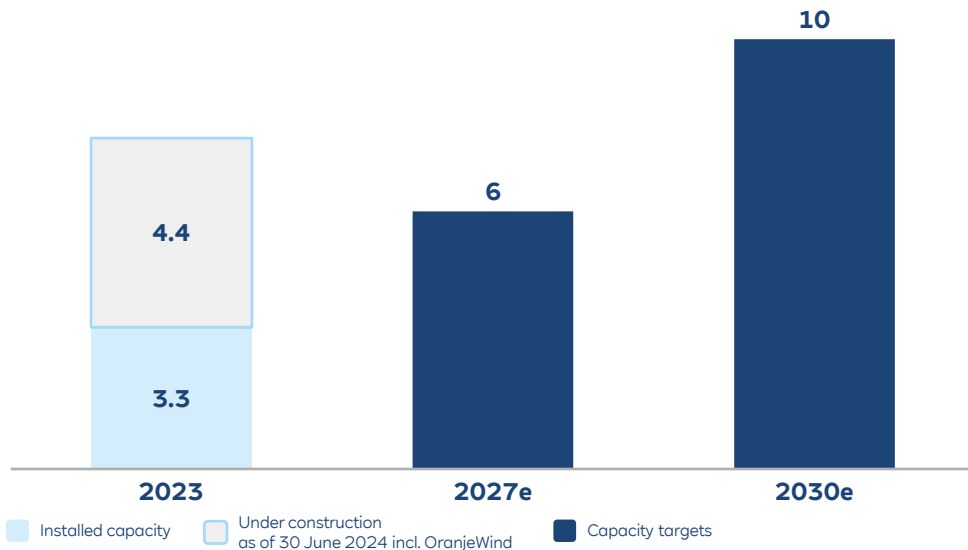
- 1 Galloper**  
UK, 353 MW<sup>1</sup> (88 MW<sup>2</sup>)
- 2 Greater Gabbard**  
UK, 504 MW<sup>1</sup> (252 MW<sup>2</sup>)
- 3 Gwynt y Môr**  
UK, 576 MW<sup>1</sup> (288 MW<sup>2</sup>)
- 4 Humber**  
UK, 219 MW<sup>1</sup> (112 MW<sup>2</sup>)
- 5 London Array**  
UK, 630 MW<sup>1</sup> (189 MW<sup>2</sup>)
- 6 Rampion**  
UK, 400 MW<sup>1</sup> (200 MW<sup>2</sup>)
- 7 Rhyl Flats**  
UK, 90 MW<sup>1</sup> (45 MW<sup>2</sup>)
- 8 Robin Rigg**  
UK, 174 MW<sup>1</sup>
- 9 Scroby Sands**  
UK, 58 MW<sup>1</sup>
- 10 Triton Knoll**  
UK, 857 MW<sup>1</sup> (506 MW<sup>2</sup>)
- 11 Thornton Bank**  
BE, 325 MW<sup>1</sup> (87 MW<sup>2</sup>)
- 12 Alpha Ventus**  
DE, 60 MW<sup>1</sup> (16 MW<sup>2</sup>)
- 13 Amrumbank West**  
DE, 302 MW<sup>1</sup>
- 14 Arkona**  
DE, 385 MW<sup>1</sup> (193 MW<sup>2</sup>)
- 15 Nordsee One**  
DE, 332 MW<sup>1</sup> (50 MW<sup>2</sup>)
- 16 Nordsee Ost**  
DE, 295 MW<sup>1</sup>
- 17 Rødsand 2**  
DK, 207 MW<sup>1</sup> (41 MW<sup>2</sup>)
- 18 Kårehamn**  
SE, 48 MW<sup>1</sup>
- 19 Kaskasi**  
DE, 342 MW<sup>1</sup>

<sup>1</sup> Total installed capacity. | <sup>2</sup> Pro rata view as of 31 December 2023.



# Our build-out plan until 2030 is secured by attractive and clearly defined projects

## Offshore wind targets GW, pro rata



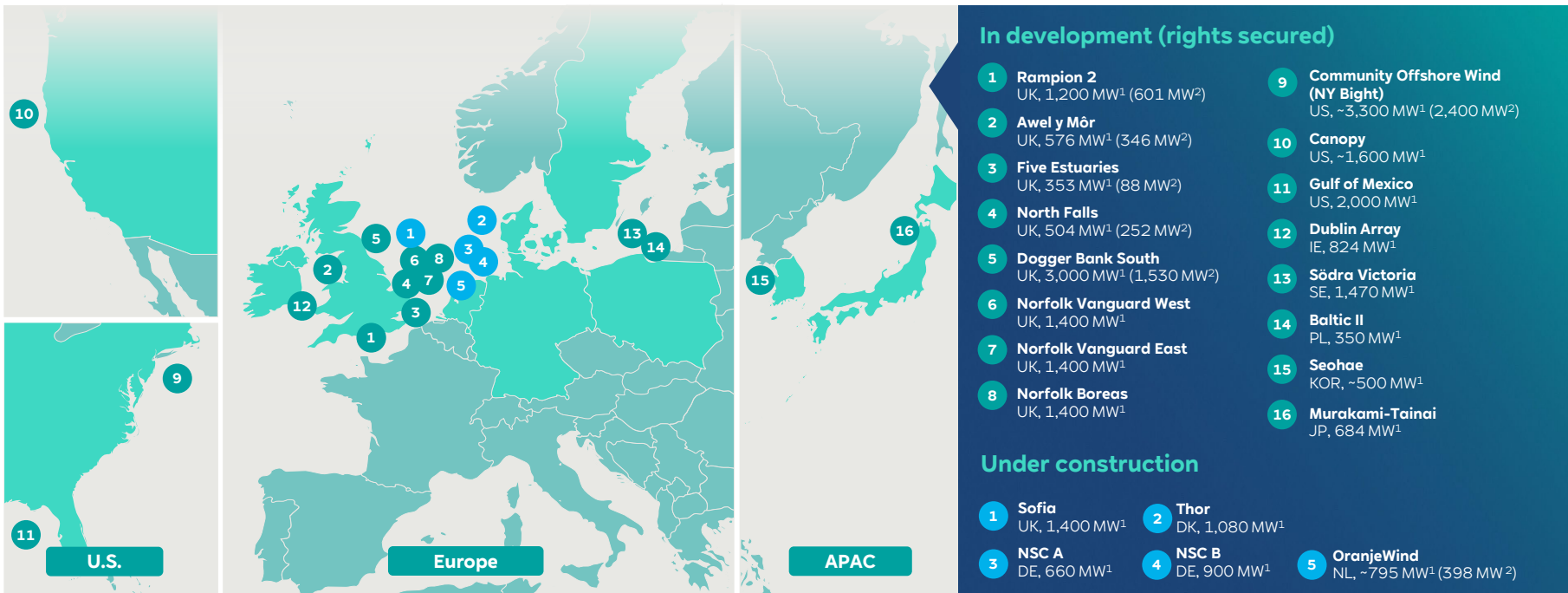
## Development pipeline with COD until 2030 GW, pro rata

Murakami-Tainai	0.7 GW <sup>1</sup>	
Baltic II	0.4 GW	
Rampion 2	0.6 GW	
Community Offshore Wind	1.0 GW	
Norfolk Vanguard West	1.4 GW	
Norfolk Vanguard East	1.4 GW	
Norfolk Boreas	1.4 GW	
Further projects	1.8 GW	

<sup>1</sup> Total capacity.



# Detailed view of our offshore projects in development (rights secured) & under construction



<sup>1</sup> Total capacity. | <sup>2</sup> Pro rata view. | World map not set to size and proportion.





# Our integrated business along entire offshore project value chain allows us to capture maximum value



**Commercialization** is fundamental in all phases of the project



# We are driving innovation and are well positioned to meet future sustainability requirements



First ever **full system integration** of offshore wind, H2, e-boilers and battery storage at OranjeWind

At the **forefront of floating offshore wind through our pilot projects** (e.g., DemoSATH and TetraSpar); first commercial scale project secured in the California seabed lease auction

**First to install recyclable rotor blades at Kaskasi**; also used for Thor and Sofia, which are currently under construction

**First developer in the world** to utilise **Siemens Gamesa's GreenerTower<sup>1</sup>** at Thor

**Active engagement with local communities**, e.g., support of local food banks and fishermen in the US

<sup>1</sup> CO<sub>2</sub>-reduced towers: The tower steel plates are made of greener steel that produces at least 63% less emissions compared to conventional steel.



# We have established a leading offshore wind platform in the US with ~6 GW of capacity<sup>1</sup>



01

## California

- Approximately 1.6 GW
- First commercial-scale floating offshore wind project
- Project is expected to be in operation by the mid-2030s ([Link](#))



02

## New York Bight

- Approximately 3.3 GW (RWE share 2.4 GW)
- Joint development with National Grid under Community Offshore Wind ([Link](#))



03

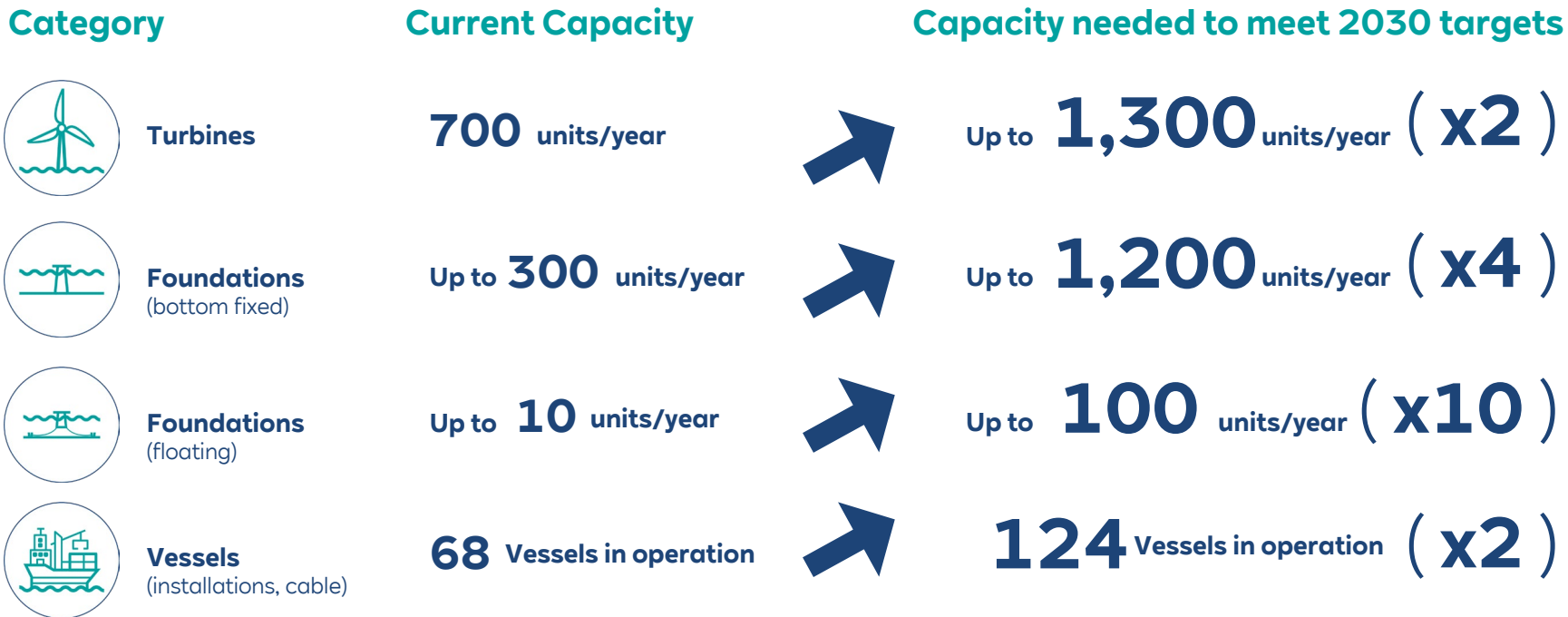
## Gulf of Mexico

- Capacity to develop up to 2 GW of fixed-bottom offshore wind
- power over 350,000 US homes with clean energy
- Project is expected to be in operation by mid-2030s ([Link](#))

<sup>1</sup> Pro rata view.



# REPowerEU target of 165 GW installed offshore capacity by 2030 requires expansion of supply chain



Note: Analysis by WindEurope.



# World's first recyclable wind turbine blades Kaskasi, Sofia & Thor

## Why?

The projects aim to



Close **knowledge gaps**



Avoid **landfill waste**



Close **material loops**



Position **RWE** as a **pioneer** by being the **world's first** to install **recyclable blades**

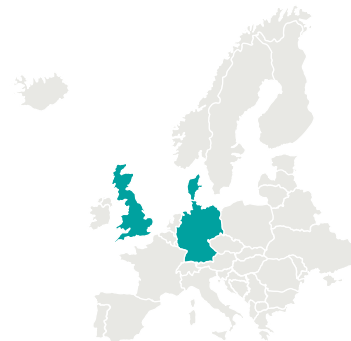
## How?



Following the **successful piloting** at **Kaskasi** in late **2022**, **44** of Sofia's 100 **turbines** will be installed with **recyclable blades**, **50%** of which are **produced** in the **UK**



## Where?



**Piloted at Kaskasi, Germany**  
To be installed at **Sofia, UK & Thor, Denmark**



Sofia's and Thor's **installation** is planned to be **completed by 2026**



# Reef Cubes in the Baltic Sea

## Artificial structures as marine habitat

### Why?

RWE pilot study in collaboration with Linnaeus University and Baltic Offshore Kalmar AB to



Deploy 180 carbon-neutral and plastic-free reef cubes from ARC Marine as a marine habitat for mussels, algae and fish species

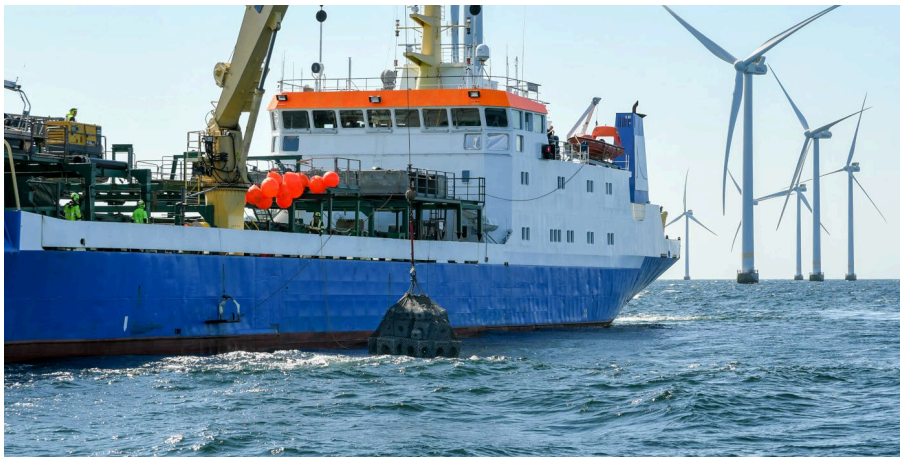


Investigate the effects on biodiversity and ecosystem services such as nutrient cycling and water quality



Pilot contribution to the restoration and preservation of the Baltic Sea

### How?



The project aims to investigate the creation of artificial reefs in the Baltic Sea by monitoring the biodiversity that grows on man-made structures. The project will assess differences at three depths through a dedicated monitoring programme, including the use of eDNA.



### Where?



Testing in  
**Kårehamn, Sweden**



Testing from  
May 2024  
for two years

Source: <https://www.rwe.com/en/press/rwe-offshore-wind-gmbh/2024-05-22-rwe-tests-artificial-reefs-at-offshore-wind-farm-in-the-baltic-sea/>



# CO<sub>2</sub> reduced towers – Thor, Denmark Greener steel for offshore wind parks

## Why?

The project enables RWE to



**Progress towards the net-zero emission goals**



**Contribute to circularity by recycling resources**



Demonstrating **leadership** by being the 1<sup>st</sup> developer globally utilizing GreenTowers



**Continue partnership** with Siemens Gamesa

## How?



### RWE will install CO<sub>2</sub>-reduced towers at Thor offshore wind farm

#### What makes Siemens Gamesa's GreenerTower greener?

The steel used in the towers emits a maximum of 0.7 tons of CO<sub>2</sub>-equivalent emissions per ton of steel for the steel plate.

This will ensure a CO<sub>2</sub> reduction of at least 63 percent in the tower steel plates compared to conventional steel.

#### How the CO<sub>2</sub> reductions are achieved:



Less energy intensive steel manufacturing process



Increased use of scrap steel in the steel production



Increased use of renewable energy sources

By using **green steel** for its turbine tower plates, RWE will **reduce** its **CO<sub>2</sub> emissions** by at least **63%**, compared to conventional steel



## Where?



**72 turbines** are planned to be installed at **Thor – 36 turbines will use GreenerTower**



**Installation** is expected to be **completed** by end of **2026**



# Floating wind

RWE is actively participating in several high-profile floating demo projects for detailed insight and experience.

- Floating offshore wind has great potential and **opens attractive market opportunities** not accessible via fixed bottom installations
- Our demonstration projects are providing **unique insights** into the particular challenges and opportunities of different structure types, materials, mooring systems, and installation methodologies
- The learnings that we acquire from our demonstration projects will help to **drive down the cost** of our **commercial-scale project** in the future
- RWE was successful in securing a **1.6 GW floating wind lease area** off the California coast and is exploring floating wind opportunities in **Europe, Americas** and **Asia-Pacific** as well

## Demo project **TetraSpar Demonstrator**

- **Location:** Norwegian coast
- **Water depth:** 200 metres
- **Distance to shore:** 10 km
- **Capacity:** 3.6 MW
- **Platform type:** Suspended counterweight
- **Platform material:** Steel
- **Operational since:** November 2021



## Demo project **DemoSATH**

- **Location:** Bay of Biscay, Spain
- **Water depth:** 85 metres
- **Distance to shore:** 3 km
- **Capacity:** 2 MW
- **Platform type:** Barge
- **Platform material:** Concrete
- **Operational since:** September 2023

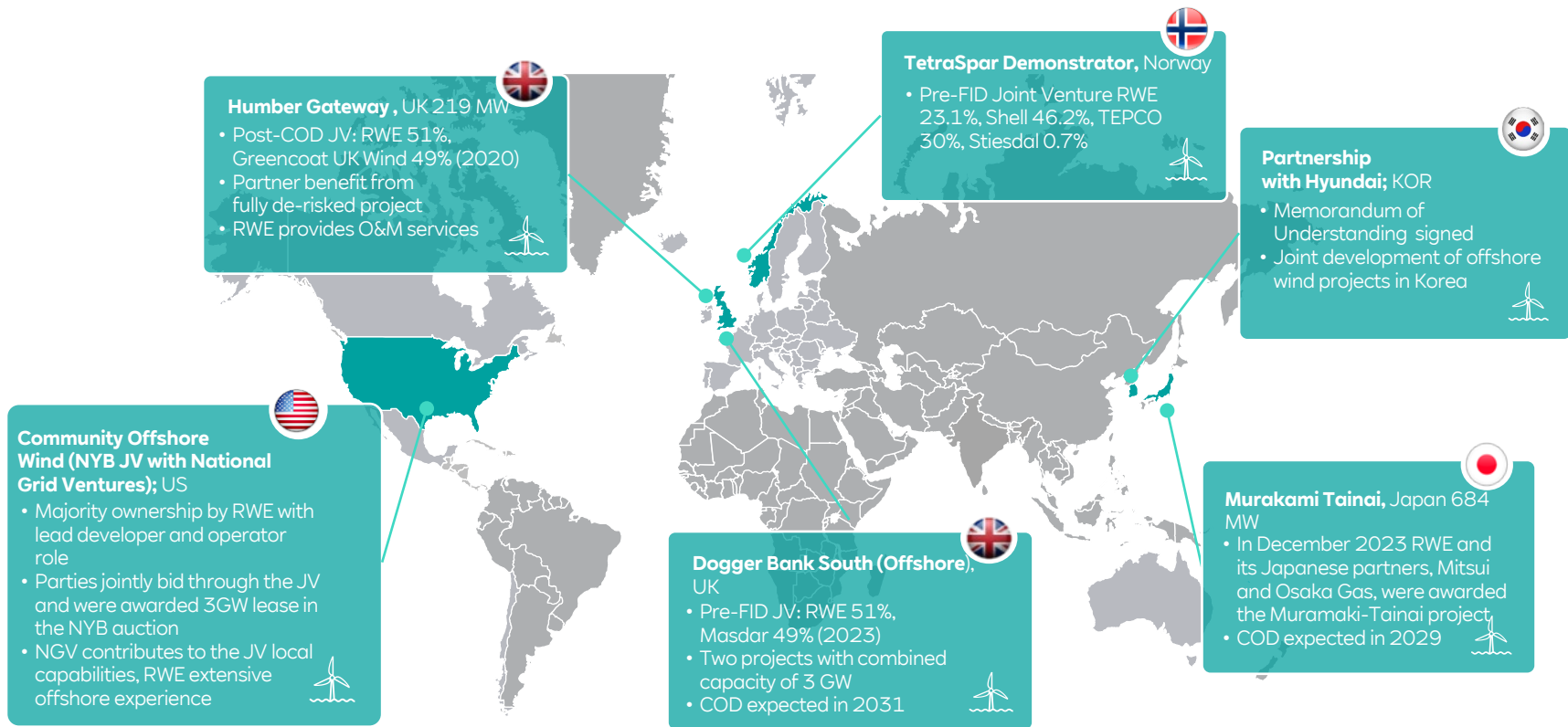






# Partnerships at all stages of the value chain

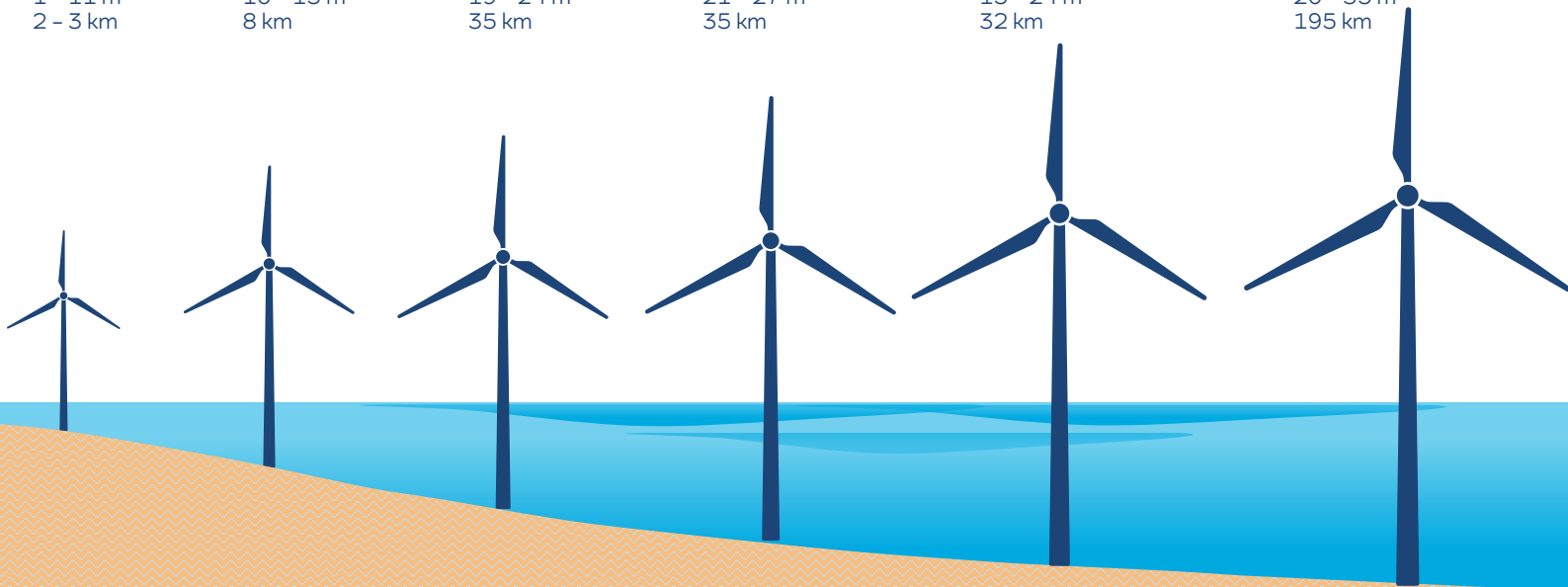
Partnerships are an essential part of RWE's business model to support our growth ambition





# Evolution of RWE's Offshore Wind Farms

Project:	Scroby Sands	Rhyl Flats	Amrumbank	Arkona	Triton Knoll	Sofia
COD:	2004	2009	2015	2018	2022	2026 (expected)
Capacity:	<b>58 MW</b>	<b>90 MW</b>	<b>302 MW</b>	<b>385 MW</b>	<b>857 MW</b>	<b>~1400 MW</b>
Turbines:	29 x 2.0 MW	25 x 3.6 MW	80 x 3.8 MW	60 x 6.4 MW	90 x 9.5 MW	100 x 14 MW
Water depth:	1 - 11 m	10 - 15 m	19 - 24 m	21 - 27 m	15 - 24 m	20 - 35 m
Distance to shore:	2 - 3 km	8 km	35 km	35 km	32 km	195 km

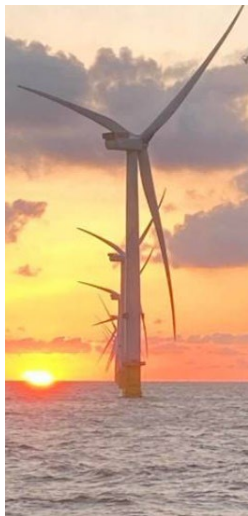




# Offshore wind assets in detail - operational

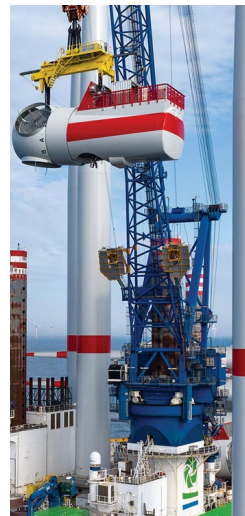
illustrative

## Triton Knoll (UK, North Sea)



- COD: 2022
- RWE share: 59%
- Capacity: 857 MW
- 90 x MHI Vestas 9.5 MW turbines
- Water depth: 15-24 m
- Location: 32 km distance to UK mainland (Lincolnshire)
- Support regime: two-sided CfD with a strike price of £74.75/MWh<sup>1</sup> for 15 years (current strike price of £ 102.03/MWh)
- ~0.8 million potential UK homes supplied annually
- One turbine rotation can power a typical home in the UK for 29 hours

## Kaskasi (Germany, North Sea)



- COD: 2022
- RWE share: 100%
- Capacity: 342 MW
- 38 x Siemens Gamesa 9 MW turbines
- Water depth: 18-25 m
- Location: 35 km north of the island of Heligoland in the “Heligoland Cluster” together with the offshore wind parks Amrumbank and Nordsee-Ost
- Support regime: one-sided CfD with a strike price of €48.6/MWh for 20 years
- Contracted via corporate PPAs
- ~0.4 million Germans homes will be supplied annually
- RWE to pilot first ever recyclable rotor blades by Siemens Gamesa at Kaskasi

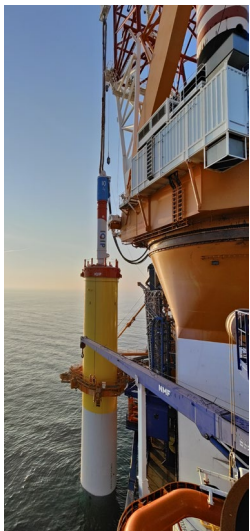
<sup>1</sup> 2012 prices.



# Offshore wind projects in detail – under construction

illustrative

## Sofia (UK, North Sea)



- COD (expected): 2026
- RWE share: 100%
- Capacity: 1400 MW
- 100x Siemens Gamesa 14 MW
- Water depth: 20-35 m
- Location: Dogger Bank, 195 km from the nearest point on the UK's Northeast coast
- Support regime: two-sided CfD with a strike price of £ 39.65<sup>1</sup>/MWh (current strike price of £ 51.89/MWh)
- ~1.4 million potential households supplied annually
- About 50% of Onshore and Offshore station to be manufactured locally in UK
- Will employ the worlds longest and most powerful HVDC-System to date

## Thor (Denmark, North Sea)



- COD (expected): 2027
- RWE share: 100%
- Capacity: 1080 MW
- 72x Siemens Gamesa 15 MW
- Water depth: Avg. 23-32 m
- Location: 22 km off the coast of Thorsminde on the west coast of Jutland
- Support regime: to be contracted via PPAs ahead of COD
- 30-year operational license with further 5-year extension possible
- ~1 million potential households supplied annually
- Grid connection agreement with Energinet
- Will be biggest Danish Offshore Wind project

<sup>1</sup> 2012 prices.



# Offshore wind projects in detail – under construction

illustrative

## Nordseecluster (Germany, North Sea)



- COD (expected):
  - Nordseecluster A: 2027
  - Nordseecluster B: 2029
- RWE share: 100%
- Capacity: 1560 MW
- 104x Vestas 15 MW (V236-15MW)
- Water depth: 28 - 33m
- Location: North Sea, 50 km north from Island Juist
- Support regime: to be contracted via PPAs ahead of COD
- ~1.6 million potential households supplied annually
- 25-year operational license with further 10-year extension possible

## OranjeWind (Netherlands, North Sea)



- COD (expected): 2028
- RWE share: 50%
- Capacity: 397.5 MW (pro rata)
- 53x Vestas 15 MW (V236-15MW)
- Location: ~53km from IJmuiden (North Holland)
- Support regime: to be contracted via PPAs ahead of COD
- 30-year operational license with further 5-year extension possible
- Will be the first system integration project in the Dutch market
- More than 1 million potential households supplied annually

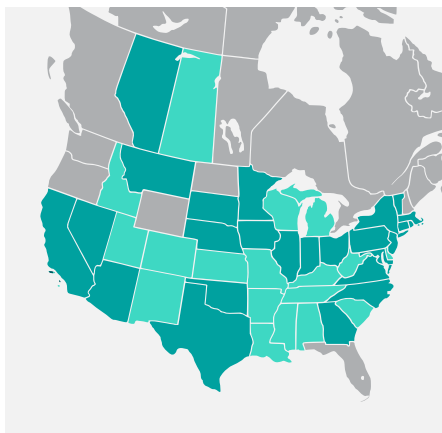
# Onshore wind & solar





# Excellent market position to accelerate onshore wind & solar build-out across North America, Europe and Australia

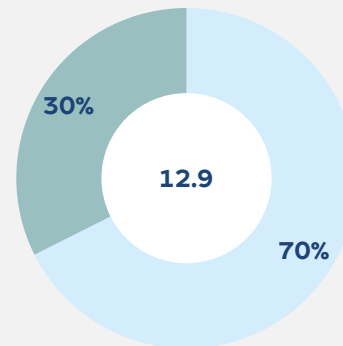
## Existing asset base



**12.9 GW** installed net capacity across North America, Europe and Australia

■ Countries/states with operating assets and development activities   ■ States/provinces with development activities only

## Current portfolio split GW, pro rata



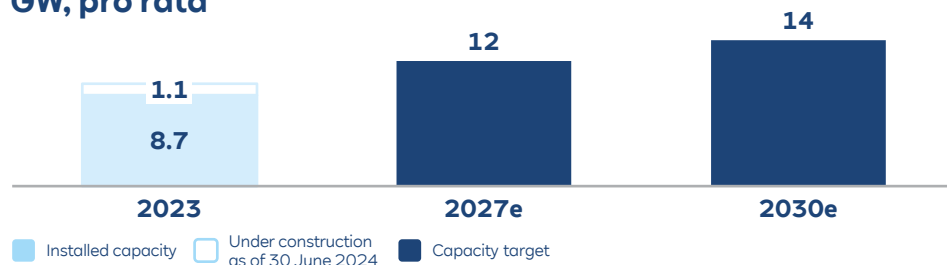
■ Onshore wind   ■ Solar

Note: Pro rata view as of 31 December 2023; rounding differences may occur.

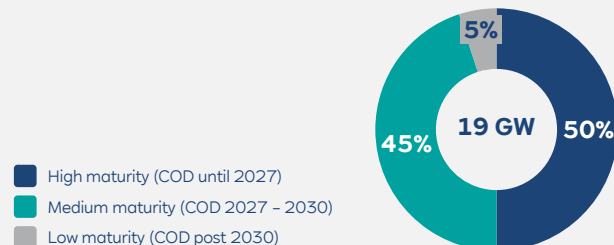


# Onshore wind and solar build-out plans until 2030 backed by an attractive pipeline

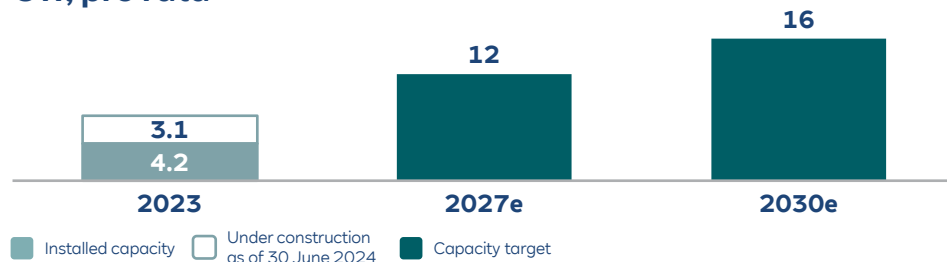
## Onshore wind targets GW, pro rata



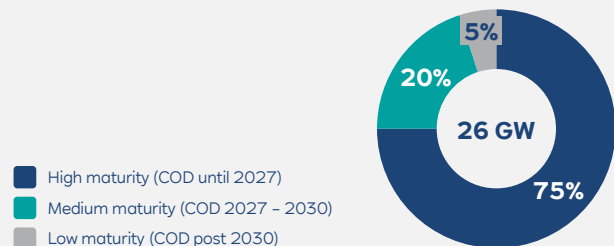
## Onshore wind pipeline maturity



## Solar targets GW, pro rata



## Solar pipeline maturity



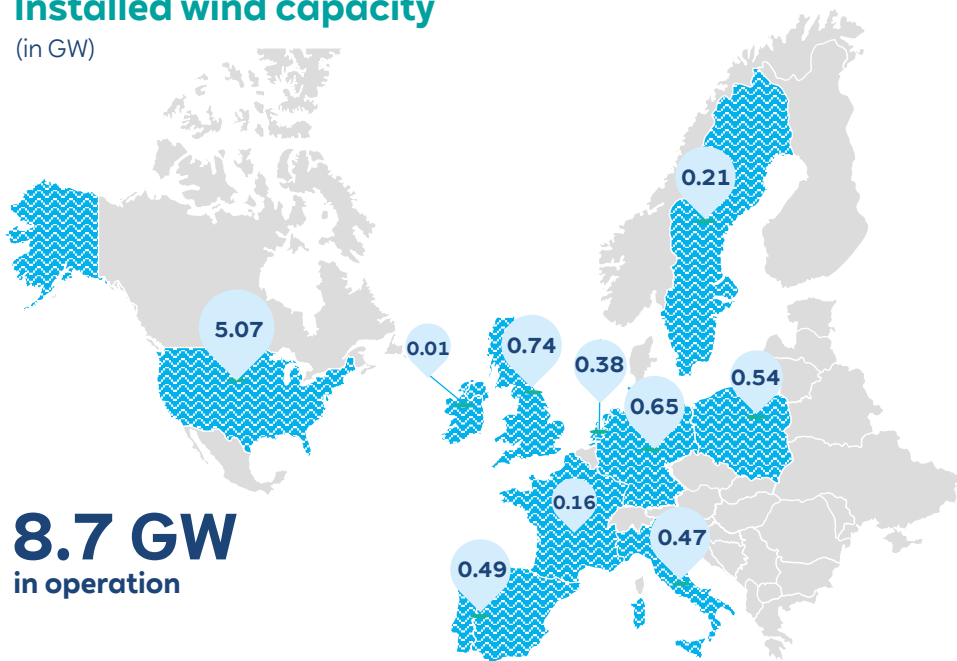




# Onshore wind globally

## Installed wind capacity

(in GW)



**8.7 GW**  
in operation

Note: Pro rata view as of 31 December 2023; rounding differences may occur.

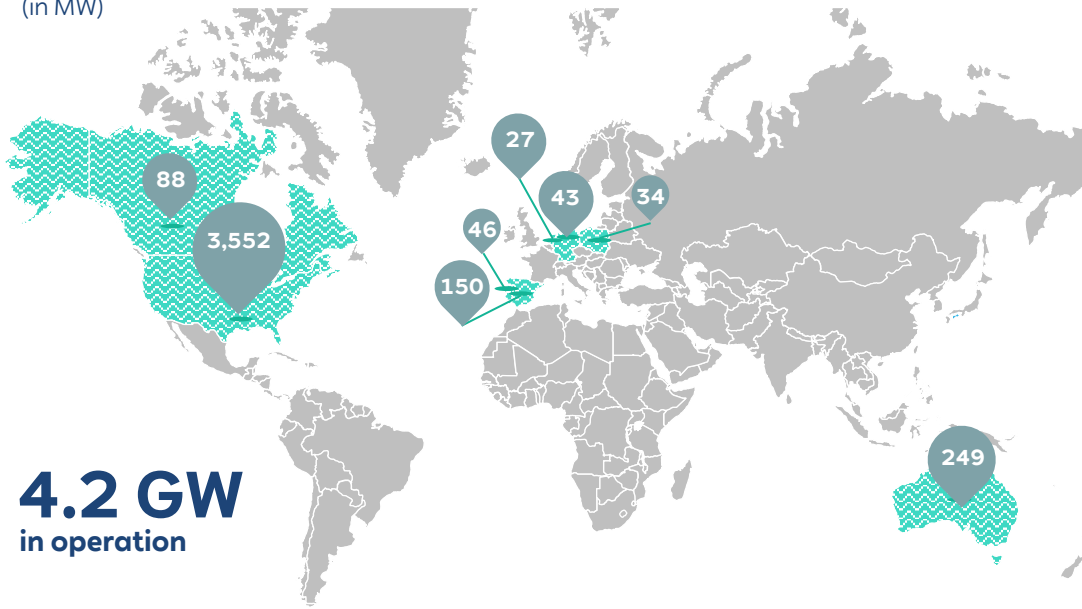
- **Industry-leading expertise** in core capabilities, from supply chain management through operational excellence, fostering future growth
- **Impressive track record** of developing, constructing and operating highest performing and most efficient sites



# Solar globally

## Installed solar capacity

(in MW)



**4.2 GW**  
in operation

Note: Pro rata view as of 31 December 2023; rounding differences may occur.

- Scaling up US growth ambitions through **acquired pipeline of CEB**
- Strengthening our EU and UK solar & battery platform by acquiring **JBM Solar (UK) (6.1 GWac)** and **AlphaSolar (PL) (~3 GWac)**



# Innovation and sustainability are a key part of our onshore wind and solar strategy



**First Agri-PV** demo project launched in **Germany (Garzweiler)**, further driving our **just transition in the Rhenish area**

At the **forefront of floating PV**; first floating solar farm commissioned in the Netherlands

**World's first operator of wind turbines on a dyke**, exploiting excellent wind conditions

**Driving sustainability** through the development of **circular economy** industrial solutions, joining the RenerCycle consortium

**Several biodiversity initiatives** to operate wind farms in harmony with the ecosystem (e.g., black blades to increase visibility of the rotors to birds)



# Onshore wind/solar assets in detail - operational

illustrative

## Cassadaga (USA, New York)



- COD: 2021
- RWE share: 100%
- Capacity: 125 MW
- 27 x Nordex and 10 Siemens turbines
- Location: Chautauqua County, NY
- Support regime: ITC
- Offtake: PPA
- ~37,000 potential US homes supplied annually
- RWE's 29th onshore wind farm in the U.S. and represents RWE's second onshore wind project in New York

## Limondale Sun Farm (Australia)



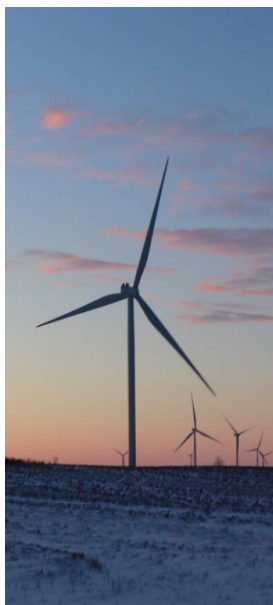
- COD: 2021
- RWE share: 100%
- Capacity: 249 MW
- approx. 872,000 panels used for this project
- Location: New South Wales
- Support regime: Merchant, PPAs and Green Certificates
- One of the largest solar parks in Australia, covering an area of around 770 hectares, 450 football fields
- ~105,000 potential households supplied annually



# Onshore wind assets in detail - operational

illustrative

## Scioto Ridge (USA, Ohio)



- COD: 2021
- RWE share: 100%
- Capacity: 250 MW
- 75 x Siemens Gamesa turbines
- Location: Ohio, Hardin and Logan Counties
- Support regime: REC/PTC
- Offtake: PPA
- More than 60,000 potential households supplied annually
- RWE's 1st onshore wind project in Ohio

## Zuidwester (The Netherlands, Urk)



- COD: 2016
- RWE share: 100%
- Capacity: 90 MW
- 12 x 7.5 MW Enercon turbines
- Location: Westermeerdijk and Zuidermeerdijk
- Support regime: FiT (SDE+€120/MWh)
- ~80,000 potential Dutch homes supplied annually
- Q&M provided by EPK Enercon
- Zuidwester is part of Noordoostpolder, one of Europe's largest wind power projects



# Solar and storage assets in detail - operational

illustrative

## West of the Pecos (USA, Texas)



- COD: 2019
- RWE share: 100%
- Capacity: 100 MW
- More than 350,000 photovoltaic panels built over a 270-hectare area
- Location: Reeves County, TXS, approx. 75 miles southwest of Midland-Odessa
- Support regime: ITC
- Offtake: PPA and Firm Hedge
- Q&M provided by RWE

## Hickory Park (USA, Georgia)



- COD: 2022
- RWE share: 100%
- Capacity: 196 MW coupled with a 40 MW 2-hour battery storage system
- Location: Mitchell County, Georgia
- Support regime: ITC
- Offtake: PPA
- Hickory Park is RWE's largest solar plus storage project in the U.S.
- Offtake: 30-year utility contract
- Solar power plant will interconnect more than 650,000 solar panel
- Hickory Park covers an area of about 728 hectares



# Solar projects in detail – operational & under construction

illustrative

## Bright Arrow (USA, Texas)



- COD: 2023/2024
- RWE share: 100%
- Capacity: 300 MW + 100 MW battery storage system
- 876,000 photovoltaic panels and 85 central inverters
- Location: 80 miles east of Dallas, Hopkins county, TX
- Support regime:
  - Solar: PTC/PPA
  - Battery: ITC

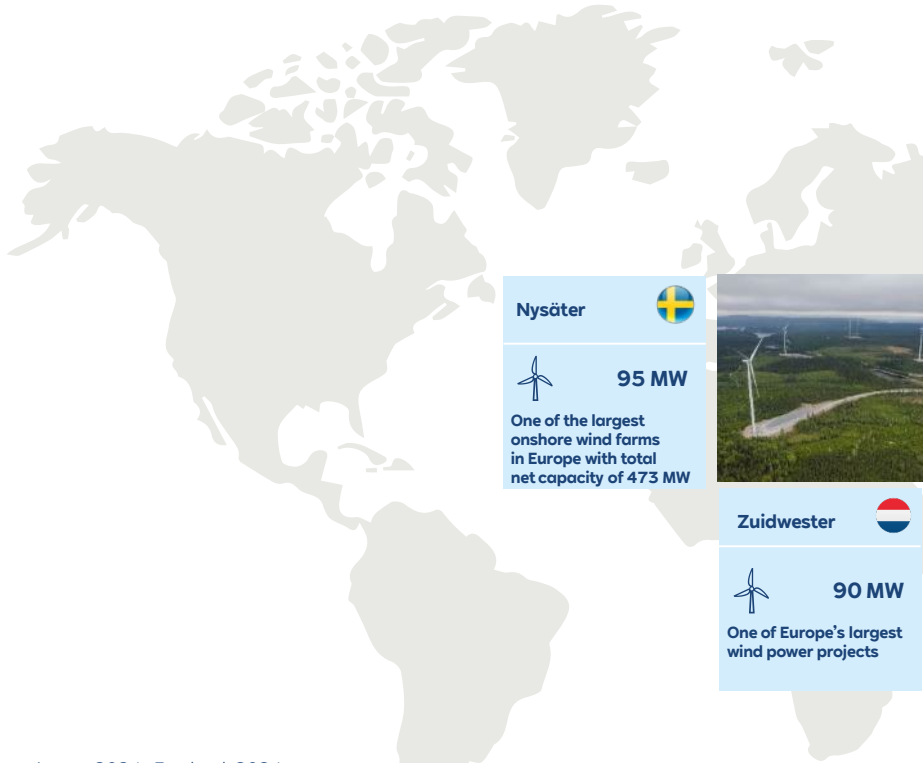
## Stoneridge (USA, Texas)



- COD (expected): 2025
- RWE share: 100%
- Capacity: 200 MW + 100 MW battery storage system
- Location: Milam County, TX



# Highlights of projects in Europe & Australia





**Nysäter** 

 **95 MW**


One of the largest onshore wind farms in Europe with total net capacity of 473 MW





**Zuidwester** 

 **90 MW**


One of Europe's largest wind power projects





**Limondale** 

 **249 MWac**


872,000 modules on 770 hectares





**Selinus** 

 **25 MW**


Blade lift technology used for transportation



**RWE inland Solar farm** 

 **13 MWac**

Use of open-cast mining area



**Lisdrum Battery storage** 

 **60 MW**

Short term back-up to help address power outages





**Agri-PV** 

 **F & E**

Solar power and agriculture





**Agri-PV** 

 **F & E**

Solar power and agriculture



**Lisdrum Battery storage** 

 **60 MW**

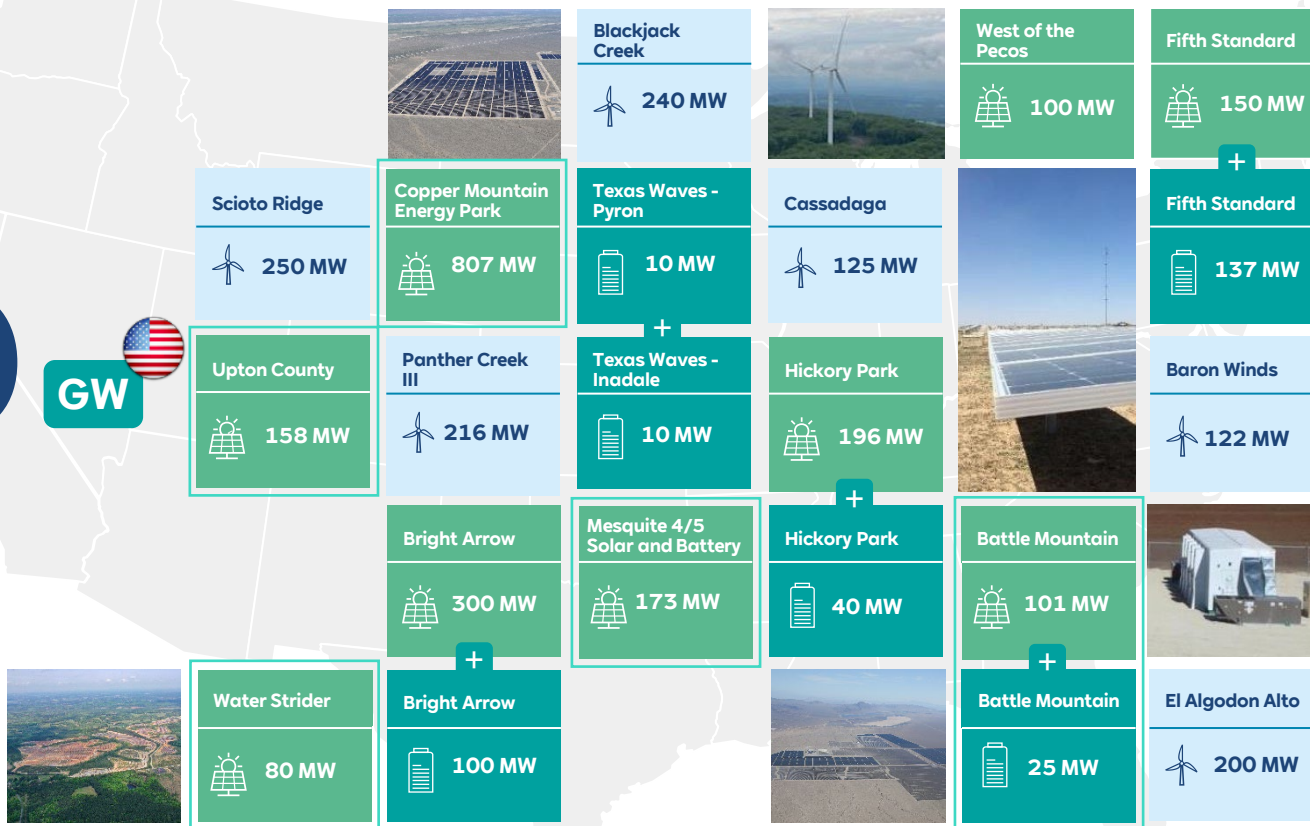
Short term back-up to help address power outages





# Highlights of projects in the US

> 9 GW



# Batteries





# Batteries hold increasing importance and attractive return profile



## Value stacking of batteries revenue streams

### Wholesale markets

**Storage of excess electricity** to sell in periods when wind/solar power is unavailable and prices are elevated

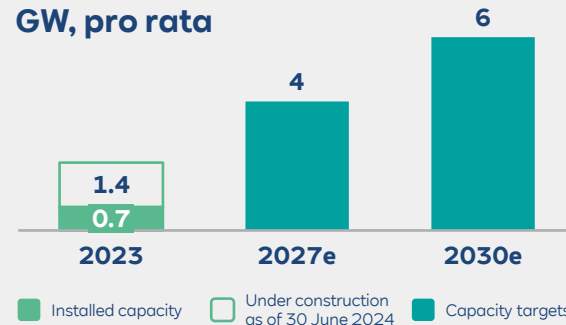
### Capacity markets

Stable income streams via the **provision of firm capacity**

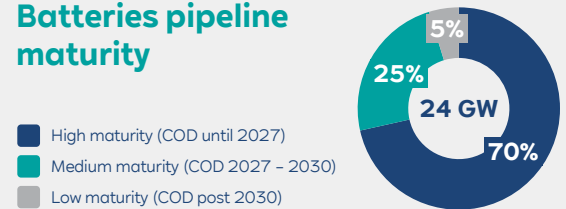
### Ancillary markets

Provision of **inertia, reactive power** or **frequency response** services for grid stability

## Batteries targets GW, pro rata



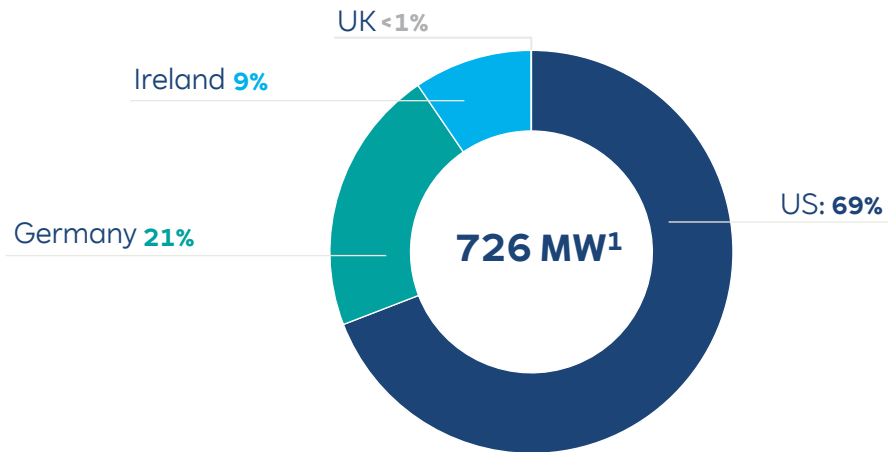
## Batteries pipeline maturity





# Batteries: Balancing the system is a growth opportunity

## Assets in operation



- Own operated battery storage systems in **US, Germany, UK and Ireland**
- Growth focus in batteries on **co-location in particular with wind and solar sites**
- Additionally working **on further innovative technologies**
  - e.g. redox-flow storage systems
  - second-life batteries

<sup>1</sup> Pro rata view as of 31 December 2023. | Note: Rounding differences may occur.



# Battery storage assets in detail- operational

illustrative

## Texas Waves - Pyron (USA, Texas)



- COD: 2018
- RWE share: 100%
- Capacity: 2 x 9.9 MW / 5 MW
- A battery system co-located at the Pyron Wind Farm (269 MW)
- Location: near Sweetwater, TXS
- Support regime: ITC
- Offtake: merchant
- Q&M provided by RWE
- Energy storage participates in the frequency regulation market and helps to maintain frequency stability
- In case the frequency drops or increases below certainty threshold, the battery will discharge or charge to support the grid to maintain the grid frequency at 60 Hz

## Lisdrum - County Monaghan (Ireland)



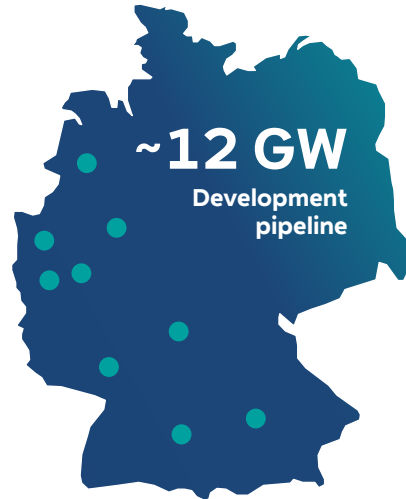
- COD: 2022
- RWE share: 100%
- Capacity: 60 MW
- Second battery storage facility that RWE has brought online in Ireland
- Location: Lisdrumdoagh, (3 km East of Monaghan town)
- Support regime: Other
- Site provides a short term back-up to help address power outages, and to maintain a more stable and secure electricity supply in Ireland

# FlexGen & hydrogen



# We are leveraging existing sites to build new FlexGen capacity and decarbonise our existing portfolio

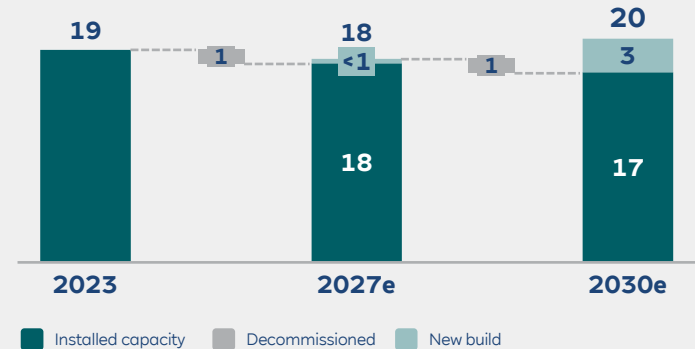
## Attractive sites for potential FlexGen new builds in Germany



■ Attractive brownfield sites

- ✓ Existing grid connection and other infrastructure (e.g., gas, H2 or water pipeline)
- ✓ Availability of **experienced workforce**
- ✓ Relationships with **local communities and authorities**

## FlexGen targets GW, pro rata

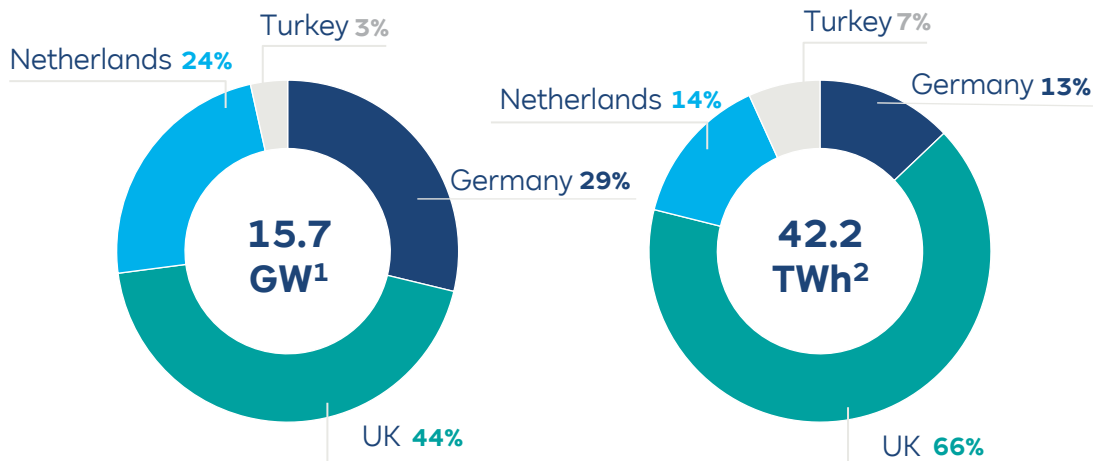


**FlexGen portfolio will be fully decarbonised by 2040** using CCS or fuel conversion



# Gas: Highly efficient and flexible gas assets

## Assets in operation and power generation



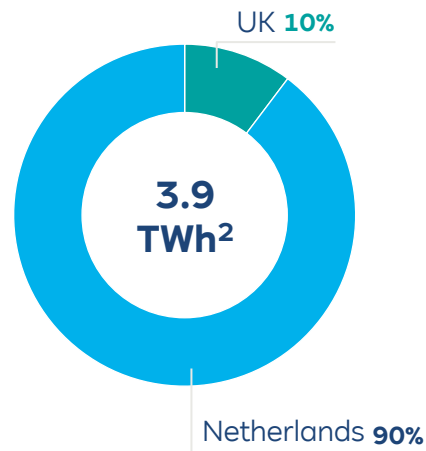
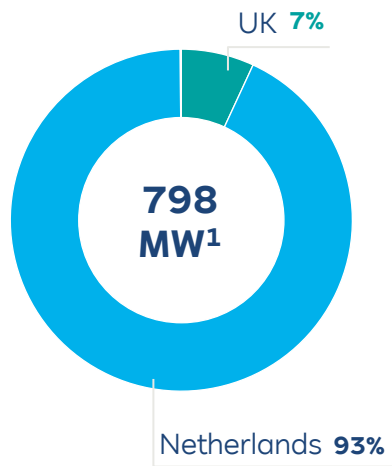
- **#2 gas fleet** in Europe
- **30 power units** in
  - Germany
  - UK
  - Netherlands
  - Turkey

<sup>1</sup> Pro rata view as of 31 December 2023. <sup>2</sup> Accounting view as of 31 December 2023. | Note: Rounding differences may occur.



# Biomass: Focused on biomass co-firing

## Assets in operation and power generation



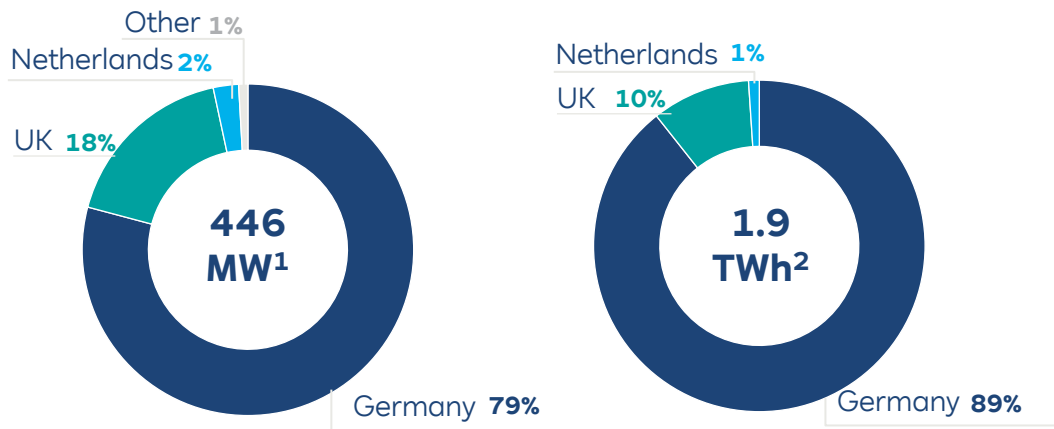
- **4 power plants in**
  - Netherlands
  - UK
  - Germany (Neurath BGA (< 1 MW))
- **Biomass co-fired power plants**
- **Biomass net capacity:**
  - Amer (505 MW) currently being upgraded to 100% Biomass
  - Eemshaven A+B (237 MW)
  - Certificated biomass

<sup>1</sup> Pro rata view as of 31 December 2023. <sup>2</sup> Accounting view as of 31 December 2023. | Note: Rounding differences may occur.



# Hydro & pumped storage: Attractive portfolio with high flexibility

## Hydro assets in operation and power generation



- **1,555 MW of installed pumped storage capacity** in Germany, thereof:
  - **Own operated power plant**
    - Koepchenwerk (162 MW)
  - **Contractually secured plants<sup>3</sup>**
    - SEO Vianden (523 MW)
    - Schluchsee (870 MW)

<sup>1</sup> Pro rata view as of 31 December 2023. <sup>2</sup> Accounting view as of 31 December 2023. <sup>3</sup> Based on long-term use agreements. | Note: Rounding differences may occur.

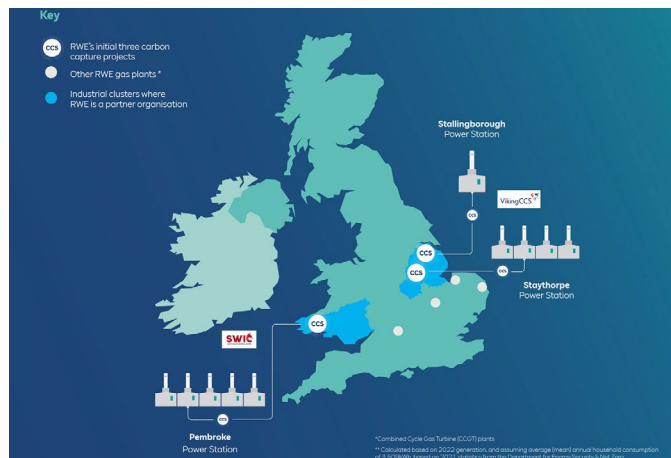


# Our carbon capture projects in the UK

## Our pathway to decarbonisation...

## ...by considering three potential carbon capture projects across the UK<sup>1</sup>

- We are looking at **carbon capture technology** as a viable way to **decarbonise our gas plants** which are located within the vicinity of proposed CO<sub>2</sub> networks or shipping facilities, where the CO<sub>2</sub> could be transferred to safe storage solutions
- We are currently **progressing early development work and preparing information**
- It will allow for **existing plants at Staythorpe and Pembroke**, and a new build Combined Cycle Gas Turbine power station (CCGT) near the Humber, to be submitted into the next stage of the Government's Track-2 Phase-2 of the Cluster Sequencing for Carbon Capture Usage and Storage Deployment process



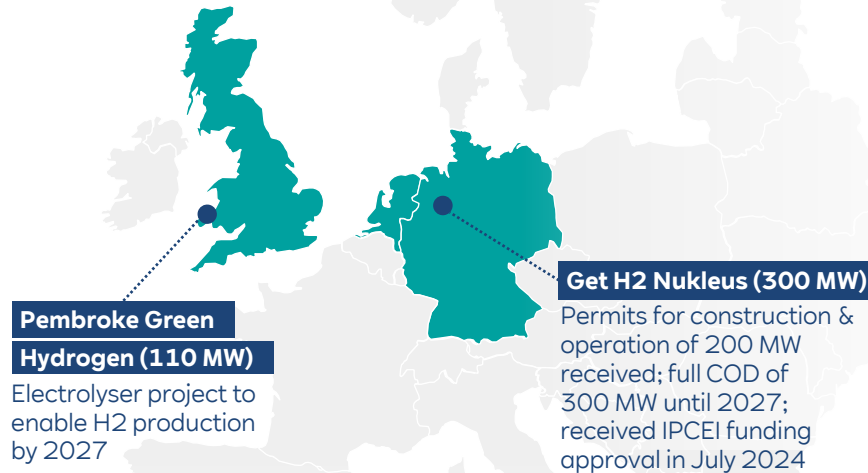
### Together, these three projects would enable:

- **4.7 GW** of secure, flexible and low carbon energy
- **11 Mt/year** of CO<sub>2</sub> capture (equivalent of removing 2.2m petrol cars from the road)
- **300+** high quality and long-term jobs

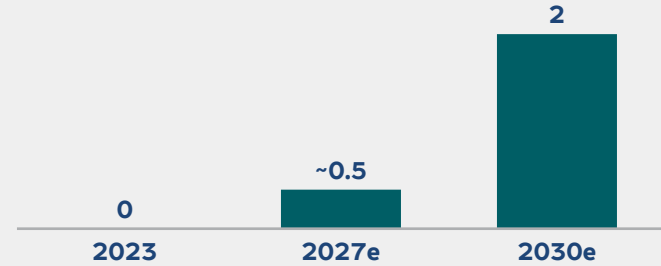
<sup>1</sup> For more information: <https://uk-ireland.rwe.com/rwe-generation-uk/rwes-carbon-capture-projects/>

# With our lighthouse projects, we confirm our ambition to be an early-mover in Europe's H2 economy

## Lighthouse projects in our core markets



## Electrolyser targets GW, pro rata



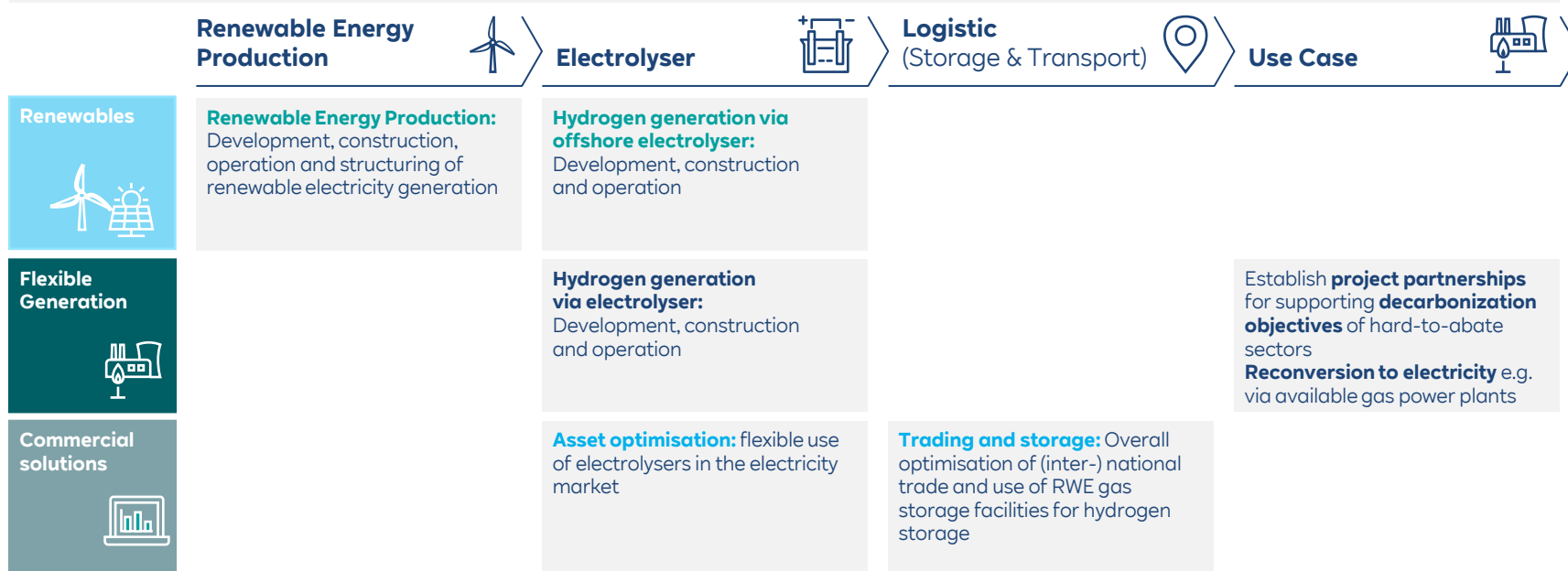
## Electrolyser pipeline maturity





# RWE has a good starting point along the value chain for green hydrogen

## Competencies of the RWE companies along the green hydrogen value chain



# H<sub>2</sub>ercules Hydrogen fast track for Germany

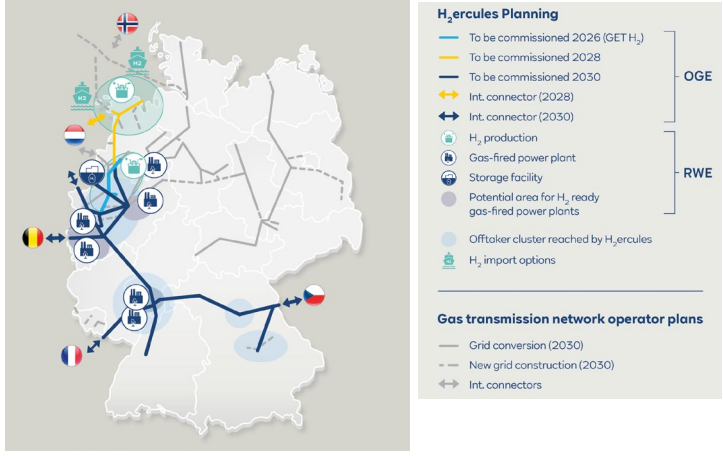
illustrative



## H<sub>2</sub>ercules

Hydrogen production, storage and import terminals in the north of Germany to be connected with consumers in the west and south

H<sub>2</sub>ercules — hydrogen fast track for Germany



- Plans for up to 1 GW of new electrolyser capacity and 1,500 kilometers of pipeline.
- Importing options through ports in Lower Saxony or grid connected neighboring countries.
- Storage facility in Gronau-Epe (as part of GET H<sub>2</sub>).
- Around 2/3 of predicted H<sub>2</sub> demand in 2030 could be connected.
- New building of at least 2 GW H<sub>2</sub>-ready power plants.
- Already over 20 companies as partners of initiative.

### Project partners (selection)



# HyTechHafen Rostock – an initial project in the Energiehafen Rostock Strategy

Supported by:

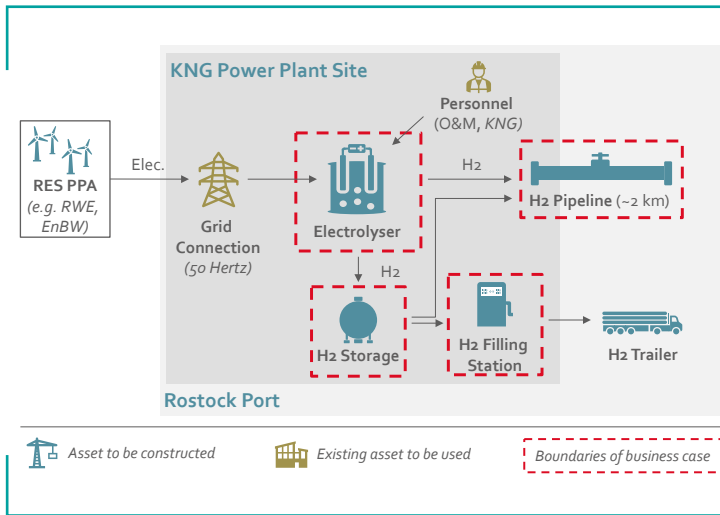


on the basis of a decision by the German Bundestag

illustrative



**HyTechHafen Rostock:** Four partners formed the project company “Rostock EnergyPort cooperation GmbH”



- The project “HYTechHafen Rostock” aims at the construction of a 100 MW electrolyser, its connection to the Hydrogen Backbone grid, the intermediate storage of hydrogen as well as the construction of a hydrogen filling station which is intended for transport by trailer.
- The project is selected as IPCEI project by the German government and is part of the IPCEI Hy2Infra wave.
- HyTechHafen Rostock received its funding approval in the amount of ~€199 m by the German Ministry of Economic Affairs and Climate Action (BMWK) and the federal state of Mecklenburg-Vorpommern in July 2024.

## Project partners (selection)



# GET H<sub>2</sub> aims to kick-start the creation of nationwide infrastructure in Germany

Supported by:



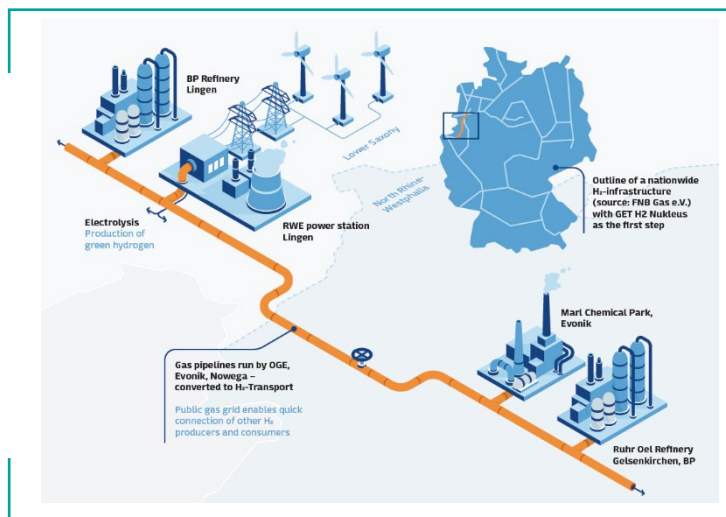
on the basis of a decision by the German Bundestag

illustrative



## GET H<sub>2</sub>

An initiative of > 40 industrial and gas companies. In the first sub-project GET H2 Nukleus, RWE plays a key role in the production of green hydrogen at the RWE Lingen site



- The initiative has spawned GET H<sub>2</sub> Nukleus, a pilot project for the construction of the first publicly accessible hydrogen infrastructure involving BP, Evonik, Nowega, OGE and RWE.
- RWE's part consists of building a 300 MW electrolyser capacity and produce green hydrogen at the RWE Lingen power plant site. Scaling potential up to 2 GW.
- RWE received its IPCEI funding approval in the amount of 619m€ for GET H<sub>2</sub> and Epe by the German Ministry of Economic Affairs & Climate Action (BMWK) and the federal state of Lower Saxony in July 2024.
- The objective is to connect Lingen to the existing hydrogen network in the Ruhr region via a repurposed natural gas pipeline, in order to supply the green hydrogen to refineries and chemical parks.

### Project partners (selection)



Wir transportieren Gas.







# In the UK, RWE is working with partners to develop a hydrogen economy for industries in South Wales

illustrative



## South Wales Industrial Cluster

RWE's Pembroke power station in Milford Haven is part of a large industrial park and can serve as a site for hydrogen production



- RWE's Pembroke gas-fired power station in Milford Haven is situated in one of six major industrial clusters in the UK. Thanks to its proximity to companies in the British steel, chemicals, oil and cement sectors, Pembroke is well suited to function as a future hydrogen production centre.
- The project encompasses the local production, distribution and usage of hydrogen.
- Further subjects of the project consortium's interest are carbon cycle options (e.g. carbon capture during cement production and synthetic fuel production).

### Project partners (selection)



**SOUTH HOOK**  
LNG TERMINAL COMPANY LTD



**TATA STEEL**



**Valero**



**TARMAC**  
A CRH COMPANY

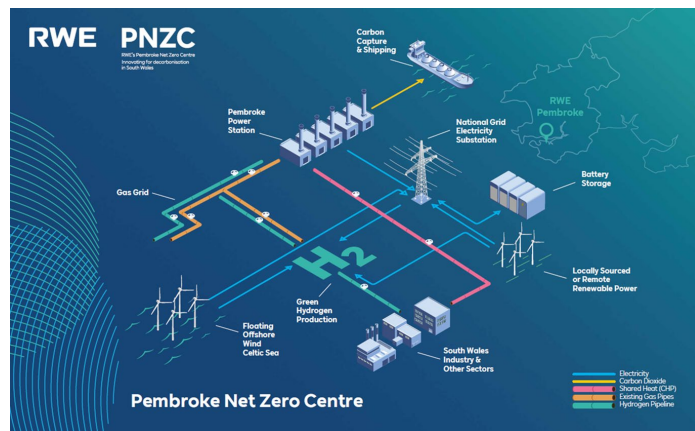


# Pembroke Green Hydrogen Phase 1 – lighthouse project

illustrative

## Pembroke Green Hydrogen Project (Phase 1)

Lighthouse green hydrogen project in SW Wales helping to decarbonise industry and support local hydrogen mobility



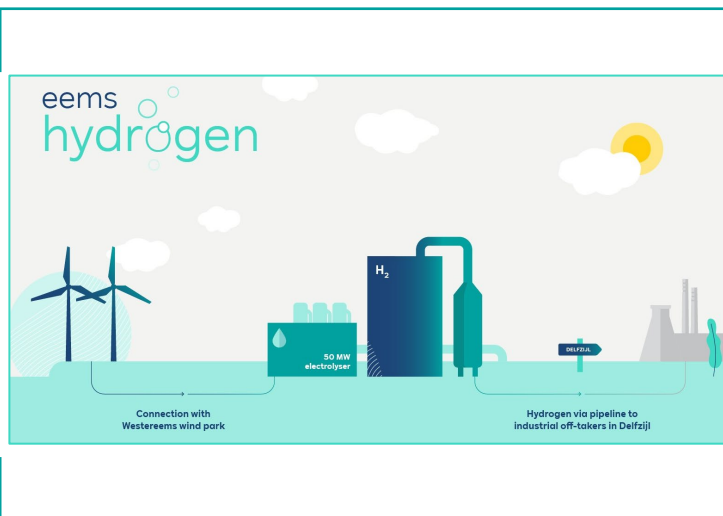
- Phase 1 is for 110 MW of electrolyser capacity.
- Main offtaker will be a nearby industrial user via pipeline, replacing natural gas supply. Smaller offtake for mobility uses planned.
- Plant will be located adjacent to Pembroke CCGT and share some services e.g water treatment plant.
- Grid connection from October 2026, water supply available.
- £1.25 m Devex funding publicly announced for RWE’s Pembroke Phase 2 project earlier this year.



# Eemshydrogen plans to produce hydrogen with electricity from RWE onshore wind farm in the Netherlands

illustrative

**Eemshydrogen:** Demonstration of flexible electrolyser operation in line with wind speed-dependent electricity from existing RWE Westereems onshore wind farm



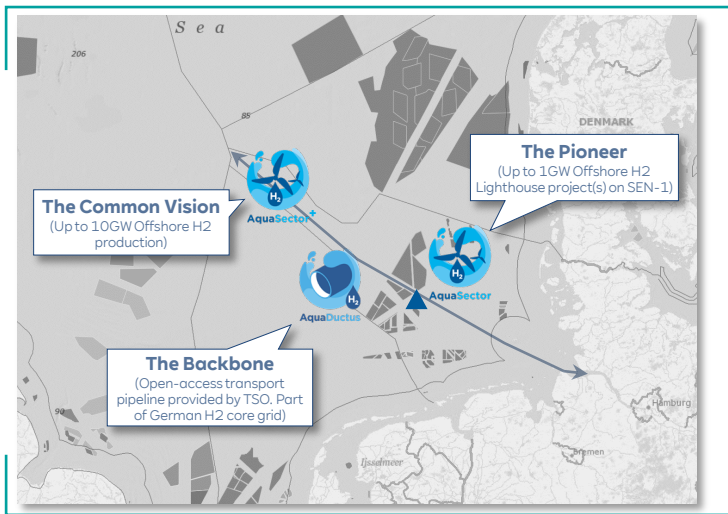
- The facility, rated at 50 MWe, is planned at RWE's power plant location in Eemshaven, Netherlands.
- Synergies with the power station site will be leveraged: a.o. demin water, fire fighting water and sewer.
- Gasunie (TSO) to build hydrogen infrastructure in order to transport to Delfzijl (northern part of the hydrogen backbone).
- OWE funding has been granted in full €124.9 m.

# AquaVentus initiative aims to kick-start Offshore H2 industry in Germany



## AquaVentus

Initiative of > 100 members across H<sub>2</sub> value chain targeting to kick-start Offshore H<sub>2</sub> industry in Germany. RWE is playing a key role in the development and realisation of the AquaVentus vision.



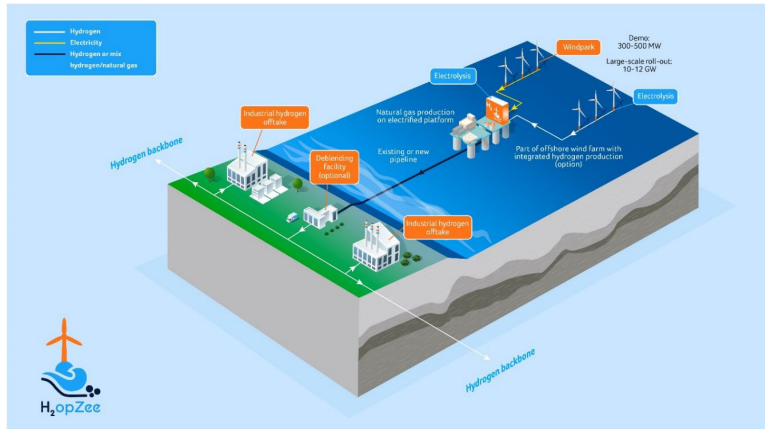
- AquaVentus has the vision to install 10 GW of offshore green hydrogen generation capacity in the German North Sea and establish an associated transport infrastructure.
- The initiative comprises numerous coordinated sub-projects along the value chain, in which agile and highly committed consortia work on the realisation of the vision.
- RWE is playing a leading role in the development and realisation of the sub-project AquaSector as well as the AquaVentus vision.
- AquaSector targets to build the world's first multi-hundred MW offshore H<sub>2</sub> project and become a steppingstone for gigawatt scale projects.

# H2opZee is one of the first large scale Offshore H2 demonstrators in the Netherlands



## H2opZee

H2opZee is a consortium-led project between RWE and Neptune Energy with the ambition to install up to 500 MW of offshore hydrogen capacity by 2031, with the possibility of future large-scale (gigawatt scale) expansion



- For the Dutch energy transition, sustainable energy from the North Sea is essential. The H2opZee project intends to demonstrate the feasibility of building a standalone offshore hydrogen production windfarm.
- RWE is developing the project in a 50-50 cooperation with the largest offshore gas producer in the Dutch part of the North Sea, Neptune Energy.
- H2opZee realizes 500 MW of additional hydrogen-out-of-sea capacity using the offshore Hydrogen backbone which is to be operated by the TSO.
- The project is one of the first demonstrators of offshore H<sub>2</sub> production technology at this scale and requires a major RD&I effort.

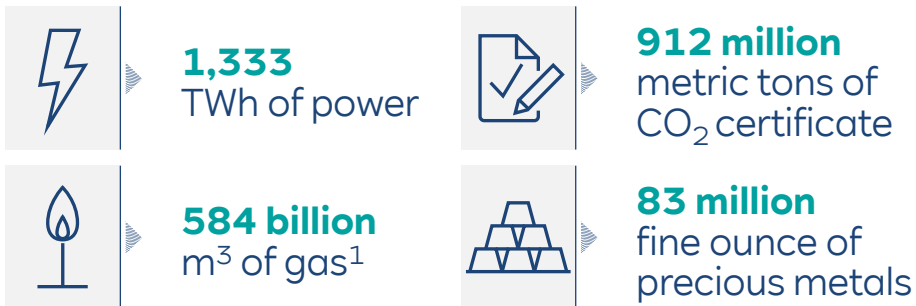
# Commercial solutions





# Value creation through fundamental understanding of markets

## Traded volumes in 2023



Leading energy trading company and **significant gas portfolio** player

**Interface** between the **RWE Group and global wholesale markets** for energy and energy-related raw materials and services

**Europe's largest energy trading floor** at RWE's headquarters (Essen, Germany);

**14** trading offices worldwide

Source: RWEST Risk Governance, March 2023. | <sup>1</sup> Gas traded volume 2023, financial and physical transactions jointly reported.



# Clearly organised in 3 core business areas

## Trading & Origination

- Proprietary trading activities in energy and energy-related commodities in all relevant markets across the globe
- Energy transition investments in commodity-driven assets and companies where we can deliver value from strong trading capability and deep understanding of energy commodity markets



## Commercial Asset Optimisation

- Optimisation of physical and contractual power assets – from long-term hedging to dispatch decision
- Energy Transition Origination is responsible for the origination of hydrogen projects



## Energy Supply & Services

- Management and optimisation of the Group's Pan-European gas portfolio, gas supply, storage and transport contracts as well as the global LNG portfolio
- Commodity Solutions as fully-fledged service provider for industrial customers and aggregators







# Understanding of fundamentals drives trading approach & Energy Transition Investments

## Fundamental analysis (examples)

- **Power:** demand, conventional power plants, renewable feed-in, cross border flows, weather
- **Gas:** demand, pipeline flows, LNG deliveries, storage levels

## Quantitative modelling

- Outright fundamental fair value
- Fuel spreads, time spreads, location spreads and product spreads

- Deep understanding of physical assets
- Fundamental modelling of supply/demand balances

- Monitoring of misvaluations in markets
- Assessment of risk/reward of trading opportunities

Diversified trading exposure

## Trading strategies

**Fundamental:** assessment of fundamental fair value

**Relative value:** detection of spread opportunities

**Systematic:** algorithmic trading, monitor money flows

**Origination:** negotiated contracts in illiquid markets

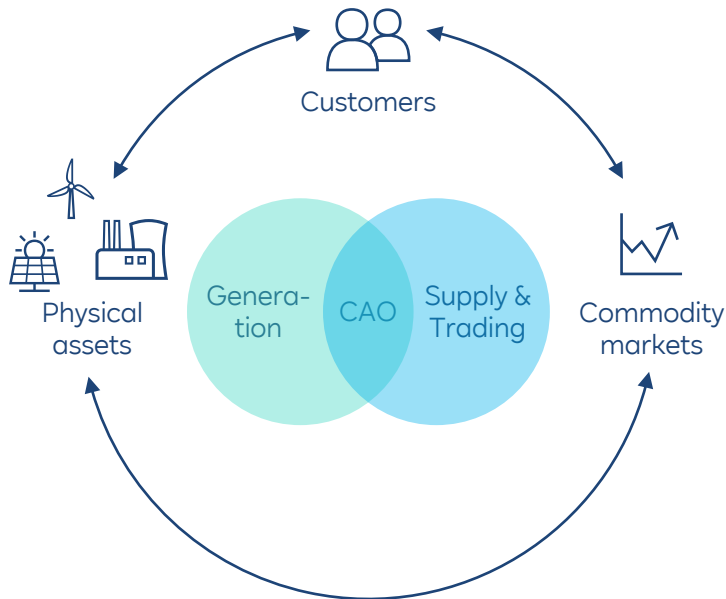
## Energy Transition Investments

- Focus on private equity-like investments in assets and companies across the energy spectrum that are related to the global energy transition
- Deployed over €500m in more than 20 transactions across the entire energy value chain, with typical equity investments of up to €50m



# Commercial Asset Optimisation (CAO) The interface between generation & markets

## Business interaction



## Commercial Asset Optimisation



Commercial asset management



Hedging



Operations



Renewables



Asset partner conventional



Sales portfolio management



# Gas Supply

## RWEST is a major asset backed gas player in Europe

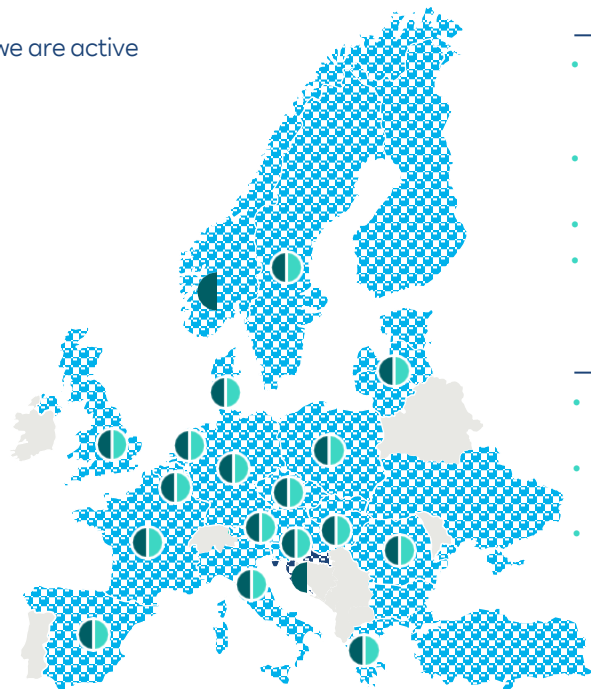
 Countries where we are active

 Not active

 Target markets

 OTC

 Exchanges



### Large gas portfolio across Europe

- Diversified **physical European gas supply of ~156 TWh/a** across 20+ countries centred around North Western and Central European markets
- Sourced from major international producers, smaller independents and from traded markets
- Booked working gas volume in **gas storages** of about 50 TWh
- ~55 GW gas **transportation capacity** at more than 70 European border points and storage connections

### Global LNG activities

- Sizeable global LNG portfolio with a strong customer base in Europe, Asia and the Middle East
- Tailor-made solutions for LNG customers & supply across all major markets
- Chartered 2 FSRUs on behalf of German government and initiation of Elbehafen project as main investor



# LNG activities:

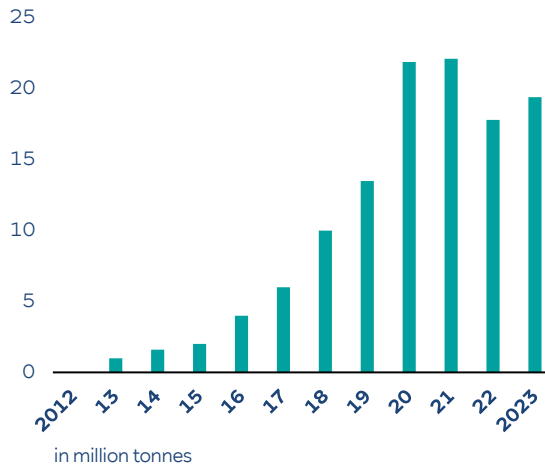
## A successful growth story

**Pioneer** in developing physical and financially structured transactions, working with our customers to offer tailored indexation and flexibility, along with competitive pricing and reliability.

### Global LNG activities

- Close cooperation with our partners combining innovation and competitive pricing
- Experience in global energy markets to develop tailor-made solutions for our counterparties
- Risk management and Liquidity solutions through financial markets
- Bespoke LNG pricing on different indexations
- Global presence enabling supply across all major markets
- Chartered 2 FSRUs on behalf of German government and developed/commissioned the Elbehafen LNG project

### LNG physical traded volumes



### 2023 in figures

- 19.4 million tonnes of physical LNG traded
- Approximately 9.3 million tonnes (~140 cargoes) delivered to offtakers



# Commodity Solutions

## Reliable partner for energy supply

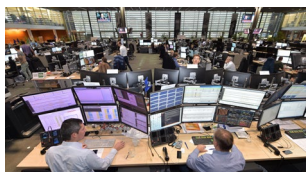
**Commodity Solutions** supplies large customers and with energy and energy-related services. We offer standard supply, trading products and bespoke solutions. We create win-wins based on our best-in-class asset- and portfolio management.

### Supply and Route-to-Market Services



- Standard (plant gate) supply
- CO<sub>2</sub> reduced power
- Structured products
- (Grid-) cost optimisation
- Flexibility management/VPP

### Trading products



- Forward and spot products
- Hedging strategies
- Analyses/research products
- Hydrogen/ammonia
- Long term supply (power, gas, LNG)

### Bespoke products and services

- Green power/PPAs
- Corporate PPAs
- Corporate Trading
- Cross-border PPAs
- Individual partnerships and services
- Certificates (REGOs & GoOs)
- Tailored marketing services





# Commodity Solutions Overview

Criteria	2024
Covered markets	<b>13</b> Germany, Netherlands, Belgium, UK & Ireland, Sweden, Denmark, Finland, Norway, Poland, France, Greece, Italy, and Spain
Number of current customers (contracted)	<b>&gt;500 (electricity)/&gt;300 (gas)</b>
Typical customer	<b>Annual power around 100 GWh</b>
Customer profile	<b>Energy suppliers, Energy intensive industries &amp; municipalities</b> e.g., Manufacturers, Chemicals, Automotives, Heavy industries, Wholesales, Pharmaceuticals, FMCG, etc.
PPA volumes sold in 2023 <sup>1</sup> (MW)	<b>1,168</b> #1 PPA Team in Europe
Number of offices with our expert presence	<b>7</b> Essen, Swindon, Rome, Paris, Copenhagen, Geertruidenberg, Athens
Number of Commodity Solutions experts	<b>&gt;40</b>

<sup>1</sup>Source: PexaQuote, PPA Tracker.






# Gas Storage:

## Operation and Marketing of underground natural gas storages

### RWE's Storage System Operators (SSO)



Germany

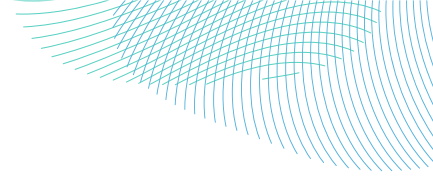
<b>Legal entity</b>	RWE Gas Storage West GmbH
<b>Locations</b>	
<b># of facilities</b>	5 (operating volume of 1.5 bcm <sup>1</sup> )
<b>Type of storages and details</b>	salt caverns
<b>Regulatory</b>	Regulated business according to Directive 2009/73/EC (“Unbundling requirements”)

<sup>1</sup> Billion cubic metres.

# Phaseout Technologies








# Lignite:

## Integrated system including mining, refining and power plants

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**34 TWh** power generation<sup>1</sup> 

---

**6.2 GW** installed capacity<sup>2</sup> 

---

**Closures by 2030**  
Responsible and socially acceptable phaseout of coal 

---

**3** major power plant sites in Germany 

---

**3** lignite opencast mines 

---

**3** refining sites 

---

**3** refining sites 

**Recultivation**  
Concept for lignite mines

<sup>1</sup> Accounting view as of 31 December 2023 including refining plants. <sup>2</sup> Pro rata view as of 31 March 2024.



# Lignite:

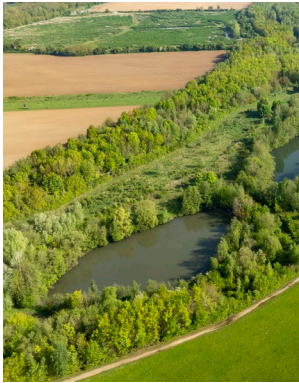
## Agreed closure plan for RWE's lignite power plants by 2030

Asset name	Net installed capacity [GW, pro rata]	Decommissioning Date
Weisweiler F	321 MW	Decommissioning 1 January 2025
Weisweiler G	663 MW	Decommissioning 1 April 2028/2029
Weisweiler H	656 MW	Decommissioning 1 April 2028/2029
Niederaußem G <sup>1</sup>	628 MW	Decommissioning 31 December 2029
Niederaußem H <sup>1</sup>	648 MW	Decommissioning 31 December 2029
Neurath F (BoA 2) <sup>1</sup>	1,060 MW	Decommissioning 31 March 2030
Neurath G (BoA 3) <sup>1</sup>	1,060 MW	Decommissioning 31 March 2030
Niederaußem K (BoA 1) <sup>1</sup>	944 MW	Decommissioning 31 March 2030

<sup>1</sup> The German government has the option to extend the term via a security reserve until 31 December 2033; decision of the German government needs to be taken in 2026 at the latest. | Note: The German government has the option to decide whether to put Niederaußem G or H in the security reserve.

# Lignite:

## Longstanding experience in recultivation & structural change



### Recultivation

- **Forestry recultivation:** Near-natural forest management. By mid of the century 2,200 more hectares of forest reforested than cleared
- **Biodiversity:** Diversity of species comparable to high value reference habitat with >3,200 animal species and >1,500 plant species
- **Agricultural recultivation:** 7 years biological activation of fields by RWE. Afterwards farmer take over the fields for planting in the lend whose quality is guaranteed by RWE for 25 years

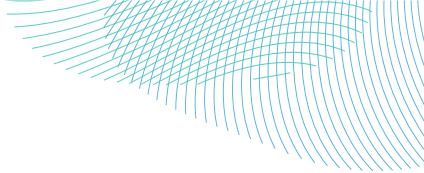
### Structural change

- **Renewable energy**  
Use of onshore wind and agri-PV on recultivated sites is currently examined together with research institutes
- **Site development:**  
Perspektive.Struktur.Wandel GmbH (PSW) is an established company entrusted with the qualification and development of strategically important sites; in cooperation with the federal government and municipalities



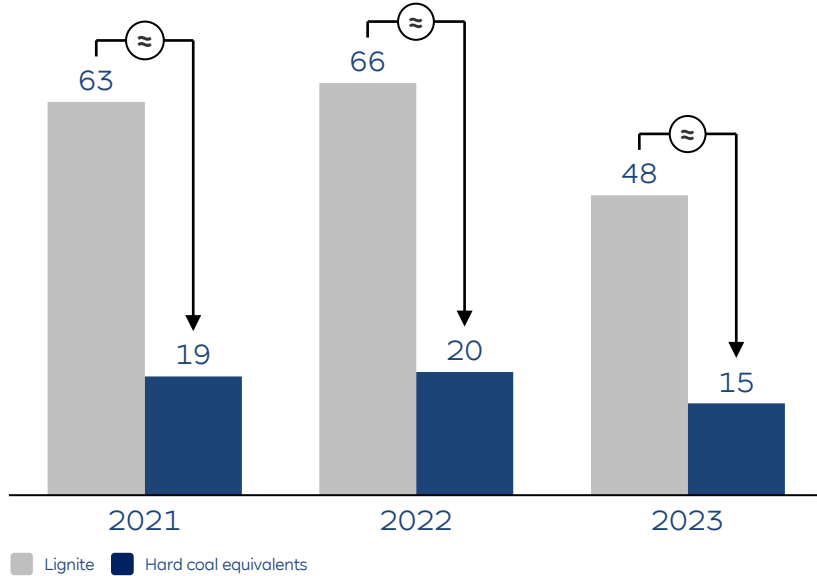
### Plant Repurposing

- **New technologies**  
Existing power plant equipment and infrastructure can be used for other technologies, e.g. Deep Geothermal energy or H2-ready combined cycle gas turbines
- **New opportunities**  
Economical use of fallow land for open-space PV systems including battery storage in the opencast mining landscape



# Lignite contains more water than hard coal and therefore converts into less electricity per ton

## Conversion of lignite mining volumes to hard coal, in million ton (mt)



- Less hard coal is required to create the same amount of heat compared to lignite
- Calorific value of hard coal equivalent is equal to 29,307 kJ/kg<sup>1</sup> while lignite is ~8,000 - 10,000 kJ/kg<sup>2</sup>
- Calculation for 2023 hard coal equivalent is computed using the following inputs:

Material	Amount (mt)	Heat value	Hard coal equivalents
Lignite	48	9,000	$(48 \times 9,000) / 29,307 = 14.7$
Hard coal	-	29,307	-

<sup>1</sup> 29,307 kJ/kg is the officially recognized number for the conversion. | <sup>2</sup> Calorific value of lignite in the Rhenish mining area.



# Nuclear:

Experience across entire nuclear plant lifecycle with focus on secure and efficient decommissioning

Nuclear power generation in Germany **ended** in 2023

Focus: Secure and efficient **decommissioning** of all RWE nuclear power plants



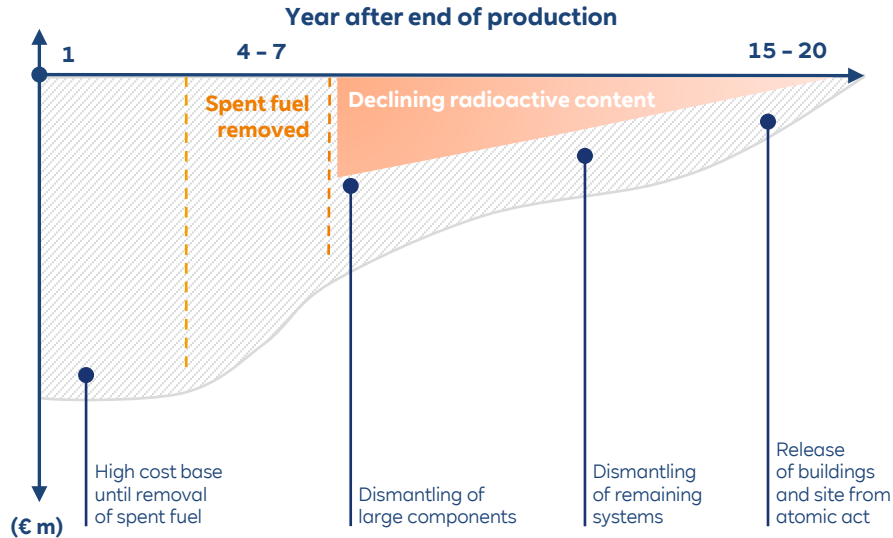
RWE Nuclear units in Germany	Net capacity (GW)	End of operations	Spent fuel removal	Decomm. licence	Status	
					Decommissioning progress	
Emsland	1.3	2023	2027	Pending	Preparation for decommissioning	Post-operational phase
Gundremmingen C	1.3	2021	2026	✓	Advanced	In decommissioning
Gundremmingen B	1.3	2017	✓	✓	Advanced	
Biblis A	1.2	2011	✓	✓	Advanced	
Biblis B	1.2	2011	✓	✓	Advanced	
Mülheim-Kärlich	1.2	1988	✓	✓	Far advanced	
Lingen KWL	0.3	1979	✓	✓	Far advanced	
Gundremmingen A	0.2	1977	✓	✓	Far advanced	
Kahl	0.01	1985	✓	✓	Finished	Decommissioned

# Nuclear:

## Cash flow profile of provisions driven by timing of individual shutdowns

### Example: Decommissioning cash flow profile (one unit)

illustrative

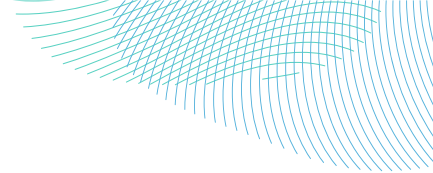


### Accounting of provisions

Nuclear provisions (31.12.2023)	€5.4bn
Discount rate	2.07%
Escalation rate	2.04%
Sensitivity (+/-10 bps change in real discount rate)	c. -/+€30m

### Utilisation of provisions

- Increased utilisation of provisions due to further shutdowns (€500m – €600m p.a.) from 2024 to 2027 and €300m – €400m p.a. from 2028 to 2030
- Clear reduction in utilisation of provisions from ~2030 onwards



# Nuclear: Decommissioning steps

## Basic site management

Periodic inspection, ongoing supervision and maintenance of systems and buildings

Downsizing/replacement of infrastructure

Final shutdown of systems

Operation and maintenance of adjusted infrastructure systems

illustrative

### Dismantling

Dismantling of systems and components

Decontamination of buildings

Release of buildings and site

### Materials & waste treatment

Sorting of materials

Decontamination of materials

Release of materials

Treatment<sup>1</sup> of radioactive waste

### Responsibility of State

Interim storage & final disposal

<sup>1</sup> For example melting, incineration, compaction, packaging and documentation.



# Appendix



# RWE generation asset list

# RWE

## RWE generation asset list as of 31 December 2023

Note: Rounding differences may occur.

# Glossary

## A

aFRR	Automatic Frequency Restoration Reserve
APAC	Asia Pacific

## B

Bcm	Billion cubic metre
BM start up	Balance Mechanism start up
Bps	Basis points
BREF-LCP	Best Available Techniques Reference - Large Combustion Plants

## C

CAO	Commercial Asset Optimisation
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CBAM	Carbon Border Adjustment Mechanism
CBS	Central office for Statistics Netherlands
CCGT	Combined Cycle Gas Turbine
CCS	Carbon Capture and Storage
CCUS	Carbon Capture Utilisation and Storage
CfD	Contract for Difference
CHP	Combined Heat and Power
CM	Capacity Market

COD	Commercial Operation Date
CO <sub>2</sub> e	Carbon dioxide equivalent
CPI	Consumer Price Index
CPPA	Corporate Power Purchase Agreement
CRM	Capacity Remuneration Mechanism
<b>D</b>	
DESNZ	Department for Energy Security and Net Zero
DUKE	Digest of UK Energy Statistics

## E

EEG	Renewable Energy Act
EFR	Enhanced Frequency Response
EMR	Energy Market Reform
EMS	Energy Management System
EnWG	Energy Industry Act
EP	European Parliament
EPS	Earnings Per Share
ETS	Emission Trading System
EV	Enterprise Value

## F

FCR	Frequency Containment Reserve
FFR	Firm Frequency Response
FID	Final Investment Decision
FIP	Feed-in Premium
FIT	Feed-in Tariff
FMCG	Fast-moving Consumer Goods
FSRU	Floating Storage and Regasification Unit

## G

GHG	Greenhouse Gas
GENCOs	Generation Companies
GoO	Guarantee of Origin

## H

HVDC	High Voltage Direct Current
------	-----------------------------

## Country Codes

AT	Austria	CH	Switzerland	FR	France	IN	India	MX	Mexico	RO	Romania	UK	United Kingdom
AU	Australia	CL	Chile	GB	Great Britain	IT	Italy	NL	Netherlands	SE	Sweden	US	United States of America
BE	Belgium	DE	Germany	GR	Greece	JP	Japan	NO	Norway	TR	Turkey		
BG	Bulgaria	DK	Denmark	HR	Croatia	KR	South Korea	PL	Poland				
CA	Canada	ES	Spain	IE	Ireland	LV	Latvia	PT	Portugal				

# Glossary

## I

ICE	Institution of Civil Engineers
IFRS	International Financial Reporting Standards
IPCEI	Important Projects of Common European Interest; Regional Hubs and Their Links wave
RHATL	Independent Power Producer
IPPs	Independent Power Producer
IRR	Internal Rate of Return
ITC	Investment Tax Credit

## J

JV	Joint Venture
----	---------------

## K

KPIs	Key Performance Indicators
KEPCO	Korean Electric Power Corporation

## L

LCOE	Levelised Cost of Electricity
LOLE	Loss of Load Expectation
LRF	Linear Reduction Factor

## M

MACRS	Modified Accelerated Cost-Recovery System
MFR	Mandatory Frequency Response
mFRR	Manual Frequency Restoration Reserve
MSR	Market Stability Reserve
Mt	Metric tonnes
MWp	Megawatt peak

## N

NECP	National Energy and Climate Plans
NYB	New York Bight

## O

OCGT	Open Cycle Gas Turbine
O&M	Operation and Maintenance
OPEX	Operational expenditure
OREC	Offshore Renewable Energy Certificate
ORESS	Offshore Wind Renewable Electricity Support Scheme
OTC	Over-The-Counter

## P

PPA	Power Purchase Agreement
PSA	Power Supply Agreement
PTC	Production Tax Credit
PV	Photovoltaic

## Q

QIA	Qatar Investment Authority
-----	----------------------------

## R

RD&I	Research, Development and Innovation
REC	Renewable Energy Certificate
RED	EU Renewable Energy Directive
REFIT	Renewable Energy Feed-In Tariff

REGOs	Renewable Energy Guarantees of Origin
REMA	Review of Electricity Market Arrangements
RES	Renewables
RESS	Renewable Electricity Support Scheme
RFNBO	Renewable Fuels of Non-Biological Origin, incl. Green hydrogen
ROC	Renewable Obligation Certificate
RPS	Renewable Portfolio Standard
RR	Replacement Reserve

## S

SDE	Stimulation Renewable Energy
SDGs	Sustainable Development Goals
SP	Service Procurement
SSO	Storage System Operators
STOR	Short Term Operating Reserve

## T

TSO	Transmission System Operator
T&S	Trust & Safety

## U

UCTE	Union for the Coordination of the Transmission of Electricity
UNFCCC	United Nations Framework Convention on Climate Change

## V

VPP	Virtual Power Plan
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## W

WACC	Weighted Average Cost of Capital
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# Your contacts in Investor Relations

## Important Links

- [Annual and interim reports & statements](#)
- [Investor and analyst conferences](#)
- [IR presentations & factbooks](#)



## ADR programme available

**Further information on our homepage**  
[RWE shares/ADR](#)

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+1 201 680-6255 (from outside the US)  
1-888-269-2377 (within the US)

## Financial Calendar

- **13 Nov 2024:** Interim statement on the first three quarters of 2024
- **20 Mar 2025:** Annual Report for fiscal 2024

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