

Factbook 2018



Powering. Reliable. Future.

RWE

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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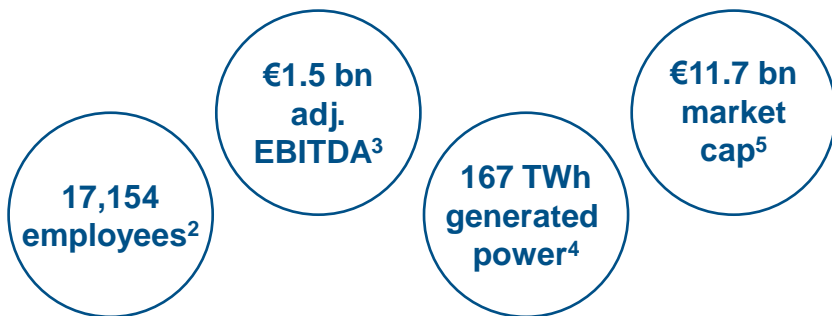
RWE Group

RWE at a glance

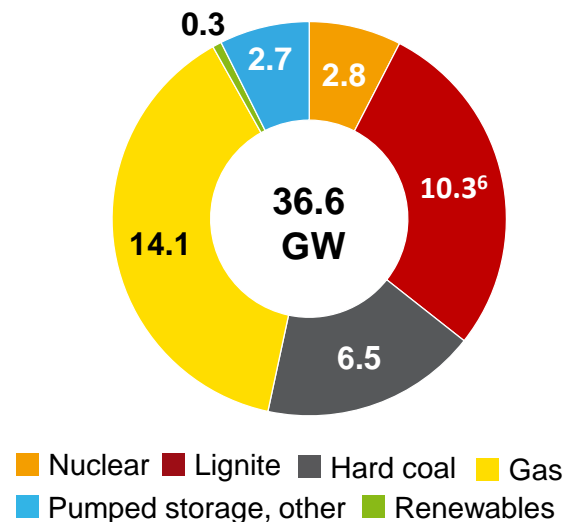
Key facts



- ✓ Leading European power generator
- ✓ Efficient and flexible power plant portfolio
- ✓ Strong global trading business
- ✓ Ongoing transformation into a leading renewables player



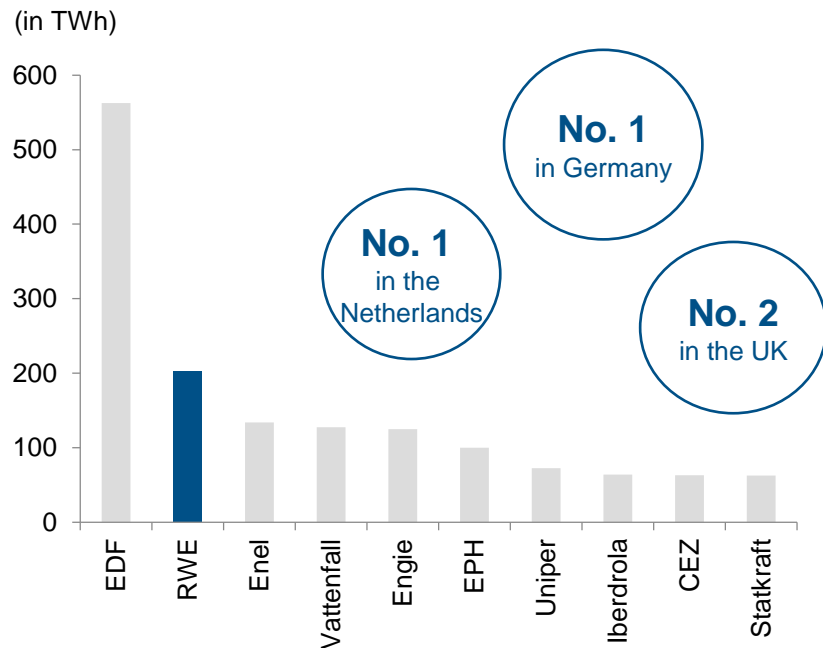
RWE's net generation capacity¹



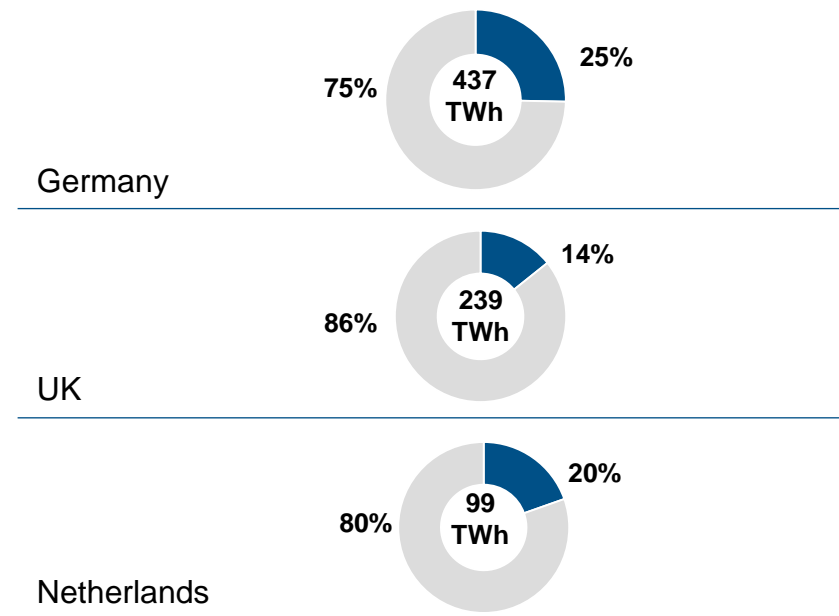
Note: Figures may not add up due to rounding differences. | ¹ Net installed generation capacity excl. innogy as of 1 January 2019. | ² Converted to full-time positions. Workforce at 2018 year-end excl. innogy. | ³ 2018 EBITDA for RWE stand-alone. | ⁴ Power generation 2018 excl. innogy. | ⁵ End of fiscal year 2018. | ⁶ Including units in security reserve.

RWE ranks No. 2 among European power generators

Top 10 European power generators



RWE market share¹ in core markets



¹ Measured by conventional power generation in 2017 (in TWh). RWE data as per annual report 2018. | Source: RWE analysis.

Key financials (RWE stand-alone¹)

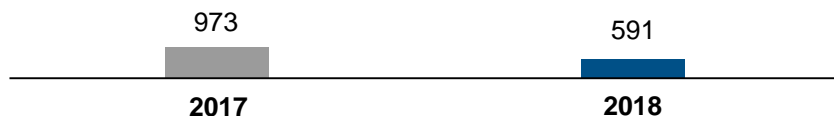
Adjusted EBITDA

(€ million)



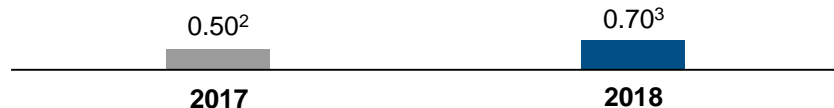
Adjusted net income

(€ million)



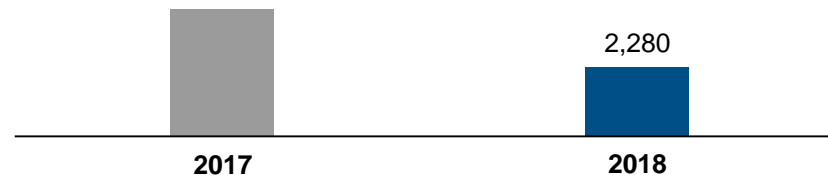
Dividend per share

(€)



Net debt

(€ million)



Leverage factor

$$\frac{\text{Net debt}}{\text{adj. EBITDA}} = \frac{2,280}{1,521} = 1.499$$

Equity ratio

$$\frac{\text{Total equity}}{\text{Total assets}} = \frac{18,495}{49,844} = 37.1\%$$

¹ Accounts for innogy as financial investment with its fair value and dividend payment. | ² Ordinary dividend, excluding €1/share special dividend. | ³ Dividend proposal for RWE AG's 2018 fiscal year, subject to the passing of a resolution by the 3 May 2019 Annual General Meeting.

Group structure

RWE

Operating business

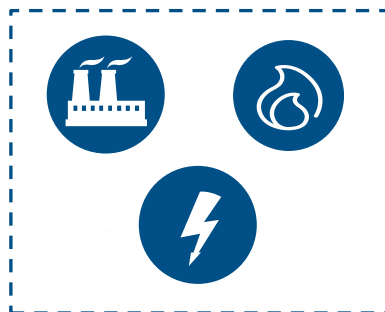
Financial portfolio

Lignite & Nuclear



Lignite mining and power generation (lignite & nuclear)

European Power



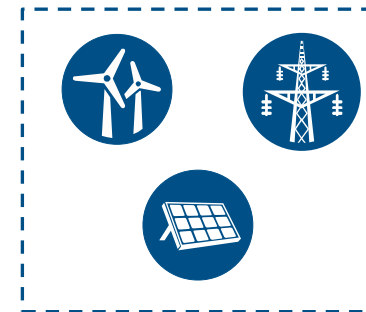
Power generation (hard coal, gas, hydro & biomass)

Supply & Trading



Trading & Principal Investments, Supply - Gas & LNG, Commodity solutions, Commercial Asset Optimisation (CAO)

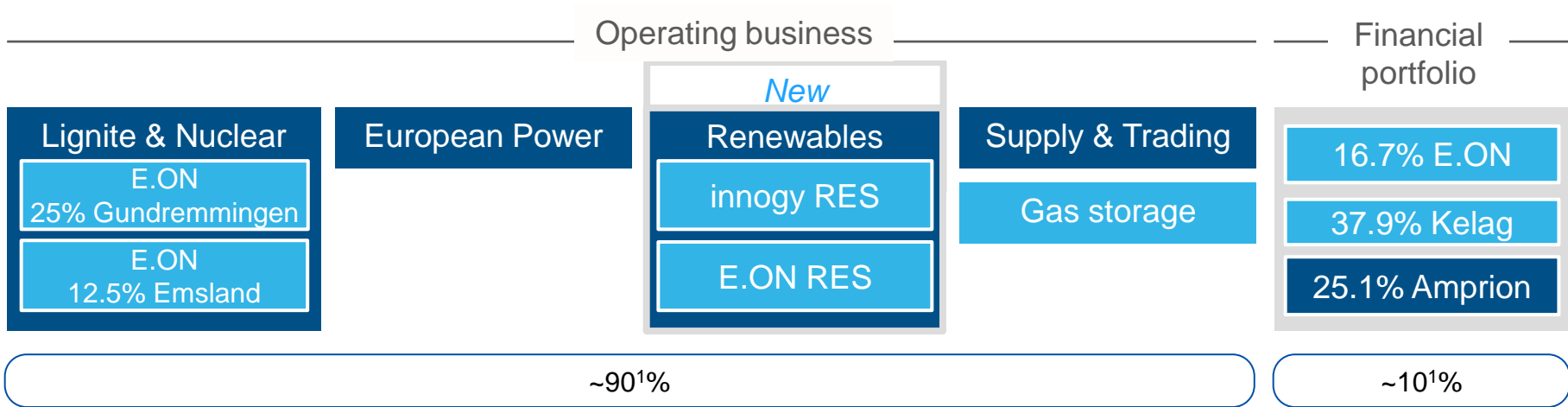
innogy



Renewables, Grid & Infrastructure, Supply

RWE is transforming into a leading renewables player

RWE



■ Additions to RWE Portfolio (from transaction).



Strengthening and future-proofing of the core operating business



Optimised financial portfolio with stable and attractive dividends

¹ Expected adjusted EBITDA share in first year after closing of transaction.

Management Board

RWE AG



Dr. Rolf Martin Schmitz
Chief Executive Officer



Dr. Markus Krebber
Chief Financial Officer

RWE Generation



Roger Miesen
CEO, COO



Katja van Doren
CFO, CHO



Tom Glover
CCO

RWE Power



Dr. Frank Weigand
CEO, CFO



Dr. Lars Kulik
CTO Lignite



Ralf Giesen
CHO



Nikolaus Valerius
CTO Nuclear

RWE Supply & Trading



Andree Stracke
CCO Origination
& Gas Supply



Dr. Michael Müller
CFO



Peter Krembel
CCO Trading



Tom Glover
CCO Commercial
Asset Optimisation

Our top executives have on average **+20 years of experience** in the energy industry.

Supervisory Board

Dr. Werner Brandt appointed Chairman on 20 April 2016. Shareholder representative since 18 April 2013

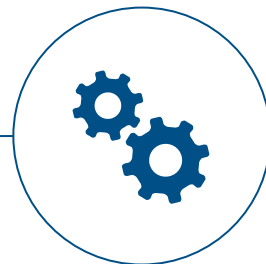
Experienced and diverse composition with broad skillset and 30% female representation



20 members, thereof **10** shareholder and **10** employee representatives



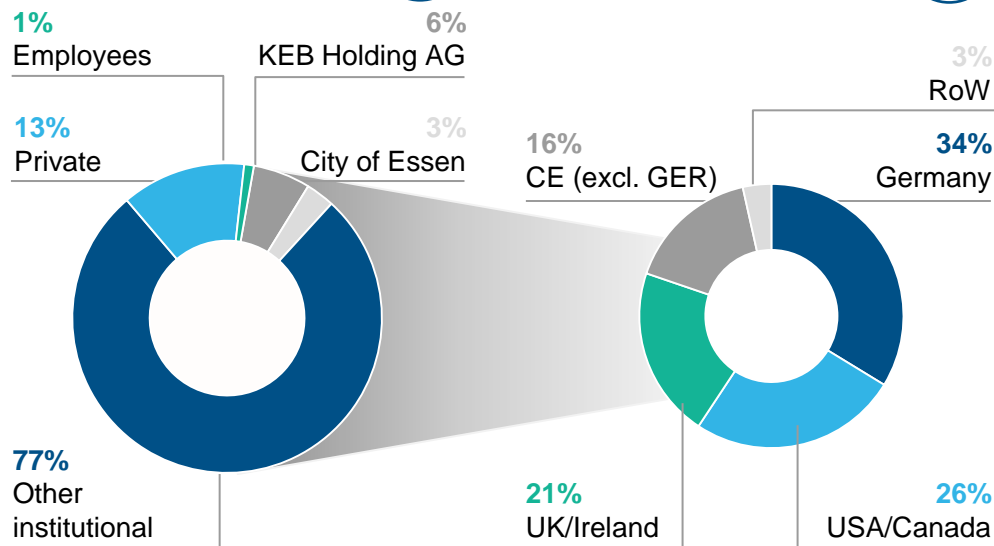
Committees¹: Executive, Audit, Personnel Affairs, Nomination, Strategy and Mediation



¹ Only permanent committees listed.
RWE AG | Factbook | March 2019

Shareholder structure of RWE AG

RWE shareholders



Institutional



Share indicators



		2017	2018
Number of common shares	thousands	576,745	576,745
Number of preferred shares ¹	thousands	39,000	39,000
Total number of shares	thousands	614,745	614,745
Share price of common shares ²	€	17.00	18.97
Share price of preferred shares ²	€	14.33	18.84
Market capitalisation ²	€ billion	10.3	11.7

Note: As of December 2018. | ¹ Resolution to convert preferred shares into common shares proposed to 3 May 2019 AGM. | ² End of fiscal year.

Capital structure

RWE stand-alone net debt (as of 31 Dec 2018)¹

(in € billion)

Financial assets and receivables	11.5
> Financial receivables against innogy	1.7
> Financial assets	9.8
Financial liabilities (incl. hybrid adjustments)	2.2
> Bonds and bank debt, Commercial paper	1.2
> Other financial liabilities	1.1
> Hybrid adjustments	-0.1
Net financial assets (incl. hybrid adjustments)	9.3
Provisions	11.6
> Nuclear provisions	5.9
> Mining provisions	2.5
> Pension provisions	3.2
Total net debt	2.3

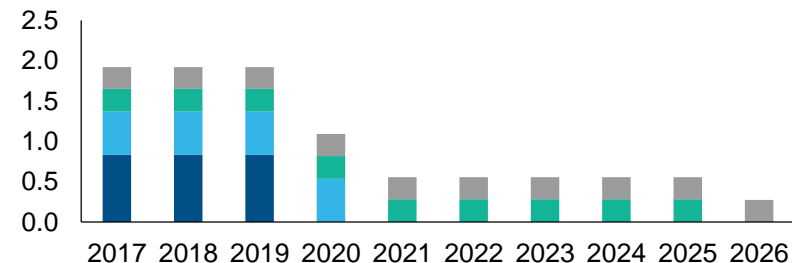
RWE's issuances – hybrid bonds

- in March 2012 (£750 m, 7.00%, 2019)²
- in April 2015 (€539 m, 2.75%, 2020)
- in April 2015 (€282 m, 3.50%, 2025)
- in June 2015 (\$317 m, 6.625%, 2026)



Maturity profile of hybrid bonds³

(in € billion)



¹ Rounding differences may occur. | ² Called to be redeemed on 20 March 2019. | ³ Assuming redemption at first call dates.

Credit rating

Fitch affirms RWE at 'BBB', Stable Outlook

FitchRatings

- On **5 October 2018** Fitch affirmed its rating view for RWE at BBB, stable outlook & upgraded RWE's short-term rating to F2 from F3
- The rating actions follow progress in the asset swap transaction with E.ON SE (BBB+/Stable), which will add a large renewable generation business to the mix and improve RWE's credit profile due to the quasi-regulated character of the new business
- Fitch does not anticipate a major impact from the rising CO₂ and coal prices on RWE's conventional generation business, due to the high share of hedged positions at RWE and parallel increases in the wholesale electricity prices in the main markets of operations
- After acquisition of the renewables portfolio, Fitch sees some potential for positive rating action

Moody's confirms RWE's 'Baa3/Ba2', Stable Outlook

MOODY'S

- On **17 May 2018** Moody's confirms its rating view for RWE at Baa3/Ba2, stable outlook. RWE's short-term rating is confirmed at P3
- The rating confirmation reflects Moody's expectation that the transaction with E.ON will transform RWE's profile. RWE's generation fleet will become more diversified and its average carbon intensity will decrease. Renewables, which have lower risk than conventional generation, given their typically fixed tariffs and limited exposure to merchant power under contracts, will account for some 55-60% of RWE's EBITDA
- It further reflects a material reduction in RWE's net debt to €4.5 billion as of end-December 2017 on the back of the proceeds from nuclear fuel tax compensation, stronger performance from commercial asset optimisation and implementation of cost cutting initiatives
- The above factors mitigate the risks associated with RWE's volatile generation, supply and trading businesses, coupled with the expected decline in the company's EBITDA as a result of lower power prices, declining volumes in nuclear and lignite production, and tight margins on spread generation business

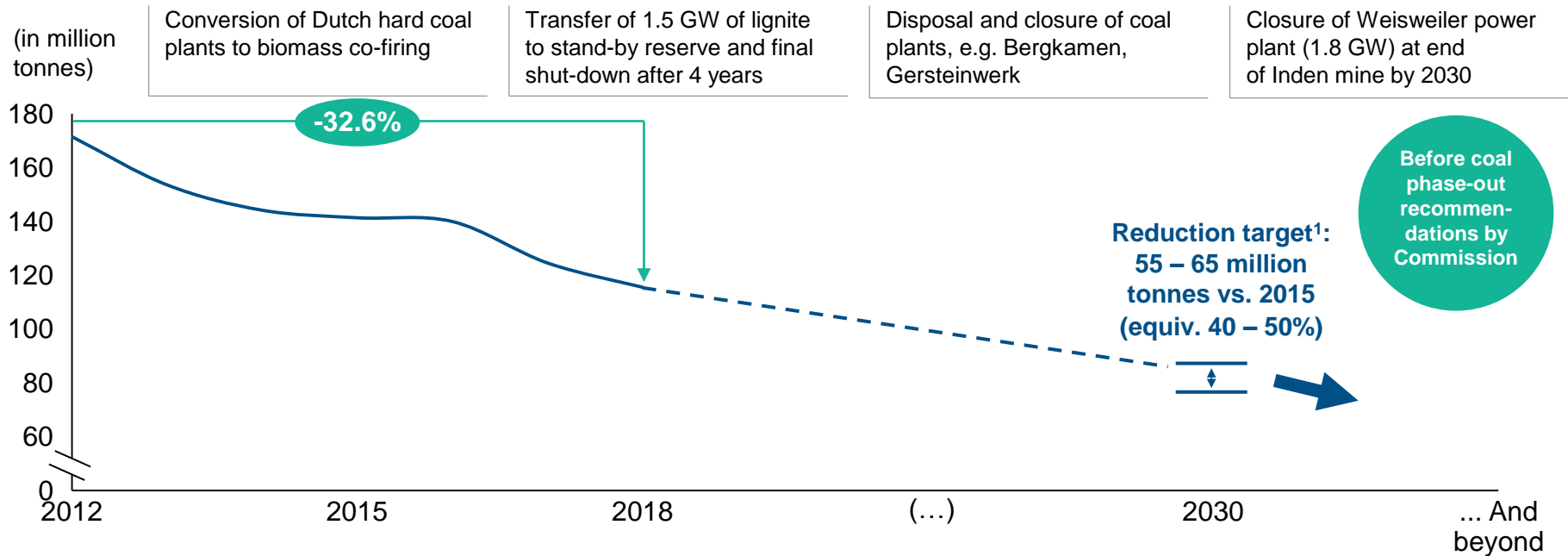
Corporate Responsibility (CR) focus areas and core value drivers



Sustainable management is an integral part of our strategy and operations by which we contribute to the company's success and the UN Sustainable Development Goals.

RWE is on an ambitious path to reduce CO₂ emissions

RWE's reduction path for CO₂ emissions in core markets¹ – our target before Commission recommendations



¹ Referring to RWE stand-alone portfolio, excluding Mátra in Hungary and Denizli in Turkey. Figures do not include a potential impact on the generation portfolio as a result of recommendations from the Growth, Structural Change and Employment Commission.



Market data

The electricity market

Generation



- Power plants generate power from sources of primary energy fuels
- Most common fuel types are uranium (nuclear), hard coal, lignite and natural gas.
- Renewable sources include wind, hydro, photovoltaic (PV) and biomass

Trading



- Acts as commercial hub for utilities, buying and selling energy in the wholesale market
- Traders also handle the commodity risk arising from fuel procurement

Transmission



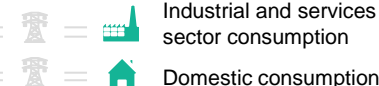
- High voltage
- Delivers electricity from power plants to local distribution power lines
- Perceived to be a 'natural monopoly' and therefore it is regulated in most markets by the local regulator/ government

Distribution



- Medium and low-voltage, local power lines
- Delivers electricity to end users
- Perceived to be a 'natural monopoly', and therefore it is regulated in most markets by the local regulator/ government

Retail/end user supply



- Power is bought by suppliers on the wholesale market and sold on to the customers (e.g. private households)
- Suppliers work in a competitive market and customers can choose any supplier to provide them with gas and electricity
- In a few markets retail remains regulated, e.g. Italy

Merit order

» The merit order refers to the order of use of power plants, determined by the marginal costs of generation technology

How is the power price set?



- **Power price is set by auction principle**
- **Consequently, prices are set by marginal costs.** All available generating units in a given region will bid their units according to the individual variable operating costs, with the exception of those plants enjoying priority of dispatching
- **All dispatched plants get paid the same price**
- Generators' gross margin is the difference between the market clearing price for power and their individual variable costs

What moves the price?



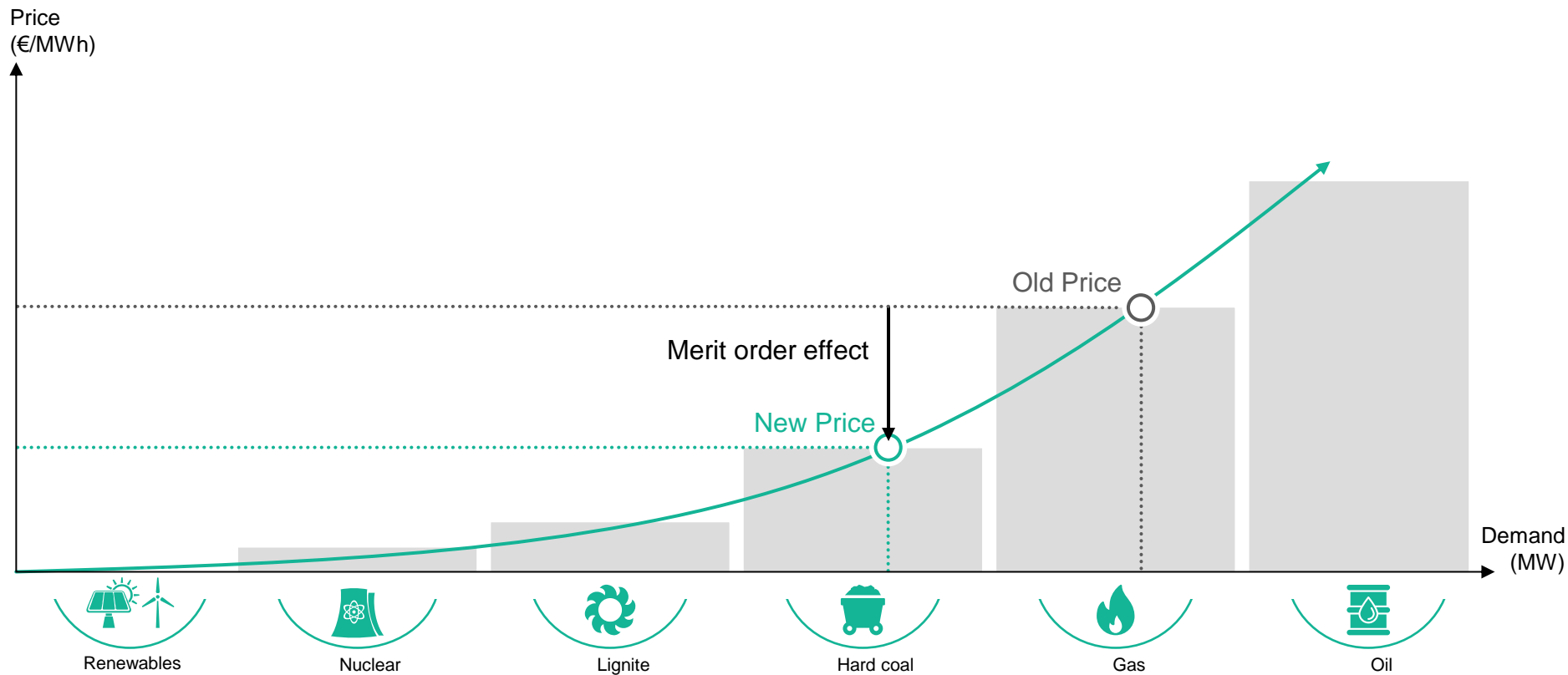
Commodities (coal, gas): Fuel is the single largest variable cost item for most generators. Commodity prices therefore have the largest impact on power prices in the (near) term.

CO₂ price: The CO₂ price is added – depending on emission factor – to each plant's marginal costs and therefore passed through to the customer. Power plants that emit less carbon than the marginal plant would benefit from an increasing CO₂ price and vice versa.

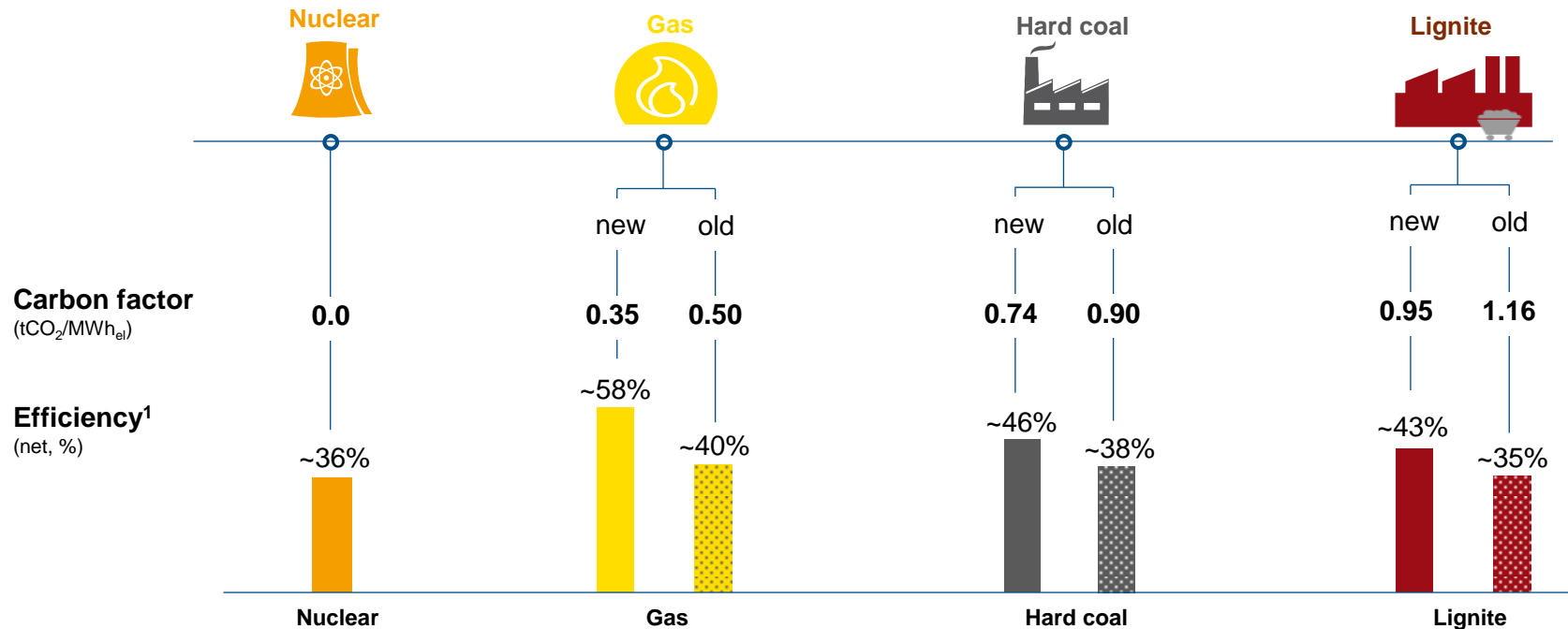
Taxes: Taxes can be applied to specific technologies/fuel or to the electricity price. Taxes on the fuel of the marginal plant are passed through to customers. If the tax rate varies by technology, it can lead to merit order changes.

Supply/Demand: More supply shifts merit order to the right, while less demand results in lower prices and vice versa.

Merit order model



Carbon factors and efficiencies by type of power plants



¹ Efficiency of converting primary energy into electricity.

Ancillary services¹

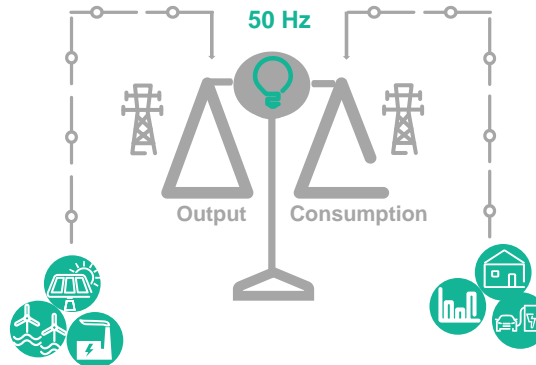
Continuous balancing of power supply and demand

The balancing market:

- A market operated by Transmission Grid 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 breakdown)

Ancillary services:

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



Energy products

Frequency Control & Reserves – to maintain system frequency at 50Hz ± 1% 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 energy balance

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

Maintains healthy grid quality

Security products / emergency assistance

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

Dedicated to restarting the grid

¹ 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

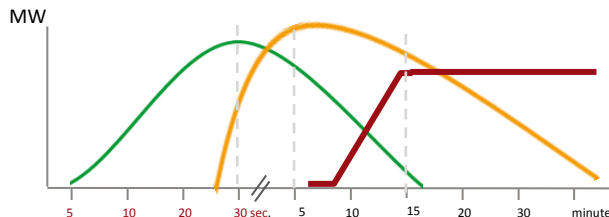
	Primary reserve	Secondary reserve	Tertiary reserve
Reaction time 	• 30 seconds (100%)	• 5 minutes (100%)	• 7 - 15 minutes (100%)
System	• UCTE ¹	• Control area	• Control area
Activation	• Automatic and decentralised activation via governor control	• Centralised (TSO); active call through IT	• Centralised (TSO); active call through phone / IT
Reserved capacity	• 3,000 MW in UCTE (600 MW in Germany)	• Decided by TSO (2,500 MW in Germany)	• Decided by TSO (2,500 MW in Germany)
Auction	• Weekly	• Weekly	• Daily
Remuneration	• Pay-as-bid	• Pay-as-bid	• Pay-as-bid
Typical suppliers	• Synchronised generators: ² run-of-river plants, storage and pumped storage hydro plants, large-scale battery storage systems	• Storage and pumped storage hydro plants; gas turbine power plants; CHP; large-scale battery storage systems	• Storage and pumped storage hydro plants; gas turbine power plants; CHP

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



¹ The Union for the Coordination of the Transmission of Electricity.

² Primary regulating units are required to reserve ~2% of their nominal power ('primary control reserve', updated every year).





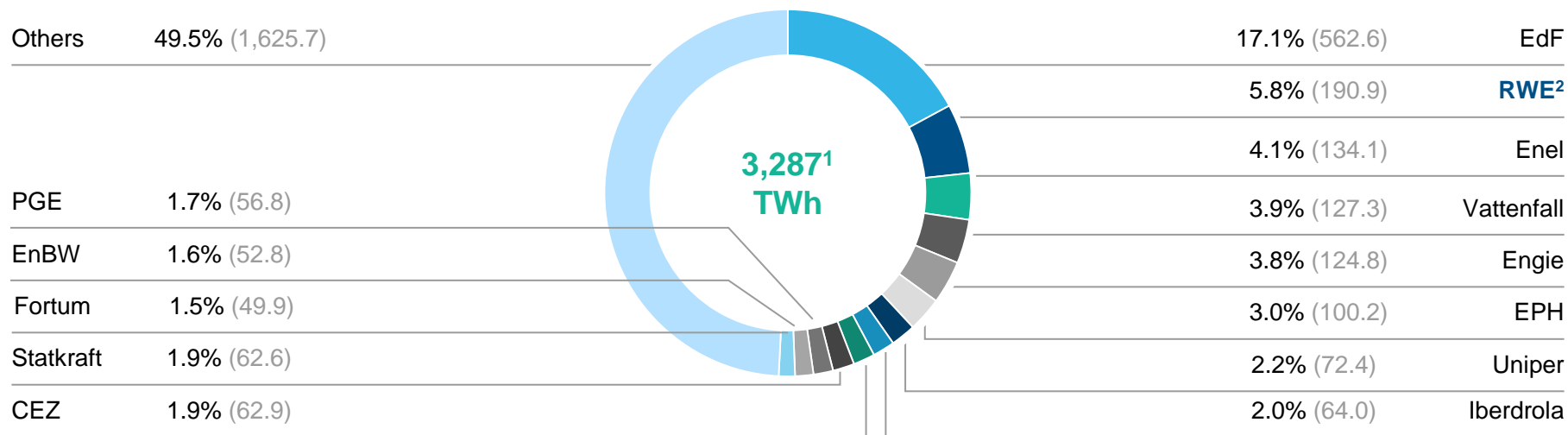
Europe





RWE No. 2 in European power generation

Share in EU 28 gross power generation (2017) | in % (TWh)



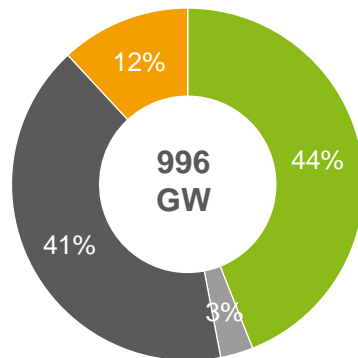
¹ Gross electricity generation. | ² Excl. innogy. | Source: BP Statistical review 2018; RWE Analysis. | Additional notes: Data as shared in relevant annual reports 2017; EnBW values for 2016.



EU 28 power generation and capacity mix

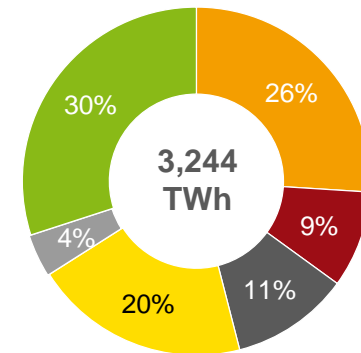
Net installed capacity in 2017

	GW
Nuclear	118
Fossil fuels (lignite, hard coal, gas, oil, mixed fuels)	409
Other (hydro, pumped storage, waste, other non-RES)	30
Renewables	439



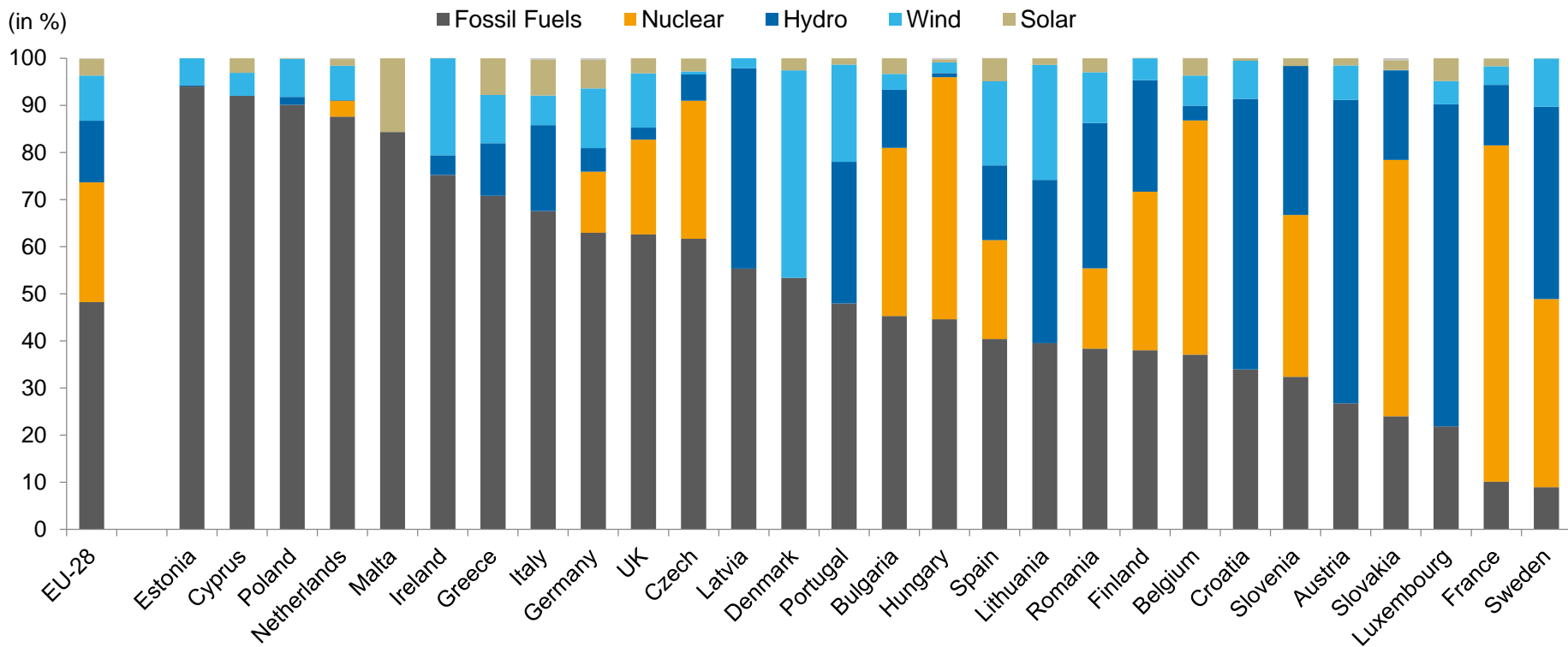
Net generation in 2017

	TWh
Nuclear	830
Lignite	312
Hard coal	357
Gas	639
Other	132
Renewables	974





EU 28 power generation by source¹

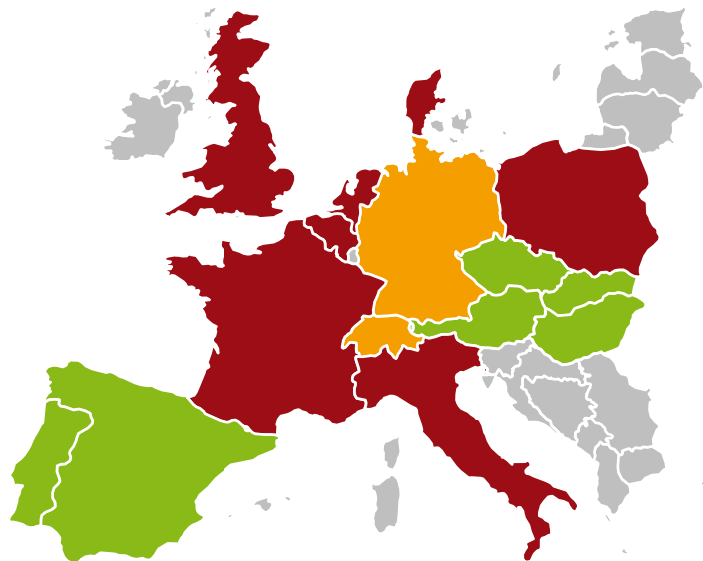


¹ As of 31 December 2016. | Source: eurostat.



Decreasing secured capacity leads to tightening market

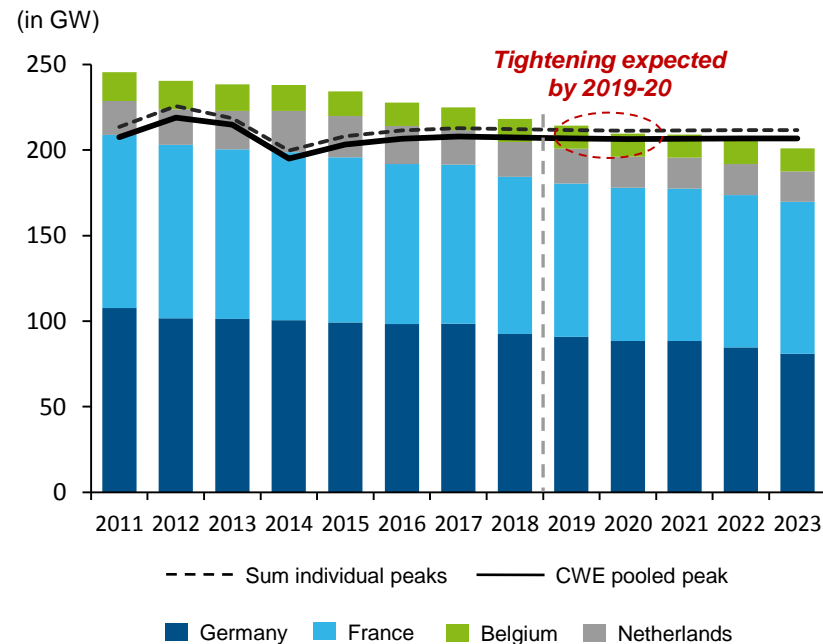
Loss of load expectation (LOLE)¹ in Europe 2025



¹ Expected number of hours where load cannot be supplied by local resources and imports.

Source: Entso-E Mid term adequacy forecast 2017, Sandbag 'The European Power Sector 2017', RWE analysis.

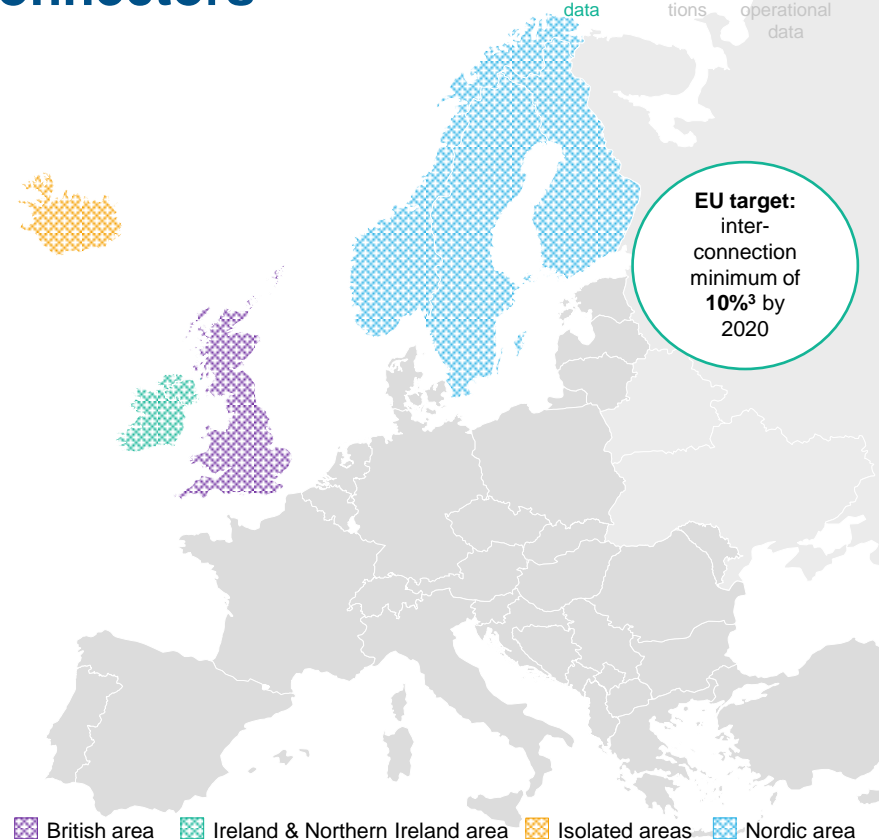
Demand-supply balance at peak load in CWE





Physical cross border flows¹ via interconnectors

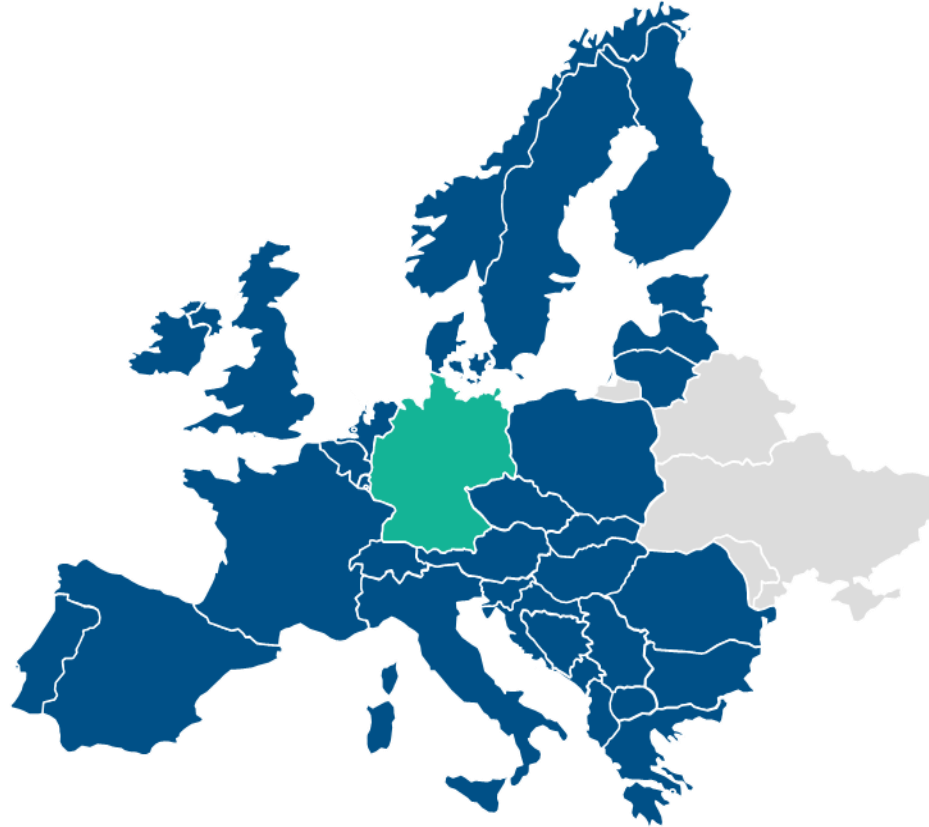
	Sum of imports	Sum of exports	Balance		Sum of imports	Sum of exports	Balance
AL	3,402	486	2,916	IE	1,107	1,787	-680
AT	31,039	23,310	7,729	IT	42,881	5,131	37,750
BA	3,348	5,188	-1,840	LT	11,926	3,249	8,679
BE	14,198	8,170	6,028	LU	7,541	1,366	6,175
BG	3,701	9,190	-5,489	LV	4,072	4,136	-46
CH	36,001	29,967	6,034	ME	3,331	2,202	1,129
CZ	15,074	28,104	-13,030	MK	4,199	2,227	1,972
DE	28,076	83,443	-55,367	NL	22,633	18,736	3,897
DK	15,334	10,620	4,714	NO	5,904	20,830	-14,926
EE	2,328	5,059	-2,731	PL	13,271	10,984	2,287
ES	23,759	14,588	9,171	PT	5,507	8,190	-2,683
FI	22,590	2,147	9,171	RO	3,192	6,087	-2,895
FR	22,590	2,147	20,443	RS	7,021	5,679	1,342
GB ¹	19,917	3,526	16,391	SE	13,831	32,982	-19,151
GR	8,686	2,460	6,228	SI	9,133	9,556	-423
HR	12,157	4,780	7,377	SK	15,565	12,535	3,030
HU	19,803	6,926	12,877	TR	2,688	3,291	-603



¹ Consolidated yearly values might differ from detailed flow data of each country due to ex-post consolidation being taking into account. | ² All data with the country code GB represents statistical data as sum of England, Northern Ireland, Scotland and Wales. | ³ In relation to installed capacity of each country. | Source: entso-e, Statistical Factsheet 2017.



Germany

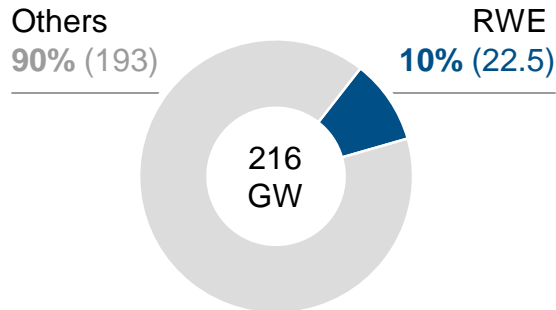




RWE's market share for 2017

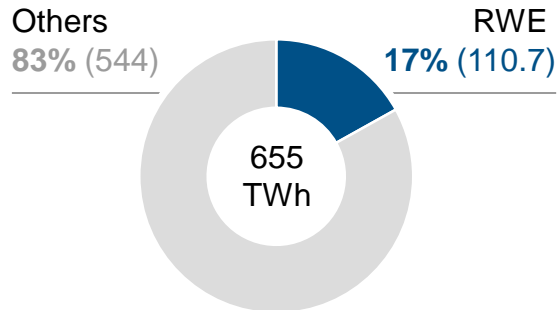
Total generation capacity

Market share in % (in GW)



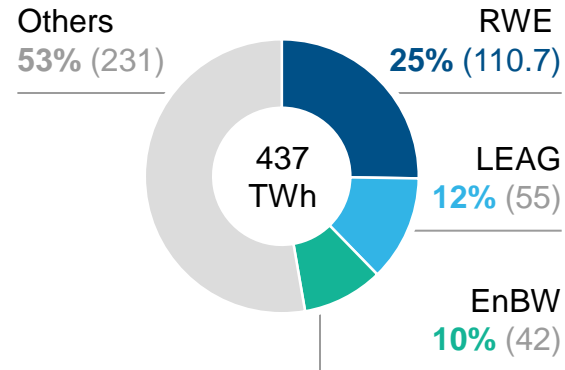
Total gross power generation

Market share in % (in TWh)



Conventional¹ power generation

Market share in % (in TWh)



RWE has leading position in German power generation market.

Note: Market data as of 2017. RWE power generation 2018 and generation capacity as of 1 January 2019.

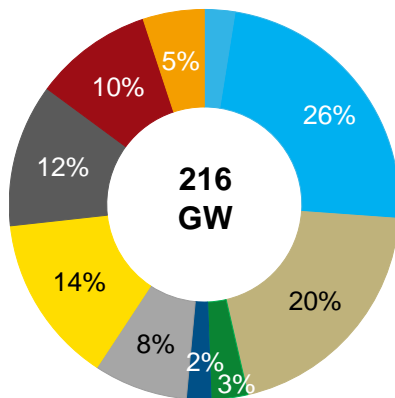
¹ Excluding renewables (hydro, biomass, wind, solar). | Source: BDEW; Annual Reports (2017); RWE analysis.



Overview of power generation mix

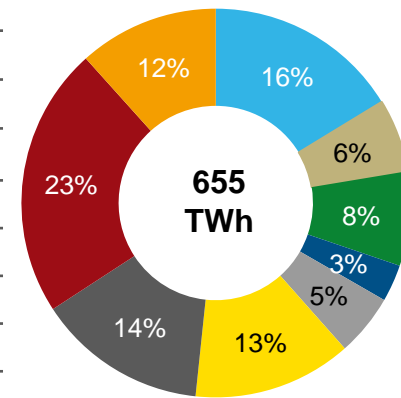
Net installed capacity¹ 2017

	in GW
Nuclear	10.8
Lignite	20.9
Hard coal	25.3
Gas	29.8
Other	16.6
Hydro	5.6
Solar	43.2
Wind	55.9
Biomass & waste	7.7



Gross power generation 2017

	in TWh
Nuclear	76.3
Lignite	147.5
Hard coal	92.6
Gas	86.5
Other	33.6
Hydro	20.2
Solar	39.9
Wind	106.6
Biomass & waste	51.4



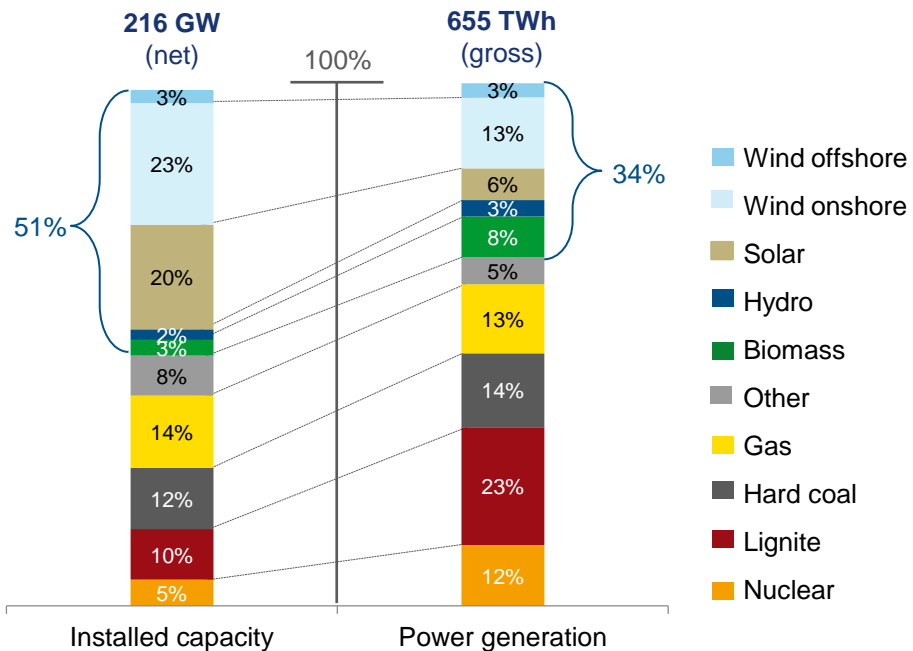
- Almost 50% of German power generation is based on nuclear and coal (hard coal and lignite)
- Germany agreed on nuclear exit by 2022, reducing installed capacity by ~11 GW

¹ As of 31 December 2017. | Source: BDEW; BMWi.
RWE AG | Factbook | March 2019

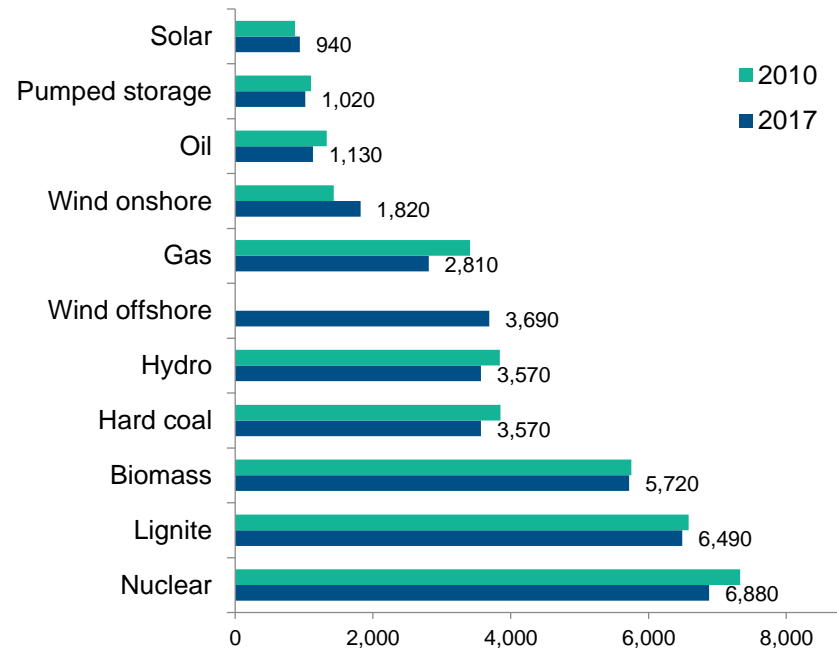


Load factors

Installed capacity and power generation 2017¹



Annual full-load hours

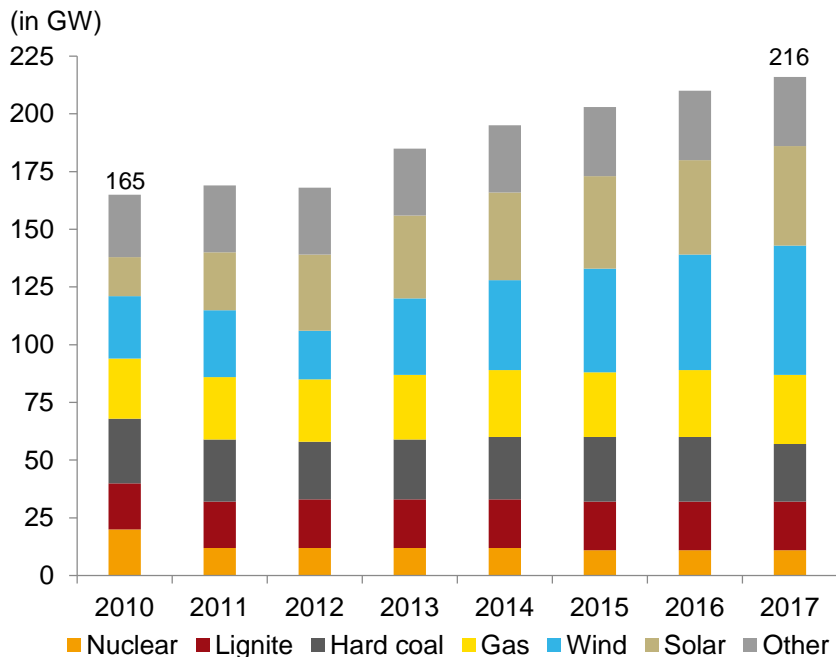


¹ Preliminary numbers. | Source: BDEW; Fraunhofer.



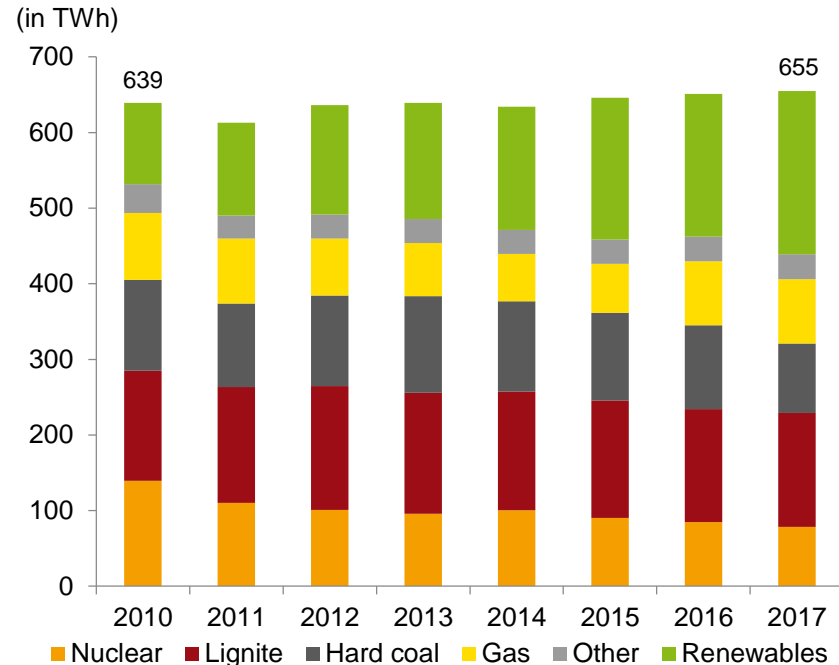
Development of power generation mix

Net installed capacity



Source: BDEW; BMWi.
 RWE AG | Factbook | March 2019

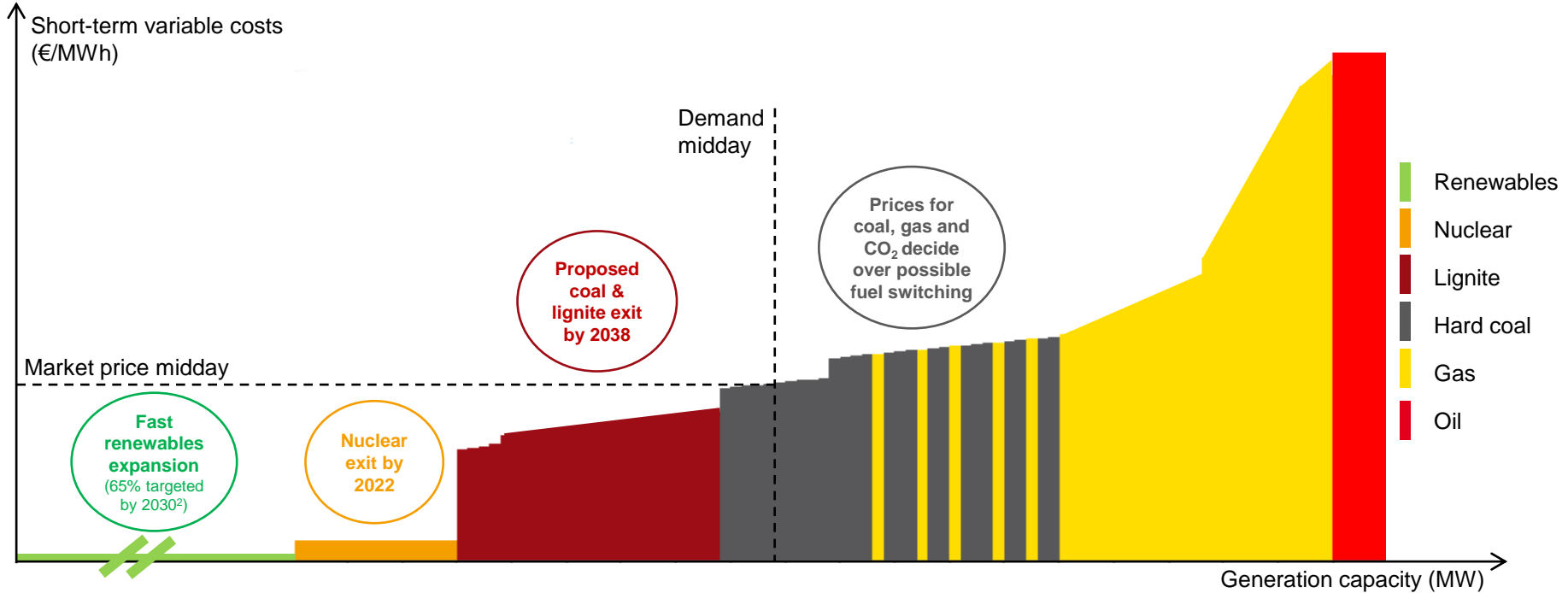
Gross power generation





Merit order 2017

The electricity supply curve in Germany¹

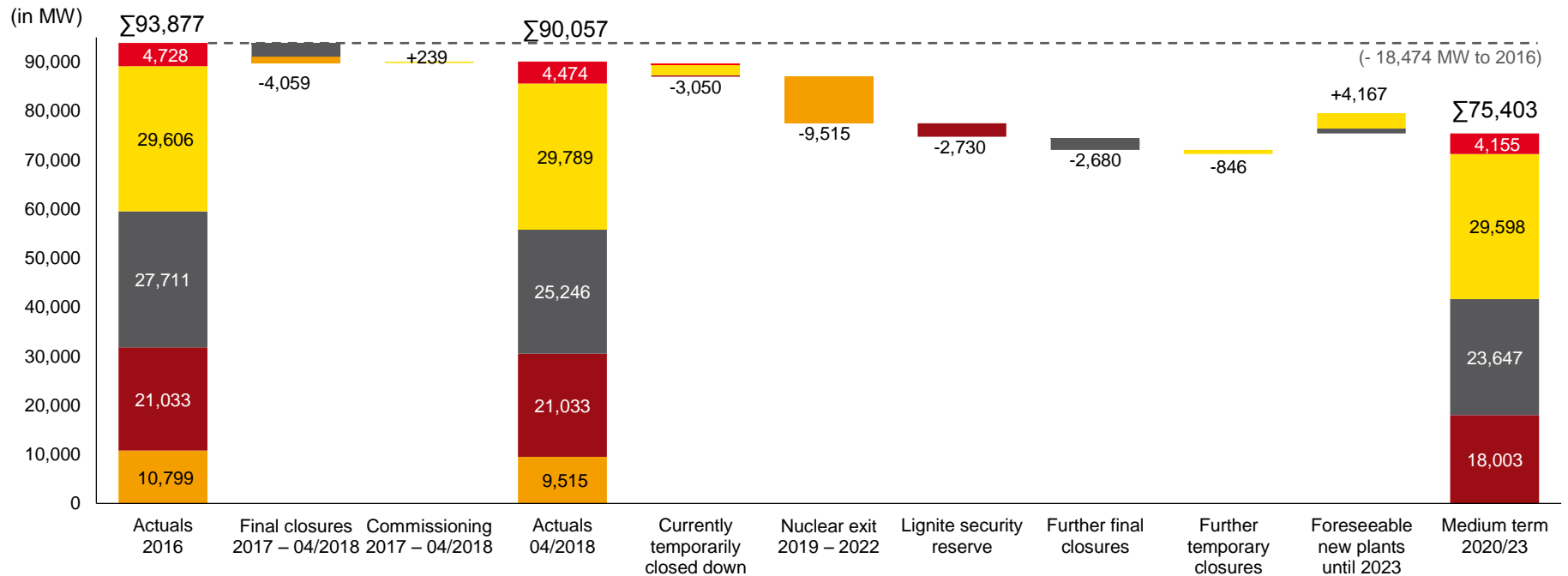


¹ Merit order is based on variable costs (mainly fuel and CO₂ costs) only. It does not include the fixed costs which have to be covered by power plant margins. | ² Renewables share of power consumption amounted to about 35% in 2017. | Source: RWE analysis.



Expected tightening due to decline in secured capacity

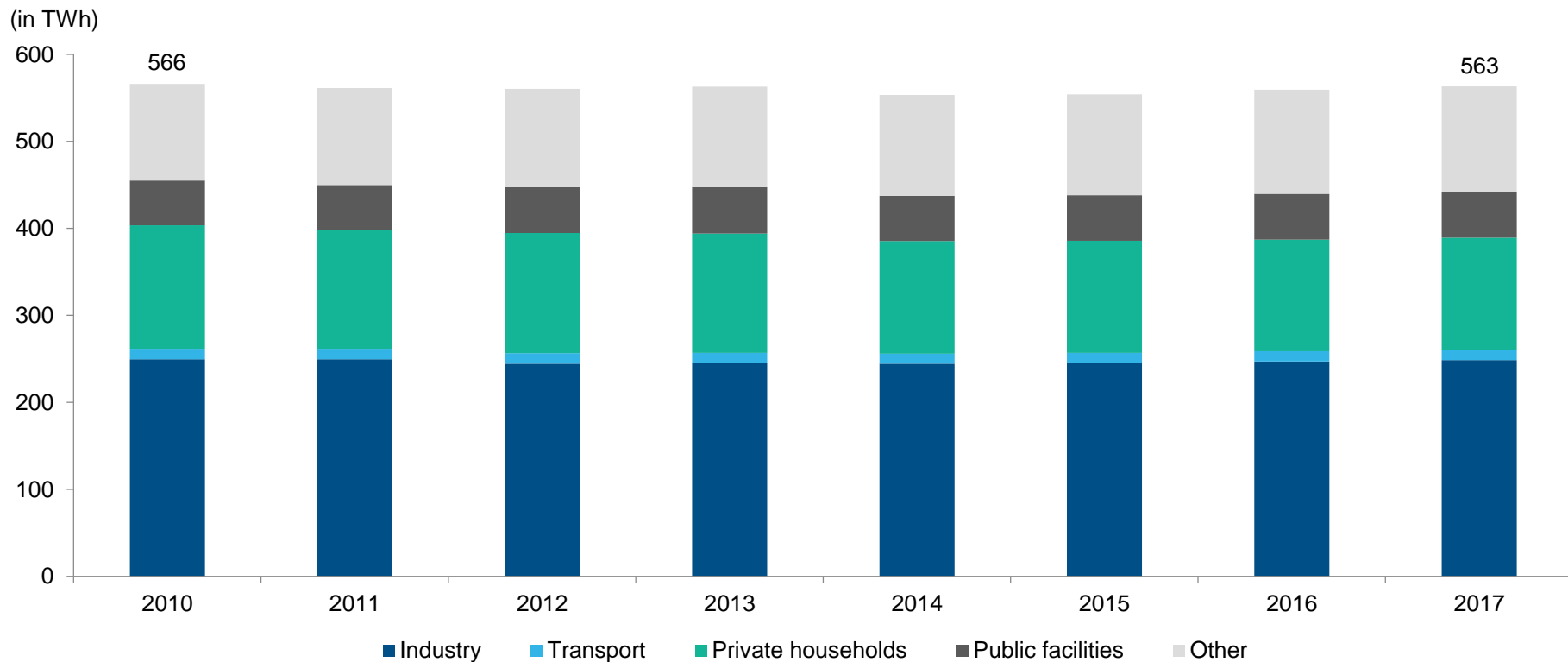
Expected development of conventional installed capacity¹ – before coal phase-out recommendations by Commission²



¹ As of April 2018. | ² Growth, Structural Change and Employment Commission. | Source: BDEW.



Electricity consumption by sector

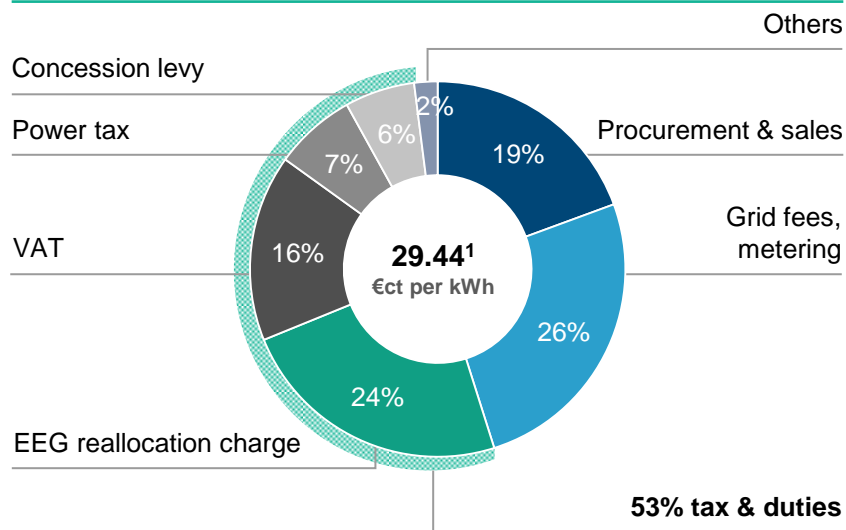


Source: BDEW, Apr 2018.
RWE AG | Factbook | March 2019

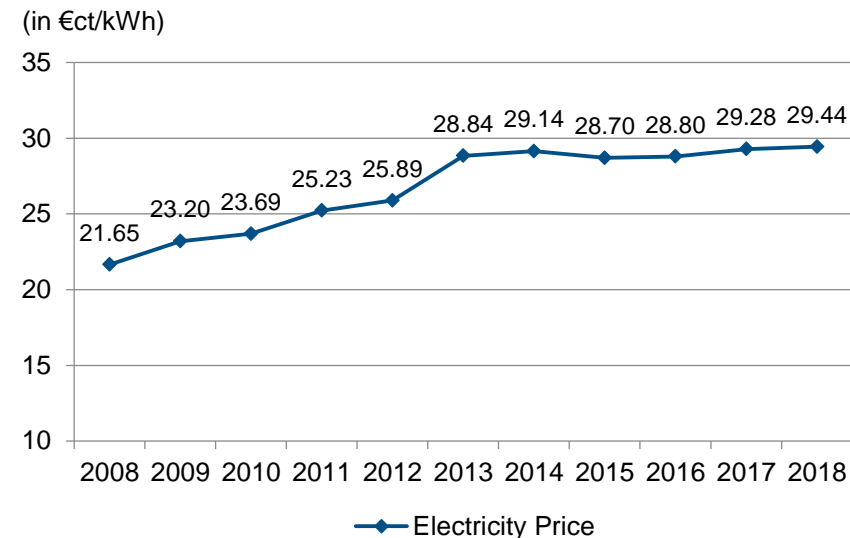


Breakdown of domestic electricity prices

Cost breakdown of electricity for households



Development of domestic electricity prices



Despite a significant wholesale price reduction household electricity prices increased due to higher levies and grid fees.

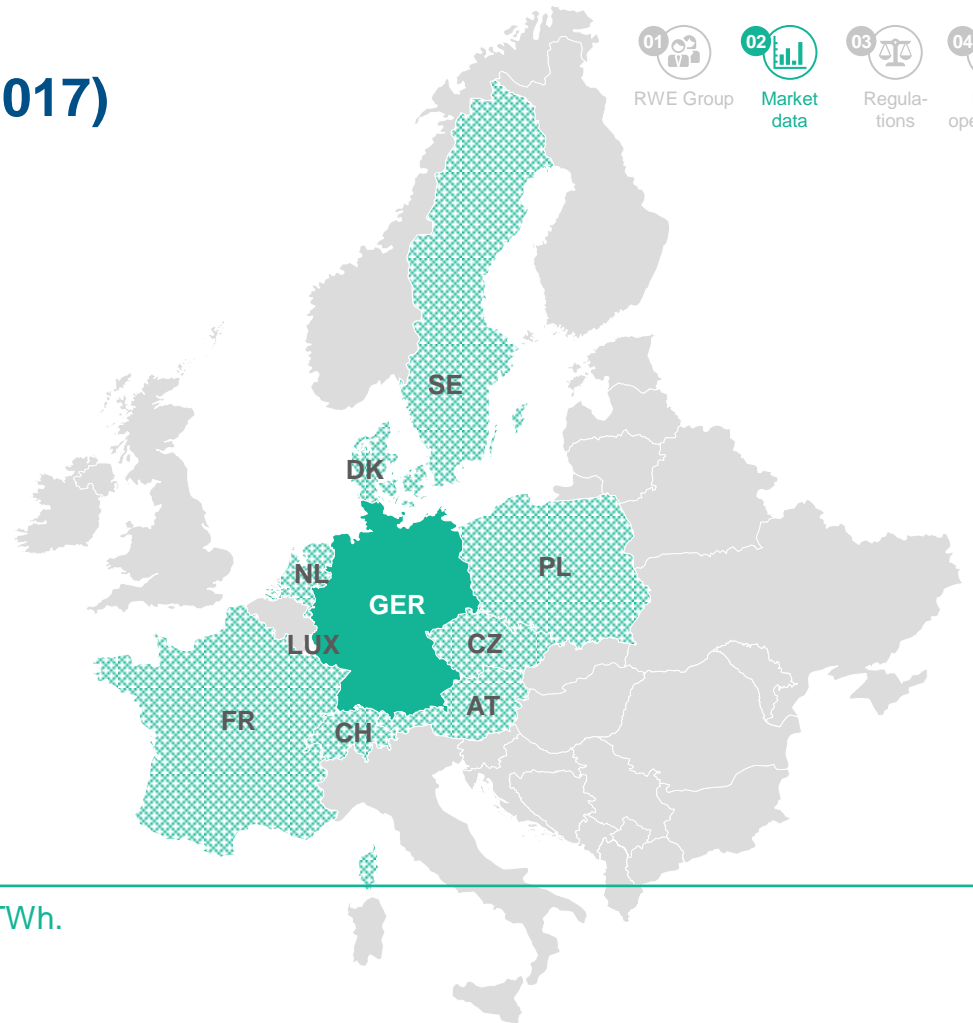
¹ Average electricity price in 2017 per household. | Source: stromauskunft.de; strom-report.de; BDEW.



Physical cross-border flows (2017)



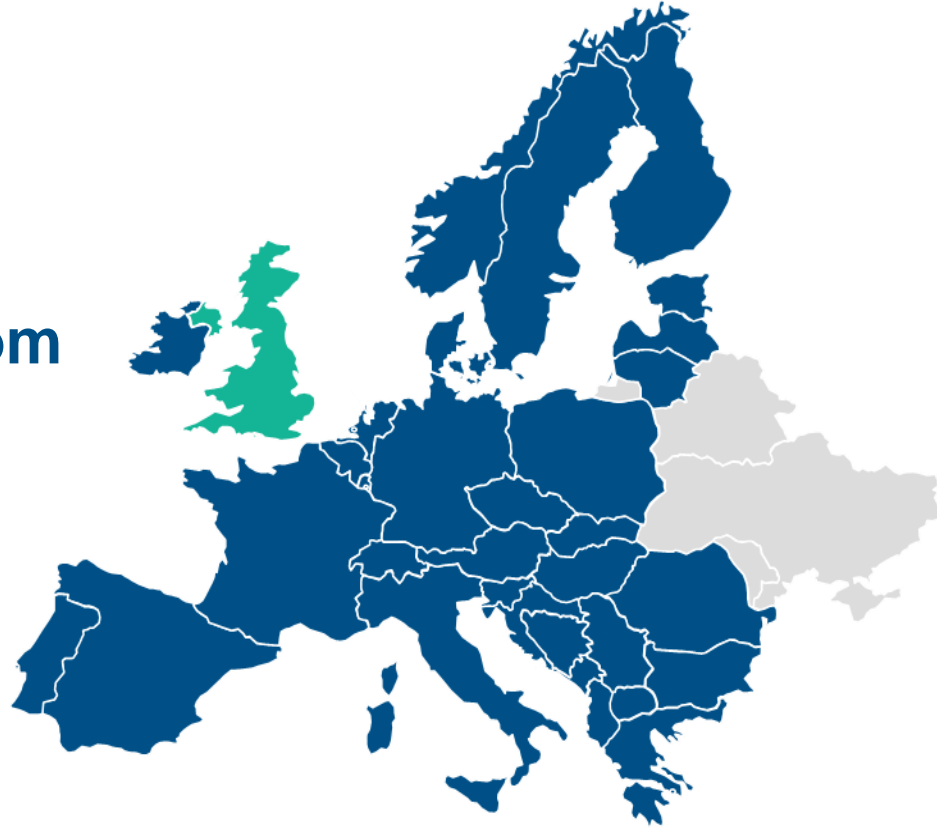
(in GWh)	Sum of imports	Sum of exports	Balance
AT	3,841.5	19,193.5	-15,352.0
CH	1,557.5	19,285.0	-17,727.5
CZ	5,551.0	9,044.0	-3,493.0
DK	5,273.0	4,101.0	1,172.0
FR	6,991.0	2,934.0	4,057.0
LUX	1,339.0	6,149.0	-4,810.0
NL	1,362.0	15,115.0	-13,753.0
PL	0	7,341.0	-7,341.0
SE	2,147.0	273	1,874.0
SUM	28,062.0	83,435.5	-55,373.5



In 2017, Germany had a net export balance of 55.4 TWh.



United Kingdom

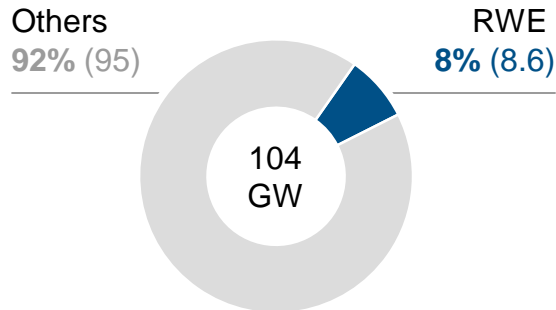




RWE's market share for 2017

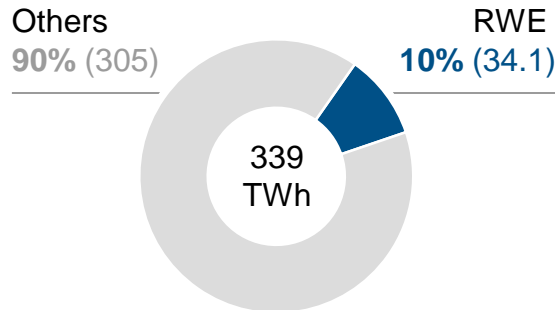
Total generation capacity

Market share in % (in GW)



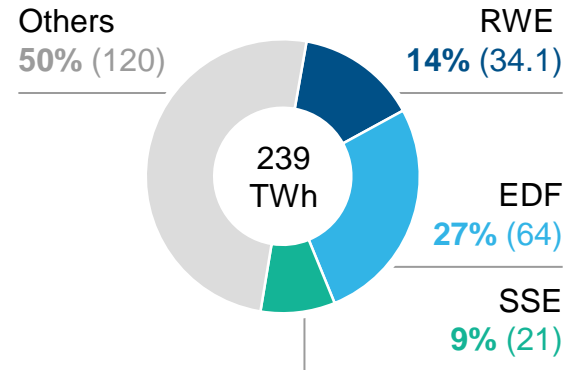
Total gross power generation

Market share in % (in TWh)



Conventional¹ power generation

Market share in % (in TWh)



RWE ranked second in UK power generation market.

Note: Market data as of 2017. RWE power 2018 and generation capacity as of 1 January 2019.

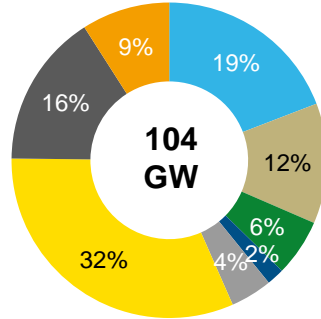
¹ Excluding renewables (hydro, biomass, wind, solar). | Source: Digest of UK Energy Statistics (Dukes) 5.6, 5.7 (gov.uk); Annual Reports (2017); RWE analysis.



Overview of power generation mix

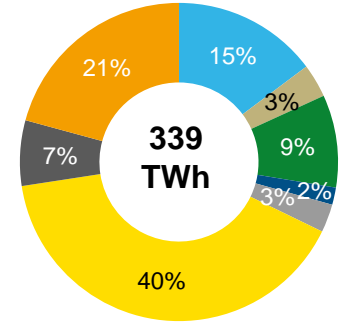
Net installed capacity 2017

	In GW
Nuclear	9.4
Hard coal	16.3
Gas	32.9
Other	4.4
Hydro	1.9
Biomass	6.0
Solar	12.8
Wind	19.8



Gross power generation 2017

	In TWh
Nuclear	70.3
Hard coal	22.5
Gas	136.7
Other	9.7
Hydro	5.9
Biomass	31.9
Solar	11.5
Wind	50.0

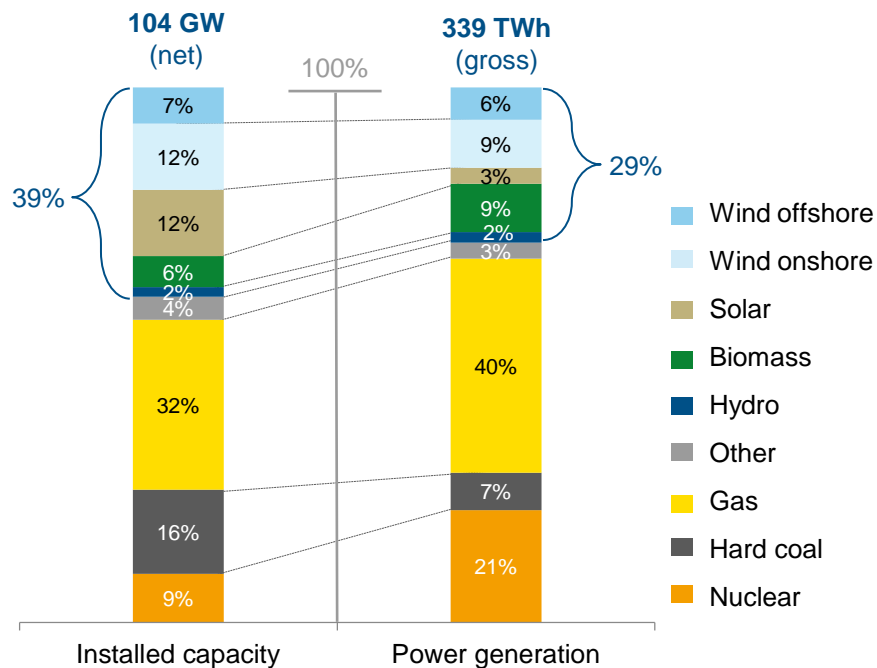


- 68% of UK generation is based on firm capacity (natural gas, hard coal and nuclear)
- UK government targets to phase out unabated coal fired electricity generation by October 2025

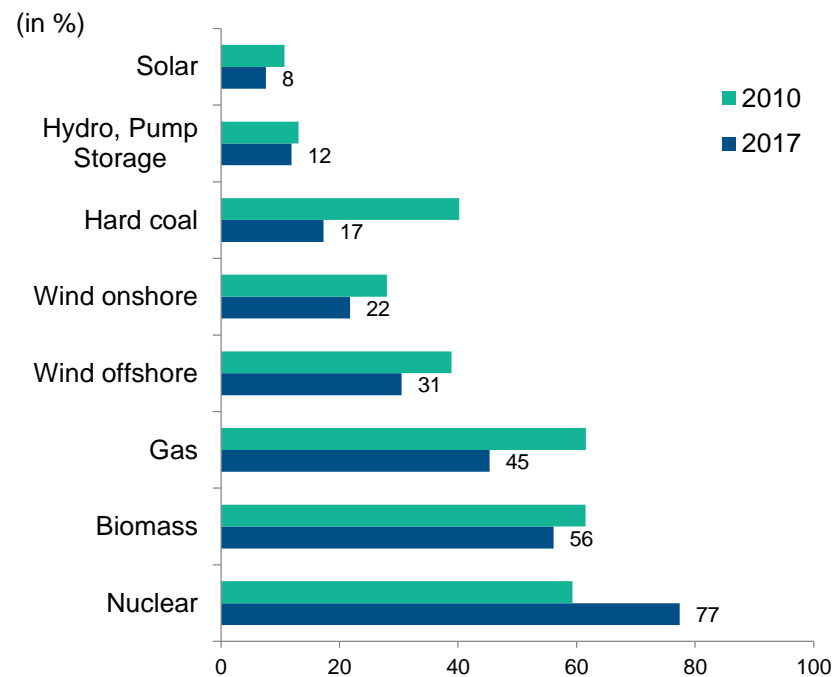


Load factors

Installed net capacity¹ and power generation 2017



Plant load factors²

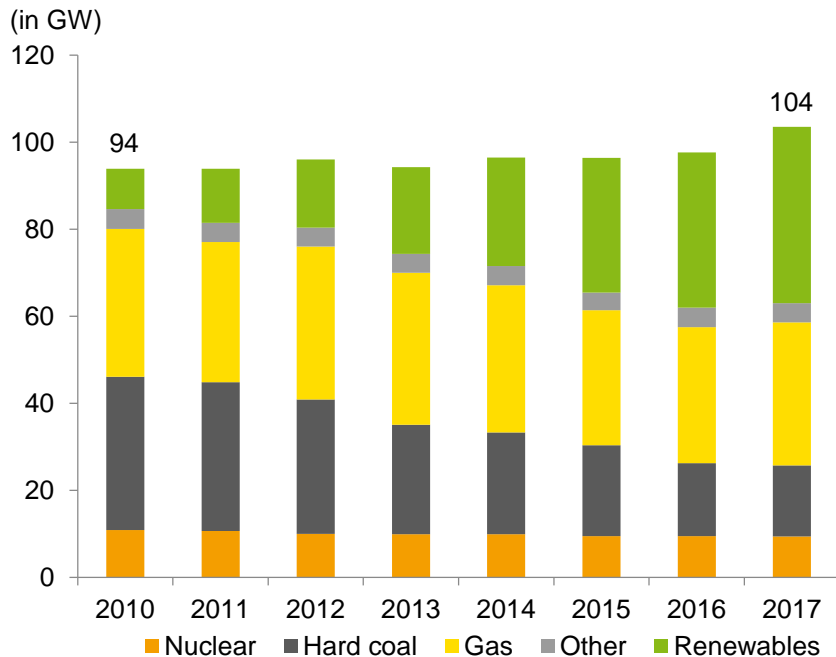


Source: Digest of UK Energy Statistics (Dukes) 5.7, 5.10, 6.4, 6.5 (gov.uk)
RWE AG | Factbook | March 2019

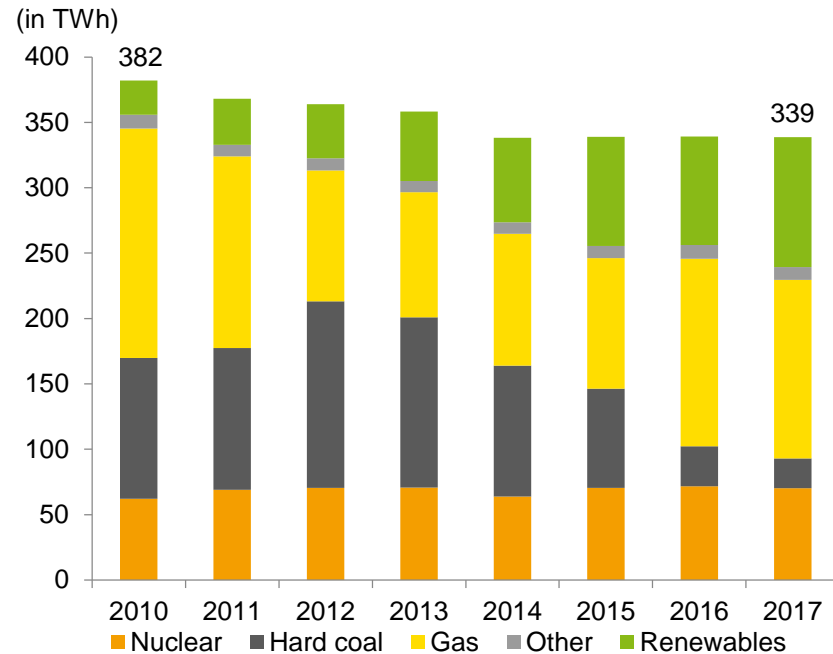


Development of power generation mix

Net installed capacity



Gross power generation

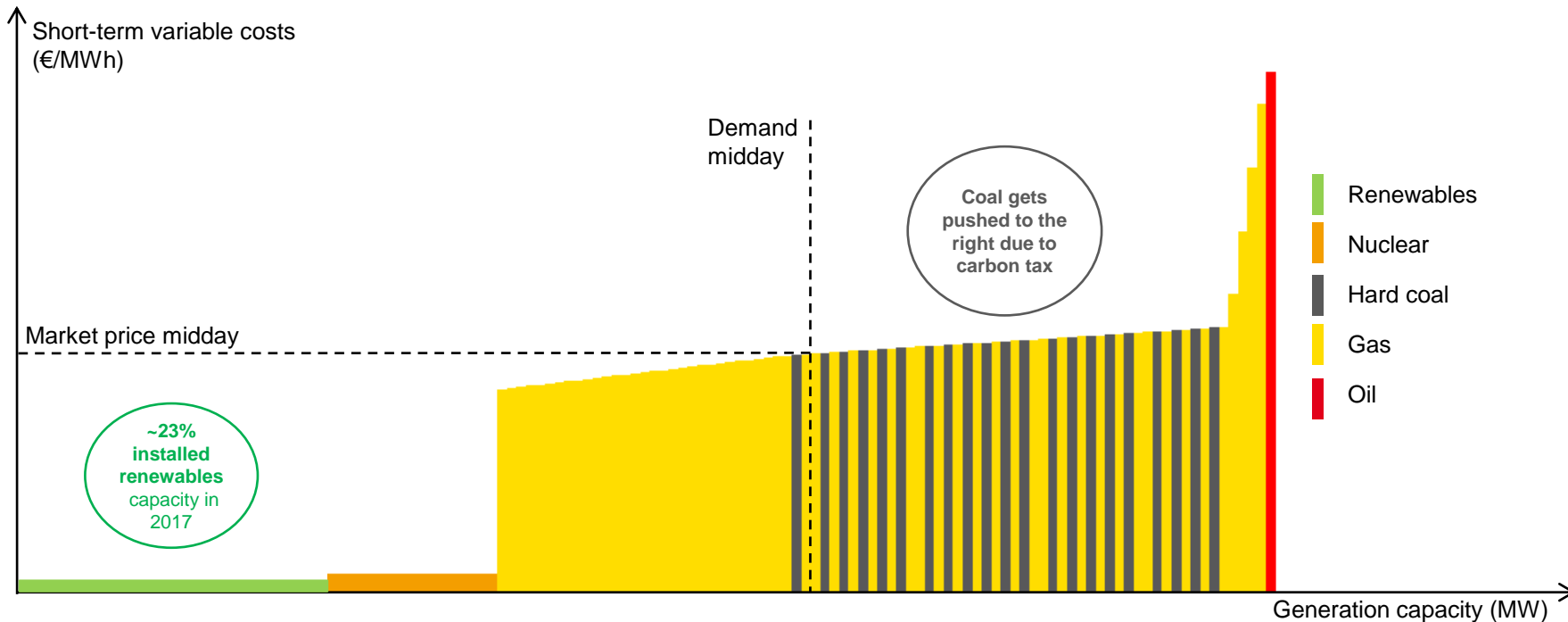


Source: Digest of UK Energy Statistics (Dukes) 5.6, 5.7, 6.4 (gov.uk)
 RWE AG | Factbook | March 2019



Merit order 2017

The electricity supply curve in the UK¹

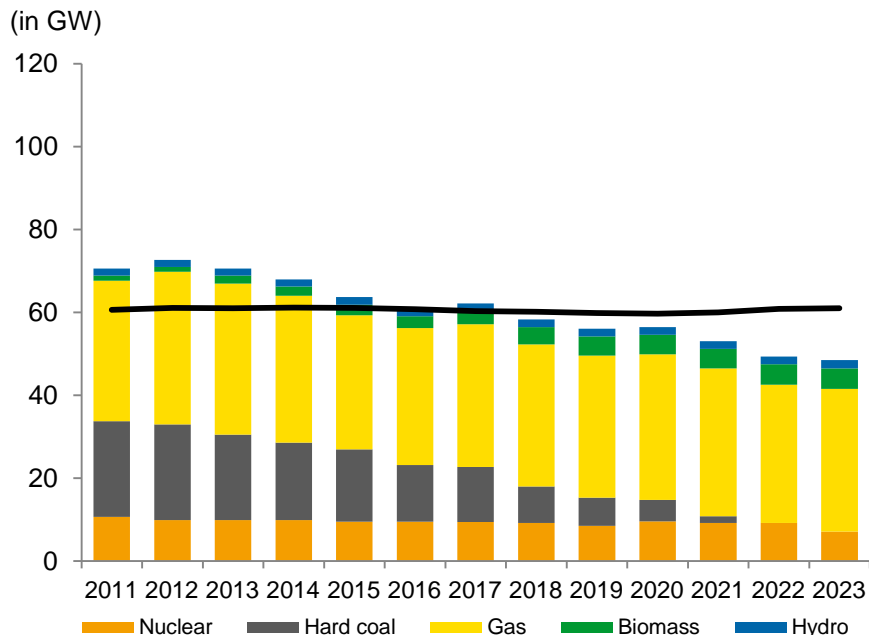


¹ Merit order is based on variable costs (mainly fuel and CO₂ costs) only. It does not include the fixed costs which have to be covered by power plant generating.

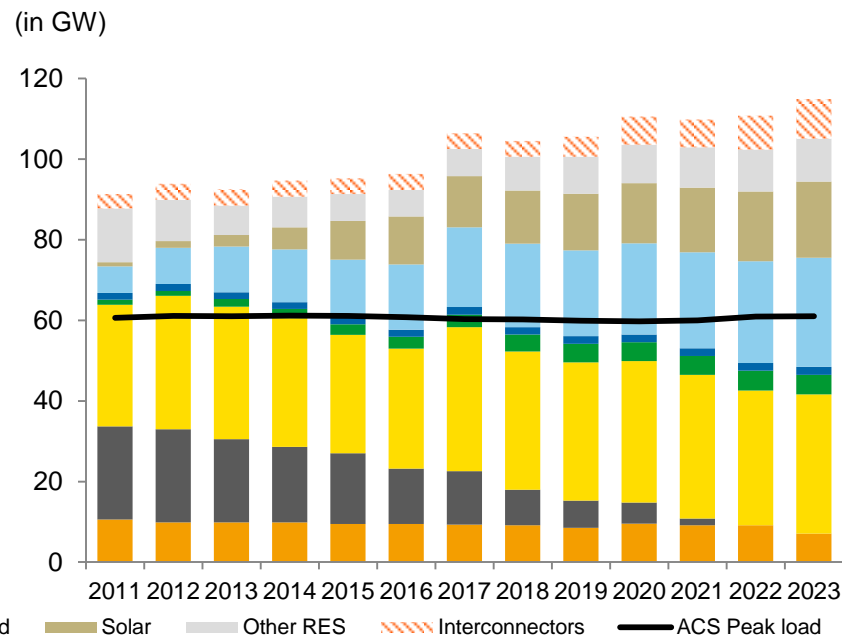


Expected tightening due to decline of secured capacity

Wholesale market capacity (gross) and peak demand¹



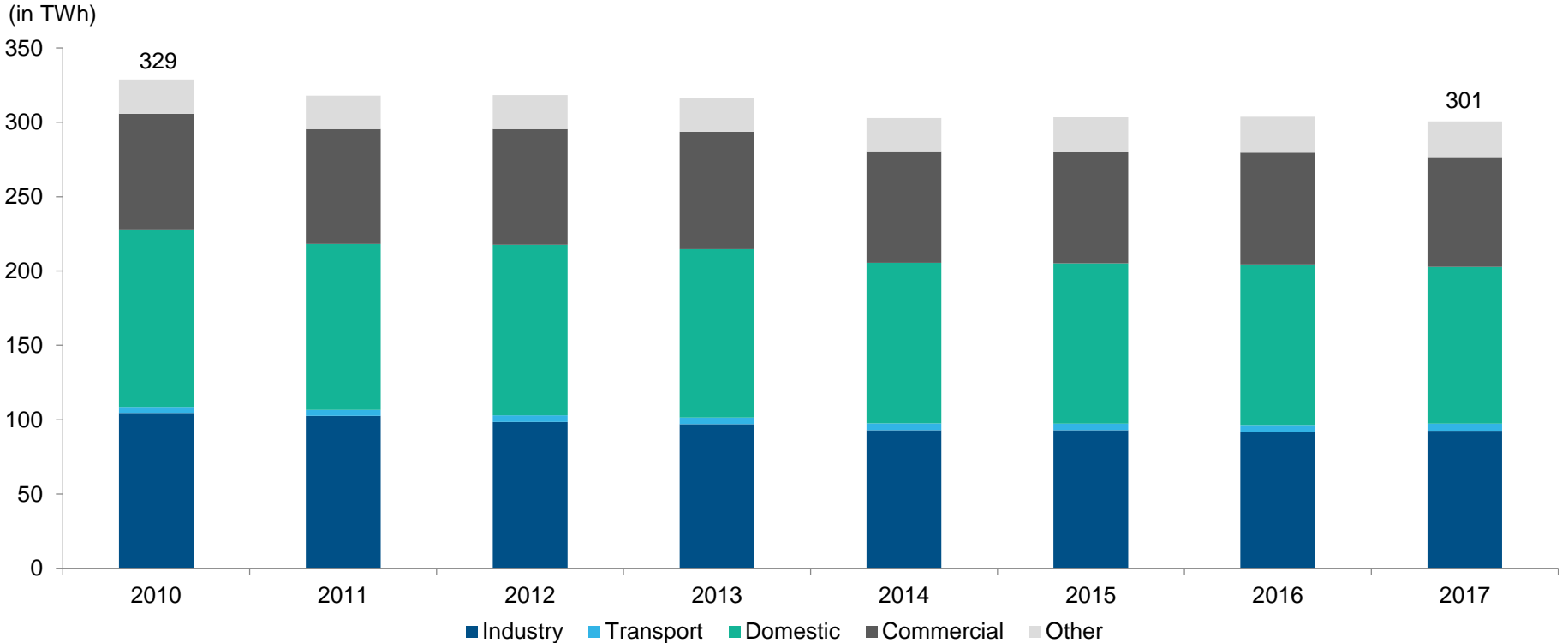
...with intermittent renewables & interconnectors



¹ Future capacities and average cold spell peak demand taken from National Grid's 'Community Renewables' Future Energy Scenario; capacities derated using Capacity Mechanism derating factors / Ofgem Wind Capacity Factor Historical Capacity Changes from DUKES 2017. 'Other renewables' includes PV derated to 0.



Electricity consumption by sector

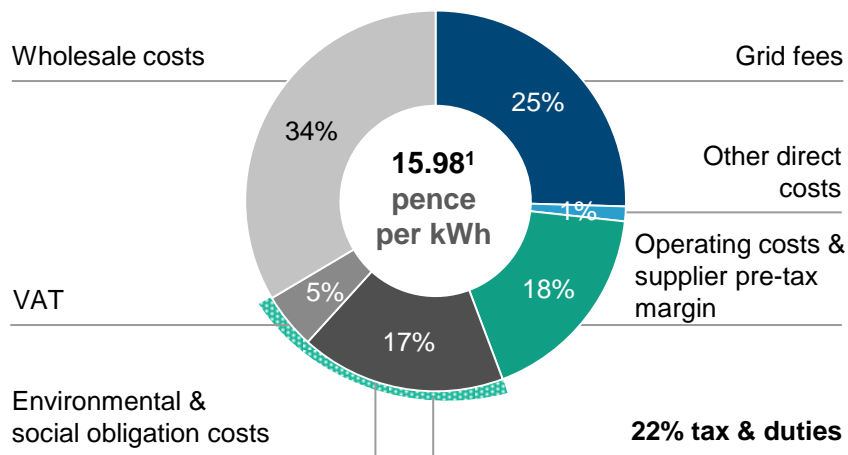


Source: Dukes 5.2 (gov.uk).
RWE AG | Factbook | March 2019

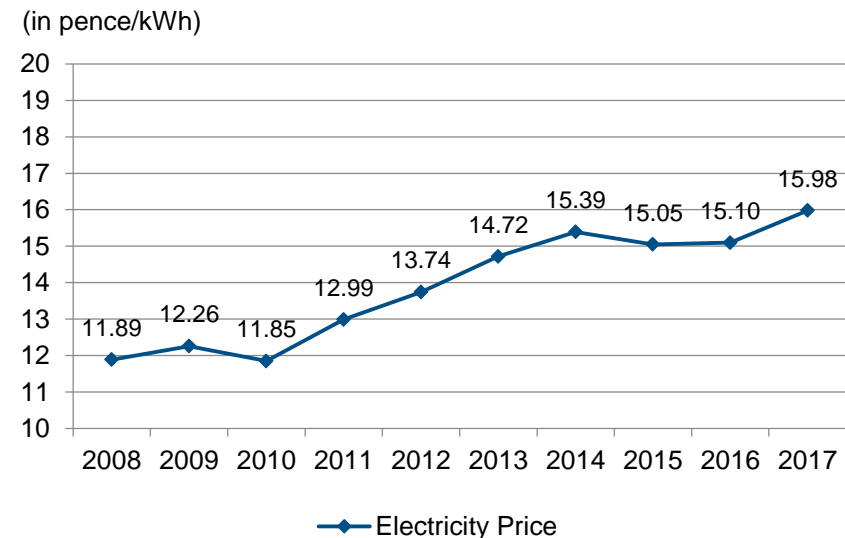


Breakdown of domestic electricity prices

Cost breakdown of electricity for households



Development of domestic electricity prices



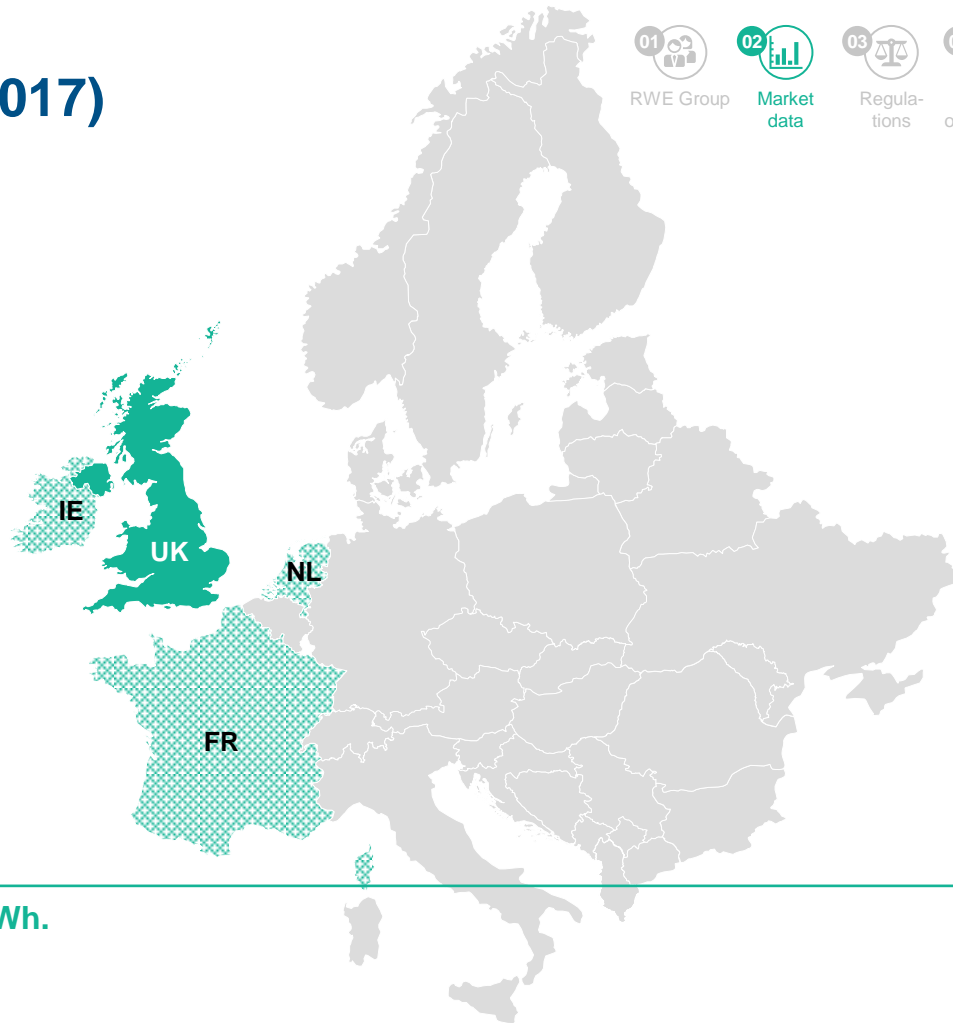
Household electricity prices more than doubled over the last 15 years but have **not** moved significantly since 2014. In winter 2018/2019, price caps for standard variable energy tariffs were introduced.

¹ Based on consumption of 3,800 kWh/year including tax. | Source: gov.uk; ofgem.gov.uk.
RWE AG | Factbook | March 2019



Physical cross-border flows (2017)

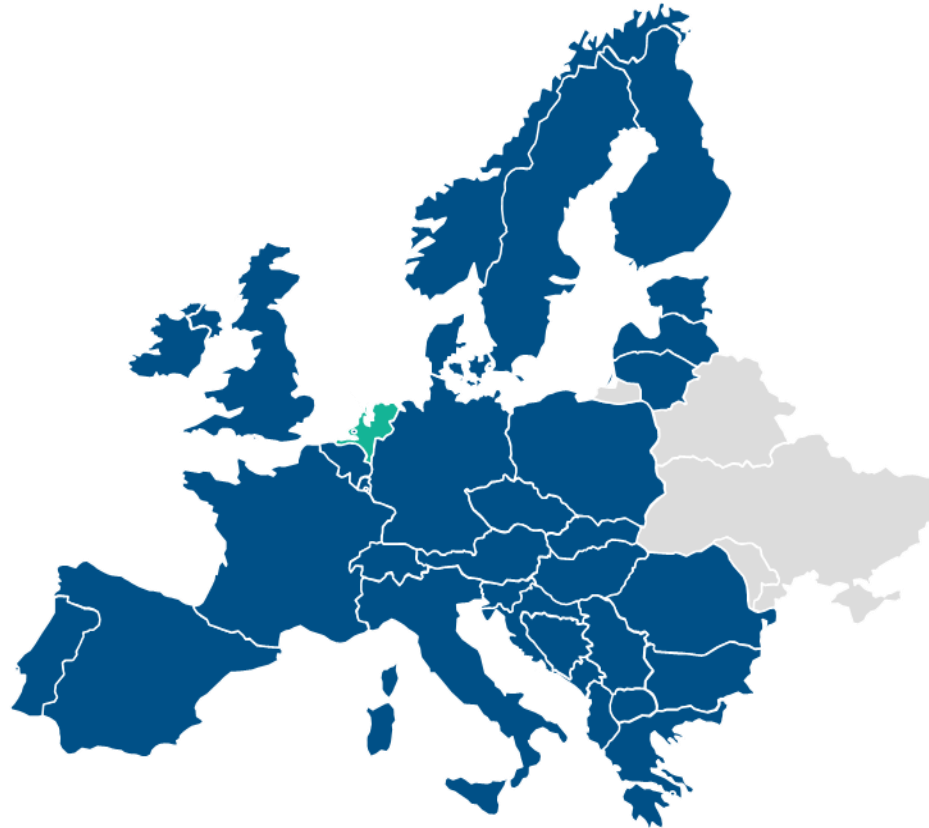
(in GWh)	Sum of imports	Sum of exports	Balance
FR	11,119	2,207	8,912
IE	1,787	1,107	680
NL	7,009	194	6,815
SUM	19,915	3,508	16,407



» In 2017, United Kingdom had net imports of 16.4 TWh.



Netherlands

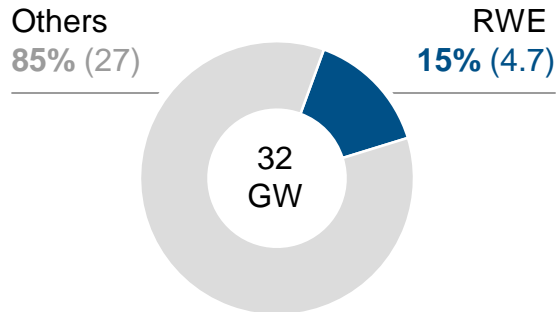




RWE's market share for 2017

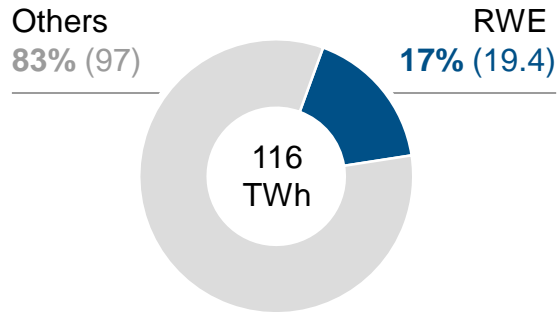
Total generation capacity

Market share in % (in GW)



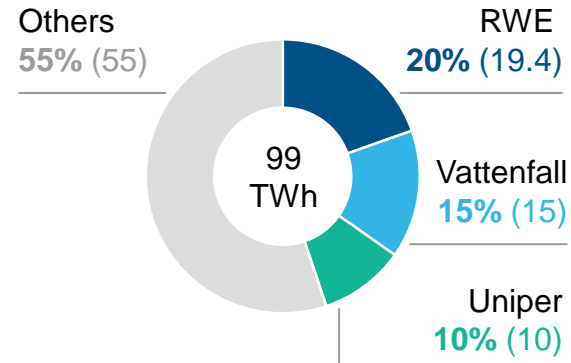
Total gross power generation

Market share in % (in TWh)



Conventional¹ power generation

Market share in % (in TWh)



RWE has leading position in the Dutch power generation market.

Note: Market data as of 2017. RWE power generation 2018 and generation capacity as of 1 January 2019.

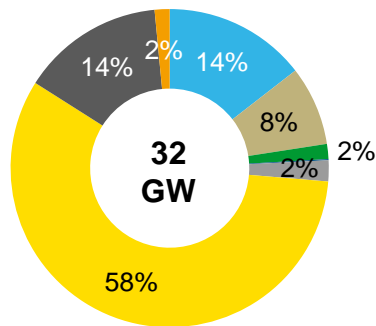
¹ Excluding renewables (hydro, biomass, wind, solar). | Source: BDEW; Annual Reports (2017); RWE analysis.



Overview of power generation mix

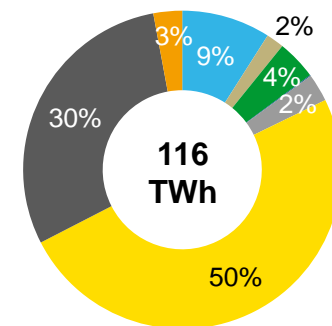
Net installed capacity 2017

	In GW
Nuclear	0.5
Hard coal	4.6
Gas	18.4
Other	0.7
Hydro	0.04
Biomass & other	0.5
Solar	2.6
Wind	4.6



Gross power generation 2017

	In TWh
Nuclear	3.4
Hard coal	34.5
Gas	57.8
Other	3.3
Hydro	0.1
Biomass & other	4.7
Solar	2.1
Wind	10.5

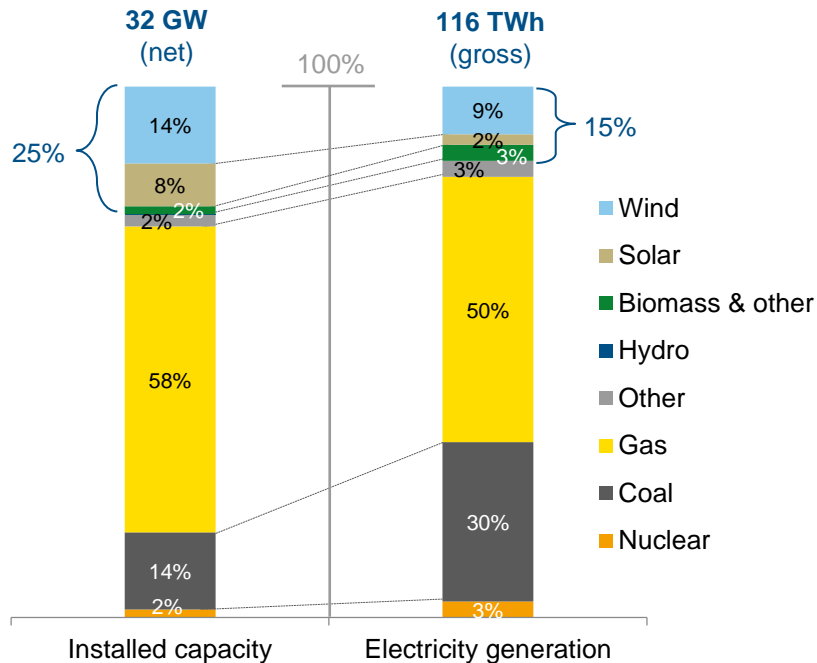


- 80% of Dutch generation is based on gas and hard coal
- Netherlands is planning to end electricity generation from coal by 2030

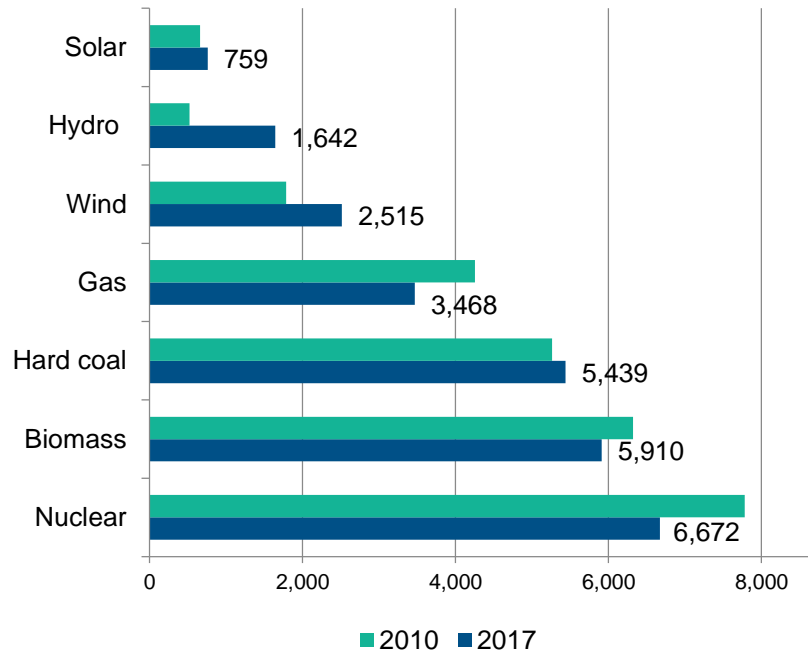


Load factors

Installed capacity and power generation 2017



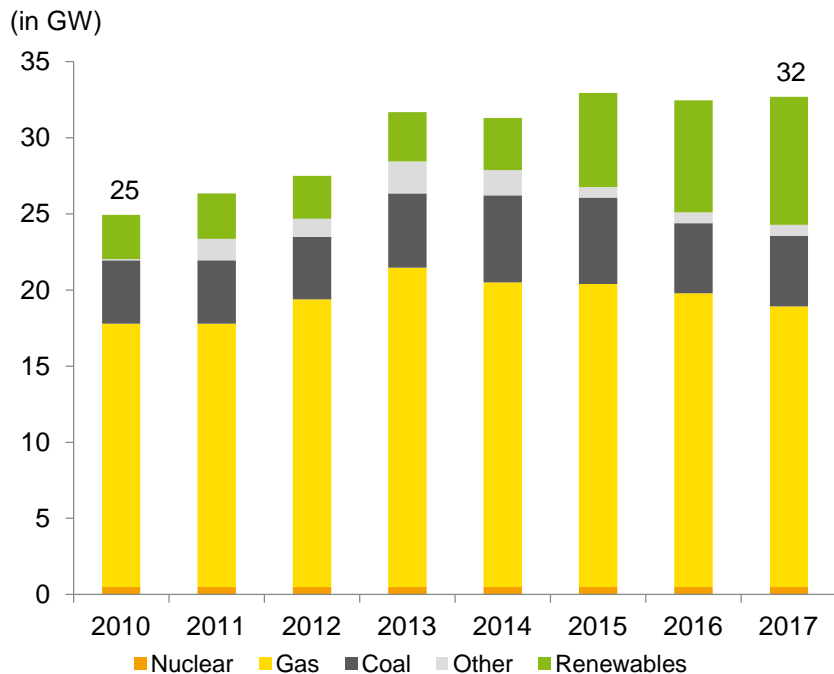
Annual full-load hours





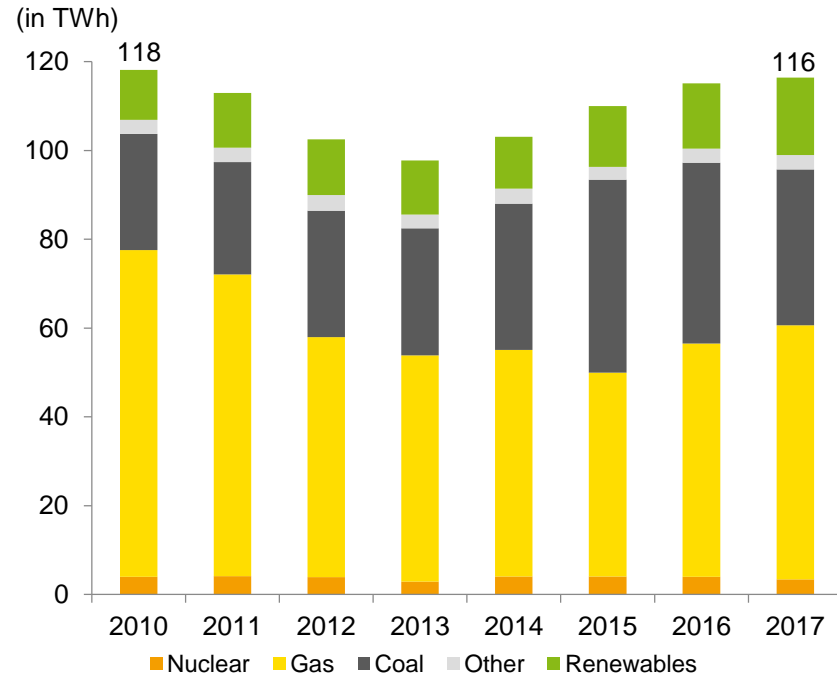
Development of power generation mix

Net installed capacity



Source: entso-e; CBS.
RWE AG | Factbook | March 2019

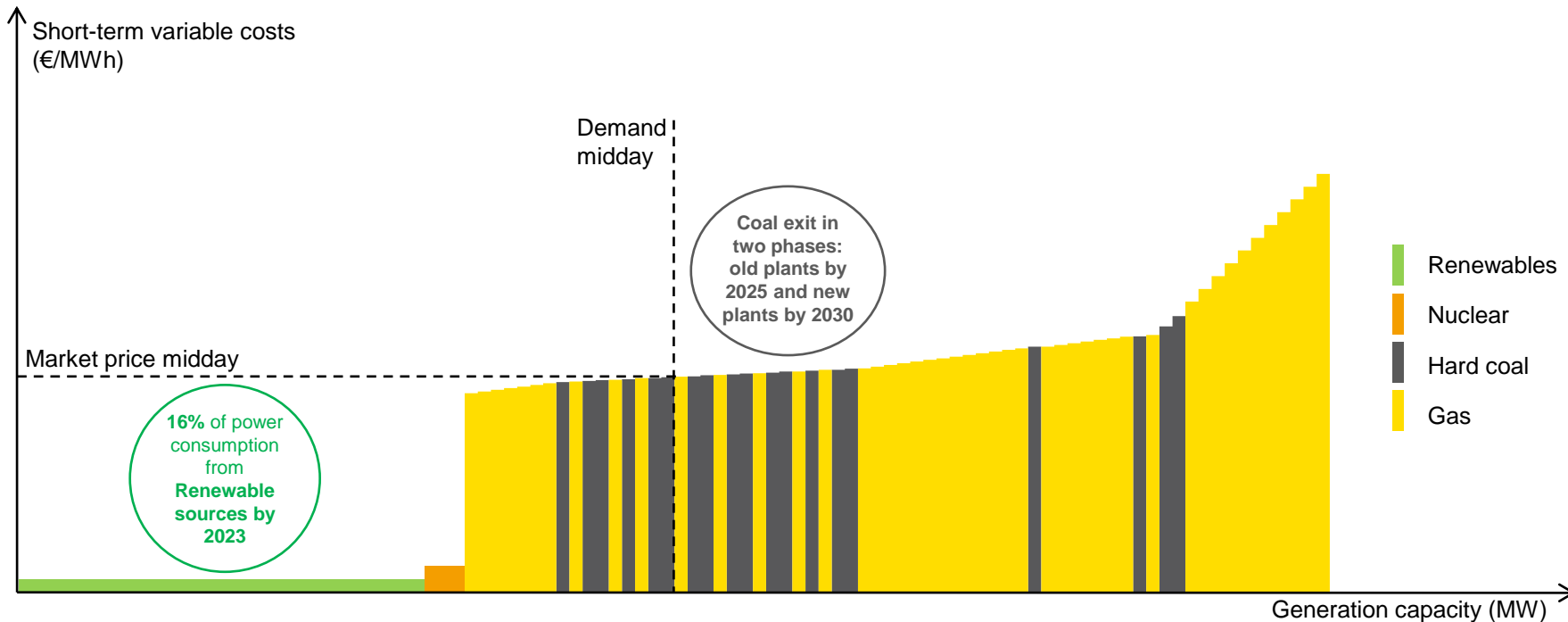
Gross power generation





Merit order 2017

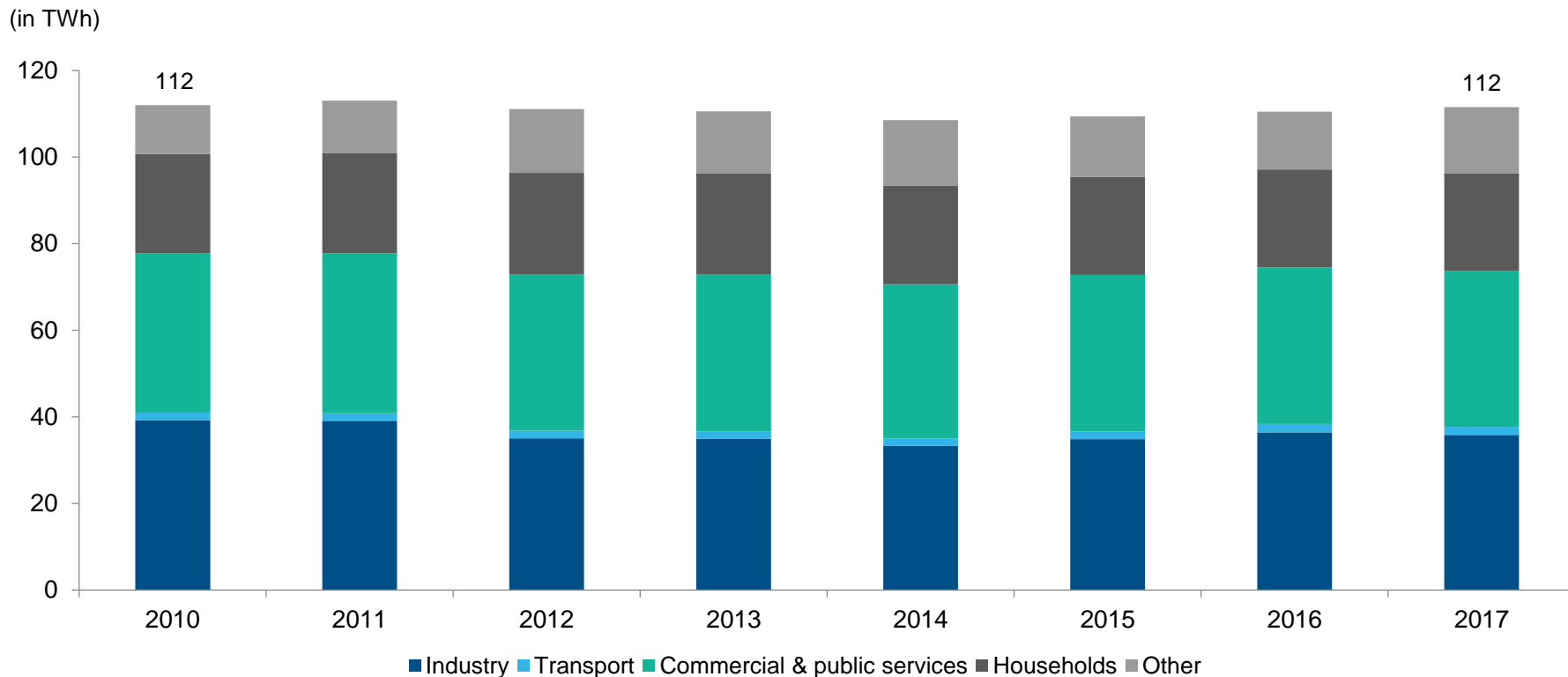
The electricity supply curve in the Netherlands¹



¹ Merit order is based on variable costs (mainly fuel and CO₂ costs) only. It does not include the fixed costs which have to be covered by power plant margins.



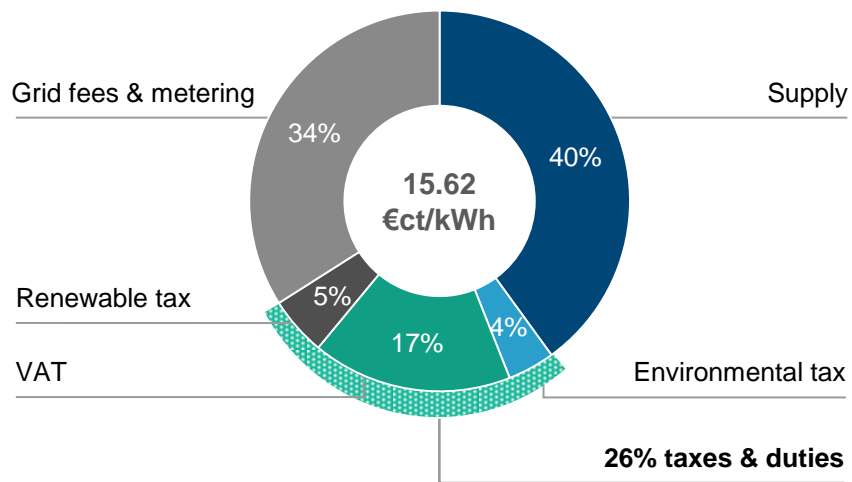
Electricity consumption by sector



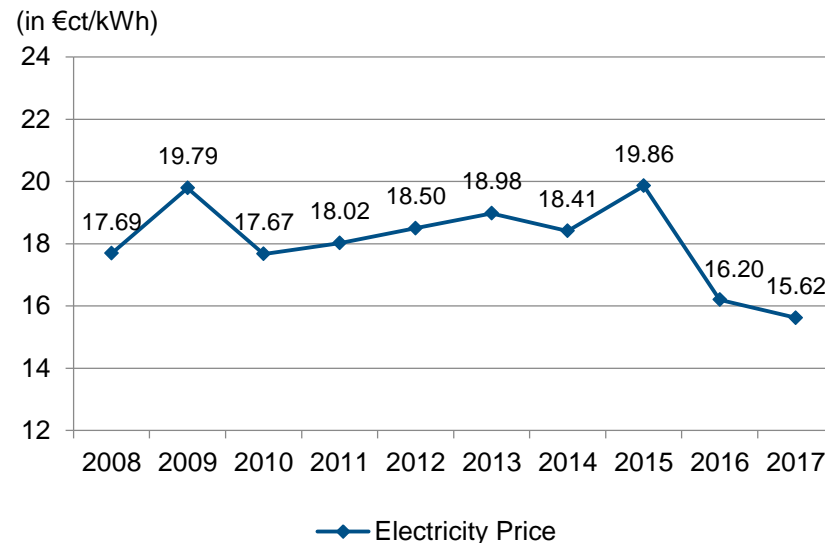


Breakdown of domestic electricity prices

Cost breakdown of electricity for households¹



Development of domestic electricity prices

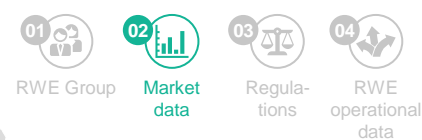


Over the last 9 years the electricity price **decreased** by 12%.

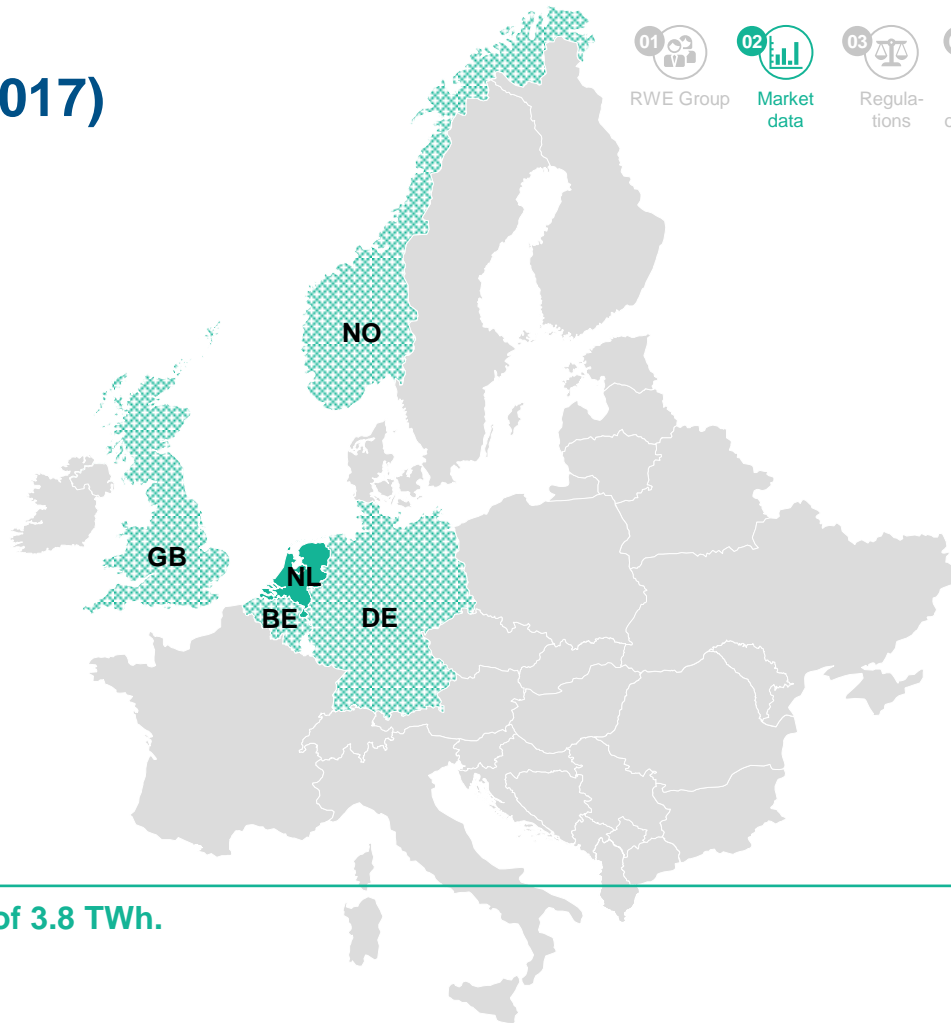
¹ From a consumption of 2,500-5,000 kWh on average price level. | Source: eurostat.



Physical cross-border flows (2017)



(in GWh)	Sum of imports	Sum of exports	Balance
BE	2,170	10,251	-8,081
DE	15,115	1,362	13,753
GB	194	7,009	-6,815
NO	5,067.5	110	4,957.5
SUM	22,546.5	18,732	3,784.5







» In 2017, the Netherlands had a net import balance of 3.8 TWh.



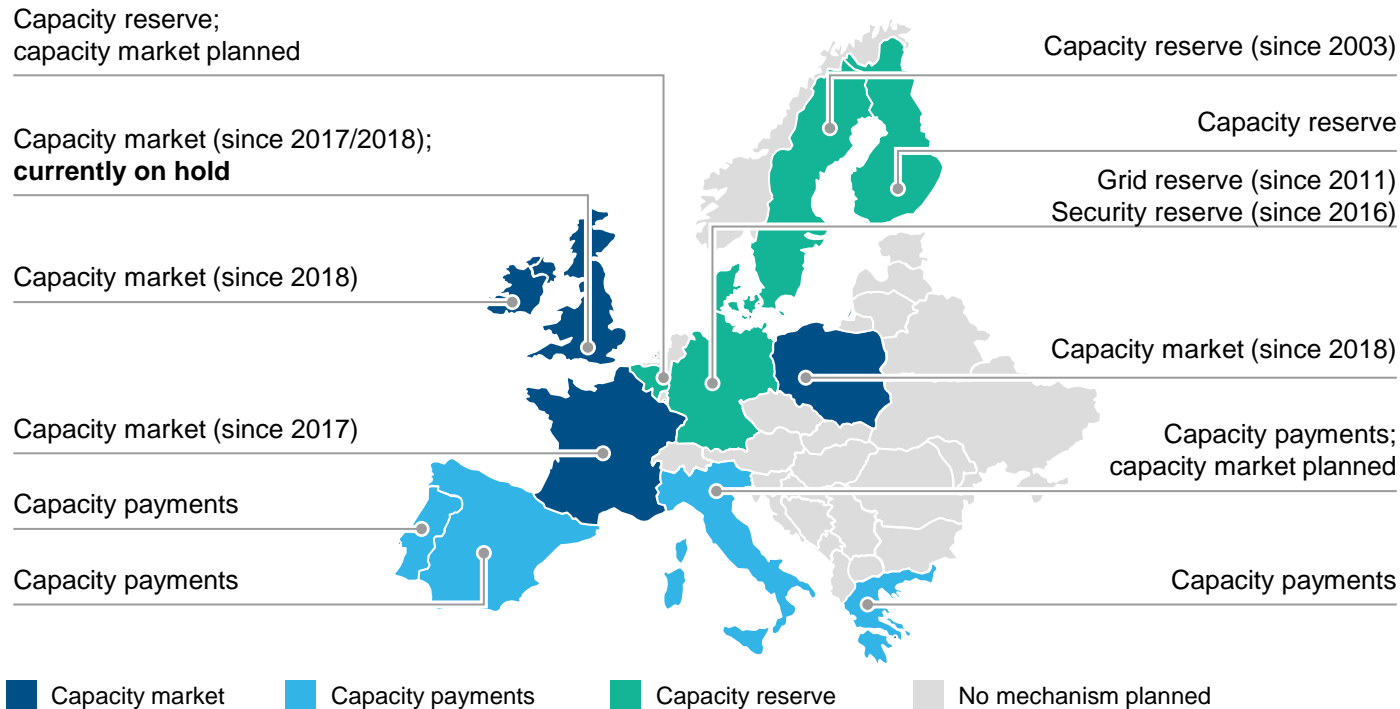
Regulations

Major regulatory measures for the European utility markets

	Market design	Energy efficiency	CO ₂ reduction	Conventional generation
	Revised Electricity Market Regulation; approval by EU Parliament and Council expected for H1 2019	Revised Energy Efficiency Directive 2018	<ul style="list-style-type: none"> EU Emissions Trading Scheme EU long term (2050) GHG emissions reduction strategy; currently in development 	Regulation on emissions of air pollutants: <ul style="list-style-type: none"> IED BREF-LCP National Emissions Ceiling Directive
	<ul style="list-style-type: none"> Revised grid fee system Acceleration of grid expansion & new provisions for redispatch Prolongation of CHP support Renewable Energy Act (REA) 	National Energy Efficiency Action Plan	<ul style="list-style-type: none"> Climate Action plan 2050 Climate act 2019 	<ul style="list-style-type: none"> Climate Action Plan 2050: proposals for coal phase-out BREF-LCP; currently in implementation National Emissions Ceilings Directive implementation Nuclear exit & final storage regulation
	Energy Market Reform (EMR); currently under 5 year review Capacity market currently suspended	Smart Meter roll out	Carbon Price Support (Tax)	<ul style="list-style-type: none"> BREF LCP implementation Gas charging review Coal phase out (by 2025)
	Preparations for revision of energy law	Climate Agreement	Introduction of national CO ₂ price floor	Coal phase out: end of 2024 for plants built in the 1990s and end of 2029 for plants built in 2000 and thereafter
		Execution of National Energy Agreement (current) / Climate Agreement (as of 2020)		



Capacity mechanisms in Europe



Different approaches and implementation at national level



European climate action

Key EU targets for 2020

- 20% cut in **greenhouse gas emissions** compared with 1990
- 20% of total energy from **renewables**
- 20% increase in **energy efficiency**

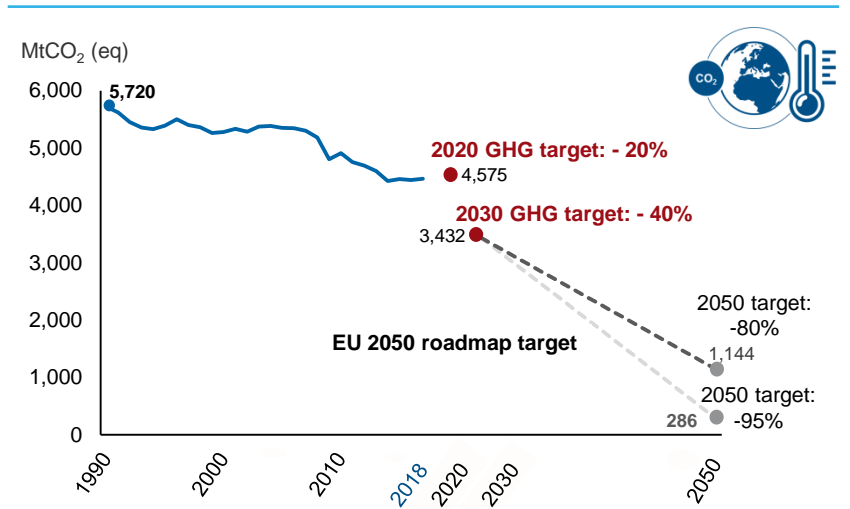
Key EU targets for 2030

- At least 40% cut in **greenhouse gas emissions** compared with 1990
- At least 27% of total energy from **renewables**
- At least 27% increase in **energy efficiency**

Long-term goal

- In 2011, the EU Commission introduced a roadmap for a competitive low-carbon Europe by 2050 with a GHG reduction target of 80% to 95%
- In November 2018, the Commission presented an updated long-term vision in line with the Paris Agreement objective to keep the global temperature increase to well below 2°C and pursue efforts to keep it to 1.5°C.
- The EU Council will decide on which long-term goal will potentially be chosen by mid 2019 before the UN Global Climate Summit on 23 September 2019

EU greenhouse gas emissions targets



Key target is the prevention of dangerous climate change: “Global warming has to be limited to below 2°C compared to the average temperature in pre-industrial times to prevent the most severe impacts of climate change and possibly catastrophic changes in the global environment.”



EU Emissions Trading System



Overview

- Established by the Emission Trading Directive
- Entered into force on 1 January 2005, in the context of international mitigation commitments by the EU under the Kyoto Protocol
- Operates in 31 countries (all 28 EU countries plus Iceland, Liechtenstein and Norway)
- Limits emissions from more than 11,000 energy-intensive installations (power stations & industrial plants) and airlines operating between these countries
- Covers around 45% of the EU's greenhouse gas emissions
- Extends over following gases: carbon dioxide (CO₂), nitrogen oxide (NO_x) & perfluorocarbons (PFC)

Functioning

- 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 cap is reduced over time so that total emissions fall
- Within the cap, companies receive or buy emission allowances which they can trade with one another as needed
- After each year a company must surrender enough allowances to cover all its emissions
- Emissions not covered by an allowance incur a fine of €100 per tonne
- If a company reduces its emissions, it can keep the spare allowances to cover its future needs (banking) or else sell them to another company that is short of allowances

» The EU Emissions Trading Scheme (EU-ETS) is the key tool for reducing greenhouse gas emissions from industry within the European Union.



EU Emissions Trading System

2005 – 2012

2013 – 2020

2021 – 2030

Emissions reduction target of 43%

Phase 1: 2005-07

- Established as pilot to prepare for phase 2
- Allocation of allowances exceeded overall actual emissions
- No banking of excess allowances into phase 2

Phase 2: 2008-2012

- Coincided with first commitment period of Kyoto Protocol
- Individual national allocation plans to meet specific reduction targets

Phase 3 (changes compared to Phase 1&2)

- Emissions reduction target: 21% by 2020 compared to 2005
- Single EU cap applies instead of the previous system of national ceilings; linear reduction factor of 1.74% per annum
- Auctioning as standard method for issuing emission allowances (in power sector), and harmonised allocation rules for allowances that continue to be issued free of charge
- More industries and gases are included
- Promotion of innovative renewable energy technologies, carbon capture and storage under the NER 300 programme, 300 Mt allowances have been auctioned to receive the funds with which projects were supported
- Revision of legal framework in 2018 to strengthen Market Stability Reserve (MSR) to reduce total number of allowances in circulation (refer to following pages for details)

Phase 4 (main points of revision)

- Emissions reduction target: 43% by 2030 compared to 2005
- Increase of annual reduction of emission allowances to 2.2% per annum from 2021
- Strengthening of Market Stability Reserve (MSR) to reduce total number of allowances in circulation
- Free allocation of allowances to ensure international competitiveness of industries affected by the risk of carbon leakage is to be pursued while ensuring that rules governing the determination of free allocation are focused on technological progress



EU Emissions Trading System

Market Stability Reserve (MSR)



Introduction

- In 2015, the Council and the European Parliament took the decision to establish a Market Stability Reserve (MSR) under the EU Emissions Trading System
- The MSR will operate as of 2019
- Purpose of the MSR is to avoid the EU carbon market operating with a large structural surplus of allowances, with the associated risk that this prevents the EU ETS from delivering the necessary investment signal to deliver on the EU's emission reduction target in a cost-efficient manner
- The decision states that, by 15 May each year and starting in 2017, the Commission shall publish the Total Number of Allowances in Circulation (TNAC). This figure determines whether allowances intended to be auctioned in the subsequent year should be placed into the reserve

Functioning

- Operational since January 2019
- Functions automatically when total number of allowances in circulation is outside of a predefined range
- Allowances are added to the reserve, if the total number of allowances in circulation exceeds the threshold of 833 million allowances, by 24%¹ of the TNAC (applicable 2019-2023²)
- Allowances are released from the reserve, if the total number of allowances in circulation is lower than 400 million allowances
- Allowances are added to the reserve by auctioning less, and released from the reserve by auctioning 100 million more allowances in future
- From 2023, allowances held in the MSR above the previous year's auction volume will be cancelled

Publication of the total number of allowances in circulation, on the basis of which allowances will be added to or released from the reserve, is a key element for the operation of the reserve.

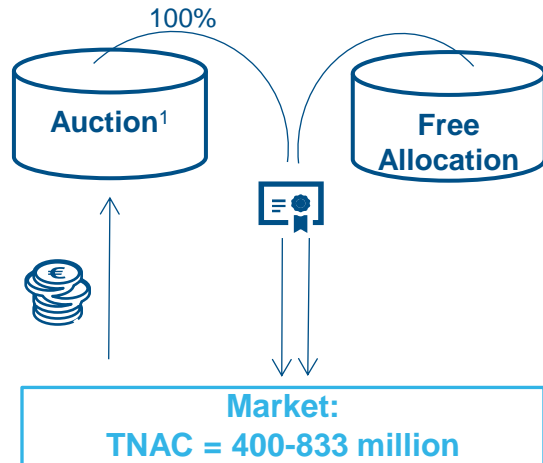
¹ For January to August 2019 only 16% of TNAC will be placed into MSR. | ² Will change to 12% after 2023 except future revision decides otherwise.
Source: ec.europa.eu/clima/policies/ets_en.



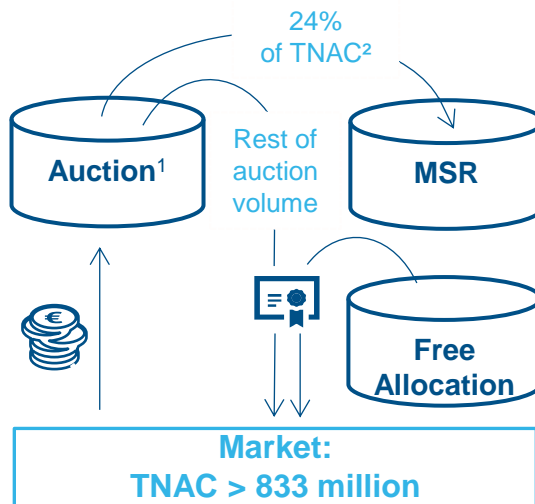
EU Emissions Trading System

Functioning of Market Stability Reserve (MSR)

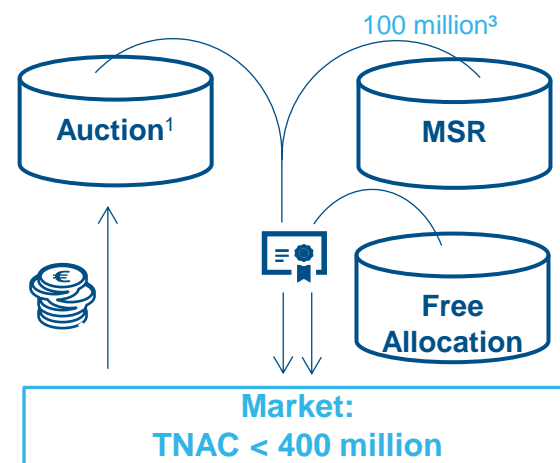
No action needed



Addition to reserve



Release from reserve



¹ 57% of total number of allowances to be auctioned (2013-2020); volumes will be reduced accordingly by 264 million allowances beginning Jan 2019.

² 16% Jan-Aug 2019 / 24% Aug 2019-Dec 2023. | ³ To be added on future auction. | Source: ec.europa.eu/clima/policies/ets_en.



EU Emissions Trading System

Total number of allowances in circulation (TNAC)

There are three different elements that determine the total number of allowances in circulation (TNAC):

1. Supply of allowances since 1 January 2008
2. Verified emissions and cancelled allowances (demand)
3. Holdings of the MSR

$$\text{TNAC} = \text{Supply} - (\text{Demand} + \text{allowances in MSR})$$

Supply ¹		Demand ¹		MSR holdings ¹	
Banking from Phase 2	1,749,540,826	Tonnes of verified emissions from installations under the EU ETS between 1 January 2013 and 31 December 2017	8,942,239,207		
Total number of allowances allocated for free	4,402,755,035				
Total number of allowances auctioned ²	3,725,458,000				
Allowances monetised by the European Investment Bank (NER300)	300,000,000	Allowances cancelled in accordance with Article 12(4) of Directive 2003/87/EC by 31 December 2017	278,524		
International credit entitlements exercised by installations in respect of emissions	419,338,468				
Sum (supply)	10,597,092,329	Sum (demand)	8,942,517,731	Number of allowances	0

Total number of allowances in circulation = 1,654,574,598

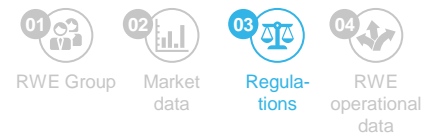
¹ As of 31 December 2017. | ² In line with the agreed MSR rules, the auction volumes will be reduced accordingly by 264 million allowances beginning in January 2019.

Source: ec.europa.eu/clima/policies/ets_en.



German Climate Action Plan 2050

Principles and objectives of German government's climate policy



Key elements

- Long-term target: based on the guiding principle of extensive greenhouse gas neutrality in Germany in the second half of the century
- Guiding principles and transformative pathways as a basis for all areas of action by 2050
- Milestones and targets as a framework for all sectors
- Strategic measures for every area of action
- Establishment of a learning process which enables the progressive raising of ambition envisaged in the Paris Agreement
- Legal implementation in 2019 planned

Sector (in million tonnes of CO ₂ equivalent)	1990	2014	2030	2030 ¹
Energy	466	358	175-183	62-61 %
Buildings	209	119	70-72	67-66 %
Transport	163	160	95-98	42-40 %
Industry	283	181	140-143	51-49 %
Agriculture	88	72	58-61	34-31 %
Subtotal	1,209	890	538-557	56-54 %
Other	39	12	5	87 %
Total	1,248	902	543-532	56-55 %

» The Climate Action Plan sets targets for all sectors to achieve Germany's domestic climate targets in line with the Paris Agreement.

¹ Reduction in % compared to 1990. | Source: Climate Action Plan 2050 (BMU).



German Climate Action Plan 2050

Growth, Structural Change and Employment Commission



- Growth, Structural Change and Employment Commission introduced in mid 2018 to develop a proposal for an action programme for climate protection and economic development in the affected regions of coal generation
- The Commission was based within the Federal Ministry for Economic Affairs and Energy and worked together with other government ministries as well as with the regions, municipalities, commerce, branches of industry, regional stakeholders and NGOs
- Representatives from parliament, business, science, trade unions, NGOs and the affected regions
- Deliverables of the Commission:
 - Structural Change: develop a proposal for a mix of instruments targeting economic development, structural change, social compatibility and climate action. This includes the investments required in sectors and regions affected by the structural change and the financing of these investments
 - National Emissions Target 2020: develop a proposal for measures to help reduce the gap between emissions target and actual emissions
 - National Emissions Target 2030: develop a proposal for measures to ensure the achievement of the 2030 emissions target
 - Coal Exit: develop a proposal for a timetable for an end to coal-fired generation

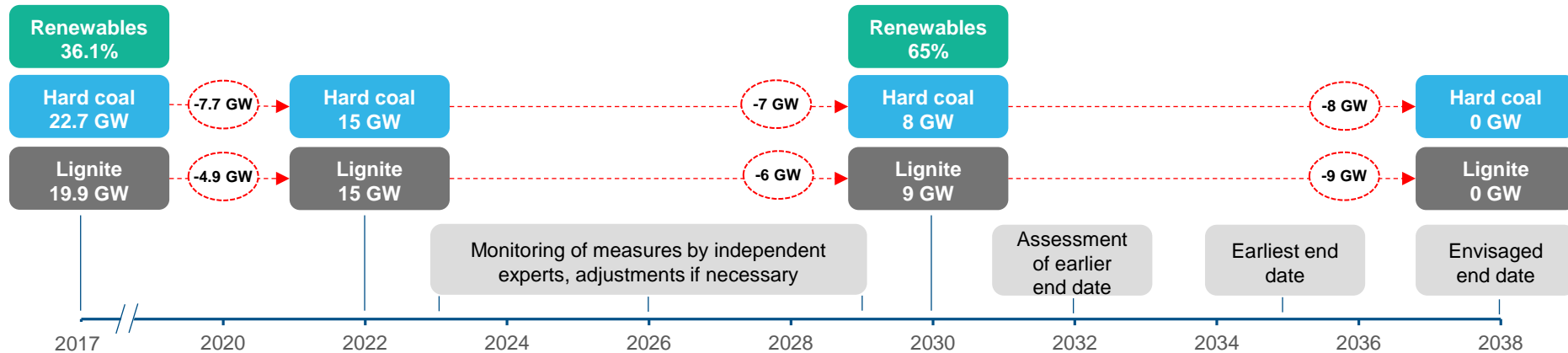
¹ https://ec.europa.eu/clima/citizens/eu_en. | Source: Climate Action Plan 2050 (BMU); kommission-wsb.de.



German Climate Action Plan 2050

Envisaged phase-out of coal-fired power generation

Recommendations by the Commission for Growth, Structural Change and Employment of 26 January 2019



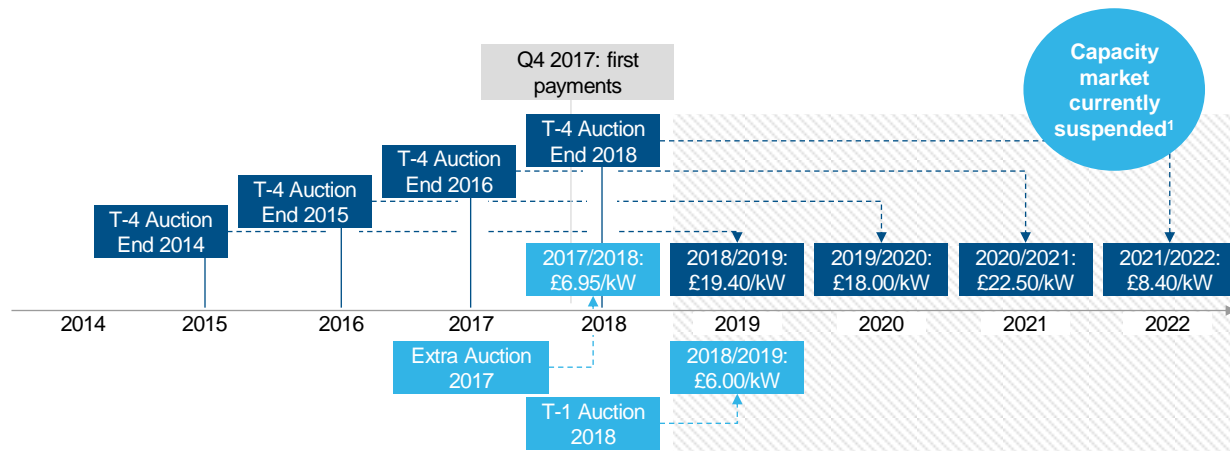
- Net closures (on top of ongoing measures/market driven decommissioning) of ~3 GW lignite and ~3 GW of hard coal by 2022
- By 2030 reduction to a total remaining capacity of 9 GW lignite and 8 GW hard coal
- No new coal plants to be commissioned
- Adequate compensation for shut downs until 2030
- Review mechanism with regards to climate protection, security of supply, power prices, regional development and employment
- Reduction in CO₂ auctions corresponding to redundant certificates
- Desire to keep Hambach Forest



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



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

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

¹ On 15 November 2018 the EU Court of Justice ruled that the Commission should have initiated a formal investigation procedure for its State Aid approval of the UK Capacity Market. The ruling imposes a 'standstill period' on the UK Capacity Market. It prevents the UK government from holding any capacity auctions, making any capacity payments under existing agreements, or undertaking any other action which could be seen as granting State Aid through this mechanism. | Source: RWE Analysis.



UK capacity market

Qualified RWE plants

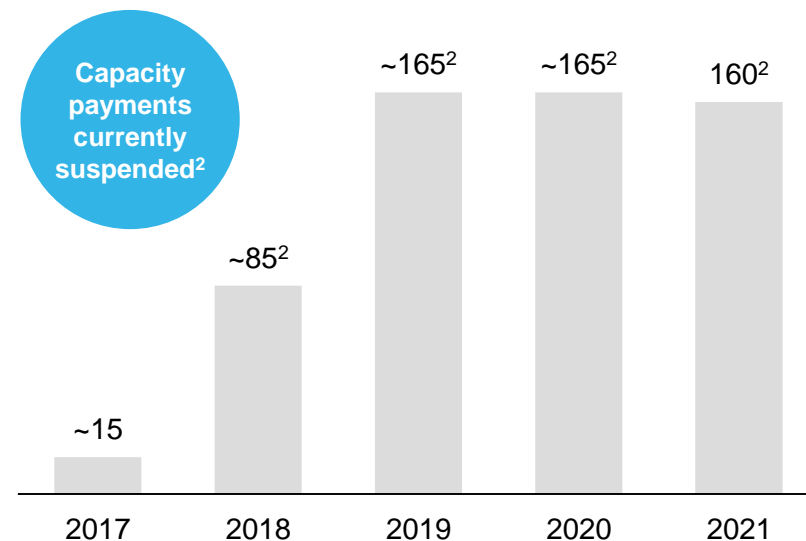
List of qualified RWE plants in UK Capacity Market



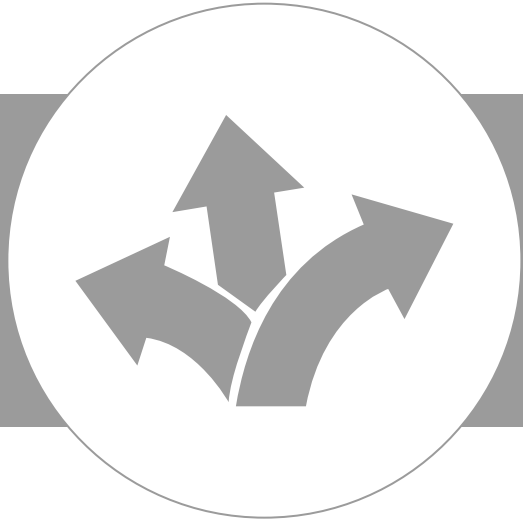
Derated capacity in MW	2017/18	2018/19	2019/20	2020/21	2021/22
Aberthaw	1,475	1,486	1,490	1,475	0
Didcot B (excl. OCGT)	1,358	1,364	1,380	1,395	1,396
Little Barford	681	683	691	699	699
Great Yarmouth	359	361	365	369	369
Staythorpe	1,626	1,633	1,652	1,670	1,670
Pembroke	2,081	2,090	2,114	2,138	2,138
Cowes	93	131	66	93	130
Didcot OCGTs	94	94	95	94	95
Cheshire GT	43	38	43	43	43
Conoco Phillips	43	49	49	0	49
Hythe	44	44	44	45	42
Grimsby A	0	19	19	19	19
Total	7,895	7,992	8,007	8,039	6,649

Revenue from capacity market¹

(in £ million)



¹ Based on cleared capacity prices (nominal) and capacity contracts secured by RWE. | ² Ruling of EU Court of Justice prevents the UK government from holding any capacity auctions, making any capacity payments under existing agreements, or undertaking any other action which could be seen as granting State Aid through this mechanism.





RWE operational data

Conventional power generation

Energy trading

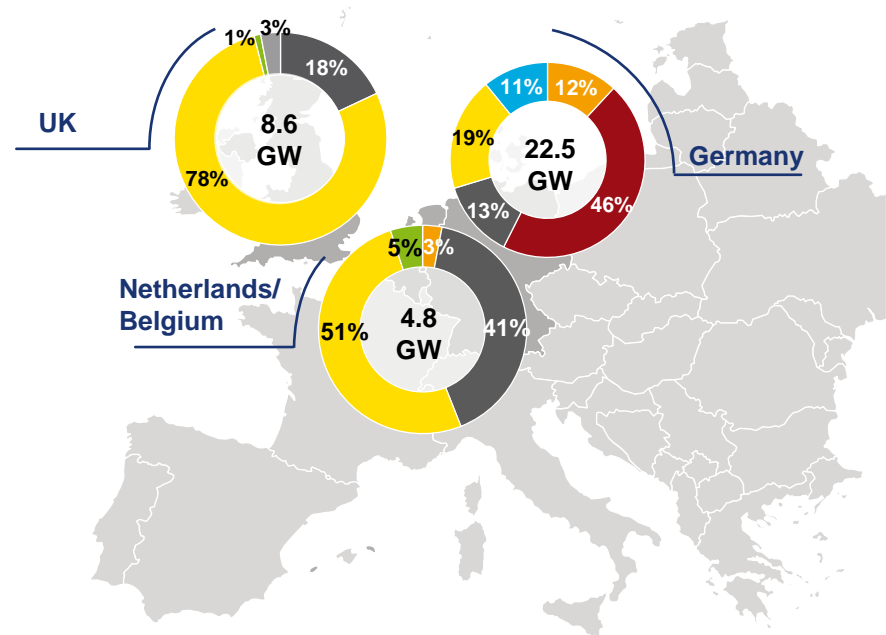
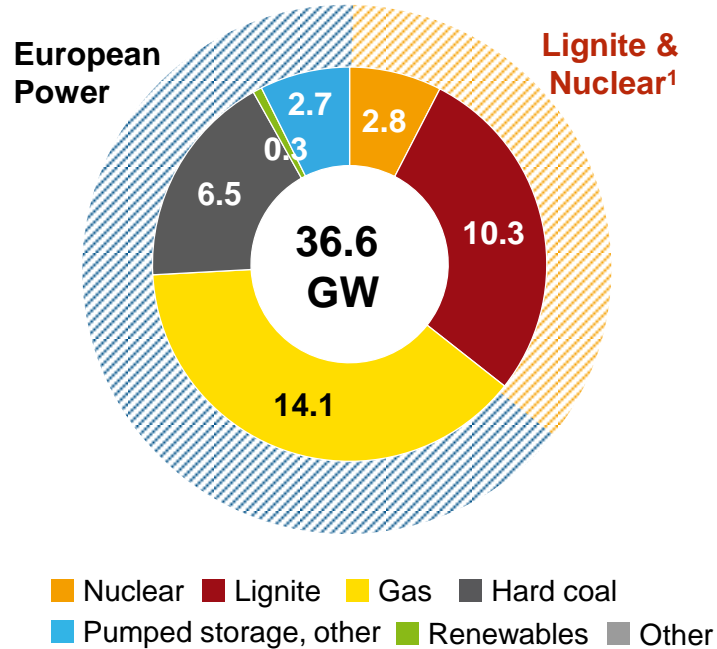
Lignite & Nuclear 

European Power 

Supply & Trading 



RWE's conventional power generation portfolio



Note: As of 1 January 2019. Figures may not add up due to rounding differences. Including Denizli CCGT in Turkey.

¹ Including units in security reserve and two topping gas turbines at the Weisweiler site.

RWE power plant portfolio

Power plant	Country	Commissioned	Net capacity		RWE's legal consolidation stake		RWE's economic stake		Partner	Stake in
			MW	%	MW	%	MW	%		
Lignite¹										
Frimmersdorf	Germany	1966,1970	562	100.0	562	100.0	562			
Neurath	Germany	1972–1976	2,091	100.0	2,091	100.0	2,091			
Neurath (BoA 2&3)	Germany	2012	2,120	100.0	2,120	100.0	2,120			
Niederaussem	Germany	1965–1974	2,446	100.0	2,446	100.0	2,446			
Niederaussem (BoA 1)	Germany	2002	944	100.0	944	100.0	944			
Weisweiler	Germany	1965–1975	1,962	100.0	1,962	100.0	1,962			
Refining plants (Berrenrath, Fortuna, Wachtberg)	Germany	various	130	100.0	130	100.0	130			
Total lignite			10,255		10,255		10,255			
Nuclear										
KKW Emsland	Germany	1988	1,336	87.5	1,336	87.5	1,169	E.ON		12.5
Gundremmingen C	Germany	1984	1,288	75.0	1,288	75.0	966	E.ON		25.0
EPZ	Netherlands	1973	485	30.0	146	30.0	146	Delta		70.0
Total nuclear			3,109		2,770		2,281			

Note: As of 1 January 2019. | ¹ Including units in security reserve.

RWE power plant portfolio (continued)

Power plant	Country	Commissioned	Net capacity		RWE's legal consolidation stake		RWE's economic stake		Partner	Stake in
			MW	%	MW	%	MW	%		
Hard coal										
Gersteinwerk Werne Kv2	Germany	1984	614	100.0	614	100.0	614			
Ibbenbüren	Germany	1985	794	100.0	794	100.0	794			
Westfalen E	Germany	2014	764	100.0	764	100.0	764			
Eemshaven A	Netherlands	2014	777	100.0	777	100.0	777			
Eemshaven B	Netherlands	2014	777	100.0	777	100.0	777			
Amercentrale ST9	Netherlands	1993	421	100.0	421	100.0	421			
Aberthaw B	UK	1971–1979	1,560	100.0	1,560	100.0	1,560			
Total hard coal			5,707		5,707		5,707			
Gas										
Emsland B, C	Germany	1973/74	950	100.0	950	100.0	950			
Emsland D	Germany	2012	887	100.0	887	100.0	887			
Gersteinwerk F – I	Germany	1973	1,206	100.0	1,206	100.0	1,206			
Gersteinwerk Werne Kv1	Germany	1984	112	100.0	112	100.0	112			
Weisweiler VGT G, H	Germany	2006	400	100.0	400	100.0	400			
Dortmund	Germany	2004	26	100.0	26	100.0	26			
GuD Dormagen	Germany	2000	326	100.0	326	100.0	326			
GuD Dormagen	Germany	2000	260	100.0	260	100.0	0	Bayer AG		100.0

Note: As of 1 January 2019.

RWE power plant portfolio (continued)

Power plant	Country	Commissioned	Net capacity		RWE's legal consolidation stake		RWE's economic stake		Partner	Stake in
			MW	%	MW	%	MW	%		
Gas continued										
Moerdijk 1	Netherlands	1996	348	100.0	348	100.0	348			
Moerdijk 2	Netherlands	2012	426	100.0	426	100.0	426			
Inesco (Antwerpen)	Netherlands	2007	133	100.0	133	100.0	133			
Clauscentrale C	Netherlands	2012	1,304	100.0	1,304	100.0	1,304			
Swentibold CC	Netherlands	1999	245	100.0	245	100.0	245			
Great Yarmouth	UK	2001	398	100.0	398	100.0	398			
Little Barford	UK	1994	727	100.0	727	100.0	727			
Didcot B	UK	1996–1997	1,440	100.0	1,440	100.0	1,440			
Staythorpe	UK	2010	1,740	100.0	1,740	100.0	1,740			
Pembroke	UK	2012	2,181	100.0	2,181	100.0	2,181			
Phillips Petroleum	UK	1999	55	100.0	55	100.0	55			
Cheshire	UK	2000	40	100.0	40	100.0	40			
Cheshire East & West	UK	2016–2018	19	30.0	19	30.0	19	Aggreko		70.0
Hythe	UK	2005	56	100.0	56	100.0	56			
Grimsby	UK	2018	20	100.0	20	100.0	20			
Denizli	Turkey	2013	787	100.0	787	70.0	551	Turcas		30.0
Total gas			14,086		14,086		13,590			

Note: As of 1 January 2019.

RWE power plant portfolio (continued)

Power plant	Country	Commissioned	Net capacity		RWE's legal consolidation stake		RWE's economic stake		Partner	Stake in
			MW	%	MW	%	MW	%		
Oil										
Aberthaw OCGT	UK	1971–1979	51	100.0	51	100.0	51			
Cowes OCGT	UK	1982	140	100.0	140	100.0	140			
Didcot OCGT	UK	1972–1975	96	100.0	96	100.0	96			
Little Barford OCGT	UK	2006	17	100.0	17	100.0	17			
Total oil			304		304		304			
Renewables										
Various sites (hydro run-of-river)	Germany		17		17		17			
Linne HH 1-4 (hydro run-of-river)	Netherlands	1989	11	100.0	11	100.0	11			
Amercentrale ST 9 (biomass)	Netherlands	1993	210	100.0	210	100.0	210			
EPZ (wind)	Netherlands	2004/2012	24	30.0	7	30.0	7	Delta		70.0
Markinch (biomass wood)	UK	2014	55	100.0	55	100.0	55			
Total renewables			317		300		300			

Note: As of 1 January 2019.

RWE power plant portfolio (continued)

Power plant	Country	Commissioned	Net capacity		RWE's legal consolidation stake		RWE's economic stake		Partner	Stake in
			MW	%	MW	%	MW	%		
Other										
MHKW Karnap (waste)	Germany	1987	38	100.0	38	100.0	38			
Köpchenwerk (pumped storage)	Germany	1989	165	100.0	165	100.0	165			
MVA Weisweiler (waste)	Germany	1996	27	100.0	27	100.0	27			
SRS Ecotherm (waste)	Germany	2003	1	100.0	1	100.0	1			
Battery storage Herdecke	Germany	2018	7	100.0	7	100.0	7			
Battery storage Hoppecke	Germany	2018	1	100.0	1	100.0	1			
Total other			239		239		239			
Contractually secured plants¹										
GKM (hard coal)	Germany		1,958	40.0	783	35.0	689	EnBW, MVV		60.0
Neckar (water run-of-river)	Germany		29	100.0	29	100.0	29			
Rhein-Main-Donau (water run-of-river)	Germany		10	100.0	10	100.0	10			
Schluchsee (pumped storage)	Germany		1,740	50.0	870	50.0	870			
SEO Vianden (pumped storage)	Germany		1,294	100.0	1,294	100.0	1,294			
T-Power (gas)	Netherlands		418	0.0	0	100.0	418	Tessenderlo		
Total contractually secured plants			5,449		2,986		3,310			
Total RWE stand alone			39,466		36,646		35,985			

Note: As of 1 January 2019. | ¹ Plants that RWE can deploy at its discretion on the basis of long-term agreements.

Overview of capacity measures

Measure	Plant	MW ¹	Fuel	Location	Date
Divestment	Mátra	840	Lignite (763 MW), gas, solar	HU	Q1-2018
	Elsta	400	Gas	NL	Q3-2018
	Inesco	130	Gas	BE	Q1-2019
Decommissioning	Voerde A/B	1,390	Hard coal	DE	Q1-2017
	Gundremmingen B	1,285	Nuclear	DE	Q4-2017
	Claus A	610	Gas	NL	Q4-2017
	Gersteinwerk H	55	Gas	DE	Q3-2018
	Bochum	20	Gas	DE	Q4-2018
	Gersteinwerk K2	610	Hard coal	DE	Q1-2019
	Gundremmingen C	1,290	Nuclear	DE	Q4-2021
	Emsland	1,335	Nuclear	DE	Q4-2022
Mothballed ²	Gersteinwerk I	355	Gas – steam turbine	DE	Q1-2013
	Moerdijk 1	340	Gas	NL	Q1-2018
	Moerdijk 2	430	Gas	NL	Q2-2020
De-mothballed	Gersteinwerk G	355	Gas – steam turbine	DE	Q4-2018
	Gersteinwerk F	355	Gas – steam turbine	DE	Q4-2019
	Claus C	1,300	Gas	NL	Q4/2019 – Q4/2020
Termination of contracts	Bergkamen	720	Hard coal	DE	Q4-2018
	Kaunertal	160	Pumped storage	AUT	Q4-2018
Security reserve ³	Frimmersdorf P & Q	560	Lignite	DE	Q4-2017
	Niederaußem E & F	590	Lignite	DE	Q4-2018
	Neurath C	290	Lignite	DE	Q4-2019

¹ Net nominal capacity, rounded. | ² In times of market tightness mothballed plants might return temporarily to the system. | ³ Capacity will be decommissioned after 4 years in the reserve.

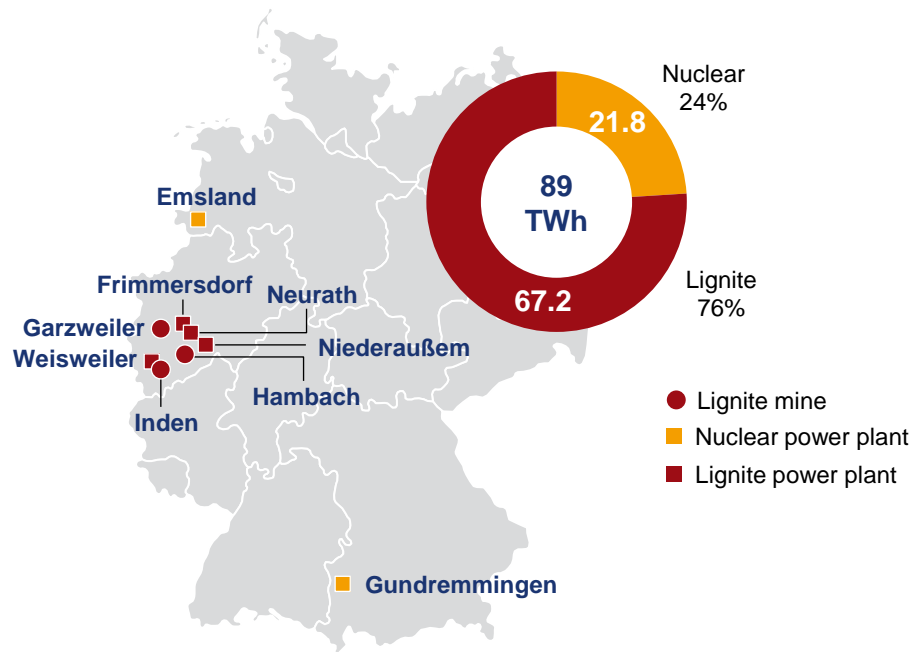
Lignite & Nuclear

Cost oriented managed asset base with strong outright position

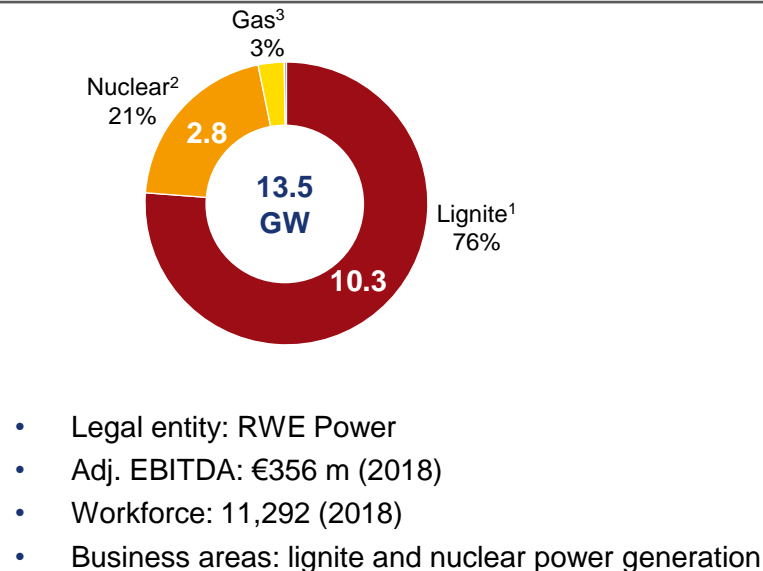


Strong outright position

Major operational sites and production volumes (2018)



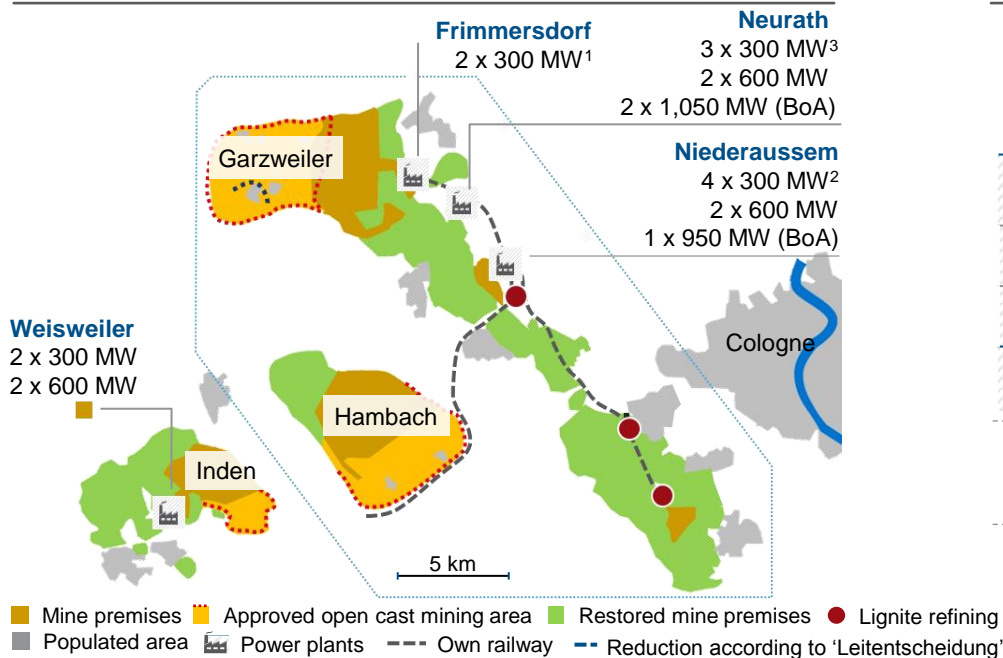
Generation capacity (2018)



¹ Including units in security reserve. | ² Includes stake in Dutch nuclear plant EPZ. | ³ Two topping gas turbines at the Weisweiler site.

Lignite: Integrated system including mining, refining and power plants

Major sites in Germany (2018)



¹ Since October 2017 in lignite reserve. | ² Thereof 2 x 300 MW since October 2018 in lignite reserve. | ³ Thereof 1 x 300 MW from October 2019 in lignite reserve. | ⁴ Extractions shrinking until mid-century. | ⁵ As of 31 December 2018.

Integrated system

3 lignite open cast mines

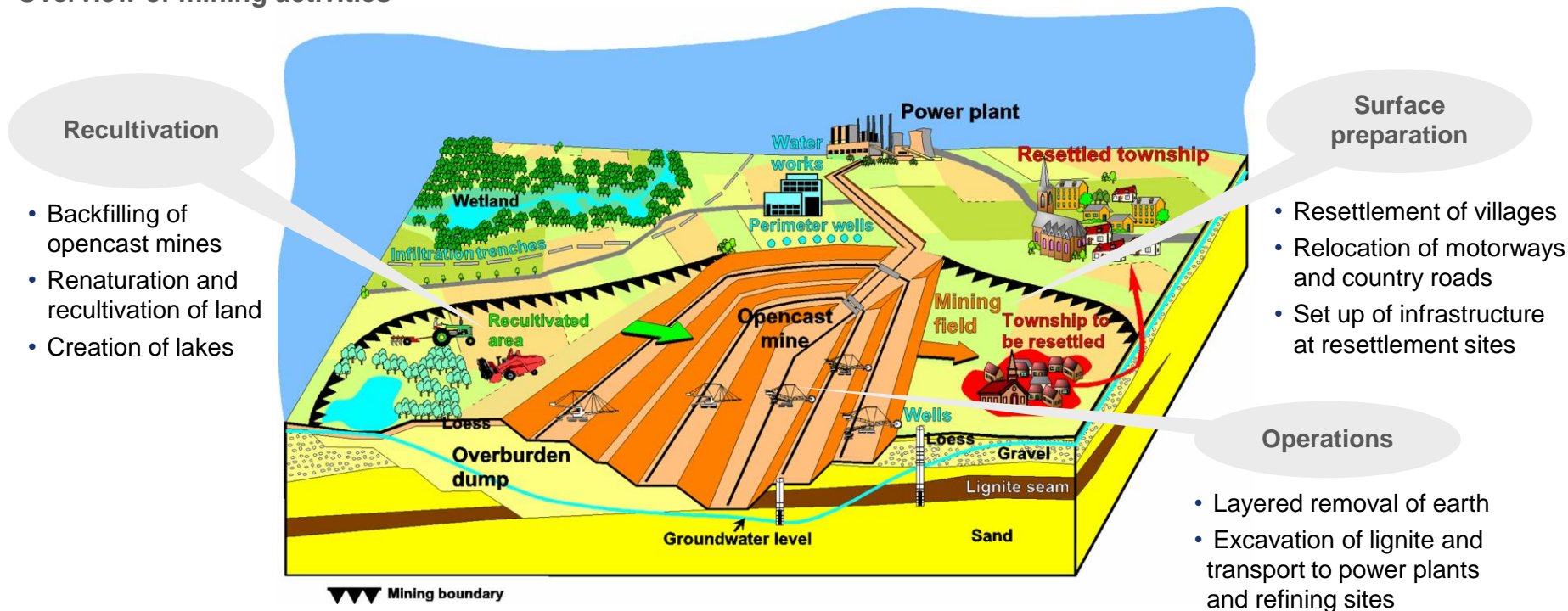
	Extraction ⁴ (million t/a)	Reserves ⁵ (bn tonnes)	Estimated end date
Hambach	~35	1.3	Mid-century
Garzweiler	~35	0.7	Mid-century
Inden	~20	0.3	~2030
Total	~90	2.3	

~10 GW installed power generation capacity in Germany

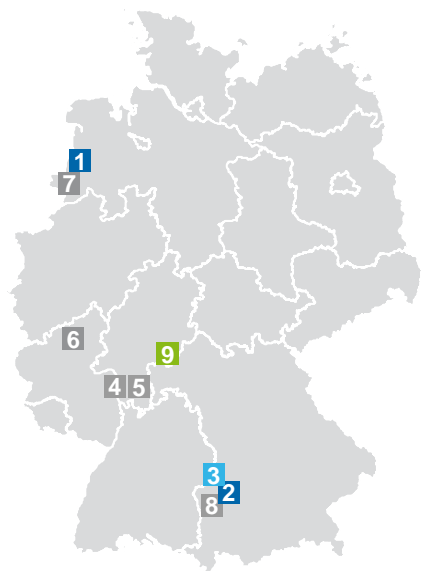
3 refining sites

Lignite: Longstanding experience in lignite mining and recultivation

Overview of mining activities



Nuclear: Experience across entire nuclear plant lifecycle



Nuclear units in Germany	Net capacity (GW)	End of operations	Status			
			Spent fuel removal	Decomm. licence	Decomm. progress	
1 Emsland ¹	1.3	2022	2027E	Pending	-	Operational (2.6 GW)
2 Gundremmingen C ²	1.3	2021	2026E	Pending	-	
3 Gundremmingen B ²	1.3	2017	2022E	2019E	-	Post-operation (1.3 GW)
4 Biblis A	1.2	2011	✓	✓	🕒	In decommissioning (4.1 GW)
5 Biblis B	1.2	2011	✓	✓	🕒	
6 Mülheim-Kärlich	1.2	1988	✓	✓	🕒	
7 KWL Lingen	0.3	1979	✓	✓	🕒	
8 Gundremmingen A ²	0.2	1977	✓	✓	🕒	
9 Kahl ³	0.01	1985	✓	✓	🕒	Decommissioned

Note: Excluding EPZ. | ¹ 12.5% owned by PreussenElektra (E.ON). | ² 25% owned by PreussenElektra (E.ON). | ³ 20% owned by PreussenElektra (E.ON).

Nuclear: Decommissioning steps

Basic site management

Periodic inspection, ongoing supervision and maintenance of systems and buildings

Operation and maintenance of adjusted infrastructure systems

Downsizing/replacement of infrastructure

Final shutdown of systems

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

Treatment¹ of radioactive waste

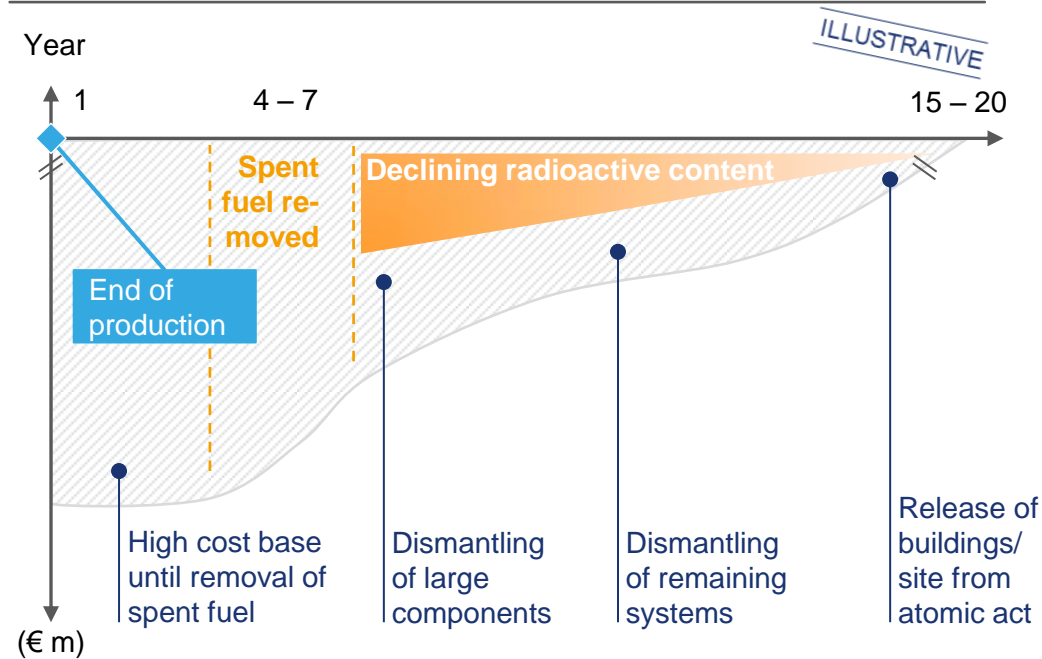
Responsibility of State

Interim storage & final disposal

¹ E.g. melting, incineration, compaction, packaging and documentation.

Nuclear: Cash flow profile of provisions driven by timing of individual shutdowns

Example: Decommissioning cash flow profile (one unit)



Accounting of provisions

Nuclear provisions (31.12.2018)	€5.9 bn
Discount rate	0.4 %
Escalation rate	1.5 %
Sensitivity (+/-10 bps change in real discount rate)	c. -/+€50 m

Utilisation of provisions

- Stable utilisation of provisions (€250 m – €350 m p.a.) until ~2020
- Increased utilisation of provisions due to further shutdowns (€300 m – €500 m p.a.) from 2021 onwards
- Clear reduction in utilisation of provisions from ~2030 onwards

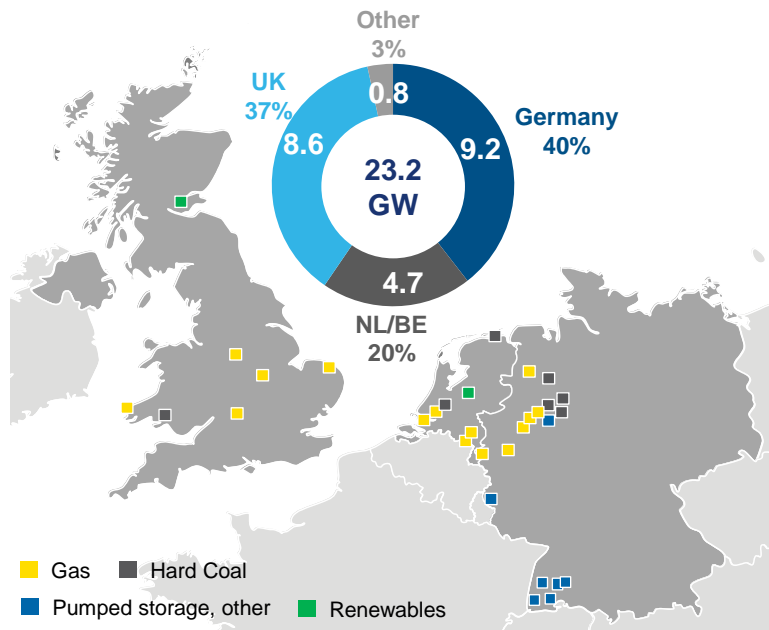
European Power

Efficient operator of modern and flexible generation fleet

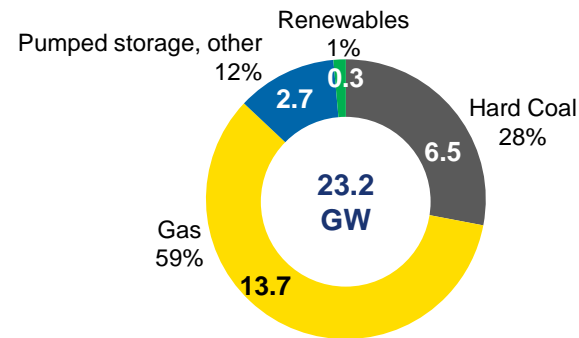


Well positioned portfolio across regions and technologies

Major power plants and installed capacity (2018)



Generation capacity (2018)



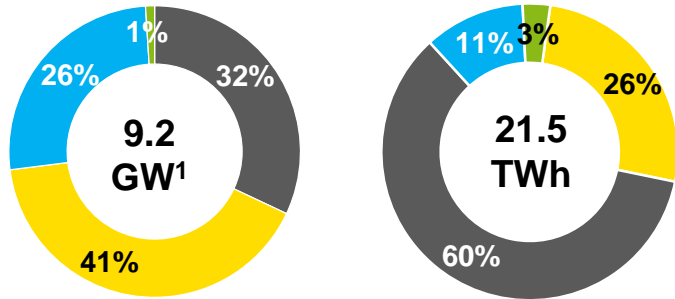
- Legal entity: RWE Generation
- Adj. EBITDA: €334 m (2018)
- Workforce: 2,738 (2018)
- Business areas: gas, hard coal, hydro and biomass
- Leading market positions: Germany, UK, Benelux

Note: Figures may not add up due to rounding differences. Including Denizli (CCGT) in Turkey. Excluding 720 MW hard coal plant Bergkamen (sold as of 1 January 2019).



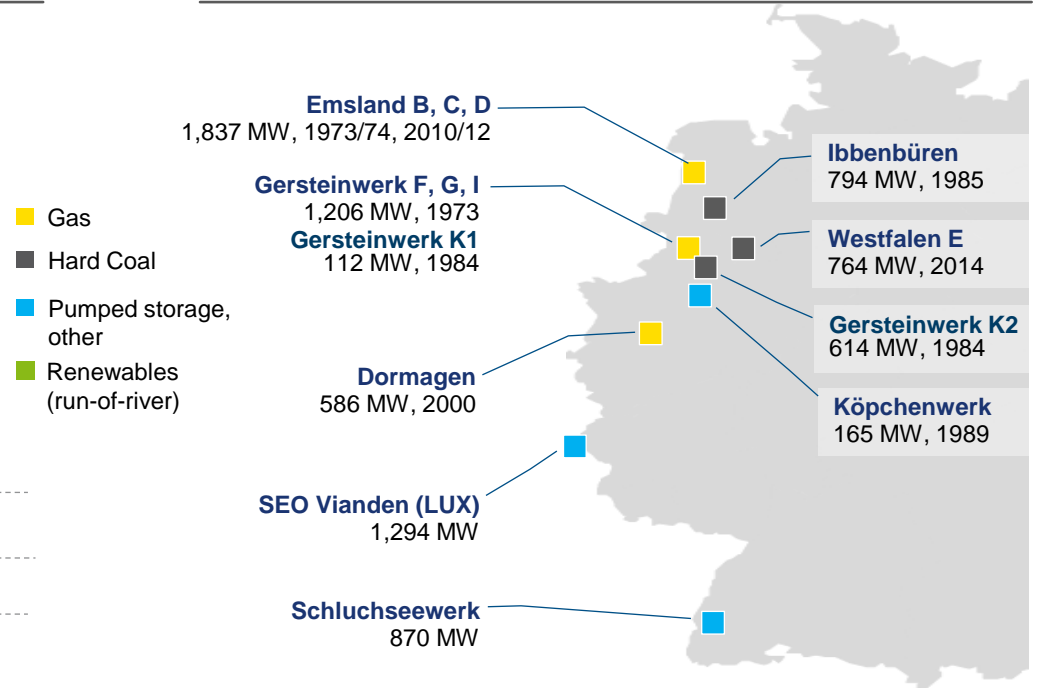
German generation portfolio: Strong position, secure and flexible output

Installed capacity and generation (2018)



- Germany's largest fossil fuel generator
- Highly efficient and flexible gas assets
- State of the art hard coal fleet
- ~900 people employed across Germany

Major plants²

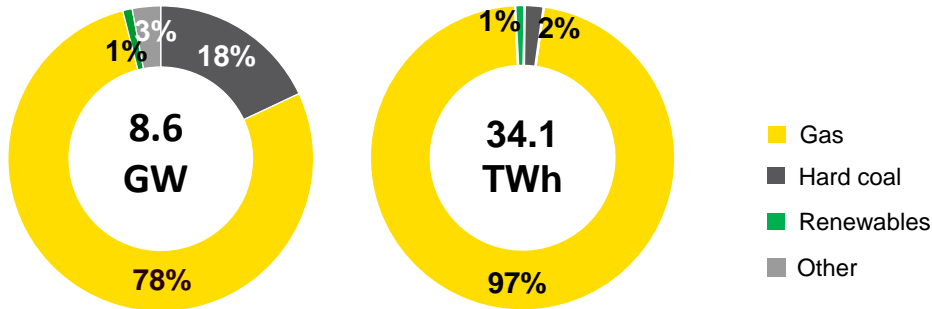


¹ Excluding 720 MW hard coal plant Bergkamen (sold as of 1 January 2019). ² Net capacity, commissioned. RWE's economic stake.



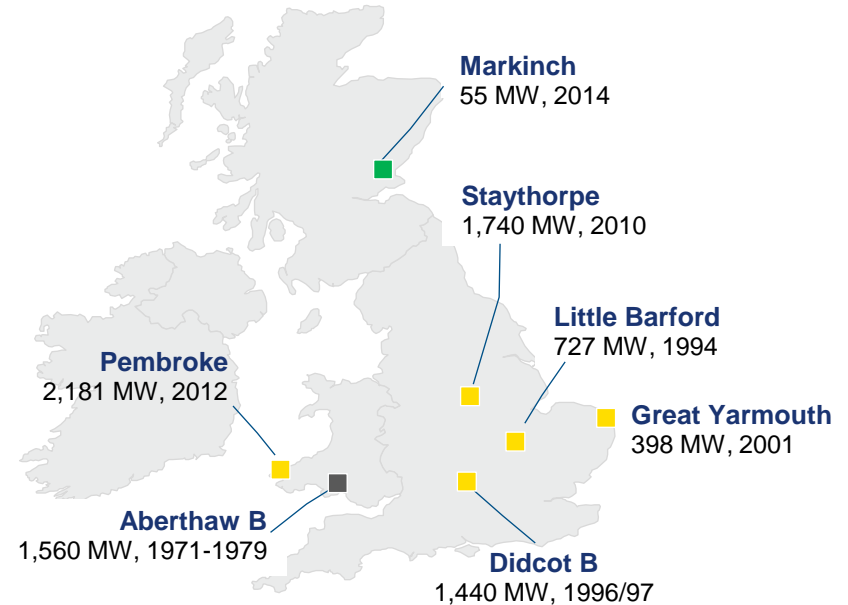
UK generation portfolio: Excellent competitive position

Installed capacity and generation (2018)



- UK's largest fossil fuel generator
- Supplier of ~15 % of UK electricity
- Efficient and flexible assets situated in attractive locations
- ~1,100 people employed across the UK

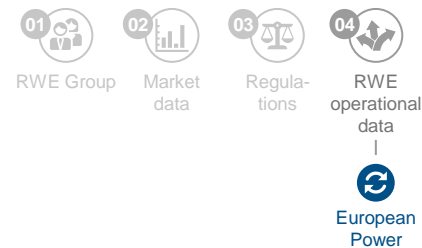
Major plants¹



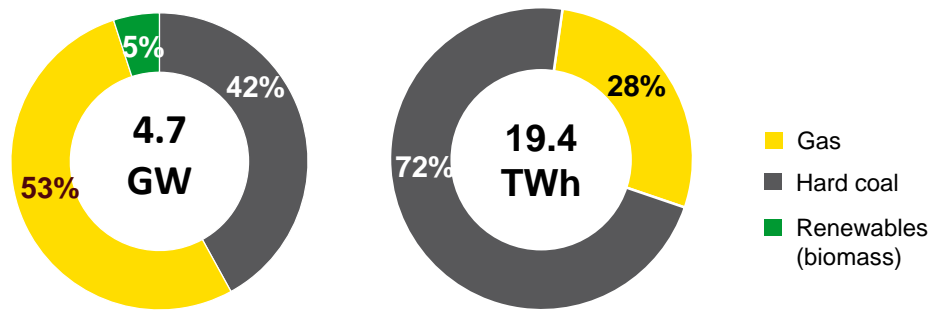
¹ Net capacity, commissioned.



Benelux generation portfolio: Modern gas fleet, well positioned for tighter markets

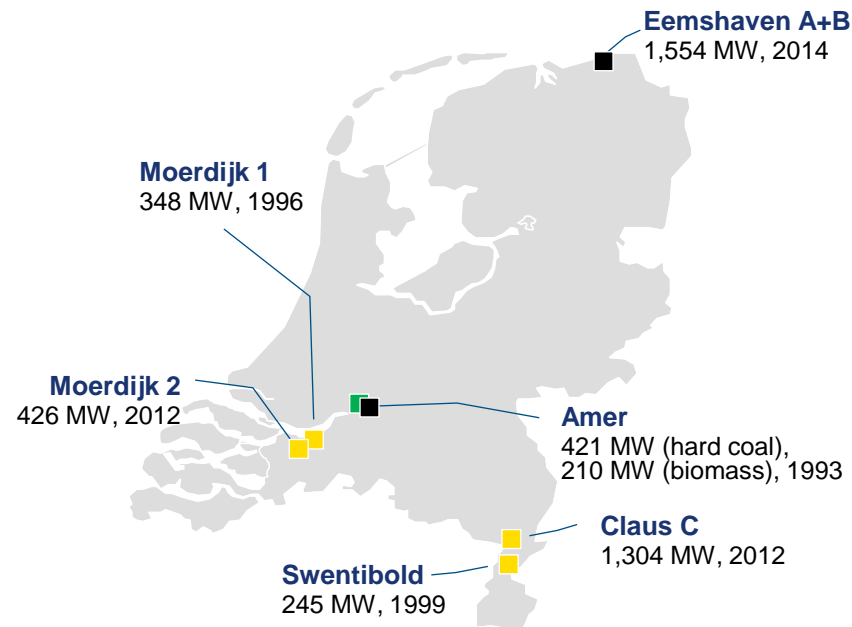


Installed capacity and generation¹ (2018)



- NL's largest fossil fuel generator
- Supplier of about 17% of NL electricity
- Modern gas fleet; upside from biomass co-firing
- ~540 people employed across Benelux

Major plants²



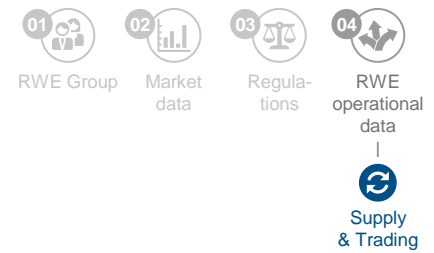
¹ Excluding Nuclear power plant EPZ, which is accounted for in the Lignite & Nuclear segment. | ² Net capacity, commissioned.

Energy Trading

Value creation through fundamental understanding of markets



Supply & Trading: at a glance



- Leading European energy trading house and significant gas portfolio player
- Interface between the Group and global wholesale markets for energy and energy-related raw materials and services
- Europe's largest energy trading floor at the headquarters (Essen, Germany); 8 trading offices worldwide
- Broad knowledge of the commodity and power markets
- Adj. EBITDA: €183 m (2018)
- Workforce: ~1,300 employees from ~40 countries

Trading volumes in 2018



1,245

TWh of **electricity**



456 billion

cubic metres of **gas**



LNG

39 billion

cubic metres of **LNG**



587 million

tonnes **coal**



2,885 million

barrels of **oil**



1,452 million

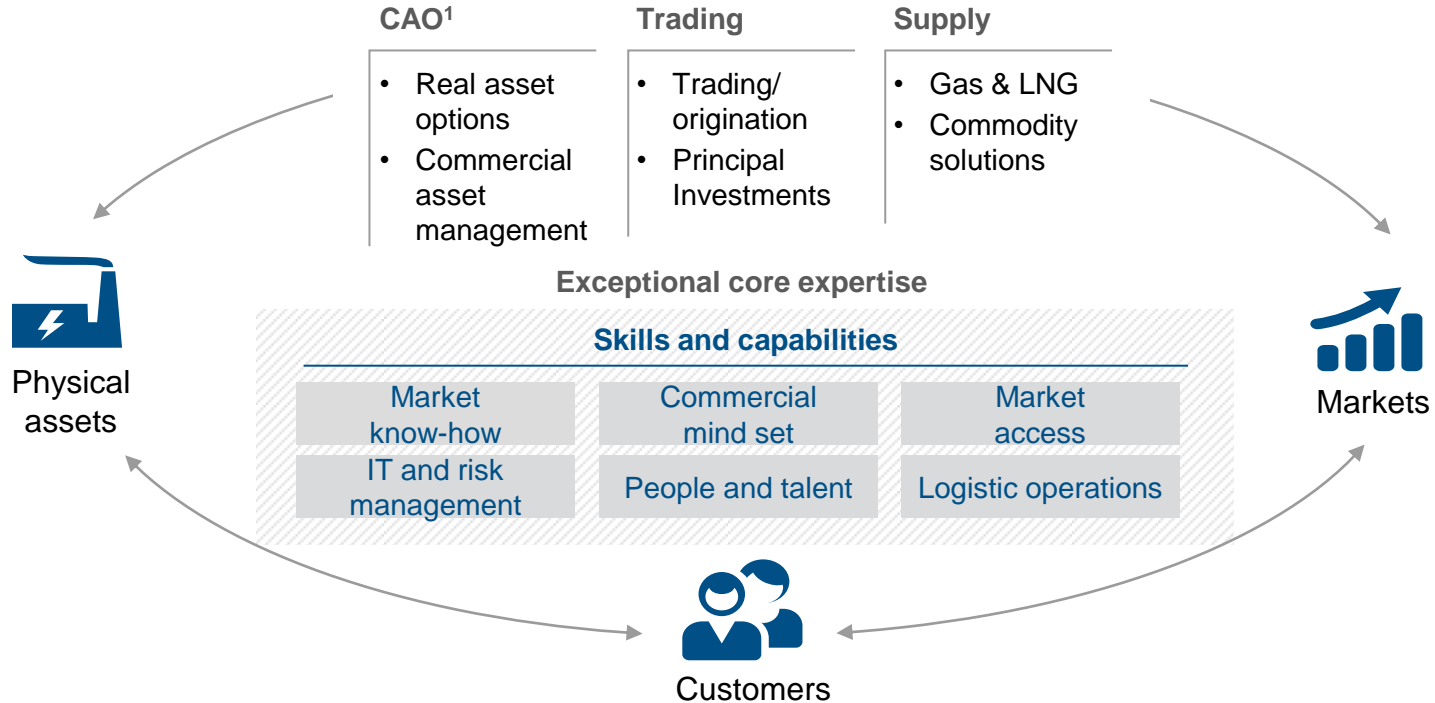
CO₂ certificates



49.8 million

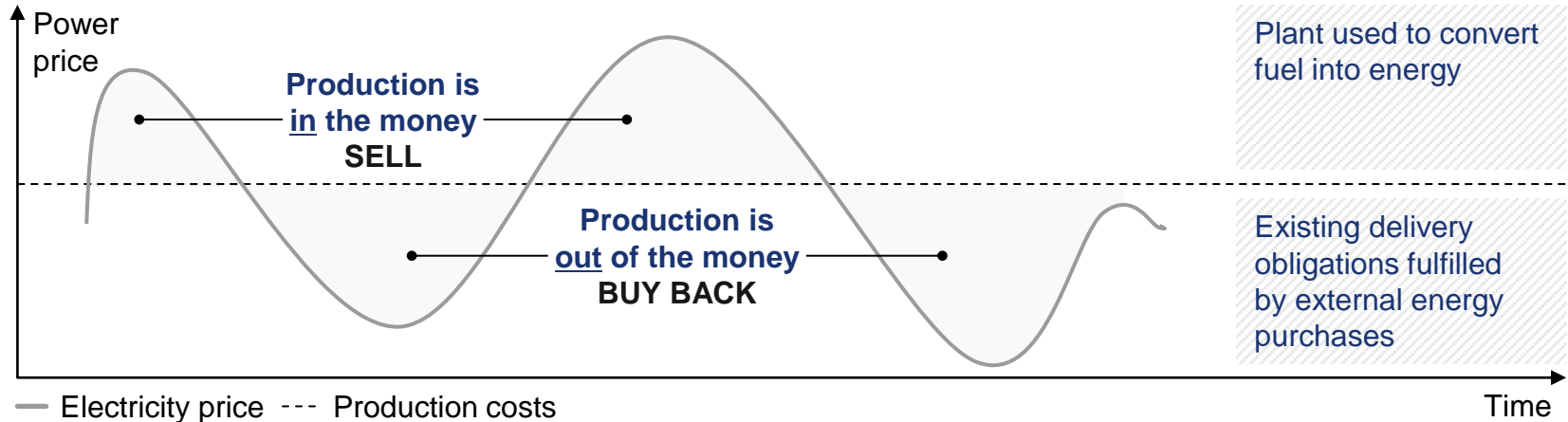
tonnes of
other traded volumes

Strong commercial platform for Supply & Trading activities



¹ Commercial Asset Optimisation.
 RWE AG | Factbook | March 2019

CAO: Treatment of power plants as real options



Intrinsic value

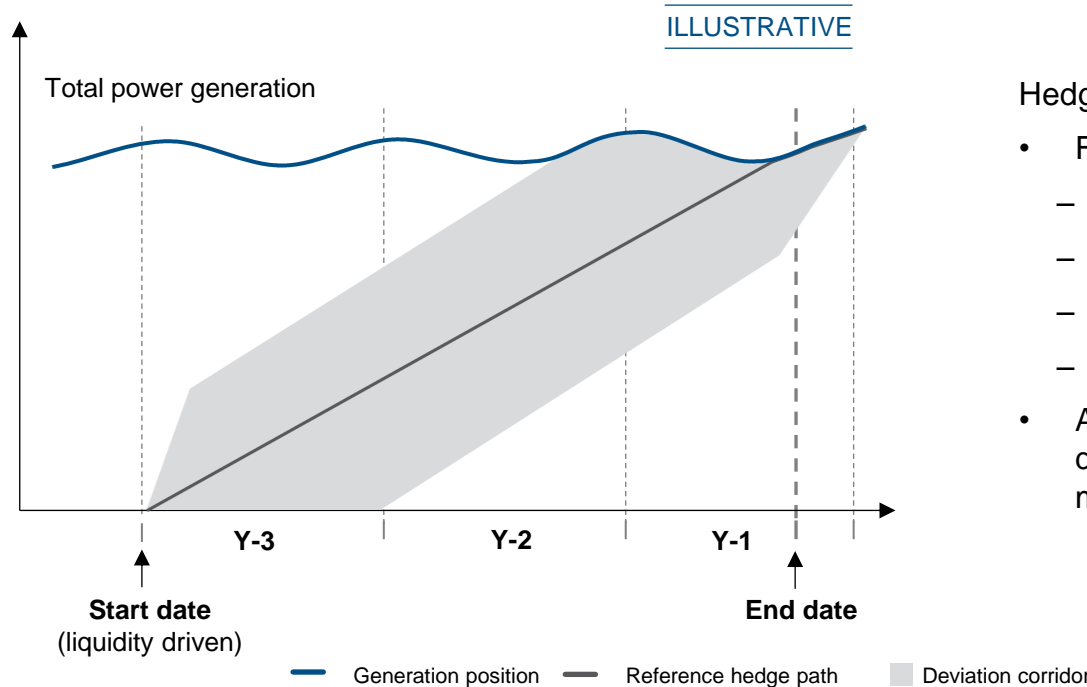
- Value inherent in physical asset
- Captured by: forward hedging in the liquid tenor; regularly reviewing and changing hedging approach

Extrinsic value

- Value in asset optionality
- Captured by: long-term optimisation (outages, mothballing, investments); short-term optimisation (dispatch, re-dispatch); reserve and ancillary services; capacity markets

CAO: Hedging strategy focuses on risk mitigation and value creation

Reference hedge path (example)

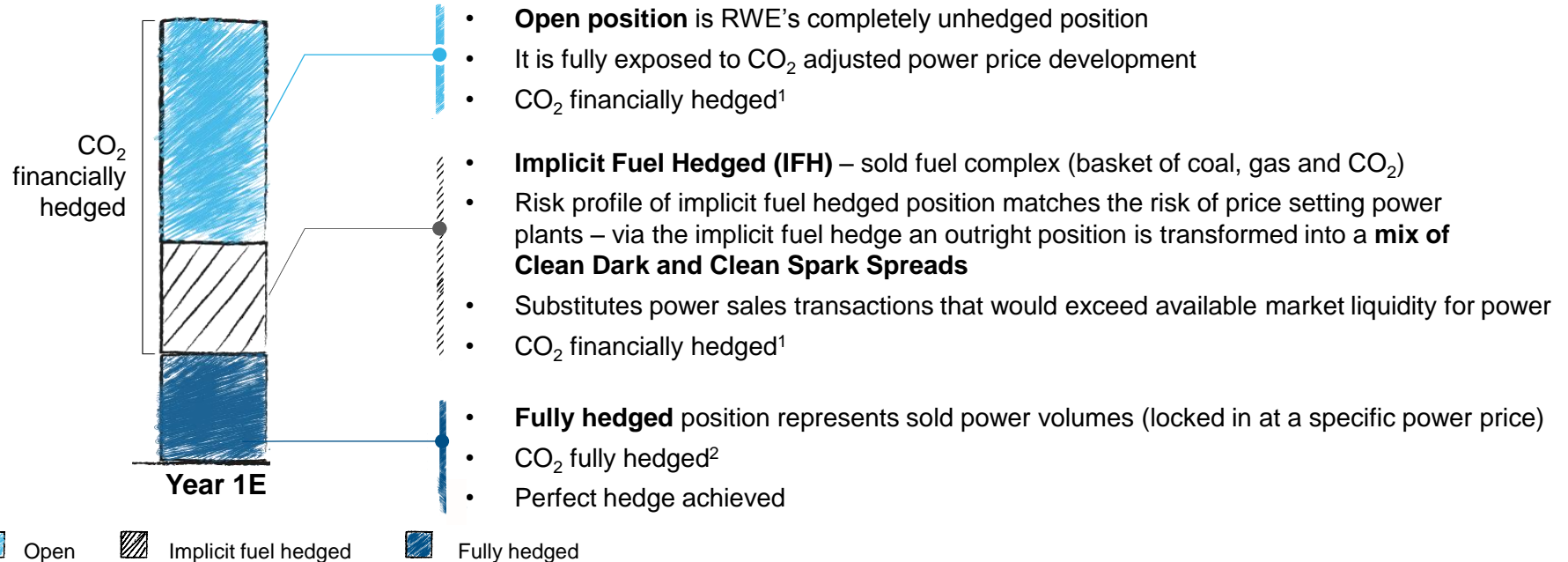


Hedge path based on risk appetite and market views

- Factors driving forward hedging
 - Risk appetite
 - Available market liquidity
 - Market view
 - Hedging costs
- Accelerating/decelerating hedging within defined limits encouraged where strong market views exist

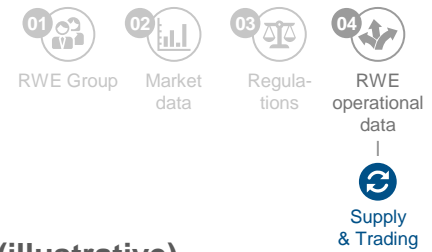
CAO: Optimised hedging to reflect fundamental market view

Hedging types of outright production volume – two hedge types







¹ CO₂ requirements are covered to close the gap between higher CO₂ intensity of outright generation and CO₂ intensity of the price setting power plant. | ² Total CO₂ requirements covered.

CAO: Risk mitigating and value enhancing carbon hedging strategy

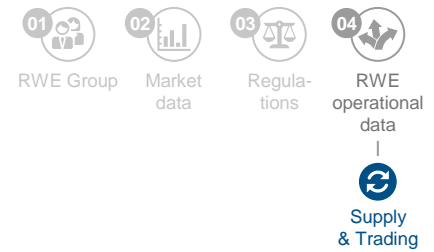


- **Objective of carbon hedging** is to **offset price risks** arising from RWE's carbon intensive generation portfolio via hedging instruments (physical certificates, financial derivatives, options etc.)
- **RWE's generation portfolio** has a **higher CO₂ intensity** compared to the average of the price setting power plants
- To avoid pressure on generation margins from increasing carbon prices, **RWE is financially hedged**. This means, RWE closes the gap between its own carbon intensity and the average of the price setting power plants

Example: Impact of carbon hedging (illustrative)

Assumption on CO ₂ intensity	RWE Ø 0.9 tCO ₂ /MWh	vs.	Avg. Price setting power plant Ø 0.6 tCO ₂ /MWh
	Scenario 1 – CO₂ unhedged		Scenario 2 – CO₂ hedged
CO ₂ price change	+1 EUR/MWh		+1 EUR/MWh
Impact on power margin	(0.6 - 0.9) x 1 EUR = -0.3 EUR/MWh		(0.6 - 0.9) x 1 EUR = -0.3 EUR/MWh
Impact on CO ₂ hedge	n/a		+0.3 EUR/MWh
			
	 Loss per generated power unit of 0.3 EUR/MWh		 No effect on margin, means the CO₂ price change is earnings-neutral

Trading: Understanding of fundamentals drives trading approach



Fundamental analysis (examples)

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

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

Quantitative modelling

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

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

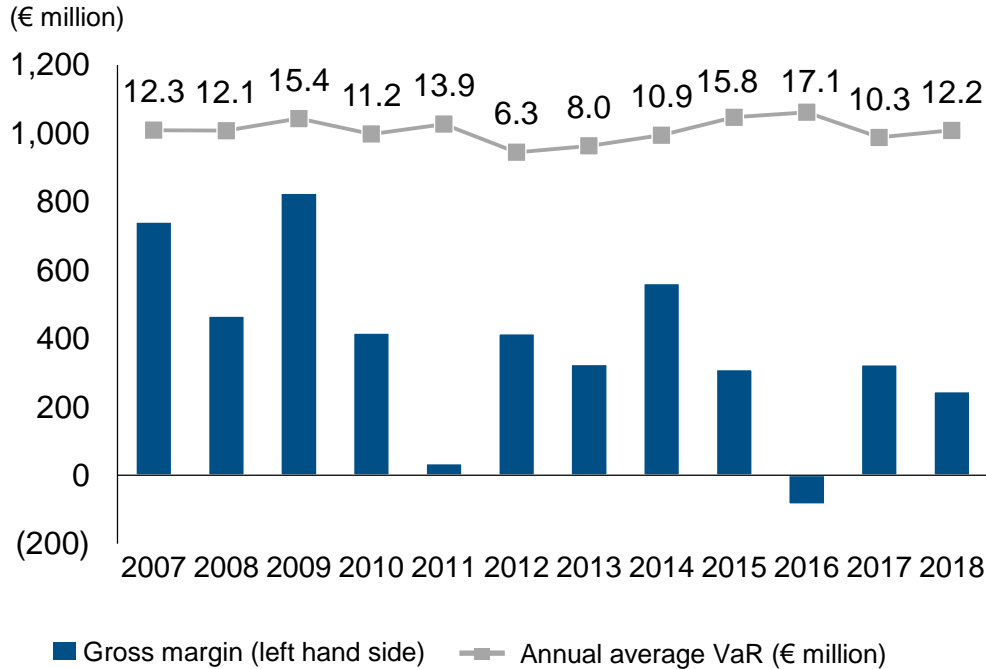
Diversified trading exposure

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

Trading: Track record of attractive risk adjusted returns

Gross margin versus VaR



- Strong track record of achieving attractive returns while staying below risk limits
- Historically, average portfolio VaR has been significantly below VaR limit (1 day, 95%) of €40 m
- Long term average gross margin of approx. €350 m

Principal investments: portfolio of energy related investments

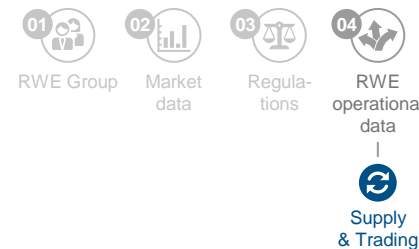
Strategic approach

- Established to invest across the commodity spectrum
- Focus on private equity-like investments where RWE Supply & Trading can extract value from strong trading capability and asset know-how
- Current investment portfolio of ~€85 m with average deal size of ~€17 m
- Equity IRR targets of 15 – 20%
- Global focus: Europe, Americas and Asia-Pacific
- Target holding period 3 to 5 years

Active investments



Supply: Leveraging skill set and know-how



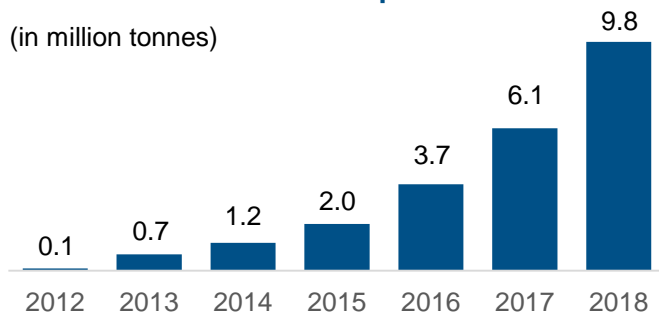
Gas & LNG

Leading European gas portfolio player

- Integrated diversified portfolio of supply, transport, storage and sales contracts
- Global LNG sourcing and supplying; portfolio optimisation
- Development of new opportunities with upstream & midstream partners; further geographic expansion of physical portfolio

Global LNG portfolio

(in million tonnes)



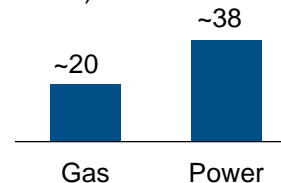
Commodity solutions

Leading supplier in large customer segments

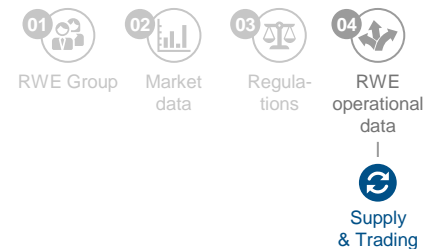
- Focus on customers with energy consumption of more than 100 GWh/a
- Large industrials, municipalities, mid market oil/fuel hedging counterparts (e.g. airlines)
- Market leader in the German large industrial B2B power segment with ~30% share
- Long-term customer relationships with typical contract duration of 2 to 5 years

Supplied volumes 2018

(in TWh)



Supply & Trading: comprehensive risk management and limit system



Elements of risk management

Quantitative

- Value-at-Risk (VaR)**
Trading VaR limit: €40 million
- Delta**
Limits for individual commodities
- Stress test**
Limits for entire position
- Stop-loss**
Absolute, draw down

Qualitative

- HR**
Internal development of senior traders and minimal external hires at senior level
- Risk culture**
Zero tolerance policy, immediate escalation
- Incentive model**
Based on EVA including risk capital, partly deferred bonus with claw back mechanism
- Risk governance**
Market risk compliant policy and ongoing improvements



Appendix

Glossary

Adj.	Adjusted	EMR	Energy Market Reform
ANI	Adjusted net income	EU	European Union
BDEW	German Association of Energy and Water Industries	ETS	Emissions Trading System
BE	Belgium	GB	Great Britain
bn	Billion	GER	Germany
CAO	Commercial Asset Optimisation	GHG	Global Greenhouse Gas
CBS	Central Office for Statistics Netherlands	GW	Gigawatt
CCGT	Combined Cycle Gas Turbine	GWh	Gigawatt hour
CDS	Clean dark spread	kWh	Kilowatt hour
CE	Central Europe	LNG	Liquefied Natural Gas
CEO	Chief Executive Officer	LOLE	Loss of load expectation
CfD	Contracts for Difference	Tonnes	metric tons
CFO	Chief Financial Officer	MSR	Market Stability Reserve
CHO	Chief Human Resource Officer	MW	Megawatt
COO	Chief Operational Officer	MWh	Megawatt hour
CO ₂	Carbon-dioxide	NGO	Non-Governmental Organisation
CSS	Clean spark spread	NL	Netherlands
CTO	Chief Technology Officer	OCGT	Open Cycle Gas Turbine
CWE	Central Western Europe	RES	Renewable energy source
Dukes	Digest of UK Energy Statistics	TNAC	Total number of allowances
EBITDA	Earnings before interest tax depreciation and amortisation	TSO	Transmission System Operator
ECO	Energy company obligation	TWh	Terrawatt hour
		UK	United Kingdom

Your contacts @RWE Investor Relations

Important Links

- > Annual and Interim Reports & Statements
<http://www.rwe.com/ir/reports>
- > Investor and Analyst Conferences
<http://www.rwe.com/ir/investor-and-analyst-conferences>
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Financial Calendar

- > **3 May 2019**
Annual General Meeting
- > **15 May 2019**
Interim statement on the first quarter of 2019
- > **14 August 2019**
Interim report on the first half of 2019
- > **14 November 2019**
Interim statement on the three quarters of 2019



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