

# Investment opportunities in European Energy

CEER

Tom Rowlands-Rees

September 23, 2019

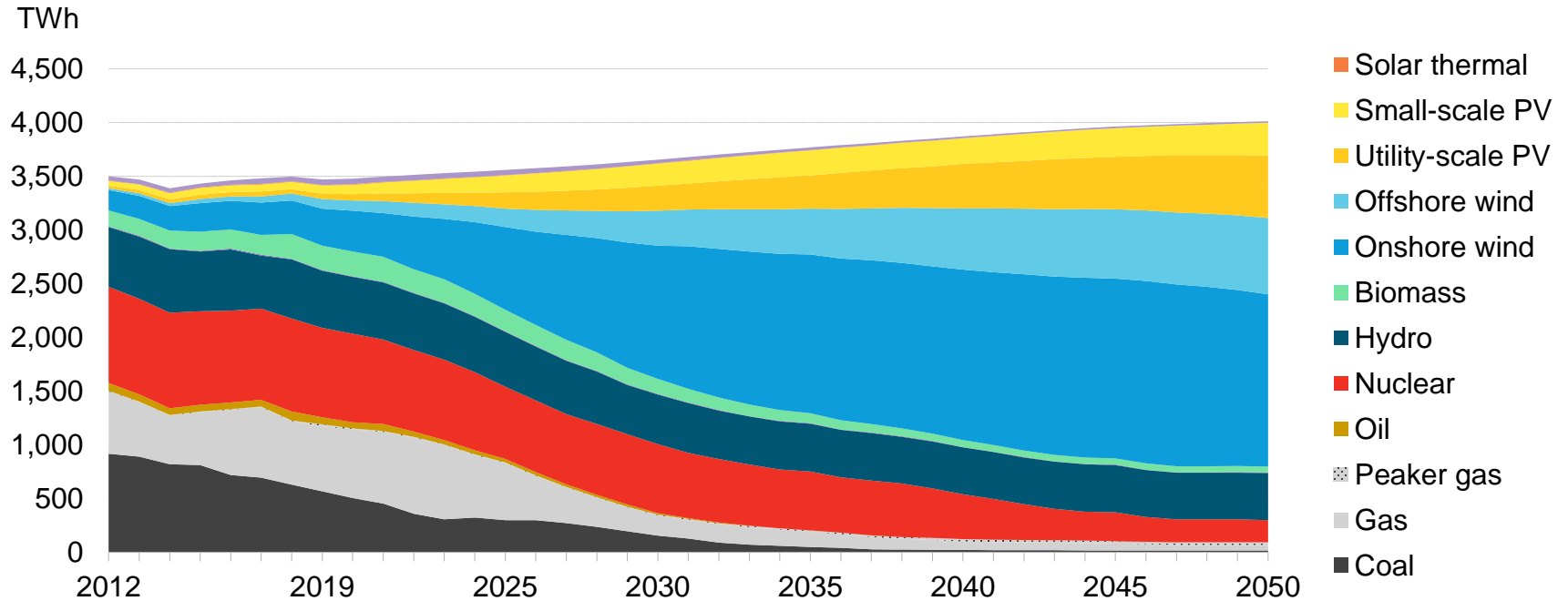


BloombergNEF

# The outlook for EU electricity

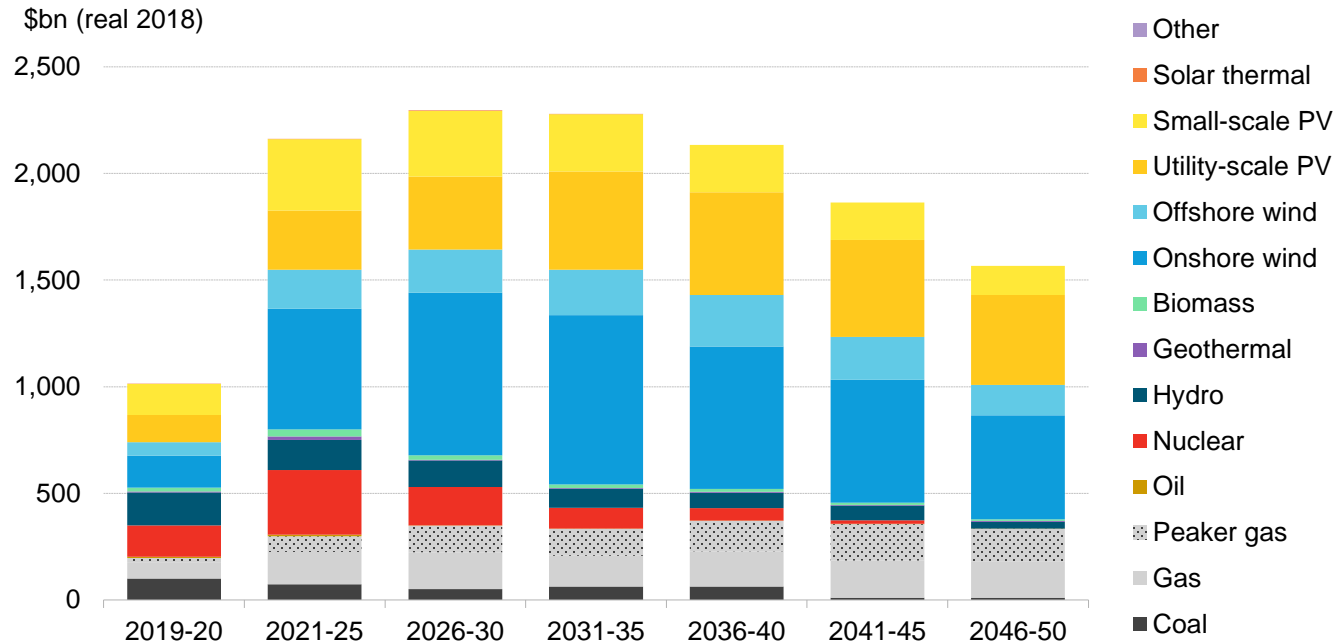
Pushing for the cheapest system

# Electricity generation, EU



Source: BloombergNEF

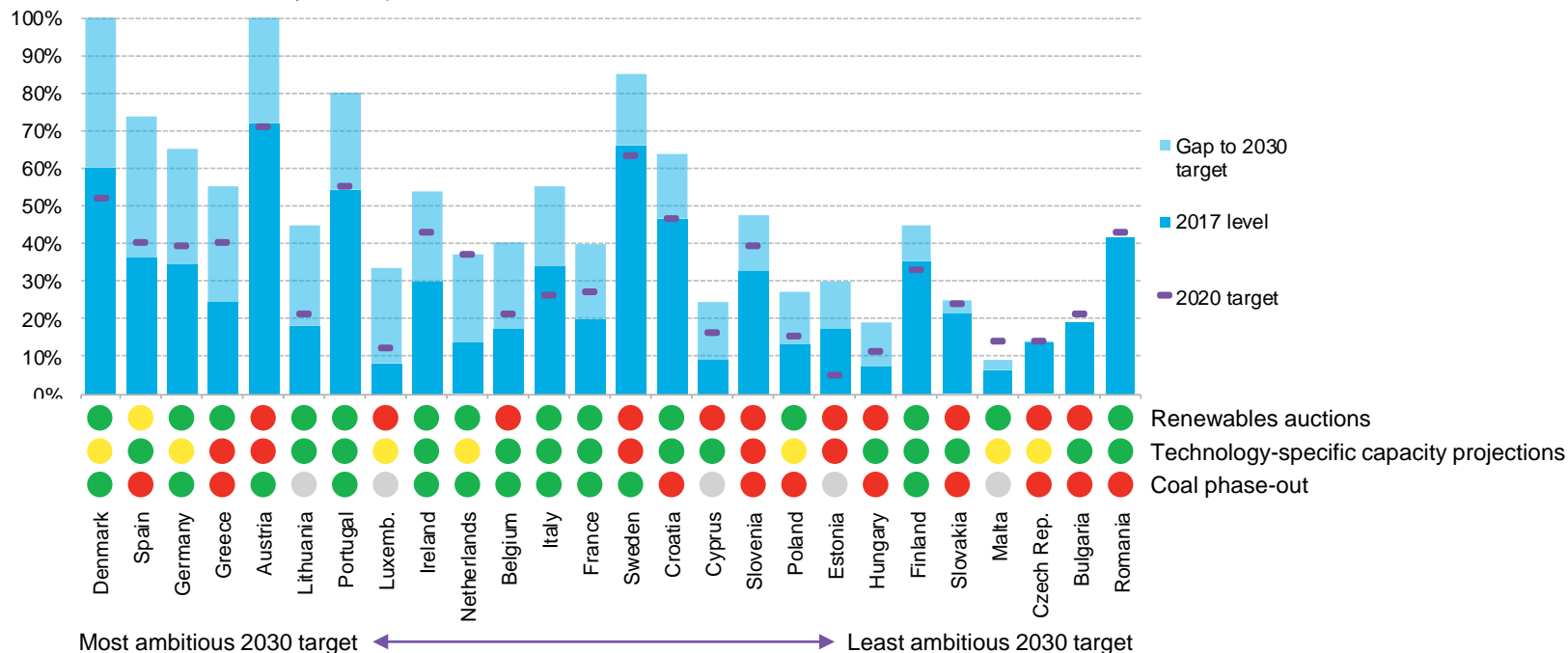
# Cumulative investments in new capacity



Source: BloombergNEF

# EU clean electricity targets and policies

Share of renewables in electricity consumption



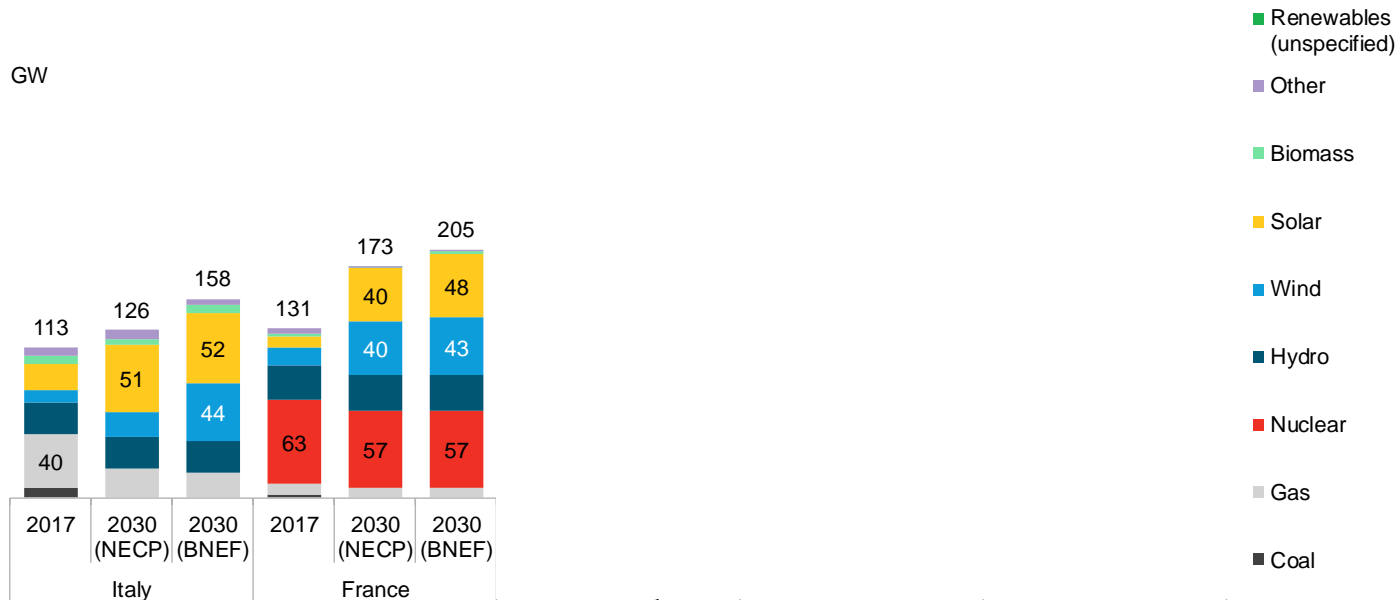
Source: NREAPs, NECPs, Eurostat. Note: Malta, the Netherlands and the U.K., did not submit targets for renewables electricity

# Installed capacity (2017) compared to 2030 government energy targets and NEO 2019



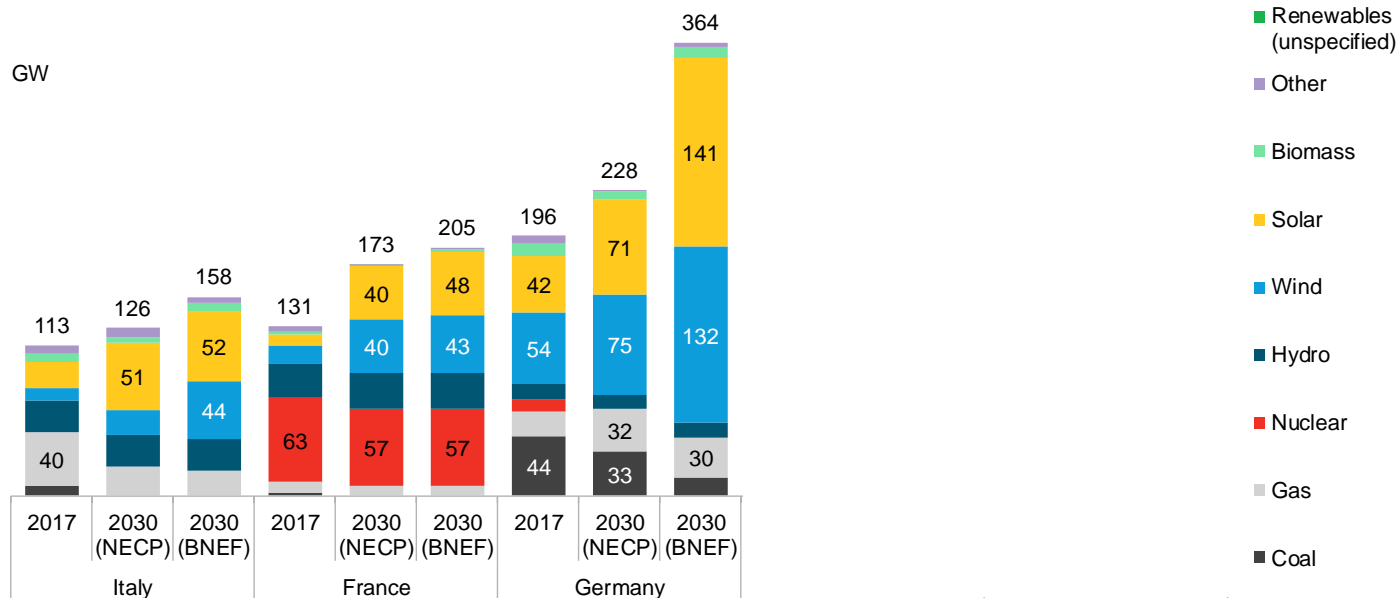
Source: BloombergNEF New Energy Outlook 2019, NECPs, BEIS. Note: Gas capacity in Italy assumes NEO retirement schedule and government capacity additions target in the NECP. Installed capacity for France's nuclear and gas (NECP) are based on NEO, as government targets are not available. Iberia data uses projections from both Spain and Portugal's NECPs. U.K. figures were not submitted to NECP process so capacity estimates from most recent government energy forecasts are used.

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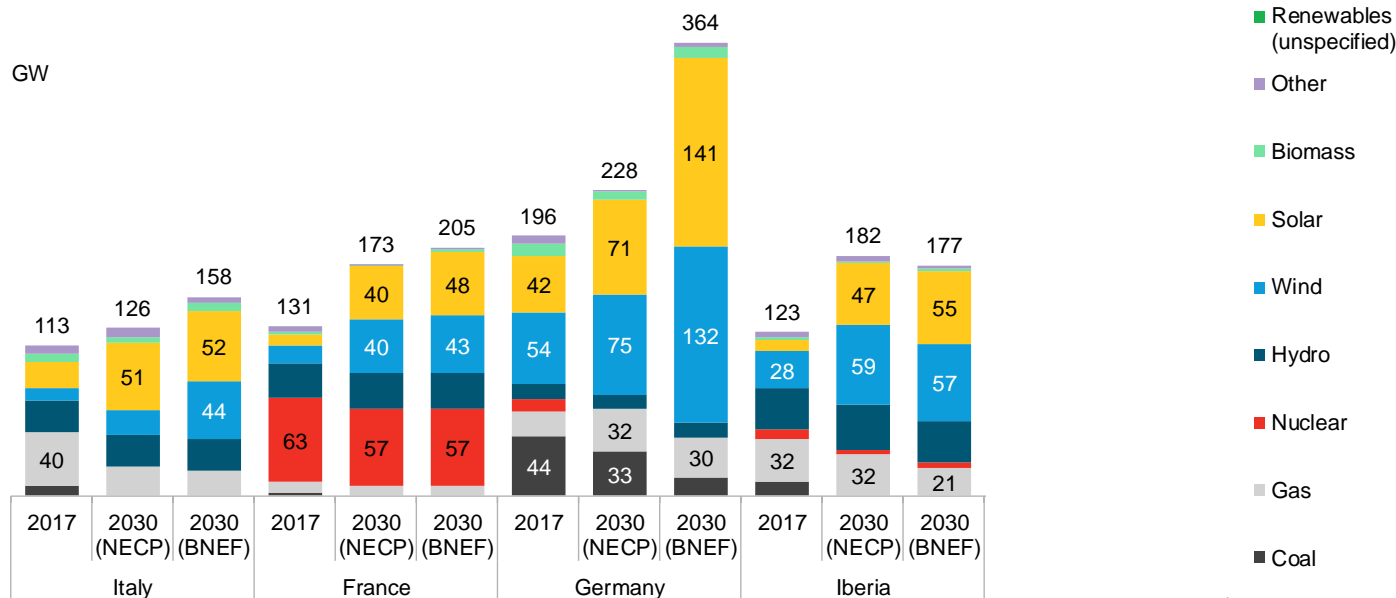
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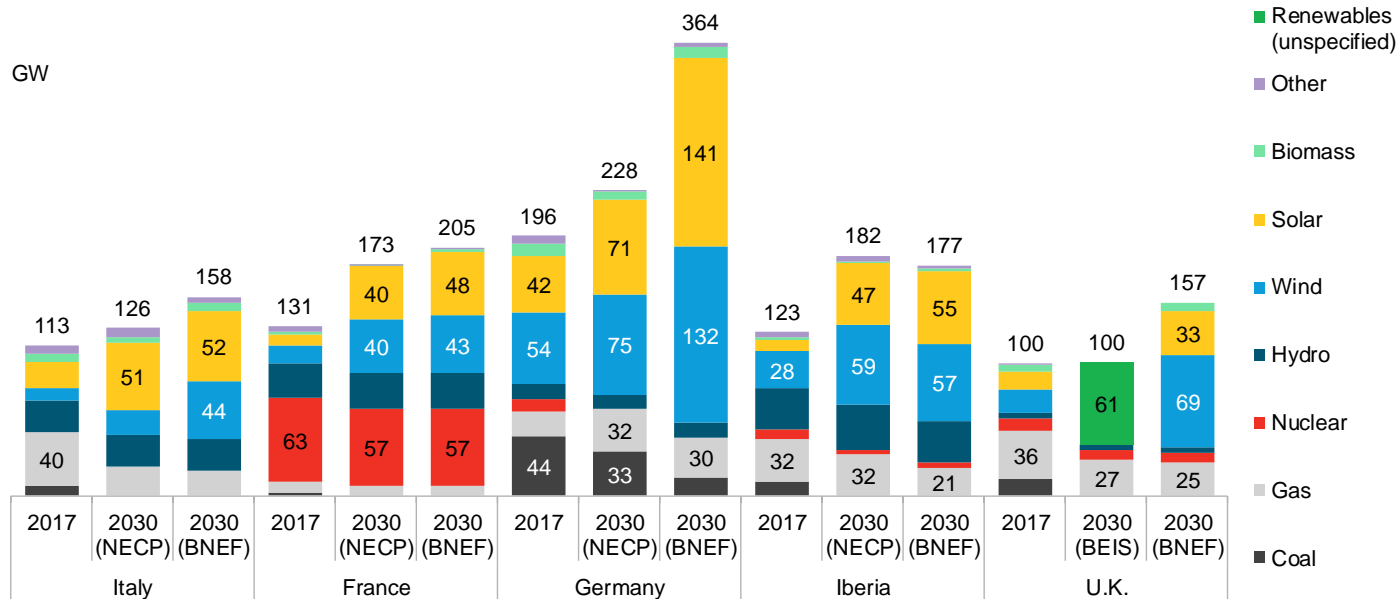


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Source: BloombergNEF New Energy Outlook 2019, NECPs, BEIS. Note: Gas capacity in Italy assumes NEO retirement schedule and government capacity additions target in the NECP. Installed capacity for France's nuclear and gas (NECP) are based on NEO, as government targets are not available. Iberia data uses projections from both Spain and Portugal's NECPs. U.K. figures were not submitted to NECP process so capacity estimates from most recent government energy forecasts are used.

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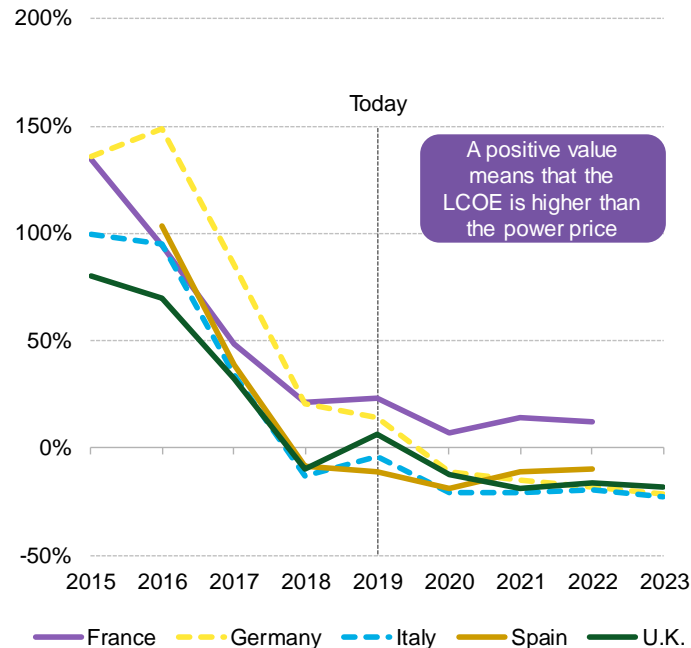
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# Renewables and power markets

Good news and bad news for renewables investors

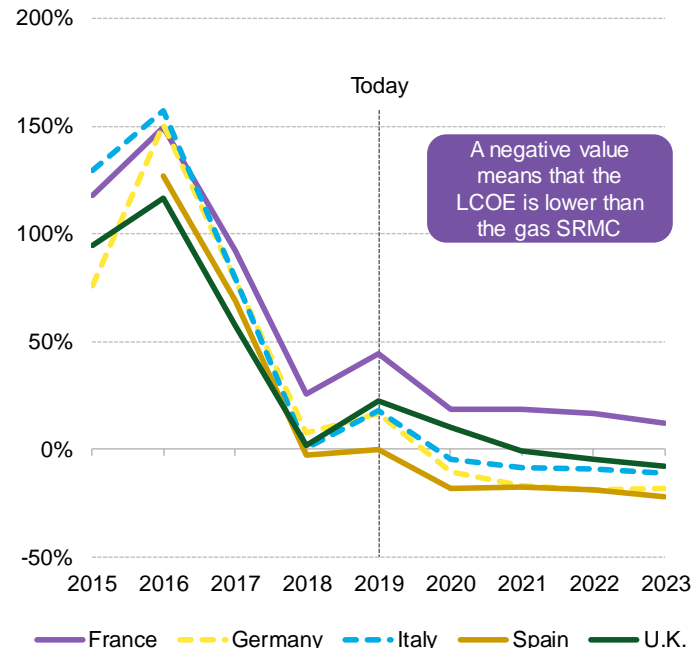
# Onshore wind – European overview

Onshore wind LCOE premium or discount over the power price



Source: Bloomberg LP, BloombergNEF. Note: Future data calculated using forward curve as of 24/04/2019. LCOE forecast based on BloombergNEF analysis.

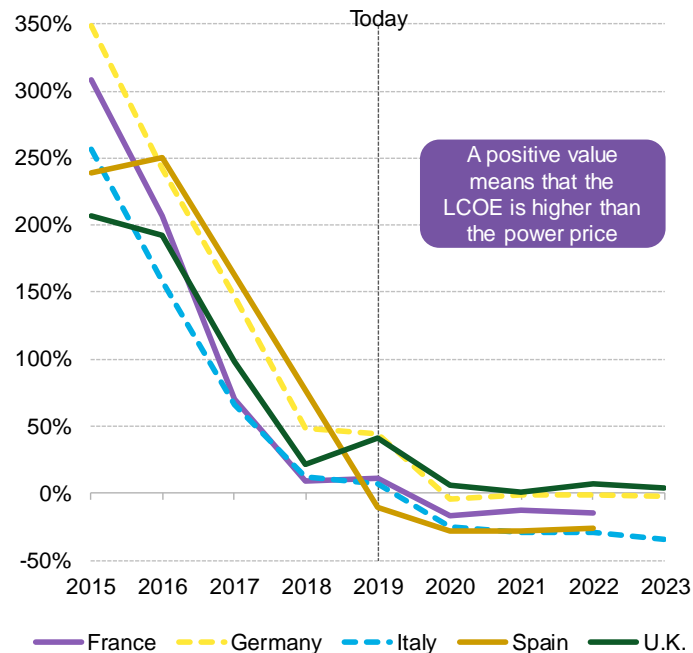
Onshore wind LCOE premium or discount over gas short run marginal cost (SRMC)



Source: Bloomberg LP, BloombergNEF. Note: Future data calculated using forward curve as of 24/04/2019. LCOE forecast based on BloombergNEF analysis.

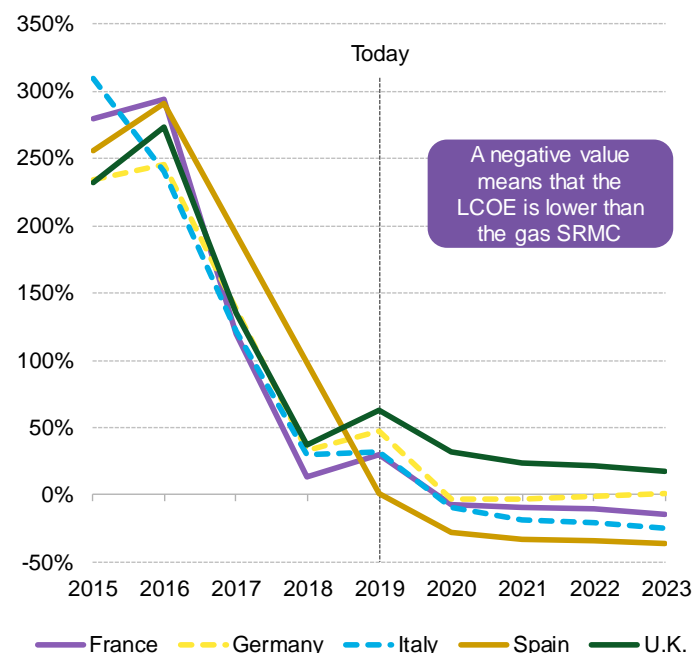
# Utility-scale PV – European overview

Utility-scale PV LCOE premium or discount over the power price



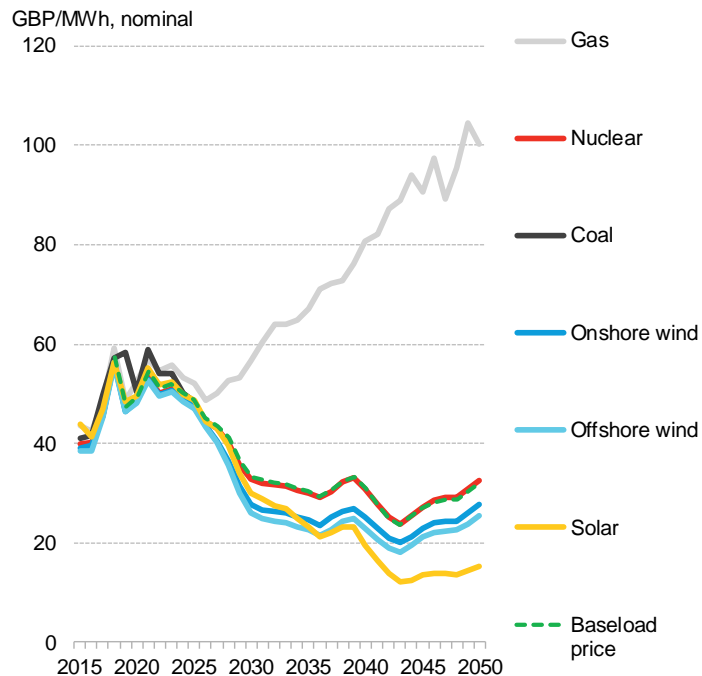
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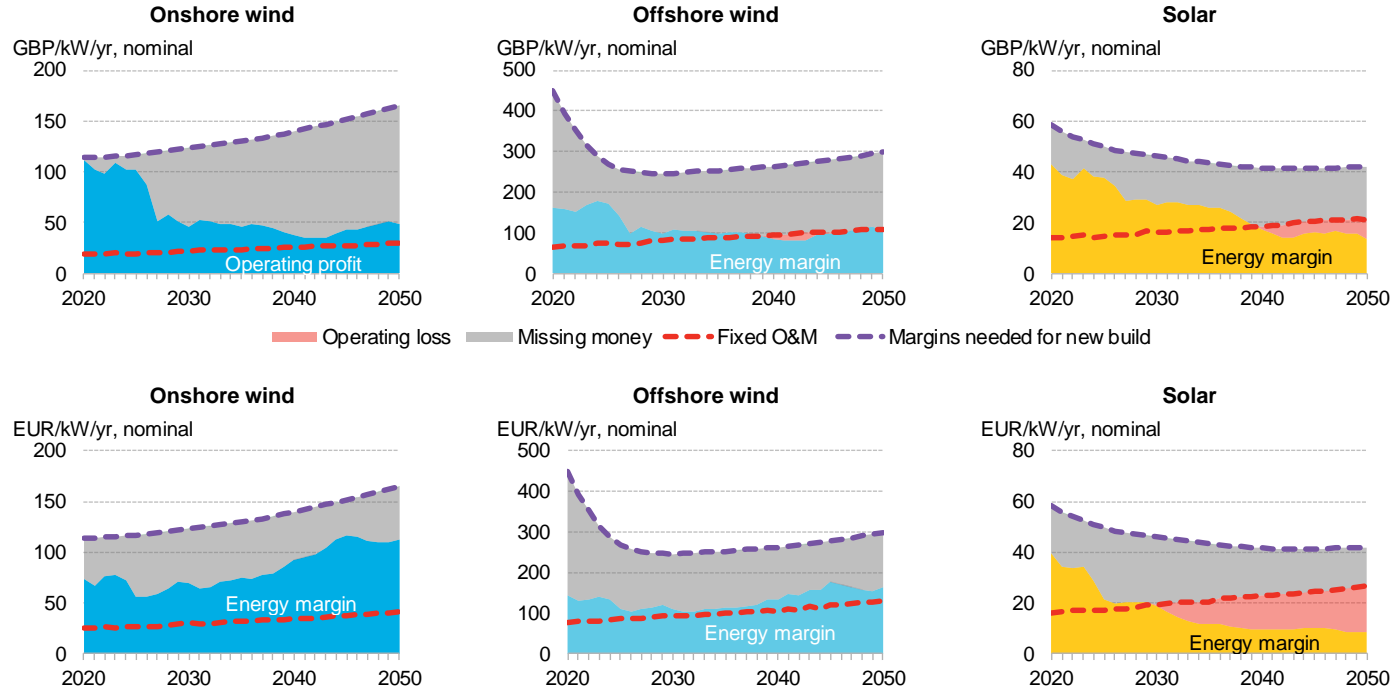
# Changes in power price dynamics



Source: BloombergNEF. Note: realized power prices are also known as captured prices, or generation weighted prices.

# Are merchant renewables viable?

Revenues from electricity sales for onshore wind, offshore wind, and solar in U.K. (top) and Germany (bottom)

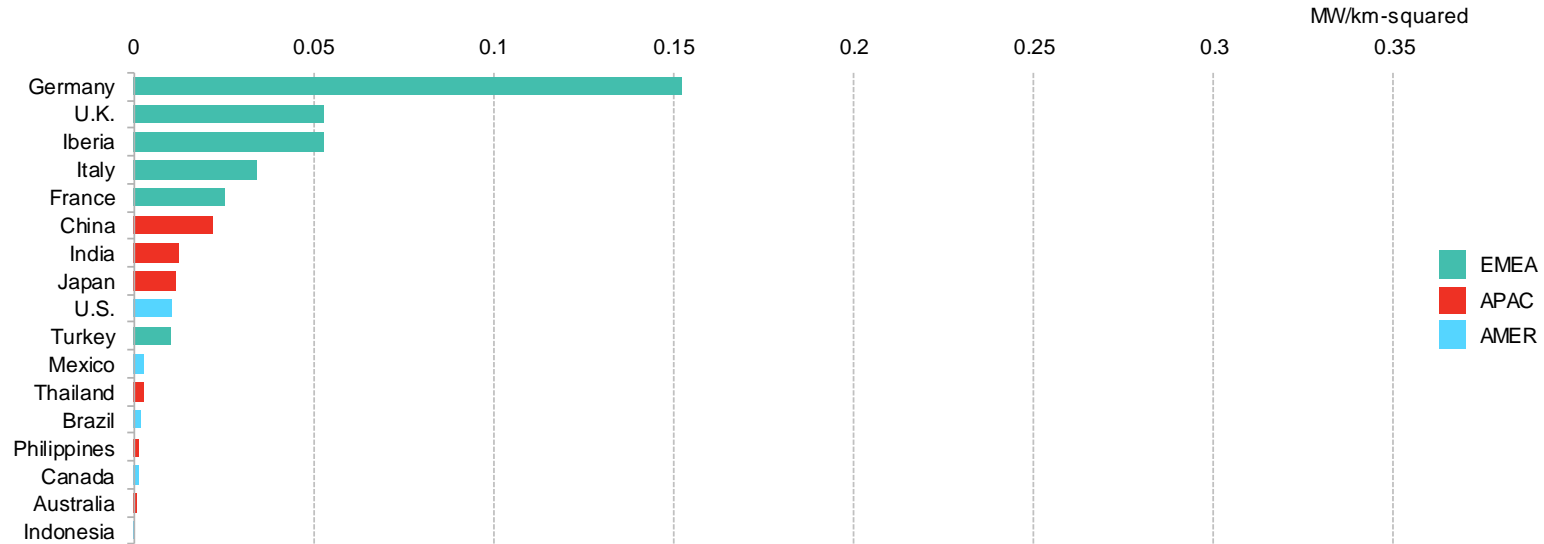


# Local resistance

A new challenge to the rollout of renewables

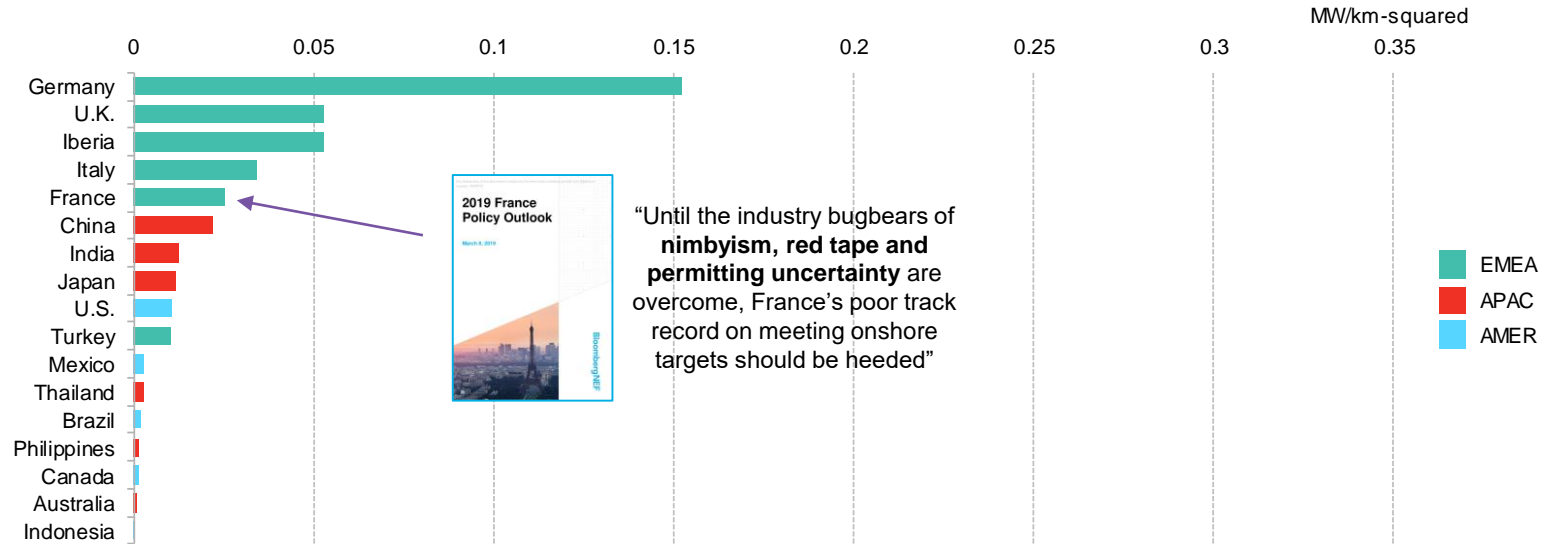


# Concentration of onshore wind capacity in selected countries, 2019-30



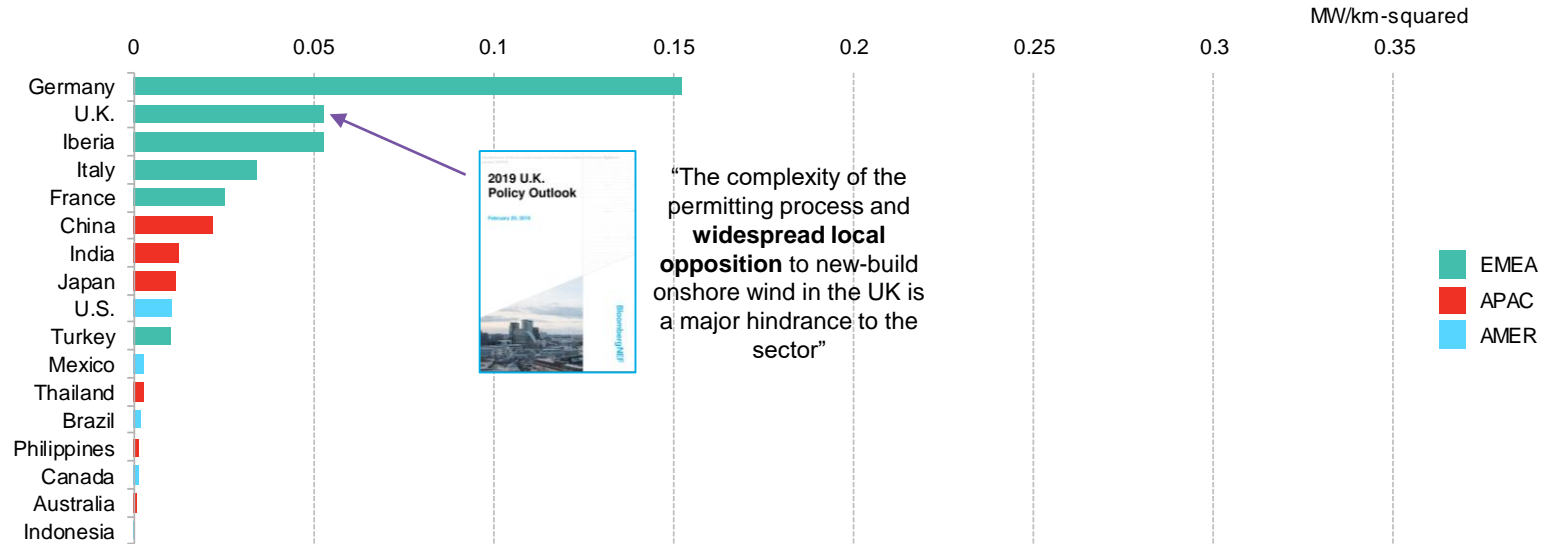
Source: BloombergNEF

# Concentration of onshore wind capacity in selected countries, 2019-30



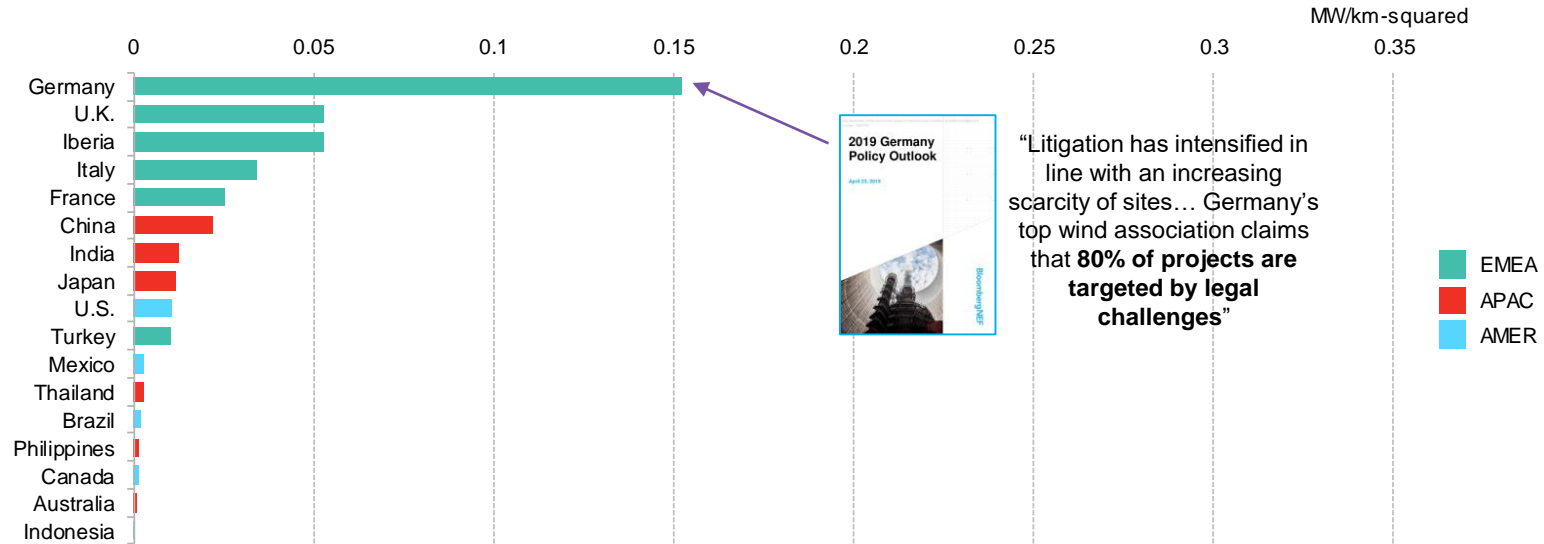
Source: BloombergNEF

# Concentration of onshore wind capacity in selected countries, 2019-30



Source: BloombergNEF

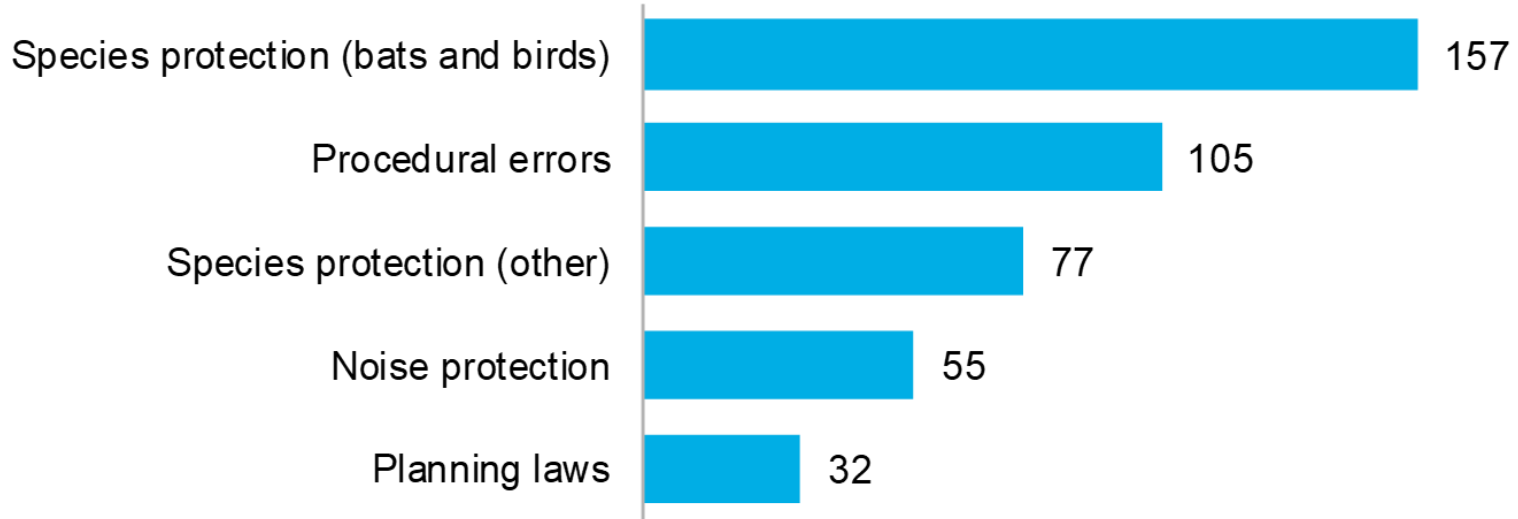
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Source: BloombergNEF

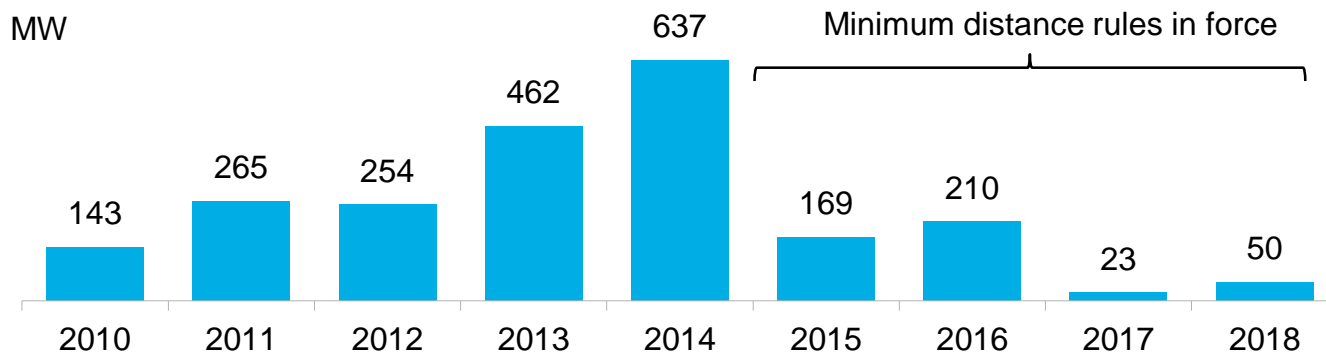
# Top five grounds for legal action against German onshore wind farms

Wind farms affected



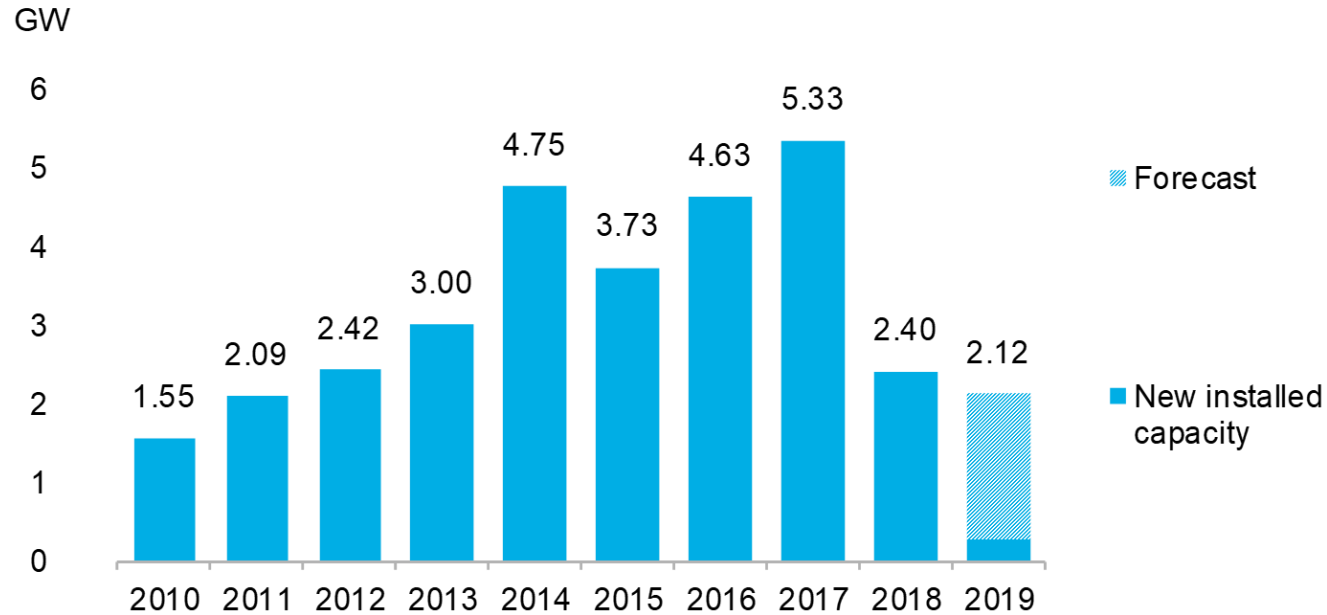
Source: Fachagentur Windenergie, BloombergNEF. Note: Respondents could select multiple options for litigation targeting a given wind farm. 325 wind farms surveyed.

# Newly permitted onshore wind in Bavaria



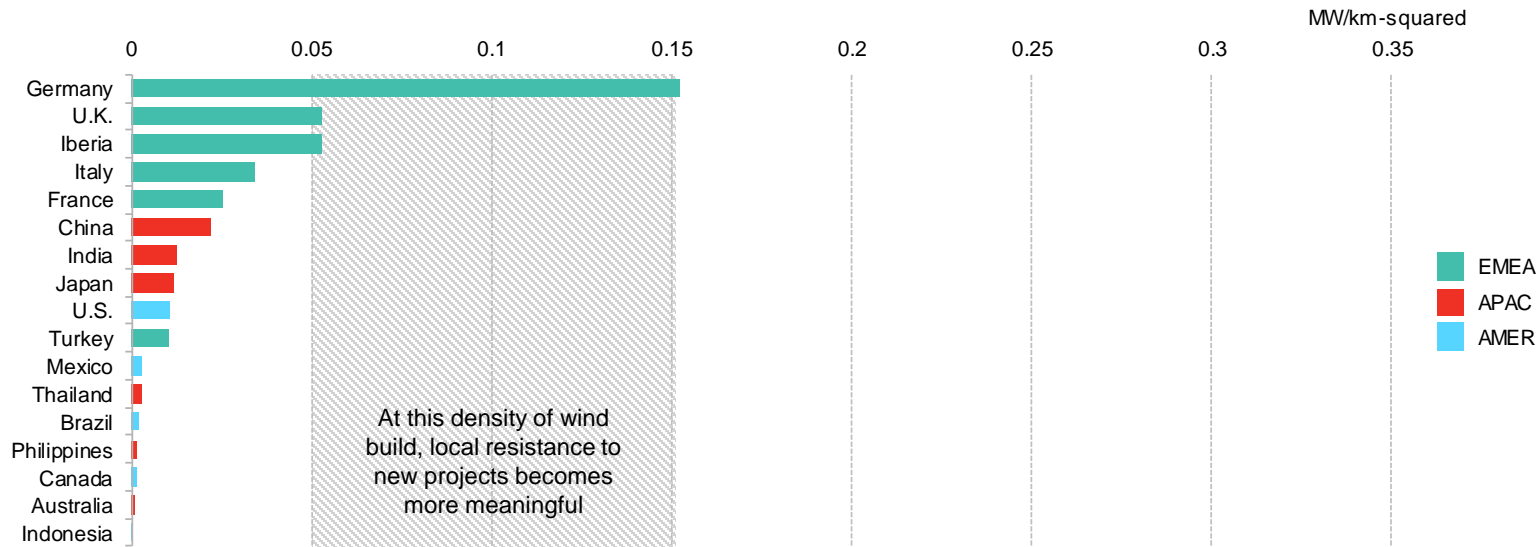
Source: BloombergNEF, Federal Environmental Agency

# New installed German onshore wind capacity



Source: Bundesverband Windenergie, BloombergNEF. New installed capacity as of 1H 2019

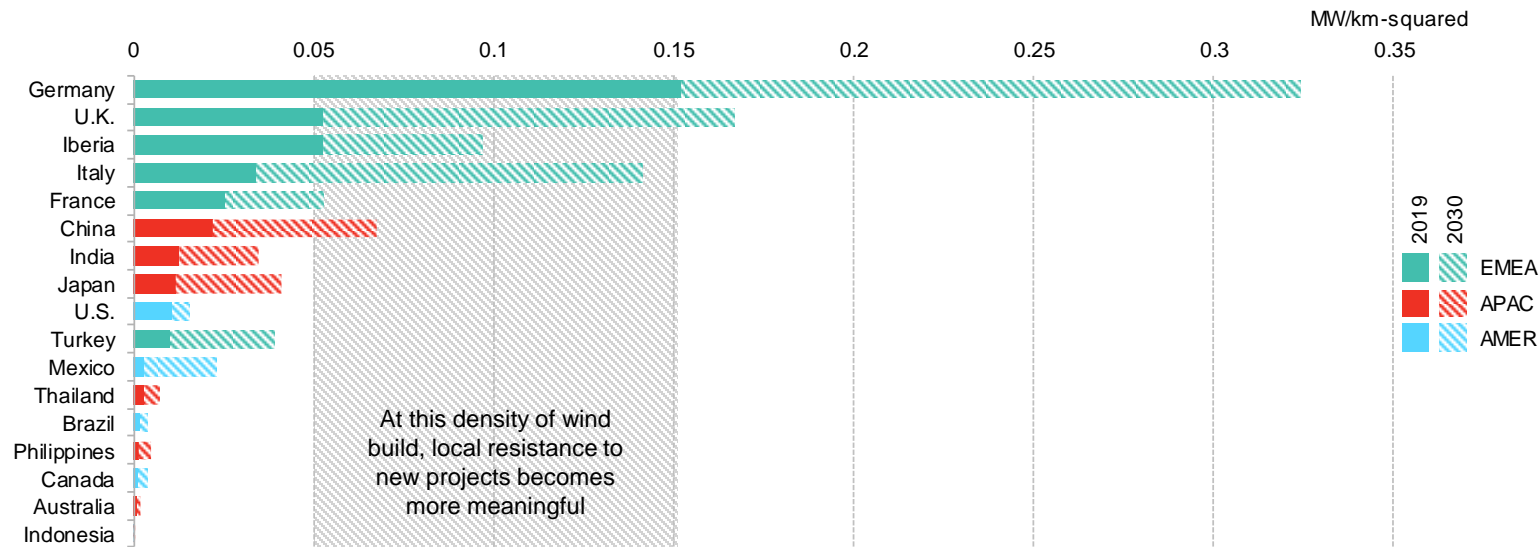
# Concentration of onshore wind capacity in selected countries, 2019-30



Source: BloombergNEF



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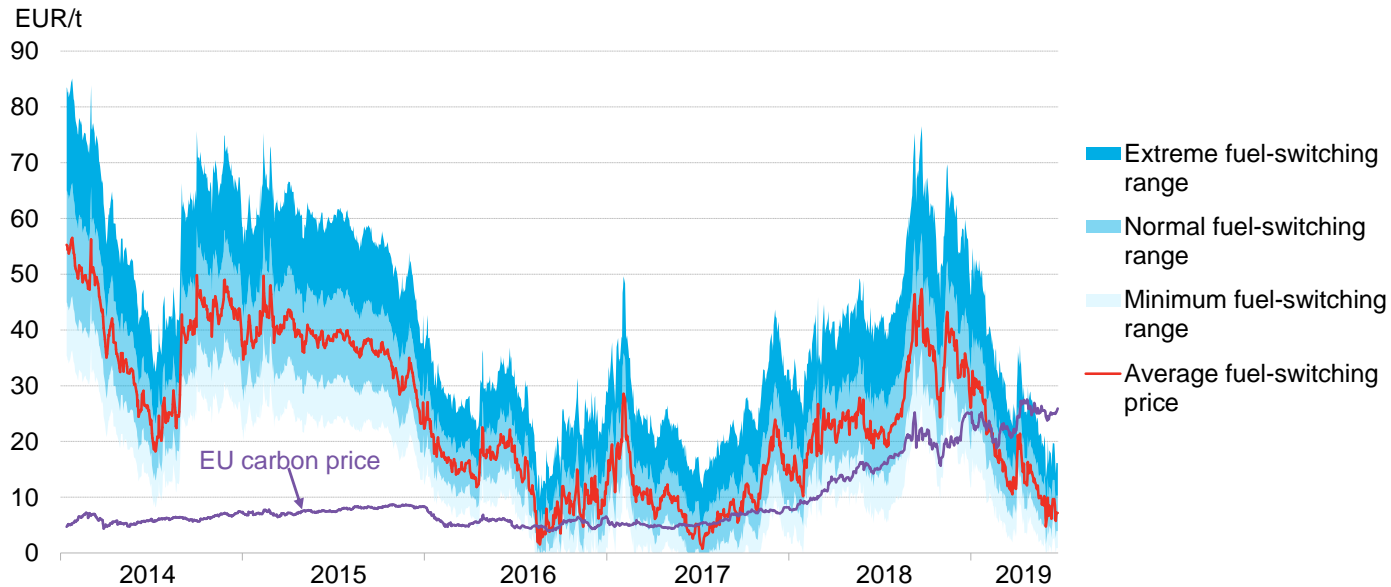


Source: BloombergNEF

# What is the impact of the EU ETS?

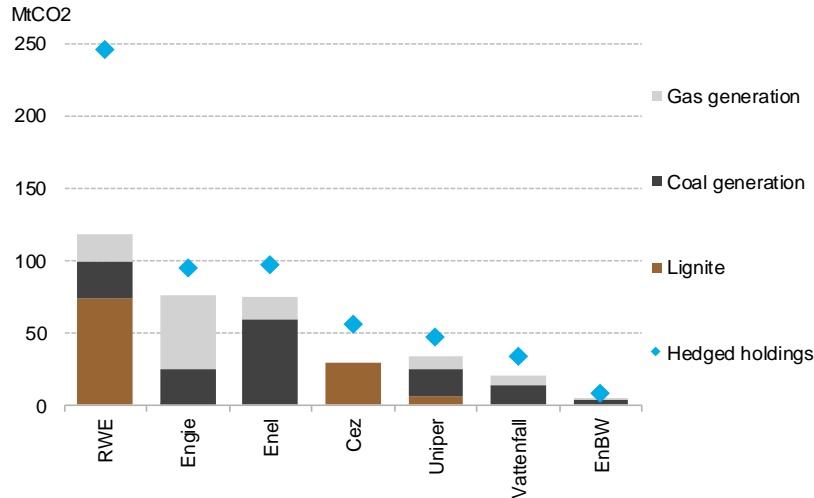
Beyond fuel switching

# EUA price and north-west Europe carbon fuel-switching price range



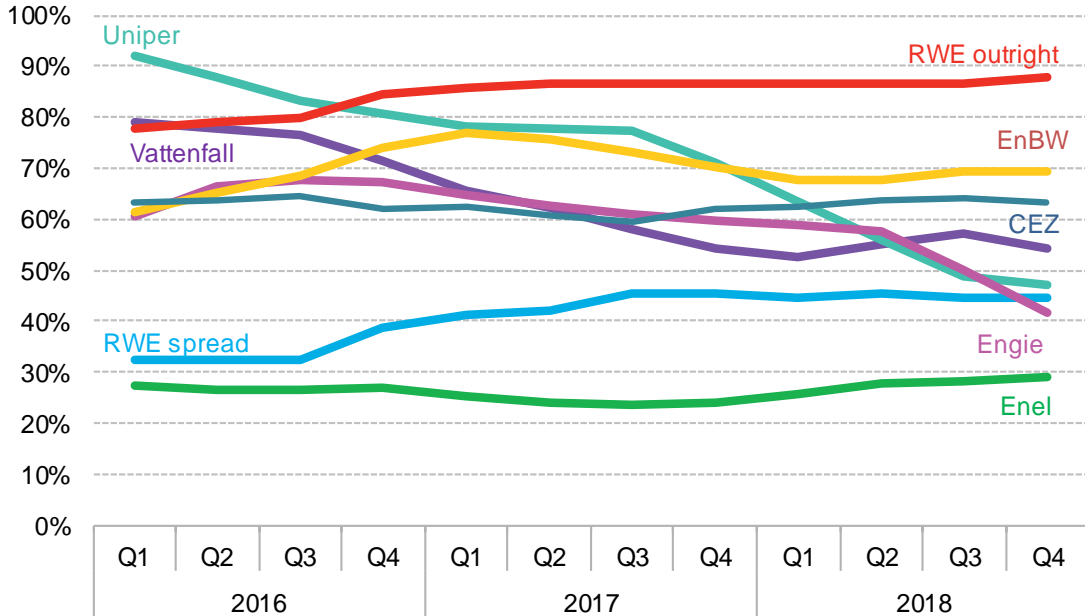
Source: BloombergNEF

# Estimated emissions from thermal generation vs. hedged EUA holdings



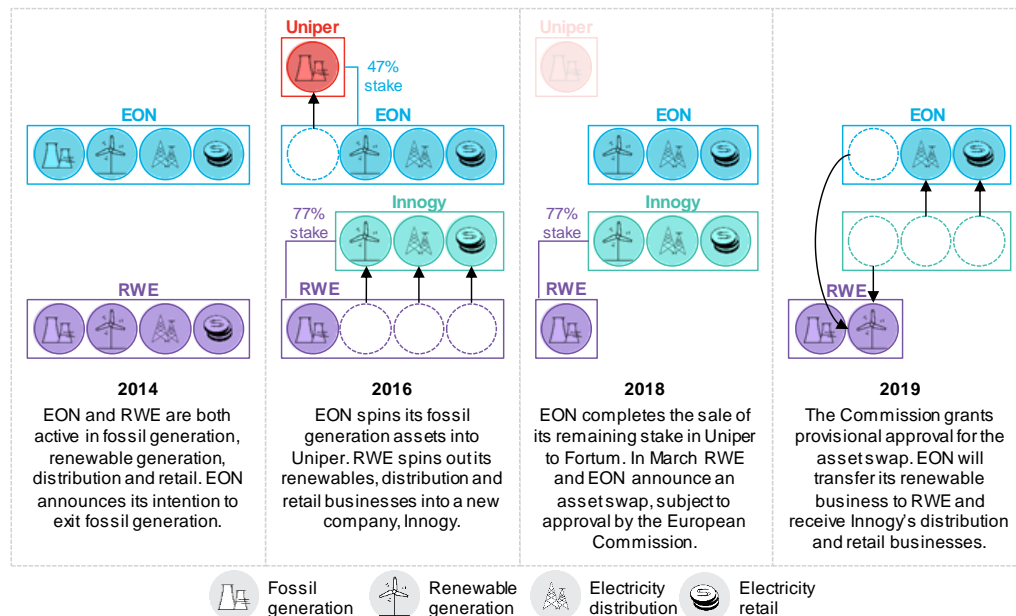
Source: : Company reports. BloombergNEF. Note: EUA holdings are estimated by factoring in generation by fuel, hedging rates, and carbon-intensity: 410g/kwh to gas, 920 to coal, 1100 to lignite.

# Generator three-year average hedging rates

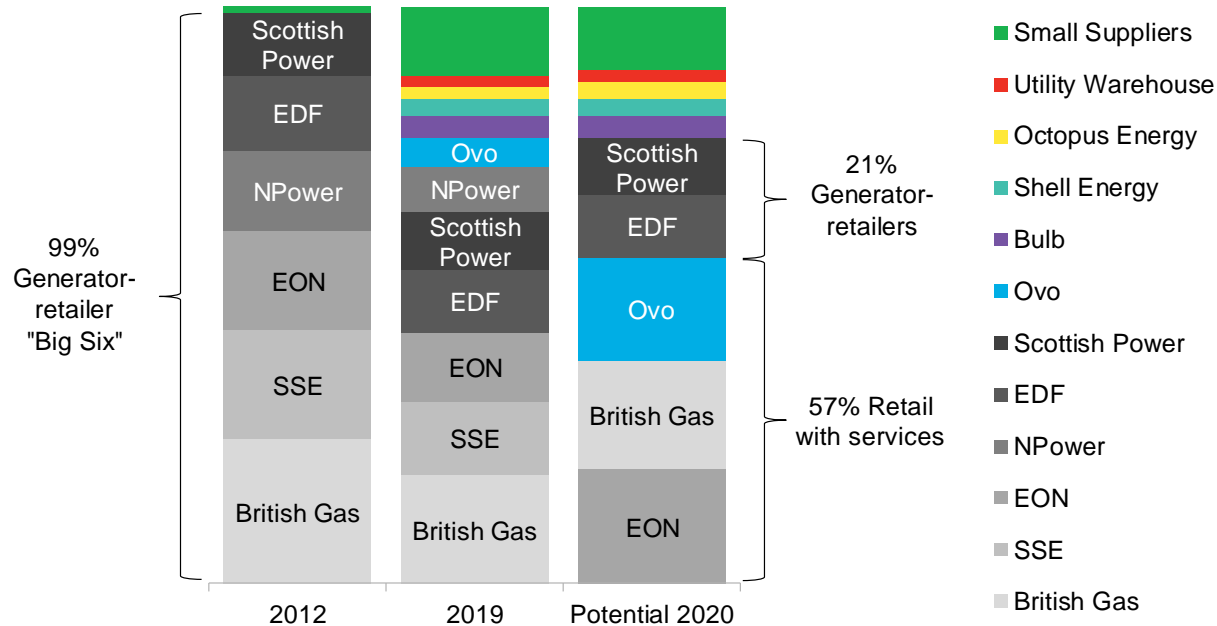


Source: BloombergNEF

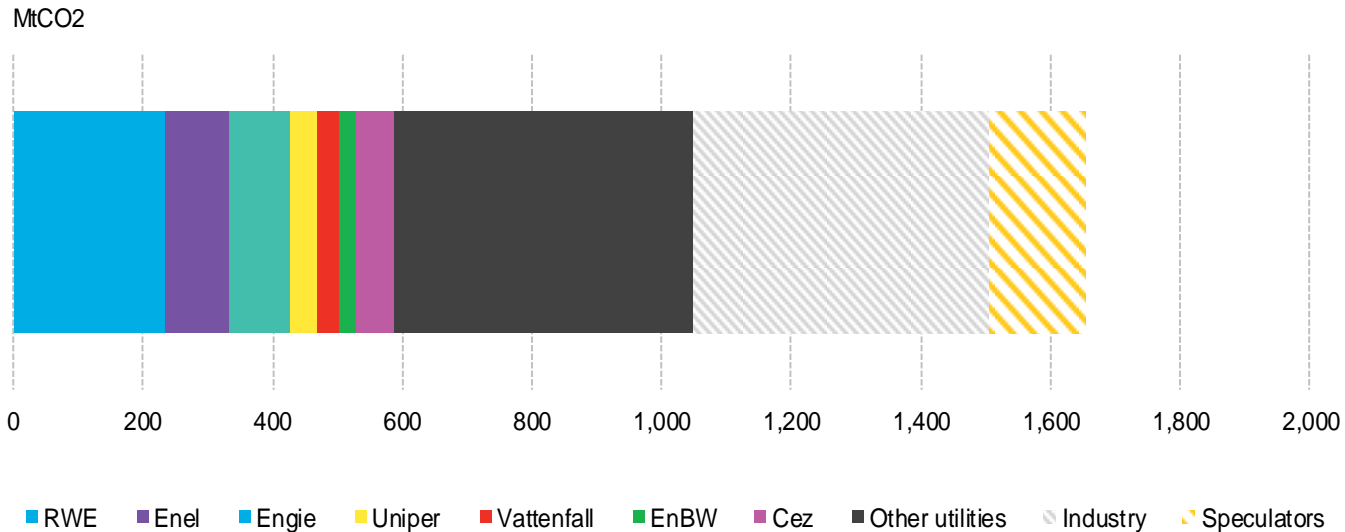
# The story of EON and RWE



# UK electricity retail market shares



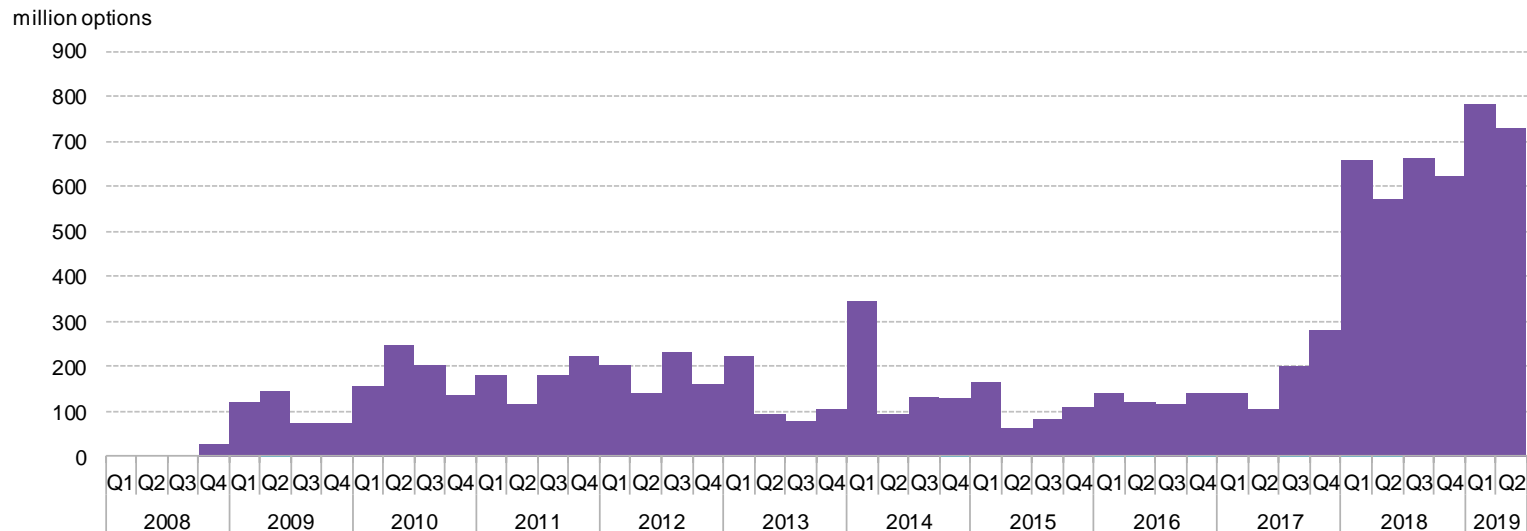
# Estimate of utilities' holdings and total number of allowances in circulation, 2018



Source: : Company reports. BloombergNEF. Note: EUA holdings are estimated by factoring in generation by fuel, hedging rates, and carbon-intensity: 410g/kwh to gas, 920 to coal, 1100 to lignite.



# Volume of EU ETS option trades



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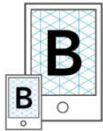
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