

European power prices

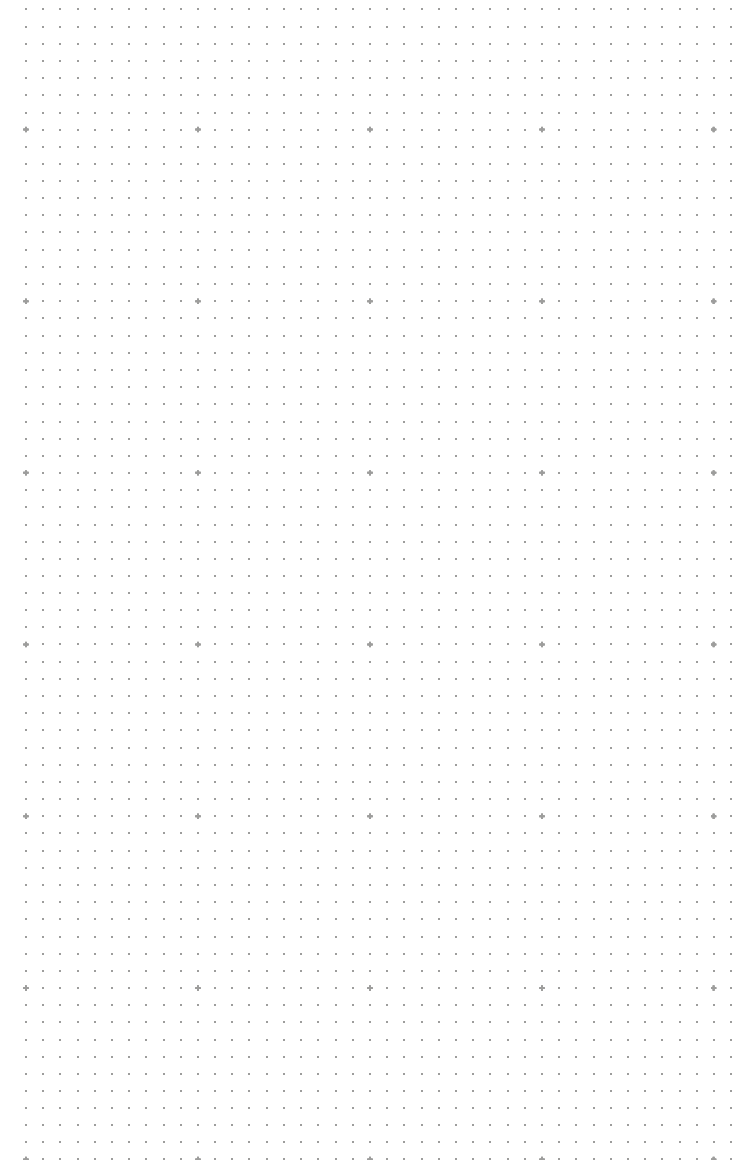
Challenges and opportunities for wind

Andreas Gandolfo

November 28, 2018

Introduction

What is BloombergNEF





Clean energy



Solar



Wind



Storage



Decentralized energy



Frontier power



Heat



Impact on power & utilities

Commodities



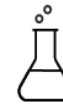
Power markets



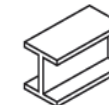
Gas & LNG



Oil & products



Chemicals



Metals



Carbon

Digital industry



IoT technologies & platforms



Advanced analytics & automation



Digital business model evolution



Digitalization of energy, industry & supply chains

Advanced transport



Electrified transport



Mobility services



Connected & autonomous vehicles

Advanced materials



3D printing & green manufacturing



Sustainable materials & circular economy



Composites, bioplastics, & new materials



Impact on industrials, utilities & manufacturing



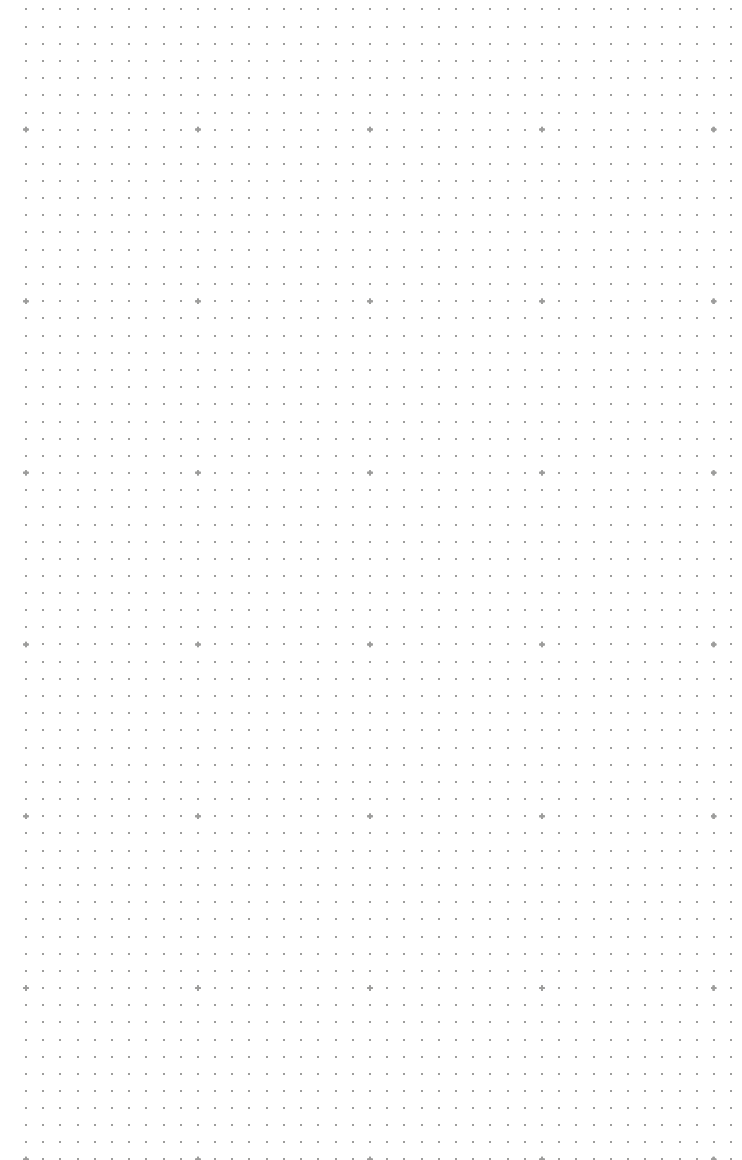
Impact on transport



Impact on oil & power

Power prices in Europe

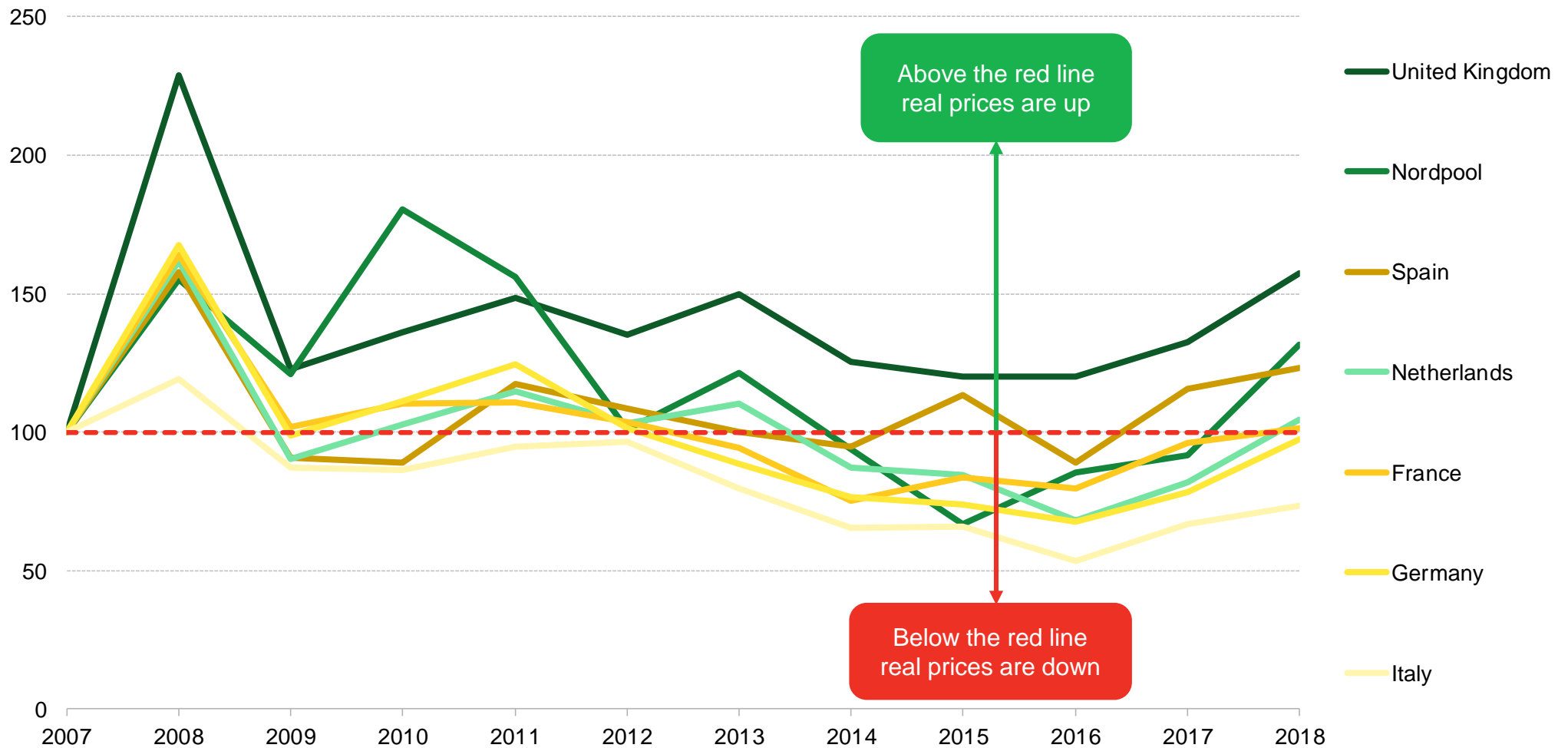
The challenge for wind



Ten years of stable power prices

Real 2007 power prices in select European markets, indexed to 2007

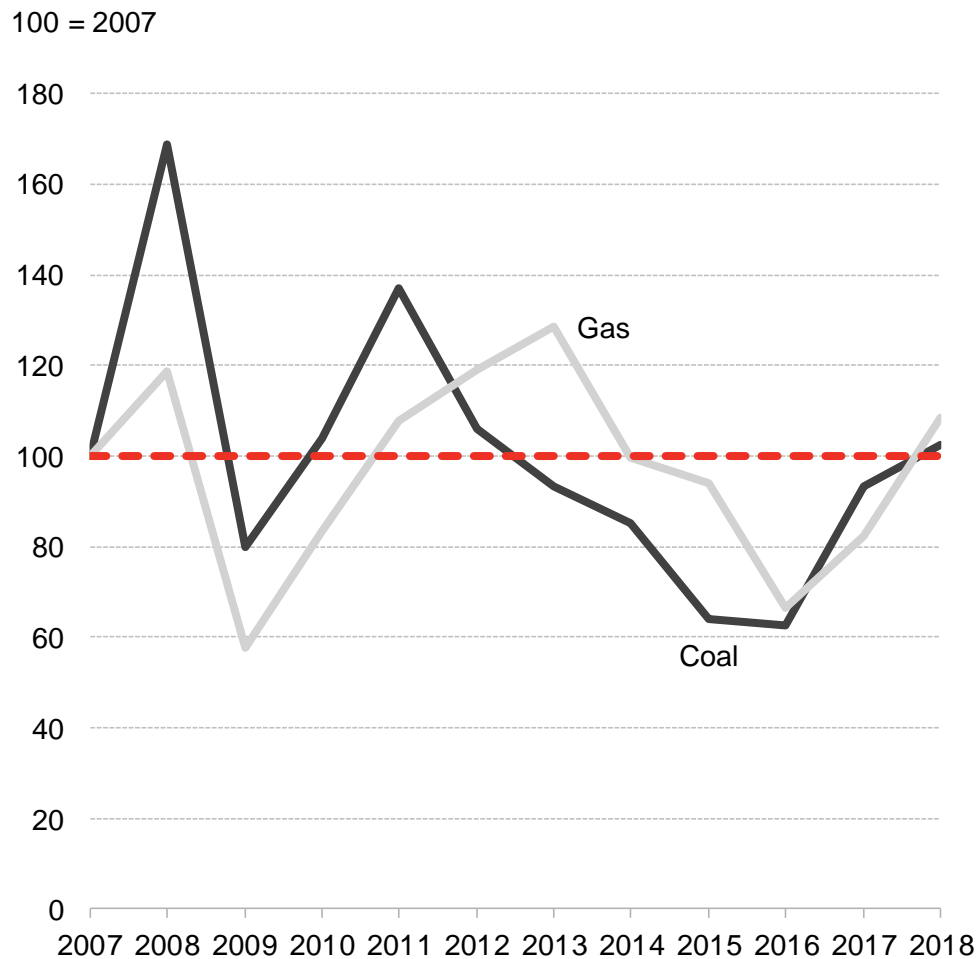
100 = 2007, real 2007



Source: Bloomberg Terminal, Bloomberg NEF.

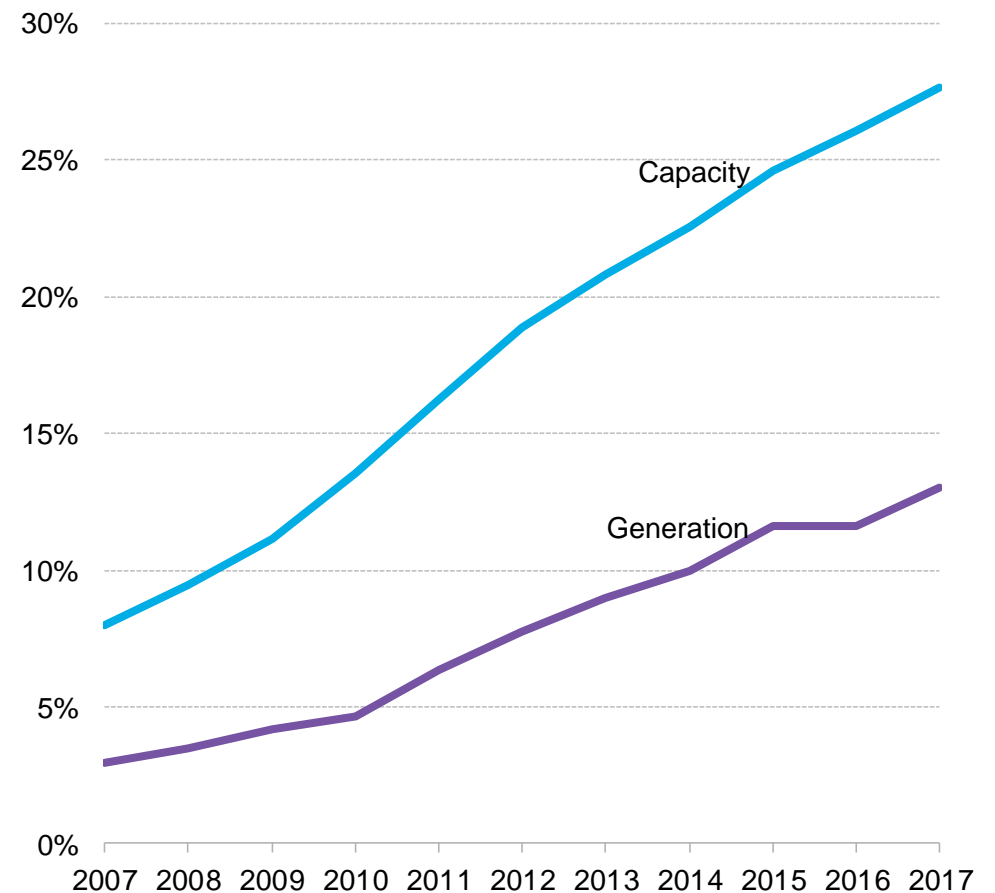
Why are power prices stable

Commodity prices in Europe, indexed to 2007



Source: Bloomberg Terminal, BloombergNEF. Note: TTF hub prices used for gas

Wind and solar as a share of total EU 28 capacity and generation

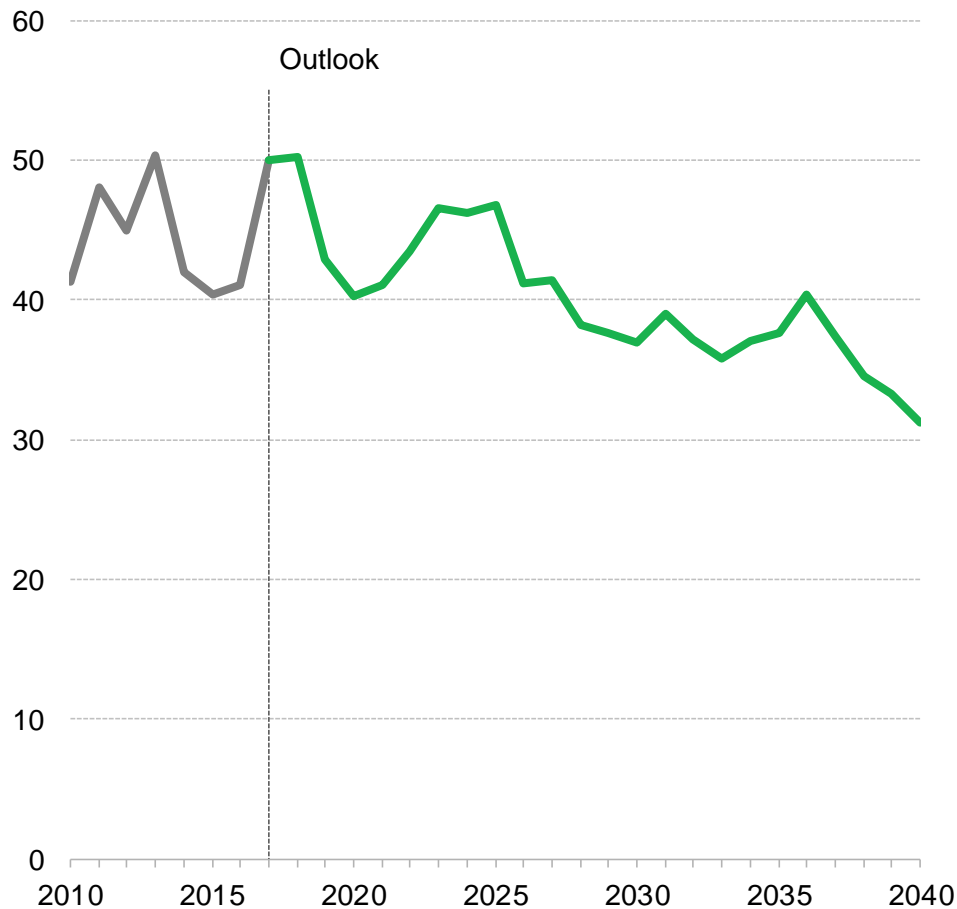


Source: BloombergNEF. Note: EU 28 is the 28 countries of the European Union

European power prices unlikely to rise

U.K. power price outlook

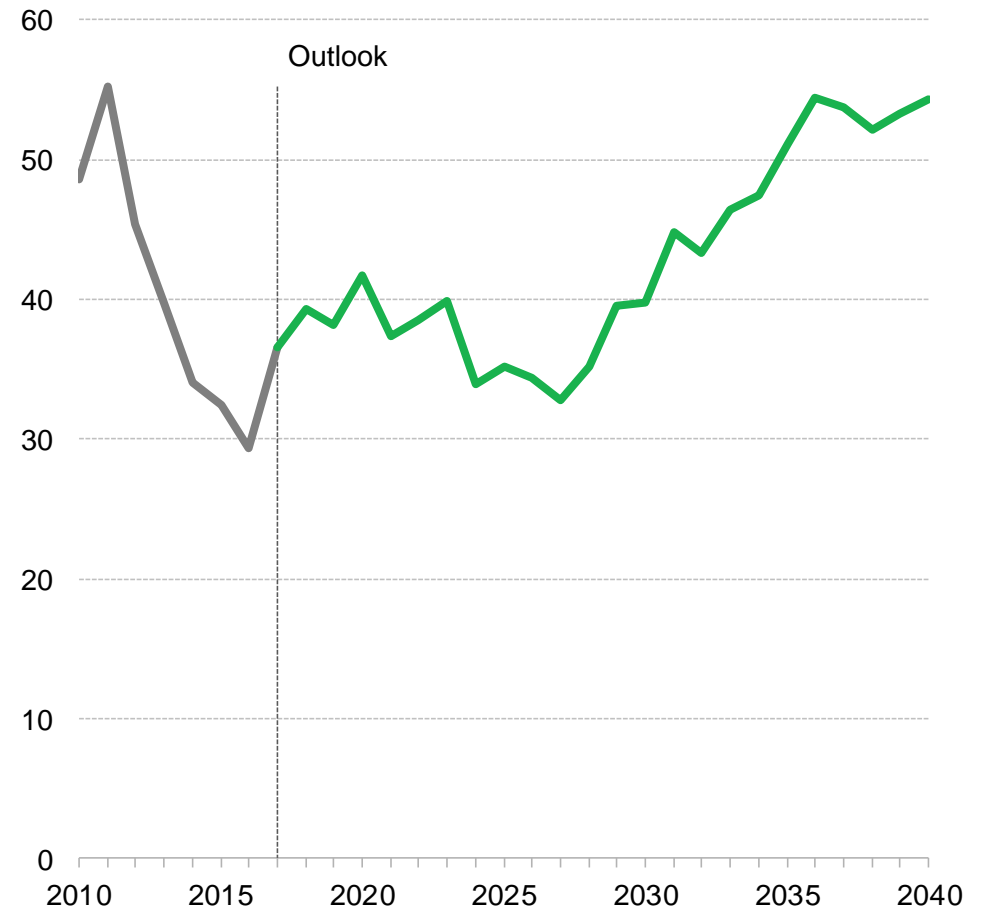
GBP/MWh, real 2010



Source: Bloomberg NEF

Germany power price outlook

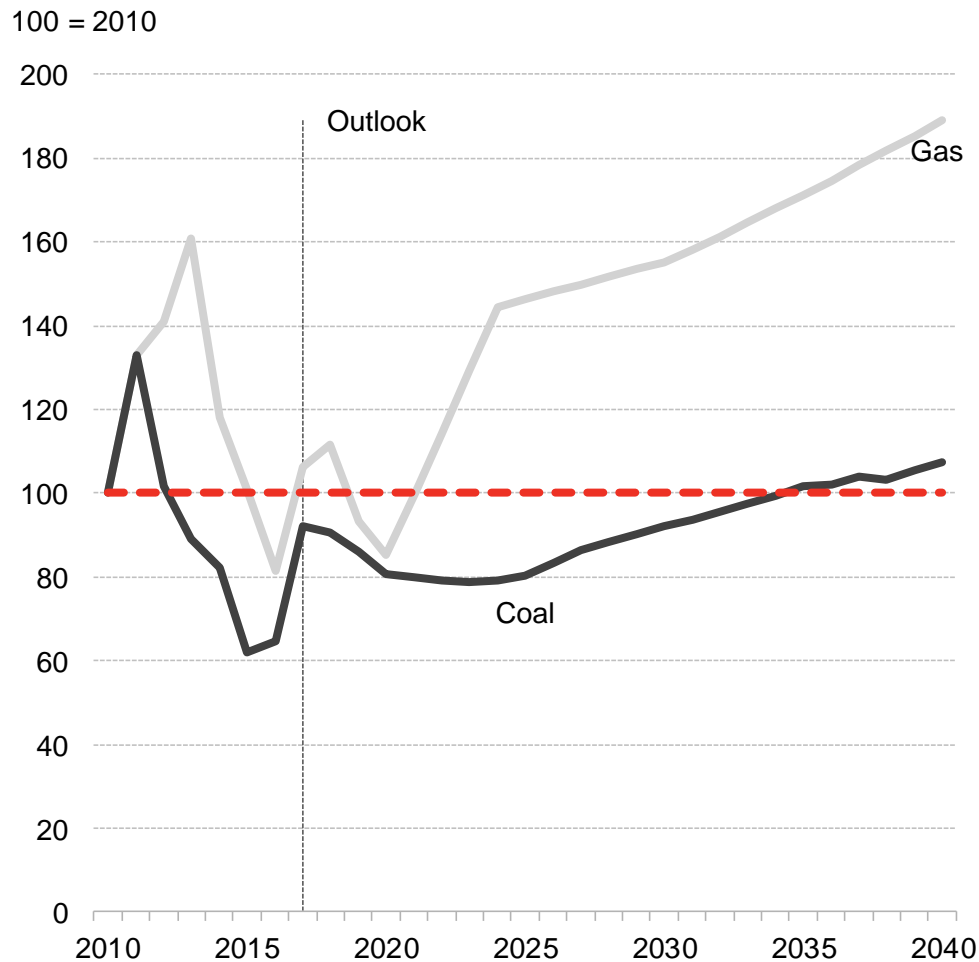
EUR/MWh, real 2010



Source: Bloomberg NEF

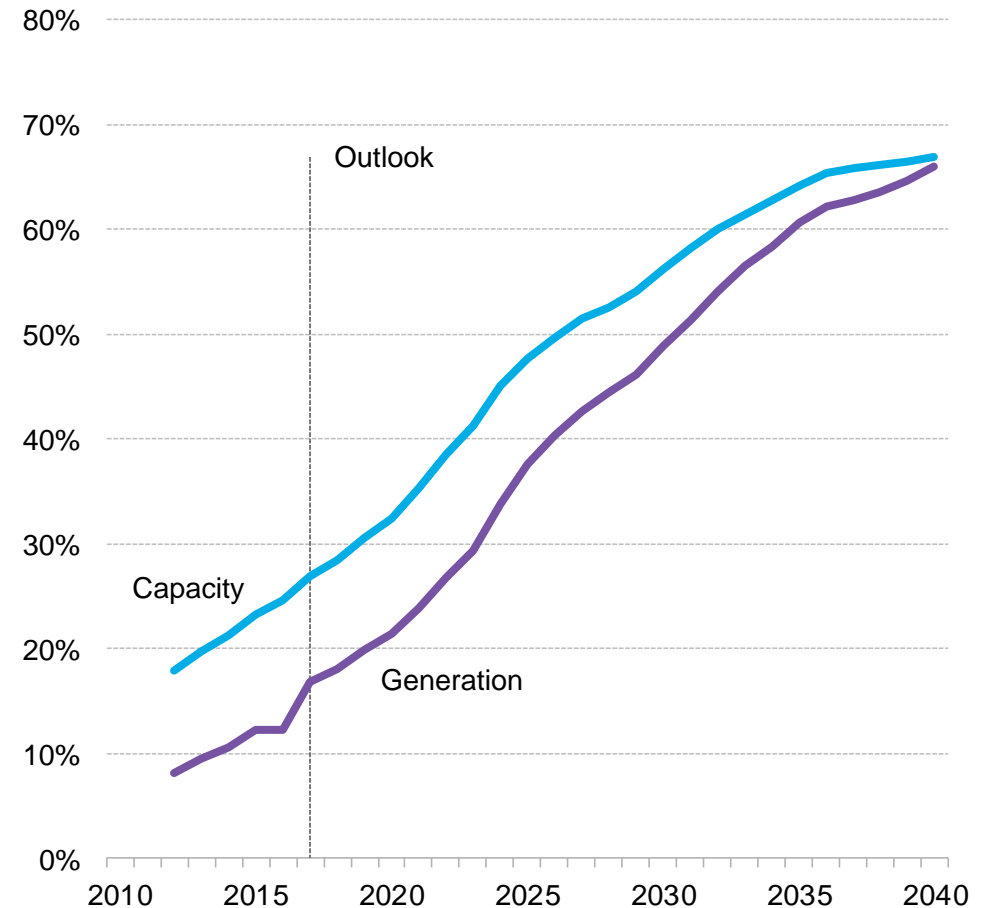
What is keeping European power prices from rising

Coal and gas price outlooks indexed to 2010



Source: BloombergNEF

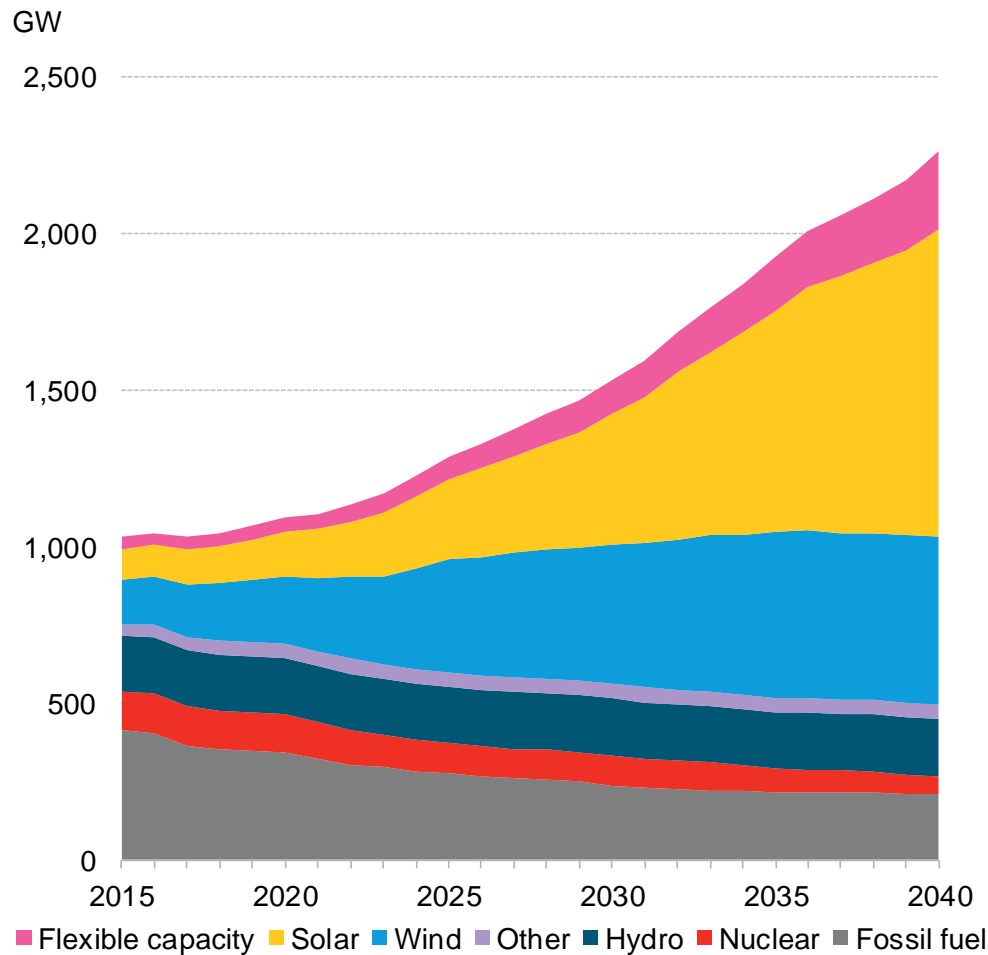
Wind and solar as a share of total European capacity and generation



Source: BloombergNEF

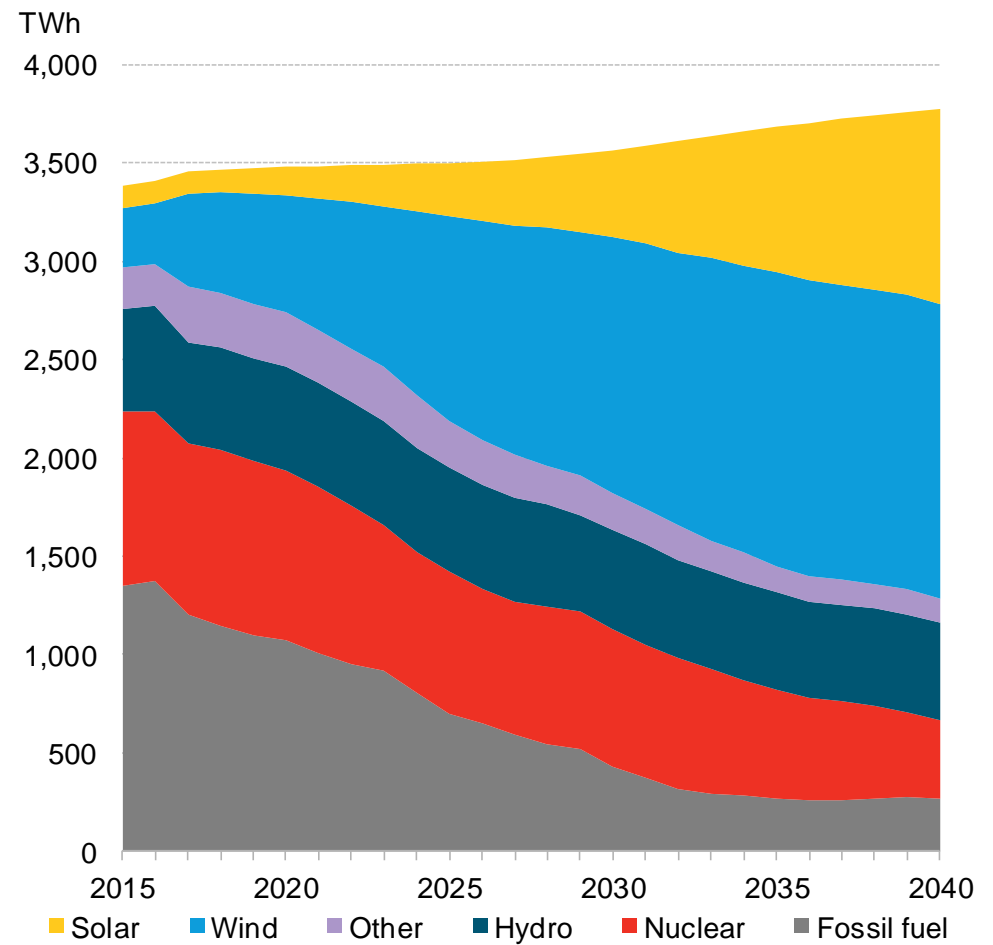
How much wind and solar do we expect in Europe

Cumulative installed generating capacity



Source: BloombergNEF. Note: Other includes biomass, and geothermal

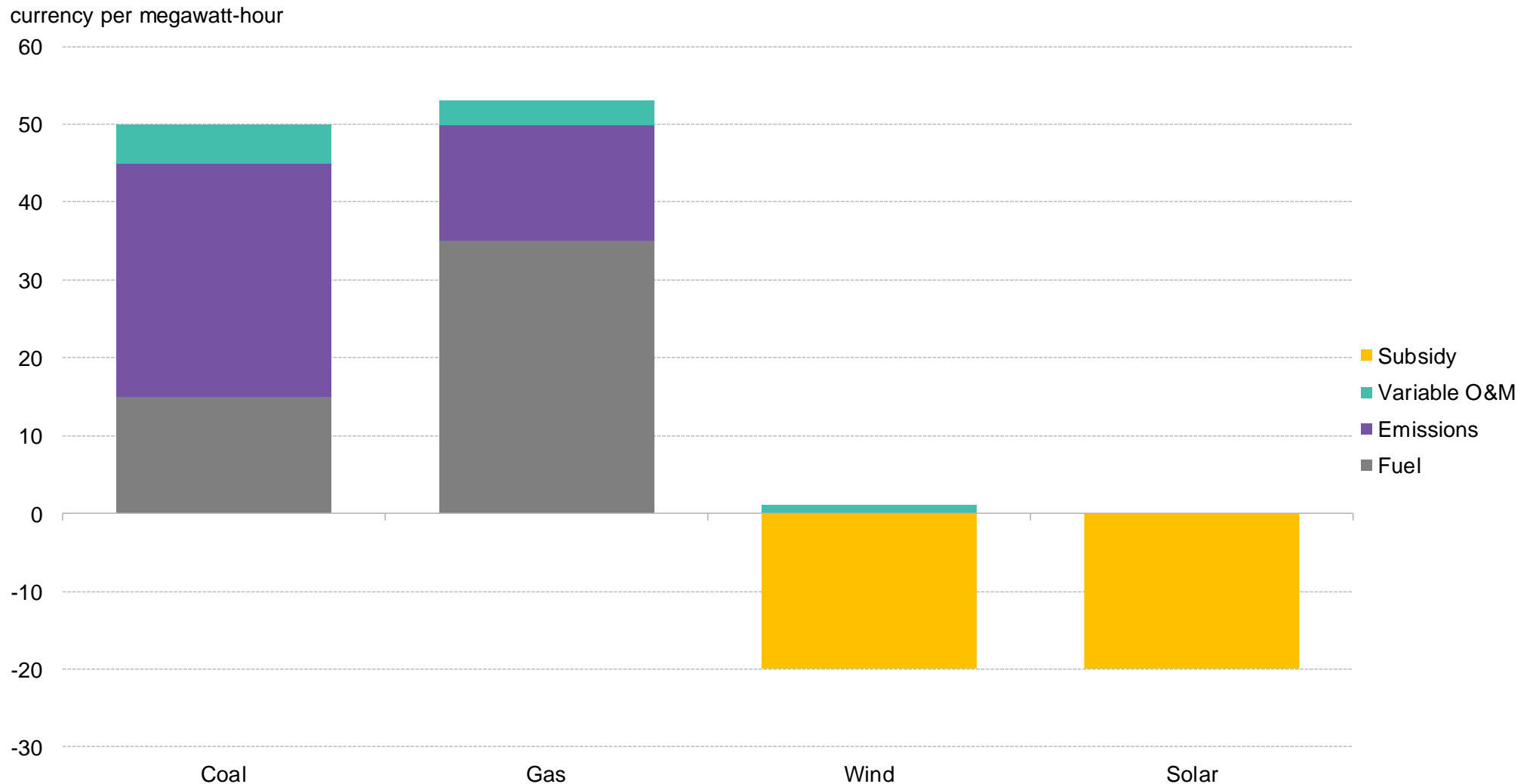
Generation by technology



Source: BloombergNEF. Note: Other includes biomass, and geothermal

Why do wind and solar depress prices

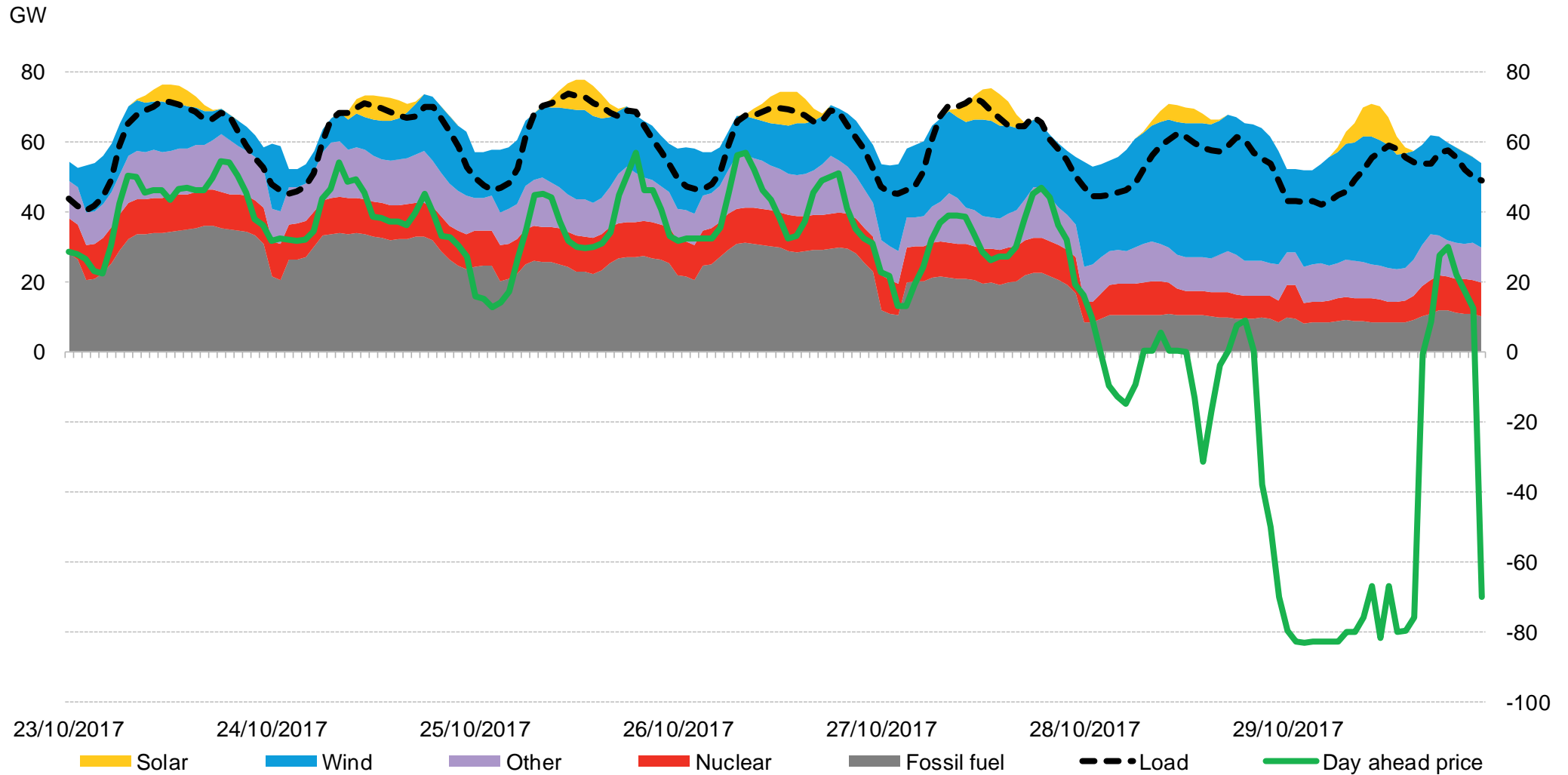
What does it cost different technologies to generate a megawatt-hour of electricity



Source: BloombergNEF. Note: O&M stands for operation and maintenance, not all subsidy schemes pay out during negative power prices

We have already seen wind and solar push prices down

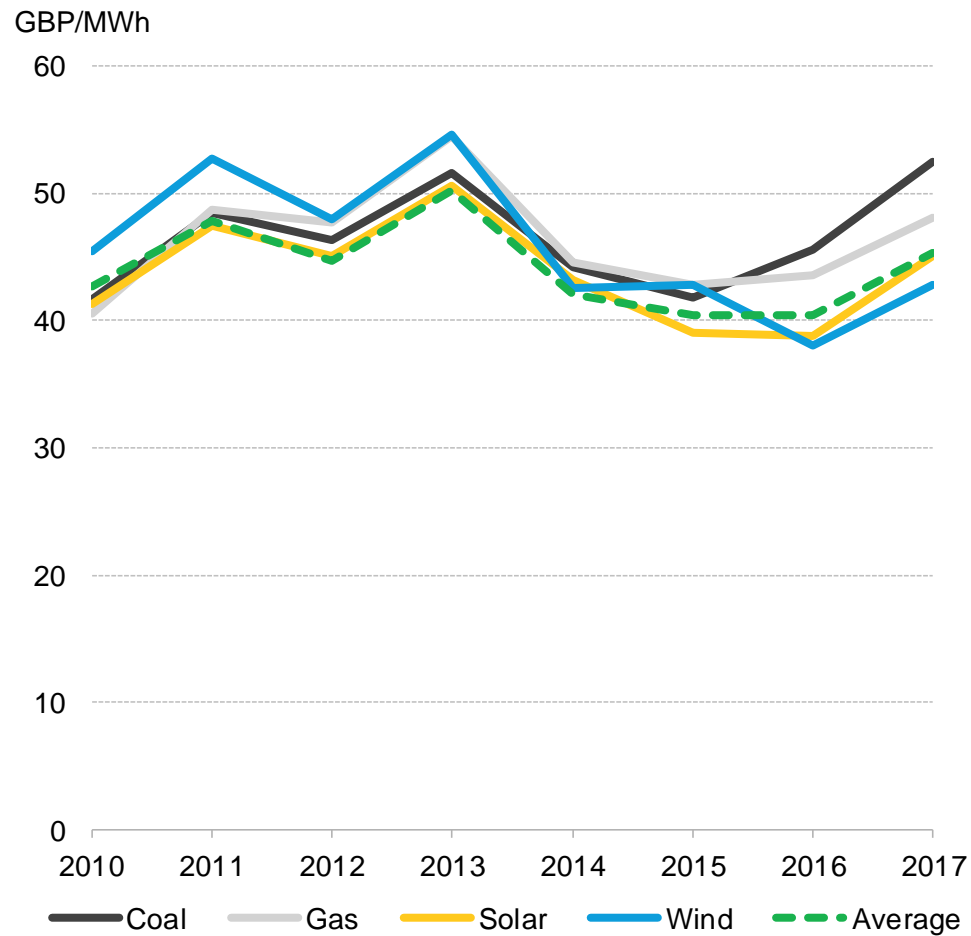
German electricity generation by fuel type and power price for the week of October 23, 2017



Source: Bloomberg Terminal, Bloomberg NEF

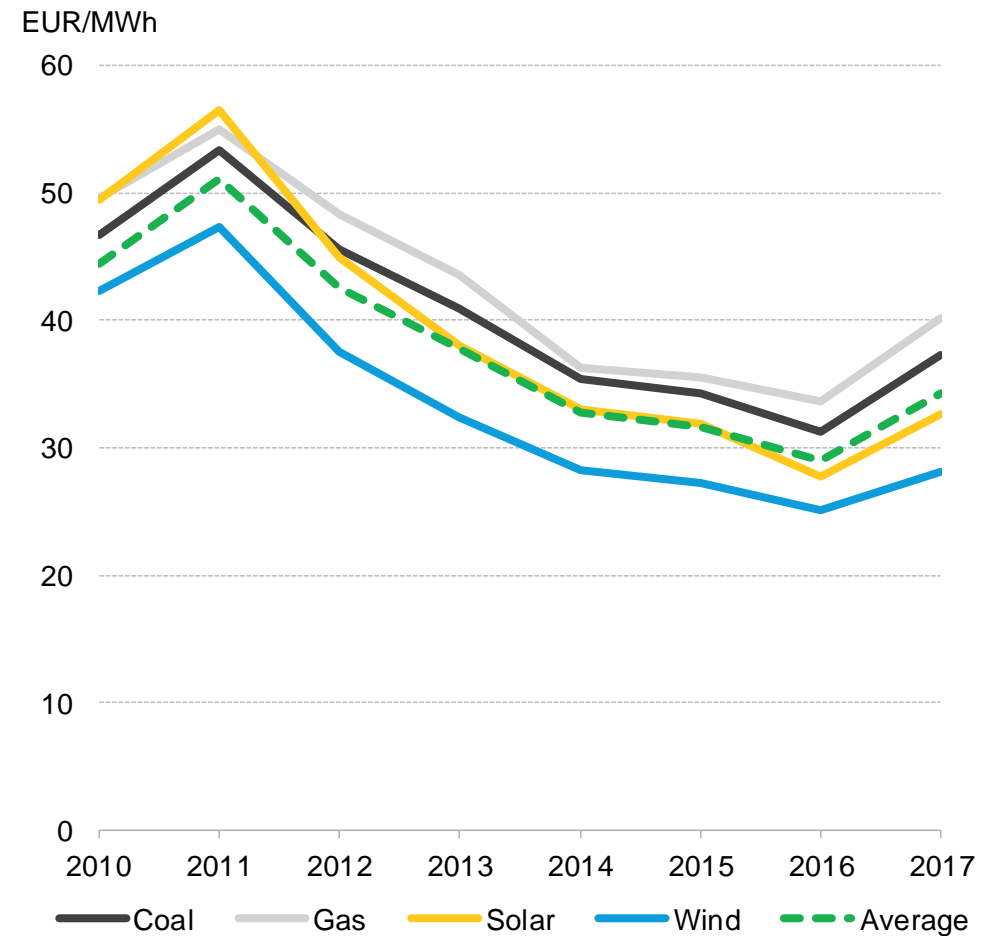
Renewables capture a discounted price

U.K. historical realized prices by technology



Source: Bloomberg NEF

German historical realized prices by technology

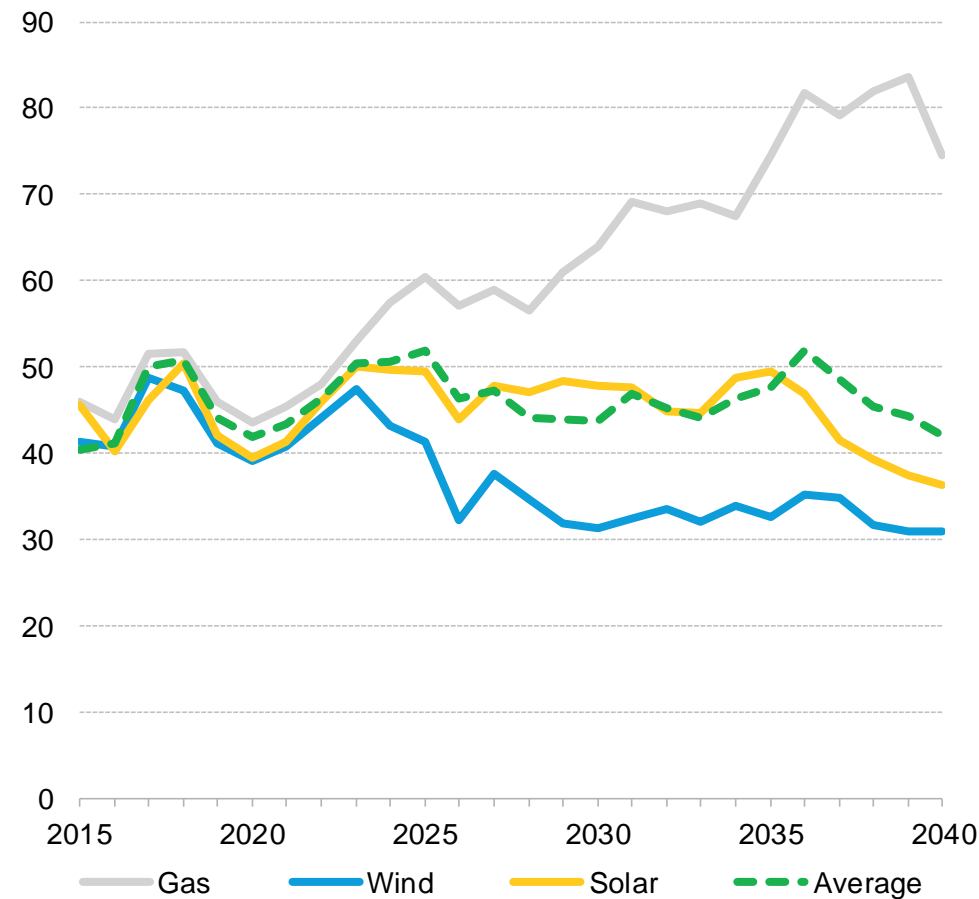


Source: Bloomberg NEF

And the discount does not go away

U.K. outlook on realized power price

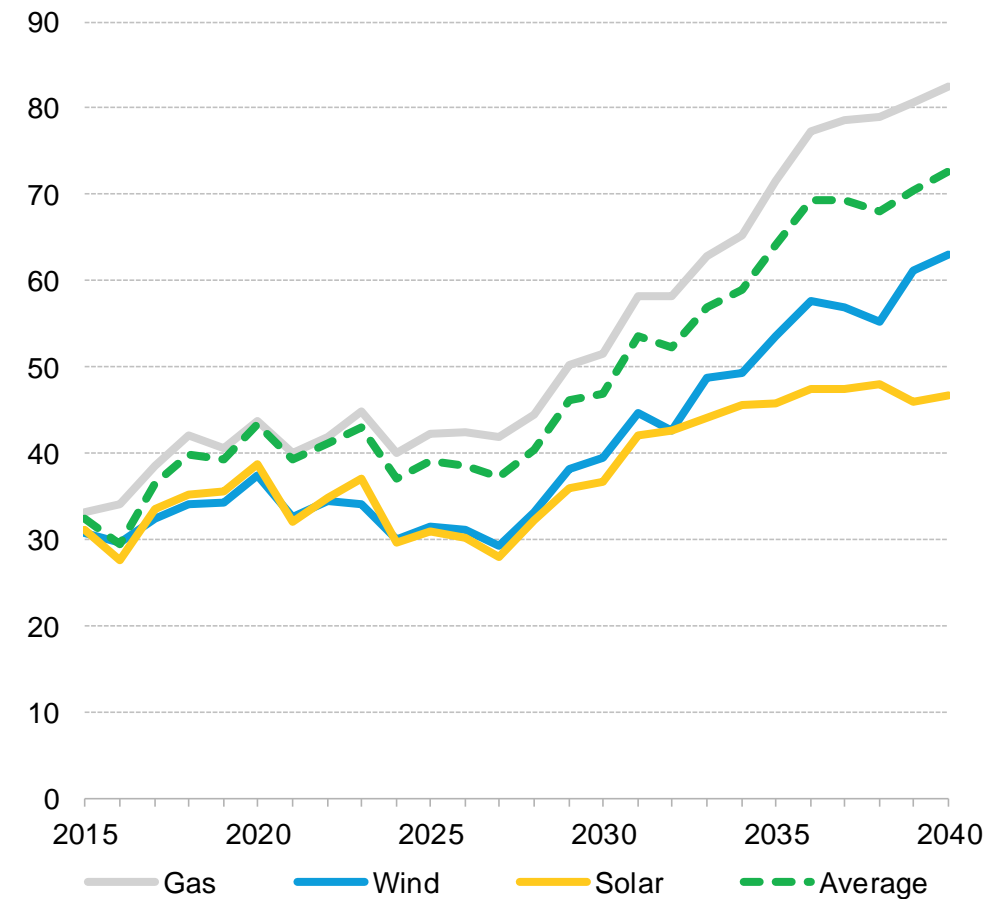
GBP/MWh, nominal



Source: Bloomberg NEF

German outlook on realized power price

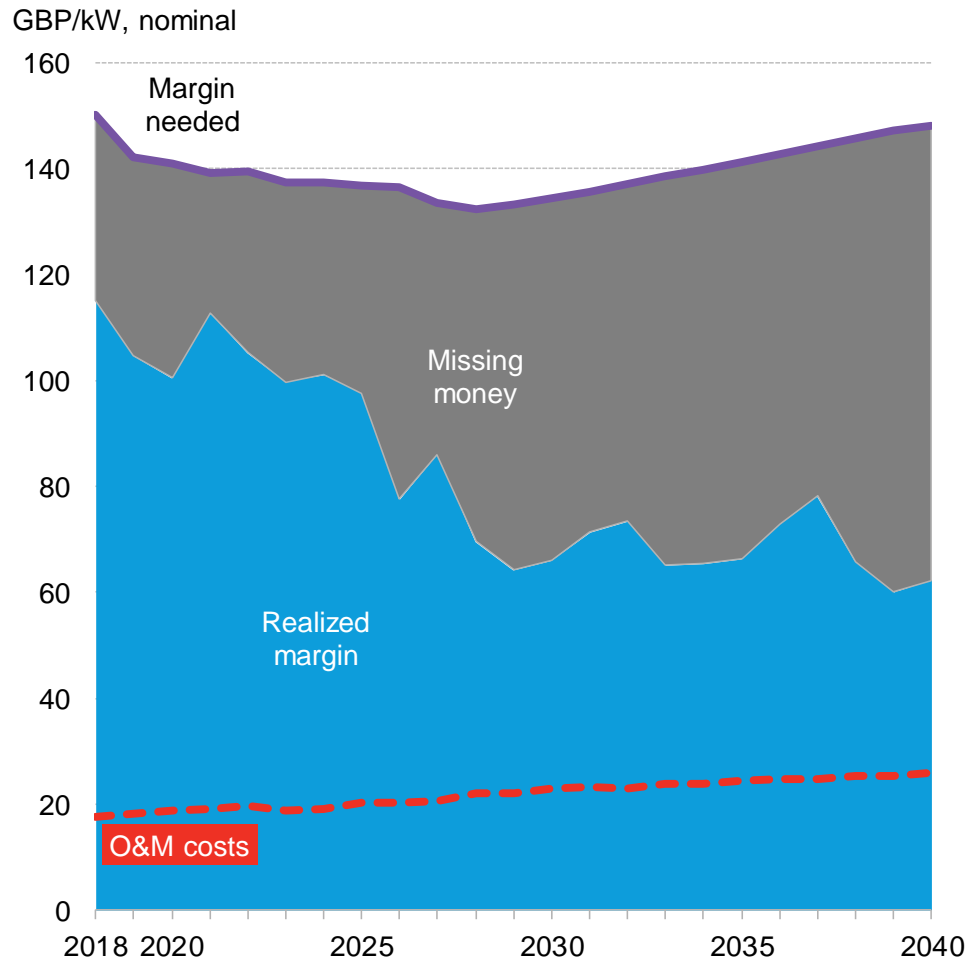
EUR/MWh, nominal



Source: Bloomberg NEF

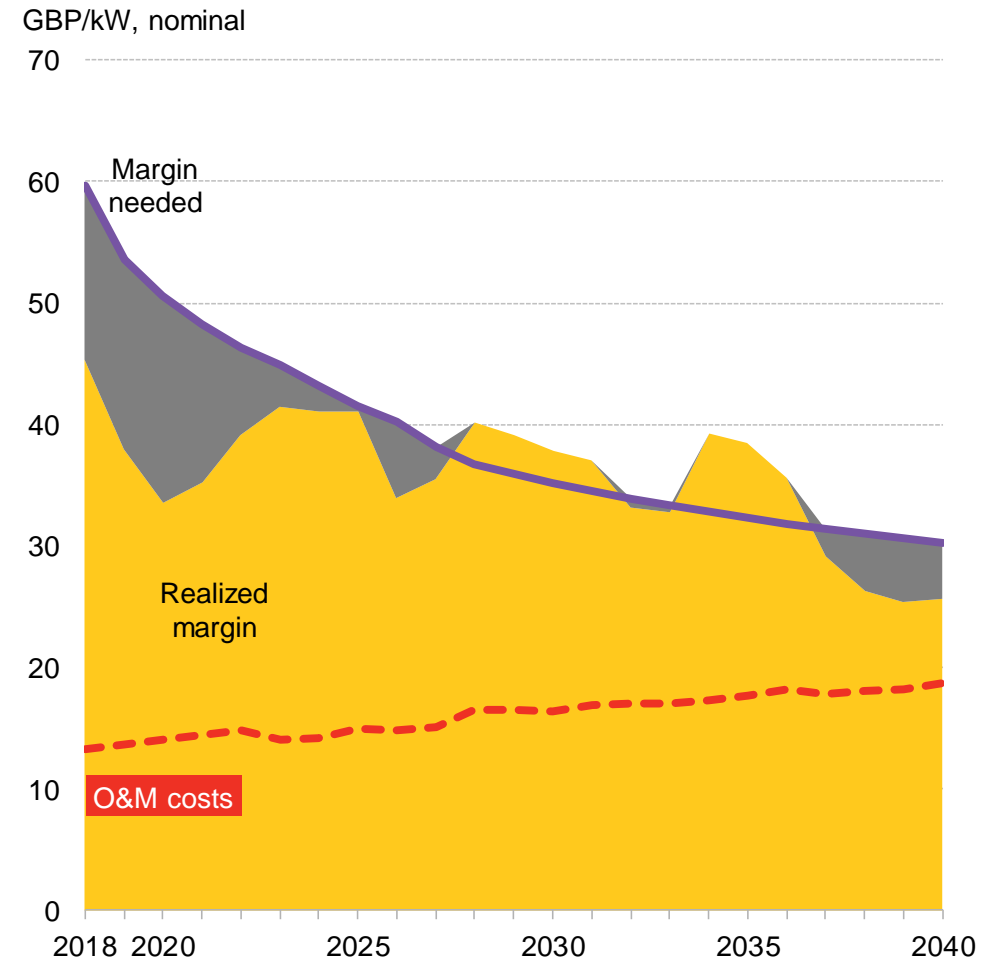
What can wind and solar expect to make

U.K. wind realized margins in power market and O&M* costs and margin needed for ROI**



Source: Bloomberg NEF Note: *O&M stands for operation and maintenance **ROI stands for return on investment

U.K. solar realized margins in power market and O&M* costs and margin needed for ROI**

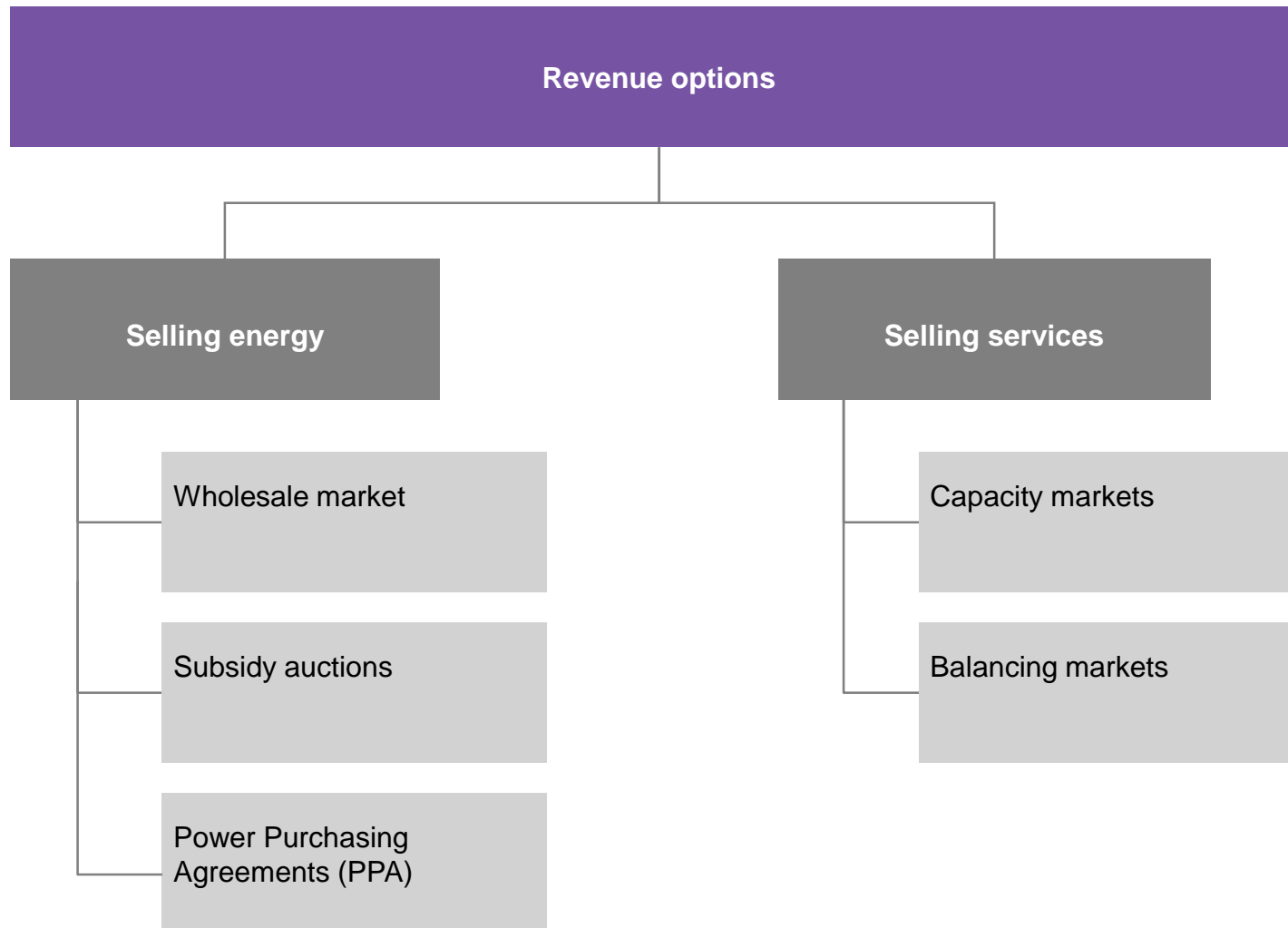


Source: Bloomberg NEF Note: *O&M stands for operation and maintenance **ROI stands for return on investment

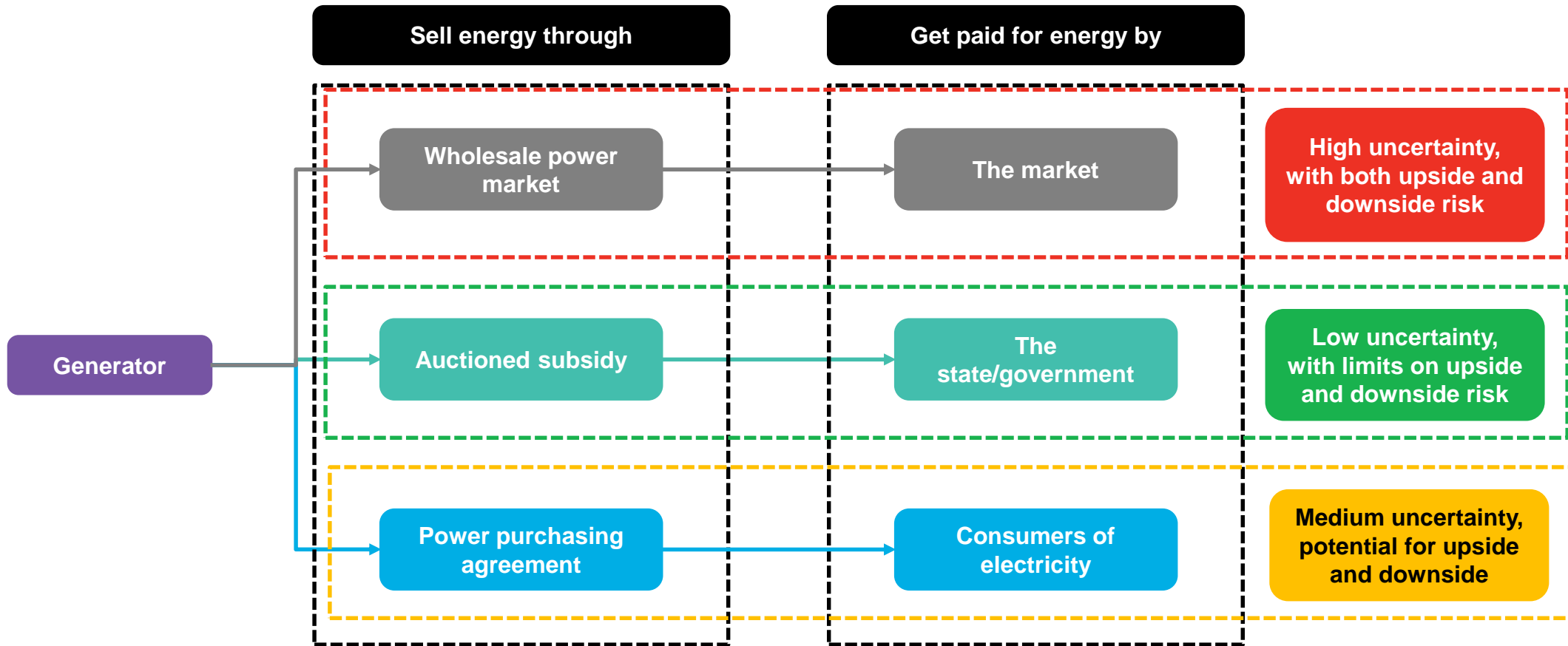
Finding the missing money

Revenue opportunities for renewables

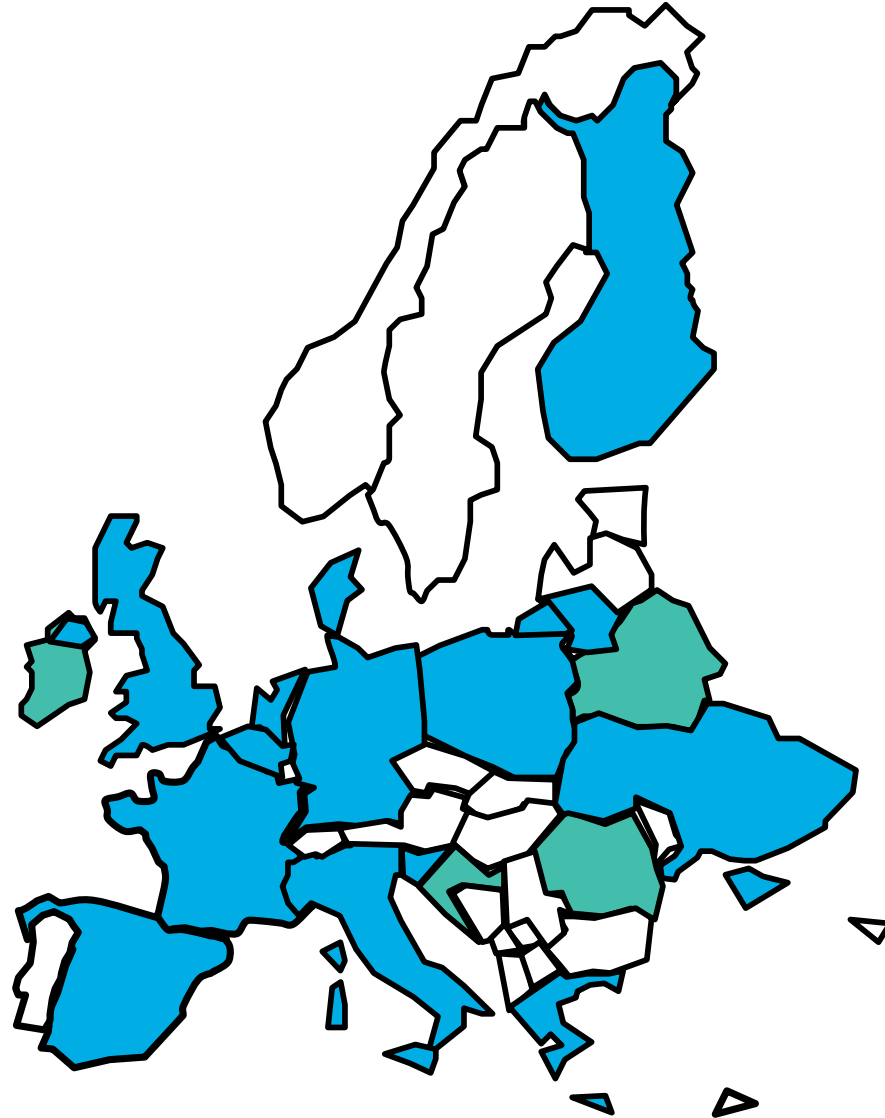
What revenue options are there



Selling energy – guaranteeing revenue



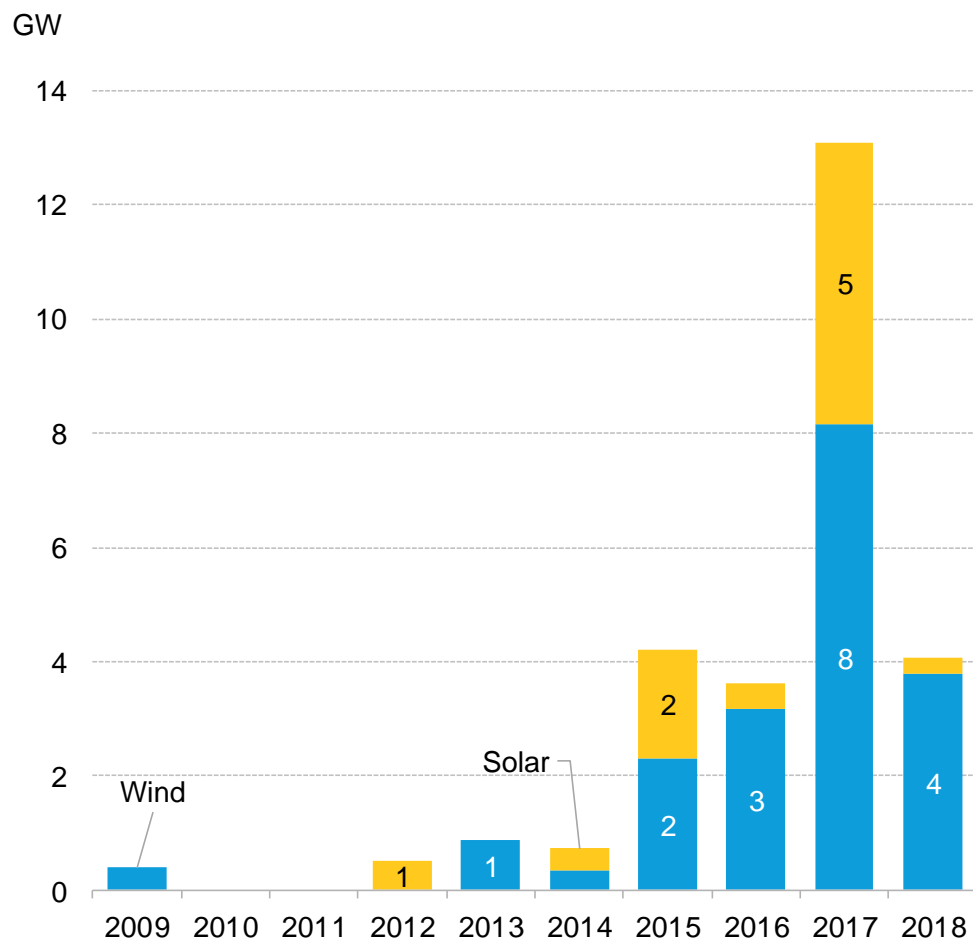
Selling energy – Auctions: where in Europe



Source: BloombergNEF

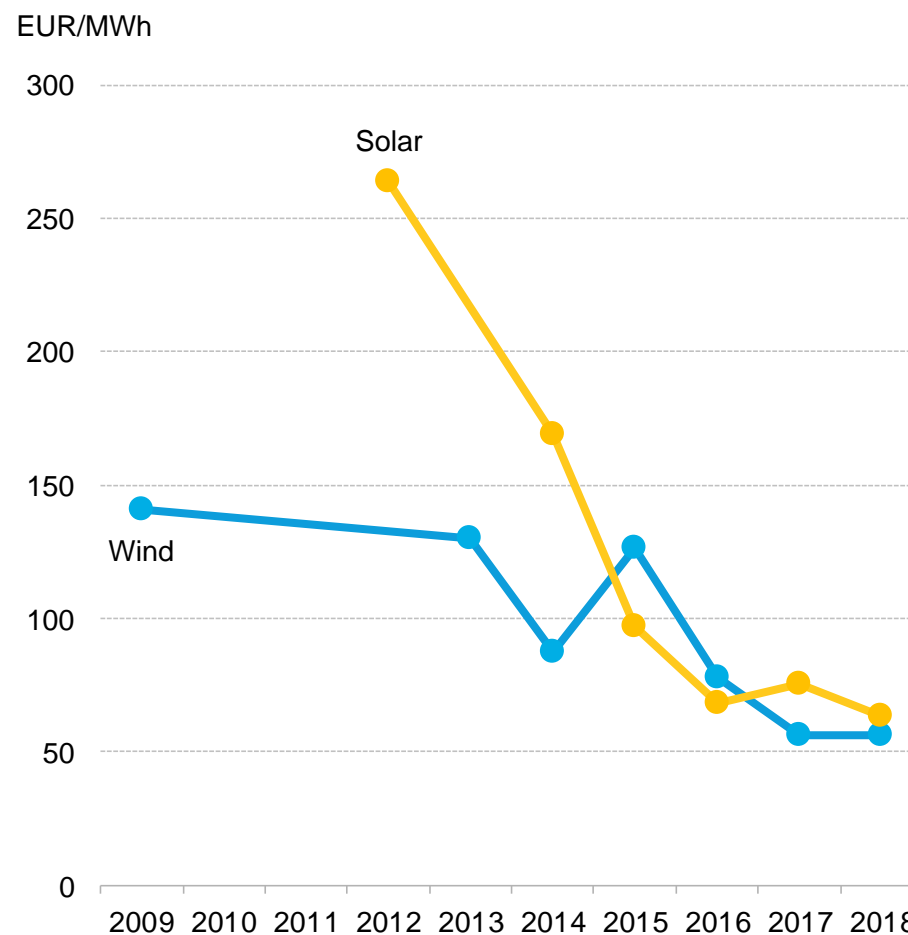
Selling energy – Auctions: volumes and prices

Capacity clearing in European Union auctions



Source: BloombergNEF. Note: 2018 is year to date

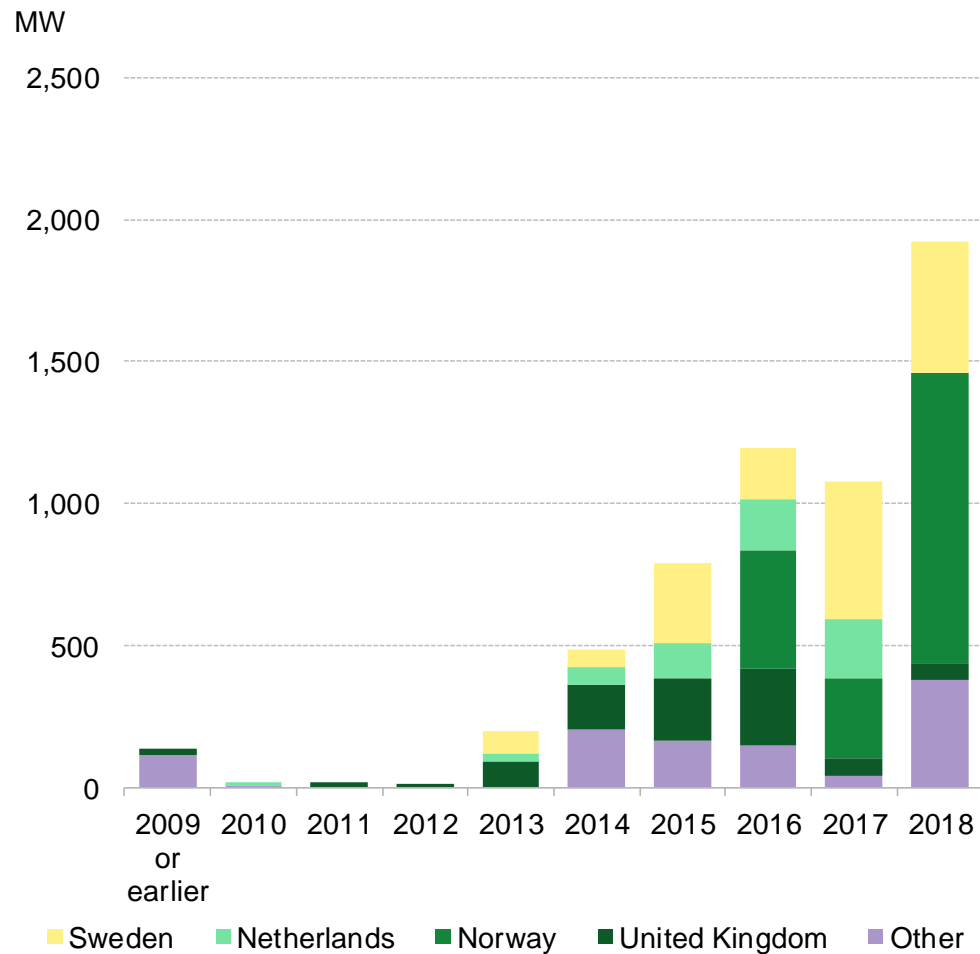
Average clearing price of European Union auctions



Source: BloombergNEF

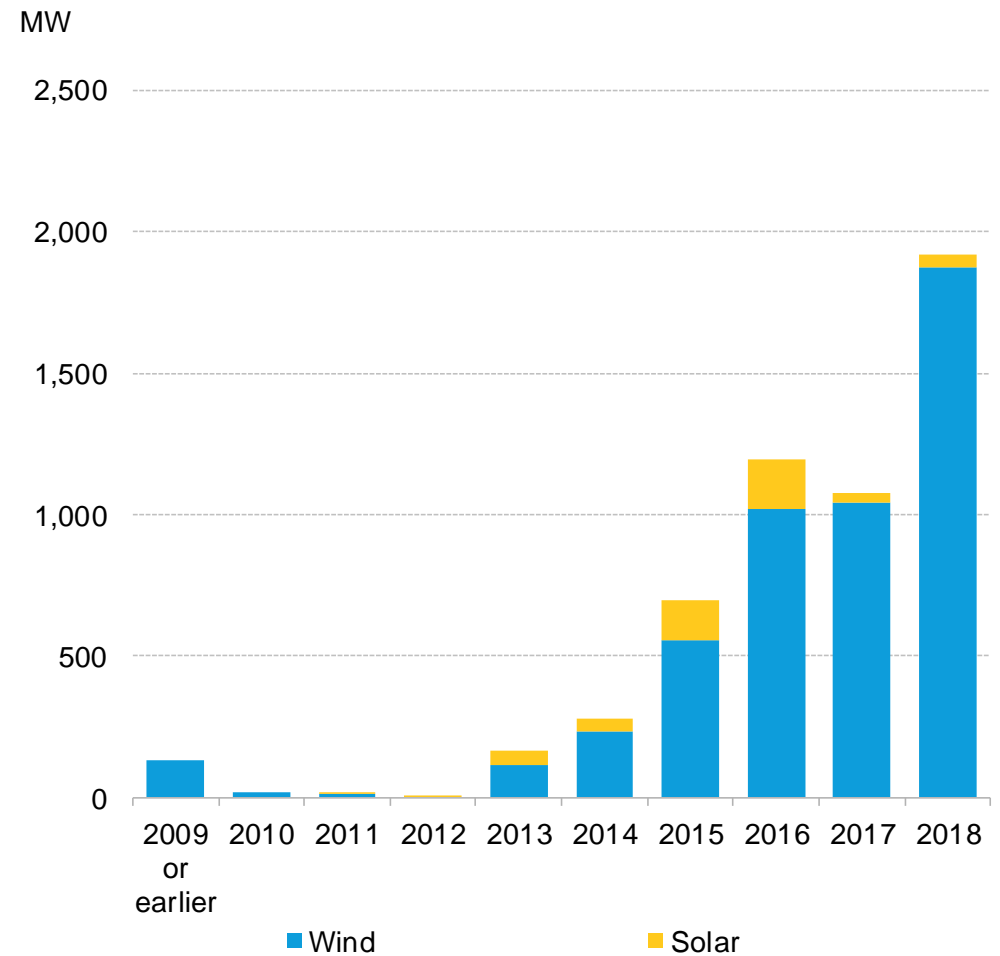
Selling energy – PPAs: where and what technologies

European renewable PPAs by country



Source: BloombergNEF Note: Other includes Finland, Belgium, Poland, Germany, Italy, Ireland, Spain, and Iceland

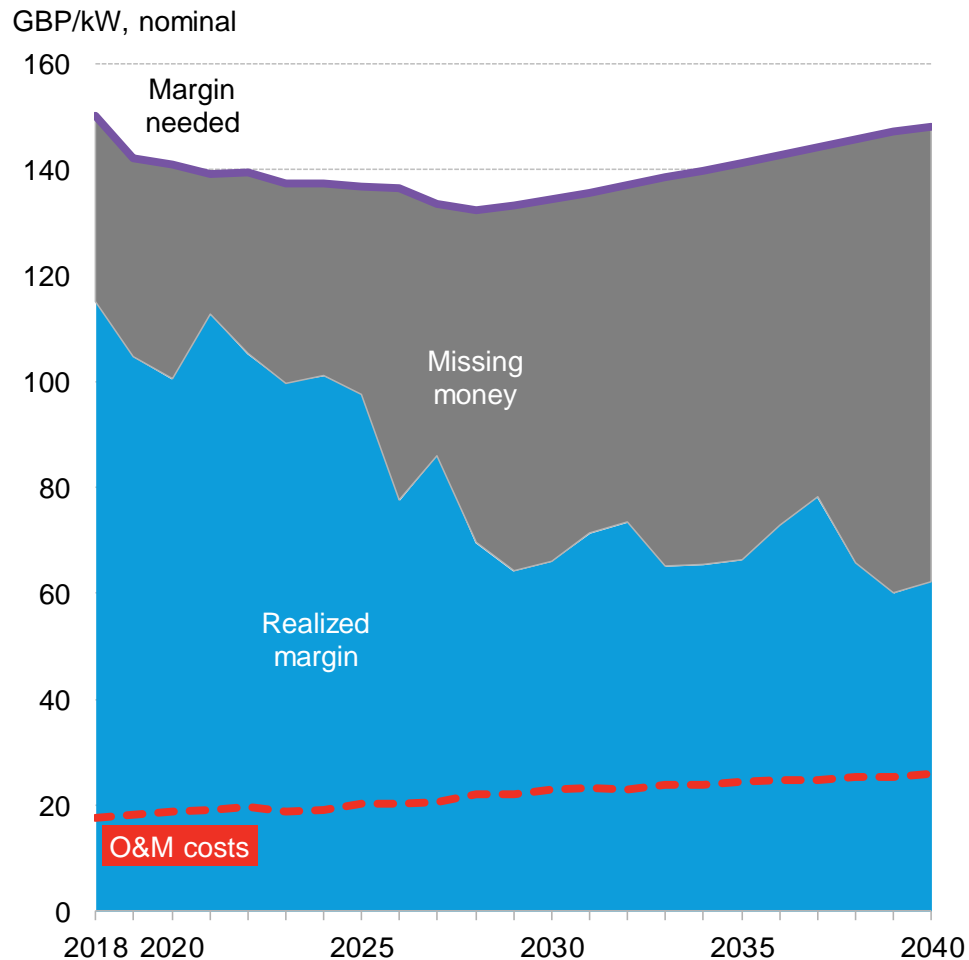
European renewable PPAs by technology



Source: BloombergNEF

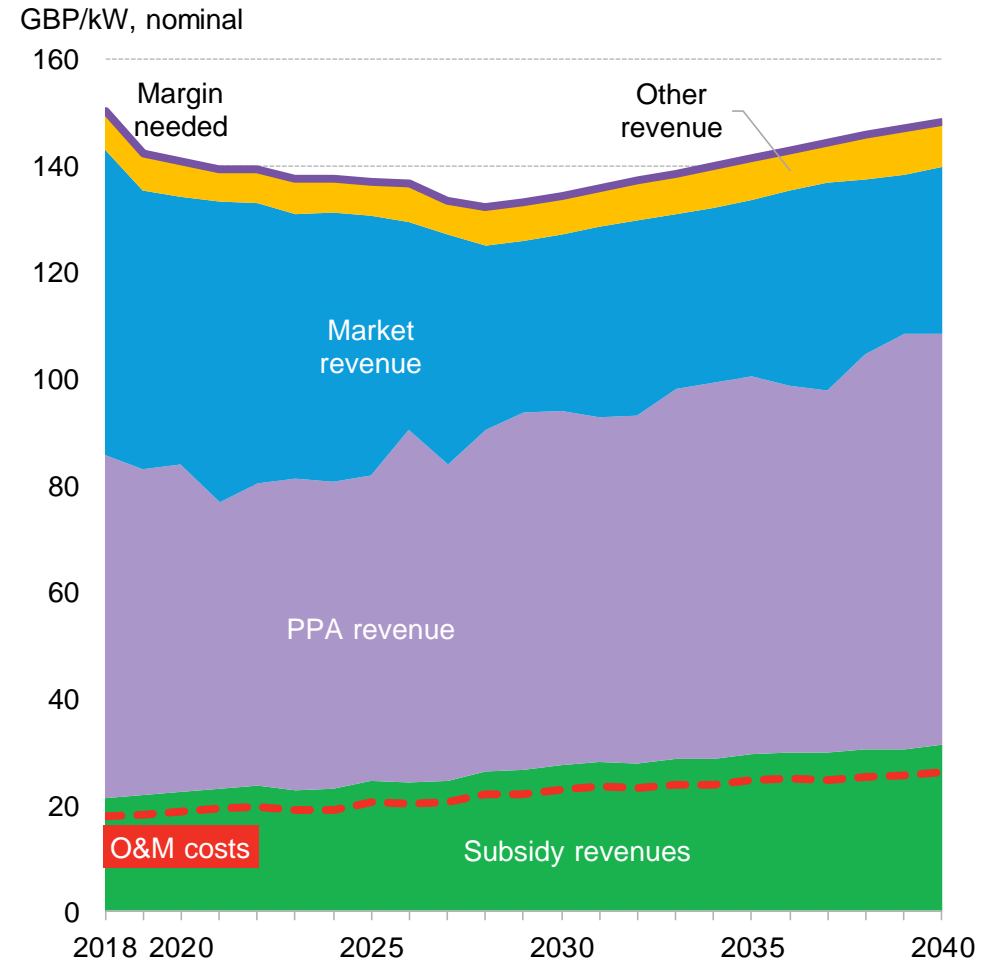
What to do? Ideas to navigate the future

U.K. wind realized margins in power market and O&M* costs and margin needed for ROI**



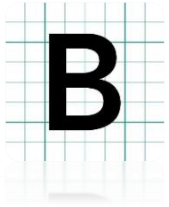
Source: Bloomberg NEF Note: *O&M stands for operation and maintenance **ROI stands for return on investment

U.K. wind example margins from different sources

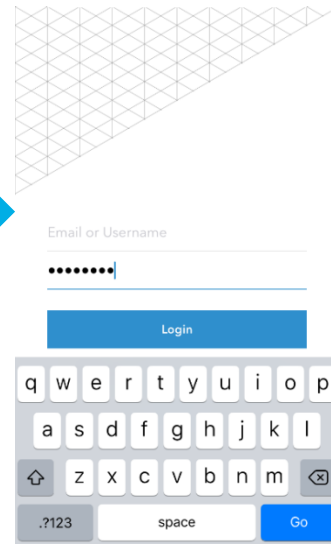
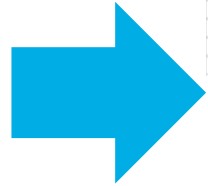


Source: BloombergNEF. Note: Purely hypothetical scenario, not representing modelled or observed data, other revenue could include payments for grid services

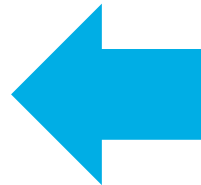
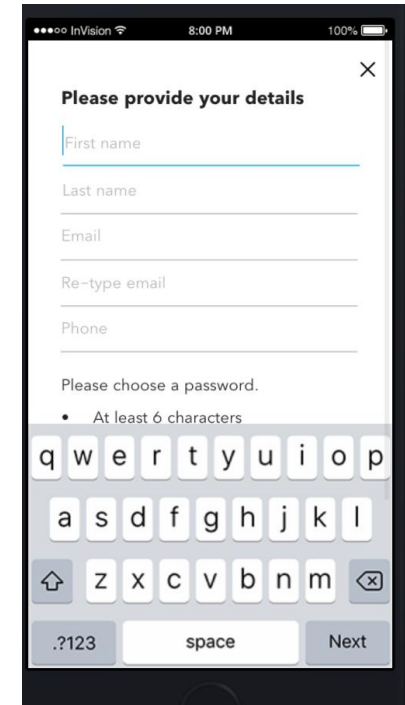
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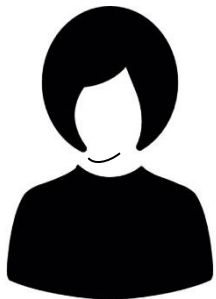
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You will be prompted to enter your details. Click “submit”.



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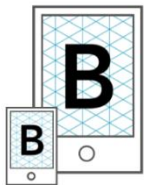
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