

WÄRTSILÄ WEBINAR

IMPORTANCE OF FLEXIBILITY AND RELIABILITY IN THE UK ENERGY MARKET

Importance of flexibility and reliability in the UK energy market



Ilesh Patel

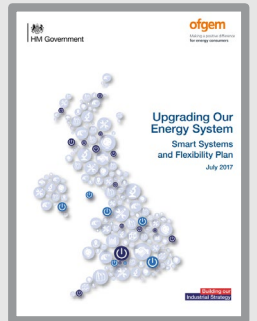
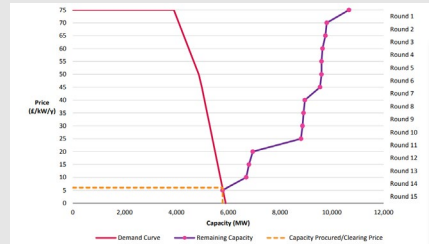
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Making sense of the energy transition – policy and market context

Capacity Market auctions have cleared at levels too low for large-scale new build



The retail market price cap is proposed to come into force by year-end

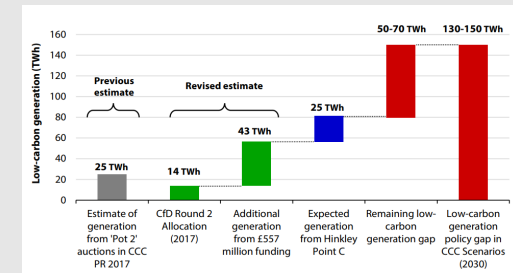


"We stand on the cusp of the next transformational change in the energy sector, and that this can move us beyond the trilemma"

The end of the trilemma?

"Our approach will be aligned with the key technological changes which can help to cut costs, cut carbon, and maintain security of supplies – and drive towards a future where the three corners of the trilemma work in concert, not opposition."

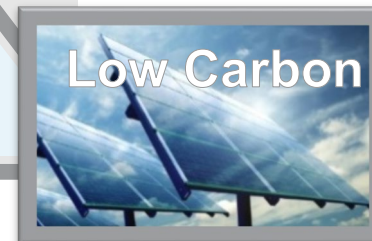
Meanwhile, regulation struggles to keep up with market changes



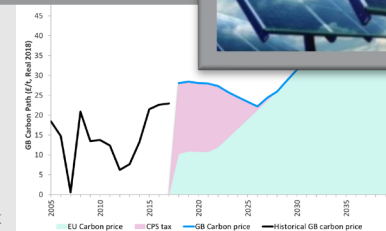
A significant policy gap still remains for the UK to meet its fourth and fifth carbon budgets in the power sector



Industry is still awaiting the government's response to the Cost of Energy Review, which criticised complex and inefficient policies for leading to higher costs

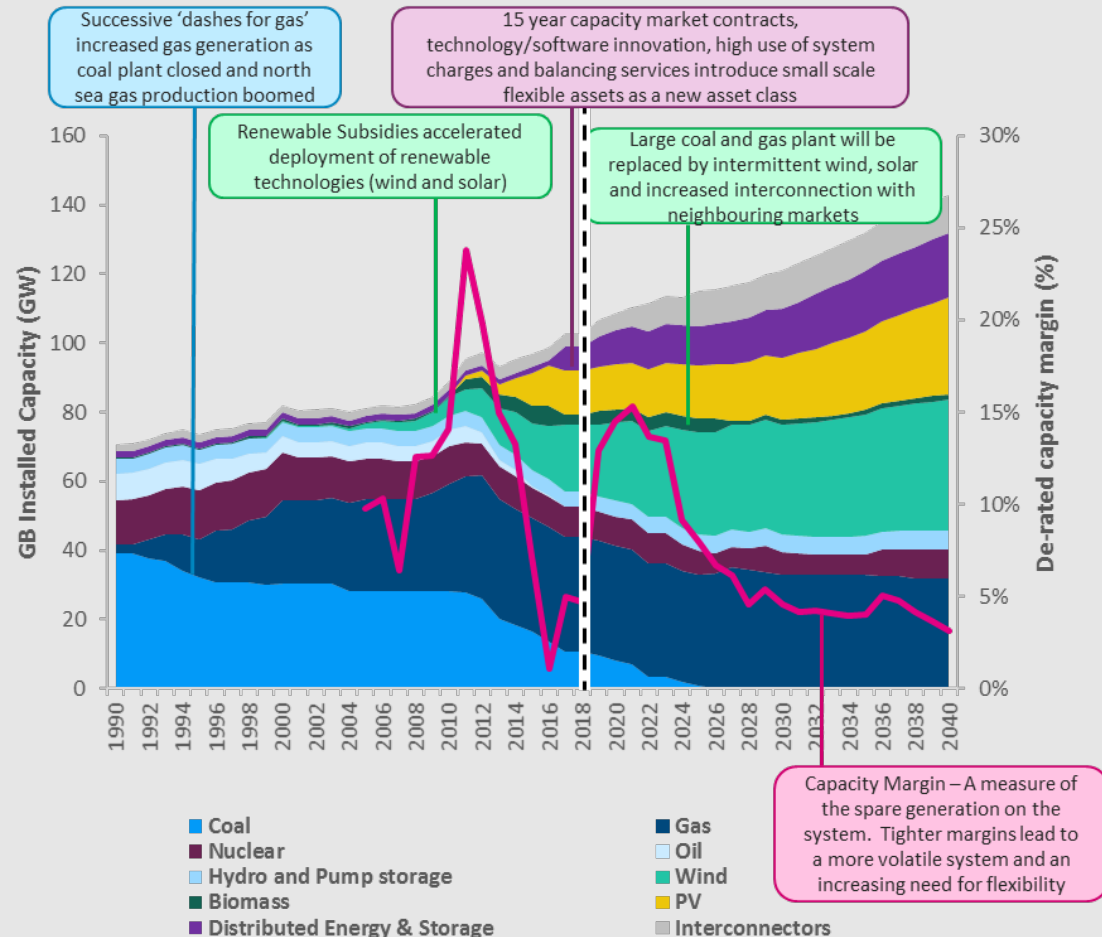


There is a lack of long-term clarity on the UK's Carbon Price Support and its ability to stay in the EU Emissions Trading Scheme after Brexit



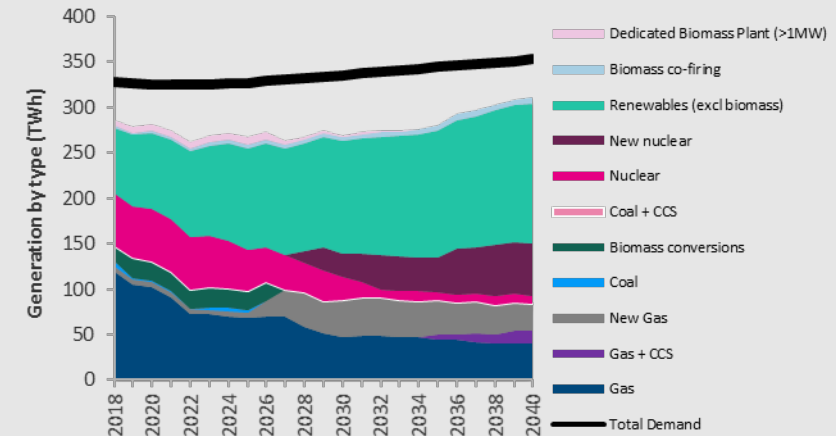
Fundamental Value Drivers of Flexibility in the GB Market

Evolution of installed capacity in the GB market*



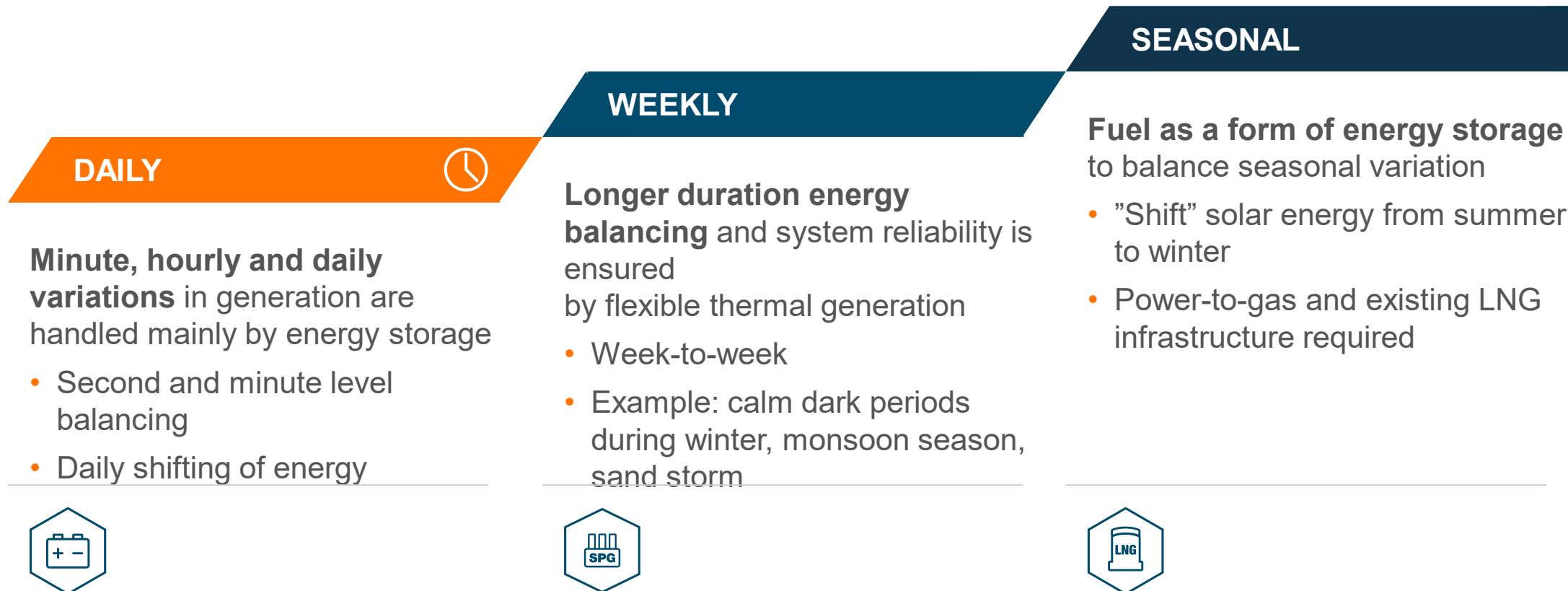
* Baringa Reference Case

Renewable's generation share

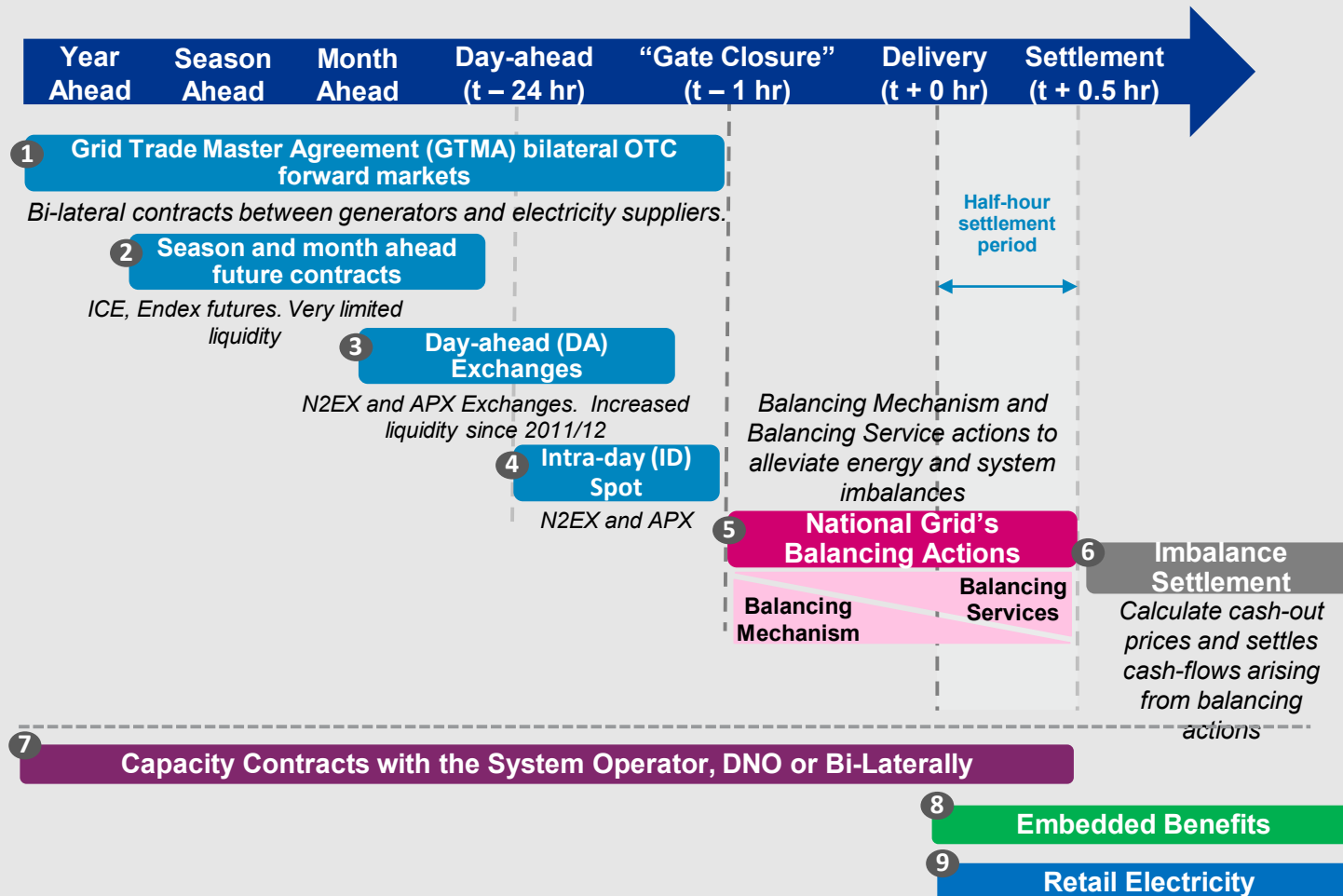


- ▶ **Less spare capacity:** Capacity margins are tightening as large generation closes to meet emissions limits (coal)
- ▶ A peak 25% headroom in 2011 will reduce to below 5% in future periods of low renewable output, high demand and low plant availability. In 2016 and 2017, tightening capacity margins are already increasing wholesale and BM price volatility
- ▶ **Less synchronous and inertia providing plant:** Intermittent non-synchronous renewables will make up a greater share of annual generation. This will necessitate increased provision from fast response and inertia providing plant to match varying generation
- ▶ **A thermal to renewable capacity switch:** Aging thermal generation and increased penetration of intermittent renewables will mean less mandatory (automatic) balancing actions from large thermal stations
- ▶ **The value of being close to demand – embedded benefits**

Increasing renewable energy system require multiple forms of flexibility



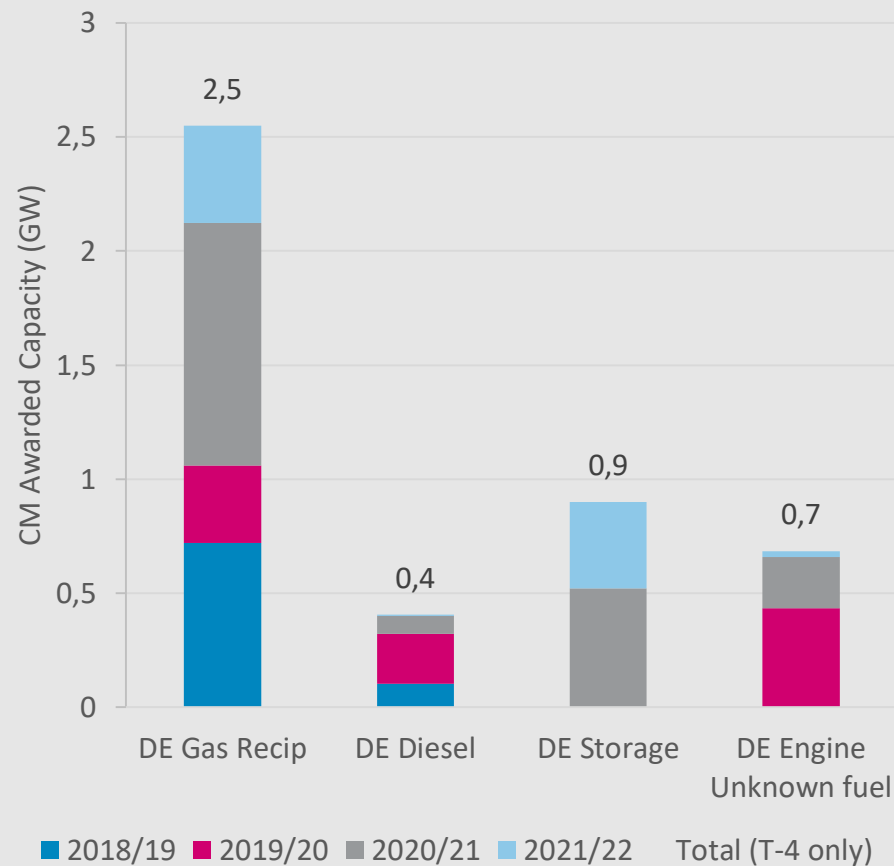
Monetising flexibility across different timeframes and markets



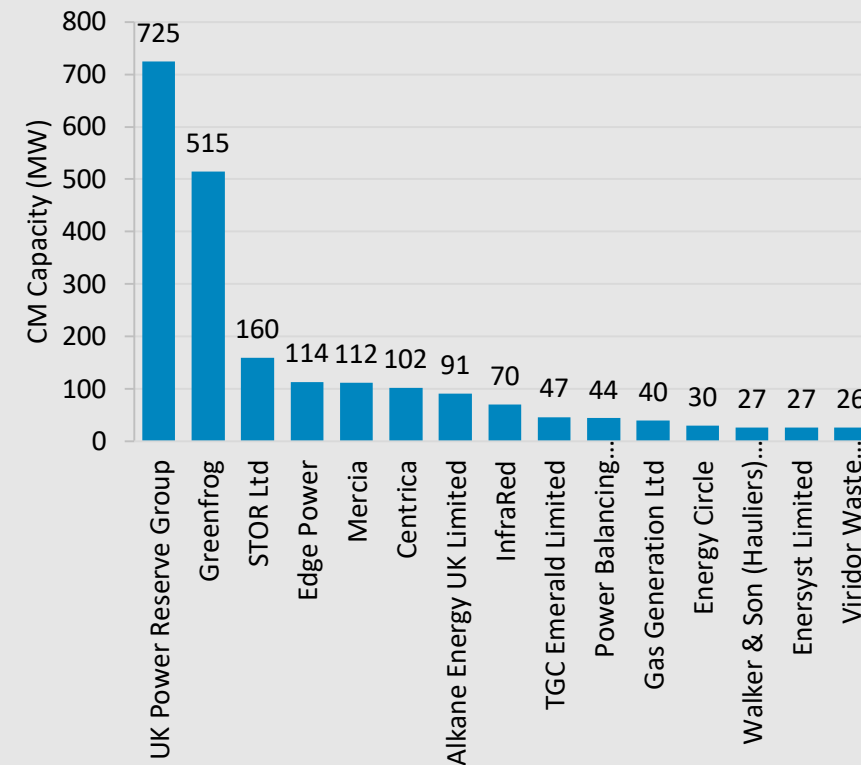
- **Bi-Laterally traded wholesale power (#1 – 4):** Most North West European power markets are bi-laterally traded markets, where parties are required to buy and sell electricity ahead of time
- **The Role of National Grid:** Prior to delivery of the electricity bought in forward timeframes, National Grid takes control of the system, receiving the contracted positions of all parties
- **Balance Responsibility (#6):** All parties are balance responsible, in that they will be penalized/paid cash-out prices ('SSPs') if their out-turn generation/demand differs to what they had notified the System Operator
- **Real Time Electricity Balancing (#5):** Post gate closure, the System Operator uses a suite of tools called Balancing Arrangements to manage real time electricity supply and demand (the BM, FFR, FR and STOR)
- **Settlement (#6) – 'NIV Chasing':** The cost accrued in one of these tools, the balancing mechanism, is used to calculate the imbalance price to be charged/paid to out of balance parties. Generating to be intentionally out of balance is often called 'NIV Chasing'
- **Capacity Markets (#7):** In addition to the wholesale traded and balancing markets, in GB, assets can receive capacity payments
- **Embedded Benefits (#8):** Assets on the distribution network can avoid 'use of system' charges – embedded benefits

GB Distributed Energy Build-Out

Capacity market Contract Award Summary (15 year)



Gas Recip Engine Contracts by Party



- Where CM participants provide their company details we can estimate the awarded CM contracts by company. It should be noted that it is not clear who owns all of the CM contracts. As such it is likely that the above summary underrepresents, or omits some portfolios

Importance of flexibility and reliability in the UK energy market



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Towards a 100% renewable energy future

The energy landscape is in transition towards more flexible and sustainable energy systems.

We envision a 100% renewable energy future.

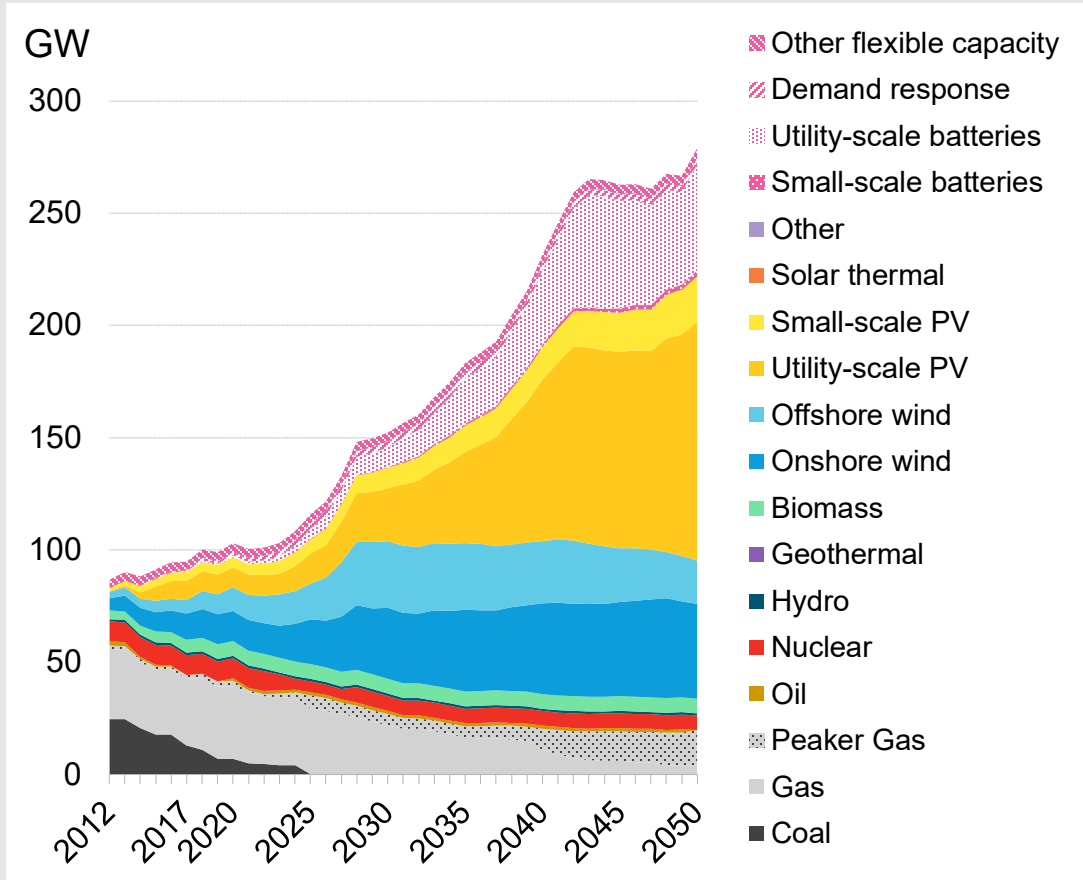
Wärtsilä is leading the transition as the **Energy System Integrator** – we understand, design, build and serve optimal power systems for future generations.

Engines and storage will provide the needed **flexibility** to integrate renewables and secure **reliability**.

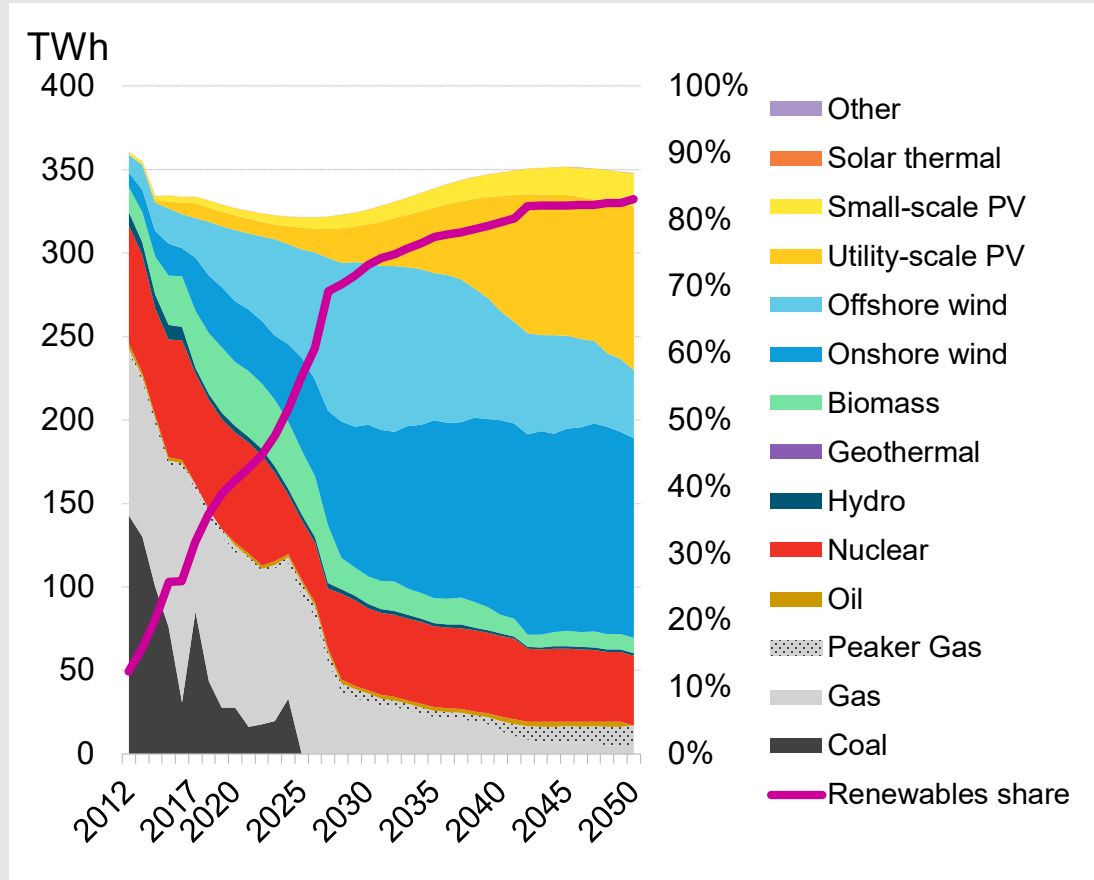


The UK power system is rapidly going green

Capacity mix



Generation mix



Source: Bloomberg New Energy Finance

New flexible capacity in the UK energy market

- Wärtsilä supplied two 50 MW gas engine power plants in Brigg in North East Lincolnshire and Peterborough in Cambridgeshire
- The two plants each utilise 2 x 5 Wärtsilä 34SG engines running on natural gas
- They are the biggest medium-speed engine-based gas power plants in the UK
- Wärtsilä delivered Engineering, Procurement and Construction (EPC) solutions for both sites



Fast-starting flexibility supports intermittent renewables

- Centrica plants will balance the stability of the grid
- Electricity to 100,000 homes in less than two minutes
- The two-minute fast-starting flexibility will support local peaks in demand and the inevitable fluctuations in supply from renewable sources
- Fast one minute shut down
- Both plants can be started remotely
- Operational flexibility ensures having energy available when the supply from renewables drop

“The under two-minute start up time that Wärtsilä’s solutions deliver is a rare feature and very important to the UK grid.”

-Mark Futyan, Distributed Power Systems
Director from Centrica Business Solutions

UK needs flexibility and reliability to move towards renewables

- The UK is rapidly moving towards renewables
- Renewable energy systems require multiple forms of flexibility
- Increased gas capacity brings the needed flexibility to the system and supports the introduction of renewables
- Engine power plants contribute to decarbonisation and improved system efficiency
- Outcome: reliable energy at an affordable price

THANK YOU FOR JOINING!

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