



AMEU/SAIEE joint virtual webinar

“THE DIGITAL MUNICIPAL Dx ELECTRICTY UTILITY OF THE FUTURE

16th August 2022

Session 3

**Case study: Journey of the UK
From Electricity Area Boards to customer choice**



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THE JOURNEY ...

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- As it was at the beginning
- Privatisation
- Generation competition
- Supply/Retail competition
- Distribution networks
- Journey's End

At the beginning.....

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- This is a more than 30 year story – starting around 1990
- Before that the British electricity supply industry was
 - Wholly Government owned
 - A monopoly
 - There was a small amount of private generation in existence for own use
- The organisational structure had broadly been in place for about 40 years with limited change
- There was no regulator. Limited oversight came from Government departments
- Tariff levels were driven by cash targets agreed with Government
- The generation fleet was dominated by coal and nuclear. Little or more wind and solar
- The industry was regarded as inefficient and slow moving
- The voice and role of the customer was very limited – although consultation was required by law

At the beginning.....

British Electricity Supply Industry – pre privatisation

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Electricity Council



Responsible for industry co-ordination, interactions with Government and some research

Central Electricity Generating Board (CEGB)



Responsible for generation, transmission networks (275kV and above) and bulk supplies of electricity to, for example, railways. Selling electricity to Area Boards using a bulk supply tariff

Twelve Area Boards in England



Responsible for distribution networks (132kV and below), sales to customers, contracting and shops

Two Vertically Integrated Boards in Scotland



Responsible for generation, transmission networks (132kV and above), distribution networks sales to customers, contracting and shops

English Area Electricity Boards and Scottish Boards




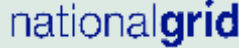
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- 1 North of Scotland Hydro-Electric Board
- 2/3 South of Scotland Electricity Board
- 4 North Western Electricity Board
- 5 North Eastern Electricity Board
- 6 Yorkshire Electricity Board
- 7 Merseyside & North Wales Electricity Board
- 8 East Midlands Electricity Board
- 9 South Wales Electricity Board
- 10 Midlands Electricity Board
- 11 Eastern Electricity Board
- 12 South Western Electricity Board
- 13 Southern Electricity Board
- 14 London Electricity Board
- 15 South Eastern Electricity Board



Unbundling, Privatisation and Competition

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- By the late 1980's the UK government became strongly in favour of privatisation including for most of the electricity supply industry
 - Expected benefits included
 - Efficiency improvements
 - Demands for investment move to the private sector
 - Competition would improve customer responsiveness
 - Broadening the base of share holding in the country
 - An industry specific regulator (OFFER later OFGEM) and new regulatory framework was introduced
 - Novel approaches to generation and retail competition were developed and implemented
- CEBG unbundled into four parts
 -  National Power (privatised from 1991)
 -  Powergen (privatised from 1991)
 -  Nuclear Electric (initially Government owned)
 -  National Grid (floated in 1995)
 - Twelve English Area Boards were privatised as existing organisations – called Regional Electricity Companies (RECs) - and floated in 1990
 - The two vertically integrated Scottish companies were privatised in 1991

Electricity Markets – Competition and Regulation

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- The electricity value chain has many elements – generation, system operation, transmission, distribution, retail and others
- Markets are the vehicle and mechanism for linking these elements together and for communicating with end-use customers
- Some of these markets are potentially partly or wholly competitive – although some supervision may be necessary
- Other are natural monopolies where competition is more difficult to introduce and need to be regulated and price controlled
- There are many steps in the reform process
- Government policy and regulation are vital to ensuing effective, equitable, robust and flexible solutions.

Wholesale/Generation Competition

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- Wholesale competition can take place in different ways, has many facets and is complex to design and operate. There are significant risks that must be managed.
- So far there have been three phases of wholesale competition in Britain
 - Electricity Pool of England Wales – 1990 to 2001
 - New Electricity Trading Arrangements (NETA), 2001 / British Electricity and Trading and Transmission Arrangements (BETTA), 2005
 - Electricity Market Reform
- Further evolution of markets is likely to deal with changing circumstances, such as renewable generation and storage

Electricity Pool of England and Wales

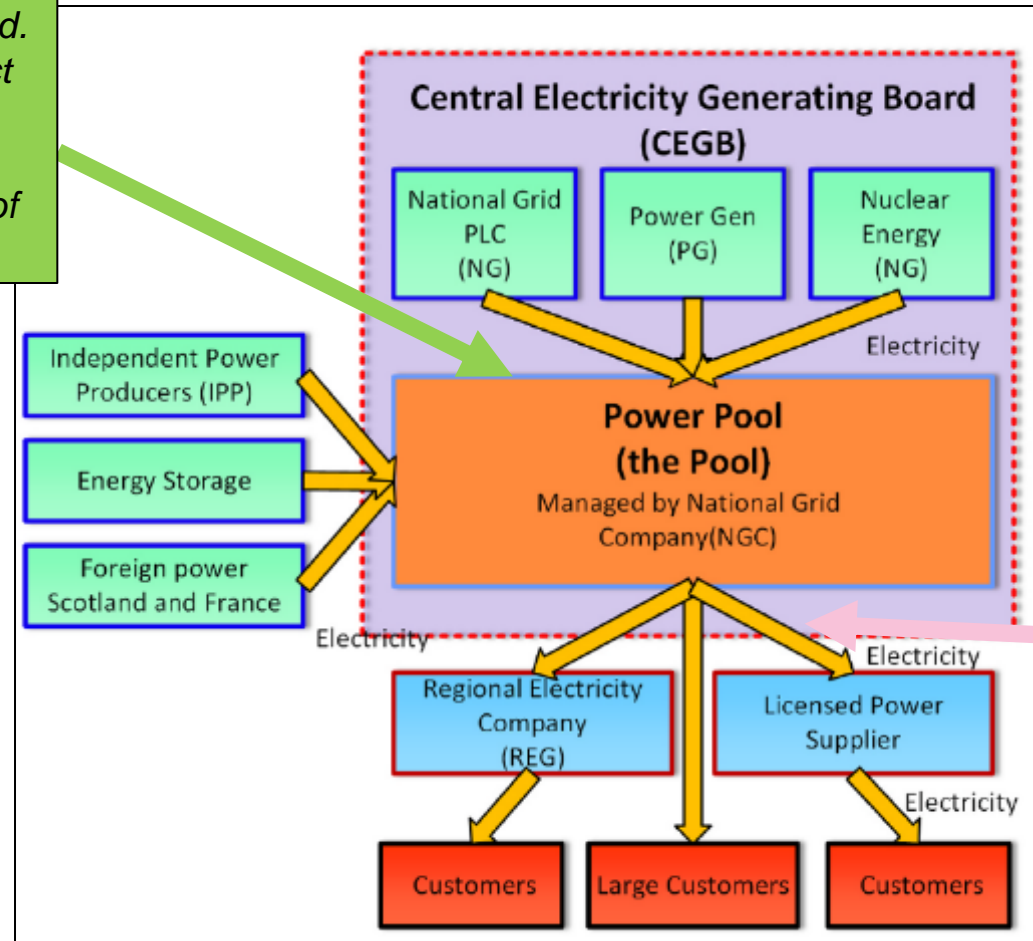
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- Introduced in 1990 in parallel with privatisation and the unbundling of the CEGB
- Market for the sale of electricity by generators and its wholesale purchase by retailers (called “suppliers” in the UK)
- Based on a contractual framework called the Pooling and Settlement Agreement
- Mandatory for all large generators – over 50MW
- Managed by National Grid - fulfilling the system and market operator role - to ensure independence from generators and retailers/suppliers
- Pool rules managed by members of the pool
- Provides market trading and bidding rules

Initial Market Structure and Competition - 1990

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- *Generators bid to be dispatched.*
- *Cheapest are used first (subject to technical constraints) until expected demand is met*
- *All are paid based on the cost of the final generator dispatched*



- Pool prices could be very volatile
- To manage the risks financial contracts called contracts for difference or CfD's were entered into
- Also other hedging approaches used

- *All Retailers/suppliers buy from the pool at the same price*
- *Prices vary for each half-hour period*

Evolution and reform of UK electricity market
Jinqi Liu, Jihong Wang, Joel Cardinal
University of Warwick, 2022

New Electricity Trading Arrangements (NETA), 2001 / British Electricity and Trading and Transmission Arrangements (BETTA), 2005

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- NETA is self dispatched market based on bilateral trading
- Several markets
 - Forward market
 - Day ahead and intraday trading
 - Balancing
- Based on a contractual framework called the Pooling and Settlement Agreement
- Key differences with the pool
 - Focus on bilateral trading
 - Extension to Scotland as well as England and Wales
 - Many other differences when looked at it detail

Electricity Market Reform, 2013

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- Introduced to run in parallel with BETTA
- It introduced a number of mechanisms. In particular:
 - A Capacity Market (CM), designed to help ensure security of electricity supply at the least cost to the consumer. CM participants can bid for contracts in auctions (called T-4 auction) held four years ahead of delivery date. Supplementary auctions (called T-1 auction) will be held a year ahead of delivery
 - Contracts for Difference (CfD), designed to provide long-term revenue stabilisation for new low carbon initiatives.

Retail Competition

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- At privatisation all customers were supplied by the REC covering their location
- However, the legal and regulatory framework allowed licenced “second tier suppliers” to compete for certain customers
- At first “second tier suppliers” were either REC’s operating outside of their service territories or the generators that had been spun out of the CEGB
- The introduction of competition led to significant commercial and operational risk providing some of the reasons why it was introduced on a phased basis
- There was large investment in new IT systems and business processes
- As more customers became contestable then many new suppliers entered the market – some were large entities such as British Gas, supermarket chains Sainsbury’s and Tesco’s, and later, oil industry giants such as Shell), others were new start ups
- Over time there have been withdrawals from the market as well as a significant number of business failures

Phased Introduction of Retail Competition

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- Customer sites with a maximum demand of 1MW or more
- 30% of the retail market (approximately 5000 sites)
- Contestable – from 1990
- Large factories, office blocks etc



- Customer Sites with a maximum demand of 100KW or more
- 15% of the retail market (approximately 45,000 sites)
- Contestable – from 1994
- Small commercial and industrial etc.



- Sites below 100KW
- 55% of the retail market (about 25.8 million sites)
- Contestable - from 1998/99
- Homes, small shops and similar

Further Developments

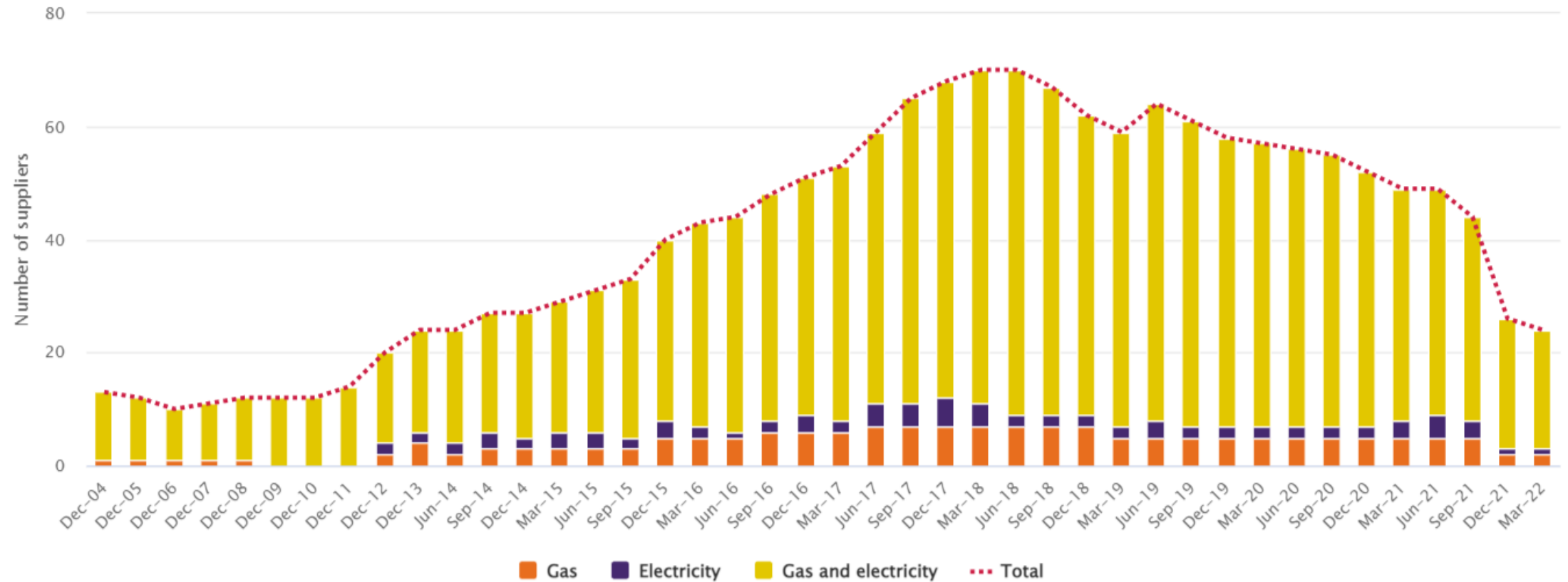
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- By 2000 all regulatory price control in retail markets had been abolished for end-use customers – domestic, industrial and commercial
- In 2019 an energy price cap was introduced under which Ofgem sets the maximum price that energy companies can charge per kWh of gas and electricity and the maximum standing/fixed charge for domestic customers
- Utilities Act, 2000 required the regional electricity companies to separate the wires/networks part of their activities from the retail parts by putting them in separate companies and operating them substantially independently. This was called “business separation”.
- Strong Government incentives encouraging renewable generation and other renewable resources. Increasing interest in flexibility.

How has competition developed? Number of suppliers to domestic customers

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Number of active domestic suppliers by fuel type (GB)

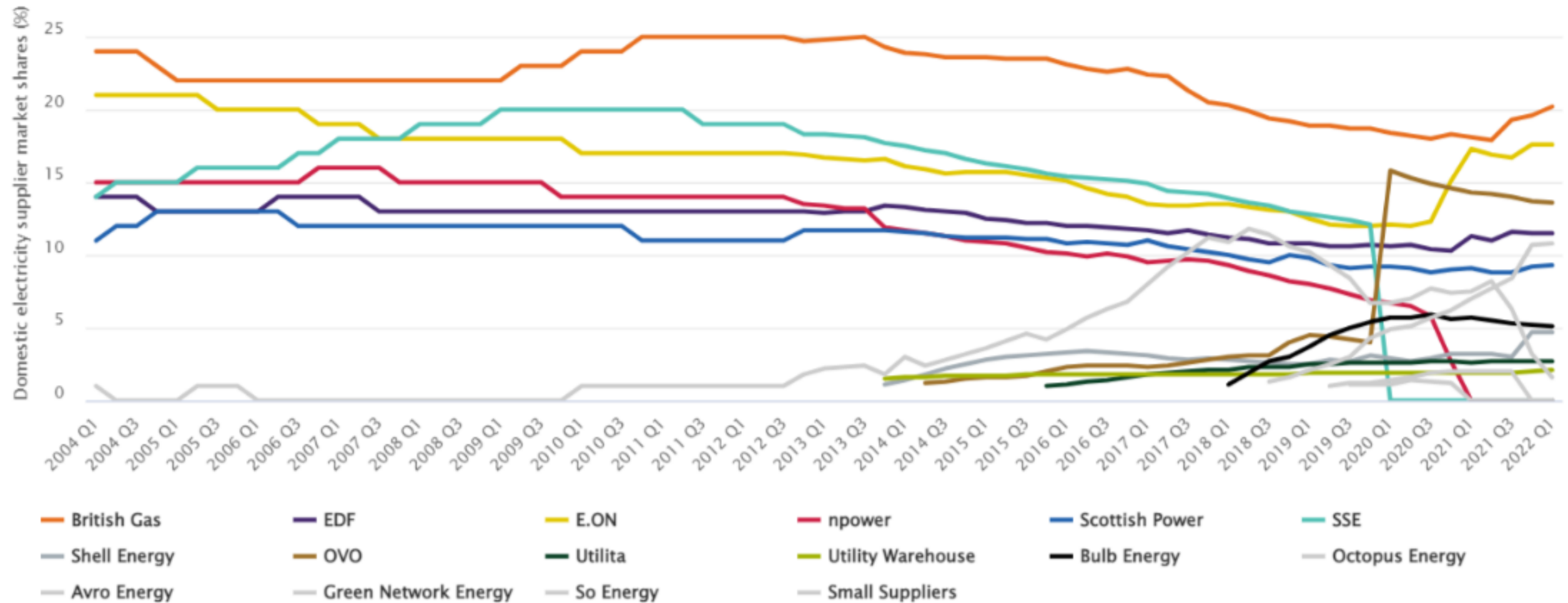


Source: Ofgem:

How has competition developed?

Domestic sector: market shares

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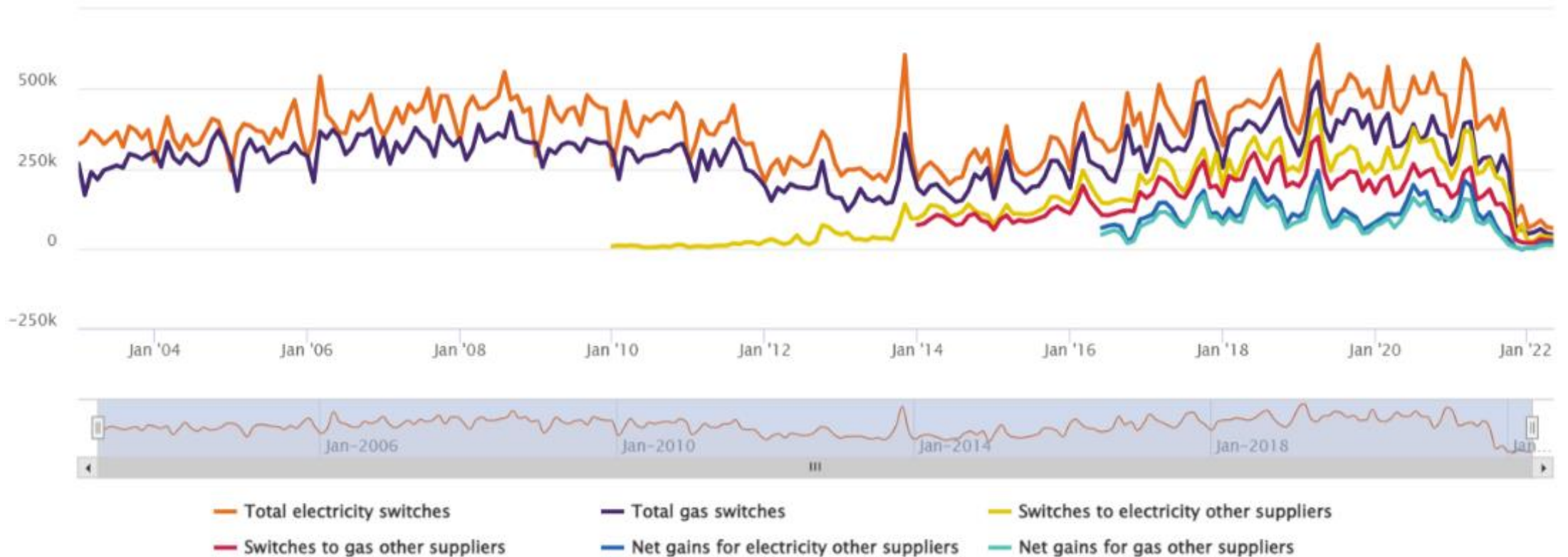


Source: Ofgem:

How has competition developed? Switching

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Number of domestic customers switching supplier by fuel type (GB)

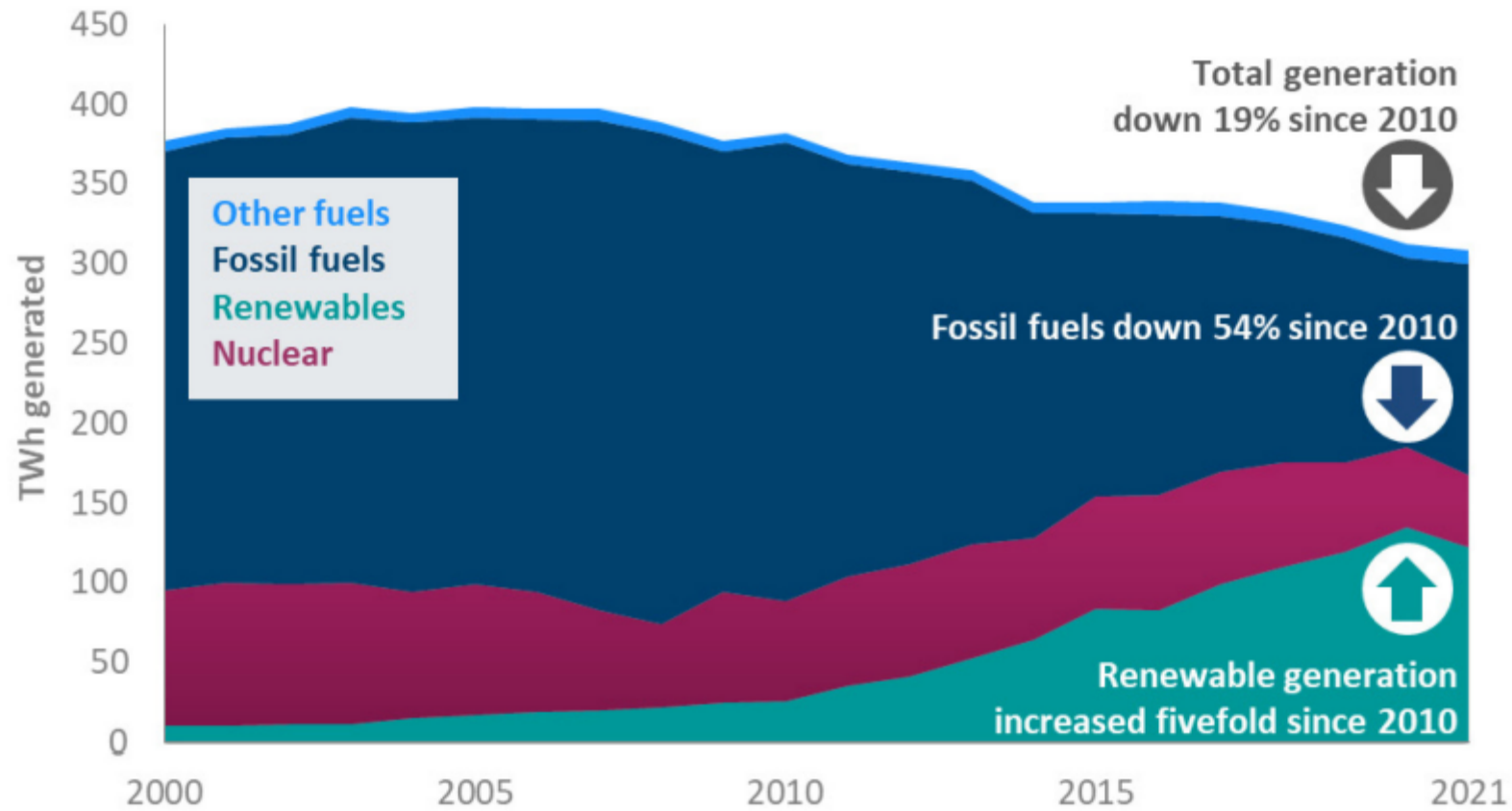


Source: Ofgem:

Renewable Generation

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Electricity generated by fuel, 2000 to 2021

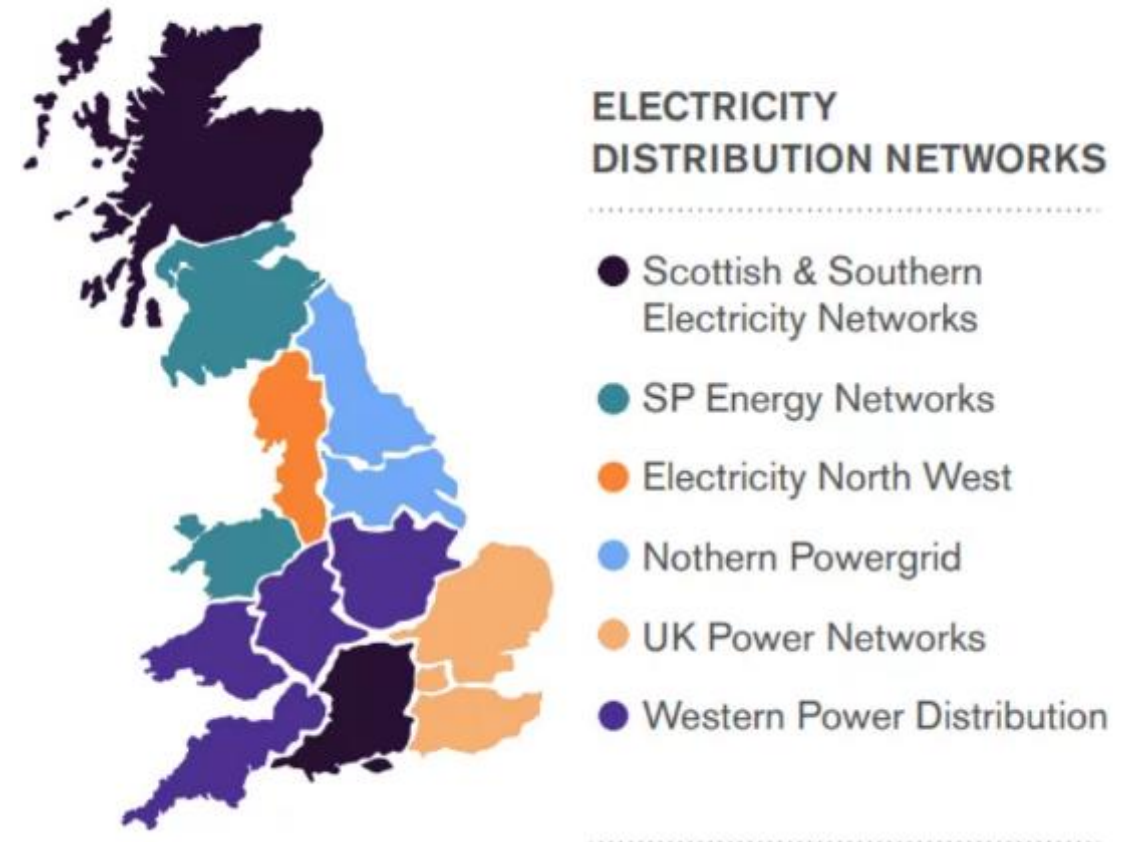


Source: BEIS:

Distribution Network Operators Consolidation and Ownership

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| DISTRIBUTION NETWORK OPERATORS | OWNERS |
|---|--|
| Scottish and Southern Electricity Networks. | Independent traded company |
| Scottish Power Energy Networks. | Iberdrola, Spain |
| Electricity North West | Long term infrastructure funds managed by Colonial First State Global Asset Management (a member of the Commonwealth Bank of Australia Group) and JP Morgan Investment Management Inc. |
| Northern Powergrid. | Berkshire Hathaway Energy, US |
| UK Power Networks. | Cheung Kong Infrastructure Holdings, Power Assets Holdings, and The Li Ka Shing Foundation – all from Hong Kong |
| Western Power Distribution. | National Grid, UK |



Of course, this journey does not end here - it carries on and on

Below are some recent issues and developments

- How to respond to the current massive hike in energy costs and prices in Western Europe?
- The system operator function has recently been removed from National Grid and is being set up in a new wholly Government owned company
- The UK government has recently launched major reviews of both the wholesale and retail markets recognising recent challenges, and aiming to redesign them to support the aim of decarbonising the electricity industry by 2035 and achieving carbon net zero for the country by 2050.

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Thank you!

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Other Jurisdictions

Other Jurisdictions

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France

Great
Britain

Northern
Ireland

Sweden

Uganda

- A selection of countries with:
 - ✓ Differences in market structure
 - ✓ Differences in scale
 - ✓ Different approaches to regulating tariffs
 - ✓ Differences in retail tariff approach
- + **Uganda**: designated by AfDB (2020 Electricity Regulatory Index) as SSA jurisdiction with the:
 - Highest Electricity Regulatory Score
 - Highest Regulatory Governance Score
 - Highest Regulatory Substance Score
 - Second highest Regulatory Outcome Score (after Namibia)

| | France | Great Britain | Northern Ireland | Sweden | Uganda | South Africa |
|----------------------------|---|--|---|---|---|---|
| Scale | Large MD = 88.5 GW PODs = 37 million | Large MD = 103.1 GW PODs = 28 million | Small MD = 1.7 GW PODs = 0.9 million | Intermediate MD = 27.3 GW PODs = 5.8 million | Small MD = 0.8 GW PODs = 1.5 million | Intermediate MD = 34 GW |
| Unbundling | Intermediate <ul style="list-style-type: none"> 1 main state-owned DSO (95% Dx) 1 main retailer but sector open to competition | High <ul style="list-style-type: none"> 8 private DSOs Active competition in retail | Intermediate <ul style="list-style-type: none"> 1 private DNO Active competition in retail | Very high <ul style="list-style-type: none"> 170 DSOs Active competition in retail | Intermediate <ul style="list-style-type: none"> 12 DNOs – with one (Umeme) supplying 93% of the customers 1 state-owned TSO single-buyer IPPs + state-owned genco | Intermediate <ul style="list-style-type: none"> Eskom unbundling partially complete Municipal distribution IPPs |
| Type of pricing regulation | Performance-based regulation with revenue cap (4 year period) | Performance-based regulation with revenue cap (5 year period – down from 8) | Performance-based regulation with revenue cap (5 year period) | Performance-based regulation with revenue cap (4 year period) | Performance-based regulation with price cap (1 year period*) | Cost-plus regulation Eskom Multi-year price determination - 3 year period, with some performance based Municipal Dx 1 year period |

Other Jurisdictions - Summary

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- **No “one size fits all” approach**
- **Radically different approaches in similar markets**, each deemed satisfactory by relevant stakeholders – approaches in place carry on legacy of decades of incremental improvements, compromises and renegotiations
- So-called “**Performance-Based Regulation**” is gold standard of CoSS
 - Essential components are the regulatory asset base, the regulated rate of return, allowed OPEX and other pass-throughs
 - Combined with ex-post and ex-ante incentives and adjustments to encourage for performance and efficiency
- **Fair assessment and allocation of costs incurred by DG expansion involves complex analysis** – only meaningful when comprehensive and accurate data sets are available to use
- Cost allocation generally somewhat similar to principles in NRS-058, **except for the allocation of demand-driven costs** – which even in much more mature markets follows a simpler approach

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