



UK Energy Research Centre

Demand Uncertainty on Low Voltage Distribution Networks: Analysing the Use of Distribution Future Energy Scenarios (DFES) in Network Company Business Plans

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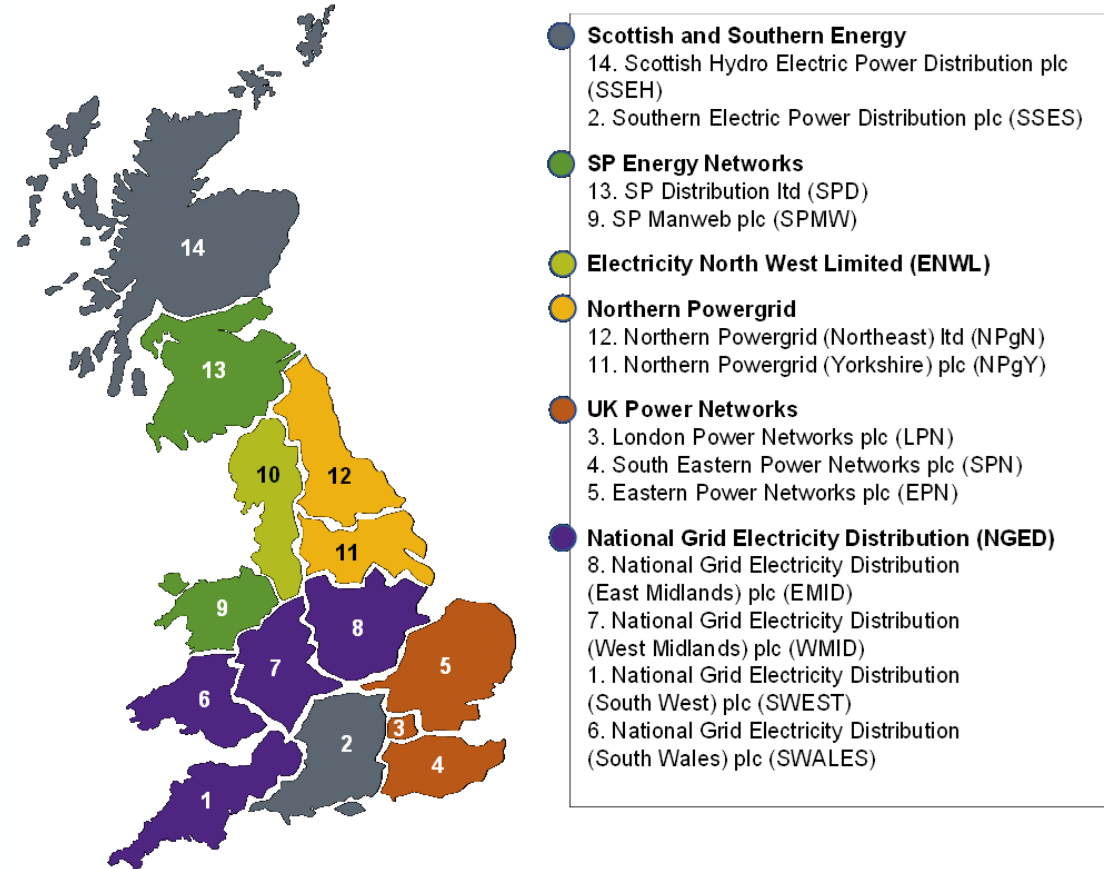
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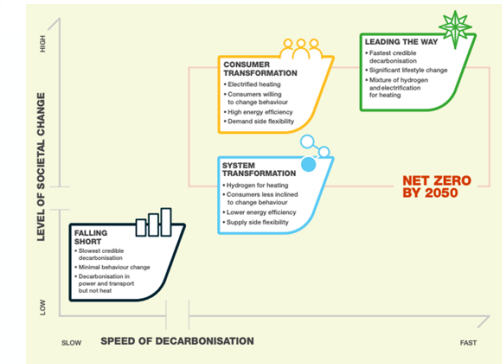
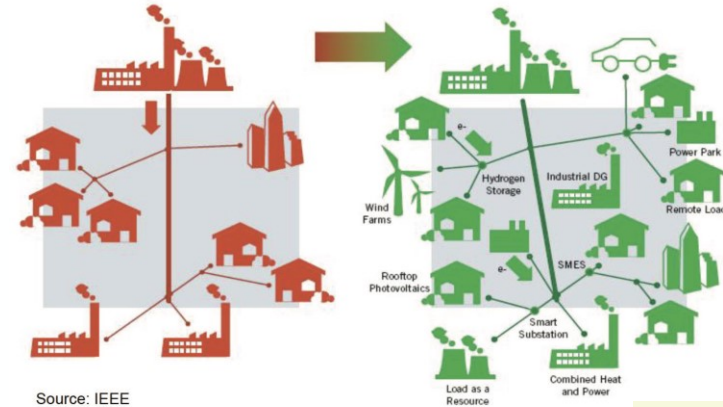
The electricity DNOs and the regulatory regime

- 6 distribution network operators (DNOs), 14 licensed areas
- Regulated by Ofgem
- Currently in 2023-2028 price control period
 - Each DNO submits a business plan in advance
 - Regulator evaluates costs and awards a revenue allowance
 - Company profits if it delivers the plan below the regulators' revenue allowance→Ex-ante, incentive regulation



The electricity system is changing

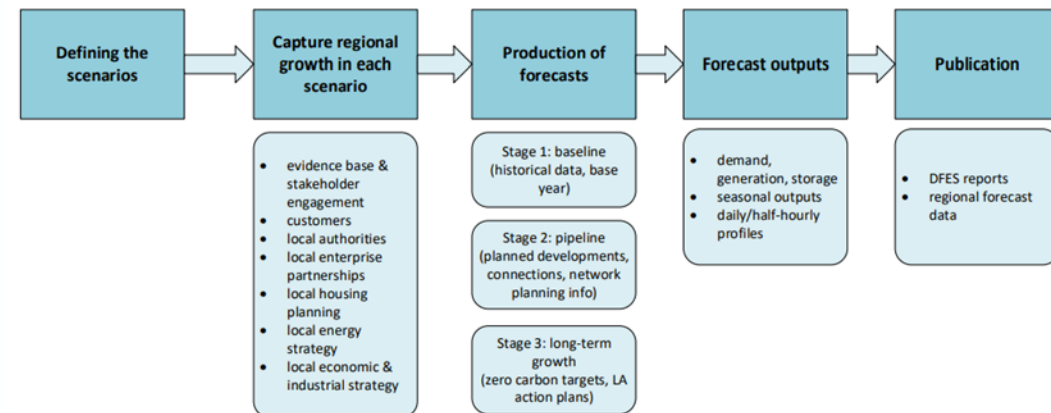
- Traditional system –
 - Steady state
 - Expected growth of 1% each year driven by new connections
 - Focus on efficiency
- Decarbonised system –
 - Changes to the power flows
 - New customers and stakeholders
 - Uncertainty in the amount of growth of LCTs
- NGENSO produces possible future pathways to net zero



How do distribution network operators (DNOs) and the regulator deal with the increasing uncertainty around future demand on the low voltage networks and what are the implications for long-term network planning and future regulation?

Distribution Future Energy Scenarios (DFES)

- Produced annually – pathways out to 2050
- Common DFES methodology framework as agreed by the six DNOs and NGENSO as part of the ENA's Open Networks project based on the FES pathways
 - Regional growth captured through increased consultation with stakeholders
- DNOs use a common set of net zero compliant forecast assumptions
 - Climate Change Committee's (CCC) 6th carbon budget
 - key government policies such as the Energy White Paper and the Net Zero Strategy



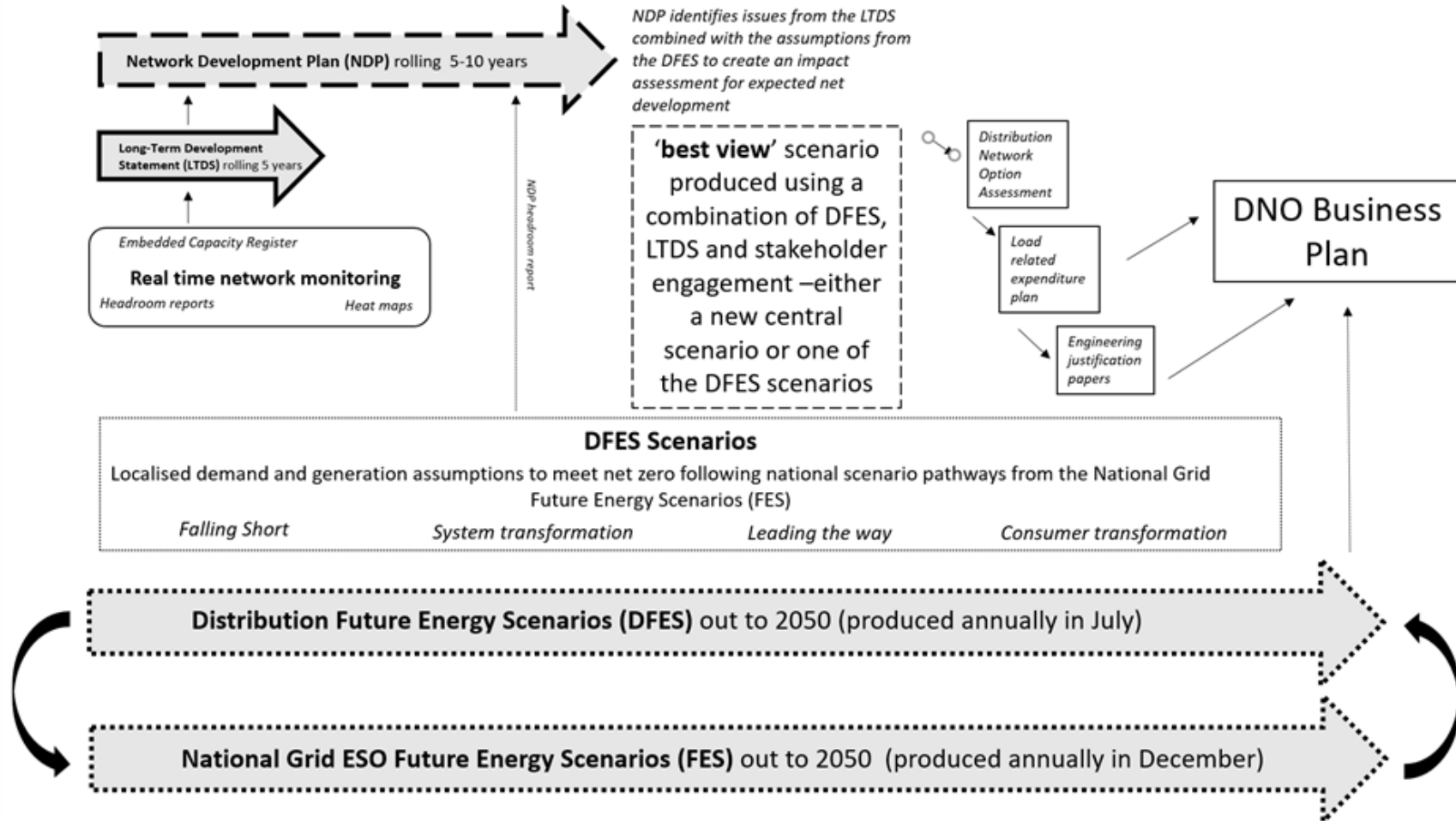
(source: Energy Networks Association)

DFES customer engagement and modelling

- Increased customer focus including LA's and devolved government's decarbonisation plans
- Consultancies model numbers of LCTs from engagement workshops, LAEPs, postcode and other open data sets plus incorporation of policy changes.
- Networks convert numbers into demand data using known data profiles, e.g. EV charger types
- All assumptions should be well justified or risk a penalty.



Network planning and modelling for load-related expenditure in electricity distribution network company Business Plans



Results from the standardisation of processes

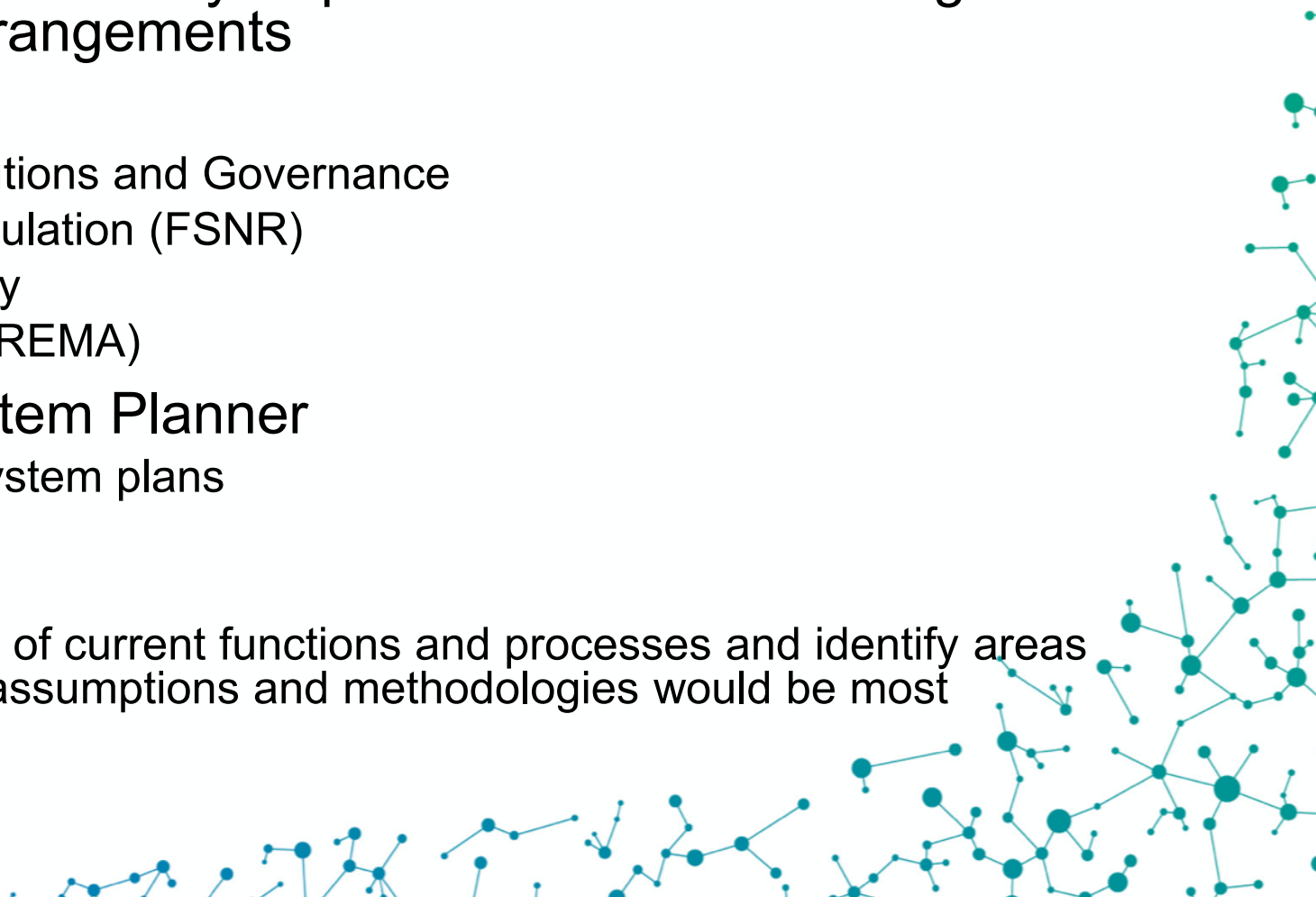
'we very quickly realised it was going to be quite difficult to set allowances consistently for all the DNOs given all of their different scenarios' (Interview, Ofgem).

- Highlights the amount of variation within and across DNO licence areas
- Ofgem considered options before releasing revenue for a least regrets option via a variety of uncertainty mechanisms
- For low value, high volume projects a capacity-based mechanism was chosen.
- A System Transformation baseline with an automatic trigger up to the Customer Transformation pathway
- Novel use of scenario pathways for revenue allowances

'So the result of that was across the different DNOs there were fairly different assumptions which, to be honest, once you end up aggregating them all and taking away some regional variation, actually have broadly similar outlooks. I think it largely boiled down to customer transformation being the most prevalent' (Interview, Ofgem).



Future developments

- Moving from steady state to uncertainty requires fundamental changes to energy system governance arrangements
 - Suite of reforms underway -
 - The Future of Local Energy Institutions and Governance
 - Future Systems and Network Regulation (FSNR)
 - The Future of Distributed Flexibility
 - Review of Market Arrangements (REMA)
 - Introduction of a Regional System Planner
 - Coordination of regional, whole system plans
 - Facilitation of dialogue
 - Arbitration between local areas
 - The RSP should avoid duplication of current functions and processes and identify areas where greater standardisation of assumptions and methodologies would be most beneficial for consumers
- 
- A decorative graphic in the bottom right corner of the slide, consisting of a network of interconnected nodes and lines. The nodes are represented by small circles of varying sizes, and the lines are thin, light blue or teal. The network is dense and appears to be a complex, interconnected system, possibly representing a network or a data structure.



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