

ASSESSING THE FUTURE ELECTRICITY SECURITY OF THE UK IN A LOW-CARBON CONTEXT

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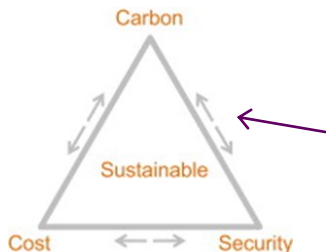
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In order to meet legislative targets for mitigating climate change, future energy systems will need to become secure, affordable and low-carbon – the so-called ‘trilemma’ of sustainable energy policy. As part of a growing body of research into energy security and low-carbon energy transitions, this project seeks to assess the future security of the UK electricity system in a low-carbon context. A new multiple-indicator framework for security of both supply and demand has been developed with the specific aim of making projections of the security of a low-carbon electricity system.



The energy ‘trilemma’ (Boston 2013). This research argues that to be ‘secure’, an energy system must also be low-carbon and low cost. For example, if a household cannot afford to pay for the electricity to switch the lights on, this is not a ‘secure’ supply of electricity to that household!

Assessing low-carbon transition pathways:

The research applies the assessment framework to three transition pathways, which were developed by the Transition Pathways to a Low-Carbon Economy Consortium (Foxon 2013). These pathways focus on the overall ‘governance logic’ which could lead the energy system down different routes through to 2050:

- ◆ ‘Market Rules’ (top-down, market-driven approach)
- ◆ ‘Central Coordination’ (centralised, government-led approach)
- ◆ ‘Thousand Flowers’ (bottom-up, civil society-led approach)

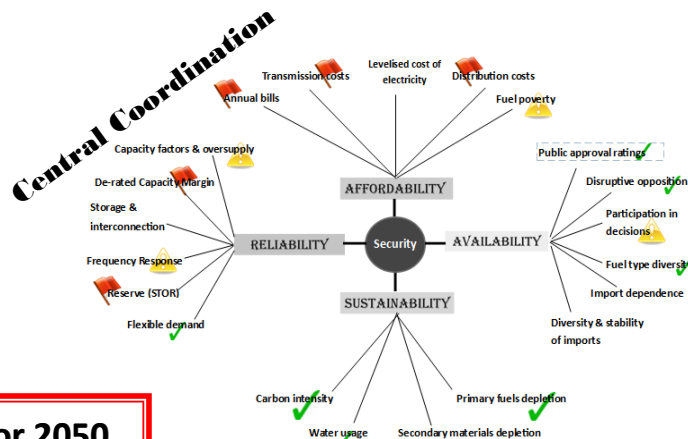
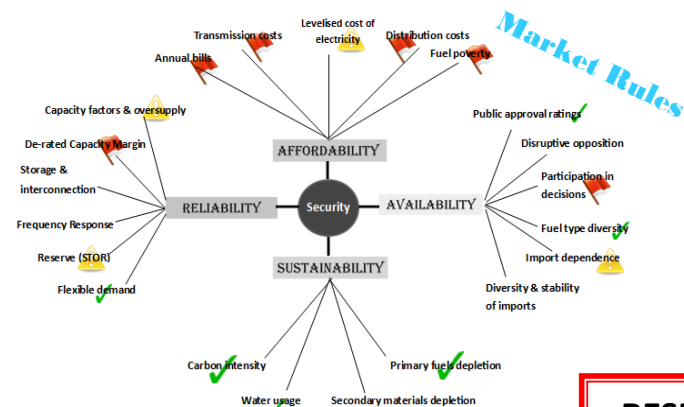
We need a framework for assessing electricity security which comprises both long-term and short-term dimensions, as well as broader aspects of the Trilemma

Three transition pathways are assessed within a framework of 24 indicators with four ‘dimensions’:

Availability, Reliability, Affordability, Sustainability

A ‘dashboard’ approach allows us to view results across a diverse range of quantitative and qualitative indicators, without the need for messy aggregation or subjective weighting

It also allows us to identify important trade-offs between dimensions and indicators



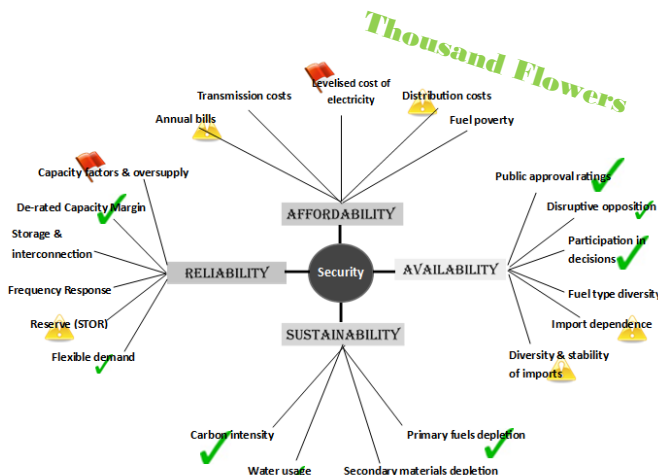
RESULTS for 2050

Conclusions

- * Short-term reliability and affordability raise the most serious concerns
- * Reliability obtained at the expense of large amounts of spare capacity
- * Low bills obtained through lower demand; but who pays for the spare capacity?
- * Key concern = securing adequate investment

Recommendations

- * Biomass vital for flexibility; we need more sustainable indigenous supply and a better idea of global market evolution
- * Reducing demand is key
- * Do current policies adequately reward flexibility?
- * Political dialogue needs to be clear about the costs and the scale of the challenge! Low-carbon electricity will be expensive!



The decentralised Thousand Flowers pathway appears to be the most secure on average in 2050

The ‘sustainability’ dimension has least risks, and is the only dimension to improve from 2030 to 2050

There are major trade-offs between Affordability and Sustainability

Key: 🚩 = ‘Severe risk’ ⚠️ = ‘Moderate risk’ 🟢 = ‘Low risk’ ✅ = ‘Secure’

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