National Grid Electricity System Operator (ESO) analysis maps how Britain can power its way to net zero by 2050

Monday 12 July 2021

- **National Grid ESO's Future Energy Scenarios (FES) model credible energy pathways over coming decades**
- **Two scenarios modelled by ESO see Britain meeting its 78% emissions reduction target by 2035, and three scenarios meet the 2050 net zero target**
- **Report says consumer behaviour change and policy clarity are pivotal to achieving net zero**
- **Hydrogen is central to all scenarios which lead to a net zero Britain**

Britain can achieve its legally-binding targets of slashing emissions by 78% by 2035, and reaching net zero by 2050 – but only if consumers embrace new ways to use energy, and urgent policy decisions drive immediate energy efficiency measures.

That's according to National Grid Electricity System Operator (ESO)'s latest Future Energy Scenarios (FES) report, which models different credible pathways for energy in Britain over the coming decades.

In three out of four scenarios in the analysis, the country reaches net zero carbon emissions by 2050 or earlier, with two scenarios seeing Britain reduce its emissions by 2035 by the 78% (from 1990 levels) committed to in the recent sixth Carbon Budget.

But the report makes clear the level of societal change that will be required to meet the targets, as well as the importance of policy direction around – among other areas – residential heating and support for energy efficiency measures to help reduce overall demands.

In the most ambitious decarbonisation scenario, consumers in 2050 are turning down their thermostats by an average of 1°C – reducing heat demand by 13%[1] – and over 80% of households are smart charging their electric vehicle (EV)[2], responding to time-of-use energy tariffs to access cheaper, greener energy and reduce peak demand on the grid.

The two scenarios that meet the sixth Carbon Budget target see government achieve its pledge to install 600,000 heat pumps per year – with up to 2.6 million installed by 2025[3] and over 25 million by 2050[4] – though the pledge should be supported by clear policies on retrofitting thermal efficiency measures in homes to fully realise energy savings.

Across the analysis' scenarios we could see:

- up to 37.4 million electric vehicles on Britain's roads by 2050[5];
- a 60% reduction in energy demand for road transport by 2050 compared to today, even in the slowest decarbonising scenario[6];
- a potential improvement of over 30% in consumers' energy efficiency as people switch to LED light bulbs and smart appliances[7];
- power sector emissions being negative by 2034 in all scenarios[8];
- no unabated combustion of natural gas for power beyond 2035 in its most ambitious scenario[9].

Hydrogen plays a central role in all of the net zero scenarios, with electrolysis – converting surplus wind or solar energy into hydrogen power – introducing significant flexibility to the electricity network, and hybrid heat pumps and hydrogen boilers replacing natural gas in some scenarios.

The government's plan for a hydrogen town – set out in its energy white paper – could be realised before the end of the decade in two of the FES scenarios[10].

Matthew Wright, head of strategy and regulation at National Grid ESO, said:

> "Our latest Future Energy Scenarios insight reveals a glimpse of a Britain that is powered with net zero carbon emissions, but it also highlights the level of societal change and policy direction that will be needed to get there.
>
> "If Britain is to meet its ambitious emissions reduction targets, consumers will need a greater understanding of how their power use and lifestyle choices impact how sustainable our energy system will be – from how we heat our homes, to when we charge our future cars – and government policy will be key to driving awareness and change.
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> "Britain is making significant progress towards achieving net zero. The fundamental changes outlined in our latest FES insight show just how important a coordinated approach will be between policymakers and industry if we're to capitalise on that momentum."

National Grid ESO is aiming to be able to operate Britain's electricity system with zero carbon by 2025. Its recent report COP26: The Road to Zero Carbon charts how the country's electricity system has changed since 1990, and how it is planning to operate carbon-free.

For more information and insight on National Grid ESO's Future Energy Scenarios past and present, visit www.nationalgrideso.com/future-energy/future-energy-scenarios.

ENDS

Notes to editors

- The Leading the Way and Consumer Transformation scenarios meet the sixth Carbon Budget target.
- The Leading the Way, Consumer Transformation and System Transformation scenarios all see Britain reaching net zero by 2050 – with Leading the Way achieving it in 2047 and becoming net negative by 2050.
- FES 2021 draws from over 1,700 experts' views to build its models.

References

1) **p46** – from the Leading the Way scenario
2) **p58** – from the Leading the Way scenario
3) **p51** – from the Leading the Way scenario (equates to around 9% of homes)
4) **p49** – from the Consumer Transformation scenario
5) **p62** – from the Steady Progression scenario
6) **p58** – from the Steady Progression scenario
7) **p49** – from the Consumer Transformation scenario
8) **p23** – from the Leading the Way, Consumer and System Transformation scenarios
9) **p97** – from the Leading the Way scenario
10) **p43** – from the Leading the Way and System Transformation scenarios

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