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Future Energy Scenarios 2018

Changes from FES 2017 to FES 2018

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Q: What are the main changes in the framework and approach when comparing *FES 2017* and *FES 2018*?

A: The framework has changed with new axes of 'speed of decarbonisation' and 'level of decentralisation' replacing 'green ambition' and 'prosperity'. This is to better reflect changes in falling cost of renewables and break the causal link between prosperity and decarbonisation.

The new framework allows us to explore two pathways to meet the 2050 target instead of one from last year and to more visibly flex where the energy could come from. This year there are two scenarios with a greater emphasis on decentralised technology and two scenarios with greater emphasis on centralised technology, although all scenarios see a greater level of decentralised energy than today.

Q: How do the scenarios from *FES 2017* compare with the scenarios in *FES 2018*?

- **Community Renewables** builds on the consumer renewables sensitivity from *FES 2017.*
- The *FES 2018* **Two Degrees** scenario builds on the *FES 2017* Two Degrees scenario, combined with hydrogen heating from the decarbonised gas sensitivity in *FES 2017*.
- **Steady Progression** combines elements from Steady State and Slow Progression from *FES 2017*.
- And lastly, **Consumer Evolution** combines elements from Consumer Power and Slow Progression from *FES 2017*.

More information about how the framework and scenarios have changed can be found in our Stakeholder Feedback Document

Q: What changes have been made to the modelling approach?

A: FES18 now uses a new model for transport and this includes all vehicles, not just cars, as was the case for FES 2017.

Last year, we began using a pan-European dispatch model to study electricity interconnector flows. This year we have further refined our analysis by developing a range of European scenarios. These account for uncertainty in Europe as well as GB. They are based on scenarios developed by European system operators sand the European Network of Transmission System Operators for Electricity (ENTSO-E).

In addition we are using a new whole system model (UKTIMES) to help with our carbon trajectories and we are working with UCL to develop it to allow us to cost the scenarios.

For more detail on changes to modelling methods and approaches please see our FES 2018 Modelling Methods document.

Q: How has the view of technologies and areas changed?

A: **Transport**: There is greater electric vehicle uptake in all scenarios compared to last year and the low case is a lot higher. This is in part due to developments since the last publication of FES such as the publication of the Government's aspiration to ban conventional vehicle engines by 2040. It is also due to modelling changes (see above).

The impact on electricity demand is mitigated with smart charging and vehicle-to-grid plays a role in meeting peak demand and absorbing excess generation away from peak times in all scenarios. The impact of EVs is seen from the 2030's when mass take up starts. Last year there was a lower uptake and less peak management in some scenarios, and no vehicle-to-grid.

Heat: Two pathways for decarbonisation of heat are explored in FES 2018. Both are a mixture of technologies such heat networks, heat pumps and boilers with either a greater emphasis on heat pumps (Community Renewables) or hydrogen networks (Two Degrees). In contrast, Two Degrees in FES 17 had high heat pumps.

In all scenarios we mitigate peak electricity impacts with either biogas or hybrid heat pumps to avoid excessive peak electricity demand. Industrial and commercial heat efficiency improves by 10% by 2030 in the 2050 compliant scenarios.

Thermal efficiency assumptions for the 2050 compliant scenarios are slightly less ambitious than FES 2017, in response to stakeholder feedback.

Electricity generation and flexibility: Greater renewables uptake can be seen across all scenarios as compared to FES 2017, to reflect falling costs and political ambition. Therefore generation capacity is higher than last year as renewable load factors are lower than conventional plant. This leads to periods of excess generation due to the weather dependency of renewables and this is seen both in GB and continental markets from the 2030's.

Storage capacities have increased in line with renewables growth, with the need to absorb excess renewable power becoming more of a factor in storage growth. New emissions limits have also led us to predict no further growth in small diesel reciprocating engines beyond currently contracted projects.

Gas demand: Large scale hydrogen production arrests the decline in gas demand in the Two Degrees scenario. Gas peaks become more pronounced, as annual demand levels fall more quickly than peak demand.

Gas supply: Broadly similar to FES 2017, the only changes are delays to shale take up in the 2 scenarios that include shale, due to current uncertainty, and greater levels of biomethane in the CR scenario to meet peak heat demand. UKCS depletes by 2050 in all scenarios.

Electricity demand: Compared to FES 17, we see slightly higher annual demands by 2050 in all scenarios, and a narrower range of peak demands. This is partly driven by the fact that there are more electric vehicles in all scenarios this year, but greater uptake of smart charging and vehicle-to-grid. In previous years we also modelled industrial & commercial energy efficiency as part of our economic modelling. For 2018, we have taken a different approach, and in Community Renewables and Two Degrees, we have assumed additional policy which improves electrical energy efficiency by 30%, by 2030.

More detail for all areas and technologies can be found in the FES 2018 Data Workbook. A high level summary of key statistics can also be found at http://fes.nationalgrid.com/fes-document/

For any queries, please contact us at: fes@nationalgrid.com