

Sent by email to RIIOElectricityTransmission@ofgem.gov.uk

21 June 2023

Centralised Strategic Network Plan: Consultation on Stage 1 – modelling future supply and demand - Thermal Storage UK response

Dear Ofgem

We agree with Ofgem that the Future System Operator (FSO) should develop transparent and plausible future energy supply and demand estimates to enable the development of the Centralised Strategic Network Plan (CSNP). However, we encourage Ofgem to adopt a more ambitious approach to system modelling that is more detailed and close to real-time than the FES. While the FES has played a useful role during the early part of the energy transition, it is very underpowered for the next phase. To deliver net zero by 2050 at lowest cost, Ofgem could go further than revising the FES guidance and FES Methodology.

Modelling future supply and demand

We strongly encourage Ofgem, the UK government and the Future System Operator (once established) to work together to develop real-time and detailed modelling to support system planning. This modelling would cover connected generation, transmission and distribution capacity and the needs of demand products such as heat pumps and electric vehicles (including winter peak demand, average demand and flexibility capacity). The model would adapt in real-time and could evolve into a digital twin. Even if this model costs as much as the UK government is investing into the successor to the Met Office's Cray supercomputer (£1.2 billion), this is a small cost in comparison to the scale of the investment needed for the energy system by 2050 (more than £500 billion). This transformation in modelling the power system is particularly important if the FES outputs are to play a more critical role in informing network build requirements and the relative role of flexible assets.

We agree with Ofgem that, without reform, the electricity grid at both the transmission and distribution levels, will become an obstacle to decarbonising. There is a need to act sooner rather than later. The business plans for the ED2 price control for Distribution Network Operators (DNOs) suggest that, by the end of 2028, there could be 3 million heat pumps operating with thermal stores in Britain. There is a real risk that electrification of transport and heat demand will outstrip the capacity of at least parts of the low voltage network during the ED2 price control. With sufficient computing power, the FSO's CSNP can contribute to ensuring that

sufficient investment occurs in the right parts of the electricity system to cope with more demand and more generation over the next two decades.

While we recognise that Ofgem's focus with the CSNP is on transmission and generation, it is important that the FES continues to model the impact of increasingly electrified heat and transport. The FES scenarios are used by a range of stakeholders and National Grid ESO sees a significant role for heat flexibility, including through smart thermal storage. Our own analysis with LCP Delta (shared with Ofgem separately and available on our website) suggests that 2.4 million smart thermal stores could operate with or instead of heat pumps by 2030, providing up to 4.1GW of flexibility on the coldest day of the year. To make the most of this opportunity requires encouraging people and installers to see the financial benefits of heat flexibility. High-quality, detailed and real-time demand and supply modelling would help make clear the scale of the opportunity once the FSO is established by the Energy Security Bill.

We recommend that the FSO (once established) goes further than Ofgem sets out in the consultation and seeks to build resilience into the electricity network to prepare for the effects of climate change. We sense that Ofgem remains overly concerned about the risk of overinvestment, relying on historical data such as 10-year weather data ranges and 10-year gas price ranges. While inherently unpredictable, we recommend that the FSO weights its modelling towards investment decisions that are resilient to more extreme weather events as climate change accelerates. This modelling approach would better align with Ofgem's approach to allowing investment ahead of need for networks in RIIO-ED2.

This response is not confidential and may be published on the Ofgem website.

Best wishes

Tom Lowe

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Thermal Storage UK

Questions

1. Do you agree that we should move towards pathways instead of scenarios, to provide greater clarity on the type of investments required under the CSNP?

The approach to pathways described by Ofgem in the consultation appears to focus on transmission networks and connecting renewable generation, with less focus on demand and the regional impacts on the distribution network. We support moving to a pathways approach if the modelling incorporates demand (including peak winter demand), distribution network capacity and system flexibility.

To achieve this, we strongly encourage Ofgem, the UK government and the Future System Operator (once established) to work together to develop real-time and detailed modelling to support system planning. This modelling would cover connected generation, transmission and distribution capacity and the needs of demand products such as heat pumps and electric vehicles (including winter peak demand, average demand and flexibility capacity). The model would adapt in real-time and could evolve into a digital twin. Even if this model costs as much as the UK government is investing into the successor to the Met Office's Cray supercomputer (£1.2 billion), this is a small cost in comparison to the scale of the investment needed for the energy system by 2050 (more than £500 billion). This transformation in modelling the power system is particularly important if the FES outputs are to play a more critical role in informing network build requirements and the relative role of flexible assets.

2. Do you agree that there should be a single forward view of the near term for all pathways?

It is difficult to see how the near-term time horizon of 8 to 12 years suggested by the consultation is feasible for modelling demand with any confidence. For instance, the demand from electric heating by 2035 will vary significantly depending on whether the UK government decides in 2026 that hydrogen has little or a limited role in home heating. In that example, the UK government could reduce uncertainty by bringing forward the date for deciding on the relative role of hydrogen in heating.

If the FES moves to a single forward view of the near term pathway, then this increases the importance of incorporating more real-time data within a live version of the FES. This would show the impact on demand - and the potential for flexibility - of energy efficiency upgrades, as well as the installation of electric heating and electric vehicles.

3. Do you agree with our proposal to have Net Zero compliant pathways (number to be determined by FSO), with a separate counterfactual demonstrating the scale of activities and investment that falls short?

Yes, we agree. It is important to provide the counterfactual where net zero is not met.

4. Do you agree that the pathways should run to 2050, and if not, why not?

Yes, we agree. We recognise that Ofgem and the FSO may revisit this in the late 2020s and early 2030s. After 2050, the goal is likely to become maintaining net zero, rather than achieving net zero. Investing in infrastructure and flexibility will continue as demand evolves after 2050, for instance with higher cooling requirements in the summer.

5. Do you agree that the model should develop the capacity to include extreme data ranges when requested of the FSO in its role as strategic advisory body?

We recommend that the FSO (once established) goes further than Ofgem sets out in the consultation and seeks to build resilience into the electricity network to prepare for the effects of climate change. We sense that Ofgem remains overly concerned about the risk of overinvestment, relying on historical data such as 10-year weather data ranges and 10-year gas price ranges. While inherently unpredictable, we recommend that the FSO weights its modelling towards investment decisions that are resilient to more extreme weather events as climate change accelerates. This modelling approach would better align with Ofgem's approach to allowing investment ahead of need for networks in RIIO-ED2.

6. Do you agree with our consultation position on modelling network constraints?

We strongly recommend that FSO modelling incorporates network constraints at transmission and distribution level. While we recognise that more data is available about constraints on the transmission system, we also note Ofgem is requiring the distribution networks to understand their low voltage constraints by the end of the ED2 price control. We recommend that this information feeds into the FES, as more distribution constraint data becomes available over the next five years.

We agree with Ofgem that, without reform, the electricity grid at both the transmission and distribution levels, will become an obstacle to net zero. There is a need to act sooner rather than later. The business plans for the ED2 price control for Distribution Network Operators (DNOs) suggest that, by the end of 2028, there could be 3 million heat pumps operating with thermal stores in Britain. There is a real risk that electrification of transport and heat demand will outstrip the capacity of at least parts of the low voltage network during the ED2 price control. With sufficient computing power, the FSO's CSNP can contribute to ensuring that sufficient investment occurs into the electricity system to cope with more demand and more generation over the next two decades.

7. Do you agree with our consultation position, and do you have a view on which data principles should be possible to adopt for the first FES?

We recommend that the modelling is as transparent as possible for all stakeholders, including those making investment decisions. With sufficient computing power and investment, the model could allow stakeholders to interrogate factors such as generation, demand and / or network capacity (at both transmission and distribution level). To ensure that organisations of various sizes (for instance, networks and aggregators) can readily benefit from the data, we encourage Ofgem and the FSO to consider ease of access to the frontend of this data.

8. Are there specific stakeholder needs cases for publication of data, including the format of outputs?

We recommend that the modelling is as transparent as possible for all stakeholders, including those making investment decisions. With sufficient computing power and investment, the model could allow stakeholders to interrogate factors such as generation, demand and / or network capacity (at both transmission and distribution level). To ensure that organisations of various sizes (for instance, networks and aggregators) can readily benefit from the data, we encourage Ofgem and the FSO to consider ease of access to the frontend of this data.

9. Are there specific data outputs associated with the FES that we should mandate?

No comment.

10. Do you agree that regional and/or industrial hub pathways should be included in the FES?

Yes, we agree.

11. Do you agree with our proposal for a 'major' FES in the year prior to the main CSNP publication, with smaller annual updates in the intervening years?

We recommend that the FES is updated in real-time, with data flowing through as demand products (such as electric vehicles and electric heating) and new generation assets connect to the grid.

We strongly encourage Ofgem, the UK government and the Future System Operator to work together to develop real-time and detailed modelling to support system planning. This modelling would cover connected generation, transmission and distribution capacity and the behaviours of demand-side products (including peak

demand, average demand and flexibility capacity). The model would adapt in real-time and could evolve into a digital twin. Even if this model costs as much as the UK government is investing into the successor to the Met Office's Cray supercomputer (£1.2 billion), this is a small cost in comparison to the scale of the investment needed for the energy system by 2050 (more than £500 billion). This transformation in modelling power is particularly important if the FES outputs are to play a more critical role in informing network build requirements and the relative role of flexible assets.

12. Do you consider that longer-term evolution of energy supply and demand modelling should head in the direction outlined above and if so how?

We strongly encourage Ofgem, the UK government and the Future System Operator (once established) to work together to develop real-time and detailed modelling to support system planning. This modelling would cover connected generation, transmission and distribution capacity and the needs of demand products such as heat pumps and electric vehicles (including winter peak demand, average demand and flexibility capacity). The model would adapt in real-time and could evolve into a digital twin. Even if this model costs as much as the UK government is investing into the successor to the Met Office's Cray supercomputer (£1.2 billion), this is a small cost in comparison to the scale of the investment needed for the energy system by 2050 (more than £500 billion). This transformation in modelling the power system is particularly important if the FES outputs are to play a more critical role in informing network build requirements and the relative role of flexible assets.