Public

REMA Dispatch Assessment

Modelling Methodology – Request for Input

Thursday 14th November, 2024

NESO
National Energy System Operator

Public

Contents

Public

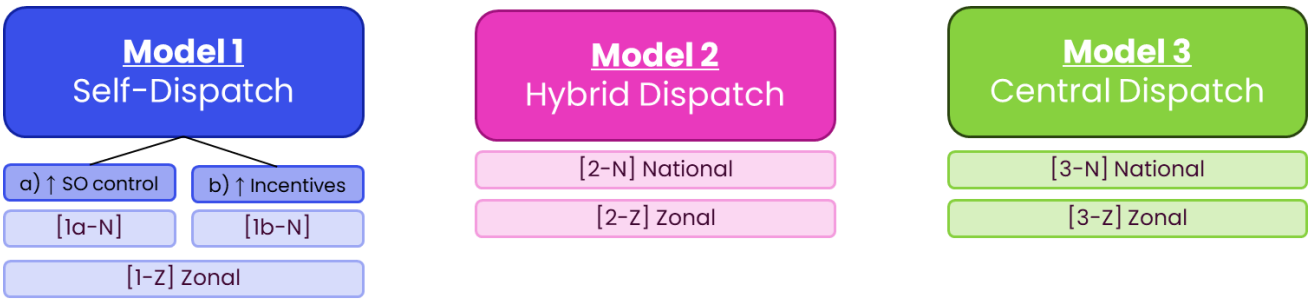
Introduction and Purpose of this Request for Input

Context

The Department for Energy Security and Net Zero (DESNZ) is identifying reforms needed to transition to a decarbonised, cost-effective, and secure electricity system through the Review of Electricity Market Arrangements (REMA). DESNZ has identified that, as the electricity system has decarbonised, new challenges have emerged for operating the system securely and cost-effectively, leading to rising balancing costs which ultimately fall on consumers. To address these challenges, DESNZ are assessing the appropriateness of the current self-dispatch arrangements, or whether the introduction of central dispatch would be beneficial. NESO is supporting DESNZ in this assessment. The ultimate decision on any reforms to dispatch arrangements remains with DESNZ.

On 17 July 2024, we presented to industry seven strawman dispatch models we are considering as part of the REMA dispatch workstream. The purpose of the webinar was to share with stakeholders our process for establishing different options; to outline the seven dispatch models we have identified; and to discuss the hypothesised pros and cons of each model.

We constructed the models seeking to address the issues identified in our 'Case for Change'. The models were intended to cover the spectrum of different scheduling and dispatch approaches taken across jurisdictions. A high-level summary of the models is shown below:



Further details of the models, the hypothesised pros and cons, and a summary of the major points of feedback we received from industry stakeholders can be found on the Net Zero Market Reform webpage.

Stakeholder feedback on evidence base for dispatch reform

Stakeholder feedback from the webinar tended to agree that while we had identified an appropriate spectrum of models and their respective theoretical advantages and disadvantages, quantitative analysis was required to understand the relative weightings and trade-offs of different dispatch designs.

Following this feedback, we have commissioned FTI Consulting to assess the advantages and disadvantages of improvements to the Balancing Mechanism and Central Dispatch compared to

current self-dispatch arrangements. We will also compare each model under national and zonal pricing.

We are now seeking stakeholder input and feedback on the key assumptions for this modelling exercise.

NESO's recent advice to government on achieving clean power by 2030 emphasises the importance of accelerated investment through this decade for decarbonising the power system. We recognise the importance to investors of stability and confidence to underpin the significant investment required to 2030, through the 2030s and beyond. This modelling is intended to help accelerate evidence-led decision-making on the reforms needed to ensure future markets maximise the opportunities of a decarbonised power sector.

This document provides:

1. Context on the status of NESO's analysis in DESNZ' REMA Programme
2. An overview of the modelling scope and intended outputs
3. A description of the model setup and approach, along with associated questions for stakeholders

We additionally provide a slide pack from FTI containing detail on the model set up, methodology and assumptions.

You can input feedback on the modelling assumptions** here**. We are accepting responses until Thursday 28th November 2024.

Public

Status of NESO's Dispatch Analysis in DESNZ' REMA Programme

The Department for Energy Security and Net Zero (DESNZ) is continuing to assess options in REMA via their own market modelling. To support the REMA Programme's assessment, we have commissioned FTI Consulting to undertake focused modelling of a subset of the 7 dispatch models we shared with industry in July 2024. This modelling is intended to complement DESNZ' existing broader analysis and to deepen the REMA Programme's evidence base on the trade-offs between self and central dispatch under different wholesale market design scenarios.

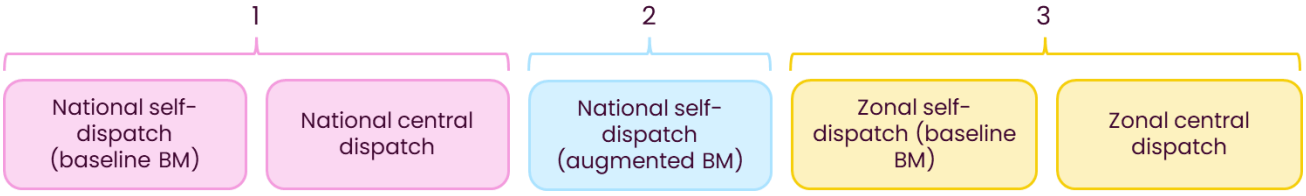
Modelling Scope and Outputs

This section describes at a high-level what we are seeking to answer through this market modelling exercise.

Overview of model setup

This assessment will:

1. Test the key trade-off between self- and central dispatch: whether it is more beneficial to (1) resolve transmission constraints at day-ahead under central dispatch or (2) to allow the market to resolve imbalances through continuous intraday trading under self-dispatch, with transmission constraints being left to NESO to address post gate closure.
2. Evaluate how an augmented BM would perform as an alternative to introducing central dispatch (recognising this would reduce redispatch costs but not volumes).
3. Evaluate how the case for central dispatch changes under zonal pricing compared to national pricing by testing the same trade-off as described in (1) above under a zonal design.



The outputs of this assessment will be a quantitative breakdown of consumer and producer impacts for each model, including:

a) Constraint management and specific payments associated with the introduction of central dispatch (described in more detail in FTI's presentation).

b) Wholesale costs

c) CfD payments (consumer and producer impact)

d) Intra-GB congestion rents (under zonal pricing)

e) Net consumer benefits and producer surplus

f) Total GB socioeconomic benefits

What this assessment does not include

Based on discussions with FTI, we are not including the Hybrid Dispatch model in the modelling project scope since we do not believe existing modelling software could reflect it effectively and with an appropriate degree of accuracy: under hybrid dispatch, the SO objective function is not to minimise the overall cost of production (least-cost dispatch) but rather is to minimise the cost of deviations from the unconstrained market schedule. The modelling software (PLEXOS) is set up to find the least-cost dispatch and the functionality to model the latter objective function is not a standard feature of the modelling software. As such, there is low confidence that the hybrid model could be modelled to any meaningful standard within the project timelines.

This assessment only considers reforms related to dispatch arrangements and the wholesale market (national and zonal pricing). Any wider reforms also being considered in the REMA Programme, such as changes to access and charging arrangements or the design of Contracts for Difference (CfDs), are not included. Similarly, changes to the cost of capital as a result of reforms to the wholesale market are not included.

Questions for stakeholders

The following section describes key model setup choices and the associated questions we have asked for stakeholder input on.

Choice of FES scenario and network background

Due to project compressed timelines we have made the following decisions on the model setup to avoid recalibration of FTI's model. We believe this is reasonable since the purpose of this assessment is to show the relative differences between dispatch designs. We will continue to explore the sensitivity of system and consumer benefits of the various dispatch options to transmission network and interconnector background. Further detail can be found on FTI's slide 8.

Item	Assumption
GB scenario	FES 2022 LtW (with exceptions in regard to interconnectors)
Modelled years	2030, 2035, 2040
Transmission network	HND + NOA7 refresh[1]

[1] This transmission representation intentionally does not include Beyond 2030, as doing so would lead to an inconsistency between the spatial distribution of generation (from FES 2022) and the underlying transmission network. The modelling assumptions deployed (FES 2022 and HND+NO7 Refresh) are contemporaneous and consistent with each other.

Interconnectors	Include all existing, under construction, and in development[2]. Assumptions chosen to align with DESNZ REMA modelling.

1. ***Do you have any comments on the model setup assumptions for displaying the relative merits of different dispatch options?***

Approach to capturing improvements in an 'augmented BM'

In our Scheduling & Dispatch Options Webinar, we outlined a number of initiatives to improve the design of the BM which would be expected to impact the case for introducing reforms to dispatch and/or wholesale design. FTI's approach to modelling an 'augmented BM' is set out below.

Increased competition
To proxy greater competition in the BM, the model will reduce offer uplifts (by a set range) applied to constrained on fossil fuel generation. Uplifts are the cost to NESO from increasing the output of some assets in the BM. They reflect start-up cost and the 'last-minute' nature of BM actions and have been calibrated based on historical data.

Out-of-merit dispatch in the BM
Broadly, out-of-merit dispatch, or "skipping", refers to seemingly uneconomic actions taken in the BM, i.e. if an action taken on a unit was more expensive than other units which were available. System actions are excluded from this definition as not all assets can provide these services, e.g. inertia.

NESO's skip rate methodology is currently under review. For the counterfactual, the assumption for skip rates will be set based on latest internal NESO calculations. Under the Augmented BM, FTI will remove this assumption, i.e. the skip rate is 0% across all technologies.

Expanded technology mix
To capture improvements to lower barriers to entry to the BM and the development of technologies which are able to participate, FTI will expand the technology mix of the augmented BM to include waste, hydrogen generation and demand side response.

Further detail on the counterfactual and augmented BM is on FTI slides 9 & 10.

Do you agree/disagree with:

2. ***How different technologies participate in the BM (i.e. how the cost to NESO is calculated)?***
3. ***What technologies are included in the Baseline BM?***
4. ***What technologies are included in the Augmented BM?***
5. ***The approach to modelling potential improvements to the BM?***

[2] There are exceptions to this which for commercial sensitivity reasons, we cannot share publicly.

Approach to modelling forecast error

A key difference of central dispatch compared to current arrangements is that there would be fewer opportunities for market parties to respond to evolving generation and demand energy imbalances between day-ahead and real-time. To capture the impact of this change, FTI will introduce forecast errors into the day-ahead schedule based on historical wind, solar and demand data. Under self-dispatch, the resulting energy imbalances are assumed to be resolved through intraday trading, while transmission constraints are resolved through redispatch. Under central dispatch, transmission constraints are solved at day-ahead and energy imbalances from forecast errors are resolved by redispatch in the real-time market. Further detail can be found on FTI's slides 6, 12 and 13.

6. ***Do you agree/disagree with the approach to capturing forecast uncertainty?***

Approach to 'make-whole' payments

Under central dispatch, there is a mismatch between scheduling choices determined by the central schedule (in turn driven by 'shadow' wholesale prices) and the associated generators' compensation price. This mismatch requires compensation payments to be made to producers whose schedules are misaligned with the commercial price signals they are exposed to (e.g to ensure producers recover their short-run costs if scheduled in a scenario where the national wholesale price is lower than their SRMC). Additionally, we have chosen to model central dispatch assuming generators would retain financial firm access. FTI slides 18 & 19 explain the rules developed to reflect how these payments are calculated.

7. ***Do you agree/disagree with how we've accounted for the principle of cost recovery and firm access, and with the methodology for how they have been reflected in the modelling?***

Under central dispatch, variations in an asset's output or load between day-ahead and real-time can occur due to the asset operator's forecast error or due to NESO balancing action. FTI detail on slide 19 how costs arising from forecast errors are allocated under the central dispatch model.

8. ***Do you agree/disagree with the treatment of payment flows relative to forecast errors?***
9. ***Do you have any other comments/feedback on the modelling methodology?***