Briefing Paper- Locational Signals under Reformed National Pricing (RNP)

Summary of Insights on the GB Electricity Market from a Multi-Stakeholder Workshop

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This Briefing Paper synthesises perspectives of key stakeholders from the GB electricity sector regarding the UK Government's decision to retain a single national wholesale price and proceed with Reformed National Pricing (RNP) under the Review of Electricity Market Arrangements (REMA). It addresses potential instruments to influence the: (1) siting of assets, (2) operation of assets, and (3) concerns regarding distributional fairness, affordability, and politics of these instruments of reform, in line with objectives to "create a fair, affordable, secure, efficient system and maximise benefits of clean power for consumers".[1]

We outline leading options, required coordination, and institutional responsibilities, building on insights from a workshop organised and delivered by UCL's Centre for Net Zero Market Design and the UK Energy Research Centre (UKERC).[2] The full report describes areas of common ground and points of divergence for each policy instrument currently indicated as options under RNP, as outlined in the REMA Summer update. [3]

Context and Overview

The goal of a system with majority of generation from variable renewable electricity (VRE) requires a greater degree of responsiveness to supply variation, and locational balance of diverse generation, demand, and transmission, to keep costs manageable. The first REMA consultation document in 2022 introduced consideration of locational pricing in the GB wholesale market, with the objective to enhance market signals for optimal location of investment and operations. In 2024, it rejected nodal pricing (at each key node in the system) due in part to concerns about complexity. The options were then narrowed to zonal pricing or retention of a single national price for the wholesale market.

The government's REMA summer update in July 2025 rejected zonal pricing. The dominant reasons were perception of unmanageable asset-hedging risk for investors, and uncertainty regarding more granular parameters and provision of associated policy, leading to a significant risk of increased Cost of Capital (CoC) for investors; the statement also cited the long timescale for any such major reform. Instead, the government will come forward with proposals for 'reformed national price' (RNP).

At our workshop, following a presentation of the government position by Jonathan Mills, an expert panel discussed the state-of-affairs of the market reform process, with attention paid to topics where uncertainty is slowing our ability to progress. Speakers challenged participants to think broadly about the objectives of ongoing reforms in the GB electricity system, noting that in many respects the outcome has reverted close to status quo, in part because of the uncertainties and potential disruptions associated with major reforms. An outstanding question

[1] https://www.gov.uk/government/collections/review-of-electricity-market-arrangements-rema

[2] Workshop held at University of London Senate House, 13 November 2025; 60+ external participants plus speakers and researchers; following morning plenary sessions, workshop roundtable discussions were held under the Chatham House Rule of non-attribution.

[3] https://assets.publishing.service.gov.uk/media/686f71412557debd867cbeff/review-of-electricity-market-arrangements-rema-summer-update-2025.pdf

remains whether the focus is on reform *for* transition, or for a new and more stable long-term structure for a renewables-dominated system.

Speakers broadly concurred that the decision to retain a single national price implies a greater role for state-led planning of asset locations, capital investments, and system operations. This implies also a greater state role in deploying instruments to translate centrally coordinated plans of system evolution, into efficient investment and operational decisions in the context of the GB systems of liberalised operational and retail markets and competitive auctions. This in turn raises questions about the adequacy of current governance arrangements, various institutional roles, and the extent of their responsibilities throughout reform and consolidation of the GB electricity system transition.

Developing a reformed system that sends investment and operational signals to effectively accommodate both locational and temporal flexibility needs is the continued focus. However, experts disagree about the i) extent to which the required scale of reform is feasible in practice and ii) how to best encourage the actioning of reforms through various options.

The National Electricity System Operator (NESO) now requires increased visibility to manage the system effectively, with focus placed on proposed reform of balancing and settlement arrangements that promote self-balancing, and supply NESO with adequate locational data flows. There is uncertainty regarding management of operational constraints, e.g. through effective design of flexibility and constraint markets, and regarding the integration of demand-side opportunities and derived benefits.

Reforms may present an opportunity to develop enhanced consumer understanding, and explore improved integration of self-generation opportunities, direct consumer-supplier agreements, community benefits derived from infrastructure investment, and consumer benefits derived from reformed investment and operational structure. The mechanisms for improving demand-side understanding, engagement and outcomes through market reform, however, remain uncertain. There is an overarching need to reduce both system cost and consumer cost. At present, the mechanism of cost reduction is not obvious.

Interrogating the Mechanisms of RNP

Workshop Design & Purpose

Over sixty participants were divided into 8-10 person roundtables to discuss policy instruments currently optioned under RNP across three thematic workshop sessions (one-hour each).

Workshop 1: Investment and Siting under RNP, prompted participants to discuss the Strategic Spatial Energy Plan (SSEP), planning reform, seabed leasing, the Centralised Strategic Network Plan (CSNP), Transmission Network Use of System (TNUoS) charging, and reforms to the connections regime.

Workshop 2: Operational Efficiency, with ten potential areas of reform suggested. These can be broadly grouped into three main categories: precision of trading positions in the intraday

market (IDM) (alignment of market trading deadline with gate closure, physical notifications (PNs) matching trades, lower Balancing Market (BM) participation threshold (i.e. unit level bidding)); shifting location-related trades out of the BM into forward markets (Demand-Behind-Constraints Contracts, improved interconnector flows, strengthened intraday markets); and maximising use of existing network capacity through engineering-based solutions and related standards (relaxed SQSS standards, integration of Dynamic Line Rating (DLR), and Intertrips).

Workshop 3: Distributional Fairness, Affordability, and Politics, prompted participants to discuss the implications of mechanisms of reform discussed in Workshop 1 and Workshop 2 for wider social and political dimensions of the transition.

Table 1 – Mechanisms discussed to reduce locational mismatch/inefficiencies, influence location decisions, and enhance temporal flexibility

	Investment signals	**Operational signals**
Cross-cutting	With context set by Strategic Spatial Energy Plan (SSSEP and Centralised Strategic Network Plan (CSNP) Reducing locational disparities through enhanced transmission investment; Dynamic Line Rating (DLR); Intertrips; relaxing SQSS (security standards) Need for institutional coordination across multiple government bodies	
Location	Transmission system upgrade/extension Distribution system optimisation Prioritisation within connections management queue System-location-needs criteria in planning consent procedures Community integration Locational criteria in CfD auctions Locational direction of any further interconnections and other offshore assets	Supply-side self-balancing (Balancing Mechanism (BM) into forward market) and lower BM thresholds Aligning short-term markets (gate closure, physical notifications, quicker imbalance settlement) Enhanced interconnector trading
Temporal flexibility	Demand-Behind-Constraints contracts Location investment signals for storage asset siting Demand-side self-optimisation tools Enhance exposure of some generators (e.g. including existing renewables) to locational or constraint-related costs to incentivise co-location storage investment	Enhance intraday market (IDM) information transparency and precision for NESO dispatch Centralised dispatch (with attention to locational constraints) Enhance feed-through of wholesale and BM price fluctuations in demand-side contracts Establish explicit flexibility and constraint markets

Investment and Siting

Overall, there seem to be multiple instruments that could affect siting decisions, particularly of larger assets, but these necessarily involve significant complexities with a greater degree of central planning; some may face the same basic distributional and political constraints (including, between different interests) that also fuelled some of the objections to locational market pricing.

Centralised Energy Planning

The SSEP[4] is a spatial blueprint designed to set the strategic direction for the energy sector. Participants consistently identified the SSEP as a potentially *"transformative"* foundation for siting yet stressed that it constitutes a framework rather than a lever in itself. Consequently, one scepticism remains about its likely potency in practice. There is a strong link to the CSNP;[5] since the latter drives the slowest-moving part of the energy system (i.e. major transmission investments), strong alignment between SSEP and CSNP is essential. Beyond networks, if the SSEP is to drive investment, it will need to connect into and effectively steer and coordinate enforceable delivery instruments including TNUoS, CfDs, connection reforms, Regional Energy Spatial Plans (RESP), seabed leasing and other elements of spatial planning.

There were divergent views on the prescriptiveness of SSEP; some participants argued that the above logic would imply a highly directive and detailed plan with strong links to the delivery levers, for instance by specifying special treatment for certain types of plant in certain locations. Others argued for a more adaptive approach to build optionality, particularly regarding flexibility assets, such as storage at various levels of the system. To some extent this reflected divergence regarding the fundamental balance between a market-led versus a centrally planned energy model, with local, small-scale developments presumably harder to manage well in a centralised way. Many noted that SSEP discussions have been too generation-centric and need to incorporate explicit treatment of demand clusters, as well as dealing with demand uncertainty.

Planning Reform

Participants emphasised that the current procedural requirement to submit grid connection applications prior to planning consent has fundamentally inflated the connection queue, further exacerbated by uncertainty over how the queue is managed. This has driven developers to submit multiple speculative projects to the connection queue to hedge their risk. These bottlenecks are further intensified by a severe lack of capacity in Local Planning Authorities, while the absence of clear spatial signals - whether through pricing or strategic direction - means that the current queue fails to accurately reflect system needs.

Participants largely agreed on streamlining decision-making (navigating the tension between national direction and local input), directly linking queue positions to strategic priorities defined in the SSEP (such as designated *"fast-track"* zones), and urgently scaling the administrative capacity required to process consents. There was divergence as to the extent of centralisation

[4] https://www.neso.energy/what-we-do/strategic-planning/strategic-spatial-energy-planning-ssep
[5] https://www.neso.energy/what-we-do/strategic-planning/centralised-strategic-network-plan-csnp

versus regional and market considerations, the timeframe of reform and the fairness and subsequent legitimacy of any planning reforms.

Transmission Network Use of System (TNUoS) charges

Participants agreed that the current TNUoS framework fails to deliver effective locational signals for investors, as changes they cannot predict often come after siting decisions, which raises costs by increasing investor uncertainty. Views were split regarding whether TNUoS should be reformed or replaced. In general, there was agreement that any administratively set locational price signal (whether TNUoS or otherwise) should be fixed at the point of investment and be designed to avoid unnecessary windfall gains and losses thereafter. In addition, locational signals should be aligned and streamlined across different instruments to avoid inefficient overlapping signals (across SSEP, CfDs, leasing, and charging).

On the TNUoS 'reform' side of the argument, options with broad consensus included differentiated access products (firm vs. non-firm access), tradeable capacity rights, and the removal of the £0 floor for large demand users. On the 'replace' side of the argument, options included rationing / auctioning of capacity, or for TNUoS to be retained at a flat rate and used solely as a means of cost recovery with locational signals provided via other mechanisms.

The role of locational CfDs was also discussed but with divergent views. There were also warnings that the 2029 implementation envisaged in the current TNUoS reform process is too late for the 2030 targets.

Operational Efficiency

Several of these specific options for affecting operational efficiency are under consideration irrespective of the REMA process, and only a few have specific locational dimensions. It was not at all clear how much these relatively minor technical reforms would incentivise more efficient operation of assets (including storage and demand-side) - particularly with respect to location and the associated rising constraint payments.

Precision of Trading Positions in the Intraday Market (IDM)

The workshop discussed three closely related proposals to (1) align trading deadlines, (2) enforce matching of physical notifications with trading positions, and (3) introduce unit-level bidding. Many participants viewed these linked proposals with some scepticism, arguing that theoretical gains in operational efficiency would be outweighed in practice by reduced market liquidity due to the need to disaggregate trading portfolios and tightening timelines making it harder to match trades with counterparties. The measures were viewed as likely to increase hedging costs and impose disproportionate administrative burdens (particularly regarding IT systems) without delivering commensurate efficiency gains.

It was contended that perceived discrepancies between physical and traded positions are often overstated or effectively managed by existing incentives, suggesting that redispatch inefficiencies stem from structural blind spots, such as the poor visibility of distributed assets, rather than the procedural misalignments these *"low priority"* reforms seek to address.

Shifting Location-Related Trades out of the BM into Forward Markets

Demand-Behind-Constraints Contracts were seen as having immediate, high-impact potential. Forward contracting for locational demand flexibility was widely endorsed as shifting the system from reactive, high cost redispatch to proactive management, provided that forecasting risks and baseline verification are robustly designed.

Whilst proposals to improve interconnector flows and strengthen intraday markets, have similar objectives and attractive benefits in theory, some participants suggested that in practice they would deliver only incremental gains due to post-Brexit political complexities, the opacity of flow-based algorithms, and *"hurdle behaviours"* created by existing CfD incentives.

Maximising Use of Existing Network Capacity

Participants strongly supported measures to maximise existing network capacity, though drew a distinction between the deployment of engineering solutions like Dynamic Line Rating (DLR) or increased use of intertrip schemes and the politically sensitive regulatory step of relaxing Security and Quality of Supply Standards (SQSS). DLR was identified as a critical near-term win, currently stalled by a frustrating *"integration gap"* where installed hardware collects data that remains unused in operational decision-making due to regulatory and IT inertia.

In contrast, while the relaxation of SQSS was acknowledged as bringing potential benefits in terms of enhanced utilisation of existing networks, it provoked concern regarding system security and investor confidence. Ultimately, success for both approaches relies on moving away from static assumptions to algorithm-driven, automated adjustments.

Distributional Fairness, Affordability, and Politics

The political mandate for the energy transition will ultimately depend on delivering consumer benefits and requires attention toward distributional effects of reform. This regards interactions with local communities, particularly in terms of local asset investments, and the quality and price of electricity services at the consumer level. These improved outcomes are not only a strategic objective of the market reform process from the outset, but an important factor in political acceptability of reform, and therefore significant factor influencing progress. For example, the SSEP is a likely point of contention for political acceptability of plans for implementation (e.g. CSNP) or tools or specific asset investments that would follow. It's important that regional fairness is considered, as 'post-code lottery' was an element considered contributing to rejection of the zonal pricing model. Consideration of community engagement and residual benefits of asset siting strategy would support fairness and inclusion.

Community Engagement with Planning

Asset siting decisions are ultimately largely determined at the level of local authorities (LPAs). From the perspective of supply-side investment, the process of obtaining planning permissions and subsequent grid connection can be slow and uncertain, which is an issue for investment planning. Greater pre-emptive engagement at the local level can create buy-in a reduce delivery delays through discovery of asset siting locations that are suitable from both supply and demand-side positions. Location-based investments also present opportunities to explore

community equity in infrastructure projects and integration of regional labour forces to promote localised economic growth. Coordination between top-down SSEP and bottom-up RESPs is a clear opportunity to close the strategic gap between supply and demand-side interests.

Optics of Physical Curtailment

Curtailment of low-carbon generation, at present mainly a result of inadequate transmission and related balancing options in the physical power system, is a major issue - the publicity of which undermines public confidence in the low-carbon transition. Innovative engagement of pre-gate-closure markets can somewhat reduce curtailment by enhancing system efficiency. Improved interconnector flows are commonly discussed as a method to reduce curtailment; however, this requires sensitive consideration of post-Brexit political complexity and energy security concerns. There is also the issue of public-backed CfDs subsidising electricity that is then consumed outside of GB via interconnector flows.

Retail Market Reform and System Costs

Retail market reform is another possible opportunity to improve economic fairness, for example through capacity-based signals, and/or through 'safe defaults' that protect against regional impacts and 'post-code lottery'. Retail market reform is a subject of considerable debate, largely centred around the narrative trade-off between providing transparency and cost-reflective pricing for energy users *vs.* the political imperative to insulate voters. Some discussions debated the pros and cons of changing bill structures, particularly with respect to standing charges and social policy costs, intended to limit costs to low-volume users. This noted a tension with the fundamental economics of moving towards a system with more fixed capital and less variable costs.

From a perspective of managing system costs, including locational dimensions, equally important will be enhancing consumer engagement in managing variability (e.g. use of domestic and commercial sector storage), in part likely mediated through suppliers responding to dynamic pricing in the wholesale market (see demand-side integration, below).

Table 2 – Summary of key opportunities and risks emerging of reforms under consideration across three strategic areas

	Opportunities	Risks
Investment and siting	Centralised energy planning (coordinated through SSEP) drives investment through effective coordination of enforceable delivery instruments (e.g. CfDs, seabed leasing, RESPs, connection reforms, TNUoS, etc.) Streamlined decision making re: planning permissions; increased LPA administrative capacity to expediate. TNUoS reformed or replaced; locational price signal for transmission fixed at point of investment.	SSEP and coordinated delivery instruments do not adapt to effectively accommodate flexible assets, creating an unbalanced system. "Fast-track" zones lack regional and market considerations. Overlapping or contradictory signals across TNUoS and other locational signals (e.g. CfDs, SSEP, seabed, etc.)
Operational efficiency	Structural blind spots, such as poor visibility of distributed assets that limit redispatch inefficiencies, are mitigated. Redispatch and related benefits improve. Robustly designed baseline verification and forecasting risks enable efficient forward contracting to promote locational demand flexibility, e.g. via Demand-Behind-Constraint Contracts. Move toward algorithm-driven, automated adjustments (away from static assumptions) & close IT and regulatory integration gap to make use of engineering-based solutions (e.g. DLR).	Measures to increase precision of trading positions in the IDM reduce market liquidity, increase hedging costs, impose excessive administrative burden. Attempts to improve interconnector flows prove limited due to post-Brexit political complexity of trade, opaque flow-based algorithms, "hurdle behaviours" created by CfDs incentives. Relaxed SQSS standards reduce system security, reduce investor confidence.
Distributional fairness, affordability, and politics	Strong community engagement in asset siting process reduces delays and maximises community benefits. Bottom-up RESPs well-aligned with top-down SSEP. Consumers effectively engaged to manage variability (e.g. through domestic and commercial-sector storage), reducing system cost.	Curtailment issues undermine public confidence in low-carbon transition. Retail market reforms fail to protect against regional impacts. Fail to develop balance between political transparency vs. insulation of energy-users from cost-reflective pricing.

Cross-Cutting Themes & Coordination Challenges

Participants agreed that a coherent, system-level plan is necessary to ensure policy levers are supportive of a common goal, rather than creating contradictory signals and risking non-strategic investment in future stranded assets. The SSEP, now articulated as the centrepiece of RNP[6], is a critical mechanism toward realisation of strategic objectives of market reform.

Transparency and Prescriptiveness of the SSEP

The SSEP is the main coordinating mechanism under RNP, planned to map quantities and types of electricity generation and storage, and set the context for subsequent network planning. Uncertainty persists regarding its level of detail, assumptions, and the iteration process over the course of system reform and transition. Investment planning and stakeholder coordination necessitates clarity on the assumptions used to develop the SSEP, how the SSEP will be informational and suggestive vs. legislative, and how the SSEP will be updated to balance long-term planning with updated strategic objectives and technology readiness. Continued delay of the SSEP release date further undermines this need for clarity and perpetuates uncertainty regarding the GB electricity system investment landscape.

Institutional Coordination

Alignment of numerous policy mechanisms to achieve a common strategic vision necessitates coordination between the institutions responsible for their implementation. There is uncertainty as to whether involved institutions can coordinate their individual objectives and strategies, and whether they can implement required reforms to achieve common objectives.

For example, the SSEP is developed by NESO, however, it requires coordination with planning reform, which is managed by the Ministry of Housing, Communities, and Local Government (MHCLG), and enacted by Local Planning Authorities (LPAs). The CSNP is developed by NESO but requires cooperation of Transmission Network Operators (TNOS), i.e. the National Grid Electricity Transmission (NGET), SP Energy Networks, and Scottish and Southern Electricity Networks (SSEN). Renumeration for investment in the transmission network, a major point of contention in current political acceptability of GB electrification, involves the role of the Office for Gas and Electricity Markets (Ofgem) in both price regulation and TNUoS, along with other institutions involved in consumer bills and infrastructure investment, including the Treasury. Siting of transmission and distribution infrastructure requires coordination between the MHCLG and LPAs handing planning permissions with the connections regime, handled by NESO, and TNUoS reforms handled by Ofgem, to ensure coordinated signals.

The challenge of institutional coordination must be effectively managed to ensure planning is aligned with delivery, and resultant investment risk keeps CoC and therefore system and consumer costs within a manageable boundary.

[6] https://assets.publishing.service.gov.uk/media/686f71412557debd867cbeff/review-of-electricity-market-arrangements-rema-summer-update-2025.pdf

Demand-Side Integration

The zonal pricing market model was proposed as a solution to managing the complexity of balancing a high-VRE system, with dynamic electricity supply profiles, and spatially/temporally uncertain demand profiles. RNP is the answer to the rejection of zonal pricing, however, demand-side integration in proposed policy packages is currently limited.

The SSEP is not set to formally include demand-side siting (e.g. industrial siting) or demand-side flexibility. Strategic assessment of demand-side asset locations across the SSEP and planning reform would enhance forward system efficiency. Demand-Behind-Constraint contracts are a promising tool to help manage existing supply-demand challenges. However, this clearly has limitation, and the lack of integration between supply (generation and major networks) vis-à-vis was for many participants a dominant and recurring theme.

Temporal Alignment of RNP Policy Delivery

The timing of the delivery of reforms matters to ensure locational signals are aligned with decarbonisation and electrification goals. The SSEP is due for initial publication in early 2027, feeding into more granular CSNP and RESP aimed to guide effective asset siting to improve system balance and reduce system cost. These plans require alignment with planning reform, including capacity upgrades at the LPA level, to actualise their delivery. The current TNUoS framework currently fails to deliver stable, forward-looking locational signals due to unpredictable rate changes that can occur after the point of investment in an asset siting decision. The TNUoS reform implementation date is due in 2029, so investment uncertainty associated with transmission costs will persist at least until then, impeding investment for the 2030 targets and risking inefficient locational choices some of which could last for decades after.

Operational Complexity under RNP

The zonal pricing model was proposed as a solution particularly to manage the operational complexity of a nationally disparate and temporally variable system in real time. The dominant messaging from NESO is that increased system visibility is needed to effectively manage the operational system under the RNP model. The operational reforms proposed under RNP are likely to add complexity to NESO's remit. There are concerns as to whether NESO can handle the increased burdens on administrative and IT systems and therefore manage the system effectively under an RNP market structure. There are also concerns whether the operational reforms under consideration are sufficient to manage an increasingly high-VRE electricity system.

Network Management

A major bottleneck to progress with electrification is required transmission system upgrades, a consequence of historic underinvestment and rapid electrification timelines. Spatial disaggregation between supply-side VRE locations, dominantly in the North (especially for onshore renewables), and demand centres in the South, were a clear reason for pursuing market reform from the outset. Various reforms are outlined for managing network capacity, from SQSS network standards to engineering/IT-based DLR solutions, to moving demand

activities to new locations that alleviate network constraint via Demand-Behind-Constraint contracts. The development of flexibility and constraint markets and alleviation of high-voltage network loads through innovative use of distribution networks are additional areas of reform that are currently underemphasised. Such reforms also require complex institutional coordination, involving similar authorities discussed in terms of strategy (DESNZ, NESO), regulation (Ofgem), planning (MHLCG, LPAs) discussed above, with the addition of TNOs and DNOs.

Actioning RNP

Reformed National Pricing, presented as the alternate to zonal pricing of wholesale electricity, will be a highly complex endeavour (and is far from the only challenge facing the future of the UK electricity market). Amongst many other factors, to increase the probability of success RNP will need to:

- Expand the scope of enquiry to cover all aspects of the energy system in an integrated way, to include generation, transmission, demand and flexibility.
- Establish credibility and capability in central planning to shift investments - including institutional arrangements, as well as well-designed and well-integrated policy mechanisms.
- Manage the distributional impacts of reform in a way that maintains a strong political mandate so as not to de-rail the wider energy transition agenda.

At present, there are multiple instruments available and under consideration. However, there is no magic bullet, or even dominant, option. In particular, it seems possible (although not easy) that reforms under consideration can influence asset siting that enhances system efficiency over time. This is particularly true if and when effective TNUoS reforms are enacted. However, discussions have yet to identify effective solutions to ensure the locationally efficient operation of assets, if actors in constrained regions are protected from facing the real, dynamic costs of transmission constraints. The need to secure political support, for decisions with inevitable distributional consequences in a politically contested landscape, is a challenge that must be met. Continued efforts are needed to understand the policy and institutional interactions of mechanisms under consideration, and to ensure reforms are positioned to achieve guiding objectives of a more fair and balanced electricity system.

There are likely additional strategic concerns that should be integrated.

We welcome ongoing advisory from readers to continue developing a robust evidence base to support ongoing reform of the GB electricity system.