



POWERED BY PEOPLE, POWERED BY PLACE

A Vision for Demand in Regional Energy Strategic Plans



July 2026

Regional Energy
Strategic Plans
**should plan not only
for where demand will
be, but for
what demand can do.**

CONTENTS

EXECUTIVE SUMMARY	3
INTRODUCTION	7
I. POLICY CONTEXT	8
II. WHAT DEMAND CAN DO	10
FLEXIBILITY	
THERMAL STORAGE	
COLOCATION AND MICROGRIDS	
COMBINED HEAT AND POWER (CHP)	
HEAT NETWORKS	
III. POLICY OPTIONS	24
IV. RECOMMENDATIONS AND CONCLUSION	26
APPENDICES	27

EXECUTIVE SUMMARY

Traditionally, energy demand has been treated as something the energy system must meet, rather than something that can actively support it. However, shifts in the energy system, particularly the transition towards more decentralised, flexible, and digitalised networks, are changing how energy flows are conceived and managed. As a result, demand is no longer simply an endpoint of consumption, but an active and valuable system asset, capable of shaping, storing, and responding to needs in ways that support the overall performance and security of the system. More than anything else, this is how we reduce the cost of energy for British consumers of every kind. Regional Energy Strategic Planning (RESP) presents a pivotal opportunity to reimagine the energy system by giving demand equal prominence to generation and networks. However, if RESP continues to treat demand solely as load, it will under-deliver against Ofgem's own principles.

If demand is treated as an asset, RESP can become a genuine whole-system planning tool.

DEMAND AND OFGEM'S 6 PRINCIPLES FOR RESP



VISION-LED

Ofgem created RESP to be a mechanism for planning a future energy system, not simply managing today's constraints. To be genuinely vision-led, RESP must ask what kind of regional energy system is needed for a decarbonised, decentralised and flexible future. This requires demand to be treated as a dynamic planning variable. Visionary thinking must ask: what **could** the system be? Not just what it is or has been.



PROACTIVE

A proactive RESP should not wait for network constraints to materialise before considering demand-side solutions. Flexibility, thermal storage, colocation, heat networks and microgrids should be assessed early in the planning process, before reinforcement decisions are locked in. Ensuring that network build-out is efficient, targeted and cost-effective, entails demand-side assets being considered as credible alternatives or complements to wires. Proactive integration of these solutions would also allow RESP to support faster connections, reduce peak demand, improve renewable utilisation and avoid unnecessary infrastructure expenditure.

EXECUTIVE SUMMARY

DEMAND AND OFGEM'S 6 PRINCIPLES FOR RESP



WHOLE-SYSTEM

Ofgem's whole-system principle requires RESP to consider interactions across electricity, gas, heat, transport, industry and local energy infrastructure. Demand-side assets are central to this. RESP should move beyond identifying where Distribution Network Operator (DNOs) need to build capacity and instead consider how DNOs and Distribution System Operators (DSOs), local authorities (LAs), NESO and demand-side actors can collectively deliver a lower-cost, more resilient system.



TRANSPARENT AND COLLABORATIVE

A collaborative RESP must give demand meaningful representation in RESP governance, namely on the Strategic Boards of each region, where cross-sector actors (including demand) are only allotted 10% of the vote share. While local authorities make up 50% of the vote share, they will provide greater opportunities for demand needs to be represented and will need support in building expertise for non-network options (which is currently not listed in the RESP methodology's Local Actor Support). A more transparent and collaborative RESP should make clear how demand-side options are assessed, valued and incorporated into strategic investment decisions.



FAIR

A fair RESP methodology should compare reinforcement and demand-side alternatives objectively, including wider consumer, social and system benefits. Where demand-side investments avoid or defer network costs, part of that value should be passed through to supporting demand decarbonisation.



PLACE-BASED

RESP should use spatial planning to identify where demand can reduce constraints across transmission and distribution, support local decarbonisation and avoid or defer reinforcement and dedicated generation capex. Treating demand as place-based would allow RESP to reflect the specific needs, assets and opportunities of each region rather than applying a generic view of future load.

EXECUTIVE SUMMARY

POLICY OPTIONS

OPTION 1: STATUS QUO OR LIMITED REFORM

NESO would remain primarily a data collector, modeller and identifier of strategic investment need, with demand-side solutions acknowledged but not systematically assessed as alternatives to reinforcement except in limited “strategic and complex” cases. This scenario leaves the predict-and-provide model intact, misses opportunities to reduce peak demand, defer network expenditure, accelerate connections and lower whole-system costs, and risks locking in higher bills for consumers.

OPTION 2: STANDARDISED DNO FRAMEWORK FOR OPTIONEERING

The first RESP creates a standardised framework requiring and assisting DNOs to assess demand-side and non-network/dedicated generation solutions once future demand and constraints are identified. This should include flexibility, thermal storage, heat networks, microgrids, colocation, onsite generation and storage. Where these options avoid or defer reinforcement or dedicated generation, DNOs should be able to pass through part of the avoided cost to support investment in the optimal solution. RESP should also include a transparent appeals process for projects not initially classified as strategic and complex. Some DNOs have already demonstrated their capability and will for this kind of high impact optioneering that puts demand on an equal footing with generation.

OPTION 3: NESO AS OPTIONEER FOR BALANCING DEMAND, GENERATION AND NETWORK SOLUTIONS

NESO takes an active optioneering role, supporting industrial and commercial sites, local authorities and public-sector portfolios (medium-large demand sites) to assess alternative energy and decarbonisation pathways before reinforcement requirements are determined. This provides scaffolding to inform DNO decisions, through enhanced consistency and transparency, and fills the gap where not all DNOs are pro-active in bringing demand into their own forecasting. Where these solutions avoid or defer network or generation expenditure, NESO could then recommend how a share of that avoided cost should support demand sites investing in system-beneficial assets.

EXECUTIVE SUMMARY

ANALYSIS

- **Option 1** is insufficient since it does not resolve the central methodological problem: demand remains something to be forecast and supplied, rather than assessed as a system asset.
- **Option 2** is a strong and practical alternative. It would embed demand-side options into RESP appraisal, create a clearer role for DNOs in assessing non-wires alternatives, and provide a proportionate route for improving the first full RESP methodology. If DESNZ, Ofgem or NESO consider a fully active NESO optioneering role too ambitious for immediate implementation, Option 2 represents a credible minimum reform.
- **Option 3** is the preferred approach because it best reflects the purpose and potential of RESP. If RESP is to identify the most efficient whole-system pathway to decarbonisation, optioneering cannot sit **only downstream** with DNOs, and **only after** future demand and constraints have already been defined. NESO is uniquely placed to assess trade-offs across demand, generation, storage, networks and local energy infrastructure at regional scale. Giving NESO this role would empower DNOs to better align RESP with a flexible, decarbonised system and with the objectives of strategic planning.

RECOMMENDATIONS

- **DESNZ, Ofgem and NESO should adopt Option 3: NESO as optioneer for balancing demand, generation and network solutions as the preferred direction for RESP.** This should begin with industrial and commercial sites, local authorities, public-sector portfolios and areas of Strategic Investment Need, where the value of coordinated optioneering is likely to be greatest.
- Delivering such proactive, vision-led, whole-system RESPs will require numerous discrete actions, outlined in detail in Appendix 1. Since the announcement of RESP in 2023, distribution connected assets have been eagerly advocating for these actions. We are grateful to the observers from DESNZ, Ofgem, and NESO who attended the engagement sessions used to draft this report.
- **Option 2 should be retained as a solid alternative** or transitional step, particularly if full NESO optioneering cannot be implemented immediately. However, **the methodology for the first full RESP should be designed from the outset to move towards Option 3.**
- Importantly, RESP 1 will set the core planning assumptions, investment signals and infrastructure pathways for demand and network needs into the 2030s and 40s. **While future RESP cycles will provide updates, they are likely to operate under a law of diminishing returns if RESP 1 fails to embed demand-side optioneering:** once major reinforcement needs, investment plans and regional pathways are established, later cycles will have less scope to avoid overbuild, redirect expenditure or fully capture the value of demand-side assets.
- Without redirection, RESP risks locking in unnecessary expenditure and missing the resources that can make regional planning more efficient, resilient and fair. **We believe in RESP's potential to upend long-held assumptions about how we design and plan the energy system.**

INTRODUCTION

Strategic plans and market reform must work hand in hand to ensure demand is not viewed as passive. **How, where, and when we use power is becoming equally, if not more important than how we generate it.**

A key priority for ADE: Demand, the UK's largest non-profit trade association for energy demand, is to develop a clear vision for how Regional Energy Strategic Planning (RESP) should address demand. **RESP presents a pivotal opportunity for spatial planning to consider demand as a dynamic asset to the system and value demand equally to generation and networks.**

As part of this work, we have convened a series of workshops bringing together members and non-members with observers from DESNZ, Ofgem, and NESO to discuss the future role of RESP for demand and to share emerging thinking that could inform the RESP methodology before final approval. The insights we gained from our workshops have been collated and reflected in this report.

Traditionally, we've thought about the energy system as a one-way flow: centralised generation delivering power through the grid to passive demand. But increasingly, that model no longer reflects the reality of the system we need. RESP must rethink the role of demand, enabling it to actively deliver system optimisation, flexibility, and resilience rather than simply consume electricity.

This document sets out what demand can do for the energy system and how RESP can maximise these benefits by identifying, valuing, and coordinating demand-side solutions alongside generation and network infrastructure as core components of a least-cost, whole-system pathway to net zero.

VISION STRUCTURE

I. POLICY CONTEXT

II. WHAT DEMAND CAN DO

FLEXIBILITY

THERMAL STORAGE

COLOCATION AND MICROGRIDS

COMBINED HEAT AND POWER (CHP)

HEAT NETWORKS

III. POLICY OPTIONS

IV. RECOMMENDATIONS AND CONCLUSION

I. POLICY CONTEXT

RESP BACKGROUND

Ofgem announced RESP alongside the Market Facilitator in 2023, signalling that the initiatives should be closely linked.

RESP will provide key inputs to the business plans of electricity and gas distribution (Dx) networks, while also complementing the Strategic Spatial Energy Plan (SSEP) and the Centralised Strategic Network Plan (CSNP). RESP is designed to support coordinated development of distribution networks and enable long-term investment ahead of need.

11 regions
5-10 staff per region
150+ staff at end of '26

Summer 2026:
Ofgem and DESNZ will decide on the RESP methodology

£17.5m operating budget 25/26
rising to **£32.2m** in 26/27 approx.
2X level of **funding allocated to SSEP and CSNP combined**

Dec 2028: First full RESP published -
reiterations every 3 yrs

5 Areas of the Draft Methodology:

Governance: Strategic Boards, working groups and the GB Steering Committee

Pathways and Consistent Planning Assumptions: model short- and long-term pathways down to Grid Supply Point level

Strategic Investment Need: identify areas of energy need in each nation and region which are strategically significant and complex to optimise investment planning

Spatial Context: mapping areas with current and future connection need

Nations and Regions Contexts: gather local and national datasets, qualitative data from stakeholder engagement on conditions and priorities of each region

REFORMED NATIONAL PRICING (RNP)

RNP is DESNZ's package of reforms to deliver a strategically planned and efficient electricity system.

Key Objectives:

Address new challenges and rising constraint costs as the system decarbonises

Encourage greater strategic planning alongside markets to send locational investment and operational signals to asset

The Strategic Spatial Plan has been described by DESNZ as the "centrepiece" of RNP.

- SSEP is a GB-wide plan to identify optimal locations, scale and timing of future electricity transmission, generation, and cross-vector infrastructure over a long-term basis.
- The first SSEP will be published late 2027, with both the CSNP and RESP relying on its outputs.
- Despite RNP emphasising the importance of consumer-led flexibility (CLF), little to no attention is given to RESP in any of the publications on RNP. The RESP methodology makes only one reference to RNP.
- Thus, there is a deep disconnect between market reform and strategic planning, one that suggests transmission level planning alone is the answer to reducing costs.
- Distributed assets will be indispensable for solving Tx level problems and must be given equal attention in sending locational investment and operational signals through strategic planning.

Closer integration between RNP and RESP is therefore essential if strategic planning is to fully reflect the significant role distribution-connected solutions can play to delivering a more resilient and efficient energy system.

I. POLICY CONTEXT

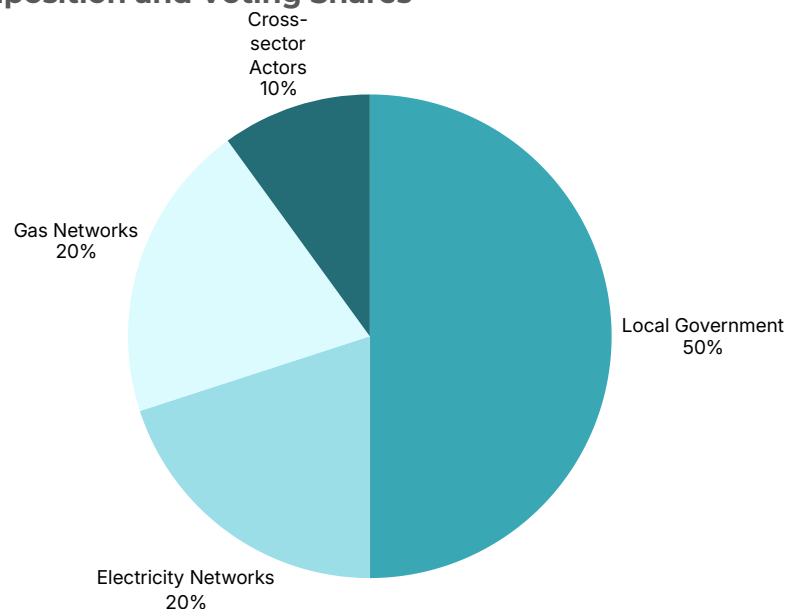
RESP GOVERNANCE

RESP options will be delivered by NESO with support from external actors via a combination of Steering Groups and Specialist Working Groups.

Final RESPs will be decided by 11 Strategic Boards (SBs). These will bring together key stakeholders, help guide whole system planning, and approve RESPs for each nation and region.

NESO will chair the Boards.

Composition and Voting Shares



Local authorities should be empowered to systematically assess and incorporate opportunities to use flexibility, microgrids, colocation, thermal storage, and heat networks before pursuing network build.

CROSS-SECTOR COST RECOVERY

A core aim of all strategic plans is to lower system costs by sending better investment and operational signals.

Other RNP programmes are driving locational operational signals. However, that does not address system savings made from avoided or significantly deferred reinforcement, generation, and storage capex. Presently, no investment signal is sent to electrify demand in the optimal way by deploying capex intensive low-carbon technologies. Where electrification through colocation and hybrid demand assets can reduce the need for investment in network buildout and dedicated generation capex, a portion of those savings should be passed to the consumer to send the needed investment signal.

There are various related approaches to this already:

- Inspiration could be taken from [Ofgem's RIIO-ED2 DSO Incentive](#), whereby DSO's use the Common Evaluation Methodology to determine where flexibility could defer reinforcement. In this case, we would need to analyse costs and benefits against avoided capex, not simply deferred.
- Cross-sector cost recovery has long been practiced between DNOs and TOs where savings made for one network by activity on another network can be shared. Given the establishment of NESO being a whole-system architect in the [Energy Act 2023](#) formalises a similar process across gas and electricity networks.

The principle of sharing system savings across different actors is well established but in the past, we never envisioned that demand assets could be one of those actors. Likewise, we have never strategically planned the system from a top-down and bottom-up approach under the auspices of a publicly owned system architect. We now have that opportunity.

II. WHAT DEMAND CAN DO

As per the Clean Power 2030 Action Plan, consumer-led flexibility involves 'voluntary actions taken freely and directly by energy consumers to shift their electricity use'. CLF can play a major role in improving how the UK energy system works. It helps keep the electricity grid balanced in real time, creates new opportunities for consumers and businesses to save money or earn income, reduces system costs, and improve energy security.

CLF can be found within the Pathways, Consistent Planning Assumptions, Working Group and Spatial Context sections of the RESP methodology consultation. While we commend its incorporation, **further attention must be paid to the nuances of flexibility**. In the near-term, RESP forecasting and modelling should recognise that electricity demand is increasingly dynamic rather than fixed. Traditional forecasting approaches often assume that future peak demand is driven primarily by installed capacity. However, actual consumer behaviour, smart technologies, price signals, and flexibility services mean that built capacity does not necessarily translate into simultaneous electricity consumption. As electrification accelerates, consumers and businesses will increasingly respond to market incentives, automated controls, and system needs by shifting when they use energy.

Modelling based solely on connected load risks overstating network requirements and underestimating the contribution that flexible demand can make to managing peak loads and reducing system costs.

Flexibility

Furthermore, **any demand forecasting that only incorporates flexibility as peak demand reduction (as has generally been the case with the Future Energy Scenarios (FES)), will overestimate maximum demand capacity on the system at any given time since flexible load will constantly be responding to price signals** in the wholesale market, participating in national balancing markets, and supporting DSO needs.

Recognising demand as dynamic also requires RESP to take account of the growing need for demand assets to increase electricity consumption when low-cost renewable electricity is abundant and at risk of being constrained. The ability to absorb surplus renewable generation can be just as valuable as reducing consumption during peak periods. RESP modelling should therefore reflect demand turn up potential when determining future infrastructure needs. **Flexibility must be evaluated as a genuine system resource rather than as an afterthought once infrastructure decisions have already been made.**

Research from 2021 reveals that a system with high demand flexibility (not including savings from electrified heat flexibility) would result in:

£4.5bn
ANNUALLY IN
SYSTEM SAVINGS
BY 2050

1/3

APPROX. AVOIDED
GENERATION AND
NETWORK CAPEX

1/5

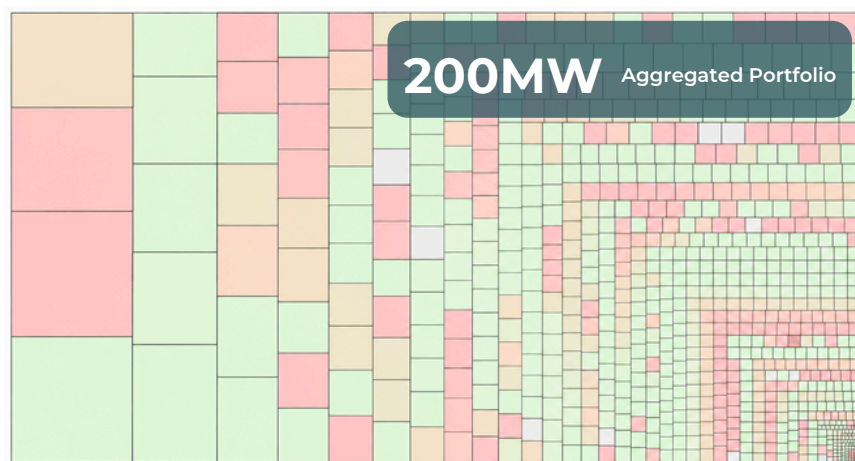
APPROX. AVOIDED
HYDROGEN PRODUCTION

1/2

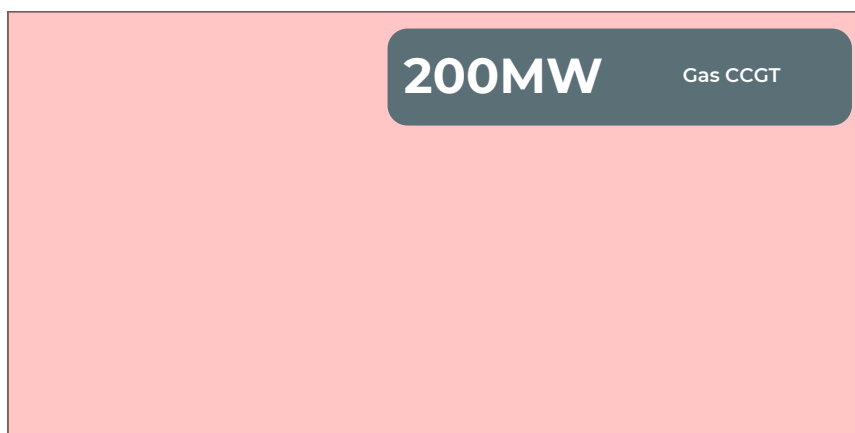
APPROX. AVOIDED
BATTERY CAPEX

II. WHAT DEMAND CAN DO

In parallel, it is also integral that RESP realises flexibility's role in delivering energy security. We recognise that a distributed, automated demand-side portfolio has the potential to provide further resilience to long-term energy system planning, reducing pressure and reliance on single sites, or infrastructure to deliver the result.



VERSUS



Demonstrative. 1

Flexibility

We can see the reliability and resilience of CLF demonstrated in Demonstrative. 1:

- The first graphic represents a real aggregated portfolio in the US, made up of over 700 sites contracted to provide over 200MW.
- Red or amber sites representing under-performance or outright failure to deliver.
- **This was a particularly poor performance day where 3 of the largest sites substantially underperformed.**
- **Even so, the portfolio still delivered 90% of its obligation.**
- On the other hand, a single large asset such as a CCGT, OCGT, or interconnector can fail in an instant, leaving the system operator to find that capacity elsewhere at a higher price.

An aggregated portfolio of hundreds of assets has no single point of failure thus providing heightened system security in an increasingly uncertain world.

We also are concerned that contracted CLF data is not included in the data collection process of the Nations and Regions Context section of RESP, which is meant to inform NESO modelling. This is especially confusing when CLF is meant to be incorporated into industrial demand modelling and flexibility in RESP Consistent Planning Assumptions.

OFGEM PRINCIPLES ADDRESSED



VISION-LED



PROACTIVE



WHOLE-SYSTEM



FAIR

CASE STUDY | E.ON boosts homes and the network with batteries

OVERVIEW

The Battery Boost pilot with Northern Powergrid shows how consumer-led flexibility can be deployed as a planned, place-based network solution. It installs centrally operated domestic batteries in constraint areas, providing firm flexibility to support the distribution network while reducing bills for participating households.

HOW FLEXIBILITY WORKS

E.ON owned, high-capacity residential batteries are installed free-of-charge at customer properties and are remotely controlled and optimised. Assets charge during off-peak periods and discharge in alignment with DSO requirements, often at times of peak demand (eg winter evening peaks). Aggregation of assets enables delivery of firm, dependable flexibility to the DSO, overcoming reliability challenges seen in traditional flexibility markets. Outside the times the DSO needs the battery, the battery can be used in other markets such as wholesale market arbitrage, capacity market and NESO markets.



WHOLE SYSTEM BENEFITS

Battery flexibility simultaneously addresses fuel poverty and network constraints, delivering direct bill savings of approx £220 per year to participating low-income households while reducing the need for network reinforcement, and lowering costs across the system. Customers receive fixed bill credits without needing to change their behaviour, enabling scalability across low-income and disengaged segments.

IMPLICATIONS FOR RESPS

The E.ON/NPG model targets deployment to areas of greatest network need. For RESPs, this highlights a pathway to embed flexibility assets within spatial plans, enabling coordinated, area-based rollout and standardisation into scalable programmes. Scalability will be helped by longer-term flexibility contracts or a pass-through mechanism that unlocks private capex investment as well as incentivising DSOs to procure targeted, reliable flexibility at scale with frameworks which account for the full range of non-financial benefits such as alleviating fuel poverty, recognising this with targeted regulatory incentives. Under a RESP framework, this supports a shift to “plan, build and flex”, where flexibility is spatially optimised alongside network investment thereby reducing capex, accelerating connections, and enabling a more inclusive energy transition.

II. WHAT DEMAND CAN DO

Thermal Energy Storage

Thermal Energy Storage (TES) is, at its core, a relatively simple concept: energy is stored in the form of heat when it's readily available and cheap, and released as required. Its ability to shift demand, thereby reducing network constraints, means that TES can play a significant role in tackling many of the challenges strategic energy planning is designed to solve, especially under the whole-systems principle.

Whilst they vary in size and application, all TES share a common function: decoupling electricity consumption from heat demand. Broadly speaking, commercially deployed TES falls into two categories. There is 'sensible heat storage', where thermal energy is stored in a material without changing its state, and 'latent heat storage', where energy is stored and released via a phase change. There is a third category, thermochemical storage which stores heat through reversible chemical reactions but this is largely at the research and development stage. These storage mechanisms form the basis of a wide range of technologies. Domestic heat batteries, hot water cylinders, and storage heaters, for example, provide behind-the-meter storage for homes and buildings. Larger thermal stores can support heat networks and industrial processes.

Rather than consuming electricity when heat is required, TES can charge at times when electricity is abundant, low-cost or beneficial to the system, then release heat when needed. At scale, TES can provide a flexible pool of demand capable of responding to price and system signals whilst continuing to meet consumer needs. This can alter peak demand, better utilise existing network capacity, and lower system costs.

Similarly, at the non-domestic level, TES can support the electrification of industrial heat processes whilst aligning energy consumption more closely with system requirements. This includes absorbing surplus renewable generation that might otherwise be curtailed, again reducing system costs and making better use of green electrons. In both cases, TES goes beyond simply supporting decarbonisation to actively contribute to whole-system optimisation.

Although the Draft RESP Methodology makes general reference to storage, there is no direct mention of TES. The risk, then, is that thermal storage and its inherent flexibility are mischaracterised, viewed primarily through the lens of additional electricity demand rather than considering the wider system benefits they can provide. This is particularly relevant for industrial demand, often regarded primarily in terms of the network capacity required to support it, rather than the flexibility it can provide.

To ensure these benefits are fully realised, RESP should explicitly recognise TES as a flexible system asset, identifying where it can shape the timing and whole-system impact of future heat demand. In practice, TES should be considered when identifying future areas of constraint, Strategic Investment Need, or required network reinforcement.

II. WHAT DEMAND CAN DO

Where TES can change demand profiles, defer network investment, support industrial electrification, or improve the utilisation of renewable generation, its value should be reflected within regional planning decisions.

This aligns closely with the guiding principles underpinning RESP. TES is inherently whole-system, its benefits extending beyond individual users to the wider system. It is place-based, its role varying depending on local network constraints, industrial activity, and heat demand. Furthermore, TES is fundamentally about fairness. At the domestic level, heat batteries and TES are in many cases, the only feasible heat decarbonisation route for space-constrained properties, with obvious socio-economic implications. At the non-domestic level, thermal storage is going to be indispensable in placing dispersed industrial sites on a fair footing for decarbonisation with sites in clusters. Recognising these interactions will help ensure RESP not only supports decarbonisation, but delivers a more secure and cost-effective system.

Thermal Energy Storage

OFGEM PRINCIPLES ADDRESSED



WHOLE-SYSTEM



PLACE-BASED



FAIR

The risk, then, is that thermal storage and its inherent flexibility are mischaracterised, viewed primarily through the lens of additional electricity demand rather than considering the wider system benefits it can provide.

CASE STUDY | Sunamp electrifies heat in urban homes

OVERVIEW

A three-bedroom, third-floor apartment in Edinburgh demonstrates how compact heat battery technology can enable electrification of domestic heating and in space-constrained urban homes. The property replaced a conventional gas combi boiler with a Sunamp heat battery system, providing space heating and hot water with year-round demand-shifting capability.

HOW HEAT BATTERIES WORK

Sunamp's heat battery stores heat in a phase change material (PCM), which is significantly more energy-dense than water. This allows it to deliver mains-pressure hot water on demand from a unit approximately four times smaller than a traditional cylinder. The system is charged using electricity and can be programmed to operate when electricity is cheapest, aligning energy consumption with user need. In this case, it is configured to charge during off-peak hours, typically overnight, taking advantage of lower-cost electricity tariffs whilst avoiding higher-cost or more constrained periods.



WHOLE SYSTEM BENEFITS

The case study shows how heat batteries can provide a practical retrofit route for homes where space is a major installation barrier, particularly flats and smaller properties. From a consumer perspective, the system provides consistent hot water at mains pressure, improved comfort, and quiet operation. It also achieved running cost savings against the previous gas boiler, due to a combination of higher operational efficiency and savings on the standing charge. At scale, heat batteries could turn a large number of individual homes into a more flexible source of heat demand, shifting electricity consumption in ways that better reflect local network conditions and the availability of lower-cost electricity.

IMPLICATIONS FOR RESPS

As the RESP methodology develops, heat batteries should be recognised as a scalable domestic heat technology with flexibility value. This case illustrates how heat batteries can combine practical consumer benefits with wider system value, supporting domestic heat decarbonisation whilst contributing to more coordinated, least-cost network planning.

II. WHAT DEMAND CAN DO | Colocation and Microgrids

Colocation and microgrids can enable demand to contribute to whole systems optimisation while providing a faster, secure route to power for demand. However, these benefits are currently being overlooked within RESP.

Colocation involves placing electricity generation, storage and demand assets in close physical proximity, enabling energy to be produced, managed and consumed at the same site. This commonly involves pairing large electricity users, such as data centres or industrial facilities, with generation assets such as solar, wind or power plants, often alongside storage technologies (i.e. thermal or battery).

For example, a large industrial site could colocate with solar generation, thermal storage and batteries. This would enable the site to meet a greater proportion of its electricity and heat demand directly from low-carbon local generation, while using storage to manage the mismatch between when energy is produced and when it is needed. Thermal storage and batteries can also help reduce reliance on imports from the wider network at constrained times and ensure that on-site generation is used more effectively before any surplus is exported. While the site would still need to fund any required on-site delivery infrastructure, this arrangement reduces the scale or urgency of wider network reinforcement by serving demand locally rather than requiring all power to be delivered through upstream transmission and distribution networks.

Microgrids offer a related but broader model. They bring together local demand, generation, storage and control technologies within a defined area so that energy can be managed in a way that reflects the needs of local users. Rather than simply adding new generation to the system, microgrids are designed to complement and optimise local demand, helping end users access lower-cost, lower-carbon and more secure energy. They can vary significantly in scale, from a small group of homes with solar panels, batteries and EV charging, to a large industrial or commercial site with substantial electricity and heat requirements. Ownership models can also vary: a microgrid may be privately owned, communally owned, or made up of assets owned by several different entities. Optimising local energy flows, microgrids and colocated assets could help unlock network capacity, potentially enabling faster connections for other projects awaiting grid access.

For industrial and commercial users, microgrids can support more active management of local demand by integrating technologies such as solar, wind, combined heat and power, small modular reactors, thermal storage, battery energy storage systems and demand-side response. The value of these technologies lies not only in their ability to provide local supply, but in their ability to match energy production, storage and consumption more closely to the operational needs of users.

II. WHAT DEMAND CAN DO

In doing so, microgrids reduce exposure to wholesale price volatility, provide greater certainty over energy costs, and improve control over security of supply. They also enable surplus electricity or heat to be shared between nearby users, allowing local energy resources to be used more efficiently. In this way, microgrids can help balance affordability, decarbonisation and resilience while reducing avoidable pressure on transmission and distribution infrastructure.

Colocation offers further benefits, namely its ability to balance generation and demand locally (behind the meter) before electricity is exported to or imported from the wider grid. This can enhance system stability and resilience, reduce pressure on constrained network infrastructure and improve overall efficiency. By optimising local energy flows, microgrids and colocated assets could help unlock network capacity, potentially enabling faster connections for other projects awaiting grid access.

Despite the clear benefits to the system, colocation and microgrids were not mentioned in the RESP methodology consultation. The lack of attention paid to colocation and microgrid for industrial sites, particularly outside of clusters, is a critical missed opportunity to relieve local network needs and upstream transmission constraints. RESP should identify where colocation and microgrid systems are the optimal solution for dispersed industrial sites in order to avoid network reinforcement where sites can self-balance more locally. Taking on this role for microgrids and colocation will enable NESO to fulfil Ofgem's principles for RESP of being place-based (examining the unique needs of different locations) and being fair (objectively assessing trade-offs between options).

Colocation and Microgrids

OFGEM PRINCIPLES ADDRESSED



VISION-LED



PROACTIVE



WHOLE-SYSTEM



TRANSPARENT & COLLABORATIVE



PLACE-BASED

This can **reduce exposure** to wholesale price volatility, provide **greater certainty** over energy costs, and **improve control over security of supply**.

CASE STUDY | BasePower optimises microgrids

OVERVIEW

BasePower generated an energy strategy for the entire Biggleswade Tritax logistics park consisting of a Private Network Microgrid, a central energy centre and distributed Solar PV that could be expanded upon over time. Despite the significant lack of available grid power, the development was able to be built and successfully leased to occupiers 4 years ahead of the local grid reinforcement, with the majority of the energy being provided through BasePower's innovative solution. BasePower now manages the Operations and Maintenance of the Private Network, including metering and bill assembly on behalf of the landlord.

HOW MICROGRIDS WORK

The Energy Centre blends available grid power, rooftop PV, Battery Storage, Gas CHP and back up generators to provide up to 3MVA of capacity. The scheme is designed to work in grid parallel to maximise the use of available grid capacity but also in island mode during grid disturbances.

WHOLE SYSTEM BENEFITS

Microgrids have the potential to allow development to continue on parts of the electrical network that are lower down the reinforcement priority list through making efficient use of the capacity that is available by shoring up interim or non-firm capacity using local generation. This can be done while not contributing any potential fault current back onto the grid.

IMPLICATIONS FOR RESPS

As the RESP methodology develops, technologies and delivery models such as microgrids and colocation should be explicitly incorporated into the data collection process, pathway modelling and strategic investment recommendations to ensure that all viable options are considered when meeting future energy demand. In addition, projects or sites that are not initially classified by NESO as strategic and complex should have access to a transparent appeals mechanism, enabling them to seek reassessment where there is evidence that a more coordinated, whole-system approach would unlock significant system, consumer or decarbonisation benefits.



II. WHAT DEMAND CAN DO

Combined Heat and Power

Combined heat and power (CHP) is a highly efficient technology that generates electricity and useful heat from a single fuel source at the same time. Unlike conventional power generation, where much of the heat produced during electricity generation is wasted, CHP captures this heat and uses it for industrial processes, space heating, hot water or heat networks. This can result in significantly higher overall efficiencies than separate electricity and heat production. CHP systems can be fuelled by natural gas, biomass, biogas and, in future, potentially low-carbon fuels such as hydrogen.

Non-dedicated CHP can play a valuable role in delivering efficient, flexible and reliable energy while alternative low-carbon technologies and supporting infrastructure are scaled up. CHP can reduce pressure on the electricity system, provide on-site generation for industrial users in hard to decarbonise sites and make productive use of heat that would otherwise be wasted, helping to lower overall energy consumption and emissions during the transition period.

In the short to medium term, non-dedicated CHP should be recognised within RESP as a strategically important technology for supporting industrial users who currently have no economically viable route to decarbonisation. Where natural gas remains part of the energy system through the 2030s, CHP provides a significantly more efficient means of utilising that fuel by simultaneously generating heat and electricity, rather than producing them separately. This reduces overall fuel consumption and can support both electricity system capacity and local heat demand. Given RESP's emphasis on whole-system optimisation and cross-vector planning, CHP should be considered an integral component of the energy system, particularly where it can support the efficient interaction of the power and heat sectors.

Furthermore, maintaining appropriate support mechanisms, including recognition of CHP's contribution to electricity and heat security, will be important to ensuring continued system resilience.

In the long term, CHP also has the potential to play a role in a decarbonised energy system through the use of low-carbon fuels such as hydrogen and biomethane. This is likely to be particularly important in industrial sectors with significant steam and high-temperature heat requirements, both within industrial clusters and at dispersed sites where alternative technologies may be more challenging to deploy. Many CHP installations are already capable of operating on blended fuels or can be adapted to use a range of future fuel sources, making them well placed to support the transition away from unabated natural gas. RESP should therefore view CHP not only as an efficient transition technology, but also as an enabling technology that can evolve alongside fuel decarbonisation pathways while continuing to provide flexible, reliable and efficient heat and power to the energy system. Cross-vector actors including industrial sites using CHP and heat networks are not given adequate voice in the current proposals and given ongoing concerns voiced from Ofgem about NESO's electricity bias, this is a missed opportunity for NESO to demonstrate a true commitment to whole systems thinking.

OFGEM PRINCIPLES ADDRESSED



**WHOLE-
SYSTEM**



**PLACE-
BASED**



**TRANSPARENT &
COLLABORATIVE**

CASE STUDY | British Sugar efficiently uses CHP plants

OVERVIEW

Operating four large-scale food manufacturing sites is particularly heat and energy intensive. To enable British Sugar to operate its sites as efficiently as possible, each factory operates its own CHP plant. These plants are essential for meeting the factories' energy needs, providing both electricity and the large amounts of heat energy required for sugar production. By producing both electricity and heat on site, British Sugar is able to reduce its energy consumption whilst increasing operational efficiency.

HOW CHP WORKS

Each CHP plant uses natural gas as fuel, powering gas turbines and boilers; generating both electricity via an alternator and heat in the form of steam. The steam is distributed for sugar beet processing, as well as the production of a multitude of co-products.

WHOLE SYSTEM BENEFITS

Equally, and primarily at its two largest factories, British Sugar can export any excess electricity to the grid.

IMPLICATIONS FOR RESPS

These plants are a crucial part of British Sugar's operations and are fully integrated into the heart of the sugar manufacturing process. However, as the energy system develops it is becoming clear that existing national data sets are observationally generally incomplete or inaccurate and more in-depth data collection is required to increase accuracy, particularly with respect to the Nations and Regions data collection process in RESP. There is inherently a risk if current data sets are used to shape the future of industrial energy demand, as they do not reflect the existing landscape which would impact on RESP pathway modelling. The future viability and longevity of CHP plants within the UK energy market is dependent on supportive Government policies and energy market conditions. The current uncertainty being experienced, along with the RESP methodology, reduces the ability to make decisions to enable future decarbonisation, particularly for energy-intensive dispersed industrial manufacturing sites.



II. WHAT DEMAND CAN DO

Heat networks provide one of the most cost-effective routes to decarbonising heating and, it is estimated that, in order for the UK to reach net zero, 20% of heat must be delivered by heat networks by 2050. Heat networks supply heat from a central source or energy centre to consumers, either in a single multi-unit building or a larger network of buildings, avoiding the need for individual boilers, heat pumps, or electric heating. Buildings or units receive heat through a 'heat exchanger' and can control their heating in the same way as other end users of central heating or hot water systems. The central heat source of energy centre can incorporate a number of technologies and larger, more complex networks often have input from multiple sources and may utilise thermal storage to optimise their energy consumption.

Heat networks are uniquely able to use excess heat from other processes or natural sources, which would often otherwise be lost, lowering their energy consumption and increasing the potential for reduced consumer bills BEIS' Heat networks opportunity areas. Heat networks can be various sizes and can be expanded over time to include new demand and new heat sources.

Heat networks can provide significant system benefits for the energy system that reduce the need for, and cost of, electricity system reinforcement. Recent work undertaken by ADE: Research shows significant system benefits that can be offered by increased deployment of heat networks.

£3.5bn

COLLECTIVE ANNUALISED NET BENEFIT
DIRECTLY ATTRIBUTABLE TO THE AMBITIOUS
DEPLOYMENT OF HEAT NETWORKS WITH LARGE-
SCALE, FLEXIBLE THERMAL STORAGE

£86.5bn

CUMULATIVE
NET BENEFITS
BY 2050

Heat Networks

ADE: Research found that the deployment of heat networks leads to net benefits for the wider electricity system across a range of areas, namely:

- A decrease in infrastructure-related capex: across urban and semi-urban areas, it is cheaper to invest in heat networks than it is in individual Air Source Heat Pumps (ASHP).
- A reduced burden on the grid, namely decreases in the need for grid reinforcement, upgrades and maintenance.
- A reduction in the installed generation capacity required to produce the electricity needed for electrified heat

RESP should account for where and how heat networks are being developed outside of zones and their strategic importance for providing support and flexibility to the grid at both Dx and Tx level, including their ability to defer or avoid reinforcement. Furthermore, RESPs must consider how DNOs and heat network developers/operators can better work together to achieve whole system efficiencies and produce advice on the same. This should include consideration of recoverable sources of heat, especially from major substations which could heat a large number of homes.

OFGEM PRINCIPLES ADDRESSED



VISION-LED



PROACTIVE



WHOLE-
SYSTEM



TRANSPARENT &
COLLABORATIVE



PLACE-BASED

CASE STUDY | Vattenfall heat networks reduce grid constraints

OVERVIEW

Vattenfall's Bristol heat network is an example of where local, place-based priorities are delivering low carbon solutions for new and existing buildings that support the wider vision for the city.

HOW HEAT NETWORKS WORK

Bristol City Leap is a transformational public-private partnership. This 20-year joint venture for heat network delivery unlocks over £1 billion of investment in low carbon energy infrastructure, including the expansion of the Bristol heat network, solar PV, wind and energy efficiency upgrades and utilises.

WHOLE SYSTEM BENEFITS

In order to maximise heat network efficiency and deliver best value for customers, there are a mix of fuel inputs across the city. For example, in Castle Park Energy Centre there is a 3MW water source heat pump with back up gas boilers, where in Broughton House Energy Centre there is a 1MW Biomass boiler (accredited under the Government's Renewable Heat Incentive scheme) with back up gas boilers. In contrast, 100 Temple Street Energy Centre has a 500kW Combined Heat and Power (CHP) unit with back up gas boilers. There is also 190,000 litres of thermal storage to further reduce electricity constraints.

IMPLICATIONS FOR RESPS

A connection to the new University of Bristol academic building has also been commissioned to enable the university to export their excess heat generated from computer servers back into the Bristol heat network in the future. RESP could have an important role to play in helping to ensure this strategic approach to connecting multiple fuel inputs is continued as the network expands. By establishing the 'lowest cost, lowest carbon' trajectory for the region's energy system and determining the scale heat networks should achieve in the Bristol city region to realise the maximum benefit for UK PLC alongside appropriate policy responses, RESP could unlock increased investment into infrastructure and economic growth.



CASE STUDY | Deep Green data centres support heat decarbonisation

OVERVIEW

Deep Green is a British developer and operator of modular AI and high performance computing data centres. Unlike conventional facilities, its data centres are designed to capture and reuse the heat generated by computing, supplying it to nearby buildings and heat networks. This transforms data centres from large electricity consumers into infrastructure that supports both the UK's digital ambitions and its transition to low carbon heating.

HOW DATA CENTRES WORK

Deep Green's soon to be operational Urmston facility demonstrates this model in practice. The Tier II, AI ready data centre provides resilient, ultra-low latency compute capacity with industry leading energy efficiency, operating at a Power Usage Effectiveness (PUE) of between 1.1 and 1.17. Rather than allowing heat to be wasted, the same electricity is used twice: first to power AI and high performance computing workloads, and then to provide a continuous supply of heat to Trafford Leisure's Move Urmston leisure centre.

WHOLE SYSTEM BENEFITS

By reusing heat that would otherwise be wasted, Urmston reduces carbon emissions, lowers heating costs and provides a direct community benefit from digital infrastructure. The same approach will be taken forward in Bradford, where Deep Green is developing a 5.6 MW data centre connected to the Bradford Energy Network. Once operational, the project is expected to remove more than 4,500 tonnes of carbon dioxide emissions each year while supplying heat to homes and public buildings.

IMPLICATIONS FOR RESPS

Deep Green's model demonstrates how RESP could unlock greater whole system value by planning digital infrastructure, electricity networks and heat demand together. By enabling heat generated by data centres to supply nearby communities, RESP can reduce demand for conventional heating, maximise the value of every unit of electricity consumed and ensure future AI infrastructure delivers benefits for consumers, communities and the wider energy system.



III. POLICY OPTIONS

Demand is a key asset to the energy system, but its potential has yet to be fully realised within RESP. There is a fundamental misalignment between the system RESP is meant to plan for and the assumptions embedded in its methodology.

The transition to a decarbonised energy system requires distribution networks that are flexible, spatially intelligent, and capable of integrating diverse demand assets as genuine contributors to system optimisation. Yet the current methodology defaults to a logic of predict-and-provide: project future demand, identify where capacity is insufficient, build more wires. This approach is not only increasingly costly as electrification accelerates, it also foregoes the significant and quantifiable benefits that demand-side assets and flexibility can deliver, namely lowering whole-system costs, deferring reinforcement, absorbing renewable generation, and improving resilience without the need for additional infrastructure.

RESP needs a paradigm shift: demand must be treated as an active system resource, not merely as a fixed constraint to be forecast and accommodated. Embedding demand-side assets and flexibility into the core methodology for assessing network needs and identifying solutions is integral for non-wires alternatives to be considered on a comparable basis to reinforcement. The following policy options set out practical approaches for integrating demand more fully into RESP's assessment framework and ensuring that network planning reflects the capabilities of a decarbonised, decentralised energy system.

The transition to a decarbonised energy system requires distribution networks that are **flexible, spatially intelligent, and capable of integrating diverse demand assets as genuine contributors to system optimisation.**

III. POLICY OPTIONS

1. STATUS QUO

Based on the RESP Methodology Consultation, NESO's prescribed role is a data collector, modeller, and identifier of where to build wires, generation and storage. NESO will only take a hands-on role convening stakeholders, working with networks to provide high level optioneering, costings and timings, and identifying an optimal solution in cases deemed 'strategic and complex' (i.e. an industrial site with cross-vector, large scale energy demand). In all other cases, much of the implementation is left to the discretion of DNOs, and while there are many examples of DNOs leading the charge on optioneering there is no standardisation or requirement. This leaves a hole in identification of energy solutions for demand decarbonisation and electrification in RESP, with opportunity costs for bill payers..

2. STANDARDISED DNO FRAMEWORK FOR OPTIONEERING

RESP creates a standardised framework for how DNOs should optioneer solutions once future demand is laid out. Where a more cost-effective solution can be achieved through alternatives to grid reinforcement (i.e. microgrids, colocation, thermal storage or flexibility), DNOs should be able to pass through the savings of the avoided network reinforcement costs to support investment in the optimal solution identified for the network and whole-system. RESP should provide detailed guidance for DNOs to implement this optioneer role and the processes involved.

We need a transparent appeals and reassessment process for projects that are not initially designated as strategic and complex. This should allow applicants to present evidence demonstrating that a more coordinated, whole-system approach could deliver network efficiency, consumer value, or decarbonisation benefits. Projects should be eligible for reclassification and consideration within the strategic and complex category.

3. NESO AS OPTIONEER FOR BALANCING DEMAND, GENERATION AND NETWORK SOLUTIONS

It is abundantly evident from the above: demand is a key asset to the energy system, but its potential has yet to be fully realised within RESP. The current methodology defaults to a logic of predict-and-provide: project future demand, identify where capacity is insufficient, build more wires. This approach is not only increasingly costly as electrification accelerates, it also foregoes the significant and quantifiable benefits that demand-side assets and flexibility can deliver, namely lowering whole-system costs, deferring reinforcement, absorbing renewable generation, and improving resilience without the need for additional infrastructure.

NESO should take an active optioneering role, working with DNOs to assess alternative energy and decarbonisation pathways before reinforcement requirements are determined. This provides scaffolding to inform DNO decisions, through enhanced consistency and transparency. Where these solutions avoid or defer network or generation expenditure, NESO could recommend how a share of that avoided cost should support demand sites investing in system-beneficial assets.

IV. RECOMMENDATIONS AND CONCLUSION

RESP needs a paradigm shift: demand must be treated as an active system resource, not merely as a fixed constraint to be forecast and accommodated. Embedding demand-side assets and flexibility into the core methodology for assessing network needs and identifying solutions is integral for non-wires alternatives to be considered on a comparable basis to reinforcement. The policy options set out practical approaches for integrating demand more fully into RESP's assessment framework and ensuring that network planning reflects the capabilities of a decarbonised, decentralised energy system.

DESNZ, Ofgem and NESO should adopt Option 3: NESO as an optioneer for demand, generation and network solutions as the preferred direction for RESP. Demand-side solutions should be assessed at the point strategic need is identified, rather than after reinforcement pathways have already been assumed. **NESO should be required to assess, on a comparable basis, the role of consumer-led flexibility, thermal storage, heat networks, non-dedicated CHP, microgrids, colocation, onsite generation and storage in meeting regional energy needs.** This assessment should inform DNOs' actions and plans, providing consistency and scaffolding for those that are already active in this, and motivation to those that are not yet.

Delivering such proactive, vision-led, whole-system RESPs will require further specific actions, outlined in detail in Appendix 1, which distribution connected assets have been eagerly advocating for since the announcement of RESP in 2023, .

Just as REMA, RNP, and SSEP have sought to bolster investor confidence for generators, RESP must bolster investor confidence for demand decarbonisation and electrification. **If NESO has a key role in driving investment in transmission connected generation and storage through the SSEP, it should be no different for driving investment for distribution-connected demand assets. Thus, align incentives with whole-system value, help overcome upfront cost barriers, and ensure consumers and businesses are rewarded where their assets reduce costs for the wider system.**

To meet Ofgem's principles of being vision-led, proactive, whole-system, fair and place-based, RESP must recognise demand as a direct system asset. **RESP should plan not only for where demand will be, but for what demand can do.**

A strategically planned system
empowers demand, it presumes it as
an asset for the benefit of all.

APPENDIX 1 | Discrete Recommendations to Deliver Option 3

The following are recommendations that ADE: Demand and its members have made throughout the consultative process and are the core nuts and bolts of enabling NESO to deliver an optioneering role through RESP.

- RESP and market reform must work hand in hand.
- Distributed assets will be indispensable for solving Tx level problems and must be given equal attention in sending locational investment and operational signals.
- A proactive RESP should not wait for network constraints to materialise before considering demand-side solutions. Flexibility, thermal storage, colocation, heat networks and microgrids should be assessed early in the planning process, before reinforcement decisions are locked in.
- RESP should clarify how demand-side options are assessed, valued and incorporated in strategic investment decisions.
- A fair RESP methodology should compare reinforcement and demand-side alternatives objectively, including wider consumer, social and system benefits. Where demand-side investments avoid or defer network costs, part of that value should be passed through to supporting demand decarbonisation.
- Local authorities should be empowered to systematically assess and incorporate opportunities to use flexibility, microgrids, colocation, thermal storage, and heat networks before pursuing network build.
- RESP forecasting and modelling should recognise that electricity demand is increasingly dynamic rather than fixed.
- RESP should explicitly recognise TES as a flexible system asset, identifying where it can shape the timing and whole-system impact of future heat demand. In practice, TES should be considered when identifying future areas of constraint, Strategic Investment Need, or required network reinforcement.
- RESP should identify where colocation and microgrid systems are the optimal solution for dispersed industrial sites in order to avoid network reinforcement where sites can self-balance more locally.
- Non-dedicated CHP should be recognised within RESP as a strategically important technology for supporting industrial users who currently have no economically viable route to decarbonisation.
- RESP should account for where and how heat networks are being developed outside of zones and their strategic importance for providing support and flexibility to the grid at both Dx and Tx level, including their ability to defer or avoid reinforcement.
- RESP should consider how DNOs and heat network developers/operators can better work together to achieve whole system efficiencies and produce advice on the same.

APPENDIX 2 | Workshop Participants

1Energy
AECOM
AMP Clean Energy
Barnet Council
BasePower
Bosch
Bring Energy
British Sugar
BU-UK
Centre for Sustainable Energy (CSE)
Chirpy Heat
Dataglow
Deep Green
EDF Energy
Elxon
Enel X
E.ON
Energy Intensive Users Group (EIUG)
Exergy3
FairHeat
Fav House
Flexitricity
Future Biogas
Glendimplex
Highgate Veterinary Clinic
Imperial College London
Joulen

Liberated Energy
London Government (Greater London Authority)
Manchester City Council
Newport City Council
Octopus Energy Generation
Ohme
Opoura
Pod
Pulsant
Pure Data Centres
Ramboll
SSE
Star Refrigeration
Sunamp
Switch2 Energy
techUK
Tepeo
Vattenfall
Vital Energi
West Sussex County Council
WSP

WORKSHOP OBSERVERS

DESNZ
NESO
OFGEM

POWERED BY PEOPLE, POWERED BY PLACE

A Vision for Demand in Regional Energy Strategic Plans

ABOUT ADE: DEMAND

We seek a complete re-imagining of the role of demand in our energy system so that:

- 1 Demand is given equal consideration to generation
- 2 Every household, commercial business and industrial site has a commercially viable path to decarbonisation
- 3 Energy users and their assets have a day job - they shouldn't have to work around the energy system, the energy system should work around them
- 4 Millions of users with automated energy provision can play a major part in keeping the lights on

Without this, we are rapidly moving towards a system that is more expensive and less reliable.

LEAD AUTHOR

OCEAN FAY | Policy Manager

AUTHORS

SARAH HONAN | Head of ADE: Demand

EMILY BAER | Policy Officer

MICHELLE FRYZUK | Policy Officer

MEGHAN NEWMAN | Policy Manager

KEVIN O'SHEA | Policy Officer

DESIGNER AND PRESS CONTACT

MURAT OMERCIK | External Affairs Manager

External.Affairs@theade.co.uk

