Public

tRESP

Pathways Methodology and Detailed Design

NESO
National Energy System Operator

Contents

Scope and Structure

The Transitional Regional Energy Strategic Plan (tRESP) Pathways are structured in a similar way as the building block (BB) outputs from National Energy System Operator (NESO) Future Energy Scenarios (FES) 2025: Pathways to Net Zero[1]. Each building block represents an individual component of demand or generation which, in combination, provide a view of the changing energy landscape out to 2050.

We are aligning to these FES building blocks as they provide a strong established foundation to build from. In particular:

- They were developed collaboratively between distribution networks and NESO through the Energy Networks Association (ENA) Open Networks project[2] and have been used for many years in FES, such as 2025 and previously.
- They were developed with a consideration for whole energy systems, not just electricity, which gives us a good starting point for the full Regional Energy Strategic Plan (RESP).
- A key purpose of the building blocks was to set a consistent language between national and regional modelling, whilst providing improved clarity and transparency to customers and stakeholders.

While the structure of tRESP Pathways aligns to these building block outputs, the scope is not the same as FES 2025 Pathways. For tRESP, we have prioritised certain demand and generation building blocks, due to their relevance and importance for the ED3 price control period. The following sections provide the rationale for this prioritisation. Due to the prioritisation, DNOs need to define additional components, particularly of demand, to provide the full view of the changing energy landscape at the distribution network level.

Demand pathways

Demand for electricity and the corresponding investment in networks will be primarily influenced by technologies projected to grow significantly in the coming years, such as electric vehicles (EVs), heat pumps, and district heating. Based on analysis of FES 2025 Pathways, EVs, heat pumps and district heating are expected to account for 93% of the increase in peak demand by 2035 and over 80% by 2050 (Figure 1).

The scope of the building blocks for demand pathways includes:

1. domestic and industrial and commercial (I&C) heat pumps
2. EVs

[1] Future Energy Scenarios (FES) | National Energy System Operator
[2] ON22-WS1B-P2 FES and DFES Building Blocks (16 Jun 2022) – ENA

3. domestic and I&C air conditioning and
4. domestic district heating

How do we know this is robust?

According to FES 2025 Holistic Transition (Figure 1), 80% of the total increase in peak demand by 2050 is due to EVs (15%), heat pumps (52%) and district heating (13%). Over 50% of the increase by 2050 relates to EVs and domestic heat pumps. The I&C component in Figure 1 includes demand from electric heat other than heat pumps, rail electrification, and industrial decarbonisation, all of which are expected to increase by 2050. Rail electrification and industrial decarbonisation projects are excluded from the tRESP Pathways as these are highly location-specific projects. They would either come through as connections requests or through stakeholder engagement for each DNO, or through the tRESP Strategic Energy Needs, for strategic projects which do not yet have a connection agreement.

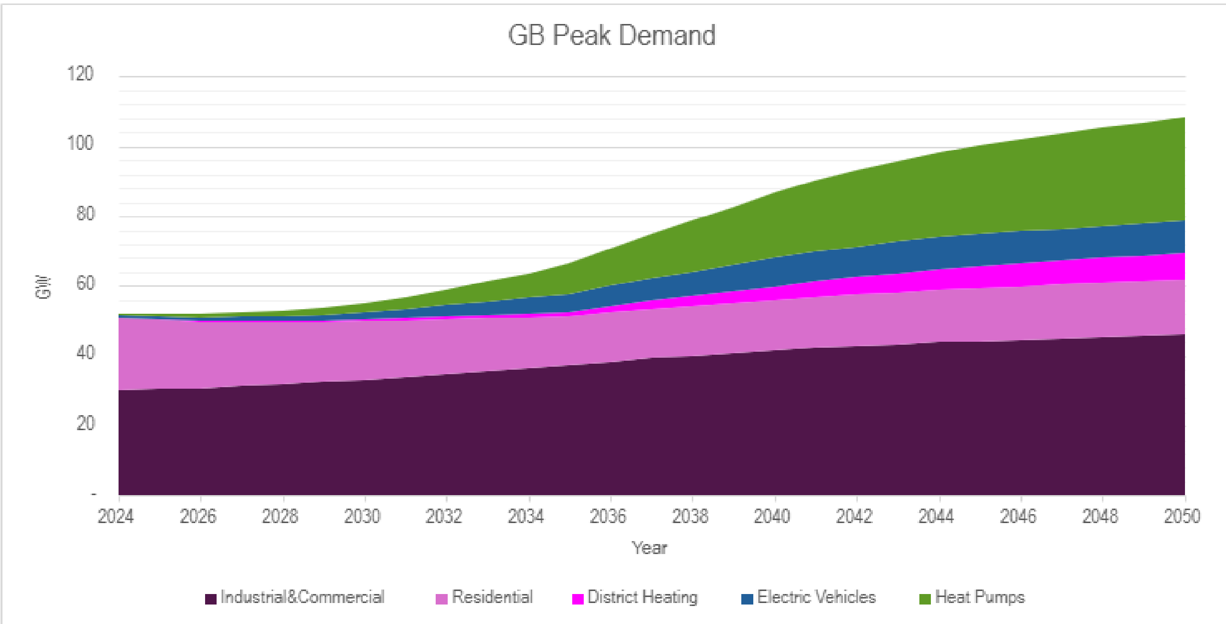

Figure 1: FES 2025 Holistic Transition peak demand breakdown excluding losses 2024-2050, sourced from FES 2025 Pathways to Net Zero, Table ED1.

We validated with DNOs, gas distribution networks (GDNs), independent distribution network operators (IDNOs)[3] and Ofgem through our Technical Working Group, that the EV charging infrastructure and the use of heat pumps are the primary contributors to growth in peak electricity demand and overall energy consumption. Electricity distribution networks, in their

[3] IDNOs were represented by the Independent Network Association (INA).

analysis, also confirm EVs and heat pumps contributing to a 99.5% increase in residential demand to peak demand by 2050 (example in Table 1).

For context, the usage of EVs and domestic heat pumps is covered in the tRESP Consistent Planning Assumptions (CPAs), including any expected behaviour change over time. Furthermore, the projections for the uptake of electrified heating and transport are developed in FES 2025 and by DNOs within the context of the range of transport and heating types, including non-electrified approaches such as hydrogen, gas and internal combustion engines. The tRESP Pathways do not include projections for those non-electric technologies, but they have been considered as part of the modelling inputs.

Table 1: Increase to peak demand and energy consumption in 2035 and 2050 of future demand components (heat pumps, electrified transport, electrolysers, industry) as a percentage of underlying residential and commercial demand (Northern Powergrid 2023 DFES – Best View scenario). Source: Energy Networks Association[4].

	Contributions to peak demand MW		Contributions to energy consumption MWh	
Category	Additional at 2035 - % of underlying (peak demand MW)	Additional at 2050 - % of underlying (peak demand MW)	Additional at 2035 - % of underlying (energy consumption MWh)	Additional at 2050 - % of underlying (energy consumption MWh)
Heat pumps - domestic	6.6%	53.6%	5.1%	41.5%
Heat pumps - I & C	2.2%	17.9%	1.5%	11.7%
EV - cars & vans	16.3%	21.2%	22.2%	28.8%
Electric HGVs	4.2%	6.8%	10.1%	16.5%
Electric Buses	0.2%	0.4%	1.4%	2.1%
Electrolysers	8.5%	21.4%	14.2%	36.0%
Large industry Fuel Switching	4.7%	10.0%	7.9%	16.9%

Generation pathways

The scope of the generation pathways aligns closely with the generation building blocks from NESO's FES 2025, developed collaboratively through the ENA working group. For tRESP, we have focused on building blocks relative to distribution networks, and have therefore excluded offshore wind, marine and nuclear, which connect primarily to transmission networks.

The building blocks for generation and storage pathways (including micro-generation) are as follows:

[4] Energy Networks Association, Open Networks: *Summary of DNO DFES Electrical Load Forecasting Assumptions, February 2025.*

1. solar PV (small and large)
2. wind (onshore, small and large)
3. storage (small and large)
4. power plants (including combined heat and power (CHP) plants)
5. hydropower plants
6. geothermal and
7. hydrogen/fuel cells

How do we know this is robust?

Solar photovoltaic (PV) systems, wind energy, and electricity storage are identified as the major contributors to the capacity installed at the distribution level. According to FES 2025, compared to the total amount of distributed generation (Figure 2) solar PV, onshore wind and electricity storage account for 83% of the distribution generation capacity in the Holistic Transition pathway in 2030 and 91% in 2050.

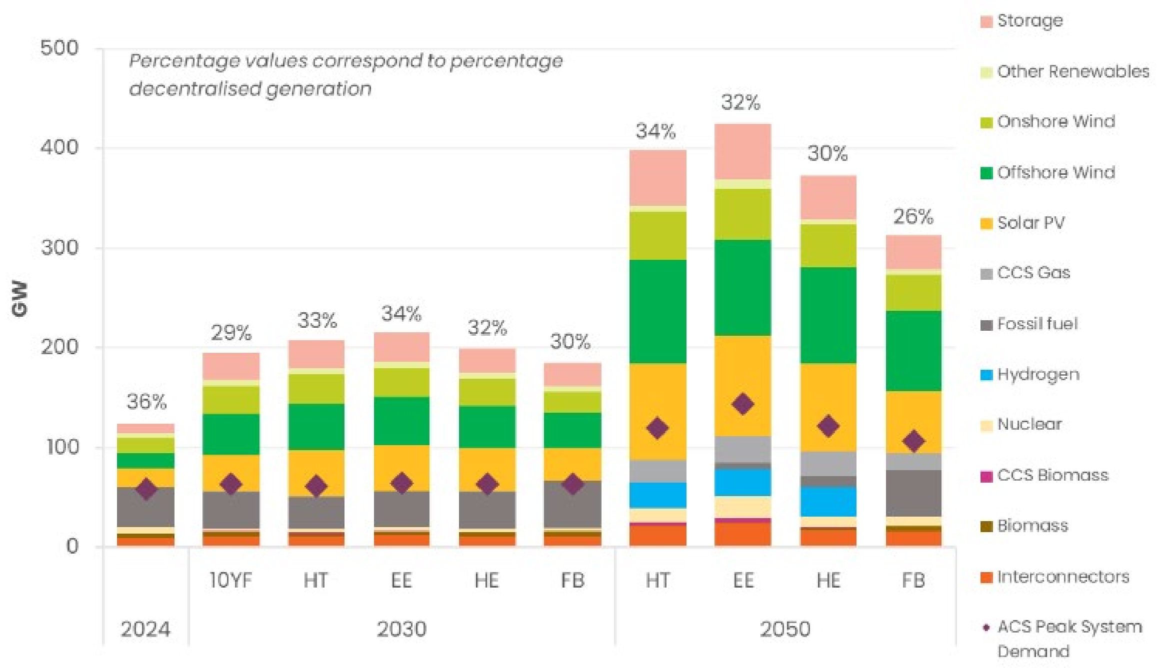

Figure 2: Installed generation capacity, peak demand and percentage of decentralised generation capacity (source: Figure F12 from FES 2025 Pathways).

Finalised building blocks for tRESP Pathways

Table 2 summarises the list of demand and generation building blocks covered in the tRESP Pathways. It is also available in spreadsheet format (published on NESO's Open Data Portal with the final tRESP Pathways outputs).

While the Pathways used the previously established building block definitions, working closely with DNOs identified several inconsistencies in interpretation which the tRESP Pathways work has been able to clarify. Specific clarifications delivered and communicated to all DNOs were:

- interpretation of district heating as domestic customers on heat pump-supplied networks (bringing consistency with the FES interpretation)
- interpretation of large and small solar at a 10 kW threshold (bringing consistency amongst various interpretations associated with interpreting this based on the G98 or G77 Engineering Recommendation)
- interpretation of micro-CHP plants as natural gas, not including hydrogen (which has its own separate category) or fuel cells
- recognition that a reference to microgeneration is ambiguous and best avoided – with a variety of interpretations from a few kilowatts to megawatts amongst different parties.

Table 2: List of building blocks covered in the tRESP Pathways

Technology	FES BB ID Number	Technology Detail	Units
Electric Vehicles	Lct_BB001	Pure Electric (Vans, Cars and Motorbikes)	Number
Electric Vehicles	Lct_BB002	Plug-in-hybrid (Vans, Cars and Motorbikes)	Number
Electric Vehicles	Lct_BB003	Pure Electric (Buses, Coaches and HGVs)	Number
Electric Vehicles	Lct_BB004	Plug-in-hybrid (Buses, Coaches and HGVs)	Number
Heat Pumps	Lct_BB005	Domestic - Non-hybrid	Number
Heat Pumps	Lct_BB006	Domestic – Hybrid	Number
Heat Pumps	Dem_BB005_1	Industrial and Commercial Heat Pumps excl. Processes (incl. Hybrid)	Annual Demand (GWh)
Heat Pumps	Dem_BB005_2	Industrial and Commercial Heat Pumps excl. Processes (incl. Hybrid)	Surface Area (m^2)
District Heating	Lct_BB009	Domestic Customers on Heat Pump-Supplied Networks	Number
Airconditioning Units	Lct_BB014	AC Domestic Units	Number
Airconditioning Units	Lct_BB015_1	AC Industrial and Commercial Units	Annual Demand (GWh)
Airconditioning Units	Lct_BB015_2	AC Industrial and Commercial Units	Surface Area (m^2)
Storage	Srg_BB001	Batteries (Non-domestic)	Capacity Installed (MW)
Storage	Srg_BB001_1	Batteries >=200 kW	Capacity Installed (MW)
Storage	Srg_BB001_2	Batteries >=1 MW and <5 MW	Capacity Installed (MW)
Storage	Srg_BB001_3	Batteries >=5 MW	Capacity Installed (MW)
Storage	Srg_BB002	Domestic Batteries (G98)	Capacity Installed (MW)
Storage	Srg_BB003	Pumped Hydro	Capacity Installed (MW)
Storage	Srg_BB004	Other	Capacity Installed (MW)
Storage	Srg_BB005	Vehicle-to-Grid	Capacity Installed (MW)
Non-renewable CHP	Gen_BB001	>=1MW	Capacity Installed (MW)
Non-renewable CHP	Gen_BB002	<1MW	Capacity Installed (MW)
Micro CHP	Gen_BB003	Domestic (G98/G83) including Gas	Capacity Installed (MW)
Renewable Engines	Gen_BB004	Landfill Gas, Sewage Gas, Biogas	Capacity Installed (MW)
Non-renewable Engines (Diesel) (non CHP)	Gen_BB005		Capacity Installed (MW)
Non-renewable Engines (Gas) (non CHP)	Gen_BB006		Capacity Installed (MW)
Fuel Cells	Gen_BB007		Capacity Installed (MW)
OCGTs (non CHP)	Gen_BB008		Capacity Installed (MW)
CCGTs (non CHP)	Gen_BB009		Capacity Installed (MW)
Biomass and Energy Crops (including CHP)	Gen_BB010	Includes Biomass Conversions	Capacity Installed (MW)
Waste Incineration (including CHP)	Gen_BB011		Capacity Installed (MW)
Solar Generation	Gen_BB012	Large (G99) >=10 kW	Capacity Installed (MW)
Solar Generation	Gen_BB012_1	Large (G99) >=200 kW	Capacity Installed (MW)
Solar Generation	Gen_BB012_2	Large (G99) >=1 MW and <5 MW	Capacity Installed (MW)
Solar Generation	Gen_BB012_3	Large (G99) >=5 MW	Capacity Installed (MW)
Solar Generation	Gen_BB013	Small (G98/G83) <10 kW	Capacity Installed (MW)
Wind	Gen_BB015	Onshore Wind >=1 MW	Capacity Installed (MW)
Wind	Gen_BB015_1	Onshore Wind >=1 MW and < 5 MW	Capacity Installed (MW)
Wind	Gen_BB015_2	Onshore Wind >=5 MW	Capacity Installed (MW)
Wind	Gen_BB016	Onshore Wind <1 MW	Capacity Installed (MW)
Wind	Gen_BB016_1	Onshore Wind >=200 kW and <1 MW	Capacity Installed (MW)
Hydro	Gen_BB018	Not Pumped Hydro	Capacity Installed (MW)
Geothermal	Gen_BB019		Capacity Installed (MW)
Hydrogen	Gen_BB023	Hydrogen	Capacity Installed (MW)

The subcategories of the building blocks shown in green in Table 1 were used with DNOs as part of the process to review and adjust the generation and storage pathways against the outcome of the December 2025 Gate 2 connections reform implementing the UK Government's Clean Power 2030 (CP30) Action Plan, as described in the Alignment Review Framework section, but are not part of the final output.

The additional subcategories were relevant to non-domestic battery storage, PV and onshore wind building blocks (Srg_BB001, Gen_BB012, Gen_BB015, and Gen_BB016), and reflected generation at or above the 200 kW, 1 MW and 5 MW Transmission Impact Assessment (TIA) thresholds. In Scotland, the TIA thresholds were set at >=200 kW, and in England and Wales this was at >= 1 MW or >= 5 MW depending on the Grid Supply Point (GSP).

Spatial resolution

The core pathways outputs are produced for the feeding area of each GSP in Great Britain (GB). The core definition for the spatial resolution of the pathways is by tRESP GSP area, which have been defined for and used as required by the tRESP outputs (Pathways, Nations and Regions Context (NRC), Strategic Energy Need (SEN)). The tRESP GSP areas are published with the tRESP Pathways.

The pathways outputs are also presented for each of the 11 RESP nations and regions, and on an indicative basis for 350 local authority areas. Further context on the translation to those additional areas from the GSP area definition is provided later in this section (see additional pathways outputs).

The GSPs in GB are at the interface between the transmission and distribution network, and therefore providing outputs at this level is a reasonable starting point for the first outputs NESO delivers as part of the RESP role. The full RESP will build on the tRESP and develop more geospatially granular outputs, though without a focus on GSP feeding areas.

Different customers and stakeholders (NESO, Elexon, DNOs) utilise varying definitions of the area served by a GSP, both for the names of the GSPs and the catchment or feeding areas that they serve. There can be contractual definitions, for example, one Bilateral Connection Agreement between NESO and a DNO licence area. There can be technical definitions based on power flow analysis, in which GSPs may be combined or split for network analysis. A single physical GSP location may serve multiple licence areas. In each of these cases, the GSP feeding area would then be defined by the downstream normal network running arrangement defined by the DNO and the location of customers served in that normal network running arrangement.

Ultimately those feeding areas would be based on network topology and the normal running arrangements on the network to define a feeding area. However, these definitions are updated over time due to the introduction of new assets and customers, and changes in network running arrangements. For consistency, a set of GSP areas were defined by NESO for tRESP to establish the pathways, ensuring that there is one consistent set of areas across GB.

The tRESP Pathways started by using the GSP feeding area definition[5] published by NESO's FES team on 9 January 2025, which was informed by Elexon definitions of area served. Based on this definition, there were initially 348 GSPs. However, this definition involved GSPs being defined across DNO licence areas, and it was difficult to relate to DNO definitions of GSPs. This was a key part of the feedback on the v1 pathways in July 2025.

Furthermore, GSPs in Scotland are connected to transmission at a lower voltage than in England and Wales, so are smaller and more numerous. To account for this difference and facilitate comparison with GSPs in England and Wales, the tRESP Pathways are defined using tRESP GSP areas which aggregate Scottish GSPs to form GSP groups at a 132 kV voltage level, similar to those in England and Wales. The grouping was implemented with the support of the Scottish DNOs.

As a result, the original NESO definition of GSP areas was adapted to create a tRESP definition of GSP areas in which:

- every tRESP GSP area can be clearly assigned to a single DNO licence area
- tRESP GSP areas represent groups of GSPs in Scotland
- there are no overlaps or gaps between tRESP GSP areas
    - In contrast, the combination of GSP feeding areas shared by DNOs in Q4 2025 had overlaps (double counting) of around 53,000 premises and 200 square kilometres (not all land area), and gaps where areas were served by no GSP
- tRESP GSP areas have been combined or split to facilitate mapping to data on DNO GSP boundaries as provided in Q4 December 2025

The large generation building blocks identified in the Embedded Capacity Registers (ECRs)(Gen_BB001, Gen_BB002, Gen_BB004-Gen_BB011, Gen_BB015, Gen_BB016, Gen_BB018, Gen_BB019, Gen_BB023, Srg_BB001, Srg_BB003 and Srg_BB004) use the nominal mapping based on network connectivity in the ECR and on the GSP name in the DFES projections. The Pathways for all other building blocks are defined on a geographic based on the tRESP GSP areas.

The final version of the tRESP GSP areas includes 231 defined tRESP GSP areas, with each area assigned to a DNO licence area. The main Pathways databooks are per tRESP GSP area, in two separate files for demand and generation.

[5] GIS Boundaries for GB Grid Supply Points | National Energy System Operator

Naming of the tRESP GSP areas

The naming of the tRESP GSP areas is consciously not identical to the names in a DNO DFES output, to acknowledge that the tRESP GSP area may be different from how a GSP feeding area is defined by a DNO on a specific date, including being a subset or combination of DNO DFES areas.

For example, the tRESP GSP area ELST_WATFS_EPN is associated to the area served by the Elstree and Watford South GSPs in Eastern Power Networks. However, with the exception of name-based building blocks (details on name-based available in Appendix 4: User guidance to DNOs on use of tRESP Pathways), the pathway is defined for the tRESP GSP area defined in the Geographic Information System (GIS) file. The tRESP GSP area may relate to a combination of GSPs with separate contractual agreements between the NESO and DNO, where it is normal practice to combine these electrically.

The tRESP GSP areas are expressed in formats like _H@AXMI_H and ELST_WATFS_EPN are short machine-readable names, suitable for coding with no spaces, and based on adapting the original NESO GSP names referenced above. The tRESP Pathways are published with these identifiers.

We have also defined alternative tRESP GSP area names - such as tRESP Axminster SSEN and tRESP Elstree Watford South UKPN - which are more user-friendly names for the areas. These names include tRESP at the front of the name to emphasise that may be defined for a different feeding area to a similar sounding GSP name published by a DNO, and that at a detailed level, a translation exercise may be required between them (again see Appendix 4 for further details). The tRESP GSP areas and the alternative names are published alongside the building block list.

Additional outputs – by RESP nation and region

The Pathways per tRESP GSP area have been translated to the 11 RESP nations and regions, by an approximate mapping.

A GSP feeding area can serve multiple RESP nations and regions. For example, GSP A within one DNO licence area could be 100% in one RESP nation or region, such as Greater London, or it could serve parts of two or more RESP nations and regions, such as Greater London and East. This occurs because although tRESP GSP areas can be subdivided per DNO licence area, the RESP boundaries are not identical to the DNO licence areas.

So, to present the Pathways according to the RESP nations and regions, the GSP feeding areas were mapped approximately to the nations and regions. For the EV and heat pump building blocks, the mapping from GSP feeding area to nation and region was done based on dwelling numbers from the latest census data. For the generation and storage capacity pathways, the mapping from GSP feeding area to nation and region was done based on spatial area.

Public

The tRESP Pathways are presented by RESP nation and region on a digital platform, in charts and in brief narratives.

Additional outputs – by local authority area

The Pathways per tRESP GSP area have also been disaggregated to local authority areas.

There are 350 local authorities in GB. The final Pathways outputs are being shown at local authority level in response to customer and stakeholder feedback at the tRESP consultation. However, the outputs at local authority level should be treated as indicative, and not used for targets or to inform local data sources in bottom-up modelling for several reasons:

- GSP feeding areas are larger than local authority areas and do not align with those boundaries, so the technology in each area was approximately split and aggregated.
- DNOs retain responsibility for spatial allocation of technologies within a GSP feeding area as part of their network and business planning, which impacts figures for reach local authority – this is not defined by NESO in the pathways.
- The same method for allocation by dwelling numbers and spatial area was used to convert from GSP area to local authority area as for the conversion to RESP national and region; this is approximate and, particularly for large generation projects, this can lead to generation associated with individual projects being split incorrectly between areas.

The indicative pathways do give an indication of volumes. It is important to note that since the local authority output is only meant to provide a general understanding and should not be considered a target or used as input for detailed Local Area Energy Planning (LAEP)+ tools. Still, this indicative output can help customers and stakeholders gain a broad view of what the Pathways represent as a strategic plan for their local areas.

Due to the number of local authorities in GB (350) and the size of the output files, the local authority pathways data is split by demand and generation, and for Scotland, England and Wales (six files overall). The area definition used in presenting tRESP Pathways by local authority is the December 2024 definition of boundaries[6] published by the Office of National Statistics.

Interaction with other tRESP components

There are four tRESP components: Nations and Regions Contexts (NRC), Pathways, Consistent Planning Assumptions (CPAs), and Strategic Energy Need (SEN). Whilst all have distinct use cases, there is also a broader coordination piece across them that is explained next.

Quantitative interactions are detailed in this section, but there are several qualitative interactions from Pathways to the other tRESP components. Qualitative interactions include

[6] Local Authority Districts (December 2024) Boundaries

how all these pieces fit together to form an overall narrative for tRESP. When discussing Pathways for instance, we will be able to refer to the NRC, such as in RESP Nation or Region X, a key priority is Y, you can see how this is reflected in our Pathways.

Strategic Energy Need (SEN)

The tRESP Pathways set a strategic direction with technology projection based upon both our own bottom-up data sources and projections from DNOs as part of their DFES process. As such, there is a potential interaction between the tRESP Pathways and what is included in SEN. For example, there could have been situations where a need is identified that already exists in the Pathway.

The SEN per tRESP GSP areas were identified by review of the outcomes of a request for information (RFI) process as defined in the SEN Methodology and Detailed Design. The duplication risk is mitigated by a filtering rule in SEN such that any duplication is removed. The type of energy need in each RFI was reviewed and compared to the building block list:

- Where the primary energy need relates to a building block, for example, a type of electricity generation and storage or a demand type such as heat pumps or charging infrastructure serving demand from EVs, then this was removed from SEN.
- Where there is a minor component of the need within the Pathways, for example, some vehicle charging as part of a larger demand development, this would not be removed from SEN.
- Where an RFI is assessed as having strategic value but duplicates a technology in the Pathways, information on the need is provided to DNOs to inform spatial allocation at their discretion, without increasing the magnitude of the technology volume of that in the Pathway.

Furthermore, we are not incorporating any new SEN directly into the tRESP Pathways based on the SEN RFI process, irrespective of whether an RFI is identified as in or out of scope for SEN.

Nations and Regions Contexts (NRC)

The NRC and Pathways teams work together to ensure there is data consistency across both outputs wherever relevant. The NRCs map and reflect an initial view of national and regional conditions and priorities, highlighting key challenges and opportunities across each RESP nation and region. Wherever possible, national datasets have been used to inform the quantitative elements of the NRCs, to ensure clarity and consistency across multiple network areas, and to provide a consistent baseline of each nation and region's energy landscape, infrastructure, economic landscape, and role in the whole energy system across GB.

The graphic below outlines the data themes, and the individual quantitative and qualitative elements included in the NRCs, providing a view of each nation's and region's demographic and socioeconomic landscape, energy infrastructure, transport and heating sectors, industrial and commercial sectors, energy generation and storage, and targets.

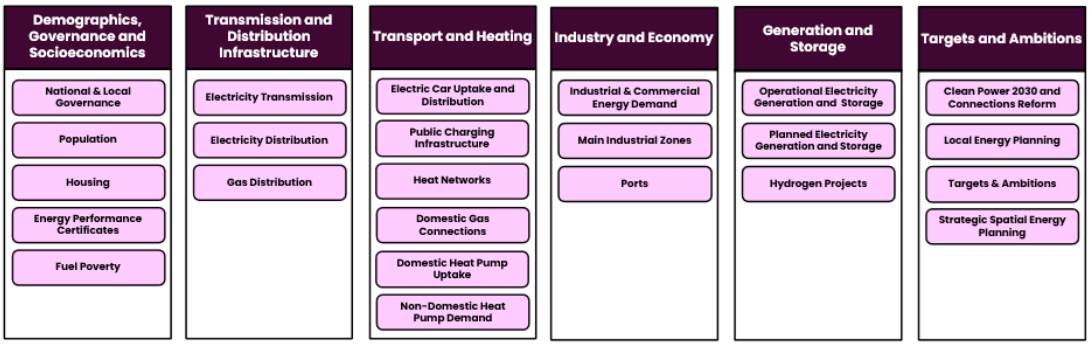

Figure 3: Content for tRESP Nations and Regions Contexts reports.

The NRCs align, wherever practical, with the tRESP Pathways. This alignment is done through consistent use of data and technologies aligned to the themes included in the topics, with some divergence in specific data themes. Several data topics included in NRC are aligned with the building blocks developed by Pathways, these include topics such as heat pumps, EVs and heat networks.

We have ensured that we are coherent with the data inputs used between NRC and Pathways for both the baseline and the short-term pathway. NRC compliments the pathways through presenting a granular view of the baseline.

Link between the Nations and Regions Contexts (NRC) and the Pathway baseline:

1. Transport: total EV chargers are covered in the tRESP NRC via using national government statistics. These are not covered in tRESP Pathways, but demand related to charging type is indicated in the tRESP CPAs. The current number of EVs is coherent across both Pathways and NRC.

2. Heating: The tRESP NRC will cover heat networks in the nations and regions from the Heat Network Planning Database. Current heat pump installations will be used directly from Pathways, as well as heat networks, noting that the Pathways refer to the subset of heat networks for domestic customers being supplied by heat pumps, whilst NRC presents the density total number of customers connected to a heat network (number of customers per square km, shown at an Lower Layer Super Output Area (LSOA) granularity in England and Wales and Data Zone (DZ) granularity in Scotland). Supply-side generation and electricity storage: installed energy generation and storage capacity has been checked against the input data sources that NRC and Pathways use, that is Transmission Entry Capacity (TEC) register and ECRs, respectively. These data sources are complementary to each other, namely larger transmission projects for hydro and biomass generation as well as large electricity storage projects (standalone or hybrid) covered in NRC are not in scope for Pathways. For distributed-connected onshore wind, solar and battery storage, it has been ensured that there is

coherence across nations and regions for the current installed capacity between NRC and Pathways.

Link between the Nations and Regions Contexts (NRC) and the short-term Pathways projections

1. Regarding future supply side generation and electricity storage pipelines, similarly to point 3 in the baseline section, the REPD and ECR datasets are complementary to each other for NRC and for Pathways. A comparison has been performed for the relevant technologies covered in both (onshore wind, solar and batteries) at the distribution level. For these technologies, differences are to be expected in between the tRESP Pathways (particularly after the November 2025 update reflecting the outcome of the Gate 2 Connections Reform process) and the long-term pipeline used in the NRC (based on the Renewable Energy Planning Database (REPD) covering generation and battery storage at both transmission and distribution levels but not reflecting the connections reform outcome). NRC has included the Connections Reform Gate 2 Outcome in Chapter 6 – Targets and Ambitions.

2. LAEPs are mentioned in the NRC Report covering future local ambitions and targets qualitatively. In Pathways, these ambitions may appear quantitatively via the DNO submission to NESO in November 2025. We asked DNOs to confirm LAEPs are included in that submission, and the list will be referenced in the list of LAEPs in the NRC. It should be noted that for any LAEP published after autumn 2025, DNOs will not have had an opportunity to incorporate this in their update to NESO, so it is not expected that this addition will be reflected in the tRESP Pathways.

tRESP Pathways delivery timeline

As illustrated by Figure 4, the tRESP Pathways are delivered following an iterative approach with versions delivered in July and October 2025 to DNOs. Each version was improved through feedback and internal checks. The October version was used for a dry-run of the Alignment Review Framework described later in this document, in the section of that name.

An update of the tRESP Pathways was done in November/December 2025 following the incorporation of data from the Gate 2 Connection Reform Process and updated building blocks projections from DNOs informed by FES 2025. The final version of the tRESP Pathways goes through an Alignment Review Framework that reviews the outputs and their alignment with the UK Government's Clean Power 2030 Action Plan, the 5th/6th UK Carbon Budget and advice on the 7th UK Carbon Budget[14].

The following sections describe, in more detail, the different steps introduced here, from the creation of the first version up to the final version of the tRESP Pathways. Note that only the final version of the tRESP Pathways is made public. Previous versions are considered draft versions and were only shared with DNOs.

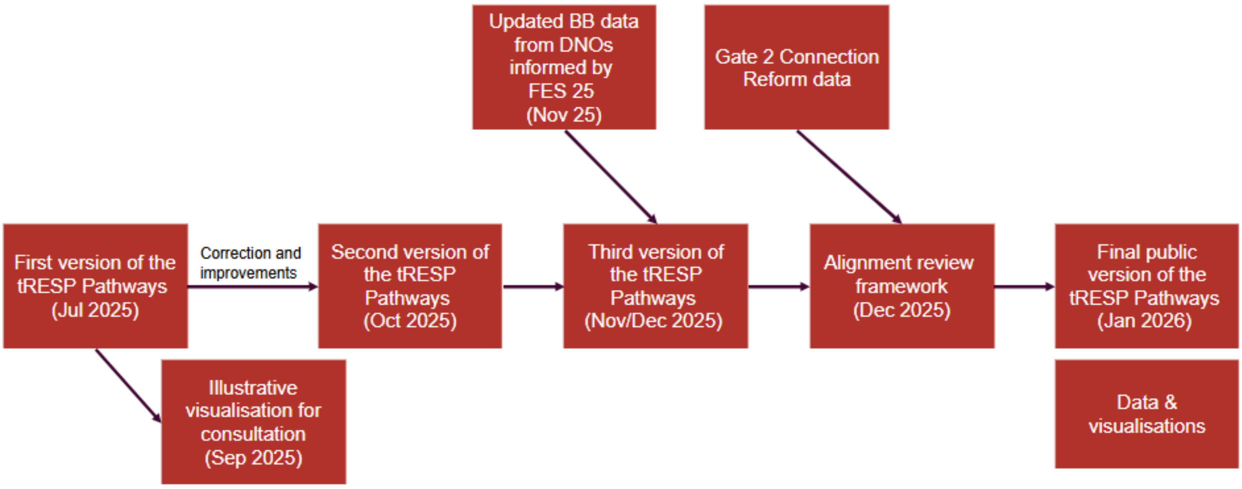

Figure 4: Delivery timeline of the tRESP Pathways from versions to DNOs in July, October and December 2025, to the final public version in January 2026.

Interaction with other NESO Strategic Energy Planning (SEP) outputs

There is no influence from tRESP to the Strategic Spatial Energy Plan (SSEP), transitional Centralised Strategic Network Plan (tCSNP) or to the Centralised Strategic Network Plan (CSNP).

The final SSEP will be delivered in Autumn 2027. The CSNP and full RESPs depend on the latest SSEP outputs, so their delivery will also move to the end of 2028. In addition, the refresh of the second tCSNP will be published by 30 June 2026. These timescales were shared on the NESO website in December 2025.

Development of the methodology for the full RESP has been informed by tRESP, but the scope structure and timeframe are different, as set out in the RESP methodology published for consultation in November 2025. The SSEP is an input to the full RESP.

The definition of the areas of the RESP nations and regions is common across tRESP and RESP, and the SSEP land zones align with the RESP nations and regions.

Methodology for Baseline (Year 0 at 31 March 2025)

Objectives

The first step in creating the tRESP Pathways is to establish the baseline year (31st of March 2025) values for each building block. Through engagements with DNOs, we have identified that the DNOs' previous detailed methodology to derive volumes in the baseline year within their DFES data varied from one DNO to another. This variation includes the approach itself, as well as the snapshot date of the input data used. To bring consistency, we have developed a bottom-up methodology that can be applied to each building block and all GSPs.

The following sections describe the baseline methodology for each building block.

Our decision

Four options were considered to create the baseline year data:

1. Use the FES 2025 disaggregation done as part of the FES regionalisation exercise to GSP.
2. Use the DNOs' data (for example, DFES) from a specific year to disaggregate FES 2025 at GSP.
3. Establish our own baseline for all GSPs via doing our own independent disaggregation of FES to GSP using primary datasets. Example of these datasets include energy performance certificates (EPC), Microgeneration Certification Scheme (MCS), ECRs and where suitable, using local data directly.
4. Purchase models from a consulting company working on LAEP or DFES and do a run for the whole of GB.

Option 3 was selected as this provides an independent view of the baseline, using granular primary datasets, while still providing the option of aligning with the baseline of the national forecasts produced by the FES Pathways. Local data includes datasets from sources such as the Office for National Statistics (ONS), EPC and MCS. The tRESP baseline year was initially set as 2024 to align with the baseline of FES 2025. For the final tRESP components, the baseline was updated to 31 March 2025 across all building blocks.

How do we know this is robust?

- The methodology for disaggregation is based on reliable sources which provide data at local level. This includes data from the ONS, EPC, Department for Transport (DfT), Department for Energy Security and Net Zero (DESNZ).
- The methodology uses data comparable to what DNOs use in DFESs which has been developed and improved in the past 10 years.
- The selected methodology went through a few iterations with external customers and stakeholders to improve the alignment of the components.

Methodology for each building block including input data mapping

This section describes the methodology used to calculate the baseline year data for each building block. Key assumptions are included in a tab of the tRESP Pathways building block list[7] shared separately.

[7] Lists of tRESP Pathways Building Blocks NESO Data Portal of tRESP GSP areas with names on NESO Data Portal.

Electric vehicles (EVs) - FES BB ID Number: Lct_BB001, Lct_BB002, Lct_BB003, Lct_BB004

This methodology leverages two DfT datasets which provide information about the number of registered pure electric and plugin vehicles in the UK: the VEH0142 data available at local authority level and the VEH0145 data available at LSOA level.

For each building block, the steps included:

1. Collecting data for accommodation (including all housing types) at LSOA/DZ using census data.
2. Calculating an accommodation weighted factor based on accommodation type at LSOA/DZ level (see key assumptions tab for details) for each local authority.
3. Collecting all EV data at local authority level from EV statistics sheet for 2025 Q1 column from the VEH0142 DfT dataset (this excludes the range extended EV category).
4. Disaggregating the EV data from LA to LSOA/DZ level using results from Step 2.
5. To deal with areas with higher than usual registrations of commercial EVs, the Ofgem methodology[8] for DNOs' annual regulatory reporting was used:
    a. Using the VEH0145 dataset from the DfT providing information for fuel type and keepership of vehicles at LSOA level, the commercially kept battery electric and plug-in vehicles were extracted. Note that there is no information about vehicle body type in that dataset.
    b. A maximum of 100 commercial vehicles was set for each LSOA. Any vehicles that could not be allocated within this limit were distributed throughout LSOAs in GB according to the existing distribution of commercial vehicles from Step a). Once an LSOA had reached the cap of 100 vehicles, no further vehicles were assigned to it.
    c. The split between battery electric cars and light vans and plugin-in electric cars and light vans was done using GB-level data from VEH0142. This data was aggregated and used for these categories of vehicles at tRESP GSP level.
6. Aggregating EV data (Step 5) to GSP level using LSOA to tRESP GSP areas weighting factors based on number of dwellings.

Domestic heat pumps - FES BB ID Number: Lct_BB005, Lct_BB006

To estimate the current number of domestic heat pumps, data from the EPCs and the MCS were combined. The date of the launch of the Boiler Upgrade Scheme (May 2022) was used as a threshold, such as before this date the EPC data was used and after this date the MCS data

[8] p107 of RIIO-ED2_Annex_B_Costs_Volumes_and_Revenue_v1.1 at Modifications to electricity distribution Regulatory Instructions and Guidance and Regulatory Reporting Packs for RIIO-2 Year 2 | Ofgem.

was used. The steps used to derive the number of heat pumps at GSP level are described in the following steps and illustrated by Figure 5:

1. Cleaning the EPC data by removing incomplete records (for example, records that do not have postcode or information about their main heating system) and only keeping the most recent EPC for buildings with multiple EPCs.
2. Assigning a LSOA/DZ to each EPC by using the postcode information.
3. Using the cleaned EPC data to calculate the number of heat pumps at LSOA/DZ level at the end of May 2022 by looking at the description of the main heating system of each record.
4. Calculating the number of heat pumps in the MCS data at LSOA/DZ level between end of May 2022 and end of March 2025.
5. Summing results from step 3 and 4, to get total number of heat pumps at LSOA/DZ level.
6. Aggregating results by tRESP GSP area.
7. Using FES 2025 ratio in 2024 at GB level, to split the number of heat pumps between non-hybrid (Lct_BB005) and hybrid (Lct_BB006) heat pumps.

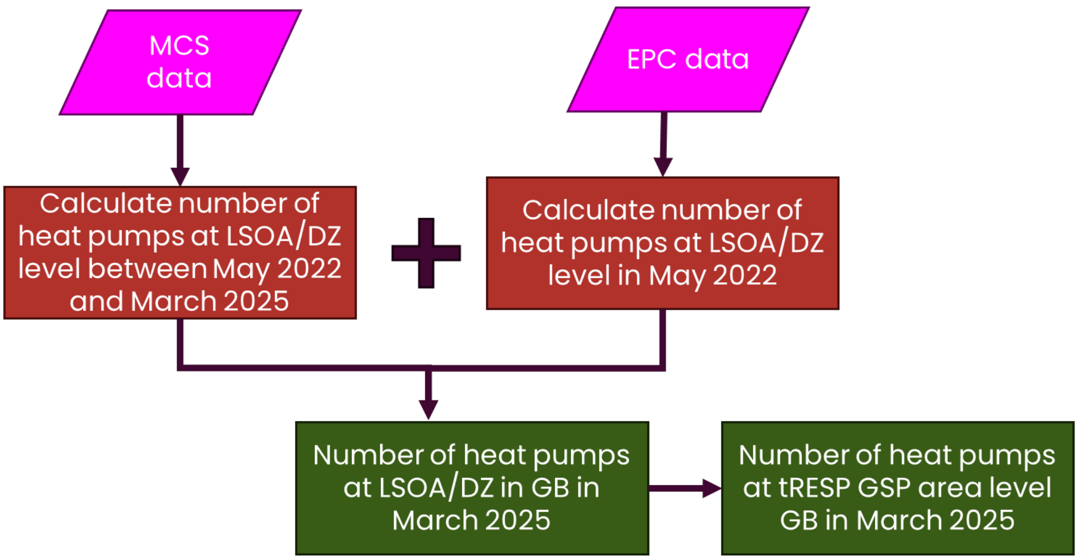

Figure 5: Diagram of the process used to calculate the total number of domestic heat pumps at LSOA/DZ level (as presented in TWG on the 13th of October 2025).

There are uncertainties regarding the estimation of the number of domestic heat pumps installed in the UK. The Appendix called 'Number of domestic heat pumps in DFES and tRESP baseline' provides details on the different sources of data explored and compare results to DFES 2024.

Industrial and commercial (I&C) heat pumps - FES BB ID Number: Dem_BB005_1 (GWh), Dem_BB005_2 (m^2)

Non-domestic EPCs were used to estimate the distribution of electricity heated property, which was used as a proxy for the distribution of the demand from I&C heat pumps. The steps included:

1. Collecting the non-domestic EPC certificates, remove duplicates and assign a LSOA/DZ to each record.
2. Collecting surface area in square metres by heating fuel and property type at the LSOA level from the non-domestic EPC data. In each non-domestic EPC file, column E is for the postcode to match the LSOA, column I is for property type, column S is for heating fuel, and column W is for the floor area. This data is used to create Dem_BB005_2.
3. Calculating the percentage of floor area for electricity heated property – the floor area which is electricity heated at LSOA level / total floor area electricity heated in GB.
4. Distributing the FES 2025 value for this building block based on percentage of floor area for electricity heated property (step 3).
5. Aggregating the data from LSOA/DZ level to tRESP GSP areas level.

Vehicle-to-Grid - FES BB ID Number: Srg_BB005

For Vehicle-to-Grid (V2G), the FES 25 data was used directly. The GSP-resolution baseline data for 2024 from the FES building blocks (FES Scenarios 2025 Data Workbook) was mapped to the tRESP GSP definition for Srg_BB005 and used as the baseline data for the tRESP Pathways.

District heating - FES BB ID Number: Lct_BB009

This building block refers to domestic customers on a heat network supplied by heat pumps. It is not all customer types and is not irrespective of fuel supply. This is the interpretation of district heating in FES, although the simple title does not make this interpretation clear to all parties including DNOs in their building block submissions. However, the interpretation of domestic customers on heat networks supplied by heat pumps is most relevant to electricity distribution network impacts.

For context, the baselining approach detailed here is more granular than that used in FES. It is also noted that the projections from the baseline are based on FES in most cases, except for the subset of GSPs where DNOs provide district heating projections consistent with this definition. While FES offers a first estimate of the uptake of heat network supplied by heat pumps, it is not considering the heat network zoning work published by DESNZ in its current version (2025).

To estimate the current number of domestic customers connected to heat networks supplied by heat pump, we used the domestic EPCs) to distribute the heat networks data at local authority data from the DESNZ report 'Heat Networks registered under the Heat Network (Metering and Billing) Regulations'[9] published in November 2023.

The steps used to derive these numbers included:

1. Cleaning the EPC data by removing incomplete records (for example, records that do not have postcode or information about their main heating system) and only keeping the most recent EPC for buildings with multiple EPCs.
2. Assigning a LSOA/DZ to each EPC by using the postcode information.
3. Calculating the number of customers connected to heat networks in GB on the 31/03/2025 by looking at the description of the main heating system of each EPC record.
4. Distributing the number of residential customers at local authority level from table 1.3c in DESNZ report using the distribution of heat networks customers at LSOA level in the EPC data from Step 3.
5. Scaling the results at LSOA level by assuming 3% of the customers connected to heat networks are supplied by heat pumps in the UK. This is based on the ratio of heat networks with heat pumps in GB shown in table 1.5b. in the DESNZ report.
6. Aggregating results at tRESP GSP area level.

Domestic air conditioning (AC) units - FES BB ID Number: Lct_BB014

The number of domestic AC is not available in FES 2025. It was estimated based on the percentage of households in England with AC from the English Housing Survey[10] and assumptions provided by DNOs. Depending on the location, 2 to 3% of the total stock of dwellings were assumed to have domestic AC in 2025. The steps included:

1. Calculating the total number of detached, semi-detached, terraced and flats at LSOA/DZ level using the Census data for England, Wales and Scotland.
2. Based on the assumption that 3% of dwellings have AC units in GB (English Housing Survey headline report), the number of detached, semi-detached, terraced and flats have AC proportionally. This percentage was set at 2% of the dwellings in the next DNO licence

[9] Heat Networks registered under the Heat Network (Metering and Billing) Regulations statistics: December 2022 - GOV.UK

[10] English Housing Survey - GOV.UK

areas due to different assumptions provided by DNOs. These license areas include Scottish Power - Electricity North West (SP ENW), Scottish and Southern Electricity Networks – Scottish Hydro Electric Power Distribution (SSEN SHEPD), Scottish Power Energy Networks – Scottish Power Distribution (SPEN SPD), UK Power Networks – Eastern Power Networks (UKPN Eastern), National Grid Electricity Distribution (NGED).

3. Aggregating the numbers of AC units from LSOA/DZ to tRESP GSP area level.

I&C air conditioning (AC) units - FES BB ID Number: Lct_BB015_1 (GWh), Lct_BB015_2 (m^2)

The I&C AC electricity demand was estimated using non-domestic EPC data and findings from a Building Research Establishment (BRE) study looking at AC in non-domestic buildings. The steps included:

1. Calculating the floor area for non-domestic AC units from EPC Data.
2. Mapping postcodes to LSOA level using lookup table for each record from Step 1 and aggregate results to GSP level. This data is used to create Lct_BB015_2.
3. Using the standard kWh/m2 of demand (40 kWh/m^2) for cooling from the BRE study[11] to estimate the demand.

Distributed generation and storage - FES BB ID Number: Srg_BB001, Srg_BB003-05, Gen_BB001-23 excluding Gen_BB003.

For distributed generation, the methodology is based on the use of the ECR published by the DNOs.

For each building block and the subcategories defined to aid interpretation of the Gate 2 Connection Reform outcome (see section Finalised building blocks for tRESP Pathways), the steps included:

1. Collecting the ECRs (current ECR data used was downloaded in August 2025) for above and below 1 MW for all six DNO groups.
2. Consolidating the data from all DNOs into a single dataset where:
    a. Each asset is categorised into building blocks.
    b. The GSP name to which each asset is connected is normalised and mapped to the tRESP GSP areas. The first preference is to use the GSP column name provided in the ECR; if not available, coordinates are used.
    c. Hybrid systems are split into multiple components (for example, a battery photovoltaic system is broken down into two assets: a single battery and a single photovoltaic system sharing the same connection).

[11] Electricity Use by Air Conditioning

3. After applying the filters, take the sum of the already connected registered capacity (MW) column for each building block for each GSP as of 31 March 2025.

Distributed small solar PV installations- FES BB ID Number: Gen_BB012, Gen_BB013

For the baseline calculation, we are combining data from the ECR for installations above 1 MW and from Sheffield Solar for installations below 1 MW. This was informed by the higher coverage of the Sheffield Solar data in comparison of the ECR datasets for small installations. This also aligns with consultation feedback that national estimates underestimate smaller solar installations.

1. Bespoke request of the Sheffield Solar data to include breakdown of installations aligned with our sub-categories at GSP level and by date.
2. Filtering of the Sheffield Solar data to only include installation below 1 MW operational on the 31/03/2025.
3. Using of the consolidated ECR data from the previous section (Distributed Generation and Storage) to breakdown installations above 1 MW by subcategories and tRESP GSPs.
4. Combining the results from step 2 and 3 to create baseline data for all subcategories.

Domestic battery storage and micro-CHP plants - FES BB ID Number: Srg_BB002 and Gen_BB003

The installed capacity of domestic batteries (Srg_BB002) and micro-CHP plants (Gen_BB003) in dwellings was calculated from the MCS data. FES 2025 data was not used for these building blocks. Gen_BB003 is defined as micro-gas CHP. The steps included:

1. Filtering MCS data to get the capacity installed of Srg_BB002 installations (and capacity installed of Gen_BB003) by short postcode before 31/03/2025. Using 'Battery Max AC Power Output' column for Srg_BB002 and 'Total Installed Capacity' column for Gen_BB003.

2. Mapping the capacity installed for Srg_BB002 and Gen_BB003 from short postcodes to LSOAs using weighted average based on number of dwellings from the latest census data (2021 for England and Wales, 2022 for Scotland).

3. Aggregating results from LSOA to tRESP GSP level using weighted average mapping based on number of dwellings.

Methodology for short-term and long-term pathways

Objectives

The starting point for projections was based on the following set of requirements:

- Align with the latest UK Carbon Budget (practically with the 5th, 6th and 7th Carbon Budgets as represented in FES 2025)

- Align with the UK Government's Clean Power 2030 Action Plan and its implementation the latest Gate 2 Connections Reform Outcome from December 2025
- Align with DNO ECR data in spring 2025 and other primary datasets (EPC, Census, MCS) for the baseline generation and storage
- Single pathways from 2025-2035 and three pathways from 2035-2050
- 35 building blocks that capture generation and low carbon technologies – increased from 35 building blocks at tRESP consultation due to I&C heat pumps and AC being presented with alternative GWh and m^2 units
- GSP spatial resolution (231 GSPs) – later extended to also show by DNO licence area, by RESP nation and region, and on an indicative basis by local authority.

We note that Scotland has established statutory targets that differ from the rest of GB. These include the Climate Change (Scotland) Act, which mandates net zero emissions by 2045, the Fuel Poverty (Scotland) Act which requires that by 2040 no more than 5% of households are in fuel poverty and no more than 1% in extreme fuel poverty, and lastly the Heat Networks (Scotland) Act, which sets targets for thermal energy supply via heat networks as 2.6 TWh by 2027, 6 TWh by 2030 and 7 TWh by 2035. Scottish DNOs would reflect these requirements applicable to their licence areas in their inputs to the tRESP Pathways. However, as part of finalising the tRESP Pathways, we do not model emissions and energy generation/ consumption and therefore, we have not made a comparison against these as part of the alignment review.

There is also an ambition for 20 GW of onshore wind in Scotland by 2030 from both transmission and distribution levels – however as there is not a target on the distribution component therefore, a comparison could not be made. The implementation of Clean Power 2030 via the December 2025 connections reform outcome is prioritised in the finalisation of onshore wind numbers.

Wales has the target to meet the equivalent of 100% of their annual electricity consumption from renewable sources by 2035[12], and to continue to keep pace with consumption thereafter. Wales' ambition for community projects is to adopt the proposal for at least 1.5 GW of renewable energy capacity to be locally owned by 2035[12], scaling up their current target for 1 GW by 2030. Similarly to Scotland, the DNOs serving Wales would reflect the requirements applicable to their licence areas in their inputs to the tRESP Pathways. However, as part of finalising the tRESP Pathways, we do not model emissions and energy generation/ consumption and therefore, we have not made a comparison against these as part of the alignment review.

[12] Written Statement: Publication of Summary of Responses to the Consultation on Wales' Renewable Energy Targets (14 July 2023) | GOV.WALES

Our decision

The methodology used for short-term and long-term pathways is based on leveraging DFES outputs for all the building blocks that are covered by DFES, and using FES otherwise. This approach was informed by the need to reflect local characteristics which is currently done by DNOs in DFES through their modelling and customer and stakeholder engagement. The Details section covers the pros and cons of the options considered to deliver the tRESP Pathways.

FES and DFES consider three net zero pathways: Electric Engagement, Holistic Transition and Hydrogen Evolution – this is the general approach since 2024. For tRESP Pathways, we have aligned our short-term pathways with Holistic Transition to provide a more balanced and low regret view. The long-term pathways are aligned to all three.

In summary, as shown in Figure 6, the projections are:

- DFES-based: Projections will be based on DFES which captures local input data.
- A short-term pathway: Projections will focus on a Holistic Transition approach, considering immediate and integrated changes within the system.
- Three long-term pathways: Projections will align with long-term DFES trends for Holistic Transition, Electric Engagement and Hydrogen Evolution by 2050, ensuring consistency with the FES 2025 Pathways for future planning and development.

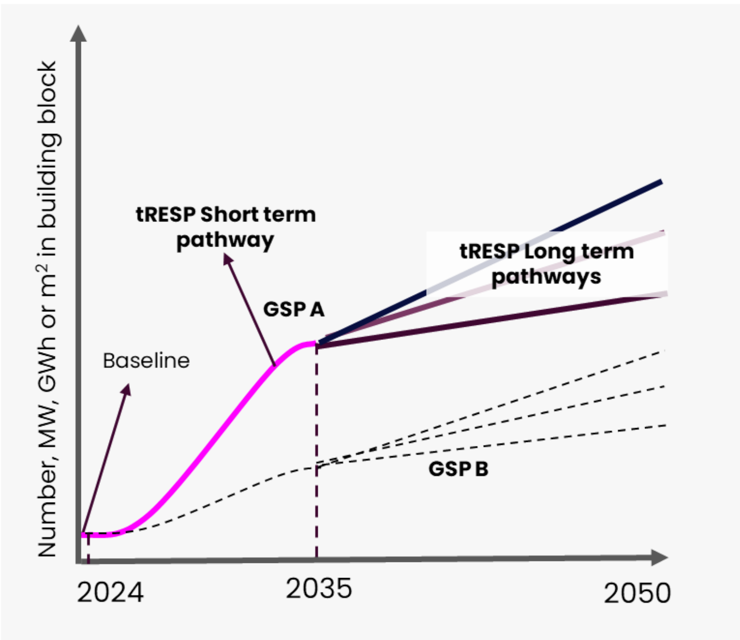

Figure 6: tRESP Short-term and Long-term Pathways.

Details

Several options were considered for short-term and long-term pathways. Table 3 describes the three options that were considered to develop the tRESP short-term pathways including pros and cons. Based on the requirements of the pathways, we have decided to develop our short-term pathways using Option 2. This was mainly driven by the need to reflect local characteristics into our pathways which is done by DFES but not by FES. Following on, Table 3 describes the options considered for long-term pathways. In a similar way to the short-term pathways, it was decided to use Option 3 (initially using numbers from DFES 2024 data and then, replaced this with DNOs November 2025 update). Option 2 was considered but disregarded as it could result in uncapped numbers (for example, having larger number of heat pumps compared to dwellings in a GSP area).

Table 3: Options considered to create tRESP short-term Pathways (2025-2035).

	Option 1 – Regionalised FES projections	Option 2 – DFES projections (numbers) aligned to baseline	Option 3 – tRESP integrated models
Approach	FES projections used for every building block.	DFES 2024 (latest) projections used for every building block for every GSP, assessing their credibility/deliverability through a framework. Option 1 is used as a default option if DFES is not available.	Develop bottom-up models (like DFES) to create pathways for each based on national and local input data and assumptions.
Benefits	• Approach is aligned with FES until 2050. • Standard approach for all GB. • Simple. • Aligned with UK Carbon Budget.	• Realigned to tRESP baseline, with most significant impact in earlier years. • Leverage local data by using DFES (DNOs already feed information from LAEP/Local Heat and Energy Efficiency Strategy (LHEES) into their process). • Leverage DNOs view on their connection pipeline, and DFES modelling capabilities which is more granular and bottom-up than FES. • Considered credible by DNOs. • Includes a framework to review all projections and assess their credibility (such as exploring projections above a given percentile and gather	• Standard approach for all GB. • Ingest national and local input data. • Can be built to align with constraints (alignment with Carbon Budget).

		narratives to validate them, facilitating additional investigation rather than just considering outliers).	
Drawbacks	• Not reflecting national and regional characteristics as it does not use local data. • Growth rates will have the same shape everywhere. • Credibility of growth rates could be challenged. • Some building blocks are not produced by FES (such as AC units and EV charging) so another methodology will be needed for those. • May not be aligned with the published regionalised FES 2025 causing credibility issues.	• Approach is not standardised as DFES approaches vary between DNOs. • Additional checks required to test alignment with Carbon Budget. • Unlikely to align with FES after baseline year. • Electricity focused pathways. • Additional checks required to test alignment with the outcome of the Gate 2 Connections Reform process implementing UK Government's Clean Power 2030 Action Plan. • Requires an approach to reflect connection reform and impact on connection pipeline and DFES projections. • Some are not produced by all DFES (such as AC units and heat networks) so another methodology will be needed for those.	• High complexity and requires resources, and very high risk of not reaching sufficient level of quality by summer 2025. • Unlikely to align with FES after baseline year. • This can create confusion for customers and stakeholders as we are producing pathways which are different from FES, DFES and Strategic Spatial Energy Plan (SSEP).

Table 4: Options considered to create tRESP long-term Pathways (2035-2050).

	Option 1 - FES based	Option 2 - DFES based (growth rates)	Option 3 - DFES based (numbers)	Option 4 - tRESP models
Approach	Use growth rates between 2035 and 2050 from FES 2025.	Use growth rates between 2035 and 2050 from DFES 2025 (informed by FES 2024).	Use 2050 numbers from DFES 2024 (subsequently updated to DFES 2025 with the November 2025 update informed by FES 2025).	Develop our own models for long-term pathways.
Benefits	Standard approach for all of GB.	Nation/Region specific (with the caveat that very few local/regional/ national inputs may be used in DFES in the period 2035-2050).	Nation/Region specific (with the caveat that very few local/regional/national inputs may be used in DFES in the period 2035-2050). Lower risk of uncapped values (such as number of heat pumps being higher than number of dwellings) compared to using growth rates.	Standard approach for all of GB. Ingest national and local input data. Can be built to align with constraints (alignment with UK Carbon Budget).
Drawbacks	Uniform change rates applied across all GSPs. Certain building blocks (such as AC units, EV charging) are not produced by FES 2025,	Lack of standardisation, as each DNO employs different methodologies in their DFES. Development of a framework like that used for projections	Approach is not standardised as every DNO uses different approaches for their DFES. Each DNO uses different building block definition so	High complexity, resource demands, and significant risk of not achieving adequate quality by summer 2025. Unlikely to align with FES 2025 post-baseline year.

	necessitating an alternative methodology. Potential misalignment with the regionalised FES 2025 published by NESO's FES Team. Projecting a 2050 value based on relative growth from a 2035 value that does not correspond with the tRESP 2035 value.	from 2025-2035 may be necessary to validate projection credibility. Influenced by FES 2025, but unlikely to align with FES. Electricity-centric pathways. Unlimited units available; consider using ratios instead of percentage changes (such as proportion of heat pumps relative to total stock). Variability in interpretation of building block definitions across different DNOs. Projecting a 2050 value based on relative growth from a 2035 value that does not align with the tRESP 2035 value.	there may be some assumptions to be done. Unlikely to align with FES 2025 after in the period 2035-2050.	Potential for customer and stakeholder confusion due to the production of pathways that differ from FES and DFES.

How to produce short and long-term pathways

This section illustrates the process used to create short and long-term pathways for all building blocks and GSPs. The same process cannot be applied to all building blocks and GSPs because of variances between DFES, including:

- different list of building blocks
- some building blocks may be aggregated in some DFES
- some building blocks are not modelled by DFES.

Hence, for each GSP and building block we have developed a decision tree and detailed methodologies to cover all cases:

1. DFES values exist for the building block at GSP level.

   → Solution: 'Use the main approach'

2. DFES values exist, but only for aggregated building blocks. Example: only 'residential EVs' exists and no split between Lct_BB001 and Lct_BB002.

   → Solution: 'Use FES data to split' (FES 2025 data)

3. DFES values do not exist, but FES (GSP-resolution) values exist. Note: only applies to the case where DFES data does not exist for any GSP within a DNO licence area. If individual GSPs are missing within a DNO licence area, but other GSPs have values, assume 0 for the missing GSP.

   → Solution: 'Use FES data' (FES 2025 data)

4. Neither DFES nor GSP-resolution FES values exist.

   → Solution: 'Bespoke solution needed'.

The decision tree is shown in Figure 7 and the detailed methodology applied in each case to produce short-term and long-term pathways are described in the rest of this section.

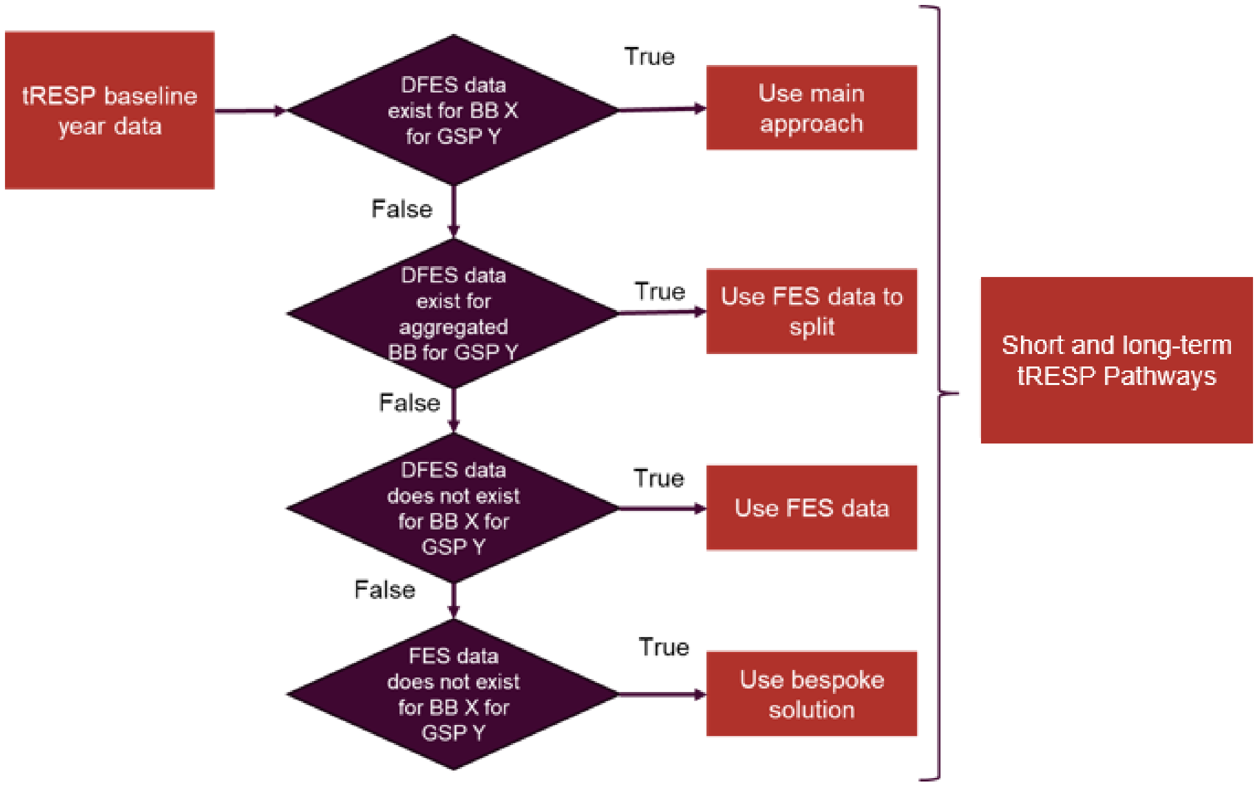

Figure 7: Overview of process to develop short and long-term pathways for each building block and GSP.

Main approach

1. Collect tRESP baseline year data.
2. Collect projections for building block X (bbX).
3. Create the tRESP short-term pathway for each GSP and each building block based on a transposed and scaled DNO projection. This should start at the tRESP baseline point while maintaining the original 2035 value, using the following:

$$tRESP_{gsp1,\,bbX,\,year_x} = DNO_{gsp1,bbX,year_x} \times Scaling\ \ factor + offset$$

with:

$$Scaling\ \ factor = \frac{DNO_{gsp1,\,bbX,2035} - tRESP_{gsp1,\,bbX,\,2025}}{DNO_{gsp1,\,bbX,2035} - DNO_{gsp1,bbX,2025}}$$

$$Offset = tRESP_{gsp1,\,bbX,\,2025} - \left(DNO_{gsp1,bbX,2025} \times Scaling\ factor\right)$$

4. Create the tRESP long-term pathways based on a transposed and scaled DNO projection for each GSP and each building block. This should start at the tRESP 2035 point while

maintaining the original DFES 2050 value, using the following equation, which provides an example of how the Hydrogen Evolution (HE) pathway is created:

$$tRESP_{gsp1,\,ev,\,year_x,\,HE} = DNO_{gsp1,ev,year_x,\,HE} \times Scaling\ \ factor + offset$$

with:

$$Scaling\ \ factor = \frac{DNO_{gsp1,\,ev,2050,\,HE} - tRESP_{gsp1,\,ev,\,2035,\,HT}}{DNO_{gsp1,\,ev,2050,\,HE} - DNO_{gsp1,ev,2035,\,HE}}$$

$$Offset = tRESP_{gsp1,\,ev,\,2035,\,HT} - \left(DNO_{gsp1,ev,2035,\,HE} \times Scaling\ factor\right)$$

5. In the case Steps 3 or 4 produces values that are higher than the DFES values despite the starting point being lower, the produced value will be replaced with the DFES values such as:

   If $tRESP_{2025,\,bb} < DFES_{2025,\,bb}$ and $tRESP_{year,\,bb} > DFES_{year,\,bb}$

   Then $tRESP_{year,\,bb} = DFES_{year,\,bb}$

   with the same process for the long-term pathways where the starting point is 2035.

6. In the case Step 3 produces a short-term pathway with values that are lower than the tRESP value at year 2025, despite DFES/FES values being higher than tRESP values, a linear interpolation is done between tRESP value in 2025 and DFES/FES value in 2035. Same process for the opposite scenario.

7. In the case Steps 3 or 4 are producing negative values for building blocks other than Srg_BB005 (V2G), which is defined as negative capacity in FES, a linear interpolation of the number between the start year and end year will be applied. For short-term pathways, this means that a linear interpolation will be done between the baseline year value and the 2035 value. For long-term pathways, the linear interpolation will be done between the 2035 value and the 2050 value.

8. In the case Step 4 produces values in 2050 for HT pathway higher than values in 2035 but at the same time values in 2050 for HE/EE pathways higher than values in 2035 (or the opposite scenario), the values for HE/EE pathways will be kept constant between 2035 and 2050, such as (example with HE pathway):

   If $tRESP_{2035,\,bb,\,GSP,\,HT} > tRESP_{2050,\,bb,\,GSP,\,HE}$ and $tRESP_{2035,\,bb,\,GSP,\,HT} < tRESP_{2050,\,bb,\,GSP,\,HT}$

   then $tRESP_{year,\,bb,\,GSP,\,HE} = tRESP_{year+1,\,bb,\,GSP,\,HE}$ for $year > 2035$

   and

   if $tRESP_{2035,\,bb,\,GSP,\,HT} < tRESP_{2050,\,bb,\,GSP,\,HE}$ and $tRESP_{2035,\,bb,\,GSP,\,HT} > tRESP_{2050,\,bb,\,GSP,\,HT}$

   then $tRESP_{year,\,bb,\,GSP,\,HE} = tRESP_{year+1,\,bb,\,GSP,\,HE}$ for $year > 2035$

Implications of the main approach for projection alignment to the tRESP baseline

It is noted that the approach to produce projections for the short-term pathway, as detailed in steps 3 and 4 above, matches the DNO's DFES projections for Holistic Transition in 2035 and 2050, as shown in Figure 8 for the period to 2035.

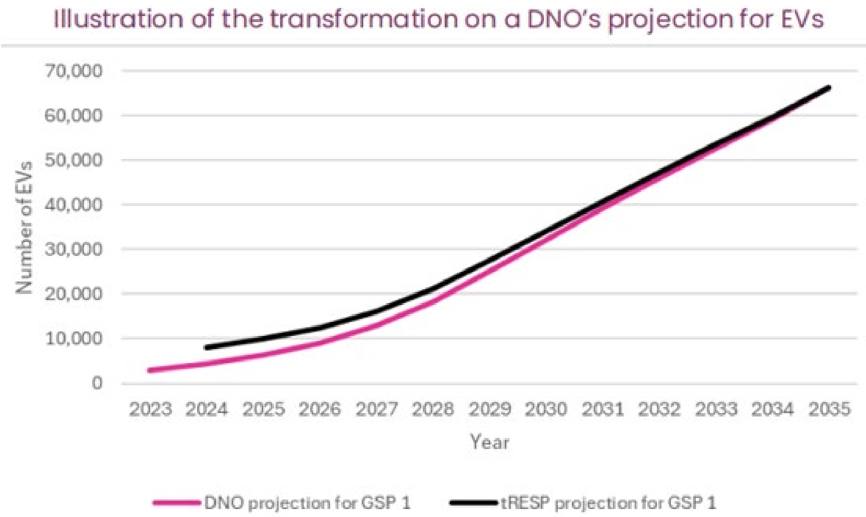

Figure 8: Transformation from a DNO projection to a re-baselined tRESP projection.

The projections for the short-term pathway for each GSP and building block may be further amended by the application of the alignment review framework and any consequential adjustments.

However, for the initial tRESP projections before the alignment review, consideration was given to matching growth rates or volumes or provided in the DNO DFES data (these options were described in Table 3 as Options 2 and 3). There are risks around incorrectly representing DFES projections by scaling a tRESP baseline with growth rates. For example, the DFES projections might be based on targets, such as the number of heat pumps by 2028 or the proportion of EV stock that is electrified. If a growth trend is derived from DFES and applied to a baseline that is different to the DFES baseline, then tRESP is not representing the DFES data in the way that it was modelled. Potential consequences are having more heat pumps than households or not aligning to the targets that drive the DFES modelling and therefore the overall projections become less credible.

The chosen approach in Option 3 of matching volumes in 2035 reflects that the DNOs possess detailed local information that FES does not have, and that this modelling and inputs are often based on volumes and projects. Consequently, the chosen approach is that the tRESP baseline does not have an impact beyond 2035. This tRESP baselining and projection approach is ideal to reflect the impact of connections project progress within 2024 up to the baseline date and realigning the projection for this, where the fundamentals of the analysis to 2035 are reasonable. Taking a percentage growth rate from DFES instead, particularly for technologies with initially small deployment volumes, leads to a material risk that 2024-2035 growth rates are distorted by the status of what projects were actually deployed by early 2025.

However, it is acknowledged that a difference between tRESP baseline and DFES baseline may not be just due to connections progress up to the baseline date. Other reasons for a baseline difference could be due to:

1. a different and more consistent understanding of baseline uptake across GB applied to each GSP. This may particularly be the case for technologies such as EVs and heat pumps, for example, a different understanding of the customers and stakeholders in the area served by a GSP.
2. a different understanding of the feeding area served by the GSP, which may particularly be the case where there have been or will be changes in network running arrangements, or GSPs shared between DNO licence areas. Such area differences were being assessed as part of the creation and review of the v2 draft pathways, including creating a metric to compare the NESO's and DNO's assumptions for area served by the GSP, and may highlight here the GSP feeding area definition needs to be updated.

On the second point, differences remain between the tRESP GSP area and DNO-defined GSP areas, beyond those which could be resolved by modifying the tRESP GSP areas or aggregating DNO-defined GSP areas to create tRESP GSP areas. As a result, a geographically-based mapping of DNO DFES input data was introduced in the forecast methodology for those building blocks where the baseline is defined geographically. This mapping was done by using ancillary data to define weighting factors (for example number of dwellings at LSOA level). This ensures that the projection data is rebased on an area equivalent to the tRESP GSP area, not higher or lower, giving more robust Pathways.

This is done by mapping the DFES values from DNO-defined GSP areas to tRESP GSP areas before applying the equations described in the Main approach section using the following equation:

$$DFES_{tRESP\_gsp,pathway,year} = \sum(DFES_{dno\_gsp,pathway,year} \times weight)$$

Where the $weight$ is a factor calculated based on number of dwellings in the tRESP GSP area.

The tRESP Pathways are defined by tRESP GSP area for the relevant building blocks in this approach, for example.:

- on a geographic basis for demand-related building blocks (all those with references starting Dem_ or LCT_), domestic batteries (Srg_BB002), micro-CHP plants (Gen_BB003), small solar installations (Gen_BB013) and V2G (Srg_BB005). They will be referred to as geographically-based
- on a nominal basis for all other generation and storage building blocks, which are all generation and storage, based on the GSPs in a DNO's ECR and DFES. They will be referred to as name-based building blocks.

Table 5 shows the mapping approach for each building block. The dwelling-based approach uses number of dwellings at Output Area level from the last census (England and Wales 2021/ Scotland 2022) to map the DFES data to tRESP GSP area and the name-based approach assigns the DFES data based on the name of the GSP. For the V2G (Srg_BB005), the mapping was based on FES 2025 GSP areas. Dwelling-based and FES-based are both geographically-based building blocks.

Table 5: Mapping used to map DFES projections for each building blocks to tRESP GSP areas

Building blocks ID	Weighting approach	Building blocks ID	Weighting approach
Lct_BB001	Dwelling-based	**Gen_BB007**	Name-based
Lct_BB002	Dwelling-based	**Gen_BB008**	Name-based
Lct_BB003	Dwelling-based	**Gen_BB009**	Name-based
Lct_BB004	Dwelling-based	**Gen_BB010**	Name-based
Lct_BB005	Dwelling-based	**Gen_BB011**	Name-based
Lct_BB006	Dwelling-based	**Gen_BB012**	Name-based
Lct_BB009	Dwelling-based	**Gen_BB013**	Name-based
Lct_BB014	Dwelling-based	**Gen_BB015**	Name-based
Lct_BB015_1	Dwelling-based	**Gen_BB016**	Name-based
Lct_BB015_2	Dwelling-based	**Gen_BB018**	Name-based
Dem_BB005_1	Dwelling-based	**Gen_BB019**	Name-based
Dem_BB005_2	Dwelling-based	**Gen_BB023**	Name-based
Gen_BB001	Name-based	**Srg_BB001**	Name-based
Gen_BB002	Name-based	**Srg_BB002**	Dwelling-based
Gen_BB003	Dwelling-based	**Srg_BB003**	Name-based
Gen_BB004	Name-based	**Srg_BB004**	Name-based
Gen_BB005	Name-based	**Srg_BB005**	FES-based
Gen_BB006	Name-based		

Use FES data to split DNO DFES data

For building blocks, where DFES trends only exist for an aggregate (sum) of multiple building blocks:

1. Determine which building blocks are covered by the DFES trend, for example, 'residential EVs' represents Lct_BB001+Lct_BB002.
2. Using FES 2025 building block data at a GB level (sum of all GSPs), determine the annual proportional split between the affected building blocks in Holistic Transition [2024-2050], Electric Engagement [2035-2050] and Hydrogen Evolution [2035-2050].
3. Apply these proportions to DFES data to split up and create 'updated DFES data' for Holistic Transition [2024-2050], Electric Engagement [2035-2050] and Hydrogen Evolution [2035-2050].
4. Feed the updated Holistic Transition [2024-2035] data into the short-term pathway methodology.
5. Store the updated Holistic Transition [2035-2050] Electric Engagement [2035-2050] and Hydrogen Evolution [2035-2050] for feeding into the long-term pathway methodology.

6. Apply the main approach to the data produced in Step 4 and 5.

Use FES data in absence of DNO DFES data

For building blocks where DFES trends don't exist, but FES data exists:

1. From FES 2025 BB data, gather data for each missing GSP from Holistic Transition [2025-2050], Electric Engagement [2035-2050] and Hydrogen Evolution [2035-2050] and use as 'updated DFES data'.
2. Feed the updated Holistic Transition [2025-2035] data into the short-term pathway methodology.
3. Store the updated Holistic Transition [2035-2050], Electric Engagement [2035-2050] and Hydrogen Evolution [2035-2050] for feeding into the long-term pathway methodology.
4. Apply the main approach to the data produced in Step 3.

The building blocks where this approach applies can vary between DNOs, depending on the scope of their DFES inputs.

Bespoke solution when neither DFES nor FES data exists

For building blocks where neither DFES trends nor FES data exist by GSP, a bespoke solution is required. The only building blocks where this is the case are residential and I&C AC.

For residential AC:

1. Use data from FES 2025 table ED1 table on Residential AC Demand (GWh) - assuming a constant demand per dwelling between 2024-2050.
2. Use the growth rate in demand and apply to the baseline year data from each GSP to project the increase in number of dwellings with AC installed.

For I&C AC:

1. For GSPs which are covered by the DFES from UK Power Networks (UKPN) and SP Electricity North West (ENW) use the main approach.
2. For other GSPs:

a) Calculate the values for each GSP for 2035 and 2050 based on baseline year using Table 6, which summarises the trends indicated by UKPN and SP ENW.

b) Interpolate linearly the data between 2024 and 2035 to create the short-term pathways.

c) Interpolate linearly the data between 2035 and 2050 to create the three long-term pathways.

Table 6: Increase in I&C AC consumption in 2035 and 2050 for the three pathways. The values in this table are average values between the DFES 2024 projections from UKPN and SP ENW.

I&C AC GWh scenarios	Growth rate for 2035	Growth rate for 2050
Holistic Transition	10%	16%
Electric Engagement	NA	48%
Hydrogen Evolution	NA	48%

Update of pathways at the end of 2025 to produce final tRESP Pathways

The description of the methodology so far describes the approach to generate the first version of the tRESP Pathways produced in July 2025 with no planned change in input data or methodology between July and October 2025, but an opportunity to address feedback points and data corrections for the October update. This section describes how the pathways will be further updated at the end of 2025 with new projection inputs requested from DNOs for the tRESP building blocks, and with the outcome of NESO's Gate 2 Connections Reform process implementing the UK Government's Clean Power 2030 Action Plan. This will generate the final update of the tRESP Pathways, which will then be subject to the alignment review and adjustments described in the next section on the Alignment Review Framework.

The data update at the end of 2025 has no planned impact on the pathways baseline but would impact the BB projections (the short-term and long-term pathways, primarily the short-term pathway).

Earlier in this document, DFES refers to the DNOs' last DFES based on 2024 inputs, which were published by DNOs at the end of 2024 or early 2025. This DFES would be a DNO's local interpretation of scenarios for its networks, informed by inputs such as FES 2024, local connections data and baseline from early 2024, and local plan inputs in 2024.

Since then, there have been material changes in the policy environment. This is particularly true for generation with:

a) the implementation of the UK Government's Clean Power 2030 Action Plan (initially indicated in April 2025[13] with data by transmission and distribution network region, with outcome implemented from GSP-level data from the latest Gate 2 Connections Reform Outcome from December 2025)

b) the change in the threshold for TIA from 1MW to 5MW in England and Wales announced in May 2025[14]

[13] Clean Power 2030 Action Plan – Connections Reform Annex Update

[14] Connection and Use of System Code (CUSC) CMP446: Increasing the lower threshold in England and Wales for Evaluation of Transmission Impact Assessment

c) the announcement in June 2025 that the Future Homes Standard for England was due to be published in the autumn and that building regulations will practically require almost all new homes to include rooftop solar[15].

In addition, it is noted that FES 2025 pathways aligned with Carbon Budgets suggests higher EV uptake and lower heat pump sales. Consequently, where DNOs could review their projections informed by FES 2025, changes in the volumes of these two building blocks would be expected. However, more generally it is recognised that in the absence of tRESP, DNOs would have used 2025 inputs to inform their ED3 business planning in 2026, particularly reflecting updates in connections data and local plans. Therefore, this will enable DNOs to provide updated projections (where they have more recent relevant local data) to inform the tRESP and ED3, in advance of their next DFES publication, which we expect will use the tRESP components.

The updated data from DNOs will not necessarily be a full DFES output; the equations set out earlier in this section about how to generate the projections will be used with this updated DNO dataset. However, there will be a change in approach for four generation building blocks listed in Table 7, where data is requested from DNOs subdivided by projects above or equal to 5MW and below 5MW, that is, the TIA threshold. For Scottish DNOs, this split should therefore be at 200 kW not 5MW. This applies for the following building blocks for batteries, solar and onshore wind. These are used only for alignment with UK Government's Clean Power 2030 Action Plan and are not published.

Table 7: Building blocks split by TIA threshold.

Technology	FES BB ID number	Technology detail
Storage	Srg_BB001	Batteries
Solar Generation	Gen_BB012	Large (G99)
Wind	Gen_BB015	Onshore Wind >=1 MW
Wind	Gen_BB016	Onshore Wind <1 MW

In these cases, the projection approach is applied separately below and above the TIA threshold, and the total result for the building blocks is the sum of those two components. Above the TIA threshold, data will be sourced from the outcome of NESO's Gate 2 Connection Reform Process. If DNOs do not provide this data by GSP, NESO will directly use the Gate 2 outcome and then extend to 2050 based on other sources such as FES 2025.

[15] DESNZ confirmed in the January 2026 "Warm Homes Plan" that it would lay regulations for the Future Homes Standard in Q1 2026. The Warm Homes Plan and Heat Network Zoning update were published after the tRESP Pathway numbers were finalised, so were not inputs, but the updated policy environment supports the credibility of the Pathways.

Alignment Review Framework

This section contains the approach for the Alignment Review Framework used to review the tRESP Pathways per GSP, including:

- trend validation: the approach for reviewing trends per GSP for EV and low carbon heating projections, the principles for assessing what constitutes a valid trend and the method for making any adjustments to ensure validation
- alignment against targets in the UK Government's Clean Power 2030 Action Plan: as they are implemented in the outcome of the Gate 2 Connections Reform Process.
- carbon Budget alignment: how we ensure that the pathways are aligned with the national carbon budgets.

NRC coherence will also confirm that the tRESP baseline and short-term pathways are consistent with the NRC.

The overall Alignment Review Framework is summarised in Figure 9. The Alignment Review Framework is applied to both the short- and long-term pathways.

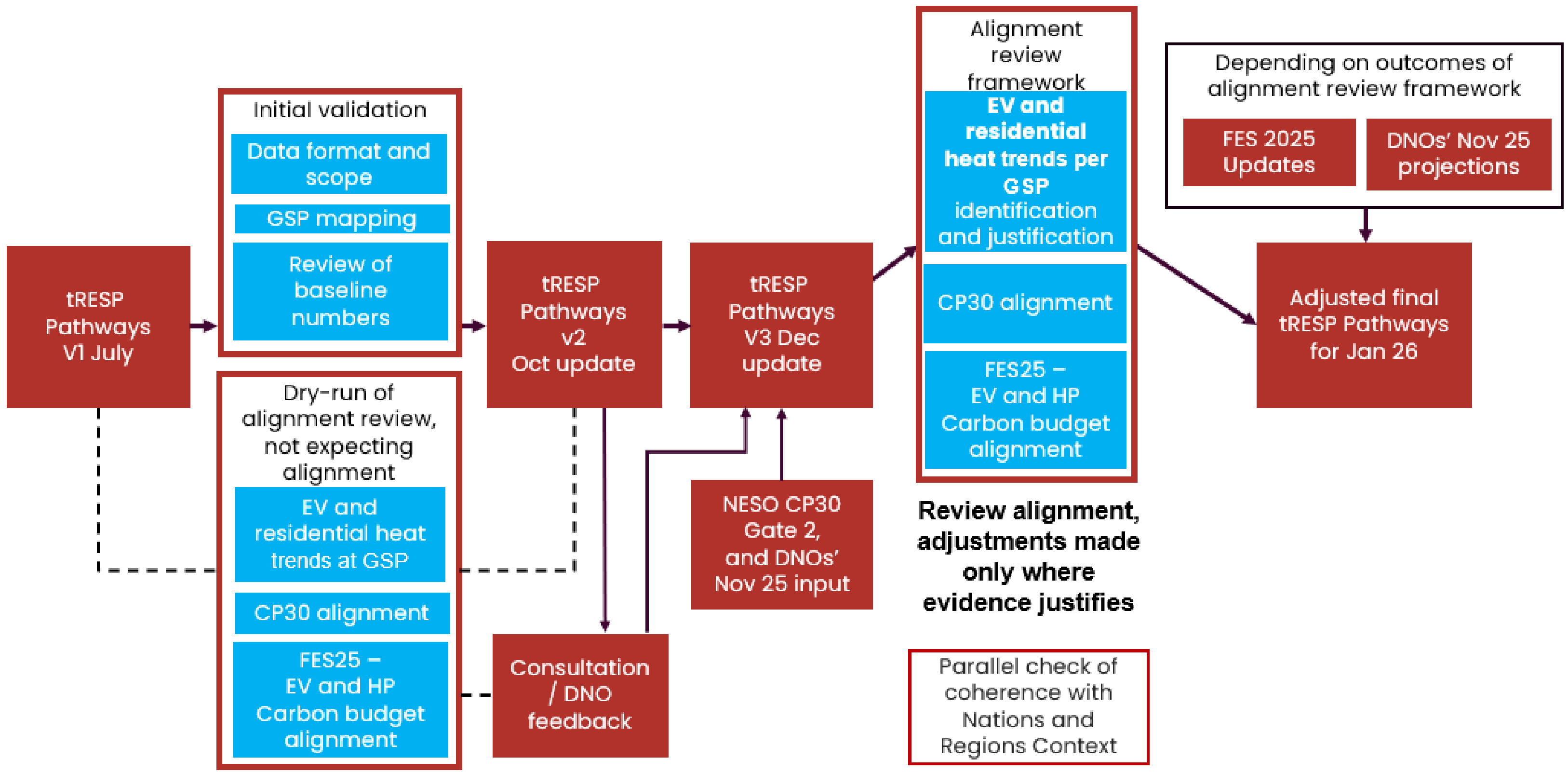

Figure 9: Alignment Review Framework applied to short- and long-term pathways with relevant timelines.

Initial validation checks were conducted on the draft tRESP Pathways produced in July with a focus on data format, correct application of the projection method, GSP mapping and baseline validation. A dry run of the Alignment Review Framework was also conducted, focused on the scope of the initial validation checks, to derisk the application in November. The focus of the dry-run was an internal operation, but the results were shared with DNOs. However, as data were updated later in the year and there was no initial expectation of alignment of the July 2025 draft pathways with the UK Government's Clean Power 2030 Action Plan and FES 2025, there were no adjustments made at this stage and minimal expectation of feedback on this from DNOs. The full Alignment Review Framework was applied in November/December. This provided the information to inform any adjustments and finalise the pathways for the end of January 2026.

The focus of the alignment review was validation of the short-term pathway to 2035 but there were also aspects affecting the long-term pathways to 2050 – both the starting point of the long-term pathways in 2035 and the trend, and Carbon Budget checks applied to the long-term pathways. Further details on the alignment review are shown in Figure 10 indicating how results were shared and reviewed with DNOs before final decisions made on the pathways. Alignment was reviewed, with adjustments only made to align where evidence justifies this. It was anticipated that there would be changes between the October 2025 and January 2026 pathways, due to the alignment review and resolving site-specific issues, and due to the data update for implementation of UK Government's Clean Power 2030 Action Plan in Gate 2 connections reform and additional DNO inputs in November 2025.

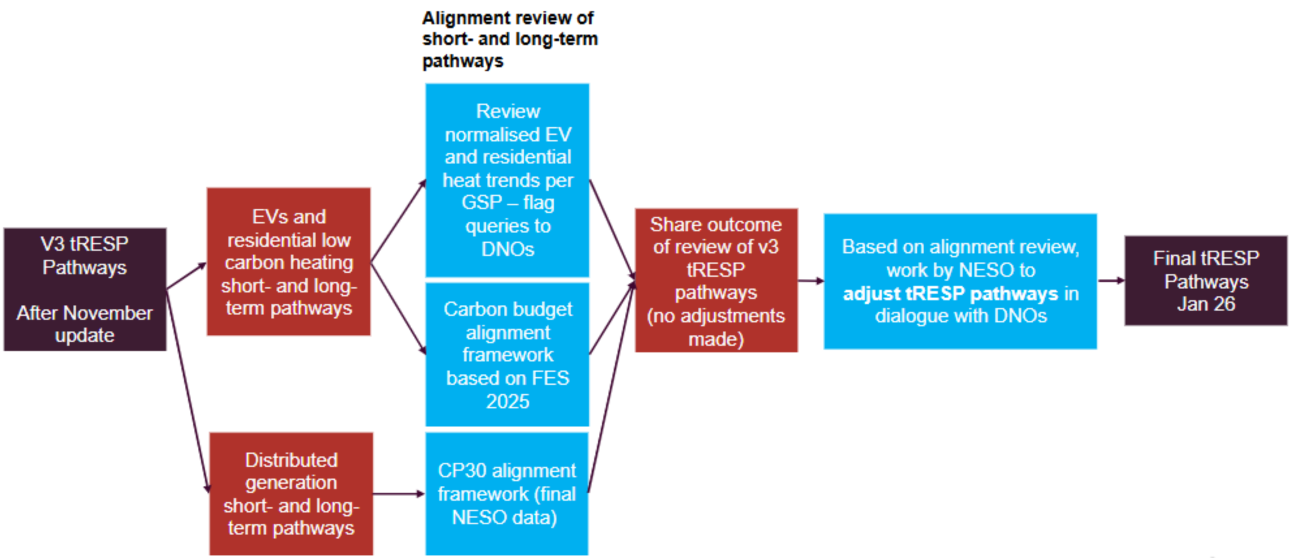

Figure 10: Detail of alignment review on the v3 short- and long-term pathways.

Trend validation: EV and residential low carbon heating projections

One part of the planned validation of the tRESP Pathways is a per-GSP review of the magnitude and shape (changes in uptake per year) of the short- and long-term pathways. This reviews similarities and differences between GSPs, to facilitate an informed discussion of the underlying reasons and whether any corrective adjustments to the DNO or NESO inputs or their application should be applied. There is no automatic adjustment made to any pathway based on this alignment review check.

Differences in the pathways will be primarily driven by the DNO inputs (DFES with 2024 inputs and then updated through the bilateral data share of projections in November 2025), and how they reflect local characteristics and local plans such as LAEPs in their scenarios, particularly Holistic Transition which will steer the short-term pathway. The validation will not review the detail of how and when local inputs have been reflected by DNOs in their scenarios, but inclusion of a local plan could be an explanation of a higher pathway.

Recognising the variation in the areas served by a GSP (both geographically and by population), this validation will be performed only for building blocks that can be made comparable by normalising based on the number of dwellings, using the domestic customer number projections provided by the DNO. Consequently, this check will be performed only for EVs and residential low carbon heating. Residential low carbon heating is defined as residential heat pumps (hybrid and non-hybrid) and district heating; it is noted that the FES building blocks definition of district heat networks is restricted to heat pumps and other low carbon technology, for example, FES excludes gas powered heat networks. DNOs aligned with this interpretation as part of the November update. There will be no trend alignment review for any other categories.

The normalised aggregated building blocks by number of dwellings covered by this framework include:

- aggregate pure EV: Sum of LCT_BB001 and LCT_BB003
- aggregate plug-in EV: Sum of LCT_BB002 and LCT_BB004
- aggregate residential low carbon heating: sum of LCT_BB005 and LCT_BB006 for domestic heat pump and LCT_BB009 for customers connected to heat networks using heat pumps.

Alignment review was performed initially as a dry-run on draft version (versions 1 and 2 in Figure 9) of the tRESP Pathways, which was based on the DNOs' DFES inputs from 2024 data, recognising that some trends will change in v3.1 of the tRESP Pathways and that adjustments will not be made at this stage.

Alignment review was then performed fully on the v3.1 of the tRESP Pathways, which includes the DNOs' updated projections received in November 2025.

Steps:

1. Send v3.1 of the tRESP short- and long-term pathways to DNOs.
2. Identify a list of GSPs to be reviewed - approximately 10 GSPs per DNO licence area, including those with the highest and lowest normalised uptake in 2035, the highest change rate between 2025 and 2035, the highest and lowest standard deviation and others allocated at random. Additional GSPs identified through data analysis may also be added to the list.
3. Share a set of identified GSPs to DNOs ahead of bilateral, with a review template. This template will be used by DNOs to record potential explanations for behaviours of GSPs, for example, network changes such as a new GSP or bulk supply point, local inputs (LAEP or equivalent, connections data or other inputs), error identified by DNO or NESO, variance linked to difference in FES v DFES baseline.
4. Engage with each DNO individually (in a bilateral) to understand the underlying reasons for the shape and magnitude of the short-term (2024-2035) and long-term (2035-2050) pathways to 2050 of each selected GSP. This discussion will be supported by the filled template.
5. Assess the 'validity' of the reasons. Outcomes will then be sent to DNOs to review. This step provides an opportunity for DNOs to provide updated profiles in case there is a disagreement.
6. If Step 5 is not conclusive and no data has been received from Step 7, the tRESP values for 2035 and 2050 will be replaced with the FES 2025 values. The values before and after 2035 will also be adjusted while keeping the shape of the tRESP profile if relevant and otherwise reverting to using the shape of the FES 2025 profile.

Carbon Budget review framework

For tRESP, we are checking the alignment between the tRESP Pathways and the UK Carbon Budget by comparing the uptake of the tRESP building blocks related to transport and low carbon heating.

As FES 2025 Holistic Transition and Electric Engagement pathways are aligned with the 5th, 6th and 7th Carbon Budgets, we will use them as a proxy to check alignment. We will check values for the short-term pathway specifically in relation to the middle of the 5th Carbon Budget (2028-2032) for the year 2030. With regards to the alignment of the long-term pathways, we will check alignment with the middle of the 6th Carbon Budget (2033-2037) for the year 2035 and of the 7th Carbon Budget (2038-2042) for the year 2040. Specifically, this is because FES 2025 is aligned with the 5th and 6th Carbon Budget, and with advice on the 7th UK Carbon Budget[14]. Therefore, its data will be used as a proxy for this alignment review check, reviewing 2030, 2035 and 2040 respectively. The building blocks covered by this framework include the building blocks covering road transport (LCT_BB001, LCT_BB002, LCT_BB003, LCT_BB004), heat pumps (LCT_BB005, LCT_BB006) and residential district heat supplied by heat pump (LCT_BB009).

Steps:

1. The analysis uses the v3 tRESP Pathways updated using 2025 DNO inputs (as described in Figure 7). Due to the different baseline dates between tRESP and FES 2025, we are using the tRESP Pathways values for 2031 (end of March 2031), to compare with FES 2025 values from 2030 (December 2030), tRESP 2036 against FES 2025 values from 2035 and tRESP 2041 against FES 2025 values from 2040.

2. Comparison of the number of units of each building block or group of building blocks at GB level between FES 2025 Holistic Transition or Electric Engagement and tRESP Holistic Transition or Electric Engagement for the years 2030/2031, 2035/2036 and 2040/2041. The tRESP Hydrogen Evolution pathway is not adjusted in this framework as the FES 2025 Hydrogen Evolution pathway is not aligned with the 5^{th}, 6^{th} and 7^{th} carbon budgets.

   For EVs, the comparison is done for each building block individually.

   For heating, the comparison is done against the aggregated numbers of domestic heat pumps together (Lct_BB005+Lct_BB006) and against the number of customers connected to heat networks supplied by heat pumps (LCT_BB009). The hybrid and non-hybrid domestic heat pumps are grouped together as they are assumed to have similar associated emissions and impacts on the distribution network (the rationale for treating hybrid and non-hybrid heat pumps similarly based on current data availability is provided in the tRESP CPA Methodology and Detailed Design[16]).

3. If FES 2025 numbers are above the tRESP Pathways numbers for a building block (or group of building blocks) at GB level, we compare values from FES 2025 and the tRESP Pathways at licence area level (unless a DNO group with has requested this to be applied at group level).

4. For licence areas where the FES 2025 numbers are above the tRESP Pathways numbers for a BB, we adjust the number of units between 2026-2031 for this BB for all the GSPs in that licence area proportionally such as:

   a. The sum of the GSP values in 2031 is equal to the licence area value from FES 2025 in 2030.

   b. The percentage increase of the initial tRESP values is the same between GSPs and is consistent through the years 2026 to 2031.

5. For licence areas where the FES 2025 numbers are above the tRESP Pathways numbers for a building block, we adjust the number of units between 2032-2036 for this building block for all the GSPs in that licence area proportionally such as:

   a. The sum of the GSP values in 2036 is equal to the licence area value from FES 2025 in 2035.

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[16] tRESP CPA Methodology and Detailed Design

   b. The percentage increase of the initial tRESP values is the same between GSPs and is consistent through the years 2032 to 2036.

6. For licence areas where the FES 2025 numbers are above the tRESP Holistic Transition/Electric Engagement Pathways numbers for a building block, we adjust the number of units between 2037-2041 for this building block for all the GSPs in that licence area proportionally such as:
   a. The sum of the GSP values in 2041 is equal to the licence area value from FES 2025 in 2040.
   b. The percentage increase of the initial tRESP values is the same between GSPs and is consistent through the years 2037 to 2041.
7. Additional tasks implemented after steps 4-6 included:
   a. For values that were not adjusted, the initial tRESP Pathways values are used and, where needed, interpolation of data was used to fill gaps. For example: if adjustment is done for the period 2026-2031 and 2036-2041, interpolation is used to fill gaps between 2032 and 2035.
   b. For building blocks excluding hybrid EVs (Lct_BB002 and Lct_BB004), no decreasing trend is expected because of the adjustment. The adjusted trend will be kept constant and will align with the original tRESP value when possible. Example: if adjustment is done to comply with the 5th Carbon Budget in 2031 for a specific BB and tRESP GSP, but the original tRESP value for 2032 is below the adjusted value in 2031, the adjusted tRESP value 2032 will be adjusted to match the adjusted tRESP value for 2031.
   c. For building blocks related to hybrid EVs (Lct_BB002 and Lct_BB004), the peak is happening around 2038 in the initial tRESP Pathways, and this is preserved in the adjusted tRESP Pathways.
   d. The adjusted tRESP values are rounded to the closest integer.
8. Note: The tasks listed in a, b and c could result in the adjustment of some building blocks to be higher than expected. This is due to some of the adjustments being carried forward - for example, alignment with the Carbon Budget in 2035 having impacts on the Short-term pathway and impacting the Electric Engagement and Hydrogen Evolution Pathways. A check of the adjusted tRESP values is done to ensure that the number of units for each building block does not exceed what is realistic and that the tRESP Pathway for Holistic Transition is below or equal to Electric Engagement.

Note that local inputs, including area energy plans, are not used to adjust the percentage increase per GSP to align with the carbon budgets in 2035 and 2042 as these are already reflected in the tRESP Pathways using the DNO projections.

Clean Power 2030 review framework

The UK Government's Clean Power 2030 Action Plan, published in April 2025, set national and regional capacity targets for batteries, solar and onshore wind across distribution and transmission zones in the Connections Reform Annex (UK Government Clean Power 2030 Action Plan[13]). The delivery of these targets is enabled through the application of Connections Reform (Connections Reform - Detailed Results Data[17]), which also sets required capacity for onshore wind, solar and batteries for each distribution and transmission zone for 2030 and 2035. Under the new process, projects are prioritised where they are aligned to national energy targets and are ready-to-build - such as those with planning permission or land rights. NESO has worked over the past two years with the UK, Scottish and Welsh governments, Ofgem, network companies and the energy industry to transform the connections process from the ground up. Around three thousand applications from projects wanting to connect have been assessed through the process.

For tRESP, we check the alignment between the tRESP Pathways and the implementation of the UK Government's Clean Power 2030 Action Plan, specifically for electricity generation and storage above the TIA size thresholds and adjust as necessary.

Firstly, it was noted that the DNOs' local interpretations of FES 2024 (in their late 2024 or early 2025 DFES publications) could not reflect the expected capacity for onshore wind, solar and battery storage from the UK Government's Clean Power 2030 Action Plan from April 2025, which was defined per licensed DNO area. As a result, in July 2025 we requested DNOs to update their views of their building block projections and share those in November 2025. We held targeted bilateral engagement and technical working groups to test and gather feedback on the availability of this data within the requested timescales.

The full details per site and per GSP from the Gate 2 Connections Reform process then became available in December 2025. There were differences between the detailed outcome of the Gate 2 Connections Reform process and UK Government's Clean Power 2030 Action Plan (abbreviated to CP30 in the steps listed in this section), but the connections outcome demonstrates the detailed implementation of the UK Government's Clean Power 2030 Action Plan.

It is understood that tRESP Pathways are directional pathways, and the remaining gap between CP30 and the Gate 2 Connections Reform process will need to be addressed through policies and incentives for 2035. The final outcome that the networks should be prepared to accommodate - to deliver the UK Government's Clean Power 2030 Action Plan - will be based on the combination of the December 2025 connections outcome represented in the tRESP Pathways, plus final adjustments based on the outcome of the forthcoming 2026 transmission connections. application window.

Although delivery of CP30 is largely defined by the December 2025 outcome, particularly for 2030, the 2026 application window will allow a process for new projects to fill gaps where any projects have withdrawn and other limited changes, update to include access for protected projects gaining consents (likely to be relevant for onshore wind in Scotland), and create a process to fill

[17] Connections Reform Detailed Results Data

the remaining gaps to deliver CP30 across GB. It is noted that during 2026, there will a further connections reform application window to enable limited changes and additions to generation, but the Pathways are aligned with the 5 December 2025 outcome and residual need at that point.

Dry run of alignment review prior to the Gate 2 outcome

Before the Gate 2 outcome was available, and to ensure a detailed alignment in December 2025, a dry-run of the adjustment process was done at GSP level in late autumn 2025, ensuring that GSP names and technology types could be matched between connections and Pathways data in advance of the outcome. As part of this review, it was confirmed that alignment would be checked for building blocks covering onshore wind, solar, battery storage (Gen_BB012, Gen_BB015, Srg_BB001) connected at the electricity distribution network. Adjustments for fossil-fuel and other renewable/low carbon dispatchable generation were done on Gen_BB006 and Gen_BB004.

We compared the capacity installed for onshore wind, solar and battery storage in CP30 compared to licensed area. Initially, we used data from Table 4 from the DESNZ Connections Reform Assessment from April 2025[13] per technology per DNO licence area.

We then matched our tRESP building blocks technology types and GSP definitions to calculate the expected volumes for these technologies for Phases 1 and 2 above the TIA threshold. We shared these tRESP building blocks technology types and GSP definitions (but not capacities) for validation with DNOs prior to queue formation.

Steps which followed after the Gate 2 Outcome in December 2025

1. Detailed information per GSP became available in December 2025, as an outcome of the Gate 2 Connections Reform process. Use of the queue formation output was a change in approach relative to the plan to use the Existing Agreement (EA) register, since that output did not include the outcome or phase information. The processed Gate 2 queue and the DNOs' submission on 21 November 2025 were compared for the relevant building blocks above the TIA threshold, using the building block categories, as part of the CP30 alignment review.
2. Specifically, we processed the outcome of the Gate 2 Connections Reform process based on the 5th December 2025 queue formation outputs shared by the NESO Connections Team with DNOs. The queue formation outputs indicated the export capacities (in MW) of solar, onshore wind, battery storage and fossil-fuel generation above TIA thresholds per GSP, indicating those which will be made offers enabling them to connect by 2030 (Phase 1) and 2035 (Phase 2). The revised connection dates were not given explicitly per year in the queue outcome. For both Phases 1 and 2, we utilised this and computed the Gate 2 capacity allocated per GSP, per DNO licence area and per technology type, that is capacity that would connect to the distribution level up to 2030 and up to 2035, respectively.
3. For both Phases 1 and 2, we have also utilised the DNOs' submission from November 2025 and compared the relevant building blocks above the TIA threshold to the Gate 2 outcome of step 2, as part of the CP30 alignment review. Wherever GSPs within England and Wales

remained at 1MW TIA threshold due to fault level issues[18], this has been taken into account in the relevant computations and comparisons.

4. For Phase 1 (2030) and following step 3, we did not make any further adjustment on top of the built capacity and Gate 2 outcome, for example, there has been no filling of additional capacity to meet the CP30 requirements per DNO group set in April 2025. The main reason for this has been the fact that as part of the Gate 2 queue formation, there was already a 'substitution and rebalancing' of the CP30 allocation between DNO groups and transmission up to 2030 as detailed in the 'Connections Reform: Detailed Results Data'[17]. This means that there will be no further revision of the Phase 1 queue to end 2030 in next year's Gate 2 process (unless a project drops out or is replaced).
5. For Phase 2 (2035), we have aligned the tRESP Pathways to the 2035 Gate 2 outcome from December 2025 as a starting point, but we requested additional DNO input on where additional onshore wind capacity should be allocated by 2035 per GSP, beyond the built capacity and Phases 1 and 2 of the December 2025 Gate 2 outcome. Steps 6 and 7 explain how additional onshore wind capacity and solar were considered.
6. The suggested level of additional onshore wind generation for each DNO group to contribute to CP30 Phase 2 requirement in 2035 has been computed after removing the built capacity and the Gate 2 outcome for onshore wind from both Phases 1 and 2 for both transmission and distribution, as shown on Figure 11. The reason we considered transmission-built capacity and pipeline was due to the fact that CP30 targets for onshore wind (and solar) for 2035 are amalgamated for transmission and distribution. The remaining requirement was computed equal to 5.7GW for England and Wales and no remaining needs were identified for onshore wind in Scotland. This figure is included in the published report: Connections Reform: Detailed Results Data. Projects from IDNOs have been included while computing the additional onshore wind generation requirements but the capacity of IDNO projects is not published as part of the tRESP Pathways which only reflect generation on DNO networks.
    a. The suggested levels of additional onshore wind generation for each DNO licence area have been based on distribution-connected generation meeting 1/3 of the gap for onshore wind, derived from FES 2025.
    b. Noting these levels were not an exact requirement for onshore wind per DNO group. DNOs may have suggested a higher or lower increase above the Gate 2 outcome for their licence area and the tRESP team ensured the increases in aggregate for 2035 alignment before implementation in the final tRESP Pathways did not exceed the total CP30 Phase 2 requirement on top of the built capacity and Gate 2 outcome for transmission and distribution.
7. The remaining solar requirement beyond built capacity and the CP30 Phases 1 and 2 outcome is estimated at 417MW across England and Wales and no remaining needs were

[18] Connections Reform Evidence Submission Handbook (page 13)

identified for solar in Scotland. This figure is included in the published report: 'Connections Reform: Detailed Results Data'. Projects from IDNOs have been included while computing the additional solar generation requirements but the capacity of IDNO projects is not published as part of the tRESP Pathways which only reflect generation on DNO networks. This capacity is expected to be covered by transmission and/or distribution projects in 2035, but only coming from T4, T5 and T10 zones, as shown in the map on Figure 11 for distribution and transmission zones.

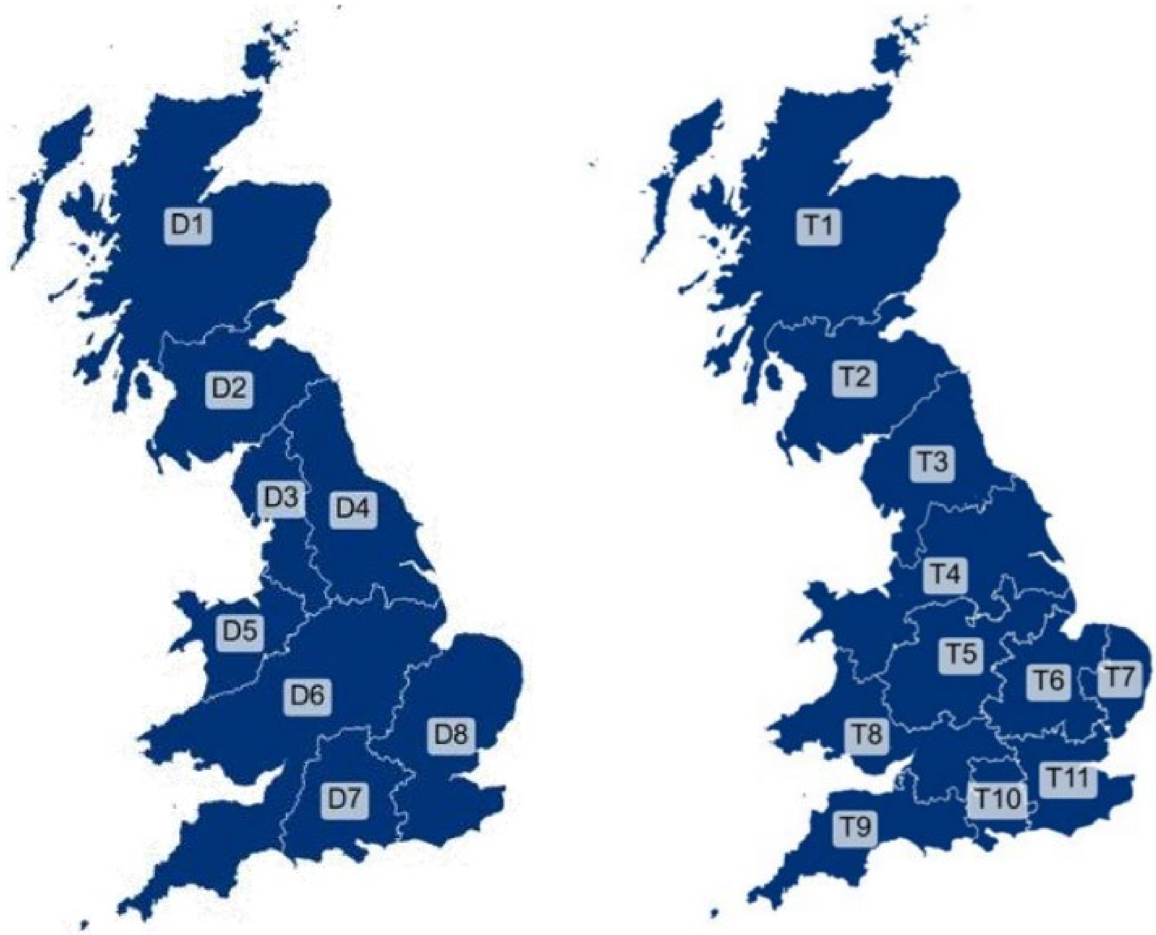

Figure 11: Distribution and transmission zones referenced in the Connections Reform outcome. Link: https://www.neso.energy/document/374936/download (page 6).

We chose not to allocate all or part of this solar capacity between relevant DNOs and across relevant GSPs in the aforementioned Tx zones for the tRESP Pathways – given the scale of it is not readily split and we would not have added any value to the tRESP Pathways and ED3 planning by trying to estimate that. The actual decision on allocation of the 417 MW capacity to distribution and transmission will be made in the next Gate 2 application windows in 2026. We note that there could be from 0 to 417 MW additional generation at distribution based on the 2026 outcome, alongside other small updates as projects drop in/out of the transmission queue.

8. Adjustments needed to the Gate 2 Connections Reform outcome for Phases 1 and 2 and any additional adjustment for onshore wind for Phase 2 only were made on years 2031 and 2036 for tRESP Pathways. This is because the Gate 2 Connections Reform outcome refers to the end of December 2030 and 2035, and the closest tRESP Pathways years are 2031 and 2036 that cover all the period to end of March 2031 and 2036, respectively.
9. No adjustment was needed for battery storage for Phase 2 (2036), as the existing built capacity and Gate 2 Connections Reform outcome from both Phases 1 and 2 at the distribution level were enough to meet the CP30 requirements in all DNO licence areas.
10. The pathways values before and after the years of 2031 and 2036 were also adjusted linearly to reflect adjustments from previous steps till 2050 (inclusive).
11. As part of the Gate 2 Connections Reform outcome and for both Phases 1 and 2, there were GSPs identified that were not part of the DNO submission in November 2025 and those have been allocated to an existing GSP within a DNO licence area, so that the CP30 alignment can be performed.
12. Within each DNO licence area, a low number of GSPs was observed with no successful Gate 2 Connections Reform projects in either Phases 1 and 2.
    a. For each one of these GSPs and for the relevant technology (solar, onshore wind or battery), it was assumed that the corresponding value for the whole capacity range in 2025 was propagating to 2050. This is because these GSPs did not have successful Gate 2 projects and therefore, no further deployment was assumed post 2025 for the above 5 MW capacity (and for the above 1 MW capacity, if a GSP had fault level issues and had a lower Transmission Impact Assessment threshold as a result). In addition, no particular decommissioning profile has been assumed for the existing capacity above 5 MW and DNOs could use their latest local knowledge to inform this.
    b. This is similar for the capacity below 5MW, where no change was assumed between 2025 and future projections and DNOs could use their latest local knowledge to inform this. This applied to a low number of identified GSPs.
    c. The only exception has been onshore wind for the capacity above 5 MW (and for the above 1 MW capacity, if a GSP had fault level issues). For this case, there have been certain GSPs, which were not part of the Gate 2 Outcome, but DNOs have provided additional capacity requirements, as advised by NESO, to enable the CP30 ambition for 2035 on top of the built capacity and Gate 2 outcome, as explained in detail in step 6.
    d. As per step 7, we note that there could be from 0 to 417 MW additional solar generation at distribution, based on the 2026 outcome, alongside other small updates as projects drop in/out of the transmission queue. These could be allocated both to GSPs that were part of the Gate 2 outcome but also to those that were not, similarly to step 12c above for onshore wind.

13. As part of the Gate 2 Connections Reform outcome, a few unbated gas, long-duration energy storage and low carbon dispatchable power technology projects have been selected per DNO licence area.
    a. For the capacity of unabated gas technologies, it has been ensured that the sum of the capacity for the relevant technologies (Gen_BB001, Gen_BB002, Gen_BB005, Gen_BB006, Gen_BB008, Gen_BB009) and GSPs in a DNO licence area is at least at the level of the Gate 2 outcome. This means that the Gate 2 outcome was used only as a minimum limit, but no other adjustments were made. Note that Gen_BB002 was removed from the checks for the non-Scottish licence areas, as this building block include non-renewable CHP plants capacity of at least less than 1 MW.
    b. Similarly, for low carbon dispatchable power, the aggregated sum of the capacity of building blocks Gen_BB004, Gen_BB007, Gen_BB010, Gen_BB011 and Gen_BB023 was used to compare with the Gate 2 outcome and the aggregated sum of Srg_BB003 and Srg_BB004 was used for long-duration energy storage. Technology projects with 'Other' category in the Gate 2 outcome were not considered in tRESP Pathways, as a direct comparison could not be made.
    c. Comparison of tRESP Pathways versus the Gate 2 outcome led to no adjustments in the tRESP Pathways for long-duration energy storage.
    d. Adjustments for unabated gas and other renewable/low carbon dispatchable generation were done on Gen_BB006 and Gen_BB004, respectively, but it is noted that adjustments could have been made on any of the relevant building blocks listed in steps a) and b).
    e. Similarly to step 10, values before and after the years of 2031 and 2036 were also adjusted linearly to reflect adjustments in tRESP Pathways till 2050 (inclusive).
14. Values for tRESP Pathways Electric Engagement and Hydrogen Evolution have been adjusted only post year 2035 with steps similar to those described above for solar, onshore wind, battery, fossil-fuel and other renewable/low carbon dispatchable generation.

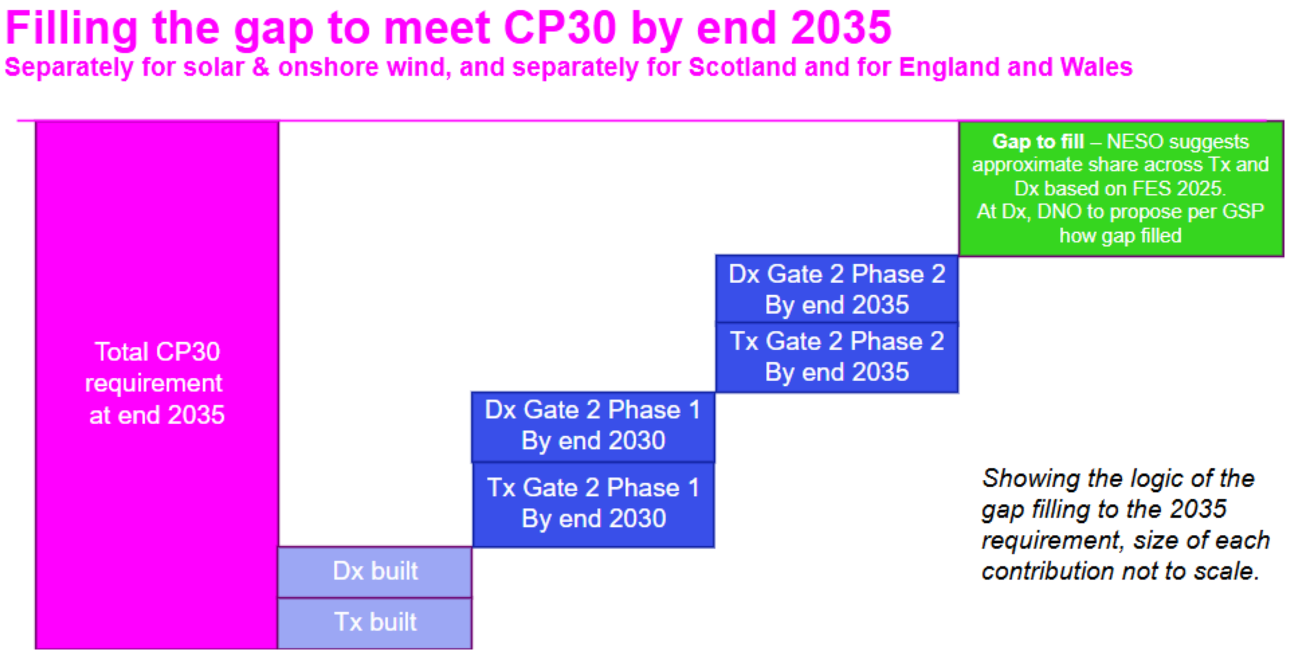

Figure 12: Filling CP30 requirements for 2035 on top of Phase 1 and Phase Gate 2 outcome and built capacity.

This figure indicates the generic approach to the alignment review and adjustments required to meet CP30, with steps 6 and 7 in the process above indicating how additional onshore wind and solar needs were identified.

Appendix 1: Glossary of Terms and Acronyms

Term / Acronym	Definition / Full Form
AC	Air Conditioning
BB/ BBs	Building Block(s)
BRE	Building Research Establishment
CB	Carbon Budget
CCGT	Combined Cycle Gas Turbine
CHP	Combined Heat and Power
CPA/CPAs	Consistent Planning Assumption(s)
CP30	UK Government's Clean Power 2030 Action Plan
DESNZ	Department for Energy Security and Net Zero
DFES	Distribution Future Energy Scenarios
DfT	Department for Transport
DNO/DNOs	Distribution Network Operator(s) - Any Electricity Distributor in whose electricity distribution licence the requirements of Section B of the standard conditions of that licence have effect (whether in whole or in part)
DZ	Data Zones (Scotland)
EA	Existing Agreement Register (outcome of NESO's generation connection reform)
ECR/ECRs	Embedded Capacity Register(s) (DNO generation data)
ED3	Electricity Distribution period three – the next electricity distribution price control, running from April 2028 to March 2033
Electric Engagement	One of the FES pathways to net zero
ENA	Energy Networks Association
EPC	Energy Performance Certificate
EV/EVs	Electric vehicle(s) - vehicles wholly driven by an electric motor that is wholly powered through a battery and does not produce any tailpipe emissions
FES	Future Energy Scenarios

GB	Great Britain
GDN/GDNs	Gas Distribution Network(s)
GSP/GSPs	Grid Supply Point(s) - interface between transmission and distribution
GWh	Gigawatt-hours
HGV/HGVs	Heavy Good Vehicles(s)
Holistic Transition	One of the FES pathways to net zero
Hydrogen Evolution	One of the FES pathways to net zero
I&C	Industrial and Commercial *for example, electricity demand*
IDNO/IDNOs	Independent Distribution Network Operator(s)
kWh	Kilowatt hour (unit of energy)
LAEP/LAEPs	Local Area Energy Plan(s)
LCT	Low Carbon Technology: LCTs is the collective term for the following technologies: • Heat pumps at existing connections that do not lead to a new or modified connection • Electric vehicle (EV) chargers, both slow and fast charging, at existing connections that do not lead to a new or modified connection • Photovoltaics (PV) connected under Engineering Recommendation G98 • Other renewable Distributed Generation (DG), excluding PV, connected under Engineering Recommendation G98 • Renewable DG not connected under Engineering Recommendation G98
LHEES	Local Heat and Energy Efficiency Strategy
LSOA	Lower layer Super Output Area (England and Wales)
MCS	Microgeneration Certification Scheme
MW	Megawatt
MWh	Megawatt-hours
NA	Not applicable
NESO	National Energy System Operator

NGED East Midlands	National Grid Electricity Distribution East Midlands
NGED South Wales	National Grid Electricity Distribution South Wales
NGED South West	National Grid Electricity Distribution South West
NGED West Midlands	National Grid Electricity Distribution West Midlands
NPg Northeast	Northern Powergrid Northeast
NPg Yorkshire	Northern Powergrid Yorkshire
OCGT	Open Cycle Gas Turbine
OFGEM	Office of Gas and Electricity Markets
ONS	Office for National Statistics
REPD	Renewable Energy Planning Database
RESP/RESPs	Regional Energy Strategic Plan
RFI	Request for Information
SEN	Strategic Energy Need
SEP	Strategic Energy Planning
SPEN ENW	Scottish Power Energy Networks Electricity North West
SPEN Manweb	Scottish Power Energy Networks Manweb
SPEN SPD	Scottish Power Energy Networks Scottish Power Distribution
SSEN SHEPD	Scottish and Southern Electricity Networks Scottish Hydro Electric Power Distribution
SSEN South	Scottish and Southern Electricity Networks South
Srg	Storage (in relation to building block list)
TIA	Transmission Impact Assessment
tRESP	Transitional Regional Energy Strategic Plan
V2G	Vehicle to Grid
UKPN Eastern	UK Power Networks Eastern
UKPN London	UK Power Networks London
UKPN South Eastern	UK Power Networks South Eastern

Appendix 2: Validating scale of the pathways baseline

Number of electric vehicles (EVs) in DFES and tRESP baseline

In this section, we are comparing the number of EVs (including plugin) between tRESP, DFES 2024 and the main source of data used by NESO and the stakeholders: the VEH0142 dataset published by DfT. The numbers of registered EVs (incl. plugin vehicles) in GB and its nations in Q1 of 2025 extracted from the VEH0142 data is shown in Table 8. This includes around 21k 'range extended vehicles' that are not included in the tRESP baseline. The VEH0142 data is used to derive the tRESP baseline numbers of the building blocks Lct_BB001-Lct_BB004 for 2025 (the VEH0145 data from DfT was used to spatially distribute commercial fleet but this does not have impact on the total numbers of vehicles at GB level).

Table 8: Summary of VEH0142 showing number of EVs for different geographies.

ONS Geography	2025 Q1
Great Britain	2,231,765
England	2,046,540
Wales	52,476
Scotland	132,348

Table 9 shows the results obtained by building blocks and compare it with the values from DFES 2024 for the baseline (year 2024) and for the projected data of 2025. The difference between the number of vehicles in GB in tRESP (2,162,894) and DfT (2,231,765) is explained by the fact that we have excluded ~21k range extended vehicles and ~6k vehicles that were not assigned a location. In DFES 2024, there are more EVs than shown in the DfT data suggesting that some DNOs have augmented the DfT data with other datasets, or that the use of inconsistent methodologies for the distribution of commercial fleet vehicles across DNOs is producing issues when aggregating numbers at GB level.

Table 9: Comparison of EVs baseline values between DFES 2024 and tRESP

		DFES 2024 - HT		tRESP - HT
Building block ID	Building block description	Baseline 2024	Projection 2025	Baseline 2025
Lct_BB001	Pure Electric (vans, cars and motorbikes) (number)	1,622,961	2,378,977	1,454,546
Lct_BB002	Plug-in-hybrid (vans, cars and motorbikes) (number)	694,605	837,537	701,217
Lct_BB003	Pure Electric (buses, coaches and HGV) (number)	35,371	47,949	7,123
Lct_BB004	Plug-in-hybrid (buses, coaches and HGVs)	0	0	9
Total		**2,371,312**	**2,352,937**	**2,162,8945**

Number of domestic heat pumps in DFES and tRESP baseline

To estimate the number of domestic heat pumps in GB for tRESP, we have been looking at several data sources. Table 10 shows the number of heat pumps in five data sources which ranges from 155k to 325k informing our approach described in the Section "Methodology for Baseline (Year 0 at 31 March 2025)" The difference in numbers between these data sources shows the uncertainty surrounding the actual number of units installed. In tRESP, we went for an optimistic approach which combined data from MCS and EPC. It resulted in a total number of heat pumps in our baseline year of 324,285 as shown in Table 11.

Table 10: Comparison of number of heat pumps in different sources of data

Data sources	Heat pump deployment statistics published by DESNZ	ONS Census data	EPC	Heat pump association	MCS
Total number (as of March 2025)	GB: 155k	England and Wales (March 2021): 98k Scotland (March 2022): 28k	299k	GB/UK: 325k (sales between 2019 and 2024)	268k

Table 11: Comparison of domestic heat pumps baseline values from the November 2025 data from DNOs and the tRESP Pathways values for 2025

		DNO November 2025 Data	tRESP – HT
Building block ID	**Building block description**	**Baseline 2025**	**Baseline 2025**
Lct_BB005	Domestic heat pumps - Non-hybrid (number)	415,377	306,174
Lct_BB006	Domestic heat pumps – Hybrid (number)	9,540	18,003
Total		424,917	324,177

Further analysis was done to look at the distribution of heat pumps at licence area level.

Table 12 shows the distribution of heat pumps at licence area level in the tRESP Pathways for the year 2025 (baseline) in comparison to MCS data (in the period May 2022-March 2025) and the aggregated census data from England and Wales from March 2021 and Scotland from March 2022. UKPN Eastern, SSEN South and NGED South West are the licence areas with the highest number of heat pumps installed according to this data.

Table 12: Number of domestic heat pumps (non-hybrid and hybrid) in the tRESP Pathways for the starting year (2025)

DNO licence area	Census 2021/2022	MCS (May 2022 to March 2025)	tRESP Pathways
SP ENW	4,906	8,049	15,163
NGED East Midlands	10,556	11,317	29,491
NGED South Wales	3,774	8,139	13,778
NGED South West	12,435	11,423	33,930
NGED West Midlands	8,029	8,712	21,862
NPg Northeast	5,147	5,767	13,376
NPg Yorkshire	6,281	8,810	16,708
SSEN SHEPD	17,833	9,584	22,498
SPEN Manweb	4,724	11,356	18,524
SPEN SPD	10,053	9,186	17,154
SSEN South	13,284	13,477	37,895
UKPN Eastern	18,962	15,177	50,002
UKPN London	4,551	2,458	16,325
UKPN South Eastern	6,090	6,776	17,471
Total	**126,624**	**130,231**	**324,177**

Figure 13 shows the distribution of heat pumps from Table 11 at licence area level. Overall, the distribution in the three datasets is consistent. The most significant differences are observed in the SSEN SHEPD licence area which shows higher level of heat pumps proportionally compared to tRESP (EPC) and MCS.

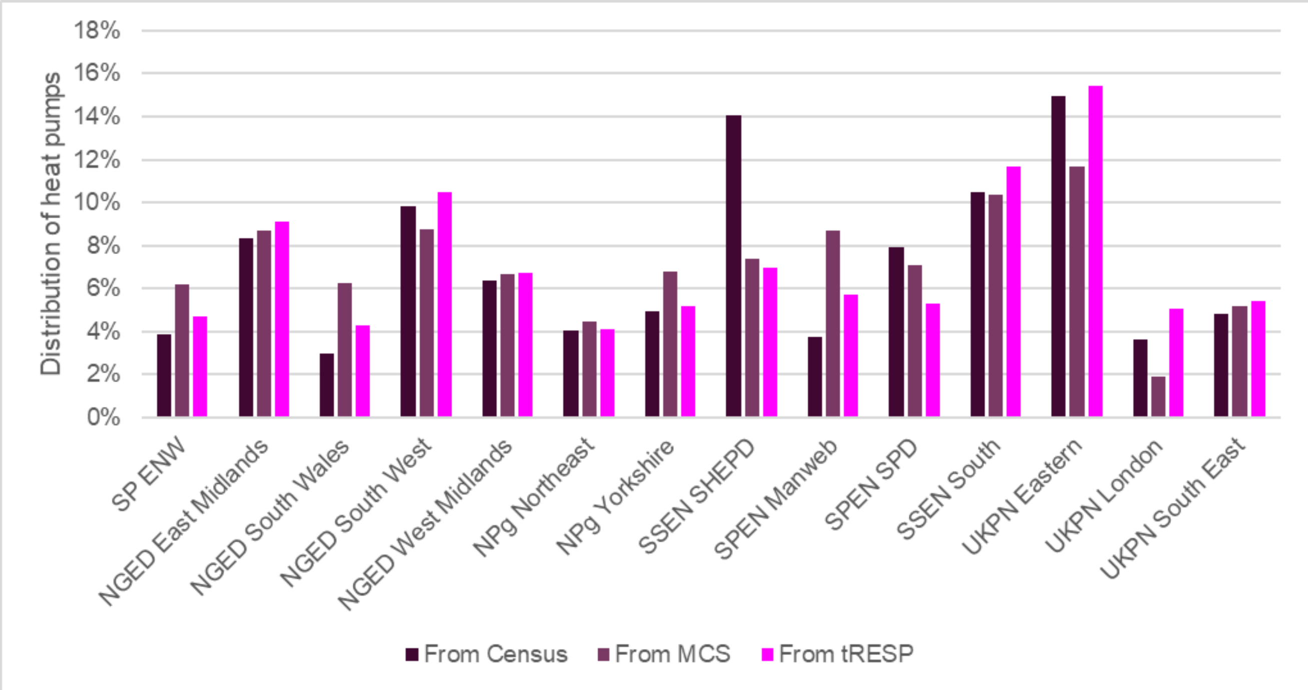

Figure 13: Distribution of domestic heat-pumps per licence area in census data 2021/2022, tRESP Pathways 2025 and MCS data (between May 2022 and March 2025).

Baseline comparison of generation and storage building blocks

To estimate the baseline generation and storage capacity in GB for tRESP at 31 March 2025, we have looked at several data sources. For large installations, the ECR from DNOs have been mainly used. For small generation and storage, Microgeneration Certification Schemes have been used. Sheffield Solar data was primarily used for solar installations below 1MW, noting the Sheffield Solar data is more comprehensive relative to the ECR datasets for small installations.

Differences observed are due to differences in the input data sources used, such as NESO using the external DNO ECRs as at August 2025 versus DNOs using internal enhanced DNO ECRs reflecting low carbon technology uptake for supply generation and storage, which may have had further updates. We are aware of continuous data quality improvements in these registers, and it is noted that we used an August 2025 snapshot of these registers to estimate the baseline numbers up to the end of March 2025. These differences may have reflected decommissioning of some projects and changes in the technology type. Lastly, projects categorised as 'Other' in the ECRs have not been included in the tRESP Pathways.

There have sometimes been changes in categorisation of generation, such as in Gen_BB008 and Gen_BB009, such as changes in the categorisation and mapping of the thermal technology types observed in the ECRs. When summing the two technologies above together (Gen_BB008 and Gen_BB009), the differences are small between DFES /tRESP Pathways. Similarly to above, we are aware of continuous data quality improvements in these registers, and it is noted again that we used an August 2025 snapshot of these registers to estimate the baseline numbers up to the end of March 2025. The DFES numbers shown in Table 13 are as of those submitted in November 2025 and may have used a later than August 2025 snapshot of these registers (from within Autumn 2025 but varying per DNO) to estimate the baseline at the end of March 2025.

Table 13: DFES/tRESP Pathways comparison between DNOs' November 2025 submission and tRESP Pathways baseline, both representing 31 March 2025.

Baseline 2025 Comparison			
Building Block ID	**Description**	**DFES Nov. 2025 (MW)**	**tRESP – HT (MW)**
Gen_BB001	Non-renewable CHP >= 1MW	2,435	2,075
Gen_BB002	Non-renewable CHP < 1MW	106	20
Gen_BB003	Micro CHP (Domestic (G98/G83) including gas)	0	256
Gen_BB004	Renewable Engines (Landfill Gas, Sewage Gas, Biogas)	1,584	1,480
Gen_BB005	Non-renewable Engines (Diesel) (non CHP)	2,072	1,489
Gen_BB006	Non-renewable Engines (Gas) (non CHP)	3,137	2,634
Gen_BB007	Fuel Cells	0	0
Gen_BB008	OCGTs (non CHP)	3,610	937
Gen_BB009	CCGTs (non CHP)	1,057	2,318
Gen_BB010	Biomass and Energy Crops (including CHP)	1,417	1,357
Gen_BB011	Waste Incineration (including CHP)	2,285	1,899
Gen_BB012	Solar Generation (Large G99 >= 10 kW)	10,873	12,778
Gen_BB013	Solar Generation (Small G98/G83 < 10 kW)	5,714	5,261

Gen_BB015	Onshore wind >= 1MW	8,100	7,841
Gen_BB016	Onshore wind < 1MW	402	402
Gen_BB018	Hydro	1,118	839
Gen_BB019	Geothermal	4	18
Gen_BB023	Hydrogen	0	4
Srg_BB001	Batteries (Non-domestic)	4,569	4,354
Srg_BB002	Domestic Batteries (G98)	464	178
Srg_BB003	Pumped Hydro	140	138
Srg_BB004	Other	9	8
Srg_BB005	Vehicle-to-Grid	-52	-68

Appendix 3: Alignment review outcome

Trend validation of EV and low carbon heat - application

The v3.1 tRESP Pathways for EV and residential low carbon heat were reviewed as described in earlier in this methodology. The results were shared with DNOs, and each DNO group was asked to comment on five to six tRESP GSP areas with different behaviours (such as, high uptake, low uptake and so on). It was anticipated that there would be diversity in trends between GSP areas due to local characteristics, and different modelling approach by DNOs for their DFESs. The position was that where a DNO was able to explain and confirm a difference, no modification would be made to the trend.

All DNOs were able to respond with comments on all the GSP areas requested. Reasons for differences included very urban and very rural customer mixes, inputs from local customer and stakeholder plans (particularly in the case of district heat) and sometimes where the area was atypical as it was developed from a previously industrial area. In one case, the analysis highlighted a modelling error with reflection on LAEP inputs, and updated data was provided by the DNO and incorporated in the final tRESP Pathways.

Carbon Budget review - application

The result of applying the Carbon Budget (CB) alignment and adjustments is summarised in Table 14. The building blocks that are not requiring adjustment were not included. The building block with the highest adjustment (10.5% to align with CB 2030 and 36.4/41.4% to align with CB

2040 for EE/HT) is Lct_BB009 referring to the number of customers connected to heat networks supplied by heat pumps. The adjustment of the other building blocks was minimal, ranging from 0.13% to 5.07%.

Table 14: Carbon Budget adjustments applied in final tRESP Pathways

	Building block ID	Description	Pathway	tRESP value v3.2	FES 2025 value	FES 2025 above tRESP	Adjustment to give final tRESP value in v4
CB 2030	**Lct_BB002**	**Small hybrid EVs**	**Short-term**	**1,734,652**	**1,822,571**	**True**	**5.07%**
	Lct_BB009	**Domestic cust. on heat network with heat pump**	**Short-term**	**432,653**	**478,096**	**True**	**10.50%**
CB 2035	Lct_BB005 + Lct_BB006	Dwellings with heat pump	Long-term EE	7,942,298	7,973,753	True	0.40%
	Lct_BB005 + Lct_BB006	**Dwellings with heat pump**	**Long-term HT**	**8,101,357**	**8,111,824**	**True**	**0.13%**
CB 2040	Lct_BB001	Small pure EVs	Long-term EE	36,011,616	36,544,650	True	1.48%
	Lct_BB005 + Lct_BB006	Dwellings with heat pump	Long-term EE	13,868,604	14,035,926	True	1.21%
	Lct_BB009	Domestic cust. on heat network with heat pump	Long-term EE	2,536,780	3,460,001	True	36.39%
	Lct_BB001	**Small pure EVs**	**Long-term HT**	**35286875**	**36,525,272**	**True**	**3.51%**
	Lct_BB009	**Domestic cust. on heat network with heat pump**	**Long-term HT**	**2,786,706**	**3,940,632**	**True**	**41.41%**

Clean Power 2030 review - application

This section summarises the results and adjustments of applying the CP30 alignment approach, as set out earlier in this document. Adjustments were made on years 2031 and 2036, respectively, for tRESP Pathways to align to the Gate 2 Connections Reform outcome, as the outcome refers to end of December 2030 and 2035 and the closest tRESP Pathway years are 2031 and 2036 that cover all the period to end of March 2031 and 2036 respectively.

There is 59.7 GW of combined generation and storage in the tRESP Pathways by end of March 2036 based on the December 2025 Gate 2 queue, implemented per GSP.

The tRESP Pathways have been adjusted from values based on the initial estimate before the connections reform outcome was known. This was an adjustment down in aggregate for years 2031 and 2036, as shown in Table 15 and Table 16, with the only exception being battery storage for 2036 where there was positive adjustment. There has also been a 1.6 GW requested addition (based on DNO input) for where additional onshore wind capacity should be allocated by 2035 per GSP, beyond the built capacity and Phases 1 and 2 of the December 2025 Gate 2 outcome. All adjustments have been implemented per GSP for the relevant technology type and year.

It is noted that the changes driven from Phase 1 of the Gate 2 outcome can connect anytime from now to 2031 and then, from Phase 2 of the Gate 2 outcome from 2032 to 2036. We have used a smoothed assumed profile for the period of 2032 to 2035 (but not up to 2031) and we acknowledge though that actual deployment will be shaped according to the years included in the transmission connections offers made during 2026. The Gate 2 outcome does not include year of connection, only the requirement by the end of 2030 and 2035.

Table 15: Adjustments applied to the v3.2 tRESP Pathways to deliver CP30 alignment in final Pathways for 2031

Adjustments for 2031					
Building Block ID	**Description**	**Pathway**	**Pre-adjustment tRESP Value (MW) in v3.2**	**After CP30 adjustment tRESP value (MW) in final tRESP v4**	**Adjustment to give final tRESP value in v4**
Gen_BB012	Solar Generation (Large G99 >=10 kW)	Short-term	39,589	30,998	-27.7%
Gen_BB015	Onshore wind >= 1MW	Short-term	14,028	11,288	-24.3%
Srg_BB001	Storage (Non-domestic)	Short-term	28,100	17,119	-64.1%

Table 16: Adjustments applied to the v3.2 tRESP Pathways to deliver CP30 alignment in final Pathways for 2036

Adjustments for 2036					
Building Block ID	**Description**	**Pathway**	**Pre-adjustment tRESP Value (MW) in v3.2**	**After CP30 adjustment tRESP value (MW) in final tRESP v4**	**Adjustment to give final tRESP value in v4**
Gen_BB012	Solar Generation (Large G99 >= 10 kW)	Long-term HT	53,384	47,682	-12%
Gen_BB015	Onshore wind >= 1MW	Long-term HT	16,318	15,264	-6.9%
Srg_BB001	Storage (Non-domestic)	Long-term HT	30,896	35,309	12.5%
Gen_BB012	Solar Generation (Large G99 >= 10 kW)	Long-term EE	52,732	47,047	-12.1%
Gen_BB015	Onshore wind >= 1MW	Long-term EE	16,401	15,319	-7.1%
Srg_BB001	Storage (Non-domestic)	Long-term EE	31,279	35,598	12.1%
Gen_BB012	Solar Generation (Large G99 >= 10 kW)	Long-term HE	52,686	47,006	-12.1%
Gen_BB015	Onshore wind >= 1MW	Long-term HE	16,124	15,135	-6.5%
Srg_BB001	Storage (Non-domestic)	Long-term HE	31,019	35,409	12.4%

Appendix 4: User guidance to DNOs on use of tRESP Pathways

Scope

This tRESP Pathways user guidance:

- sets out the approach for DNOs to use the tRESP Pathways when developing their forecasts to inform their network investment plans for their ED3 business plan submissions to Ofgem
- is presented as an appendix to the tRESP Pathways Methodology and Detailed Design.

Disaggregation to other voltage levels and to specific network assets

As indicated earlier in the methodology, the tRESP Pathways are defined and produced per tRESP GSP area by one of two methods:

- on a geographic basis for demand-related (all those with references starting Dem_ or LCT_), domestic batteries (Srg_BB002), micro-CHP plants (Gen_BB003), V2G (Srg_BB005) and small solar installations (Gen_BB013). They will be referred to as geographically-based building blocks.
- on a nominal basis for all other generation and storage, which are all generation and storage, based on the GSPs in a DNO's ECR and DFES. They will be referred to as name-based building blocks.

These two methods are aligned with the way the DFES projections for each were mapped to the tRESP GSP area. Table 5 showed the mapping approach for each building block.

In both geographic and name-based cases, it is expected that in order for the DNO to reflect tRESP Pathways in network planning for ED3, that DNOs will need to translate and disaggregate the technology volumes in the tRESP Pathways to their distribution network assets, consistently, with their prevailing interpretation of network topology and feeding areas in normal network running arrangements.

This section provides high-level guidance, principles and recommendation for the approach by DNOs to disaggregate Pathway outputs from tRESP GSPs to downstream network assets (substations and feeders) which should depend on whether a building block is geographically-based or nominally-based. Adhering to this high-level guidance, a DNO should set its own approach to detailed redistribution and disaggregation of the Pathways based on its modelling methodology and NESO does not intend to prescribe this.

This guidance does not address if or how alignment with these principles or the adequacy of the disaggregation approach will be verified. Ofgem's business plan guidance for ED3 will set out what information DNOs should share as part of their business plan submissions.

Translation and disaggregation principles:

- The detailed methodology of their translation and disaggregation approach should be clearly documented by each DNO.

- For all building blocks apart from EVs (Lct_BB001-4), demand and generation are assumed to be stationary, meaning the location of the demand is fixed to the location of the technology.
- For EVs, demand is not stationary as vehicles move around and charge at different locations. The demand is correlated to the charging distribution rather than EV registration addresses. Therefore, a clear distinction between EV vehicle numbers and EV demand is necessary. Further information and guidance on modelling EVs and their demand can be found in the tRESP CPA Methodology and Detailed Design[16].
- Building block volumes at GSP resolution are expected to be reflected at downstream network assets within that GSP, consistent with normal network running arrangements. The lowest voltage level that should reflect these volumes depends on the technology. For example, while domestic, workplace, and some public charging would be reflected at the secondary substation level, public rapid charging might connect directly to higher voltages and only be reflected at the primary level.
- Similarly, demand or generation in MW or MWh per building block at GSP resolution is expected to be reflected at downstream primary and secondary substations and other distribution assets, with appropriate consideration for lowest voltage level, different peak times between network assets, and the impact of demand diversity.
- For name-based building blocks, volumes should be reflected at the point of connection as per the ECR (where available), and any upstream network assets up to the GSP. For example, if a generator connects at a Primary, this should be reflected at that Primary and all upstream assets, but not downstream ones.
- Disaggregation of building blocks to downstream substations is expected to consider supplied areas to guarantee that the allocation of technologies to specific locations covered by network assets remains appropriate. For example, disaggregation of heat pumps should consider the number of households connected to each network asset, and there should be checks in place to ensure that heat pump numbers do not exceed the forecasted household numbers in each year.
- Additional detail can be incorporated into the disaggregation approach by, for example, assessing the suitability and likelihood of different building types to adopt heat pumps. The outcomes of this analysis can be used to allocate heat pump numbers to more appropriate building types.

Interpretation of tRESP GSP areas

In relation to the precise definition of the tRESP GSP areas, NESO expects that DNOs will allocate the technology volumes in the tRESP Pathways to its distribution network assets, such as at the GSP and, more importantly, below a GSP, based on the network topology and the areas and customers it considers to be served by each distribution network asset.

For geographically-based building blocks, DNOs should translate Pathway volumes to its distribution network assets, taking account of the following aspects:

- **The tRESP volumes should be treated as a total within the geographic region**, which NESO has provided as geospatial features, *not* as the total volume which would be connected to the corresponding GSP (or GSPs) under prevailing running arrangements given the best information available to the DNO. Based on the comparison of the latest DNO-provided electricity supply areas for GSPs and the tRESP GSP areas for the corresponding GSPs, we expect that these volumes will be materially different in some instances but not all.
- **The DNO should reflect the network topology and area served per network asset in normal network operation that the DNO uses for its other licence condition reporting to Ofgem in 2026** (noting that this may be updated and defined for additional assets relative to the GSP feeding area shapefiles shared with NESO with the DNO's November 2025 input to the tRESP Pathways).
- **The DNO should consider areas and customers served by embedded IDNO networks**, both in the baseline year and in future.

For name-based building blocks, translation of the Pathway to its distribution network assets for use in its network planning should take account of:

- any changes in network topology the DNO uses in its other licence condition reporting in 2026, relative to the GSP assigned in the ECR and Gate 2 Connections Reform outputs exchanged with NESO in Q4 2025.

Recommended approach

Guided by the translation and disaggregation principles listed previously, NESO has set out a recommended approach for the disaggregation of the tRESP Pathways to network assets downstream of a GSP. As illustrated in Figure 14, this approach follows two paths depending on if it is being applied to a geographically or a name-based BB.

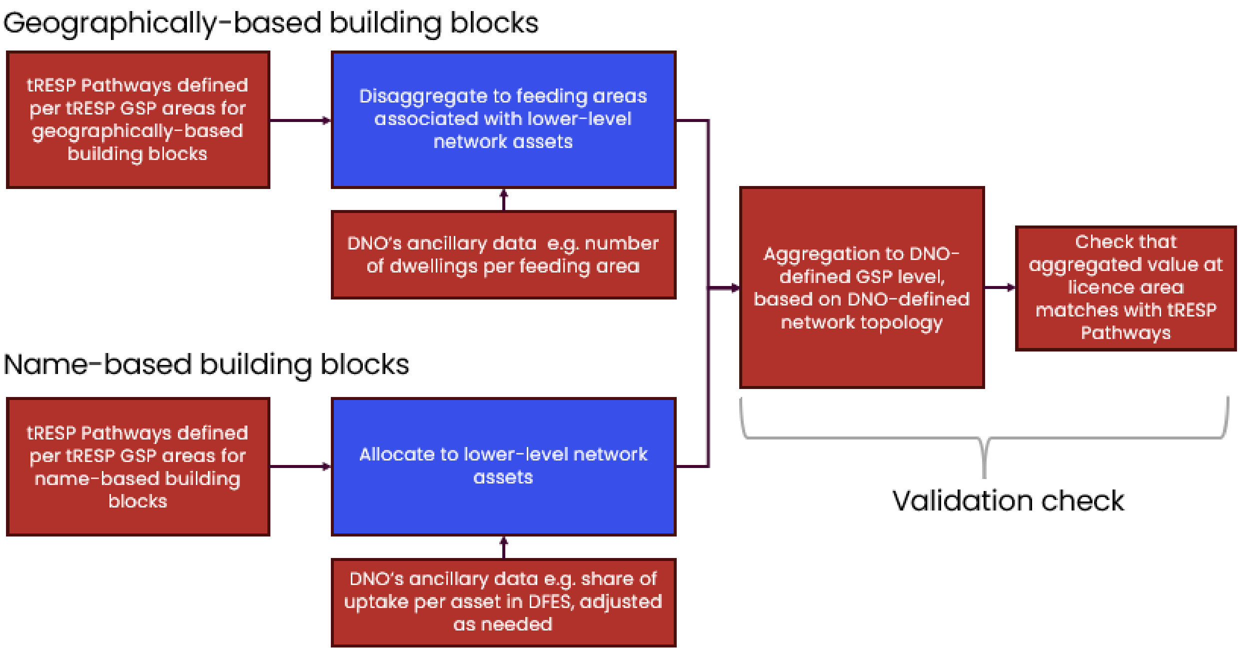

Figure 14: Diagram illustrating the recommended approach to disaggregate the tRESP Pathways

Example of disaggregation for a geographic-based building block

For geographically-based building blocks, the tRESP GSP areas represent the areas where the physical assets can be found (such as, heat pumps) or are registered (such as, EVs). We recommend disaggregating the tRESP projections from tRESP GSP areas to lower voltage levels by using ancillary data (number of dwellings or population at LSOA/OA level, feeding area of lower voltage network assets, and so on.).

By lower-level network assets, this could be for example a disaggregation to the feeding areas of secondary substations, with those areas as defined by the DNO based on normal network running arrangements. Uptakes at primary substations, bulk supply points and GSPs would then be identified based on the DNO-defined network topology in normal network running arrangements used for other licence condition compliance activities. The disaggregation would ideally be performed as one process across a licence area, not per tRESP GSP area.

Note, that we do not recommend DNOs to convert the tRESP GSP areas to DNO GSP areas before disaggregating them as this could result in an extra step that could also potentially lose information, but this is an option that DNOs can take if additional checks are made to ensure no gaps or overlaps in the DNO's final area definition.

NESO has shared with DNOs for transparency the weighting factors used to convert DFES uptakes over DNO-defined GSP areas to volumes in the tRESP Pathways. However, noting the gaps and overlaps between DNO-defined GSP areas, it is not recommended that these factors are used in reverse to generate uptakes at those DNO-defined GSP areas from the tRESP Pathways, but that instead mapping is recalculated by the DNO based on its latest information on areas served by lower-level network assets.

Example of disaggregation for a name-based building block

For name-based building blocks, the tRESP GSP *areas* are not to be used as part of the disaggregation process. The distribution of the volume each building block per network asset at a lower voltage level could be used by a DNO as a starting point, for example, to use the distribution from a DFES to disaggregate the tRESP Pathways values, then adjust upwards or downwards consistent with a connection pipeline or other source of expected volumes.

As an example, the DNO GSP called 'GSP_1' is mapped to the tRESP GSP 'tRESP_GSP_1' for name-based building blocks. For the capacity installed of onshore windfarms >= 1 MW in the tRESP_GSP_1, the distribution of the capacity at primary substations by DNOs to produce their DFES could be used to disaggregate the tRESP value for this building block. The distribution will be calculated for every year and every pathway.

Validation check

In both cases, the values from lower voltage levels can be aggregated to form the uptake at the DNO-defined GSP. The result of this translation to network assets should be that:

- Total technology volumes per pathway per licence area for DNO-defined GSPs as per the network topology used by DNOs for their 2026 reporting, plus the DNO's expectation of embedded IDNO technology uptake, are equivalent to the tRESP Pathway volume
- The combination of DNO-defined GSP feeding areas is equal to the DNO licence area., noting that any adjustments for customer served out of area may have impacts on these equivalences and would need to be highlighted.

The tRESP GSP areas are based on a definition of the licence area boundaries, but it is acknowledged that in some cases one DNO network may serve customers out of its licence area. Hence, the sum of uptakes across all DNO-defined GSPs plus IDNO uptakes, and the sum of uptakes across all tRESP GSP areas for a licence area should be close but may not always be equivalent.

We also acknowledge that GSPs are transmission assets and not distribution network assets, so investment in GSPs is not fully subject to the ED3 price control. However, DNOs will report GSP demand to NESO under Grid Code requirement and demand projections may influence GSP changes under the CUSC, and transmission capacity charges under the distribution price control.

Relationship of the Pathways to IDNO networks

The tRESP Pathways are intended to inform the planning of DNO networks as part of the ED3 price control, and there is no specific output for IDNOs, which are not subject to that system of price control regulation.

For the geographic-based building blocks where, the Pathways are defined for that area without any adjustment to remove areas served by embedded or IDNO) networks, either in the baseline or future years.

Thus, for those building blocks, the technology uptakes in the Pathways should be considered inclusive of technology on IDNO networks. DNOs themselves will have the best information on current and future IDNO penetration including its location and connectivity within their licence areas, so may adjust the tRESP Pathways for IDNO customers and their view of associated building block uptake, when converting the pathways to uptake on DNO network assets. It is also acknowledged that DNO approaches to inclusion of IDNO uptake within their DFES may vary. Each DNO should be able to confirm whether customers on IDNO networks were included in their DFES inputs to the pathways. The Carbon Budget alignment review did not assume additional EV and heat pump uptake on IDNO networks, but that these were included in the tRESP GSP area.

For the name-based building blocks where technology is assigned to a tRESP GSP, that is, generation assigned to a GSP on nominal basis, uptake of generation connected to IDNO networks has already been removed where possible. For example, the ECR baseline would not include IDNO generation, and the DFES input would generally not include IDNO uptake, but this may vary per DNO. Specifically, the alignment review to Clean Power 2030 was done against the December 2025 Gate 2 connections reform outcome, taking account of allocation of generation above the TIA threshold to IDNO networks and ensuring this was not allocated to the host DNO.