



Regionalisation of the Future Energy Scenarios

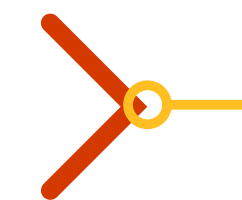
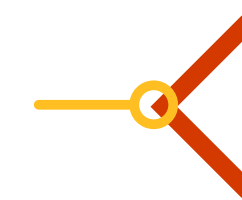
Explainer
April 2022

Navigation

This version of the Regionalisation of the Future Energy Scenarios document has been optimised for printing out or viewing on a tablet.

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About the Electricity System Operator

National Grid ESO is the electricity system operator for Great Britain.

Our control room moves electricity around the country second by second to ensure that the right amount of electricity is where it's needed, when it's needed – always keeping supply and demand in perfect balance.

We also have to plan for the future.

We must think about things like where our energy will come from and how we will operate a greener and cleaner system in the future.

We want to be able to run a zero carbon electricity system by 2025, which will be crucial in helping the UK meet its wider zero carbon target.

Our mission is to meet the challenges of the future and deliver cleaner, affordable electricity. We constantly strive to do this better by using technology and innovation to transform the way we work.

To find out more about what we do please visit:
nationalgrideso.com/who-we-are/what-we-do




About the Future Energy Scenarios

What are the Future Energy Scenarios and why are they important?

With an ambitious target for net zero emissions by 2050, our energy system will need to transform rapidly while continuing to deliver reliability and value for consumers. We believe decarbonising energy is possible but also that it will be complex, not least because there are many ways to reach net zero, each with their own trade-offs.

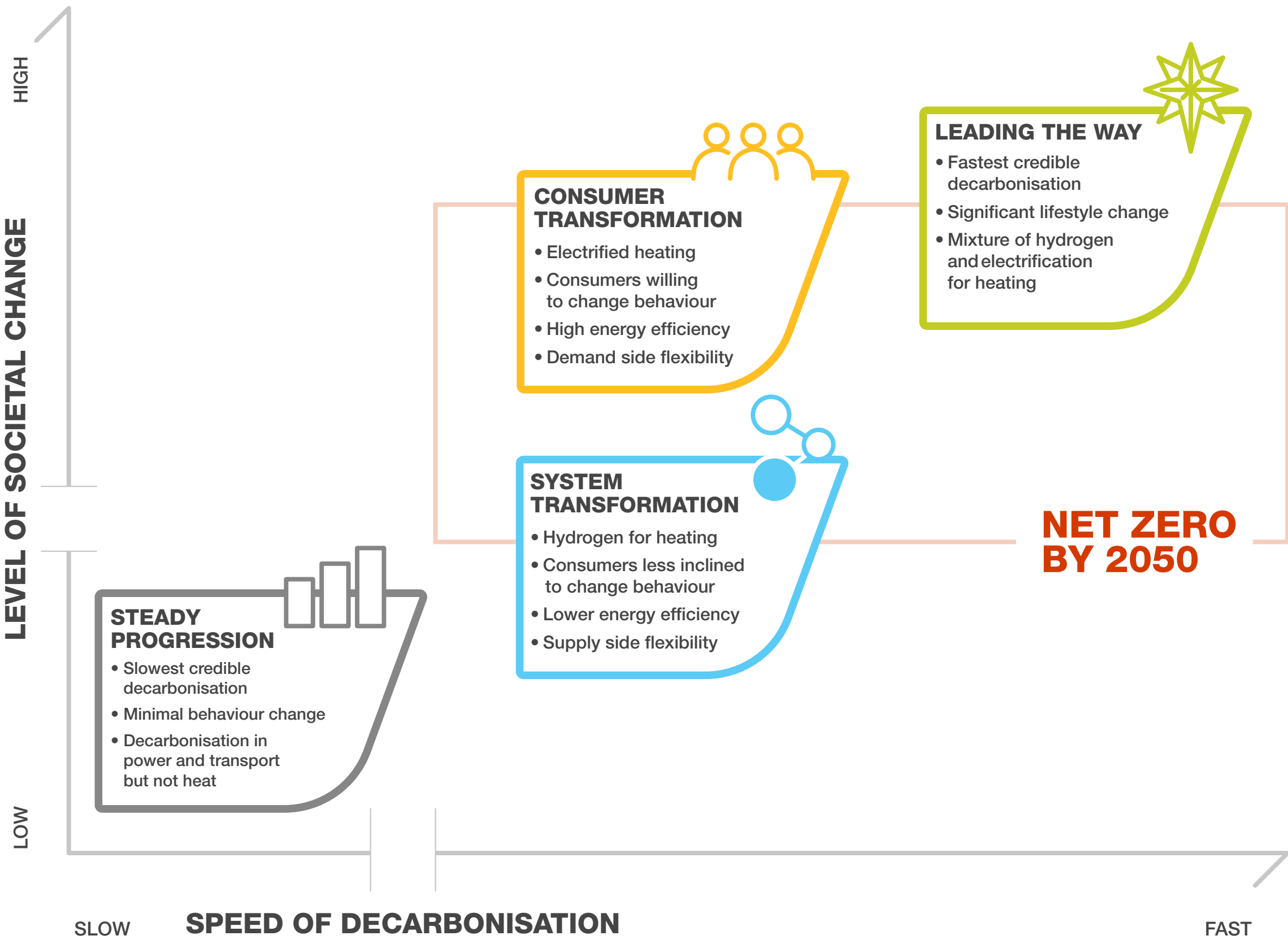
Our Future Energy Scenarios (FES) outline four different, credible pathways, shown in the scenario framework for the future of energy between now and 2050. Each one considers how much energy we might need and where it could come from. FES can be used to inform a range of energy system activities including network operation, investment decisions and energy policy.

For more information on our future energy scenarios please see our summary document [FES in 5](#).



The publication of the Future Energy Scenarios in July 2021 marked the 10th anniversary of FES.

The Scenario Framework



Regionalisation of FES: What is it?

Regionalisation will enhance FES to accelerate GB towards net zero by applying a whole system lens, offering greater granularity, broader engagement and more regional insights.

Through these activities we are enhancing our regional assumptions and modelling to allow us to more accurately represent aspects of the scenarios which vary due to local factors.

At the moment we create top down GB scenarios from the individual components of demand and supply. We then split this into regions for network development purposes. Regional scenarios mean we

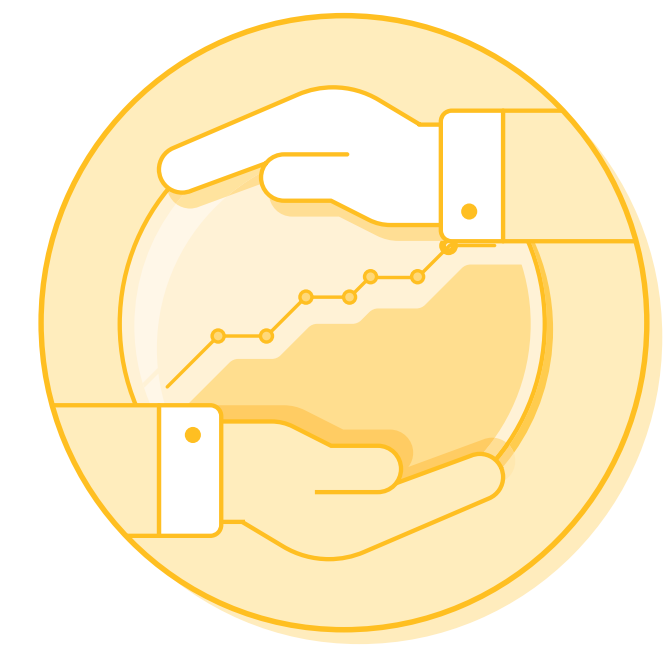
will work with the network companies and other stakeholders to adopt a more “bottom-up” approach on a regional basis (where it is relevant and material to do so). This will improve our data and insights, allowing us to model spatial and temporal variations to a greater level of accuracy and comparability.

This will build upon and enhance the regional information we currently produce, such as the regional datasets that are used in the Electricity Ten Year Statement process.

Find out more about the regionalisation of FES in our RIO-2 business plan.



Regionalisation is about the whole energy system



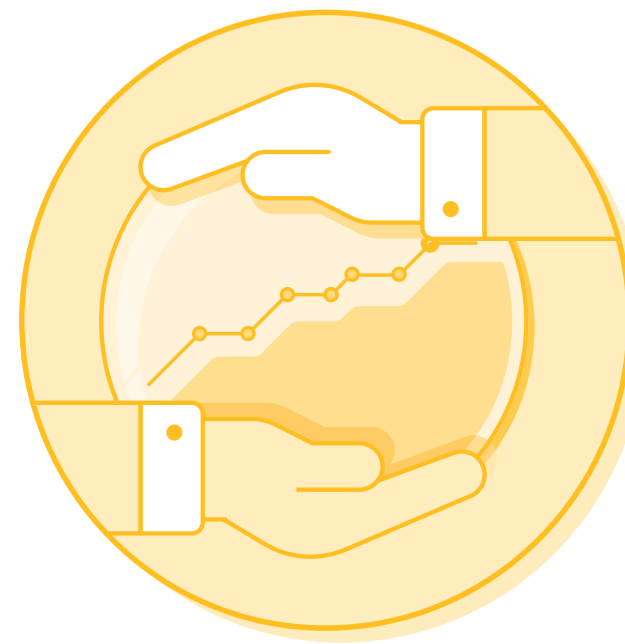
Regionalisation is collaborative

Regionalisation of FES: What is it?



Regionalisation is about the whole energy system

A key aspect of regionalisation is that it is about the whole energy system, ensuring that cross-vector interactions are fully considered as we transition to net zero. We currently share granular data with our network colleagues in gas and electricity. This is now also expanding to include hydrogen as the system becomes more dynamic with changes across energy vectors. Our regionalisation activities will build on this and ensure there is increased accessibility to the data and information, as well as enhancing the modelling from a whole energy system perspective.



Regionalisation is collaborative

Through the Energy Networks Association (ENA) and the FES Network Forum we are working closely with our network colleagues in gas and electricity to align our assumptions and ensure there is feedback and data flowing in both directions. This will enable our stakeholders to see how our data and scenarios link together, providing a coherent set of whole system scenarios. Through industry collaboration we can all learn from each other, striving to develop a better system for the end consumer on our transition to net zero.

We also want to enhance our understanding of the different decarbonisation pathways down to local authority level. This is both in terms of the modelling we do across the whole energy system as well as the insights we provide. We want to better reflect how different parts of GB will decarbonise at different rates and in different ways. Understanding this down to a local authority level will be an important step so we can reflect each local authority's unique journey towards net zero.

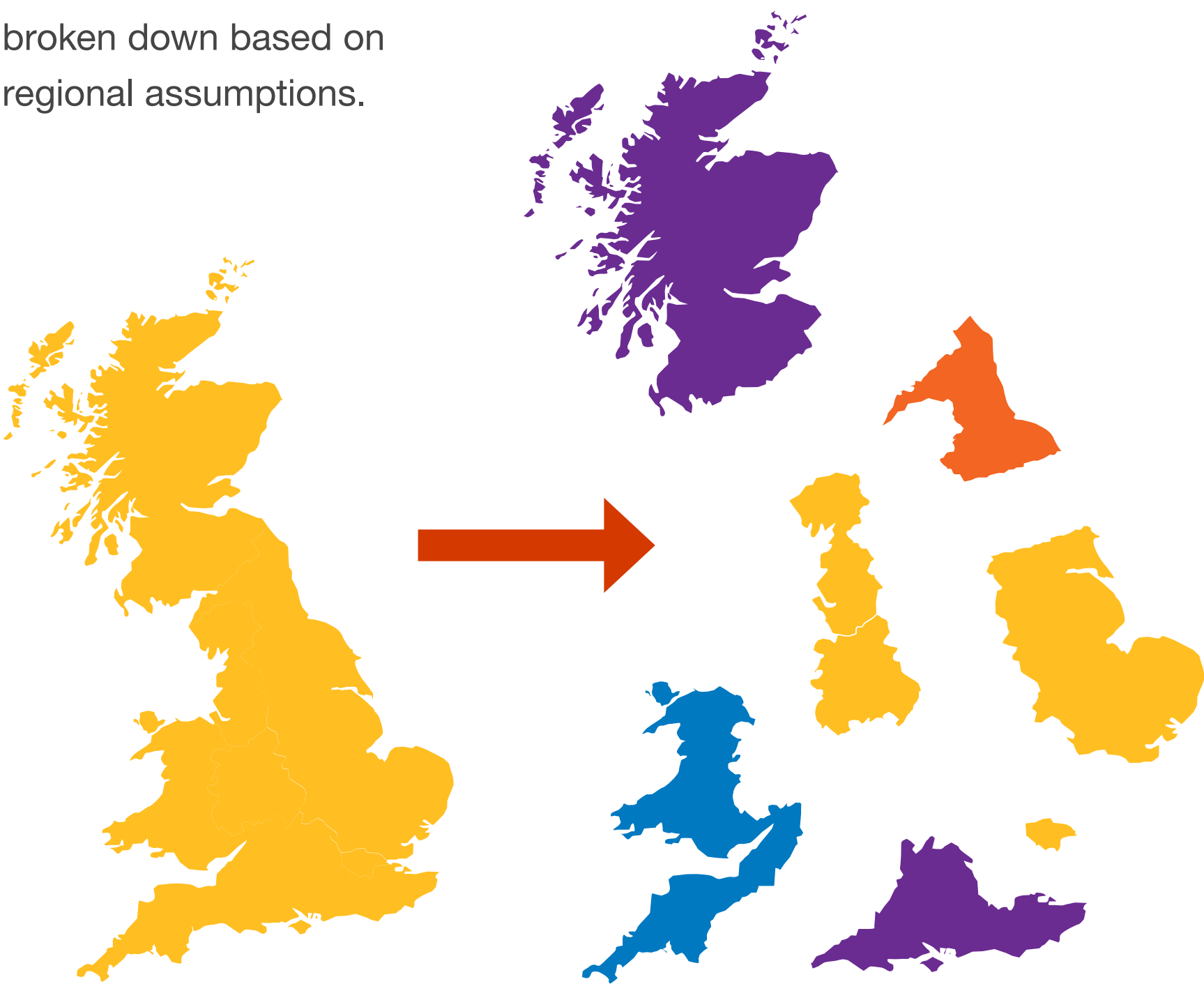
Regionalisation of FES: How we're changing our modelling

Now

How we develop our regional modelling today

We analyse the demand and supply initially at a GB level.

The GB forecast is then broken down based on regional assumptions.

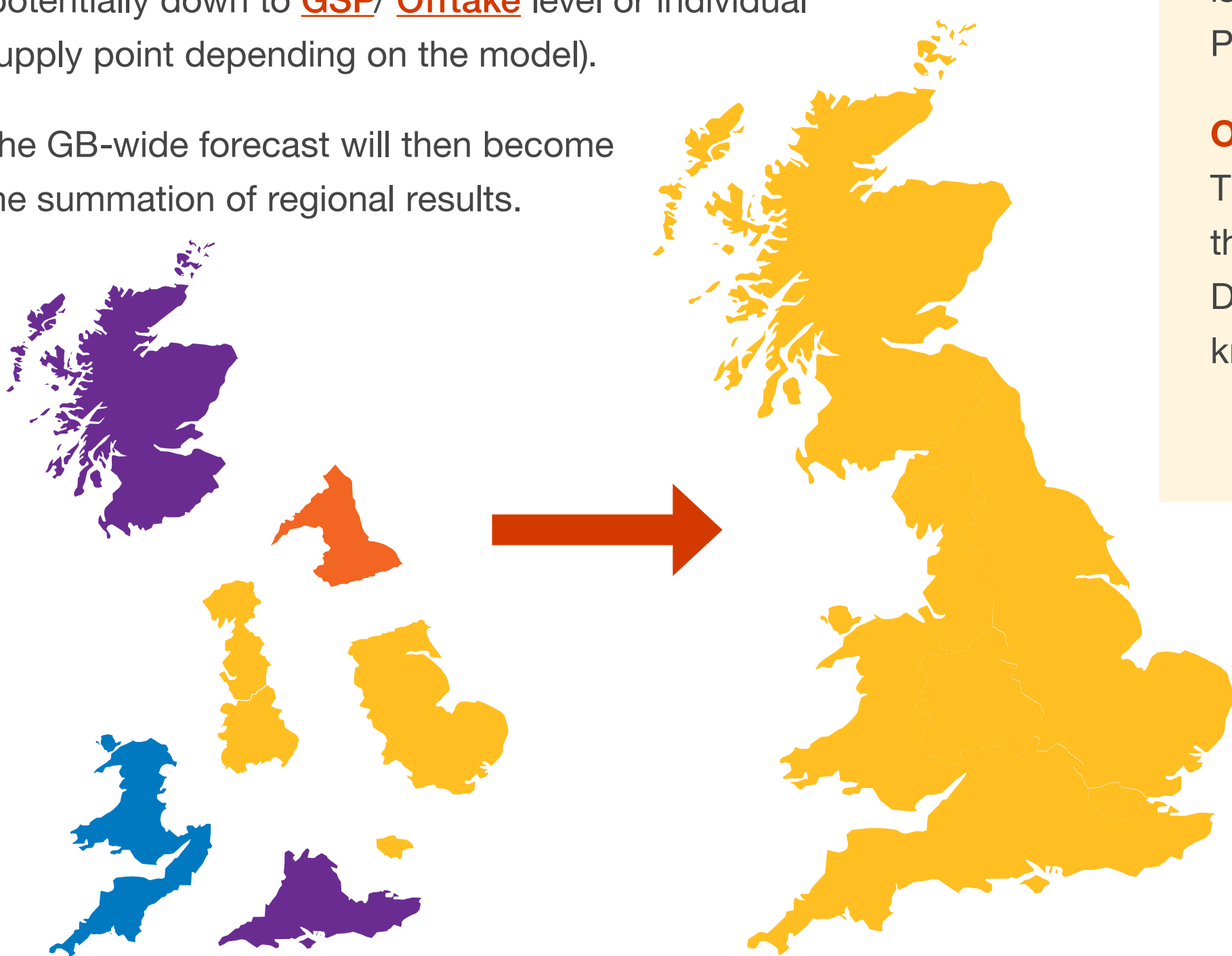


Future

How we will model regions in the future

Our ambition is for our modelling to start at regional level where it is relevant or material to do so (potentially down to **GSP/ Offtake** level or individual supply point depending on the model).

The GB-wide forecast will then become the summation of regional results.



GSP:

The connection between the Electricity Transmission and Distribution Systems is known as a Grid Supply Point (GSP).

Offtake:

The connection between the Gas Transmission and Distribution Systems is known as an Offtake point.

The map used here is for illustrative purposes only and doesn't show the full extent of the granularity some of our modelling may go down to.

Stakeholder feedback

Engagement with our regional partners and stakeholders plays a key role in providing insights for the ongoing regionalisation of FES.

Seeking to understand our customers needs will:

- enhance our understanding at a GB level
- help align assumptions
- analyse potential gaps
- support discussions with local gas and electricity transmission and distribution network companies.

Ultimately this valuable input will enrich how we further regionalise our FES assumptions.

Direct engagement with our regional partners to produce focused insights for each region is at the core of what we do.

Our key regional stakeholders have highlighted what they would like to see as part of the regionalisation of FES and how it will be beneficial to their process. We have taken on board the following comments to better understand how our published FES data is used in making assumptions and as an input into our stakeholders' processes.

“Stakeholders would welcome a more granular view of whole system scenarios, and agree it would increase the robustness of FES.”

“There is a need for transparency of the assumptions driving the regionalisation of the GB FES, and potentially for a level of feedback loops with stakeholders to sense check outputs.”

“More interactive tools can make it easier to use FES outputs to generate relevant insights.”

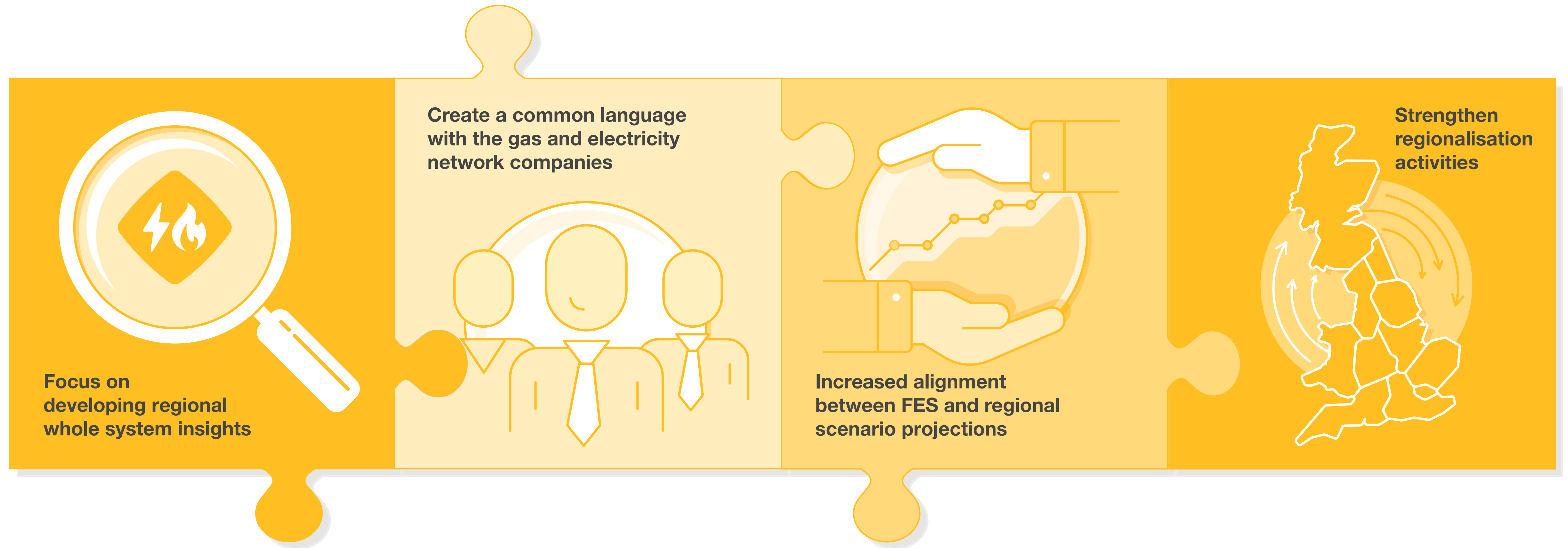
“There is a need to ensure scenario creation is coordinated and that there isn't a duplication of effort.”

“There is broad support for closer collaboration on the creation of more granular scenarios.”

“More visibility of upcoming changes can help manage downstream impact.”



Our steps in developing the regionalisation of FES



Our steps in developing the regionalisation of FES

Focus on developing regional whole system insights



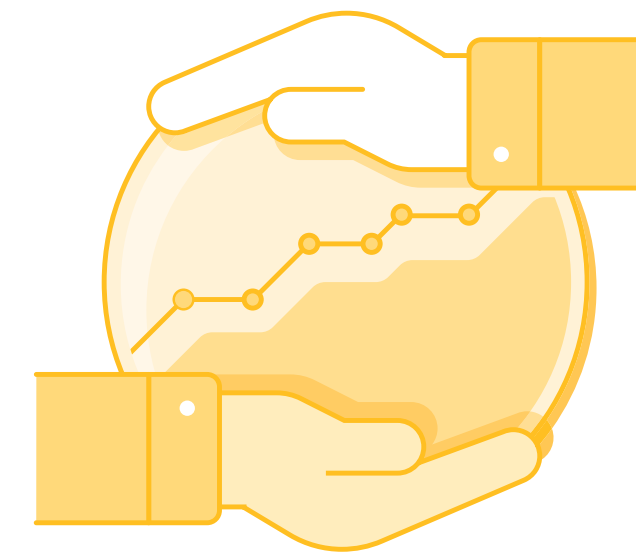
We intend on providing more clarity on possible pathways for whole system decarbonisation through regional insights. We will continue to broaden our engagement to bring in new voices and perspectives, enhancing our understanding of consumer behaviour and sense checking the FES outputs so we understand what they mean on a more local level.

Create a common language with the gas and electricity network companies



One of our next steps is to create a common language and consumer segmentation with both gas and electricity network companies. We aim to understand how consumer behaviour will vary with time and across geographical locations to then apply to future scenario development for both distribution and transmission network planning.

Increased alignment between FES and regional scenario projections



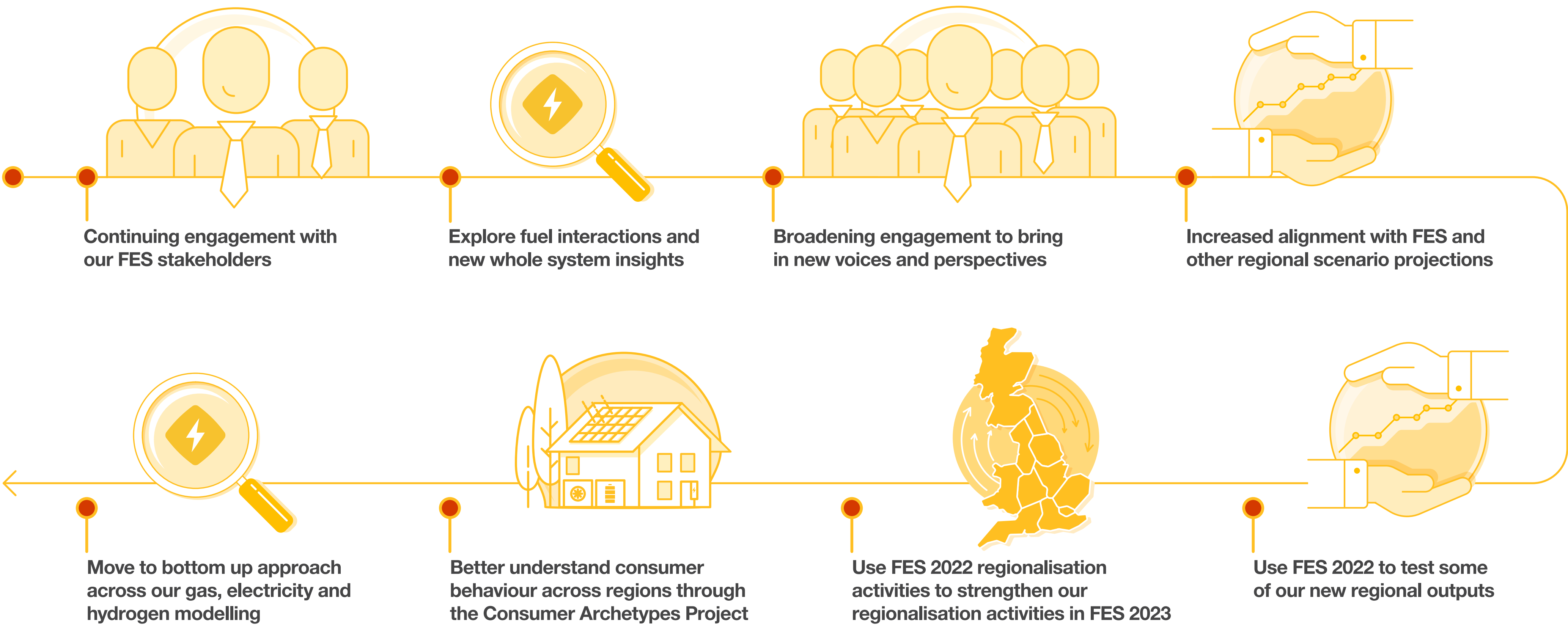
We want to ensure there is increased alignment between the FES and other regional scenario projections and we will be continuing to work with the network companies, ensuring further alignment of our assumptions and comparison of our data.

Strengthen regionalisation activities



We will be using FES 2022 to test some of our new regional outputs with stakeholders, which will include enhancing the visualisation of information and providing key regional insights. Our FES 2022 regionalisation activities will be used to strengthen our regionalisation activities in FES 2023.

Our steps in developing the regionalisation of FES



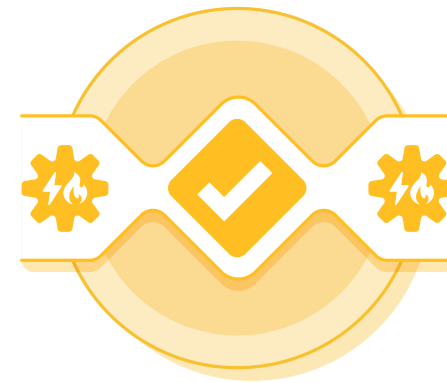
Regionalisation of FES: Why are we doing it?

By collaborating with industry and local decision makers, FES regionalisation will provide more robust analysis and consistent whole system scenarios.



Better insights for better decisions

Strengthen GB and regional insights with regional outputs and a coherent set of whole system scenarios. This will be done through enhancing regional assumptions and modelling (including better reflection of local factors, technological and fuel differences, increasing accuracy of models with spatial and temporal variations). Ultimately better information will be provided for policy and transmission investment decisions, which are a key enabler of net zero.



More consistent and transparent outputs

Providing customers with clear, consistent and comparable scenarios, developed through cross-industry collaboration, where modelling differences will be easily understood and the data easily compared and shared.



Greater granularity for targeted solutions

Be able to anticipate regional operability issues on the transmission system with enhanced regional data and provide greater support for conversations with local and industry stakeholders.

Scenario collaboration between network companies

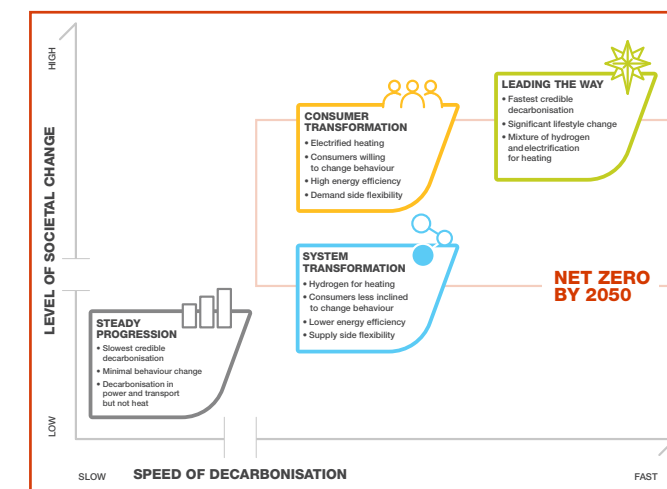
Regionalisation of FES will simplify and optimise the interface with the scenarios currently developed by gas and electricity network companies, such as the [DFES](#), which we will be using to enrich future iterations of FES and further development of the regional breakdown of the GB scenarios.

A common scenario framework is used for FES and the regional scenarios developed by network companies. This allows for comparison of datasets for all network and system operators. Whilst a common scenario framework is used, regional variations in projections from local network companies mean that the summation of the regional forecasts may not have identical alignment to the GB FES forecast.

DFES:

Distribution Future Energy Scenarios (DFES) is an annual forecasting activity undertaken by Distribution Network Operators across Great Britain. They provide granular scenario projections that incorporate regional factors and can be used at a local level for strategic planning of distribution networks.

These projections are informed by local stakeholder engagement to understand the needs, plans and delivery progress of local authorities and other stakeholders. The DFES provides an evidence base for DNOs to develop the business case necessary to support future investment, including regulated business plans.

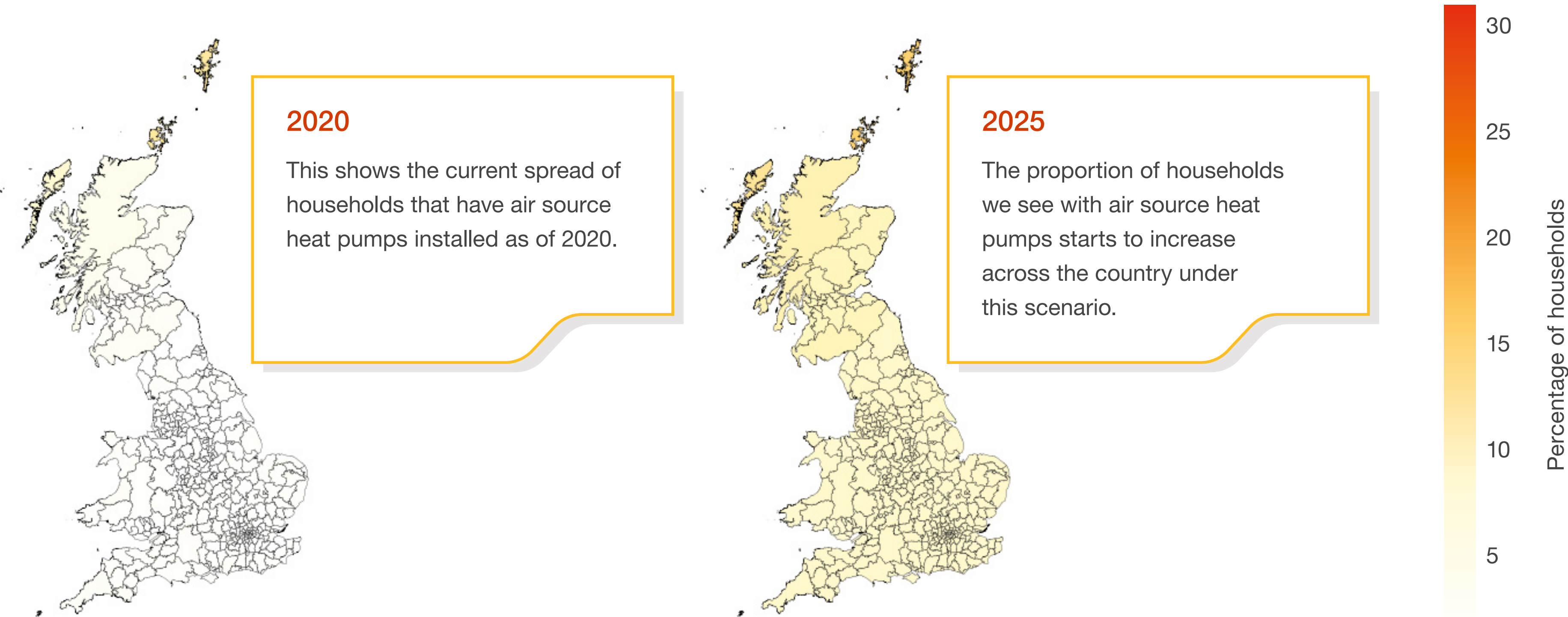


A heat pump example

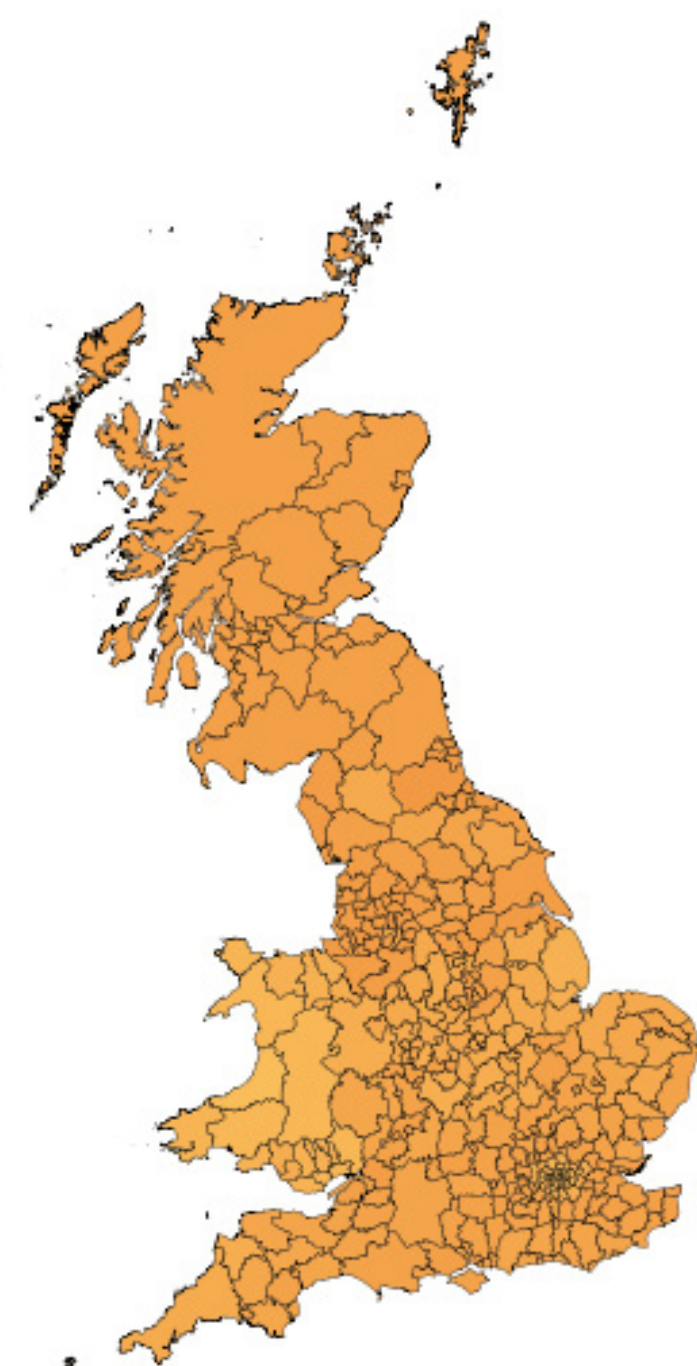
Regionalisation of FES can be used to show how different parts of Great Britain may decarbonise in different ways and at different rates.

Understanding the national and local factors that impact this evolution is key. Here we are investigating how the uptake in air source heat pumps will vary across GB under the Leading the Way Scenario in 5 year increments using the FES 2021 results.

Read more about our regional heat analysis [here](#).

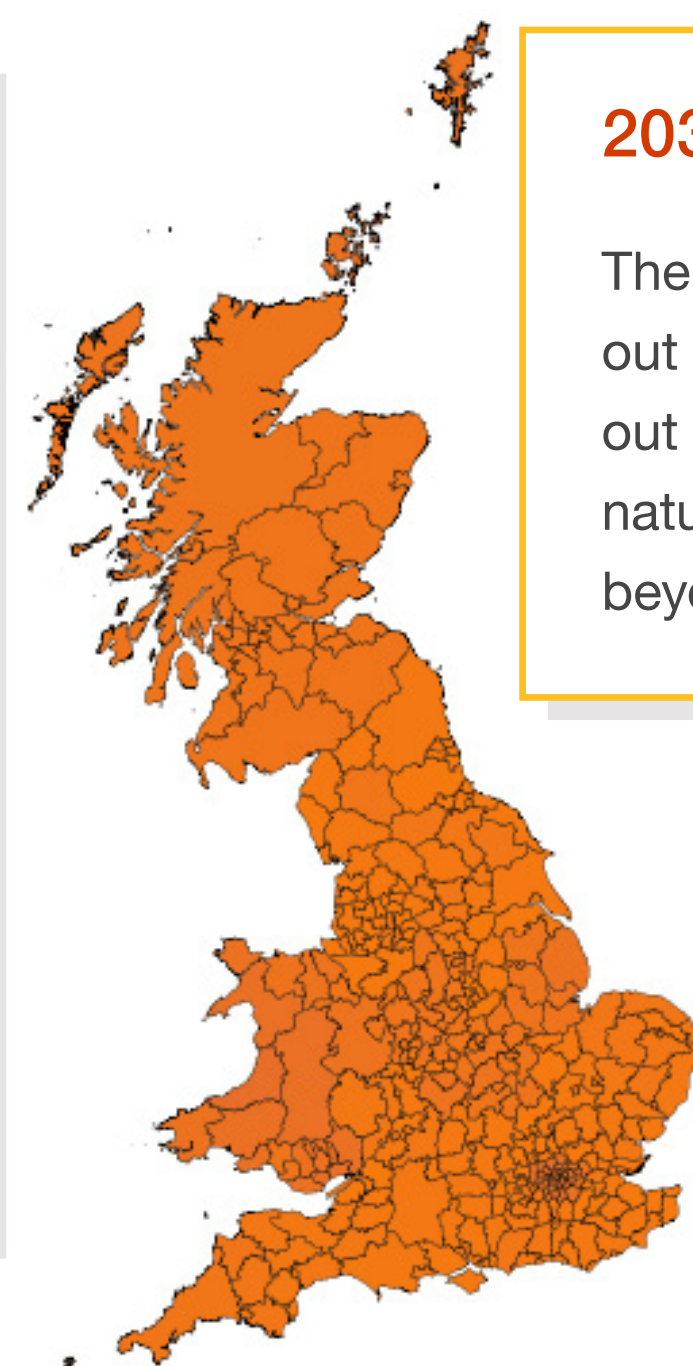


How the potential proportion of households with air source heat pumps could evolve under the Leading the Way Scenario, shown at Local Authority level. Please note that the percentage of households installing alternative low carbon technologies are not represented here.



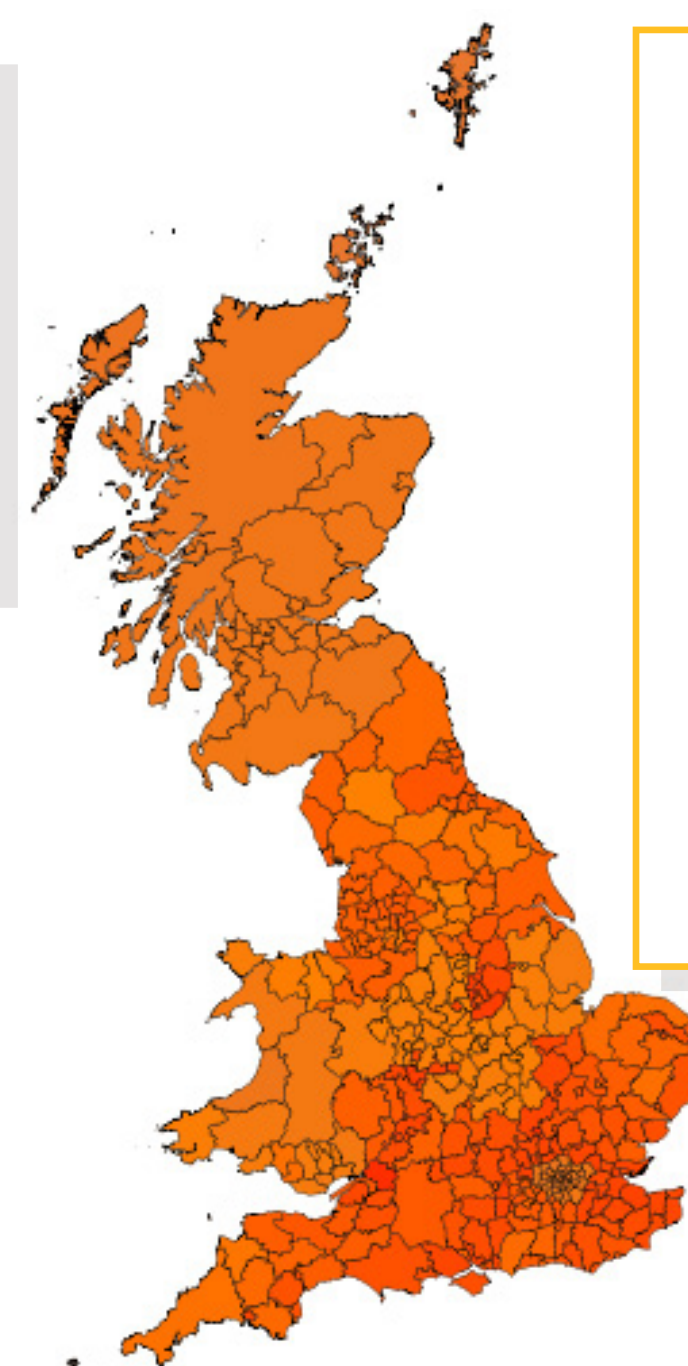
2030

The proportion of households with air source heat pumps continues to increase into the 2030s. Technologies that require large scale infrastructure investment such as hydrogen and district heat will need time before large numbers of properties transition to these technologies.



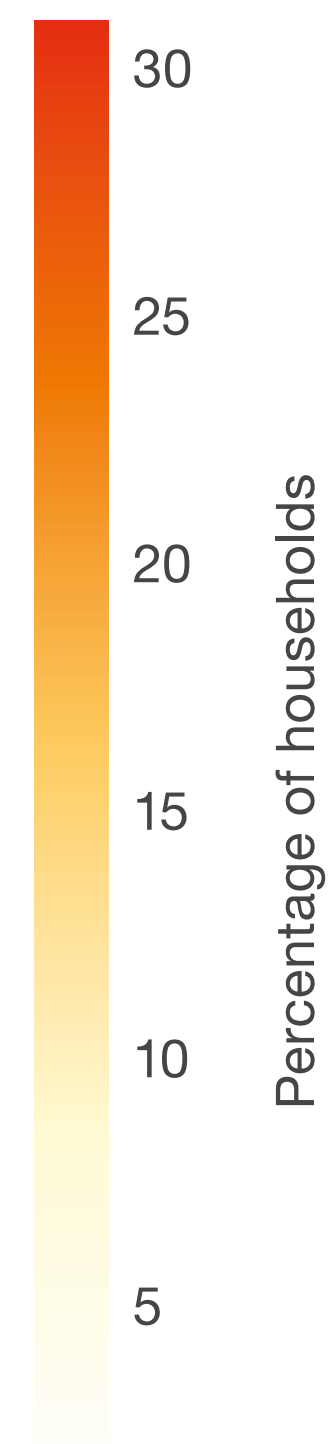
2035

The government has set out its ambition to phase out the installation of natural gas boilers beyond 2035.

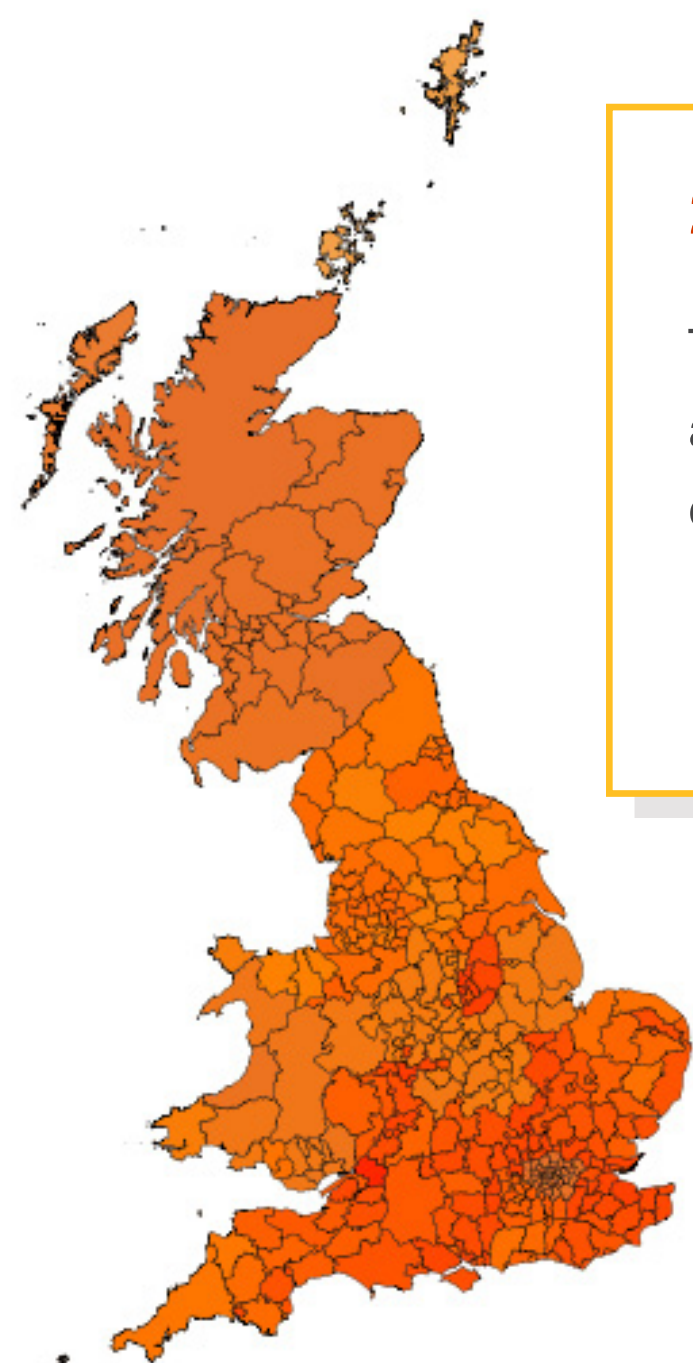


2040

As we progress into the 2040s regional differences can clearly be seen in air source heat pumps deployment as the range of choices for decarbonisation of heat grows across the country.

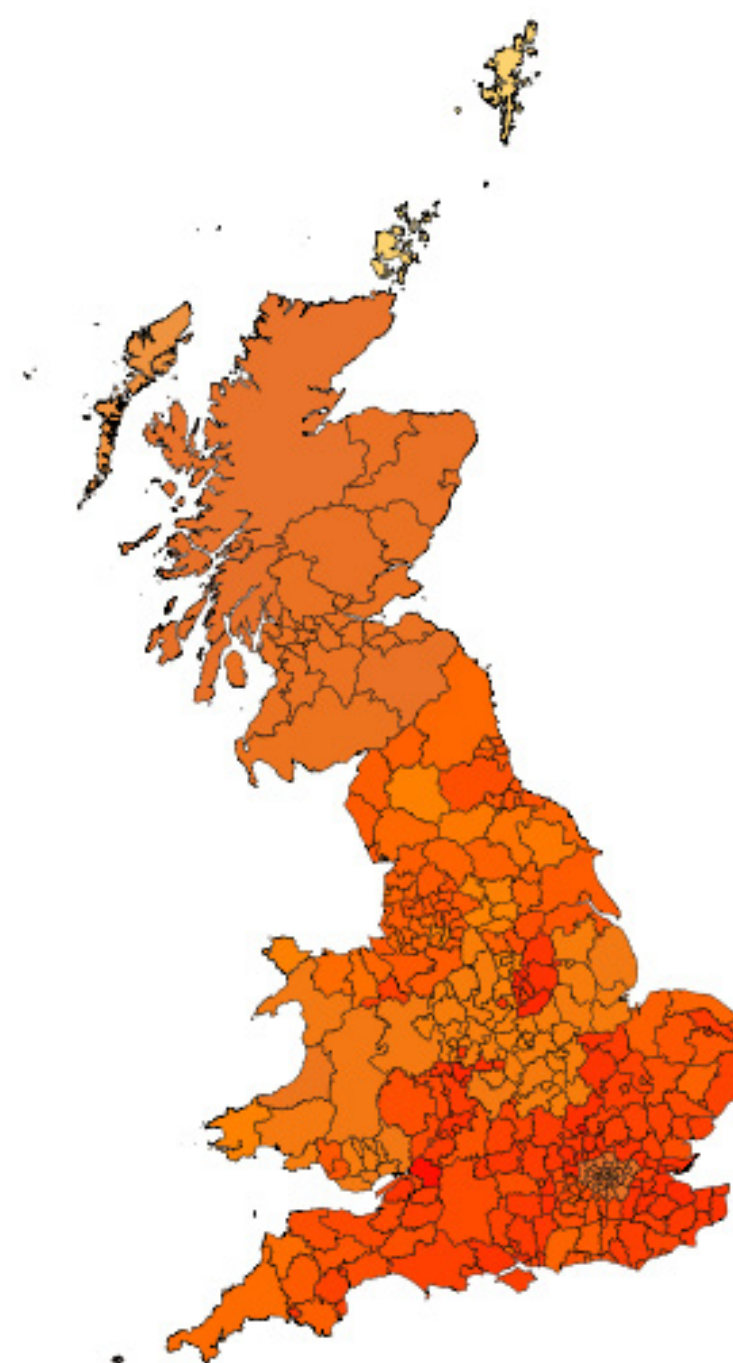


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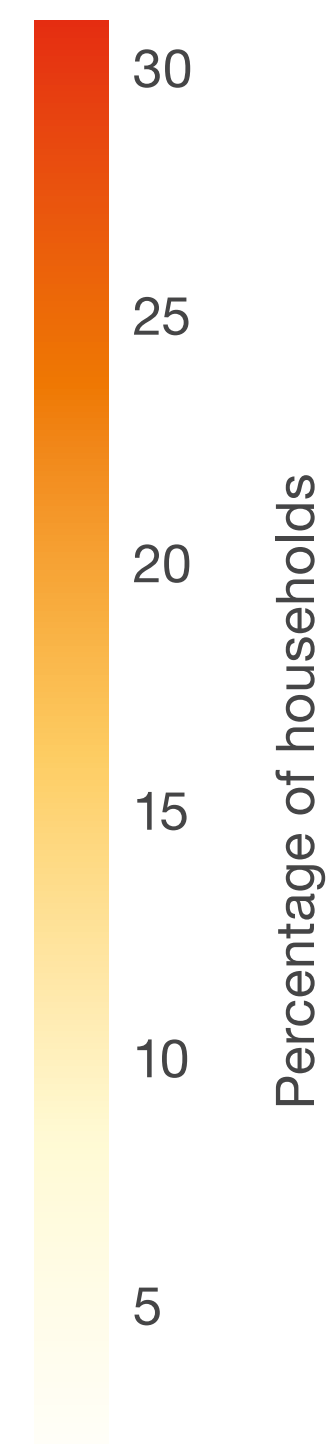
2045

Through the 2040s and towards 2050 air source heat pumps deployment continues to rise across the country.



2050

In Leading the Way government policy will drive significant uptake of air source heat pumps across the whole of GB by reducing the costs of the air source heat pumps to the consumer, but the development of local hydrogen networks would still be an important factor in decarbonisation. In this scenario, hydrogen production facilities are located in Wales and in Scotland, with district heat available in London therefore air source heat pumps deployment is lower in these areas.



How the potential proportion of households with air source heat pumps could evolve under the Leading the Way Scenario, shown at Local Authority level. Please note that the percentage of households installing alternative low carbon technologies are not represented here.

Regionalisation of FES: How can it be used?

Here we are using the example of heat pumps in the Industrial and Commercial (I&C) sector to show how as well as constantly increasing the amount of regional granularity we provide, we are also exploring how best to facilitate stakeholders being able to configure the data in a way that is relevant to them.

We want to be able to provide a whole system user configurable regional FES view for electricity, gas and hydrogen, working closely with regional stakeholders to understand their needs.

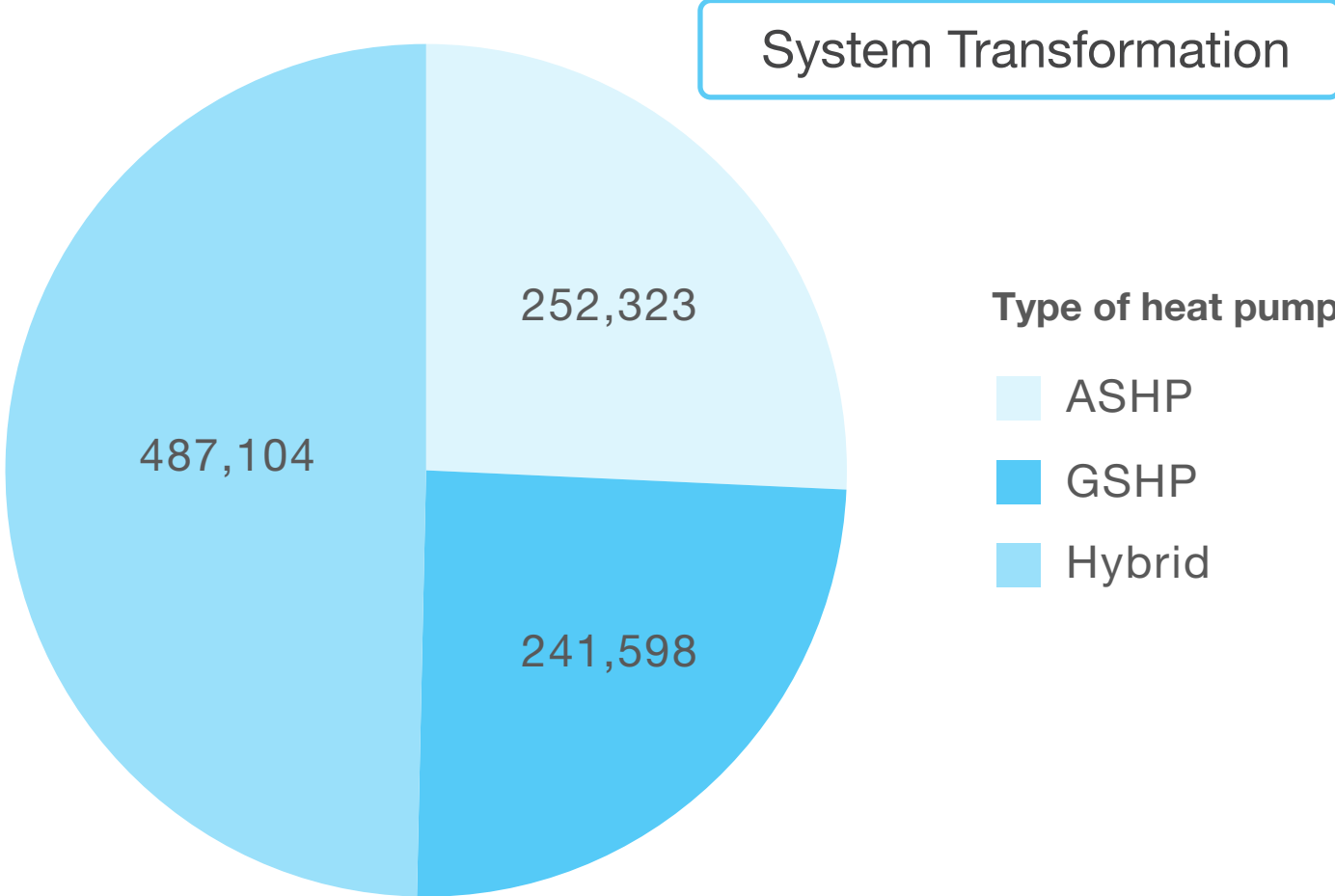
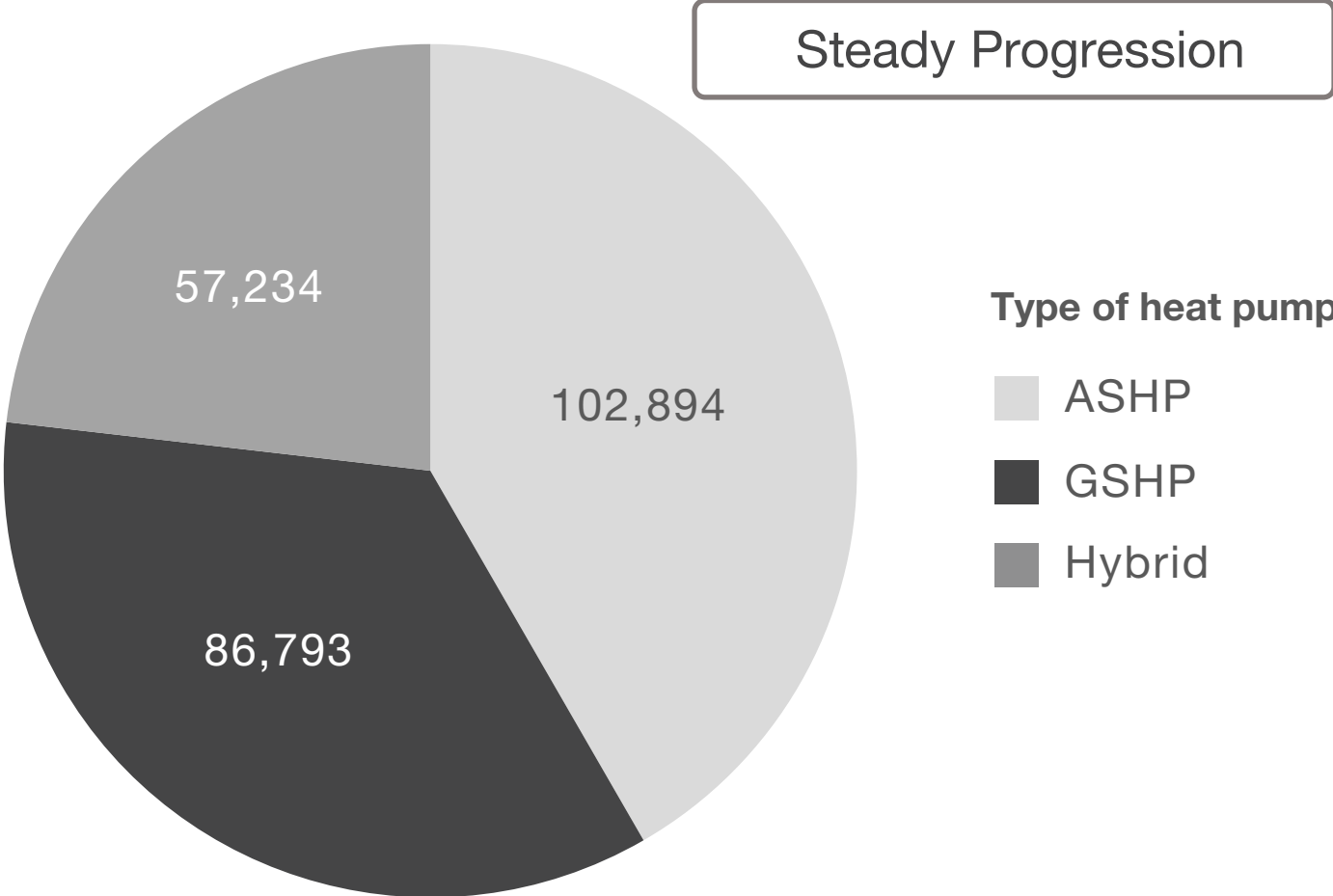
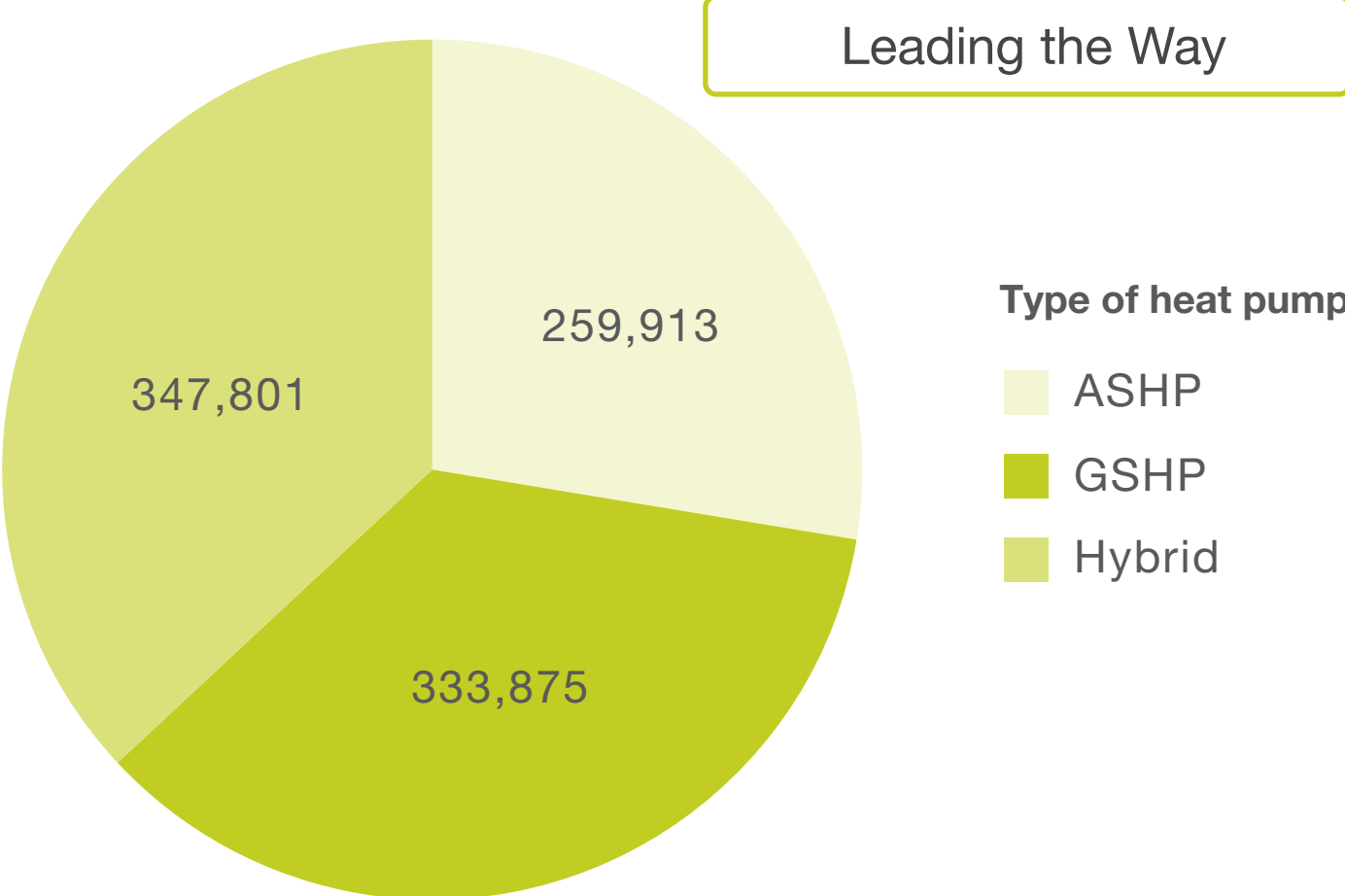
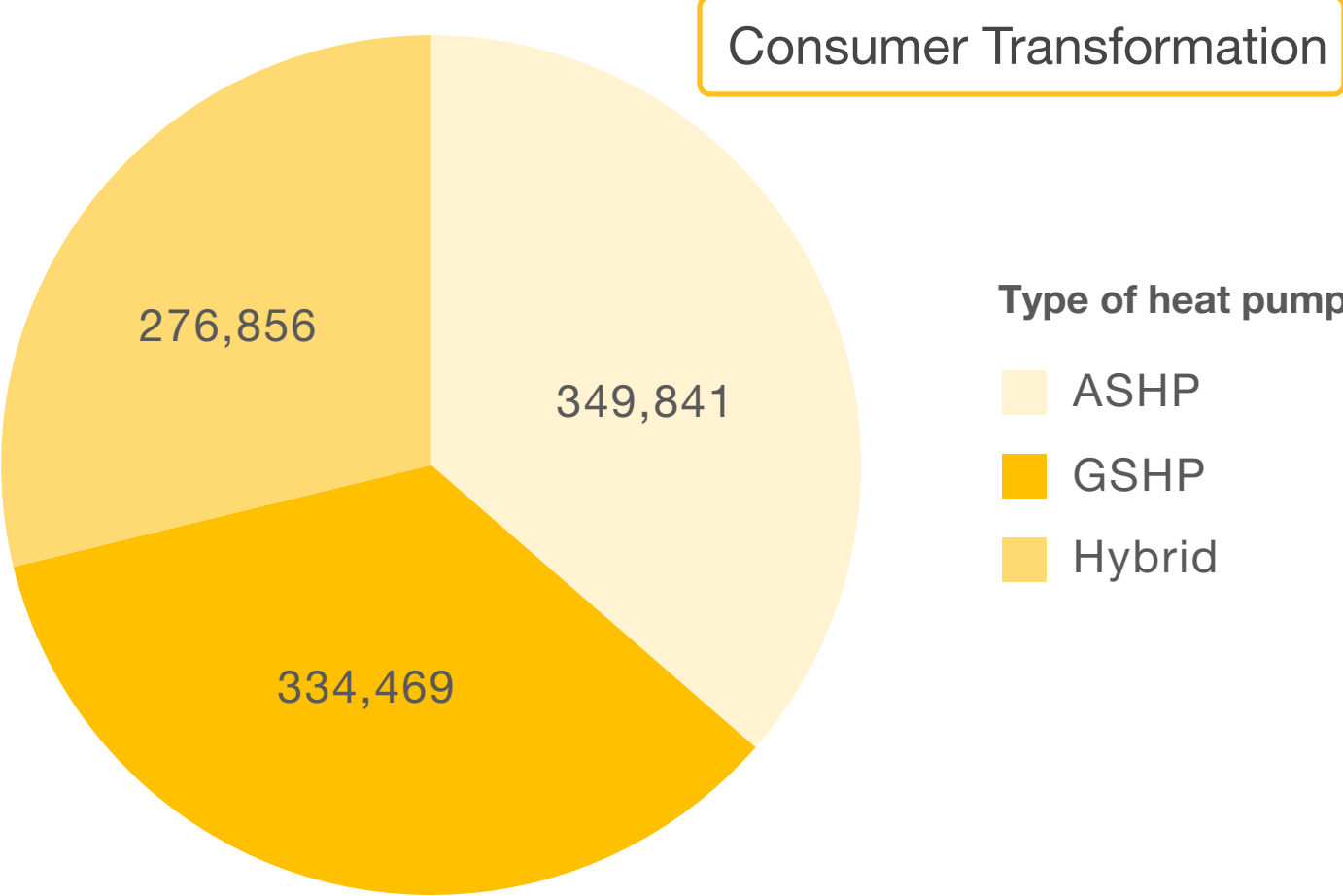


Regionalisation of FES: How can it be used?

Potential number and type of I&C heat pumps in 2050 in FES Scenarios, GB.

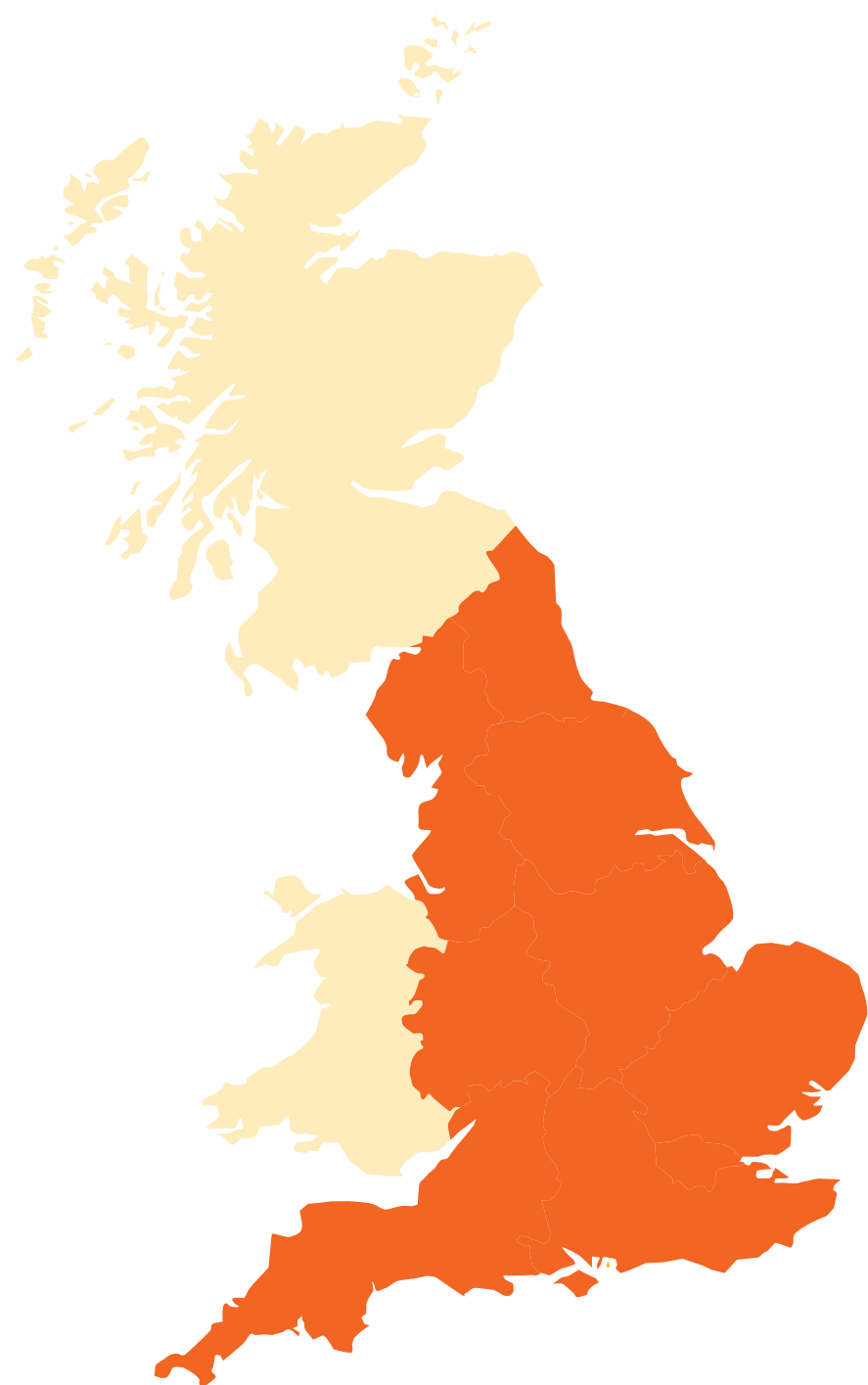


ASHP - Air Source Heat Pump **GSHP** - Ground Source Heat Pump
Hybrid - Heat pumps combined with another technology in a hybrid heating system

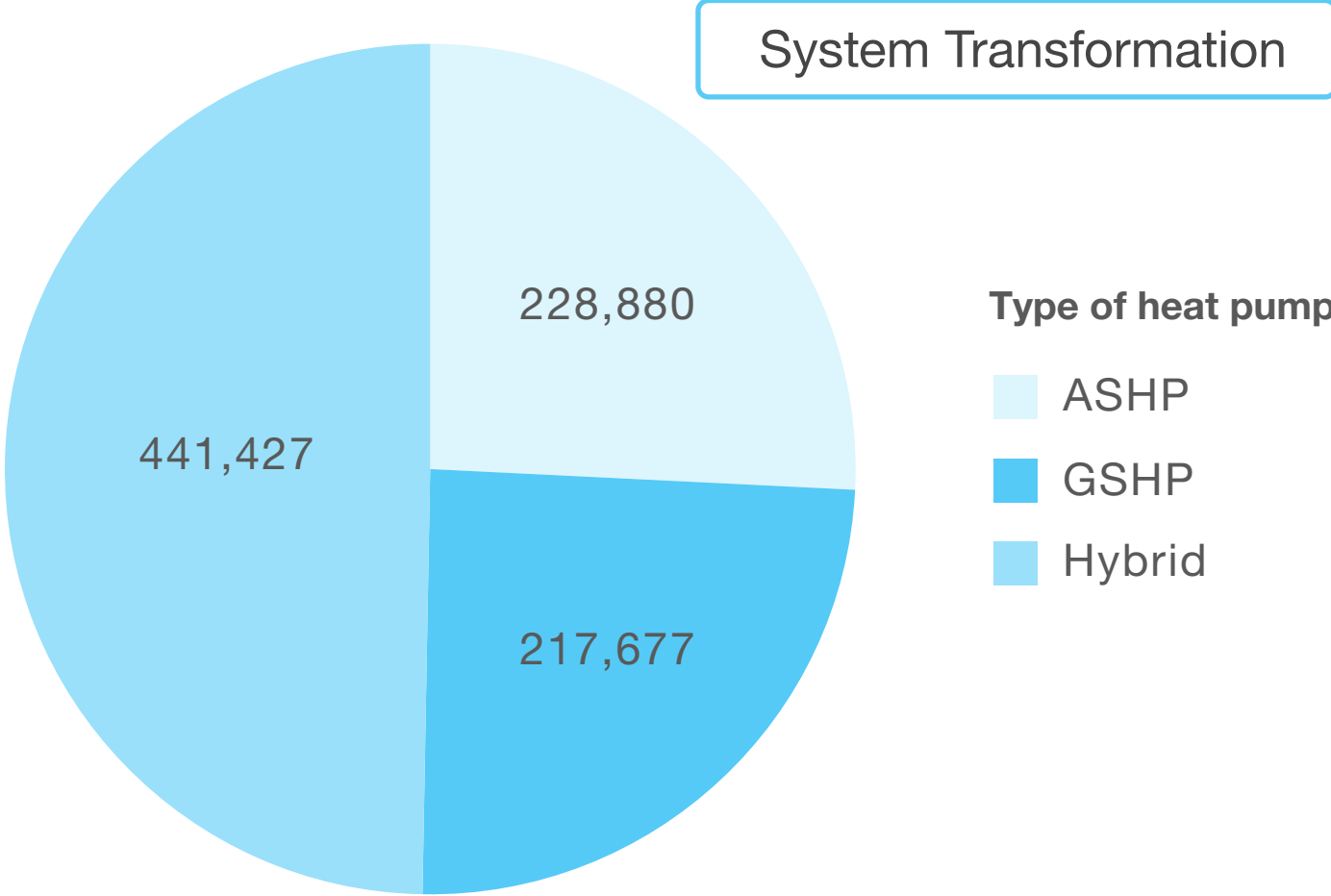
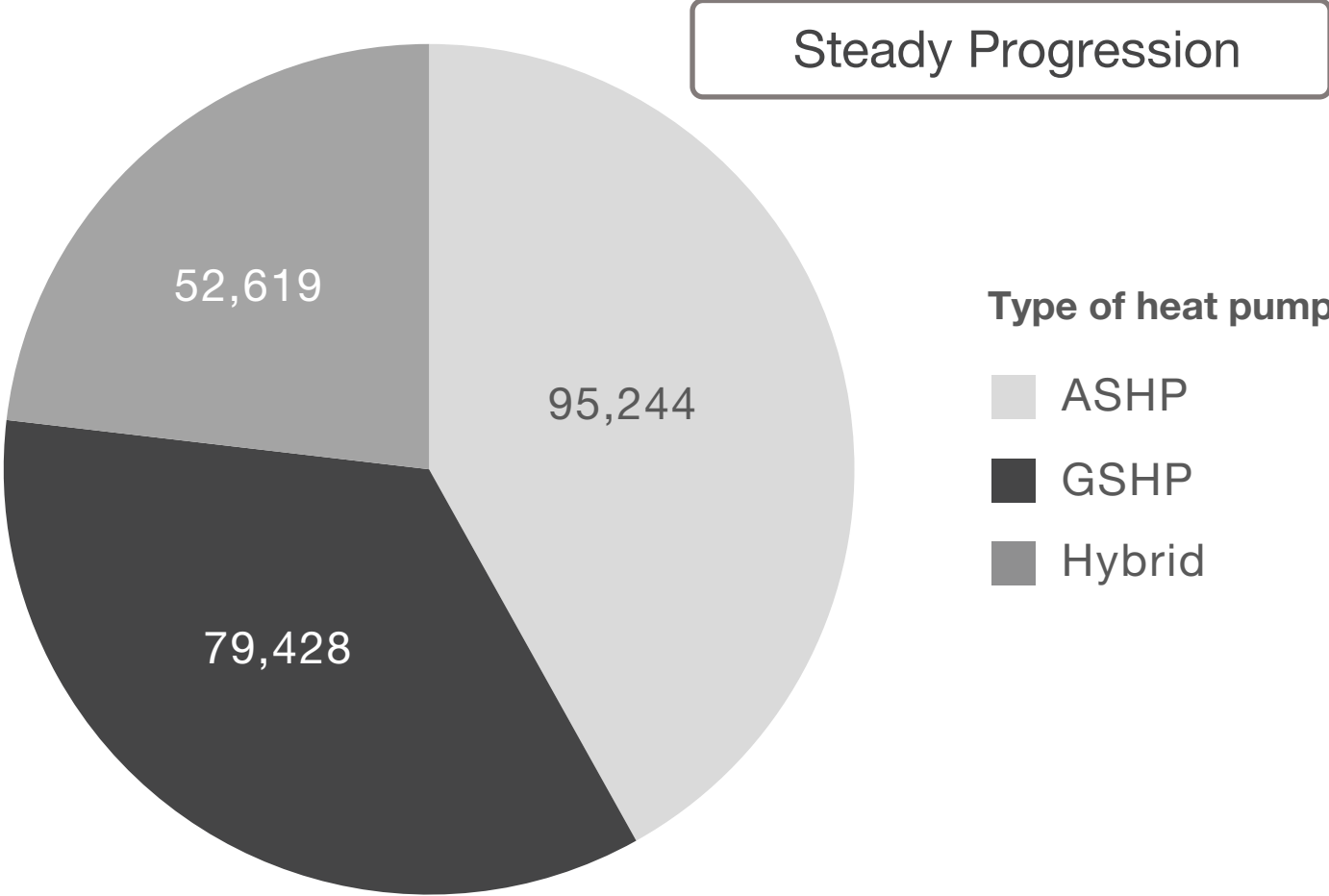
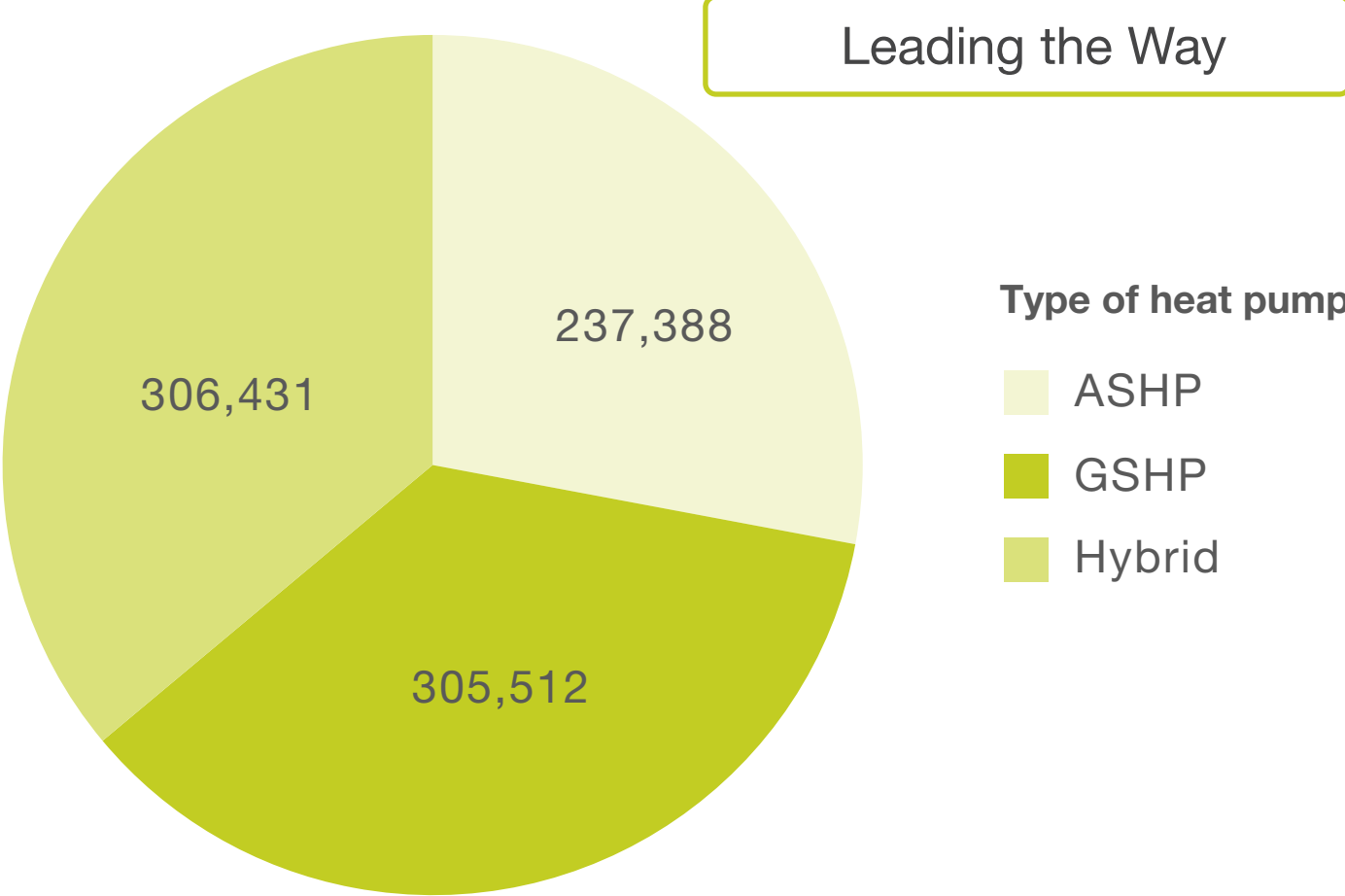
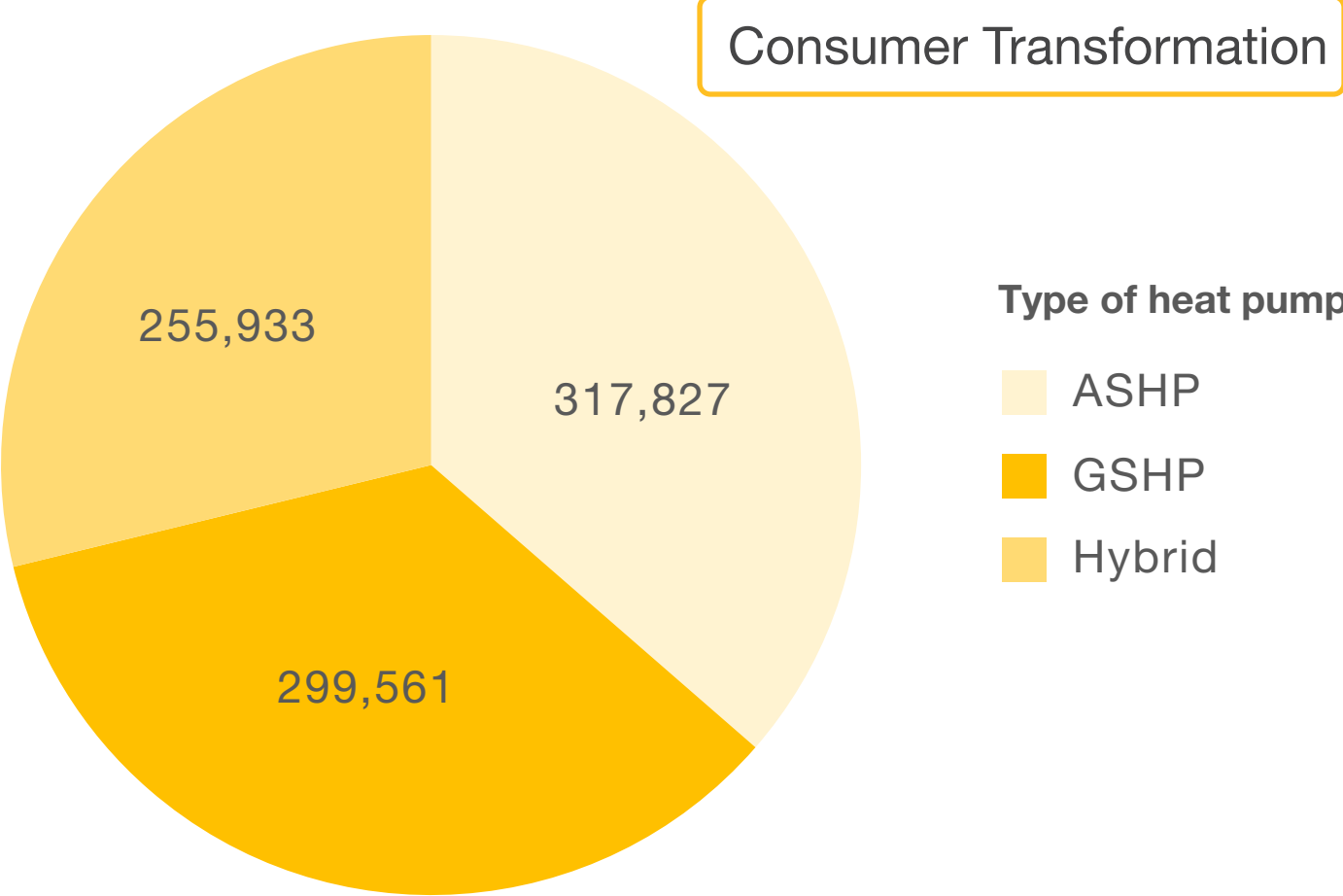


Regionalisation of FES: How can it be used?

Potential number and type of I&C heat pumps in 2050 in FES Scenarios, England.

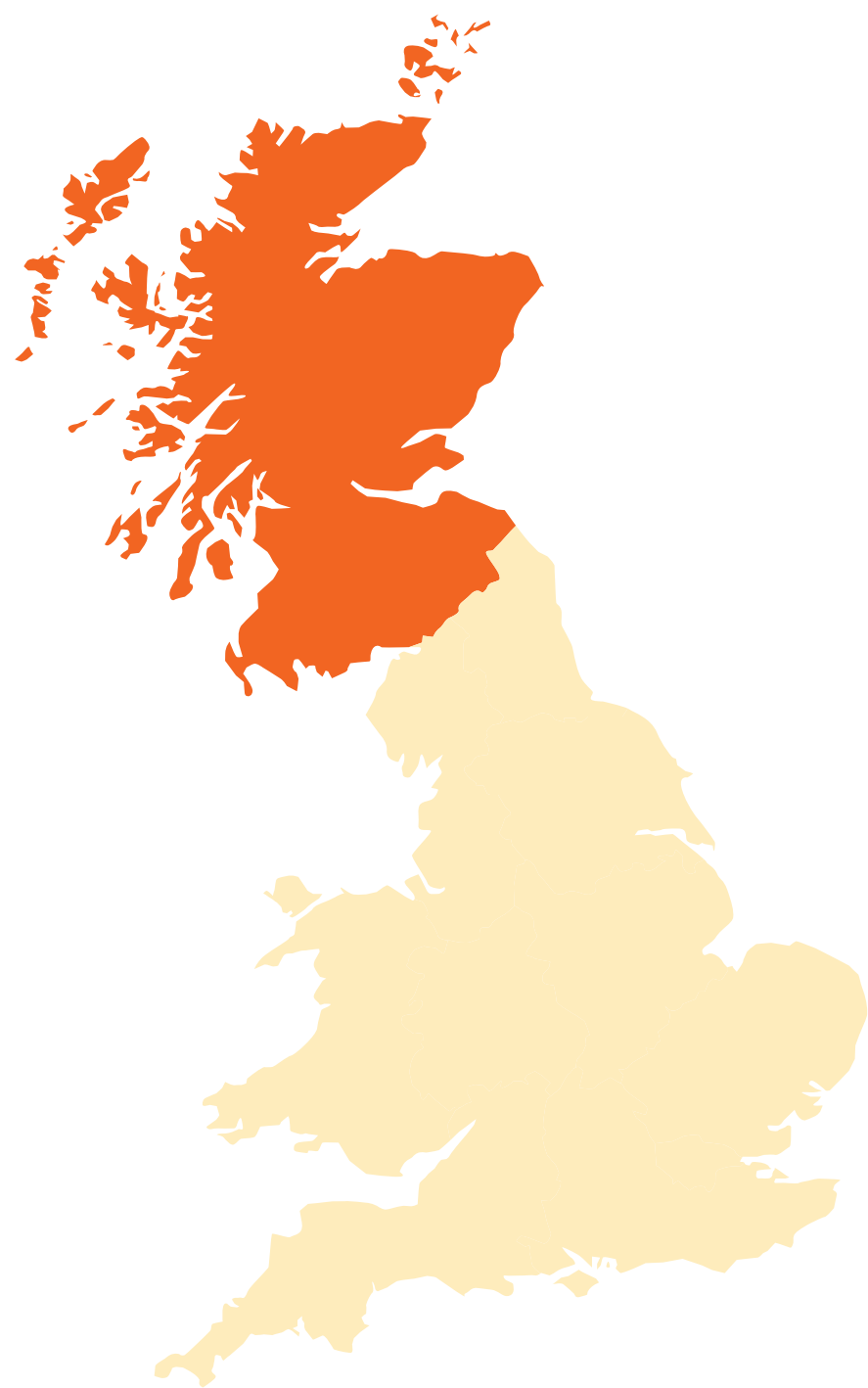


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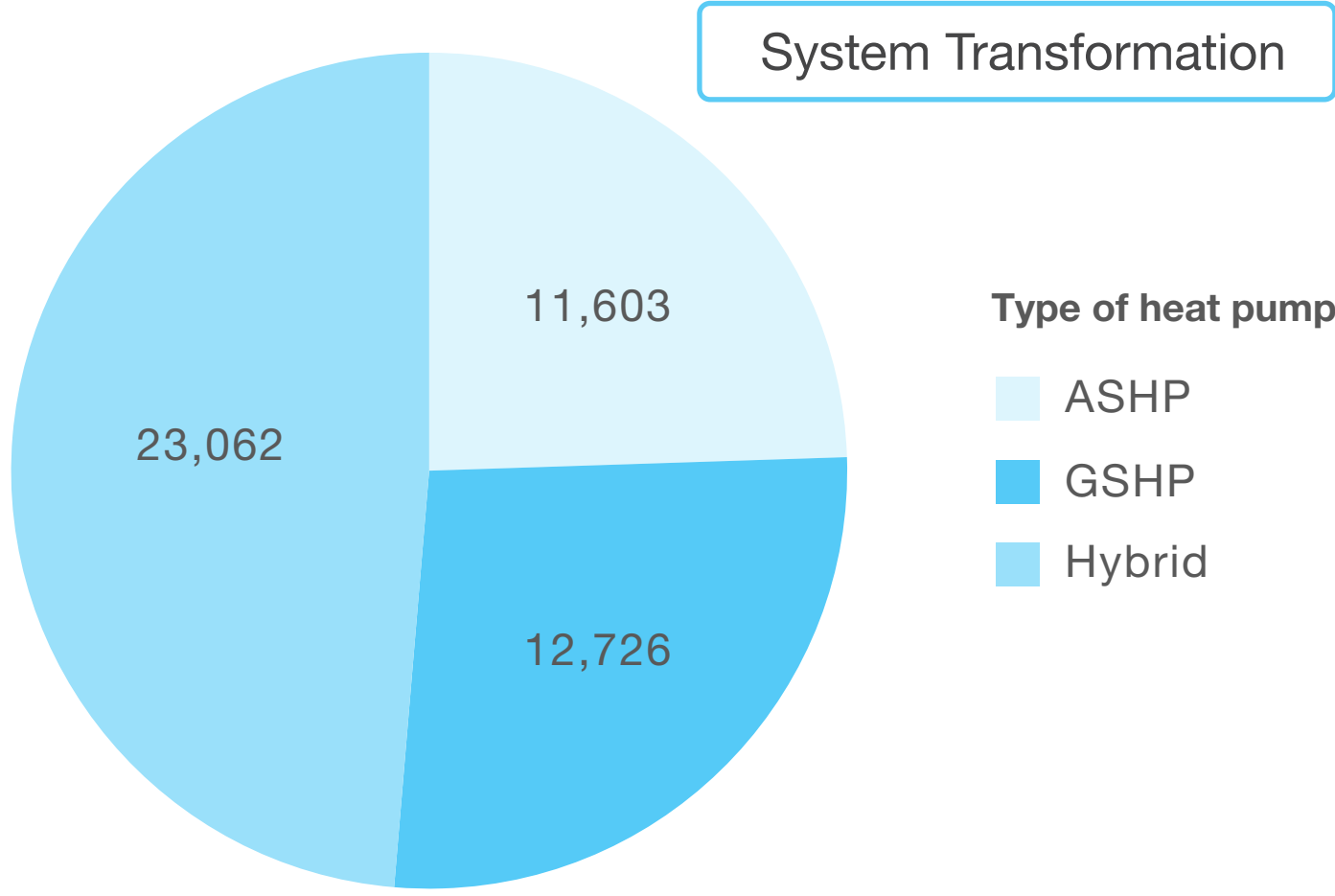
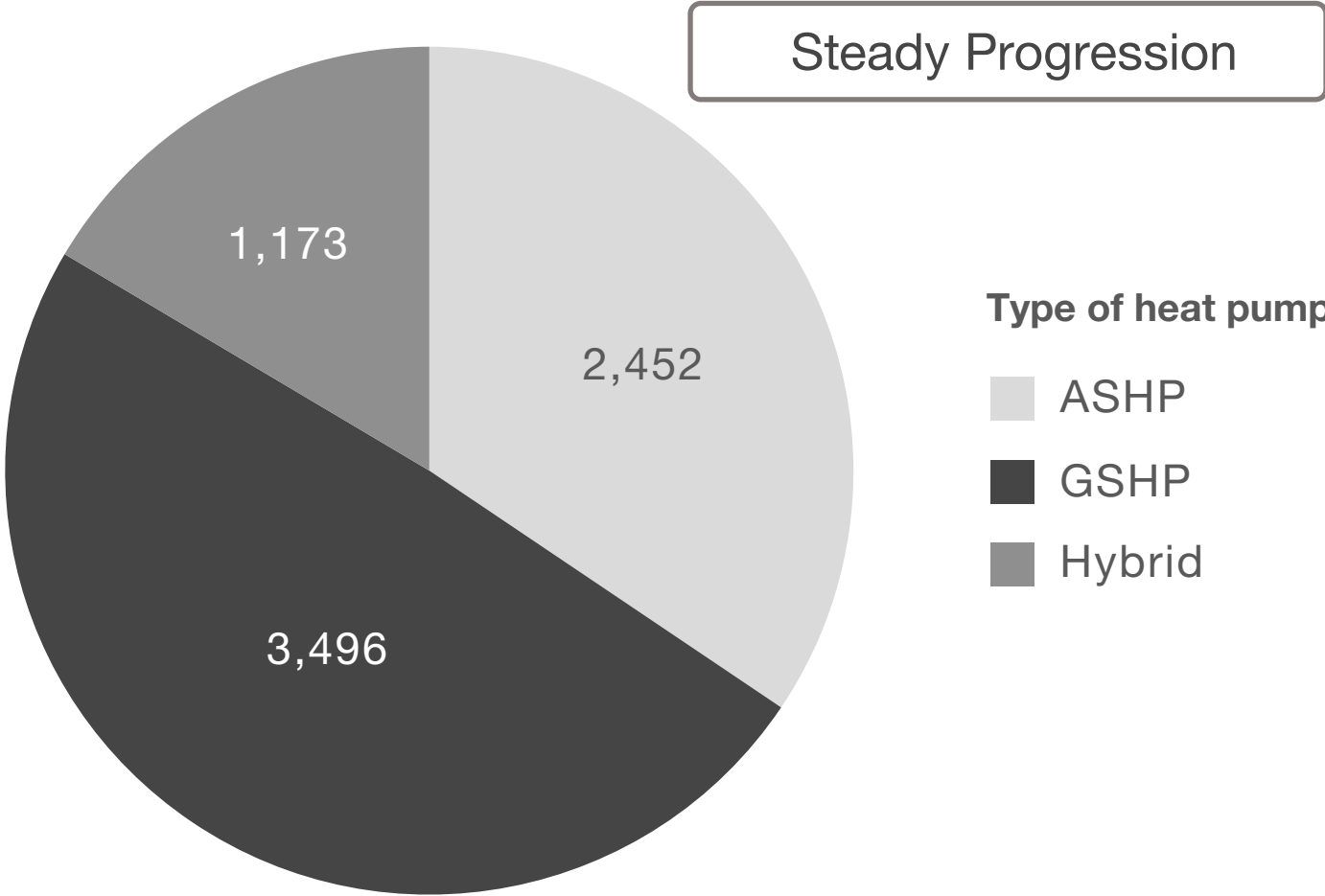
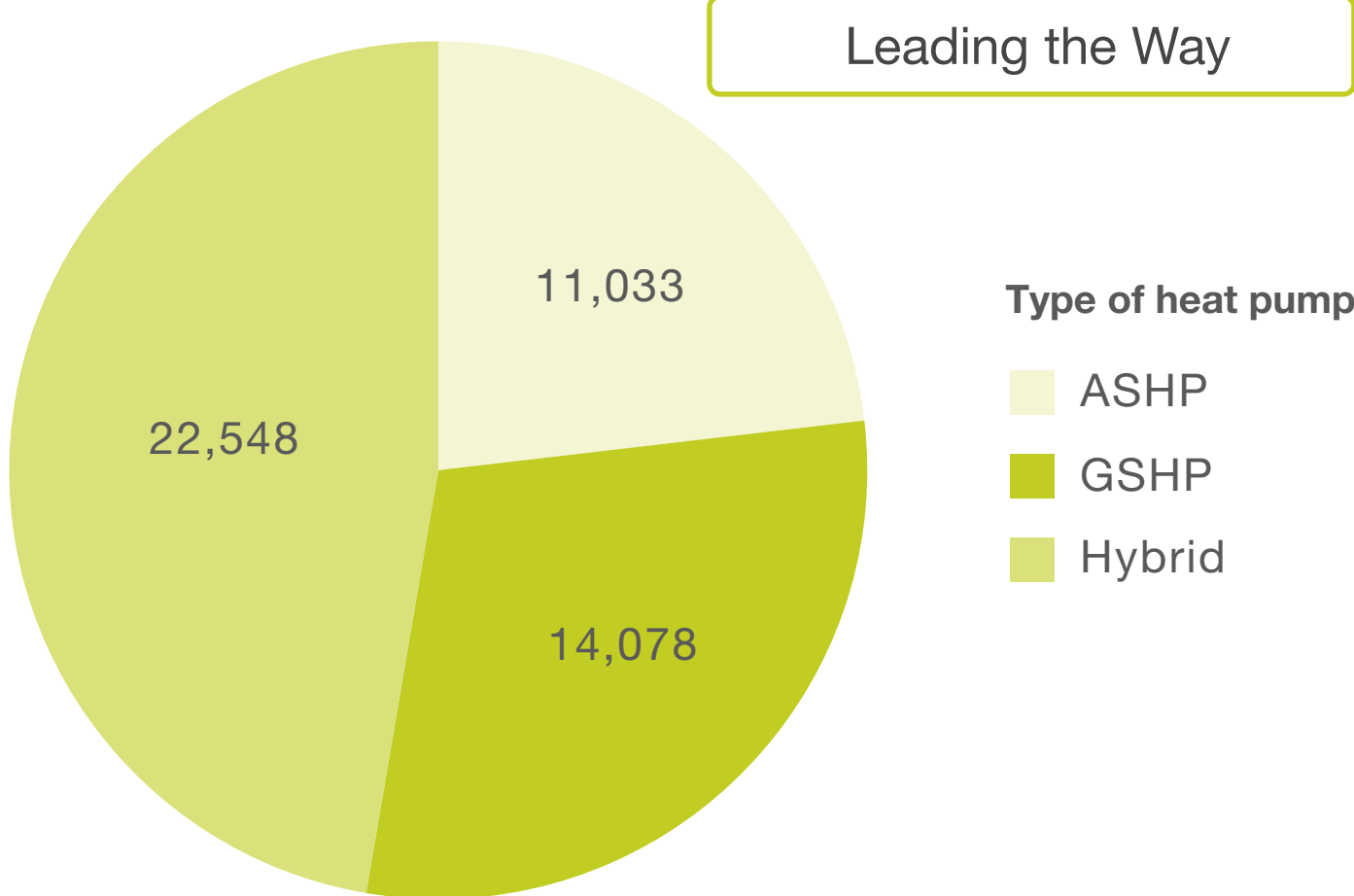
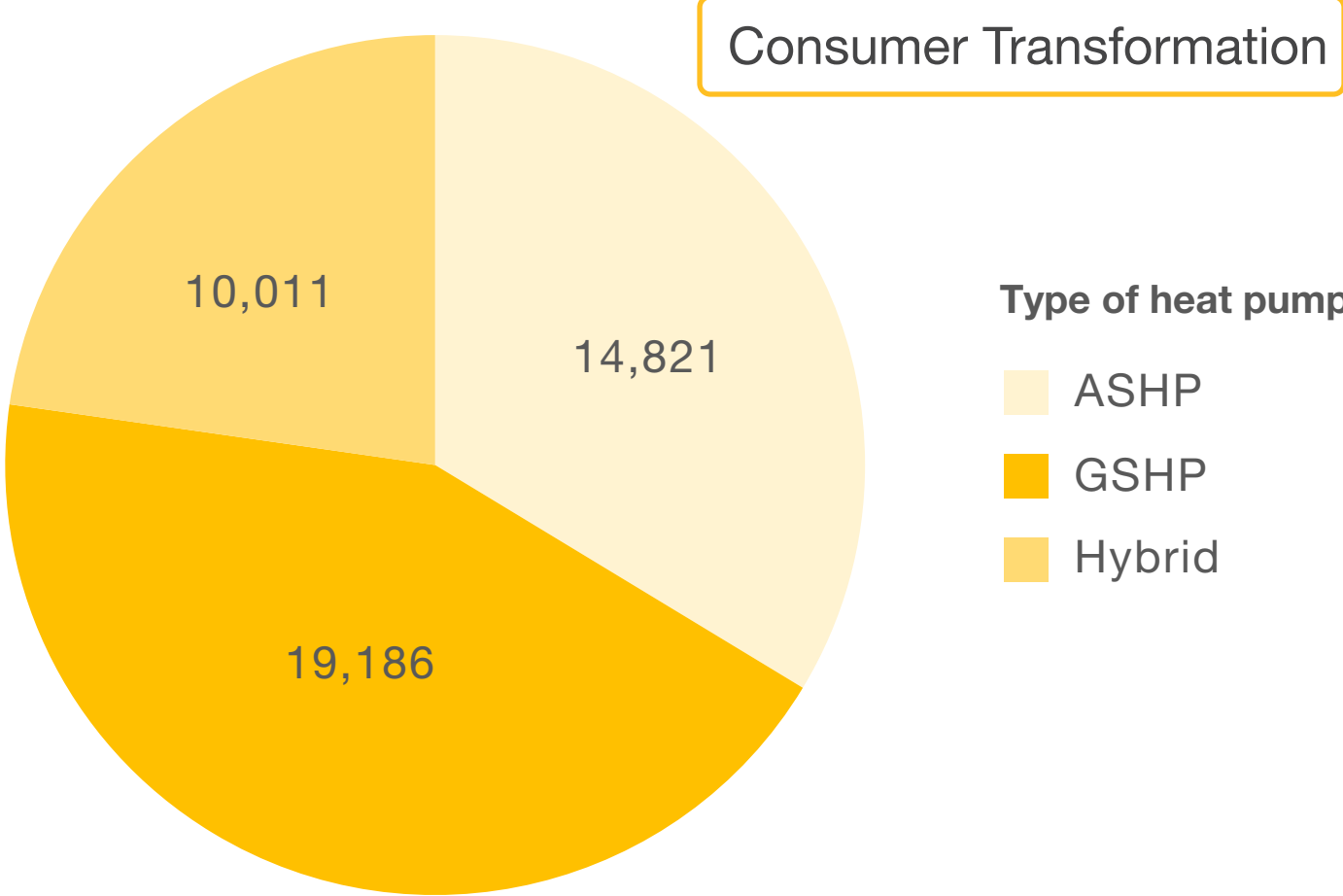


Regionalisation of FES: How can it be used?

Potential number and type of I&C heat pumps in 2050 in FES Scenarios, Scotland.

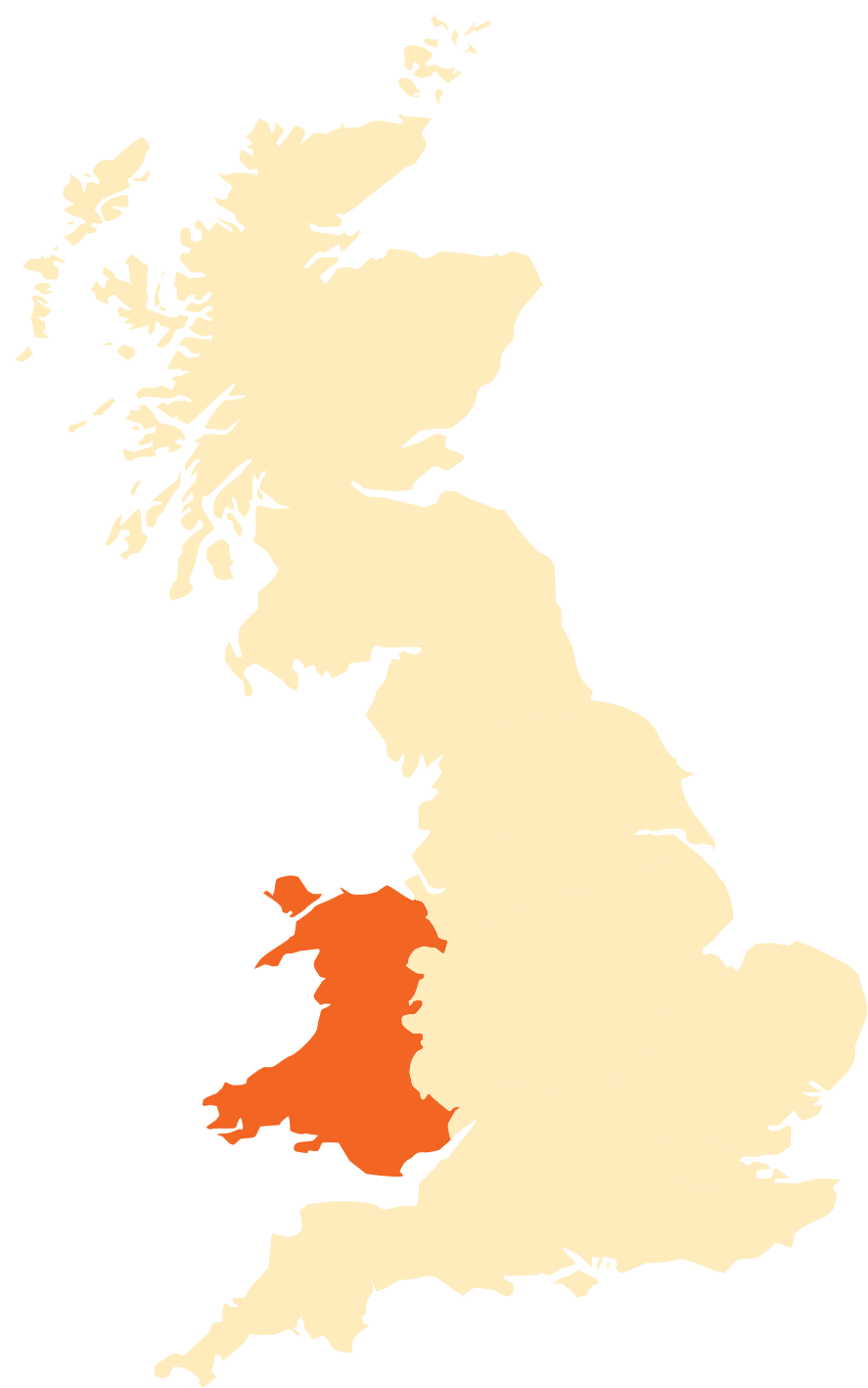


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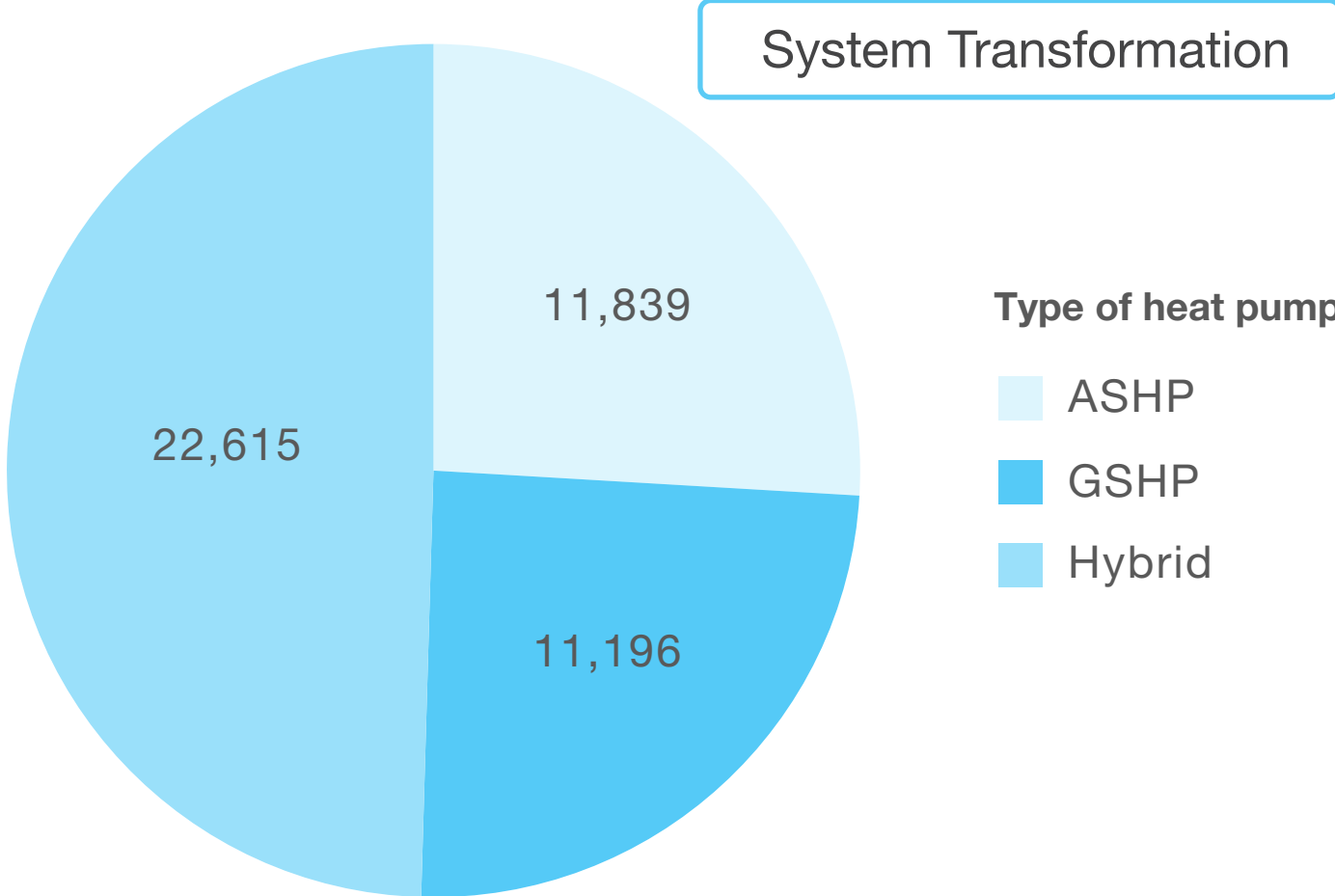
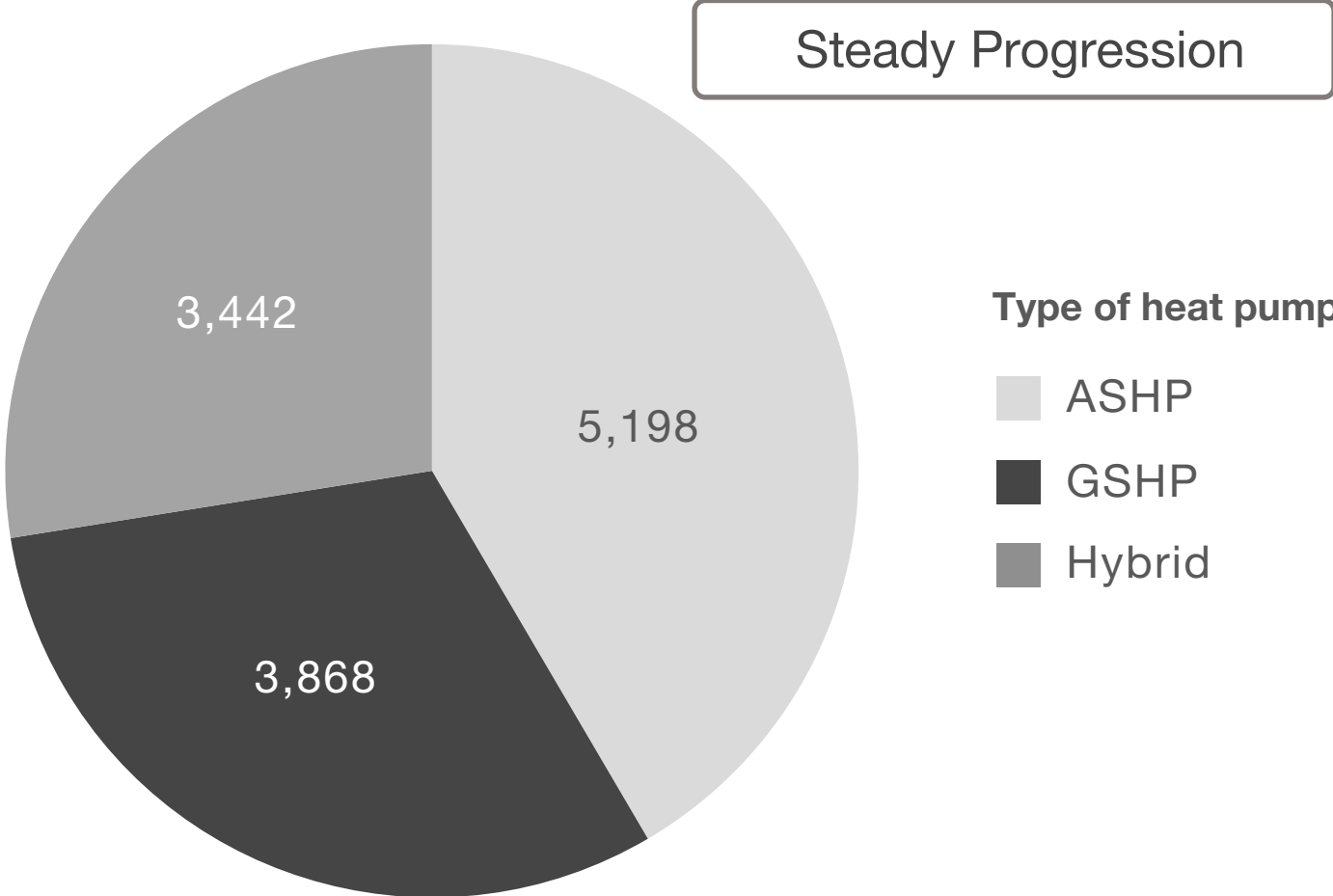
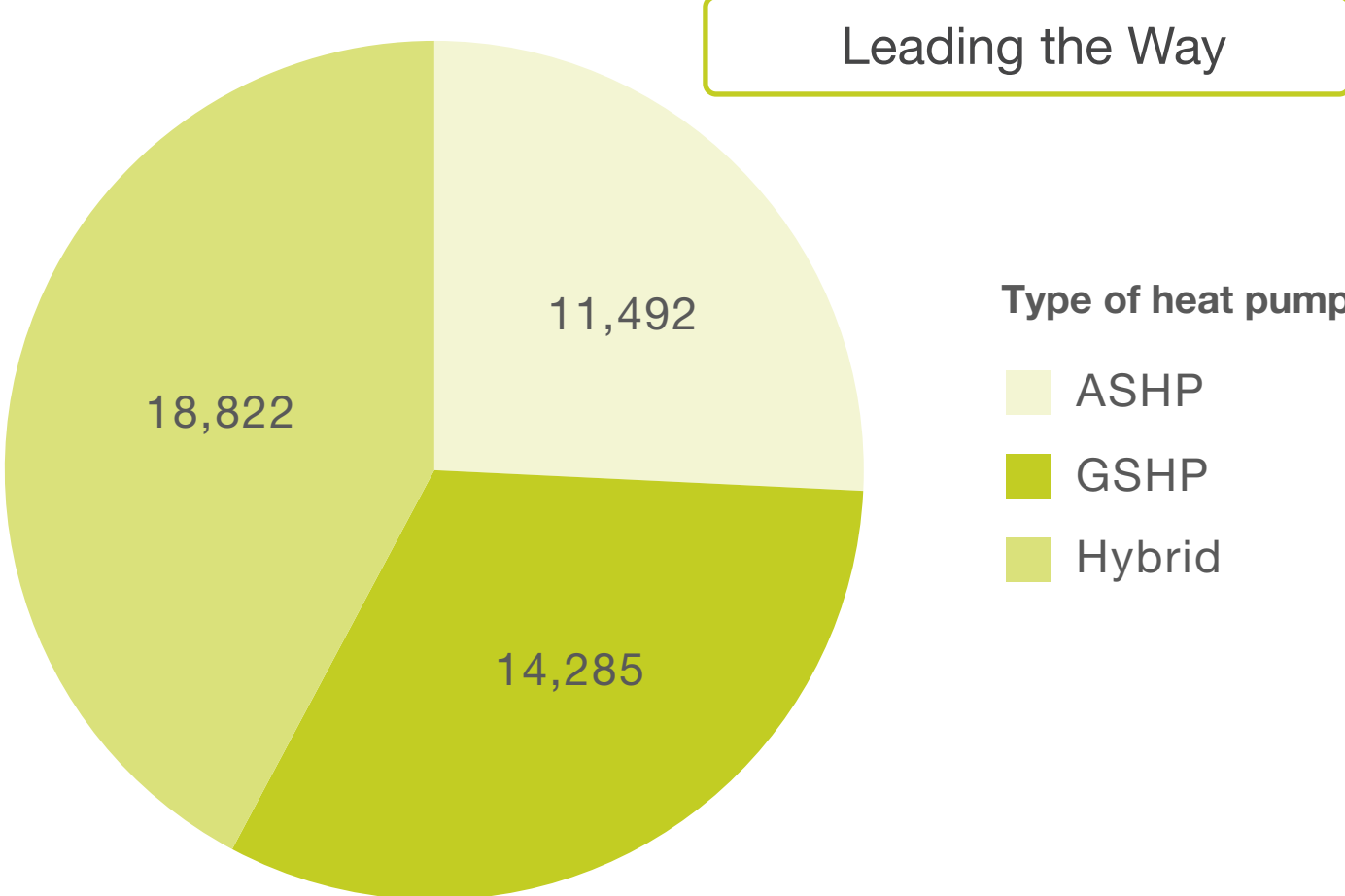
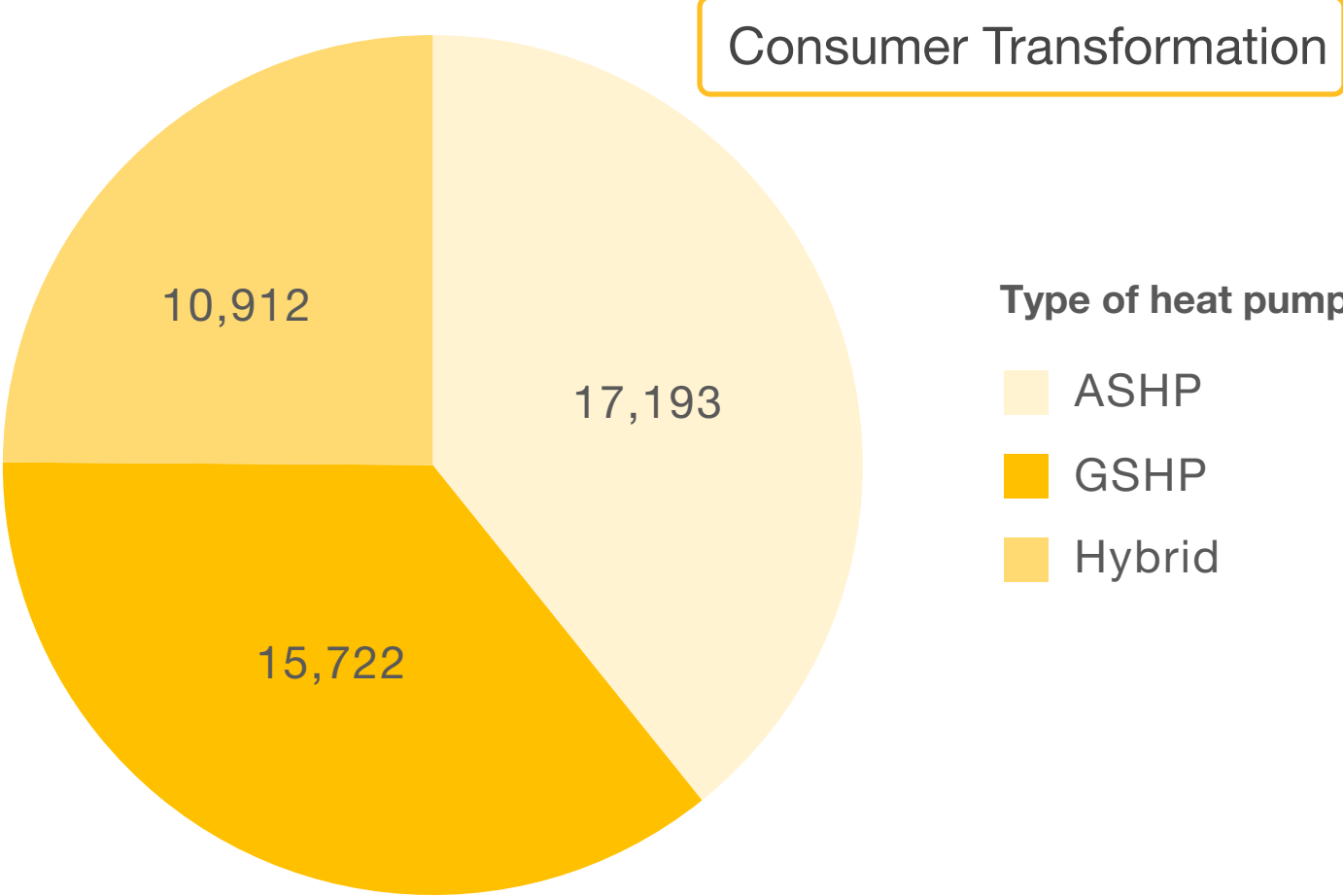


Regionalisation of FES: How can it be used?

Potential number and type of I&C heat pumps in 2050 in FES Scenarios, Wales.



ASHP - Air Source Heat Pump **GSHP** - Ground Source Heat Pump
Hybrid - Heat pumps combined with another technology in a hybrid heating system



Get in touch

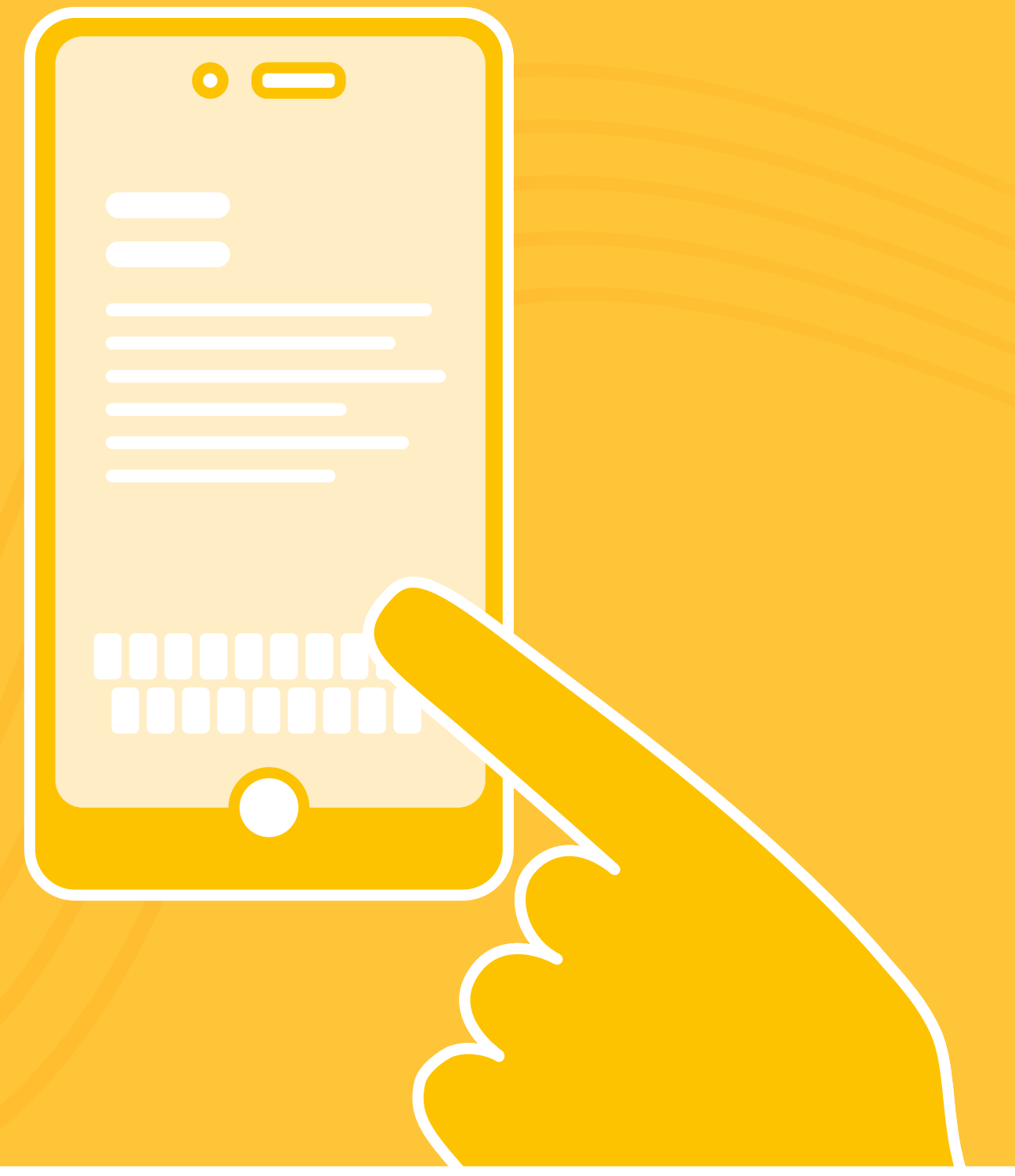
Email us with your views on FES or any of our future of energy documents at: fes@nationalgrideso.com and one of our team members will get in touch.

Access our current and past FES documents, data and multimedia at: nationalgrideso.com/future-energy/futureenergy-Scenarios

Get involved in the debate on the future of energy and join our LinkedIn group: [Future of Energy by National Grid ESO](#)

To find out more on the Regionalisation of FES please visit: nationalgrideso.com/future-energy/future-energy-scenarios/regionalisation-fes

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