Stakeholder consultation - WPD Distribution Future Energy Scenarios

West Midlands licence area - 22 May 2020

Regen

Regen is a mission-led membership organisation, a centre of energy expertise and market insight. We work with community energy groups, local authorities, network operators, developers and other stakeholders to help decarbonise, decentralise, and democratise the energy system.

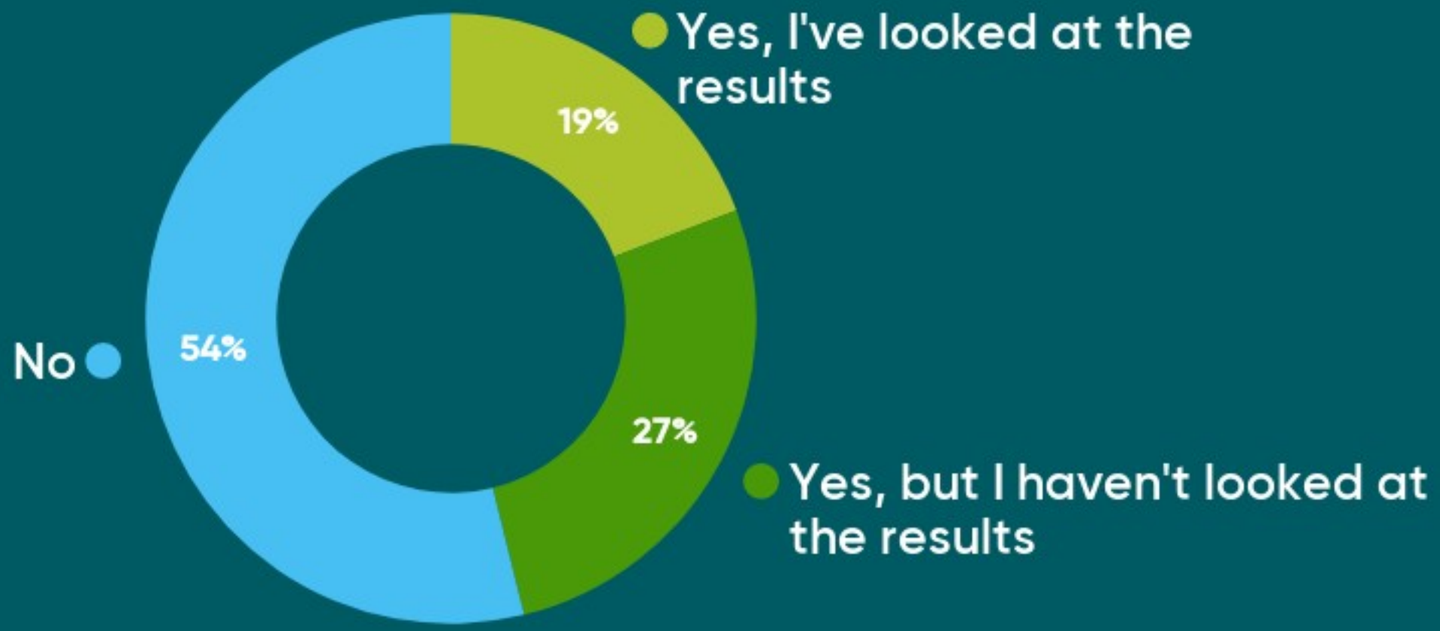
Agenda

- WPD - Network strategy for net zero future energy scenarios
- Regen - Modelling the 2020 future energy scenarios
- Regen - Modelling new homes and non-domestic developments
- Q&A

Menti.com to interact with the presentations

Ask questions on your phone using the code above, Please leave a name and email address so that any questions not answered in the time we have, we can contact you separately to answer.

Were you aware of the WPD Distribution Future Energy Scenarios process before today?



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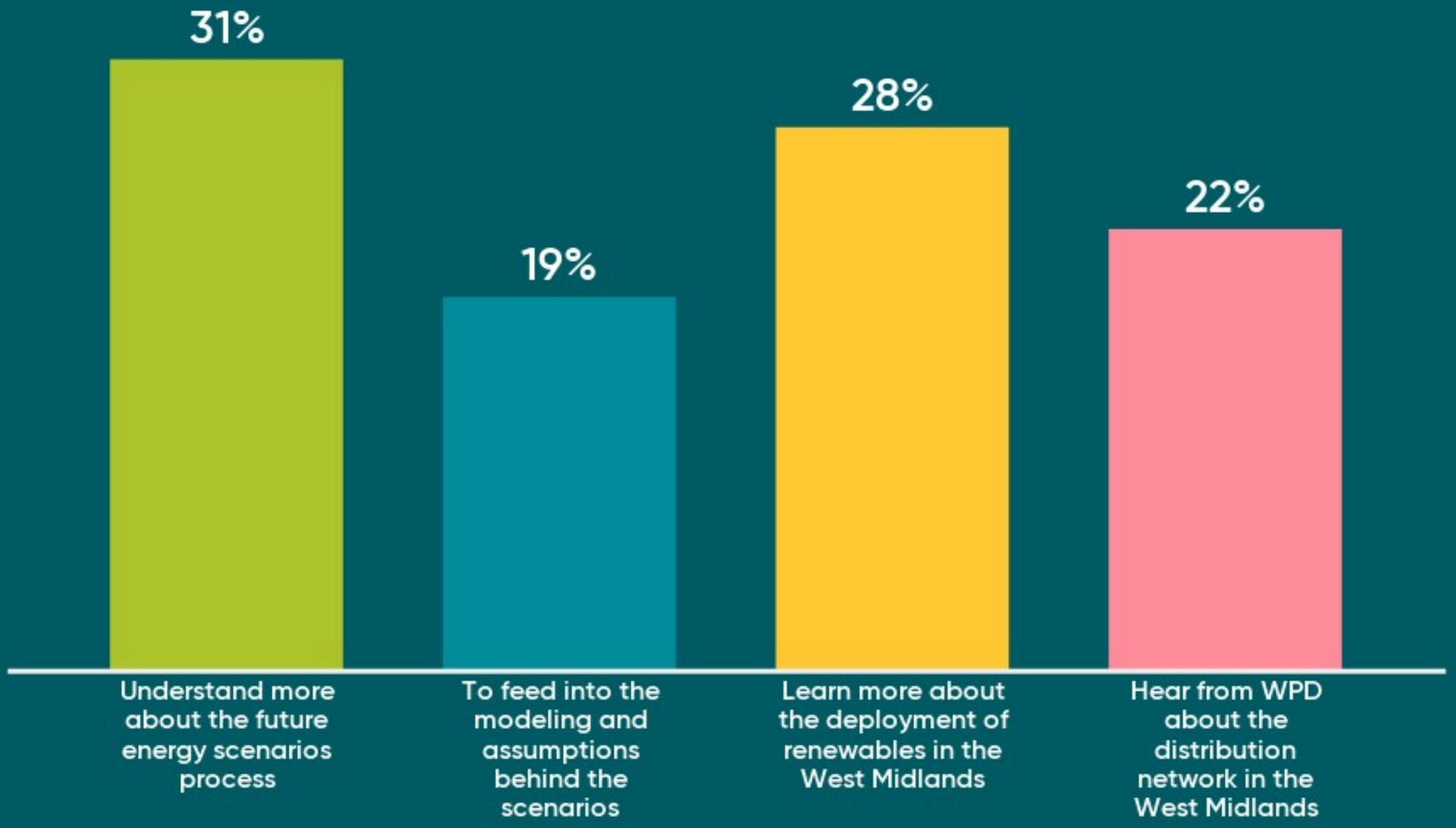
What do you want to get out of today?



Network strategy for net zero future energy scenarios

Oli Spink - Network Strategy Engineer at Western Power Distribution

Distribution Future Energy Scenarios

Oliver Spink
Network Strategy Engineer

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Topics to Cover

- What are the Distribution Future Energy Scenarios (DFES)?
- Why is the DFES necessary?
- Updates for 2020 DFES
- What is the DFES used for in WPD?

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Distribution Future Energy Scenarios

- As a distribution system operator, we are responsible for facilitating the **electricity** needs of our customers.

- To continue to meet the needs of our customers, we need to understand their future **energy** requirements and likely energy supply mix.

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The need for scenario based planning

- Traditional extrapolation from historic trends are no longer sufficient.
- Need to understand the potential growth of:
  - Emerging demand like EVs and HPs
  - Distributed generation (DG)
  - Battery storage
  - Domestic and non-domestic conventional demand growth
- Understanding the differences between areas of our network, and accepting that a UK view of the future may not correlate with a local picture.

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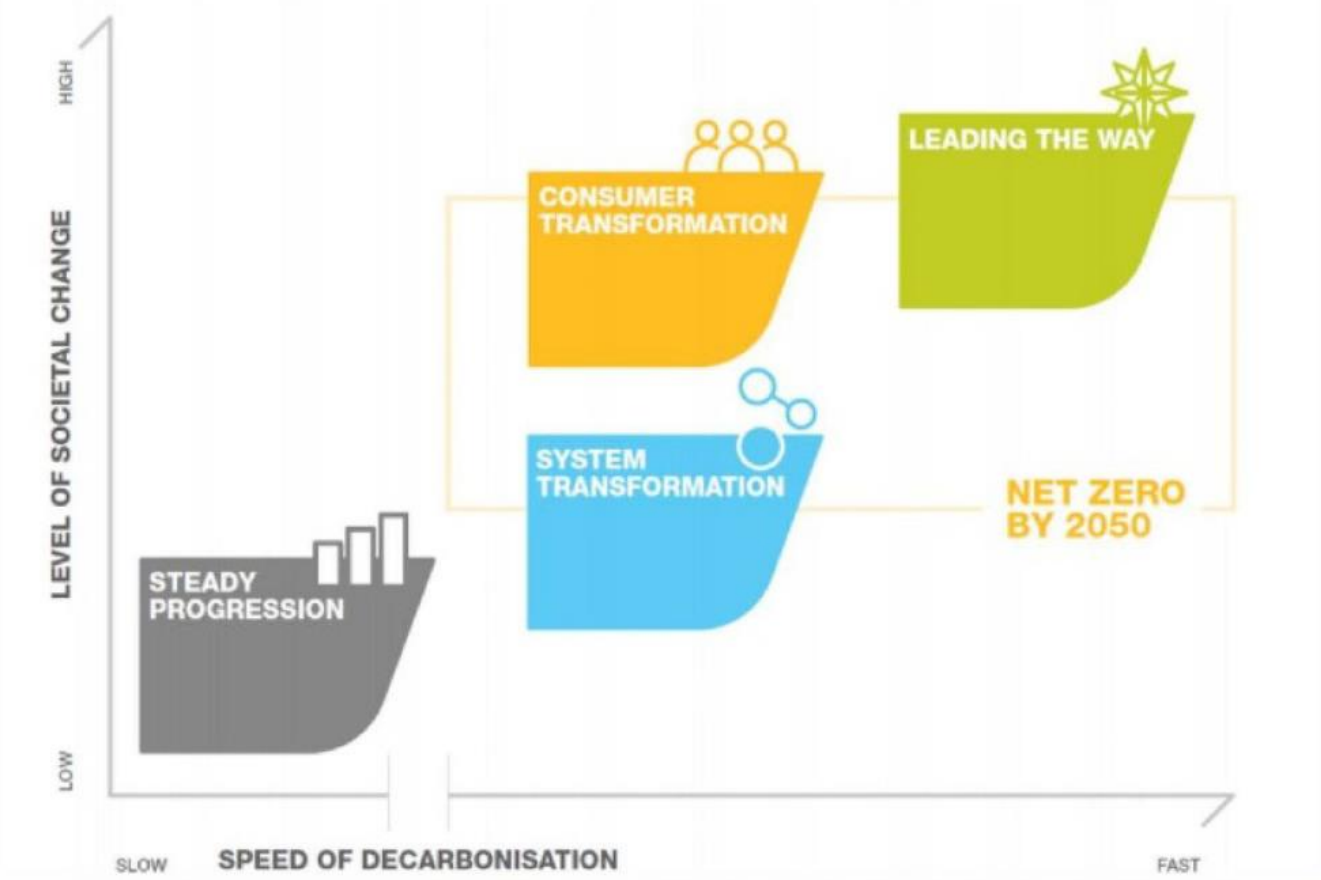
Industry Aligned Scenario Framework

The FES 2020 scenario framework

The FES 2020 scenario framework has been designed to explore the most fundamental drivers of uncertainty in the future energy landscape and reflects extensive analysis and consultation with industry. The new scenario framework is shown below.



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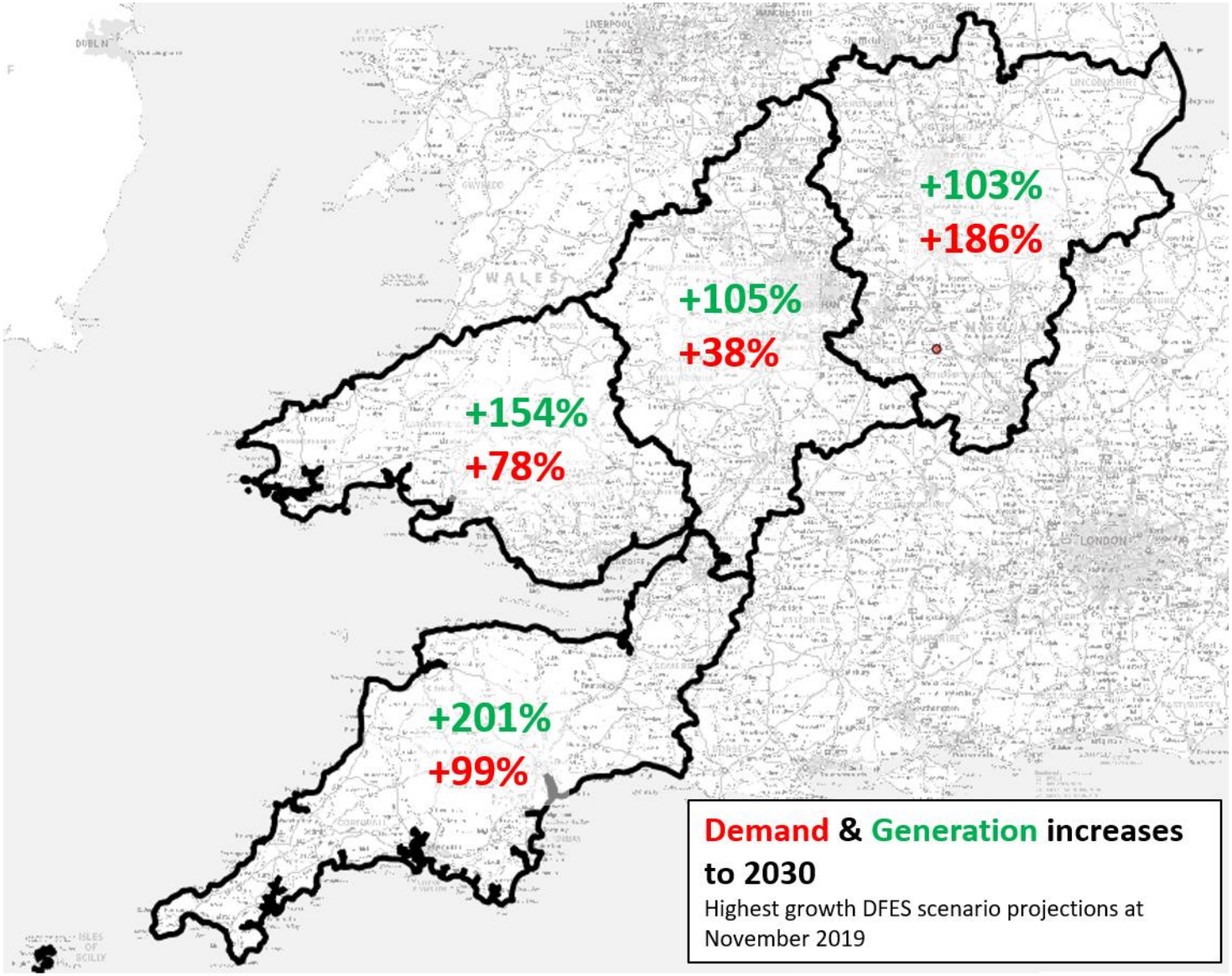
The need for regional scenarios



With reference to a 2019 baseline in each licence area.

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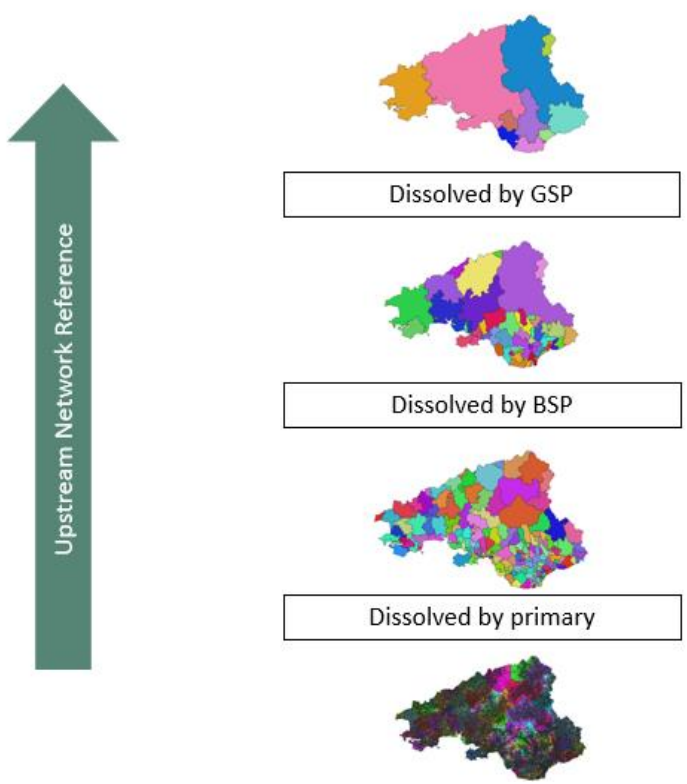
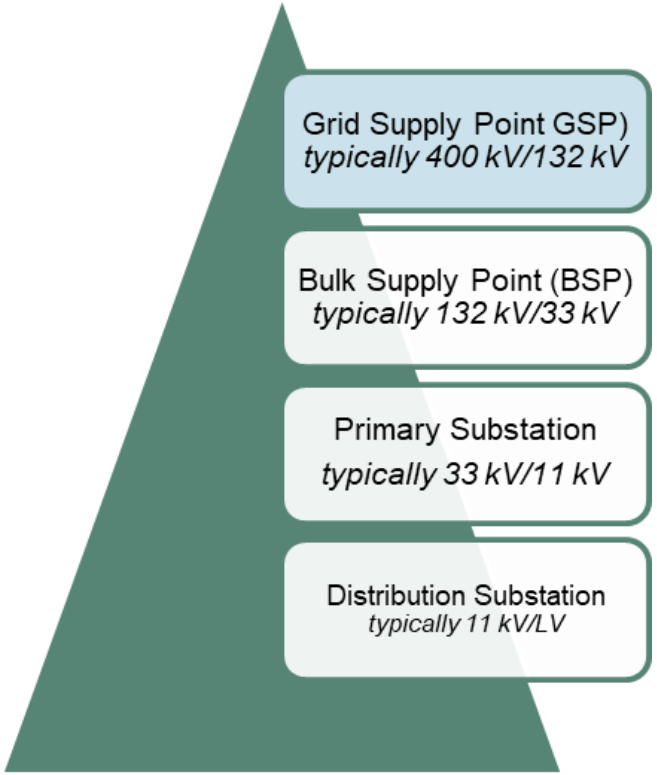
DFES Process – mapping forecasts to our network

Electricity Supply Area – a geographical area which represents a block of demand and generation as visible from the distribution network, sharing the same upstream network infrastructure.





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DFES Process – mapping forecasts to our network

Electricity Supply Area – a geographical area which represents a block of demand and generation as visible from the distribution network, sharing the same upstream network infrastructure.

DFES Round 3

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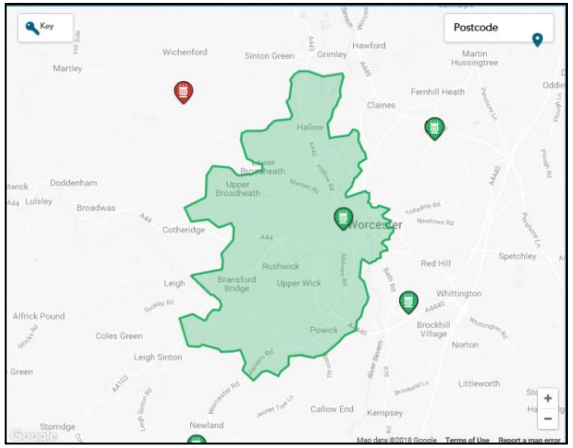
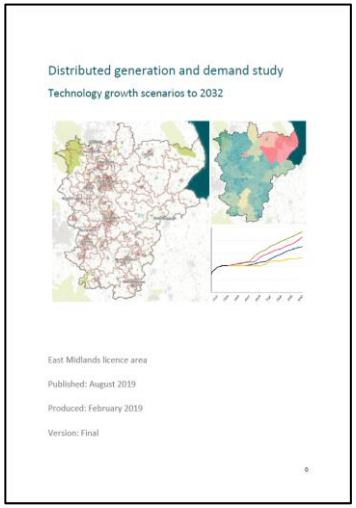
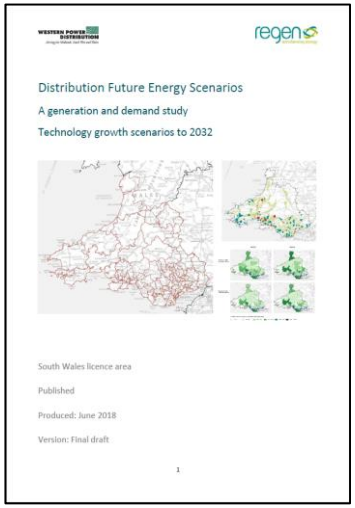
DFES Process – Study Outputs

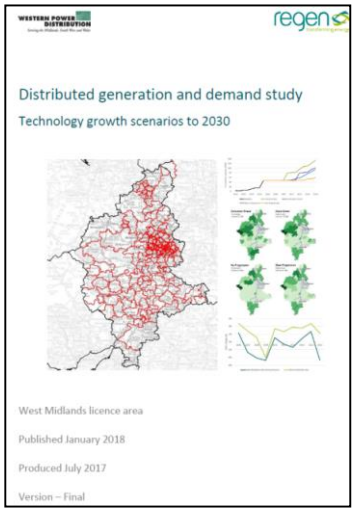
Dataset, with a growth projection for each unique combination of:

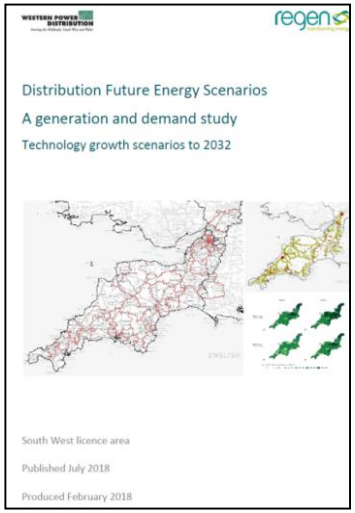
- Electricity Supply Area (~3000)
- Technology type (~50)
- Scenario (4)
- Year (20)











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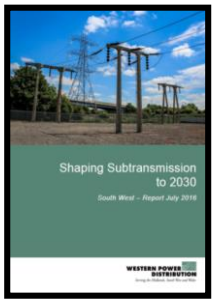
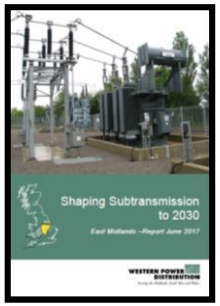
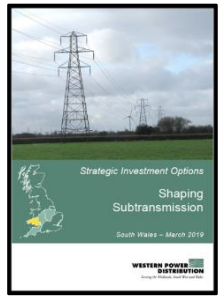
What is the DFES used for in WPD?

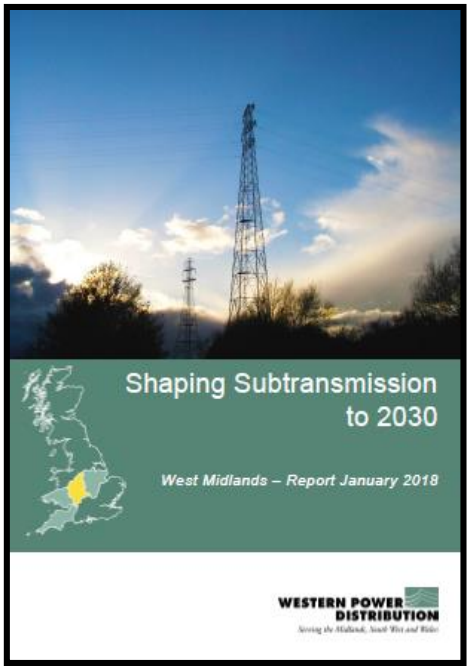
Shaping Subtransmission

- Detailed network review of the subtransmission network
- DFES a direct input into Shaping Subtransmission studies
- Completed on a periodic cycle
- For each combination of scenario, year, day and half-hour the network is assessed for thermal issues, voltage violations and lost load under intact and credible outage conditions
- Recommend different reinforcements/solutions to solve network constraints in different years and scenarios
- Publish a report with a summary of findings and run a webinar









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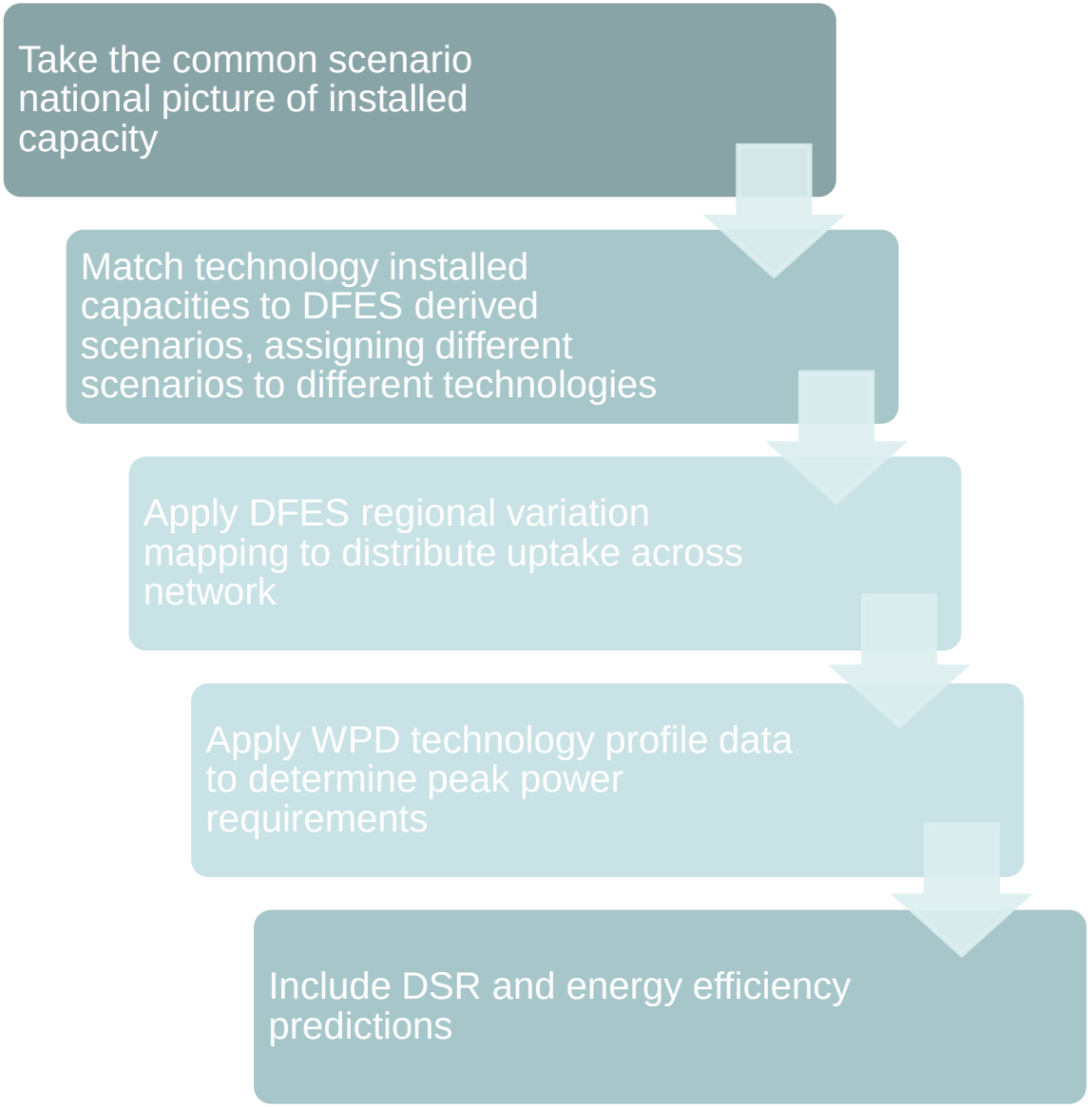
What is the DFES used for in WPD?



RIIO-ED2 Business Planning

Uses the Ofgem Common Scenario framework which is aligned to the DFES scenario projections, to create a WPD view of the future for ED2 Planning Purposes.

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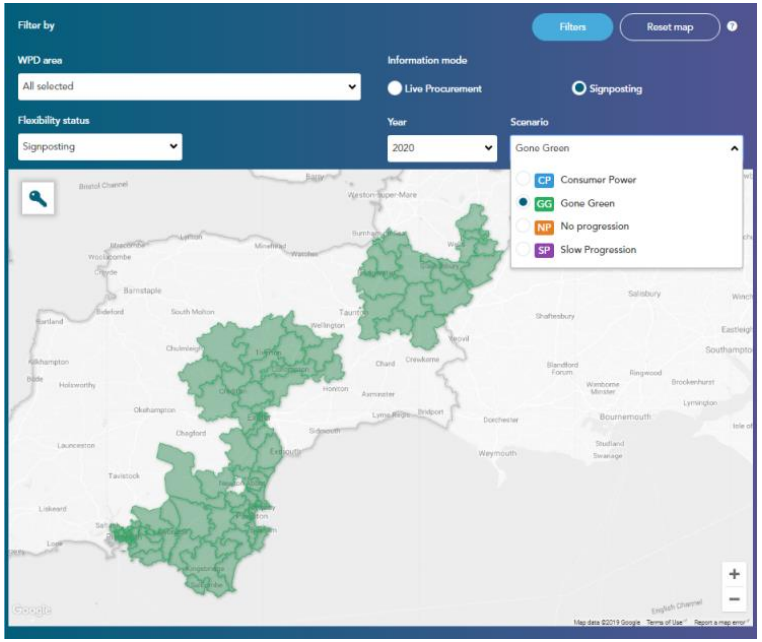
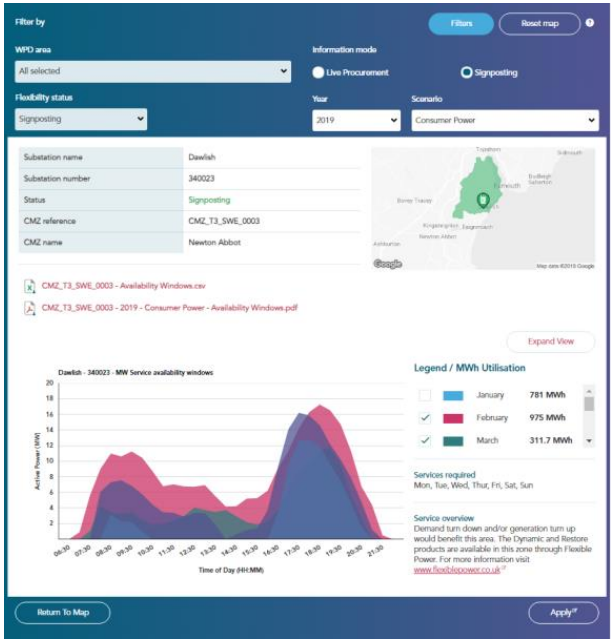
What is the DFES used for in WPD?

Signposting – highlighting potential system needs for flexibility services aligned with the DFES scenario projections.

Flexible Power – procurement of services (where appropriate) to alleviate a potential constraint.





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What is the DFES used for in WPD?

Improving Data Transparency

WPD publish DFES scenario data on our website at:

www.westernpower.co.uk/distribution-future-energy-scenarios-map

Further Collaboration

If you have any questions in relation to WPD's Network Strategy work, please contact WPD on the details below:

Email: wpdnetworkstrategy@westernpower.co.uk

By post:
Network Strategy Team
Western Power Distribution
Feeder Road
Bristol
BS2 0TB

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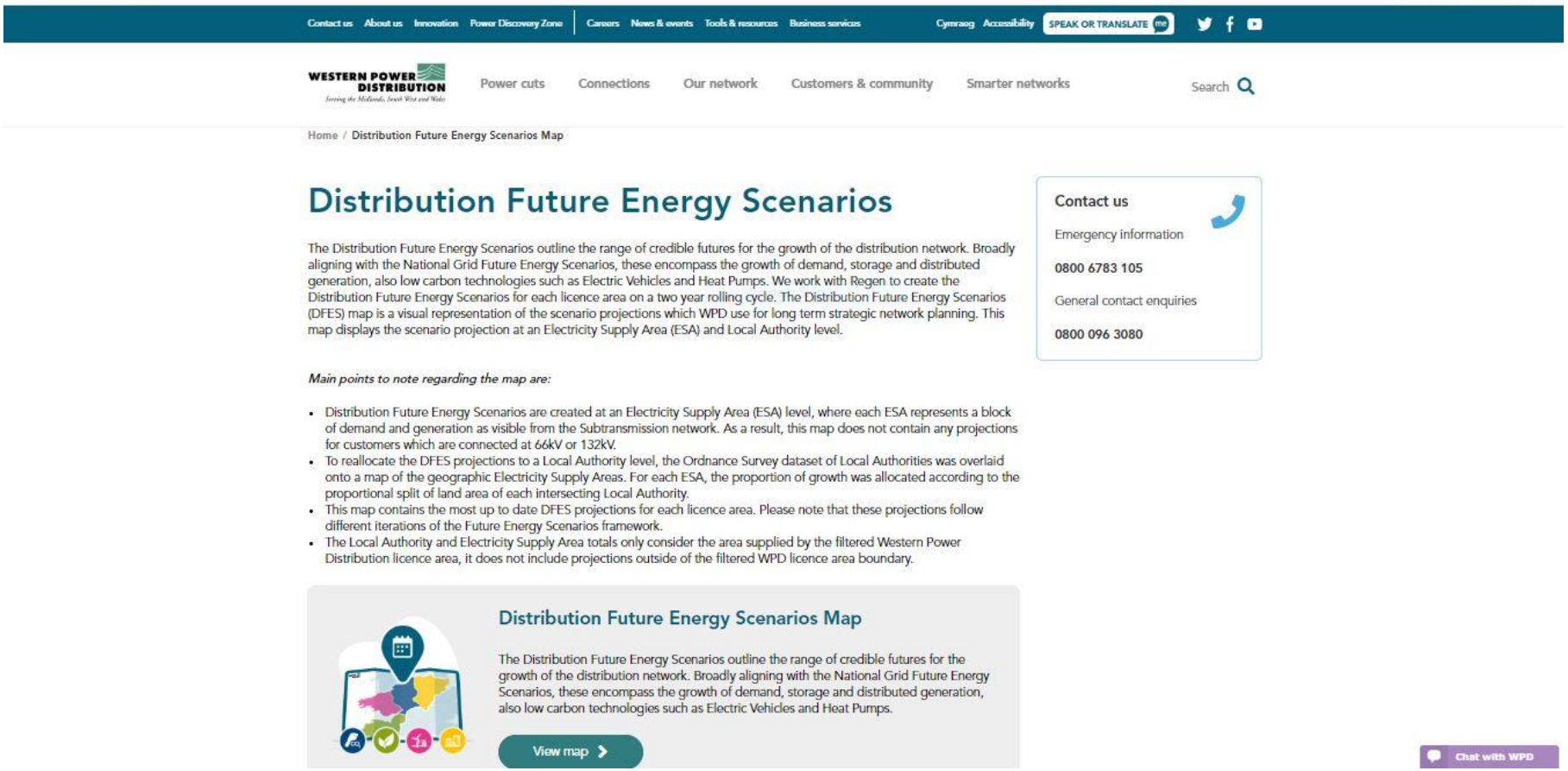
DFES Map



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Home / Distribution Future Energy Scenarios Map

Distribution Future Energy Scenarios

The Distribution Future Energy Scenarios outline the range of credible futures for the growth of the distribution network. Broadly aligning with the National Grid Future Energy Scenarios, these encompass the growth of demand, storage and distributed generation, also low carbon technologies such as Electric Vehicles and Heat Pumps. We work with Regen to create the Distribution Future Energy Scenarios for each licence area on a two year rolling cycle. The Distribution Future Energy Scenarios (DFES) map is a visual representation of the scenario projections which WPD use for long term strategic network planning. This map displays the scenario projection at an Electricity Supply Area (ESA) and Local Authority level.

Main points to note regarding the map are:

- Distribution Future Energy Scenarios are created at an Electricity Supply Area (ESA) level, where each ESA represents a block of demand and generation as visible from the Subtransmission network. As a result, this map does not contain any projections for customers which are connected at 66kV or 132kV.
- To reallocate the DFES projections to a Local Authority level, the Ordnance Survey dataset of Local Authorities was overlaid onto a map of the geographic Electricity Supply Areas. For each ESA, the proportion of growth was allocated according to the proportional split of land area of each intersecting Local Authority.
- This map contains the most up to date DFES projections for each licence area. Please note that these projections follow different iterations of the Future Energy Scenarios framework.
- The Local Authority and Electricity Supply Area totals only consider the area supplied by the filtered Western Power Distribution licence area, it does not include projections outside of the filtered WPD licence area boundary.

Distribution Future Energy Scenarios Map

The Distribution Future Energy Scenarios outline the range of credible futures for the growth of the distribution network. Broadly aligning with the National Grid Future Energy Scenarios, these encompass the growth of demand, storage and distributed generation, also low carbon technologies such as Electric Vehicles and Heat Pumps.

View map

Contact us

Emergency information

0800 6783 105

General contact enquiries

0800 096 3080

Chat with WPD

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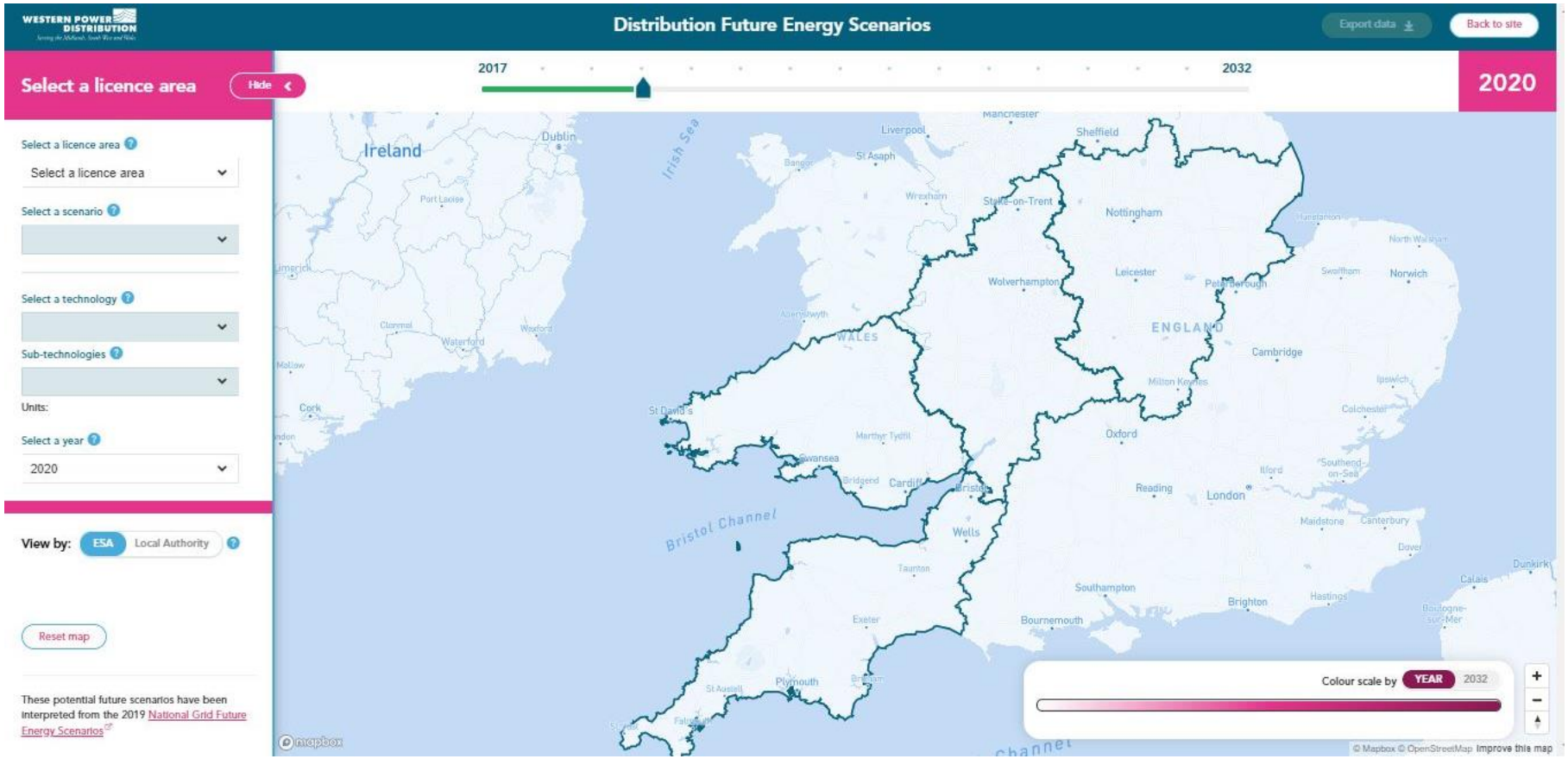
DFES Map



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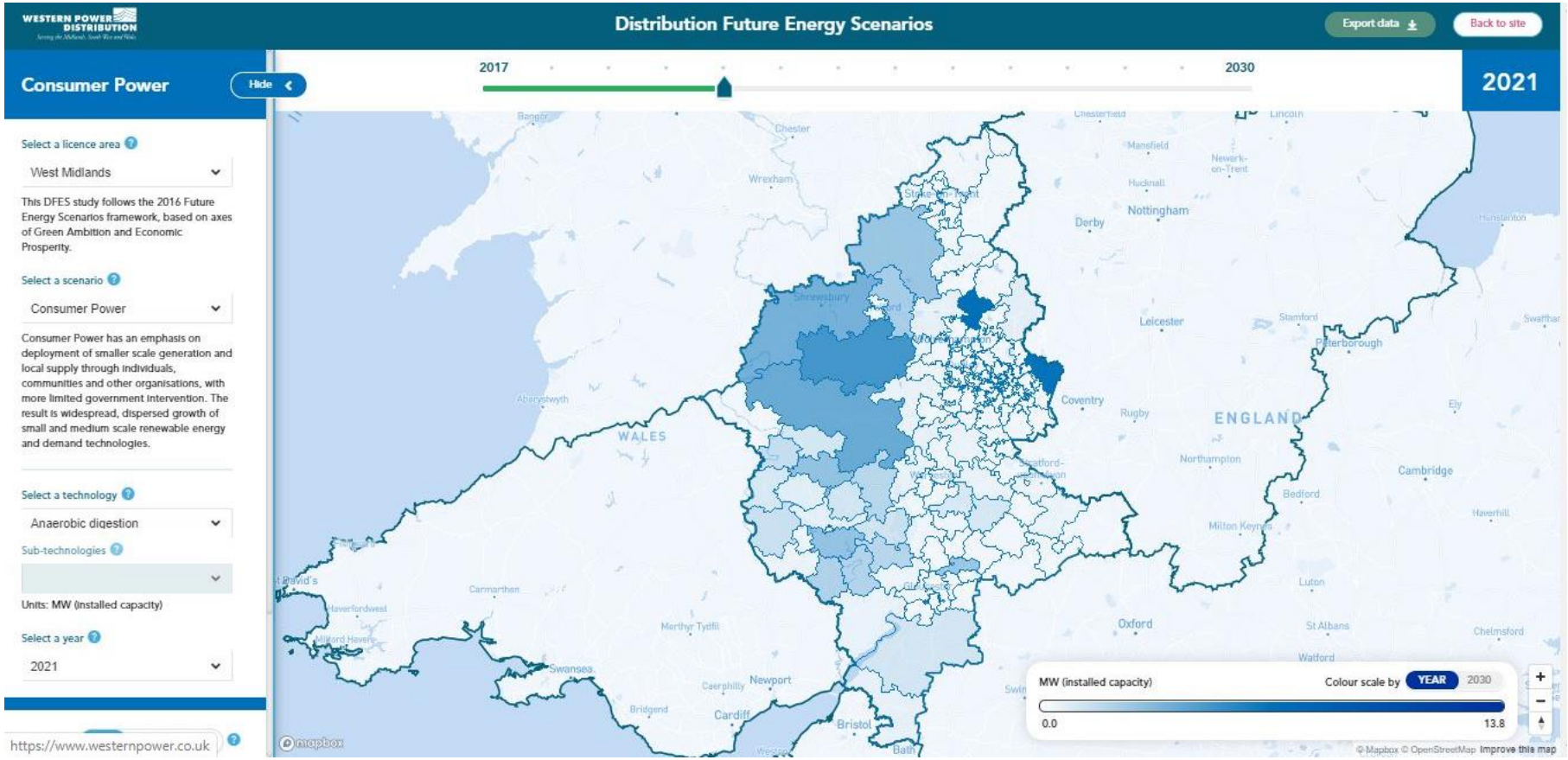
DFES Map



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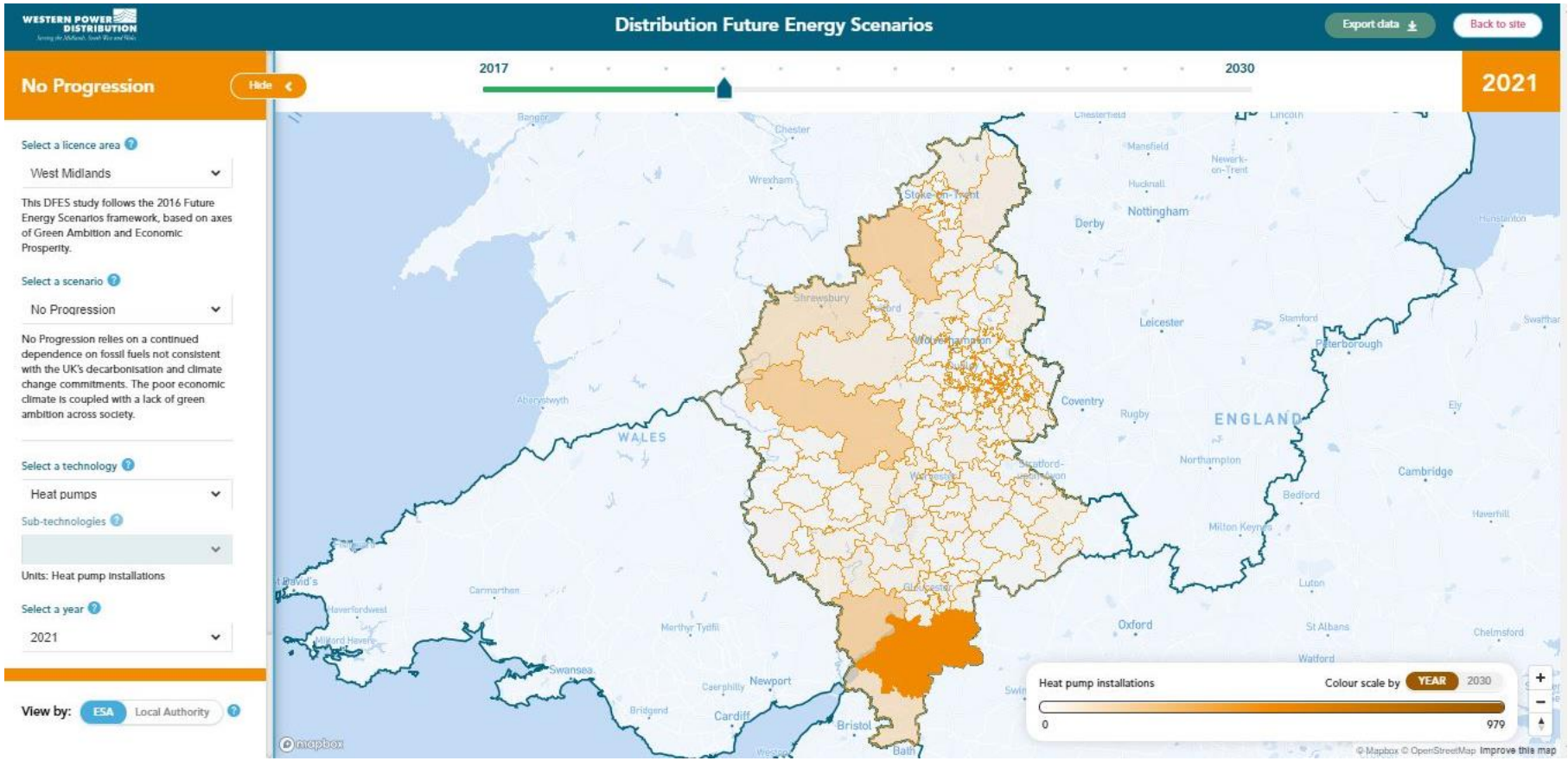
DFES Map



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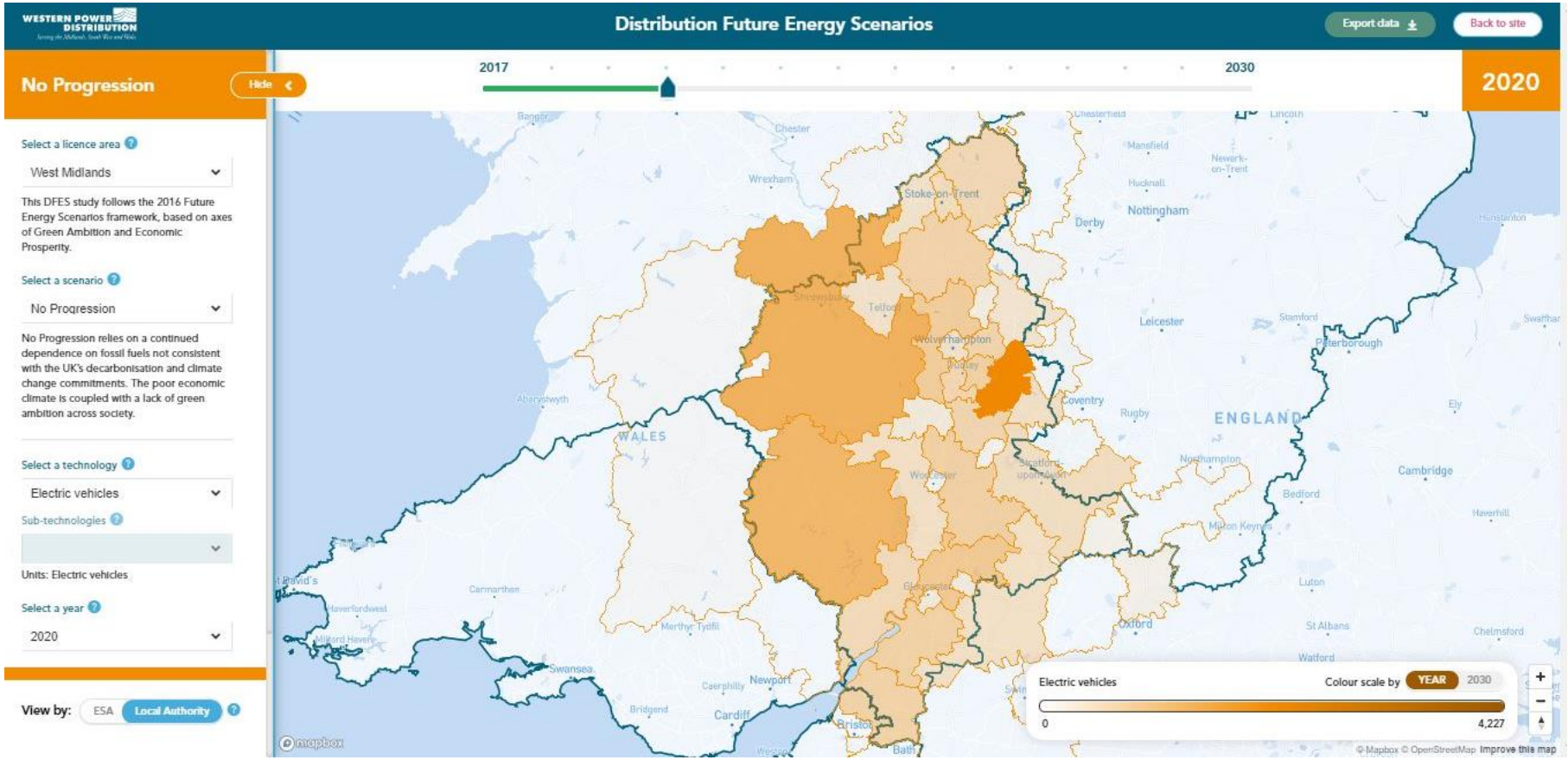

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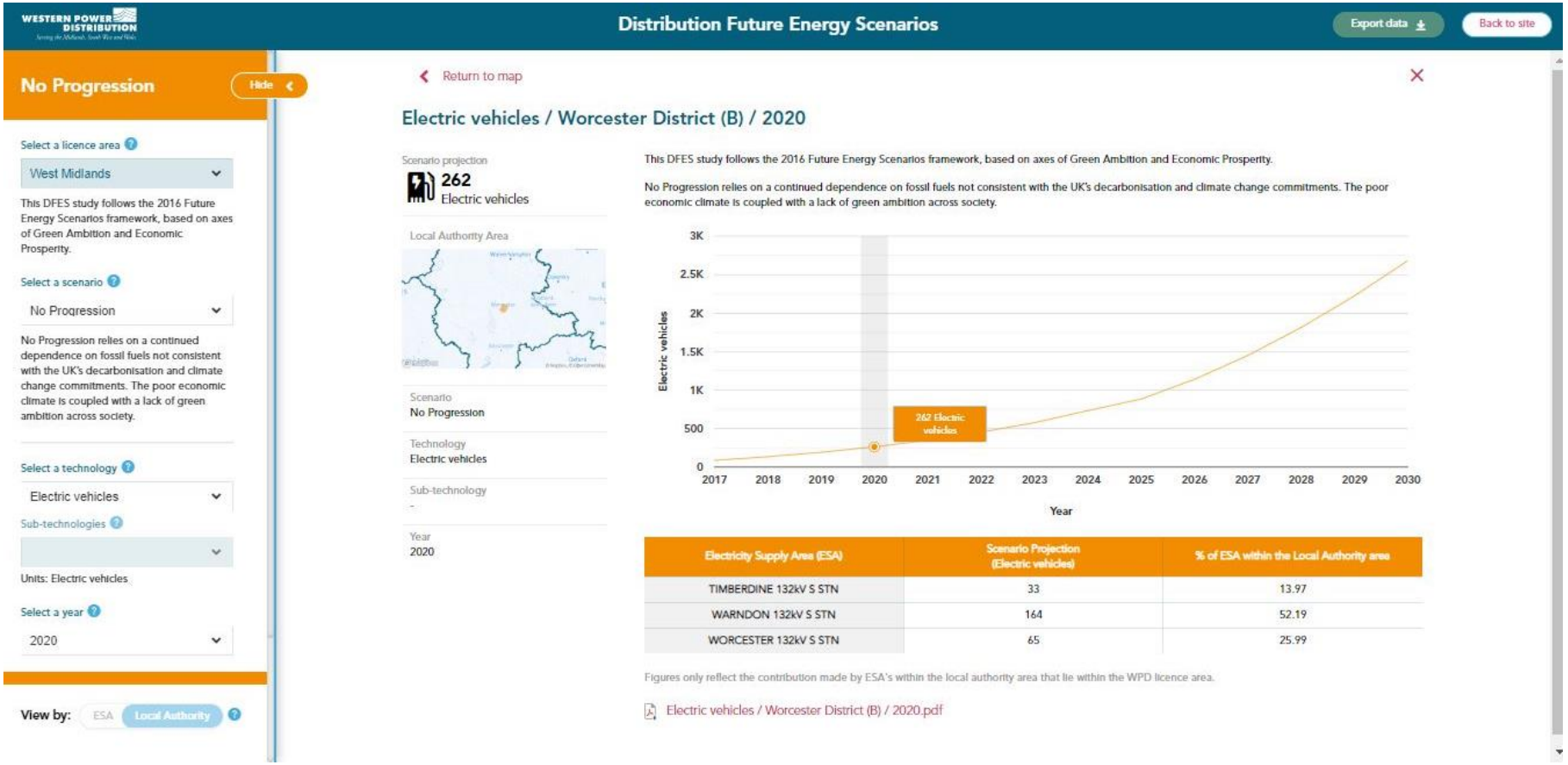
DFES Map



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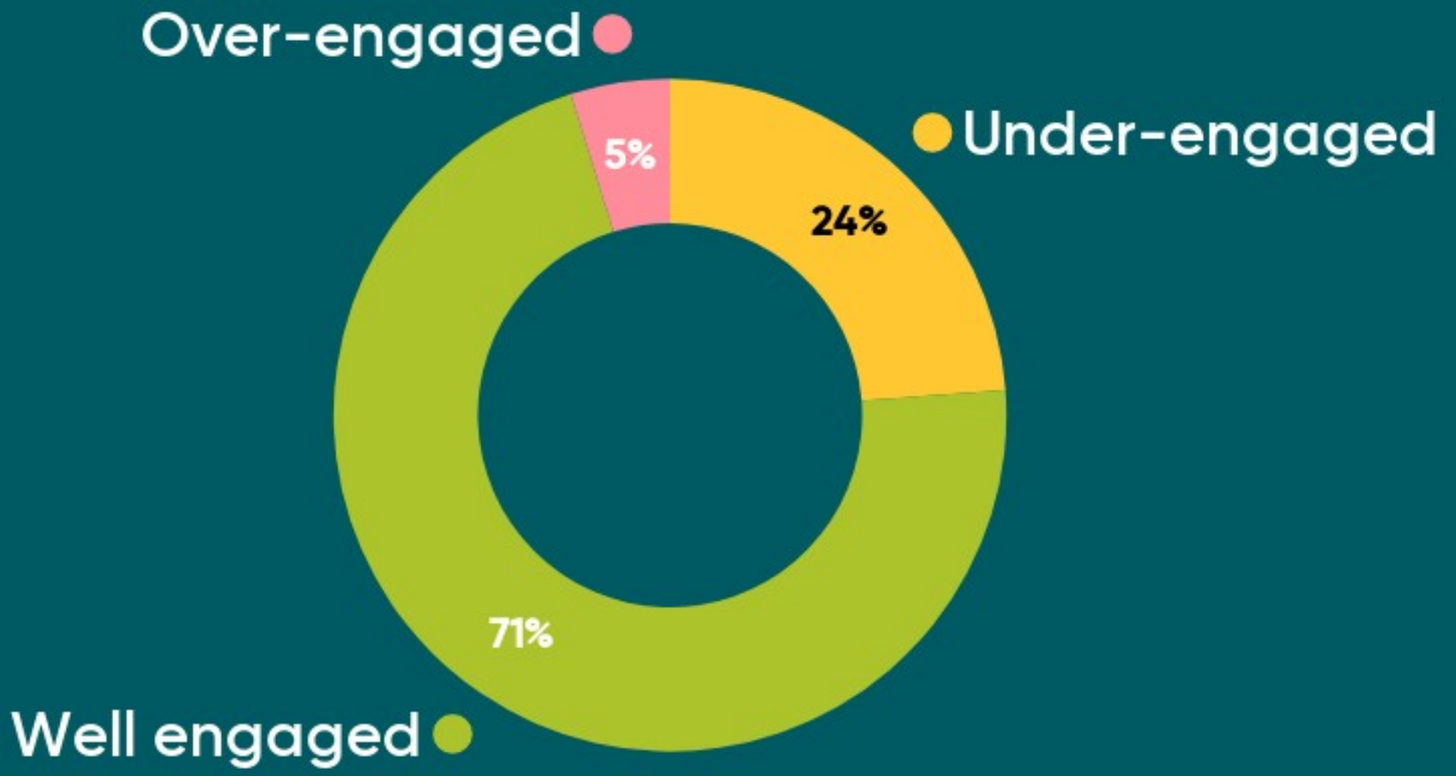
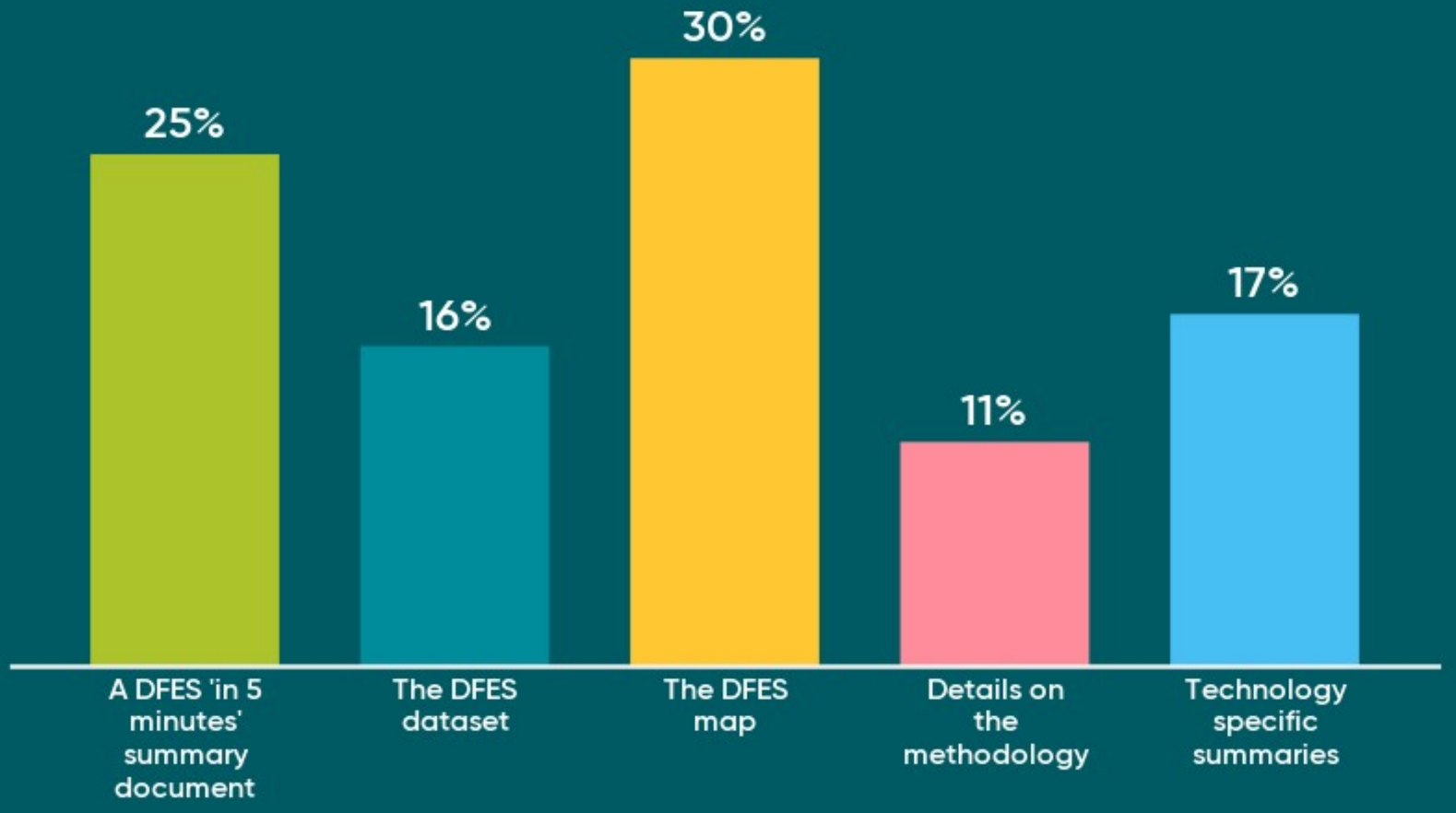
Stakeholder engagement from WPD



Which WPD DFES publications would be useful to you?



Input into modelling the 2020 Future Energy Scenarios

Ben Robertson - Analyst at Regen

Scope of work

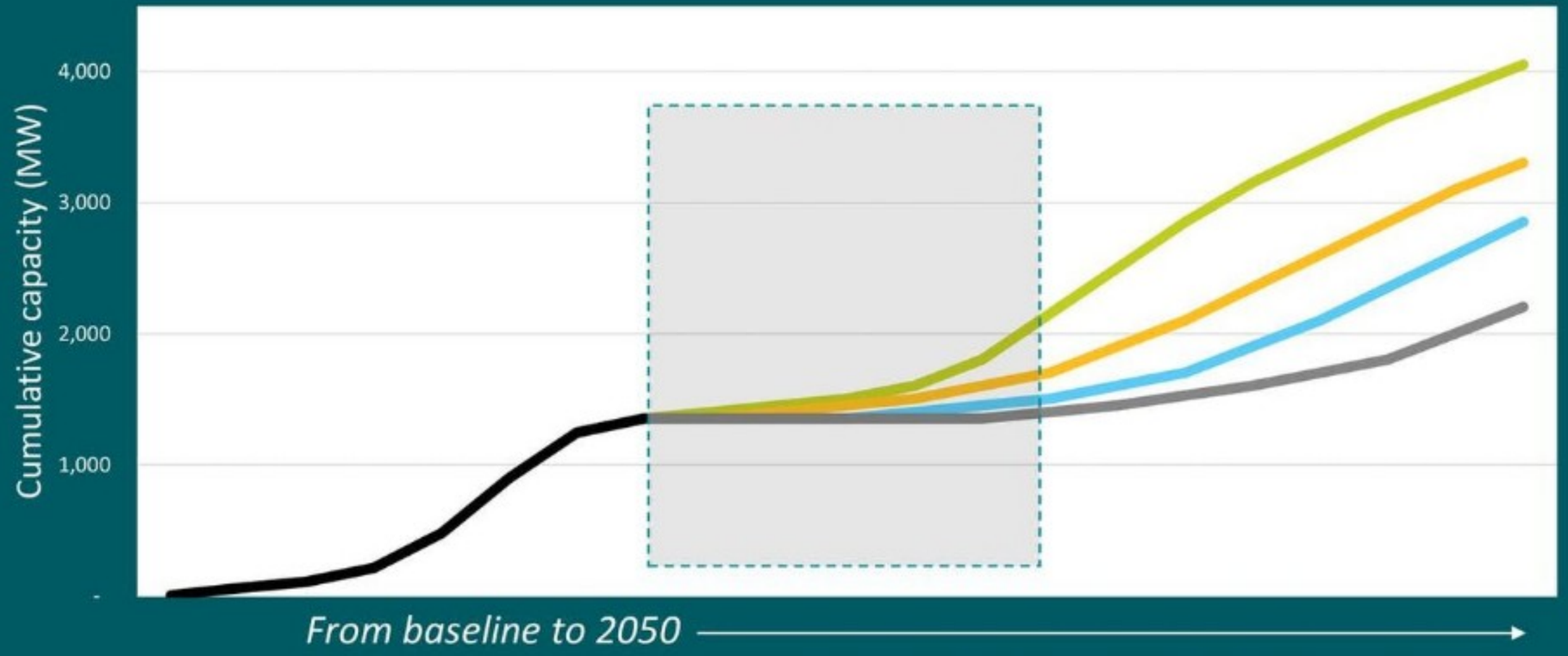
Using the National Grid **Future Energy Scenario (FES)** framework we project installed **generation** / **storage capacity, disruptive demand** technologies, and new **building development**. → the *what*

These are reported down to small **specific areas** within the Western Power Distribution licence areas termed Electricity Supply Areas (ESAs), by year out to **2050**. → the *where* / the *when*

The analysis is informed by **local stakeholders**, such as local government, developers, and community energy groups. → the *why*

Scope of work

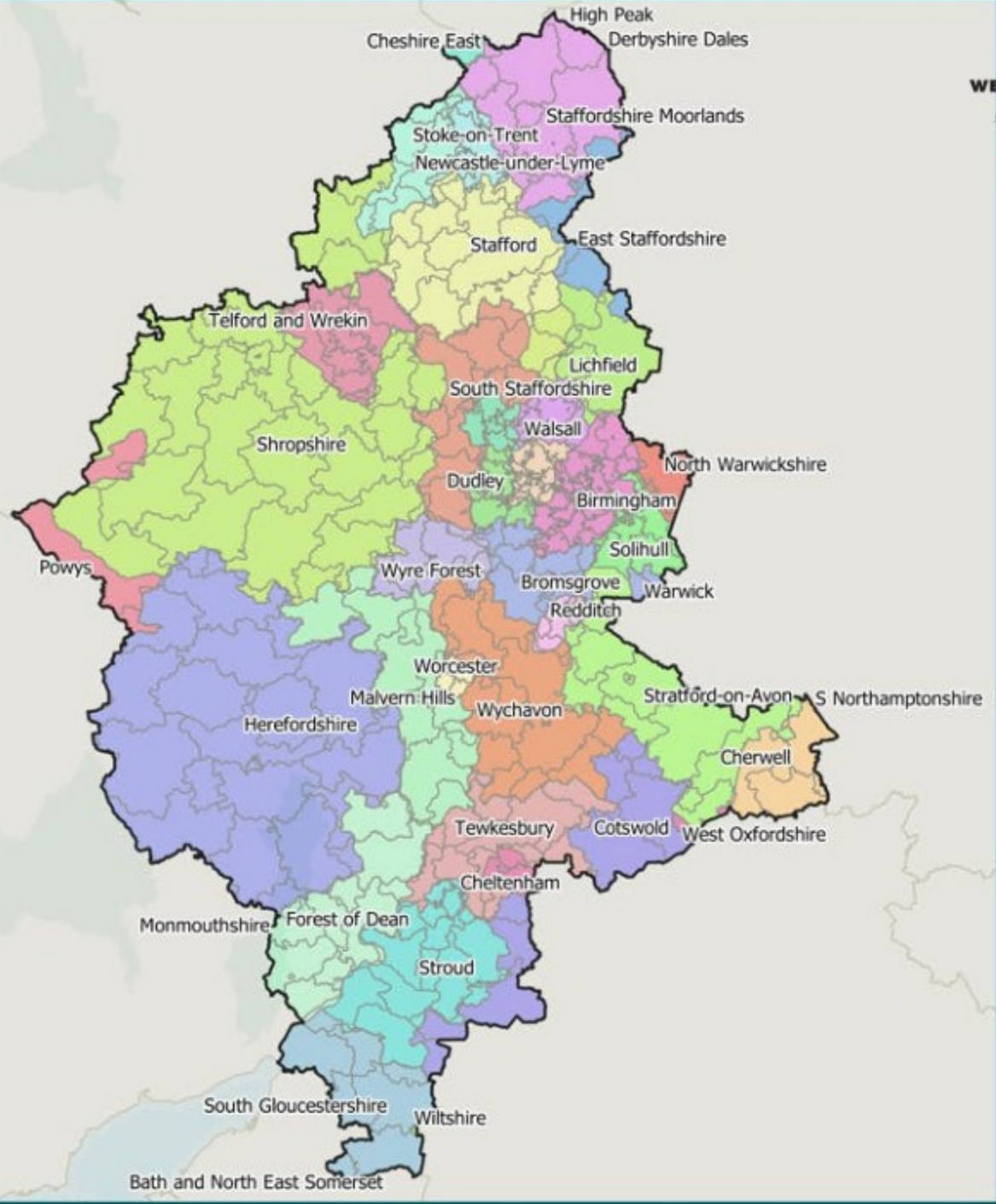
1. Baseline → 2. Pipeline / near term growth → 3. Scenarios / long term growth



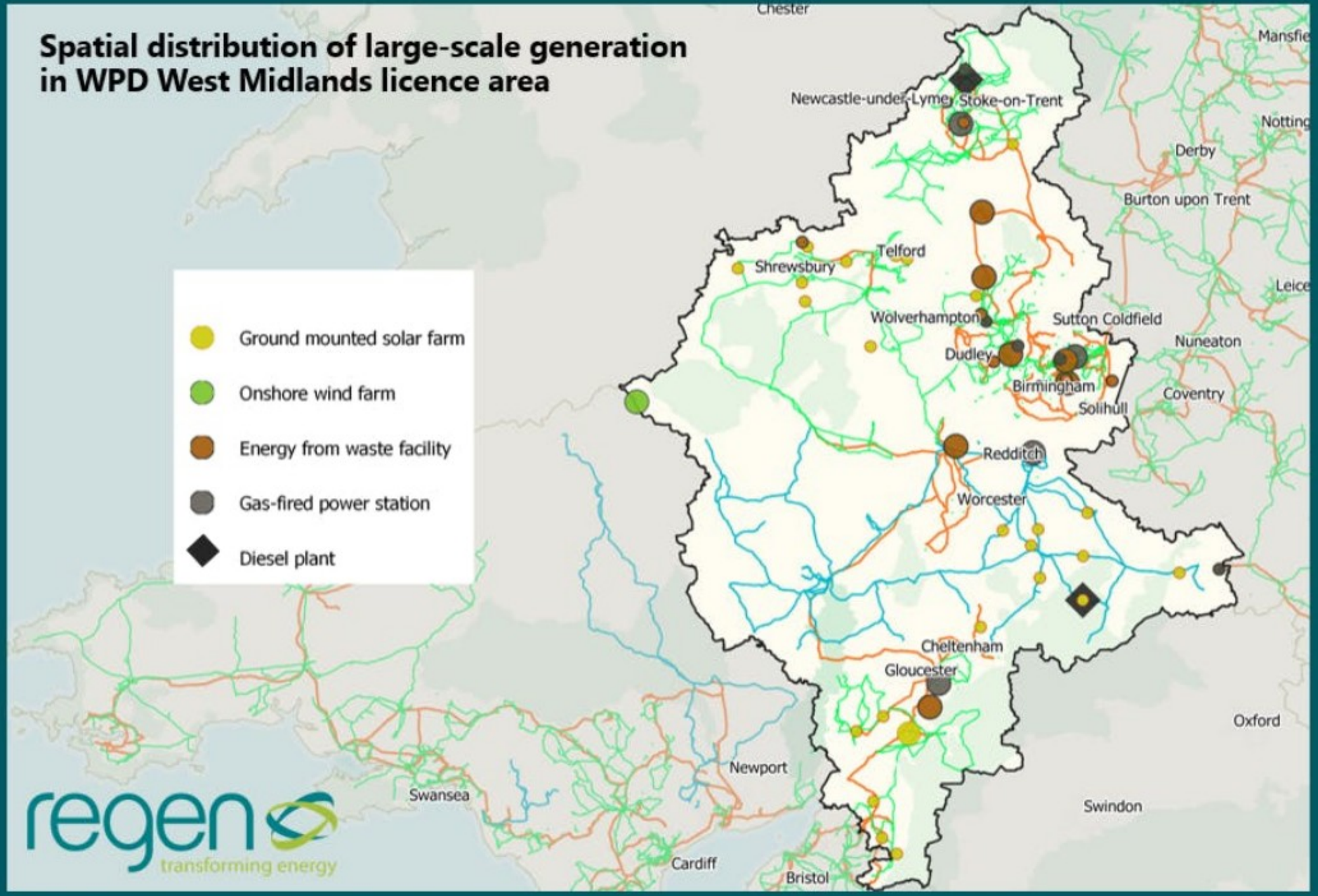
Geographical scope:

Small network-defined geographies termed ‘ESAs’ in WPD West Midlands licence area

Coloured by local authority



Spatial distribution of large-scale generation in WPD West Midlands licence area



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transforming energy

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Pipeline of future projects

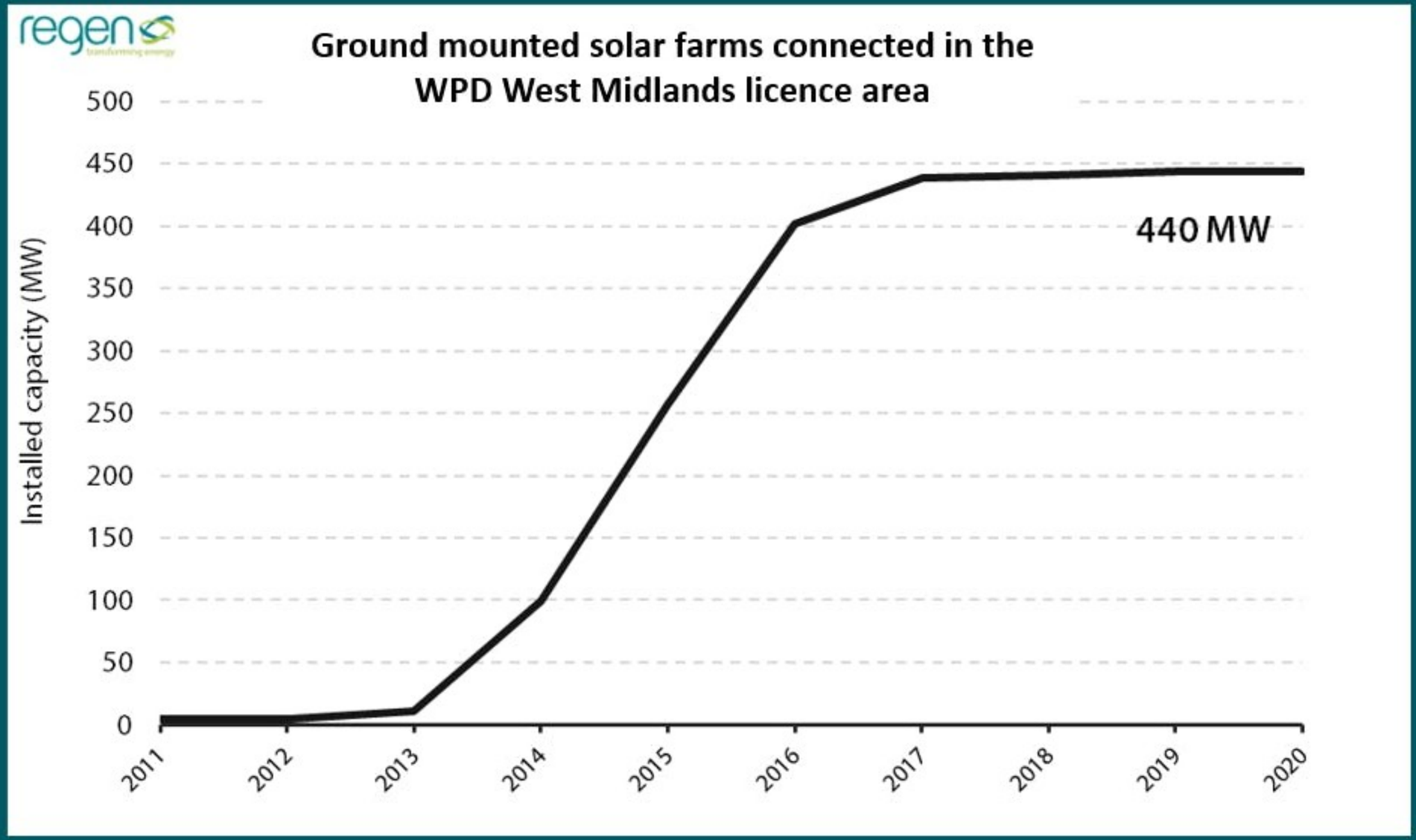
- Over 900 MW of solar PV with accepted connection offers
- Over 120 MW of energy from waste with accepted connection offers
- Over 440 MW of gas-fired power with accepted connection offers

We will be looking in-depth at the following technologies:

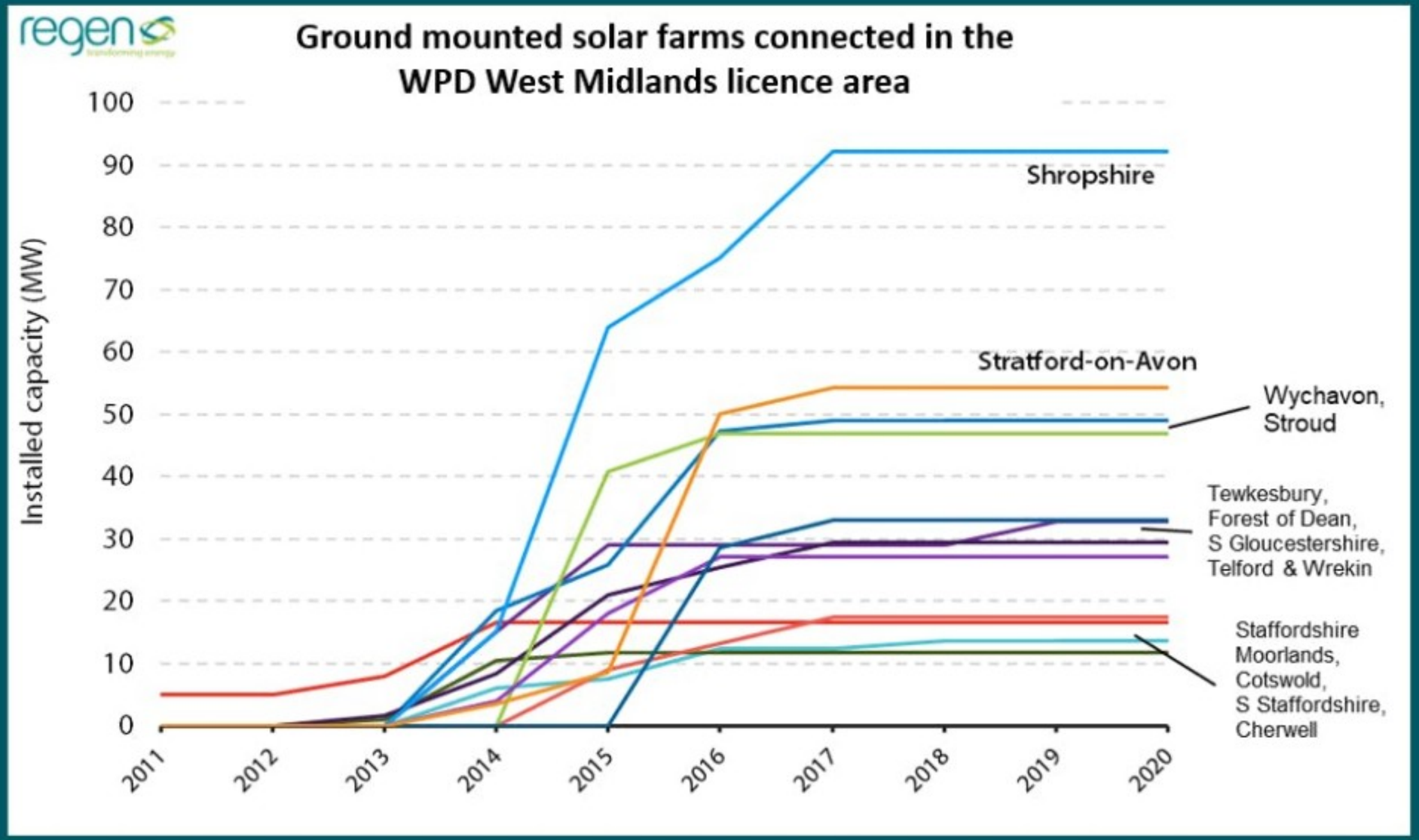
- Ground mounted solar PV
- Electricity storage
- Electric vehicles

Future energy scenarios for ground mounted solar

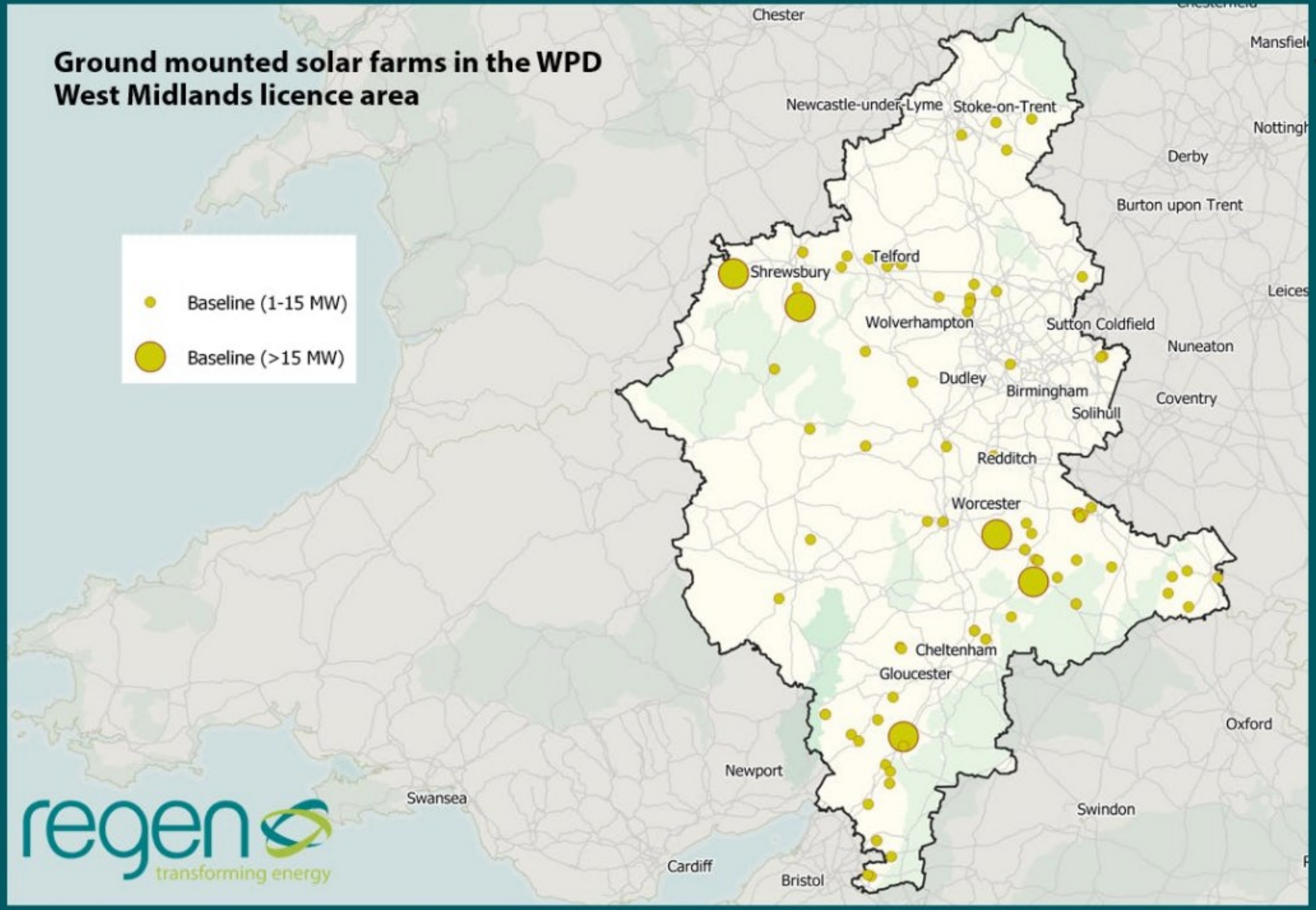
Ground mounted solar PV total baseline



Ground mounted solar PV baseline by local authority



Ground mounted solar farms in the WPD West Midlands licence area



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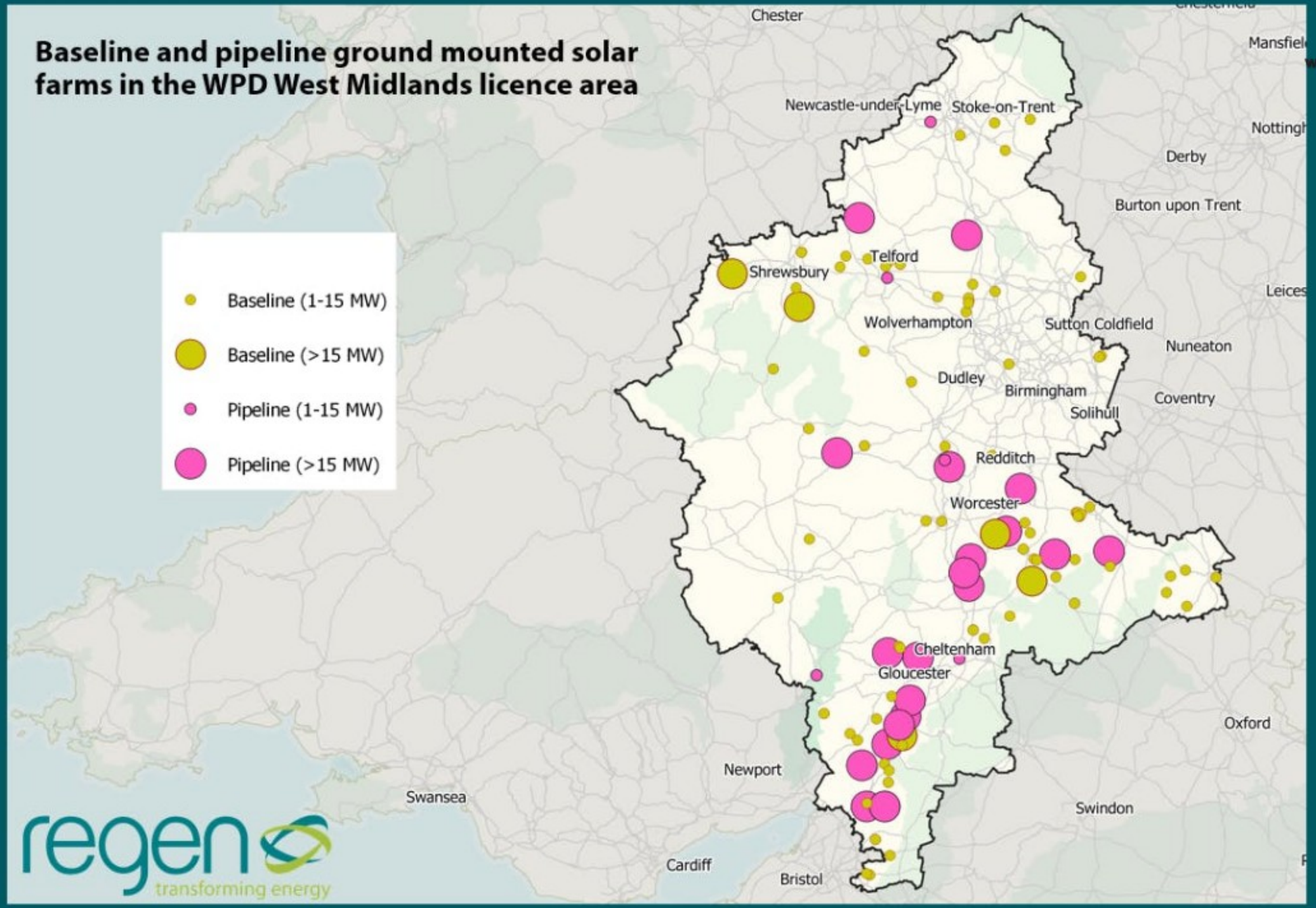
Pipeline of ground mounted solar projects

- 25 ground mounted solar sites (900 MW) have an accepted connection offer
- Average size of a solar farm in the pipeline is 35 MW
- 820 MW obtained a connection offer since the start of 2019

Baseline and pipeline ground mounted solar farms in the WPD West Midlands licence area



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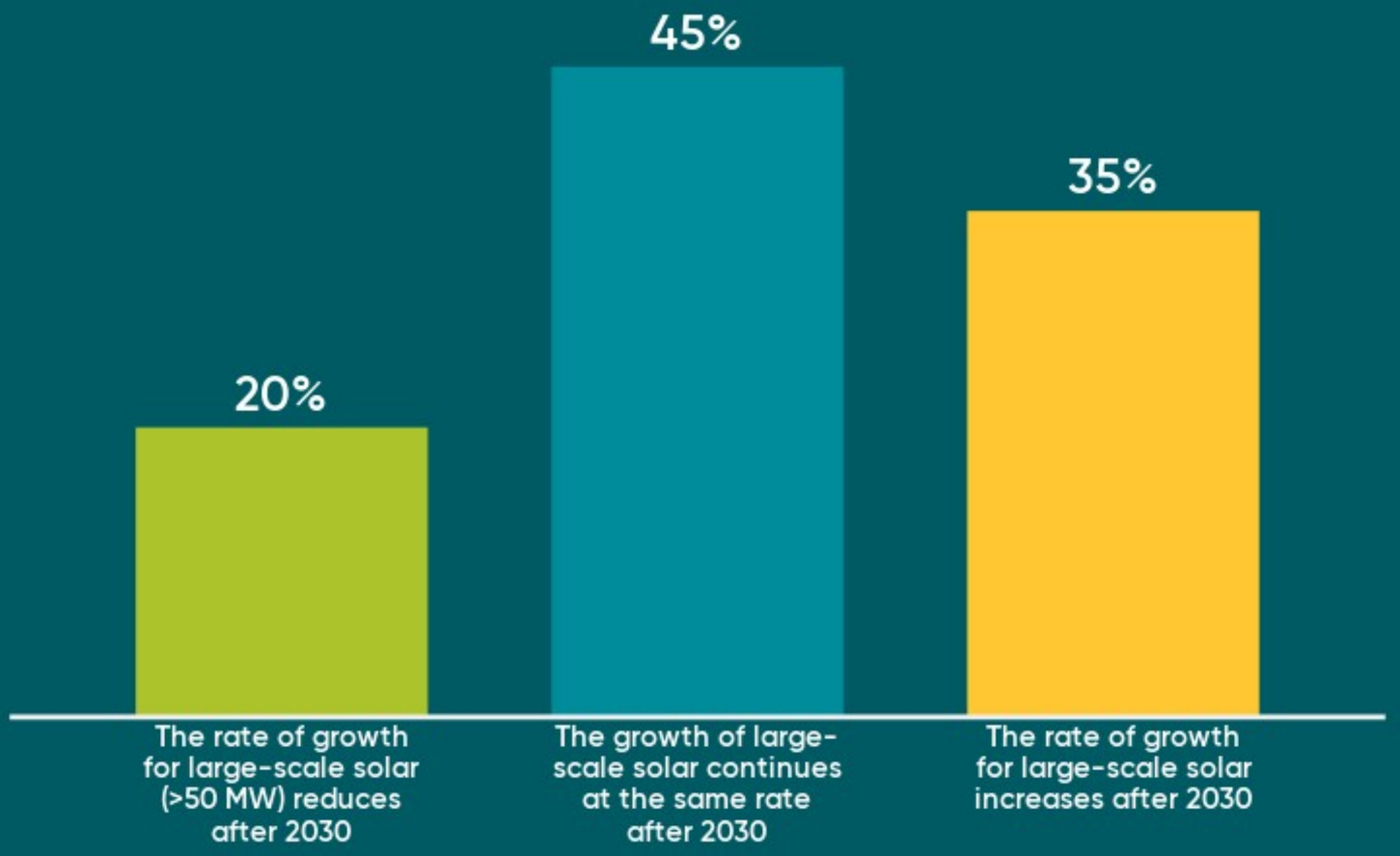
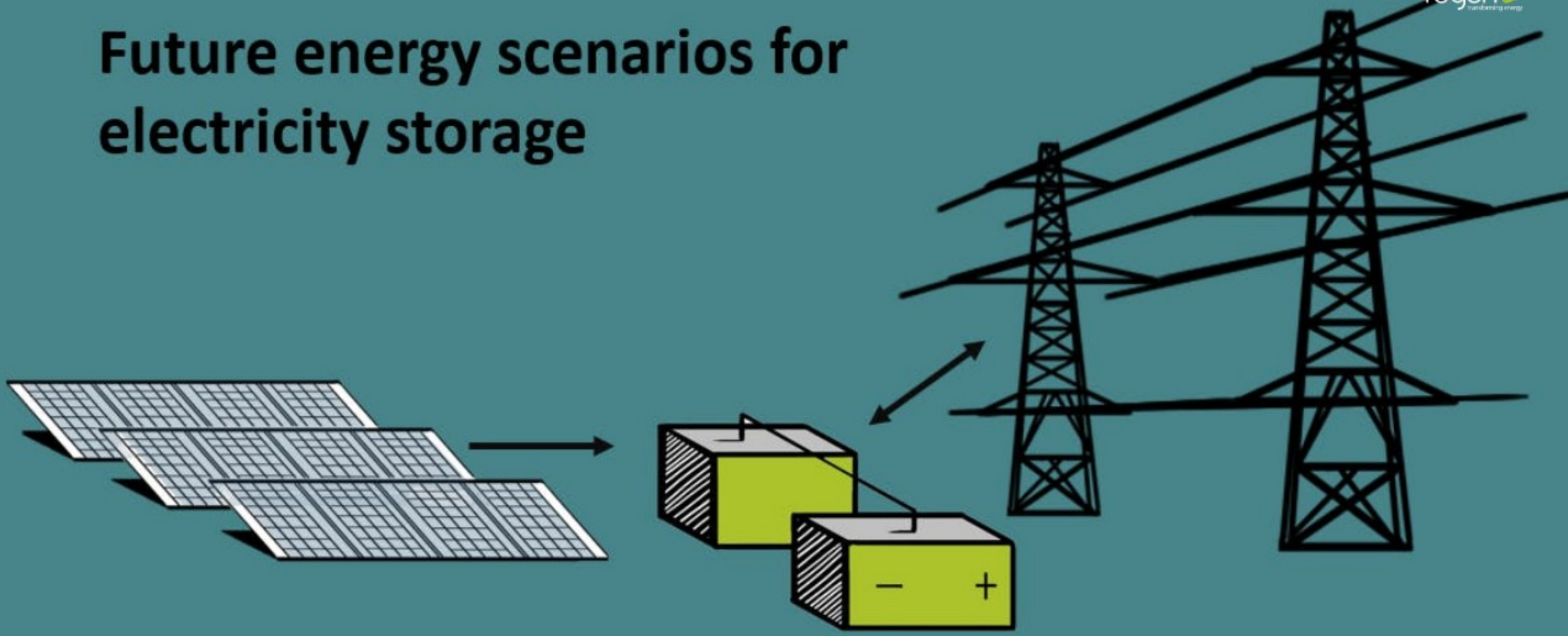
1. When might ground mounted solar deployment pick up again?

2. Beyond what's currently in the pipeline, where will subsidy-free business models lead in the future?



Future energy scenarios for electricity storage

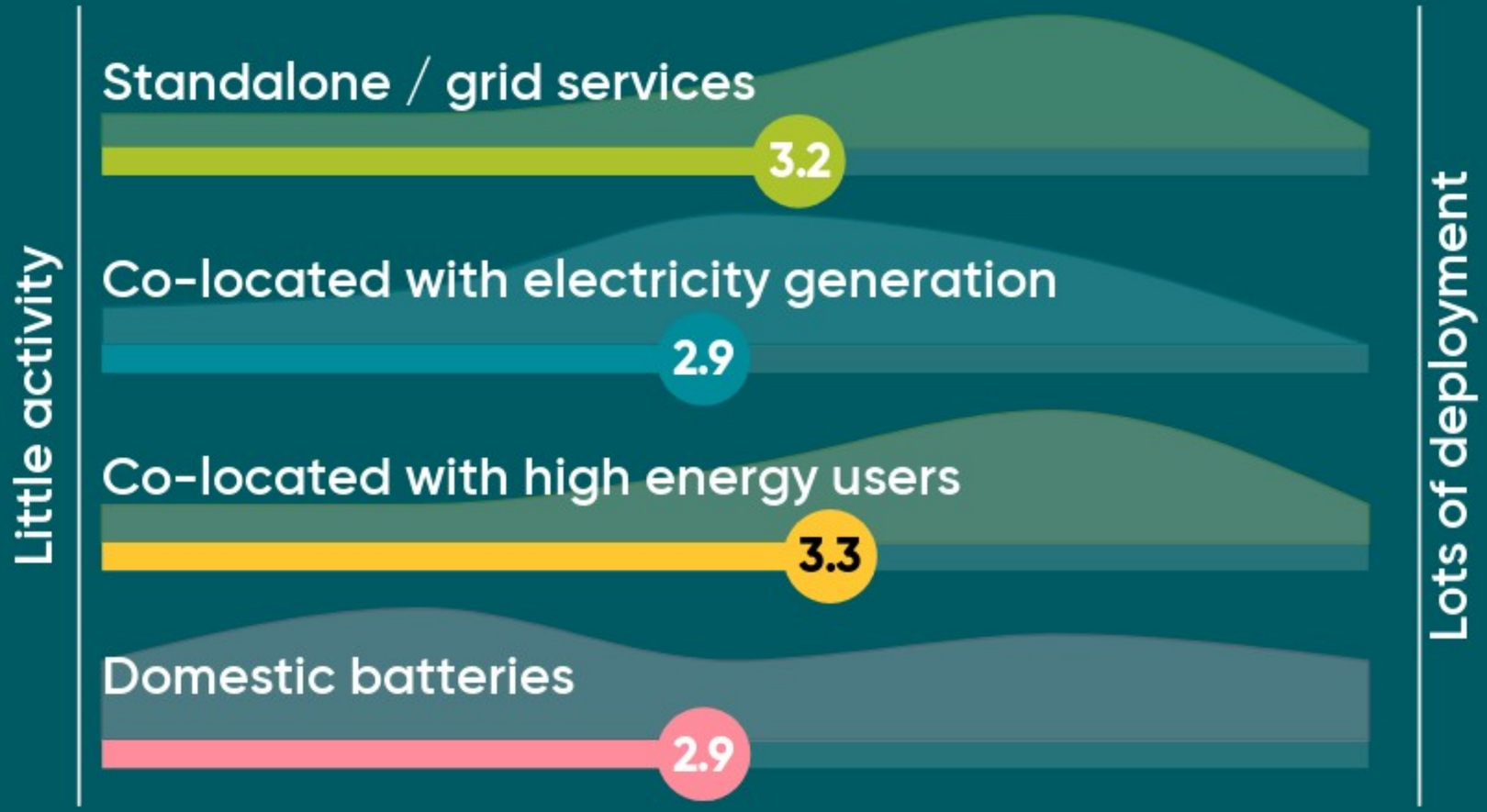


Storage business models

We use the following categories to assess the future of battery storage:

- Standalone / grid services
- Co-location with generation
- Co-location with high energy users
- Domestic batteries

1. In the near-term, how active will each of these business models be?



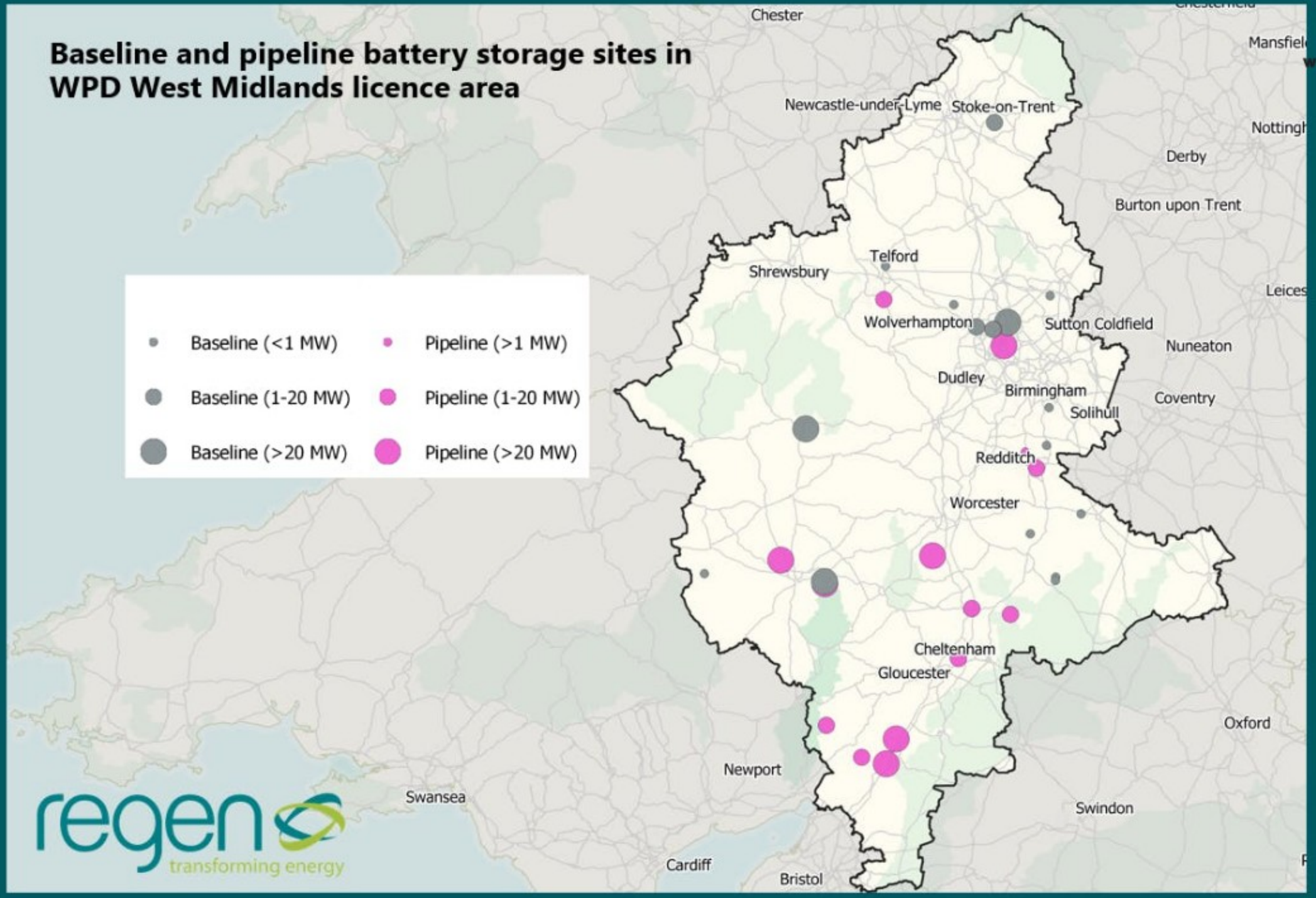
Baseline of battery storage projects

- There is 93 MW of battery storage connected in the West Midlands licence area
- 88 MW of which connected in 2018, mainly from four 20 MW-scale sites

Pipeline of battery storage projects

- 440 MW of battery storage projects have an accepted connection offer
- There are 250 MW of large-scale battery projects. One of these is a 100 MW battery
- The average size of battery in the pipeline is 16 MW

Baseline and pipeline battery storage sites in WPD West Midlands licence area



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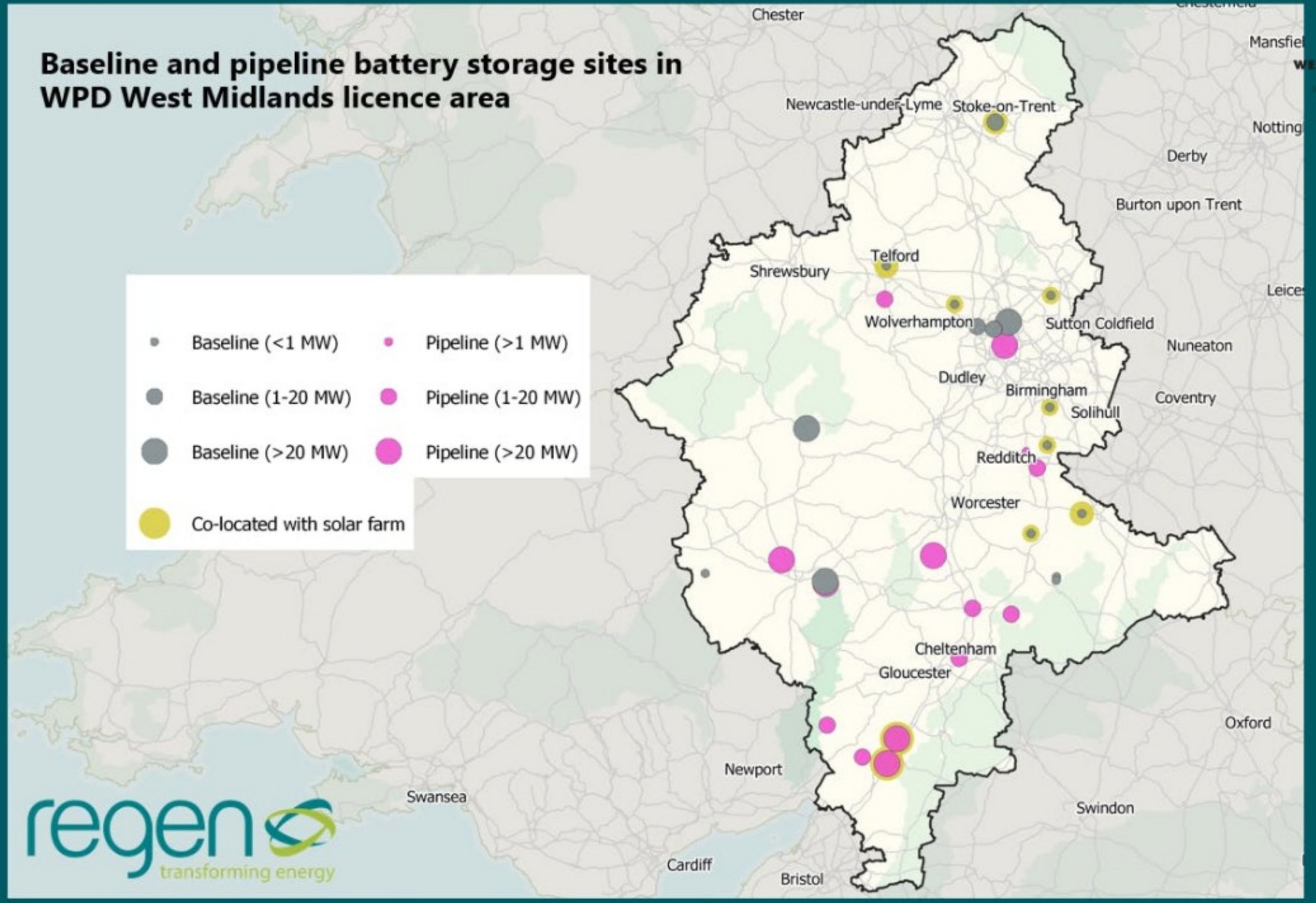
Baseline and pipeline battery storage sites in WPD West Midlands licence area



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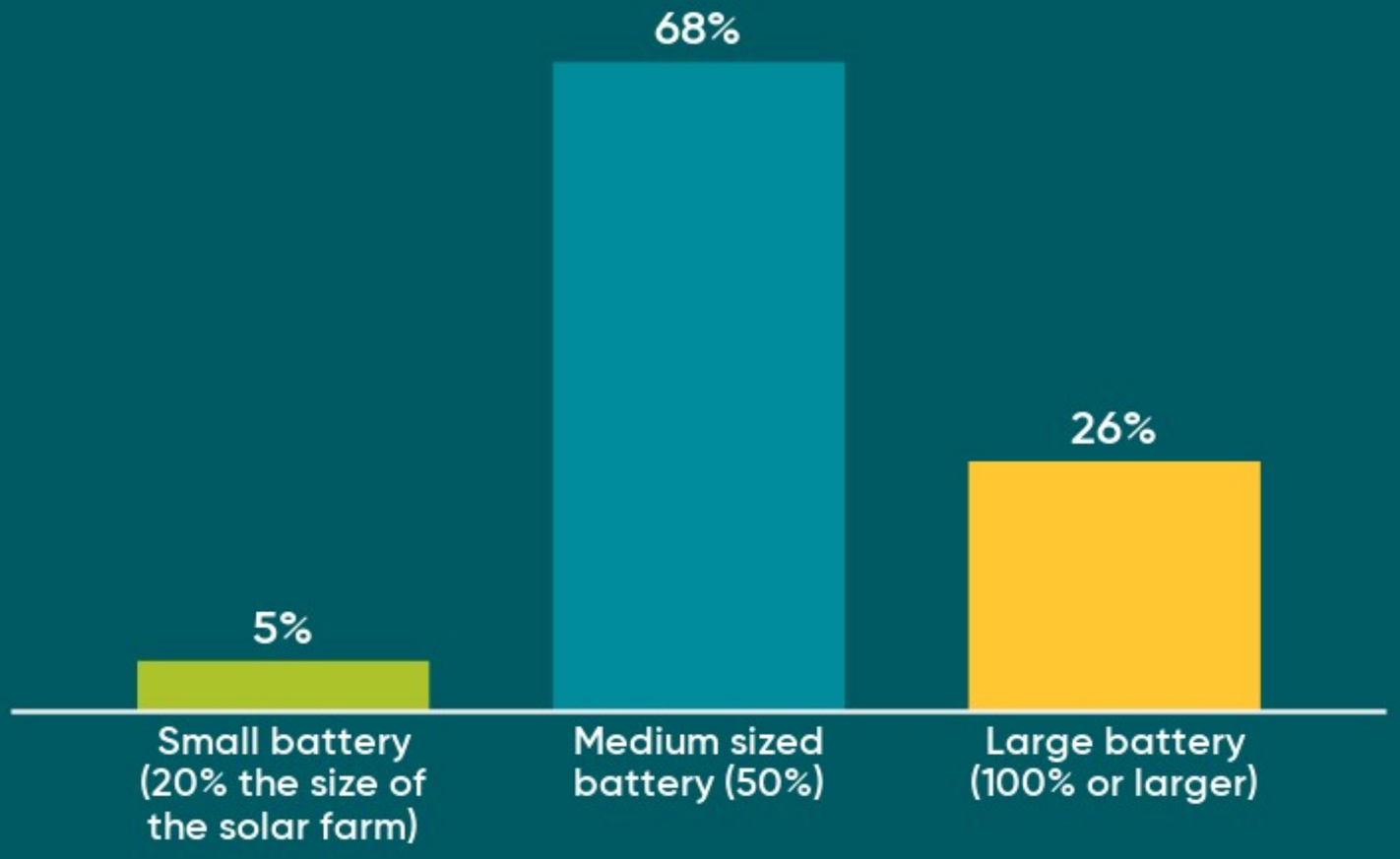
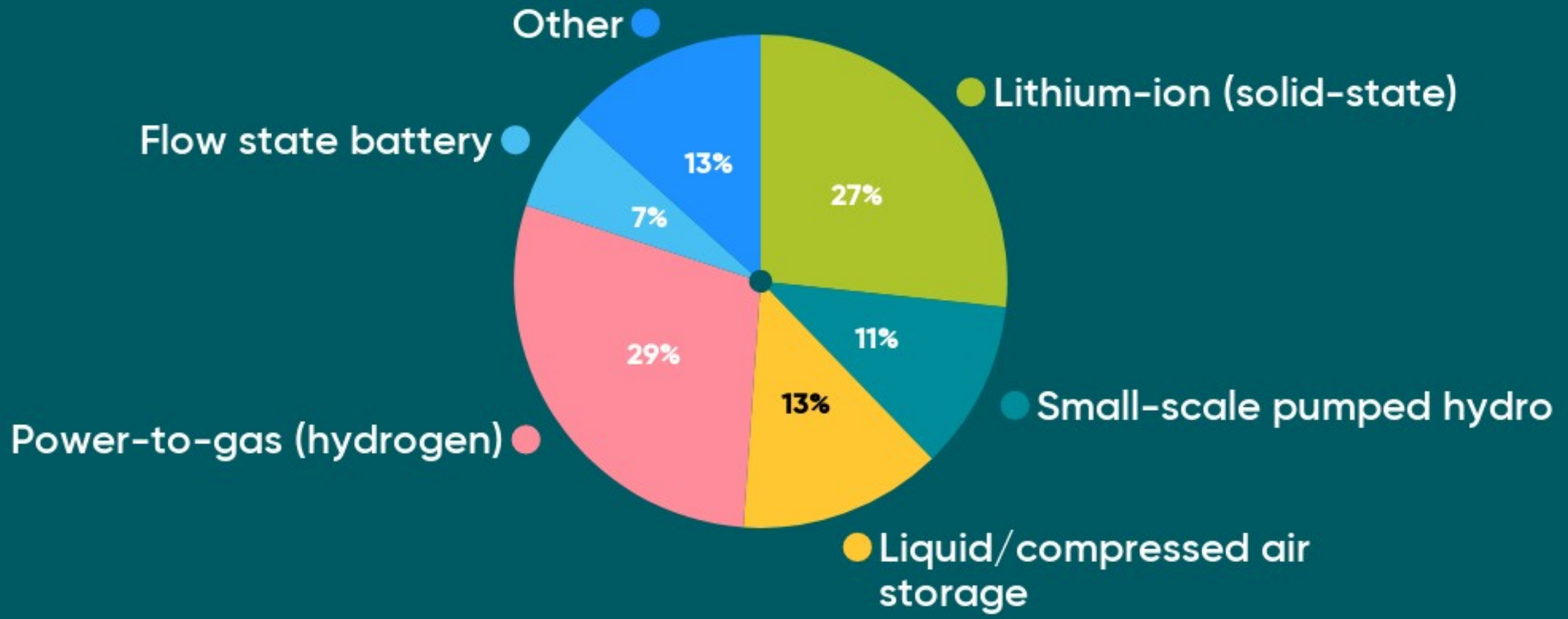
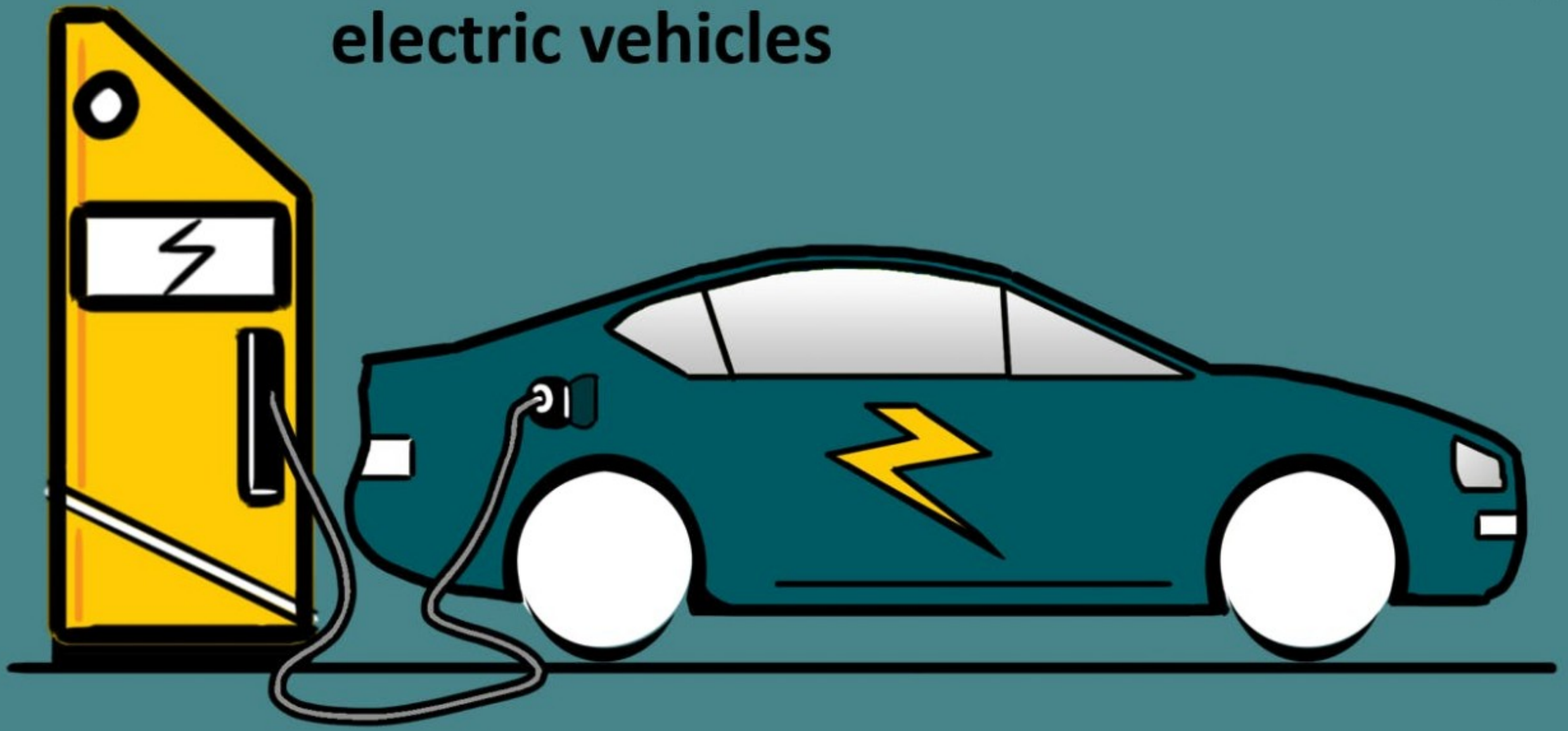
1. Proportionally, what size batteries will be co-located with solar farms after 2025?



2. What storage technologies will we see connecting to the distribution network before 2050?



Future energy scenarios for electric vehicles



Our consultation event in West Midlands last year raised the following points:

- There is a need for more information sharing about the planned locations of charging hubs
- Local authorities are starting to include EV charge points as a requirement for new developments

EV uptake drivers

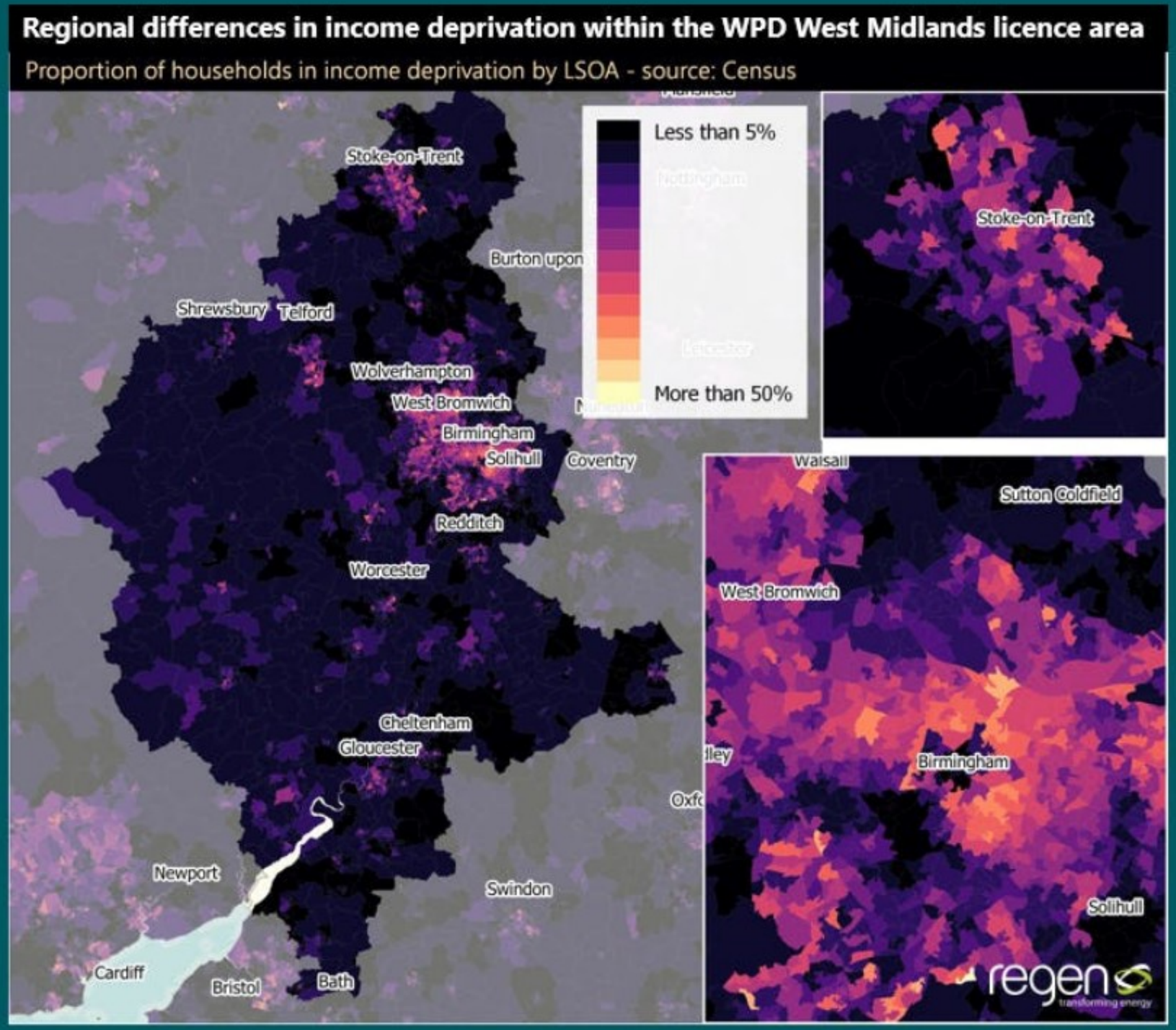
- Plans to bring ban on new petrol/diesel car sales forward to 2035 (from 2040)
- Proposed changes to building regulations to increase the proportion of new developments with a charge point
- £10m government funding pot for local councils to install on-street chargers
- Clean Air Zones (e.g. Birmingham)

Electric vehicle uptake so far

At the end of 2019, there were around **36,600** electric cars registered in the West Midlands licence area, around **1.2%** of all the cars in the area.

In the 2040s under National Grid Net Zero scenarios, almost 100% of cars are projected to be electric.

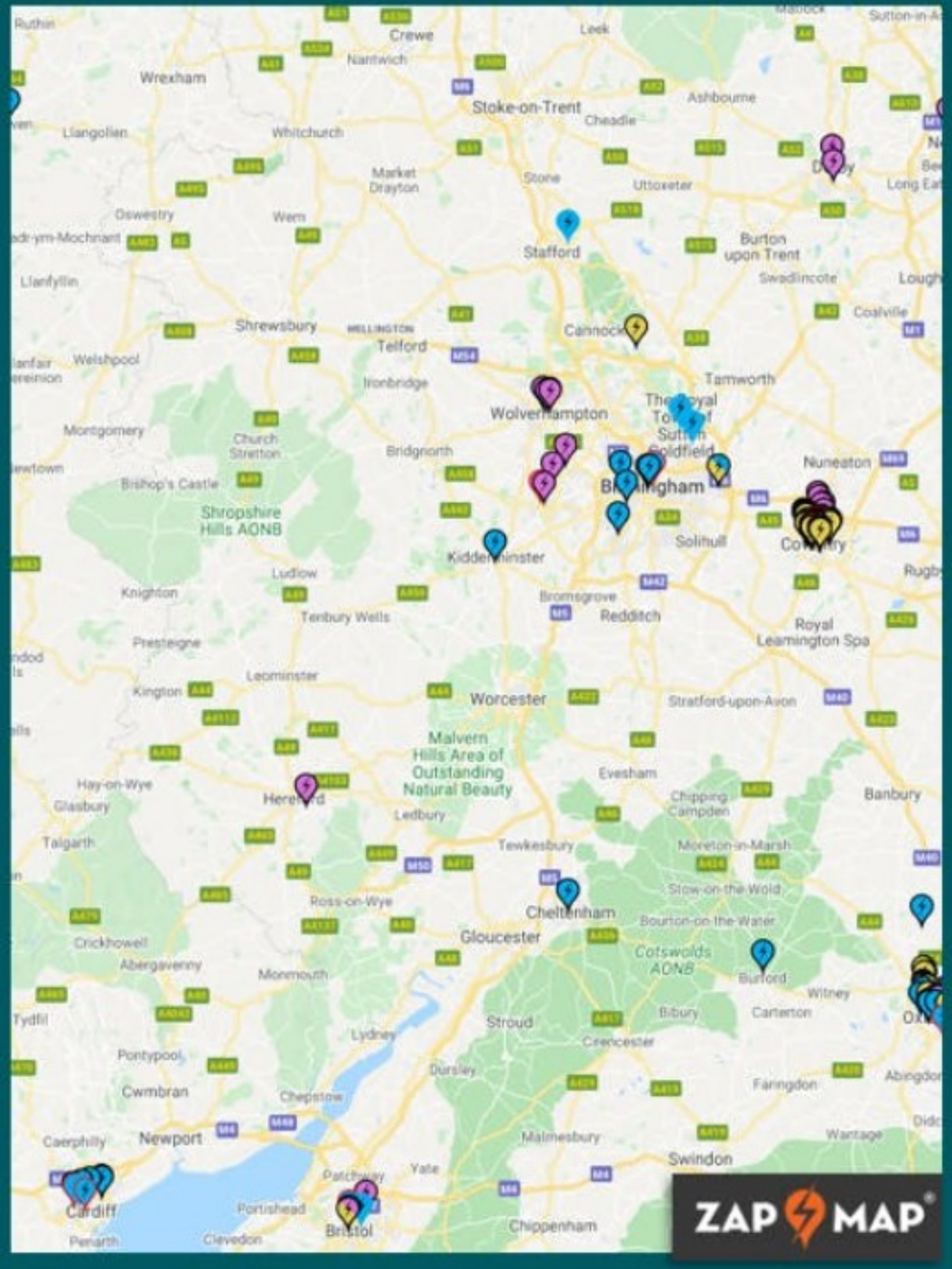
Source: DfT



Uptake factors

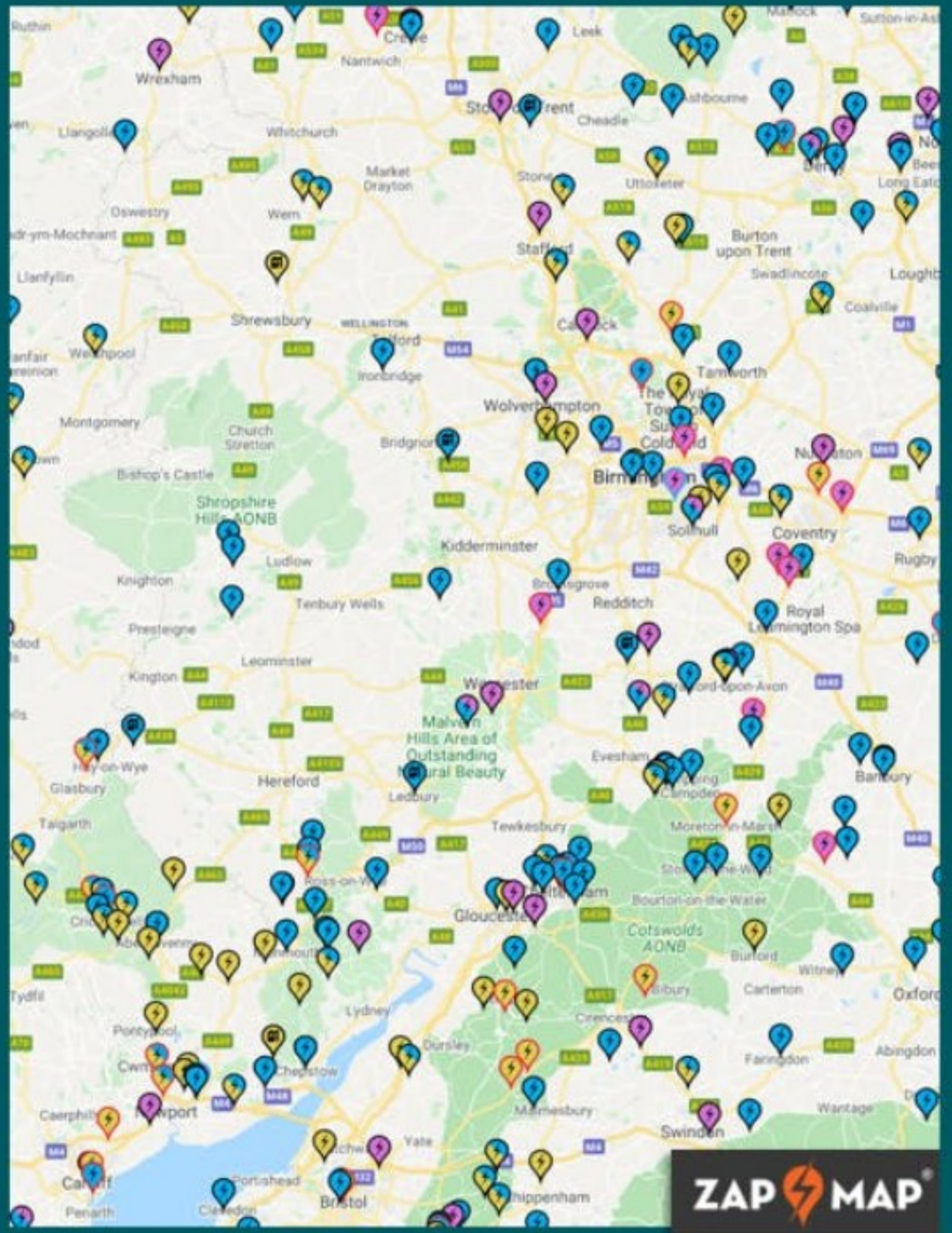
We use demographic factors for domestic-scale technologies, such as:

- Affluence
- household type (detached, terrace etc.)
- Household tenure (owned, rented etc.)



‘On-street chargers’

- On-street chargers see very distinct spatial distribution
- Heavily weighted towards urban areas
- Often installed by local councils and private developers



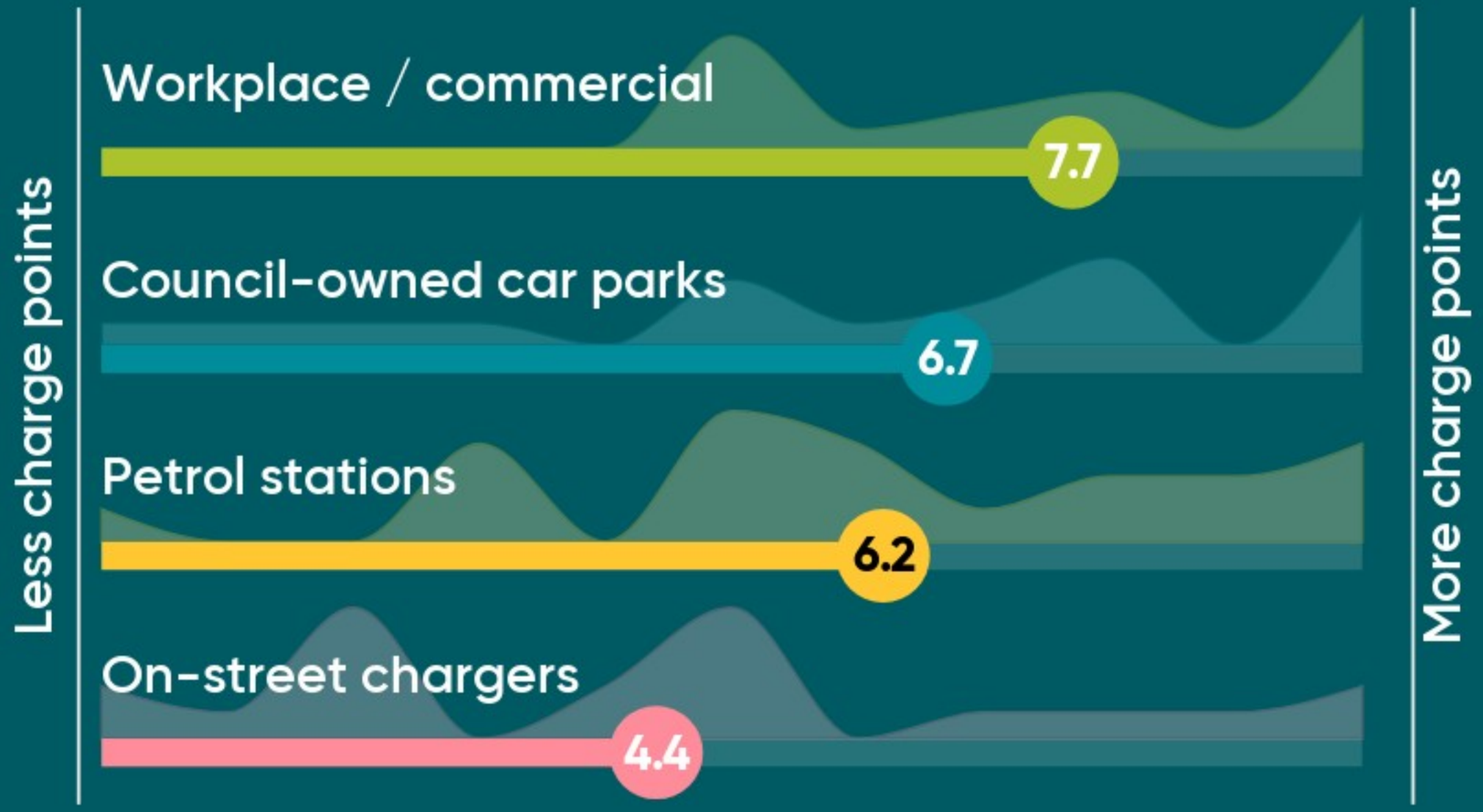
WESTERN POWER DISTRIBUTION

regen

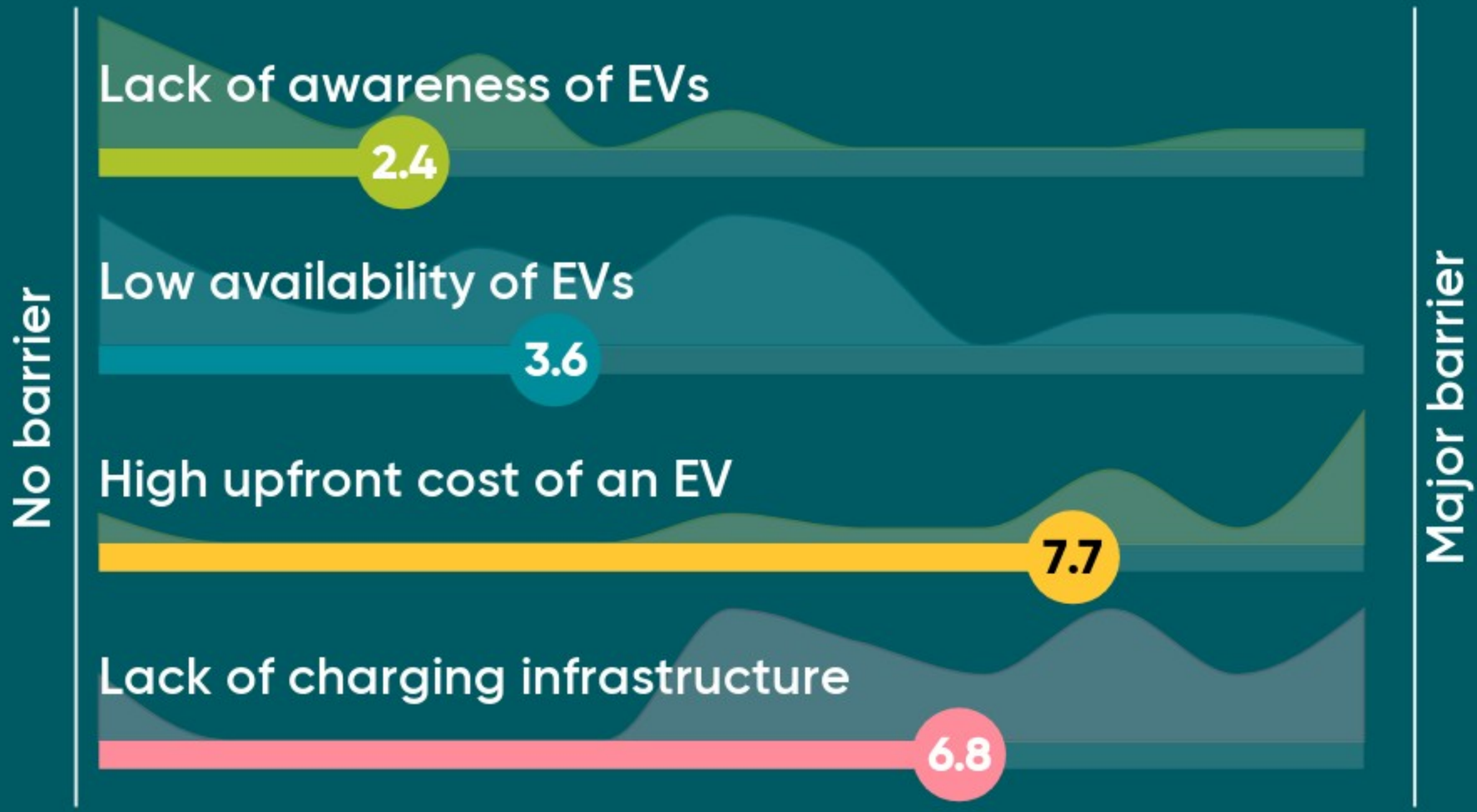
‘Hotel chargers’

- One of the largest categories of public charge points is in hotels and other accommodation
- More disperse, but lower rates of utilisation

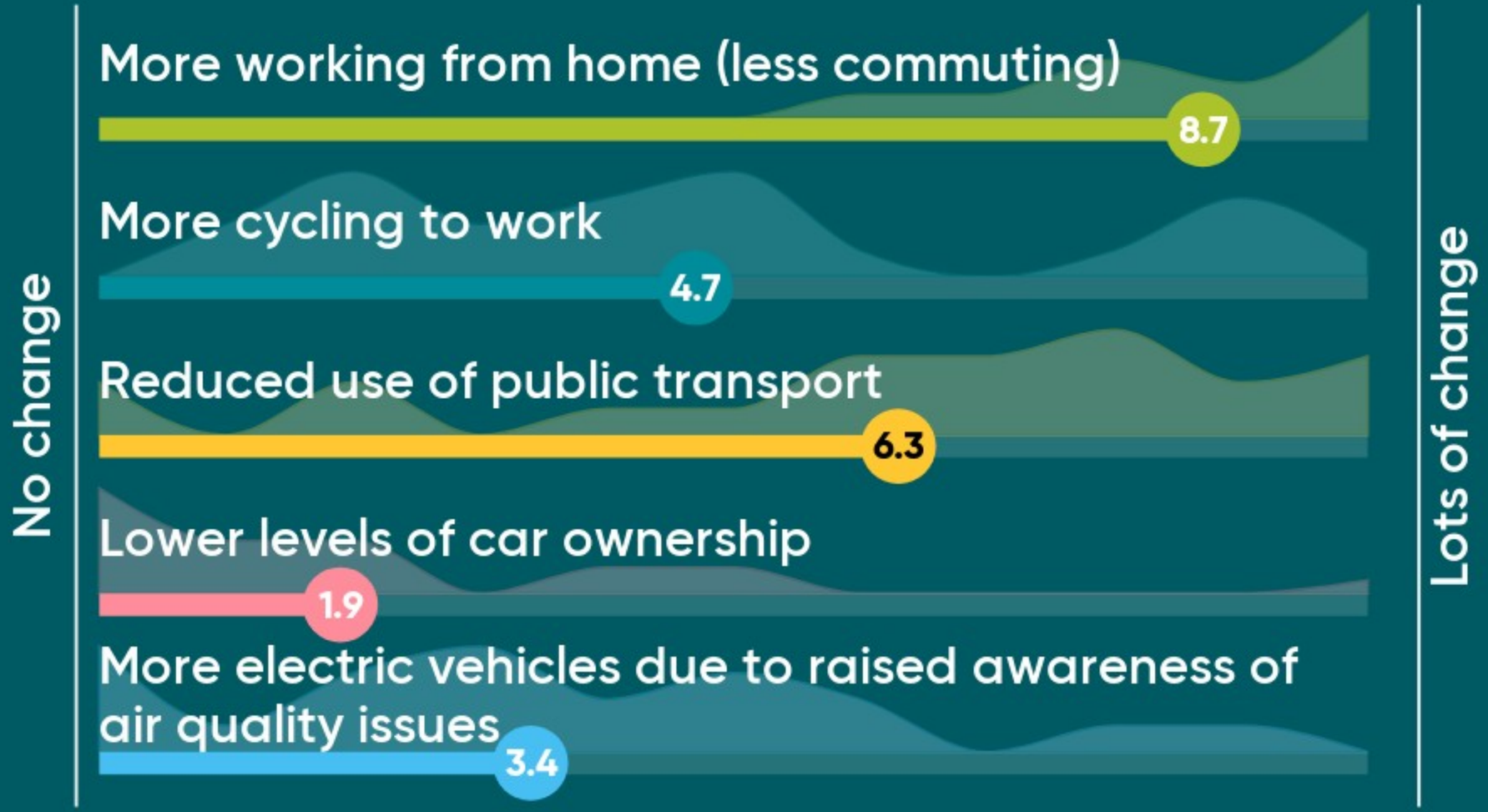
1. In the near term, where are we likely to see high levels of EV charger deployment?



2. What are the key barriers to uptake?



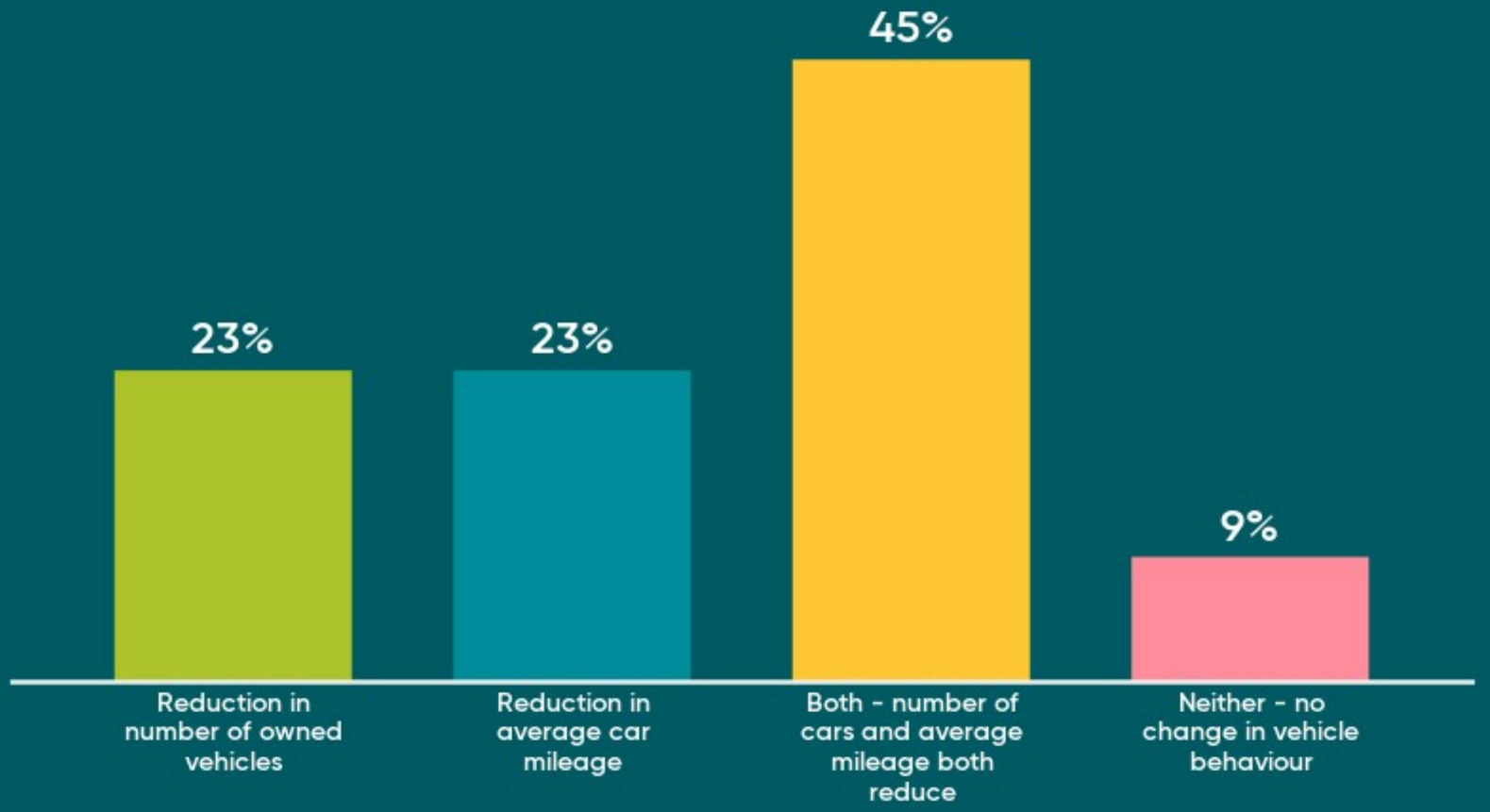
3. How will covid-19 impact transport?



Long-term vehicle usage

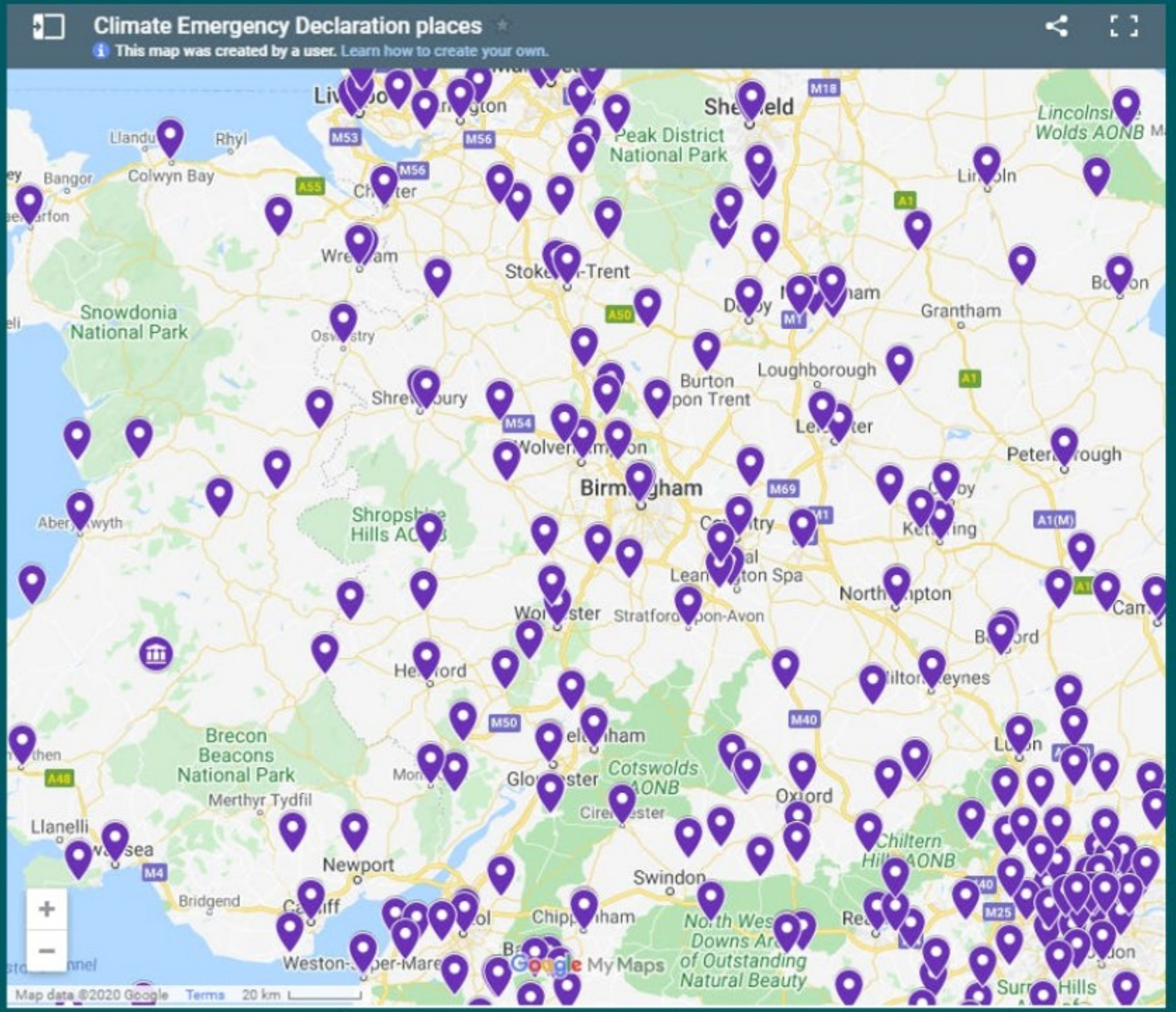
- Achieving net zero will require changes in consumer behaviour
- National Grid's FES has not included changes in vehicle mileage or number of cars on the road
- CCC report includes a 10% reduction in average vehicle mileage by 2050 in their net zero scenario

4. In a net zero scenario, how may vehicle usage change in the long-term?



Local plans, policies and schemes

We are researching local plans and policies in regards to heat and wider electricity supply and demand too. We are looking to find out more about heat networks, clean air zones, new-build policies etc.


Climate Emergency Declaration places
This map was created by a user. Learn how to create your own.
Sheffield
Peak District National Park
Lincolnshire Wolds AONB
Llandudno
Rhyl
Colwyn Bay
Bangor
Chester
Wrexham
Stoke-on-Trent
Derby
Nottingham
Grantham
Boston
Snowdonia National Park
Oswestry
Shrewsbury
Burton upon Trent
Loughborough
Leicester
Peterborough
Wolverhampton
Birmingham
Coventry
Kettering
Aberystwyth
Shropshire Hills AONB
Leamington Spa
Northampton
Worcester
Stratford-upon-Avon
Milton Keynes
Hereford
Brecon Beacons National Park
Merthyr Tydfil
Gloucester
Cheltenham
Cotswolds AONB
Oxford
Cirencester
Llanelli
Swansea
Newport
Swindon
Bridgend
Cardiff
Chippenham
Weston-super-Mare
North Wessex Downs Area of Outstanding Natural Beauty
Chiltern Hills AONB
Luton
Google My Maps
Map data ©2020 Google
Terms
20 km

What changes will climate emergency declarations bring about? (Select up to 3)

More heat networks

More electric vehicle chargers

Electrifying public transport

Renewable energy designated zones

Refusal of fossil fuel generators in planning

Higher standards for new homes (e.g. Zero carbon homes)

Other

Are there any specific documents or plans you would direct us towards?

https://www.sstaffs.gov.uk/planning/spatial-housing-strategy-infrastructure-delivery.cfm

Marches LEP Energy Strategy

Heat Pump Association Roadmap of November 2019. This isn't regional but it is instructive

Worcestershire LEP energy Strategy

Malvern Hills district council net zero plan

Stroud District Local Plan Review - draft plan and evidence base

Anthesis Report for Birmingham WM 2041

The Startegy for the Urban Growth Area at the Hub in Solihull - we need to manage over 50,000 car parking spaces - all of which will need to take account of EV.

Wychavon intelligently green document

Are there any specific documents or plans you would direct us towards?

Tyseley Energy Park initiative,

Stroud District net zero 2030

South Worcestershire call for sites for renewable generators

Herefordshire Council Carbon Plan

Bromsgrove heat network

Telford & Wrekin Climate Plan

Birmingham decarbonisation of heat delivery plan

Shropshire Climate Change Plan

Worcester city heat network geothermal

Are there any specific documents or plans you would direct us towards?

Stoke-on-Trent and Newcastle Draft Local plan 2020

Marches Local Nature Partnership

Stoke-on-Trent District Heat Network

All Council Local Plans

The Energy Challenge for the JLR, Birmingham Airport, Extension of the NEC, HS2 station (Interchange) , provision of 5,000 houses etc all at the Urban Growth Company in Solihull. 300Mva shortfall predicted.

Stoke & staffs LEP energy Strategy

New developments study

- Joe Noble, Graduate Analyst at Regen

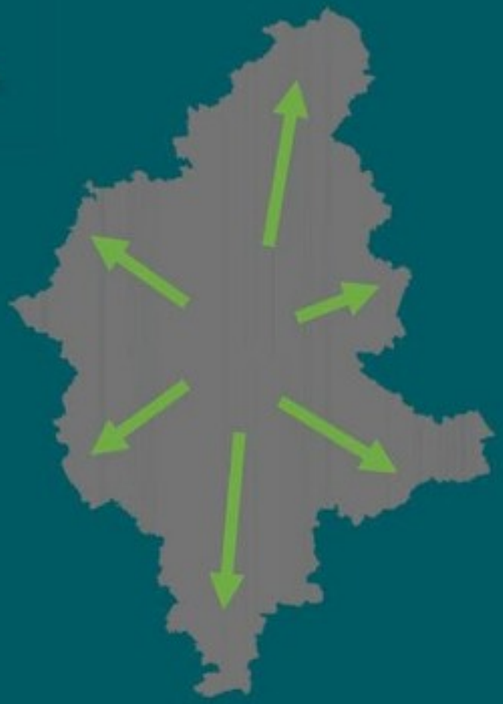
New developments overview

What?

Assesses the scale and spread of new underlying demand

How?

Collecting planning policy data from local authorities



Why?

Inform WPD of future network requirements, **preventing the network being a barrier to a net zero future**

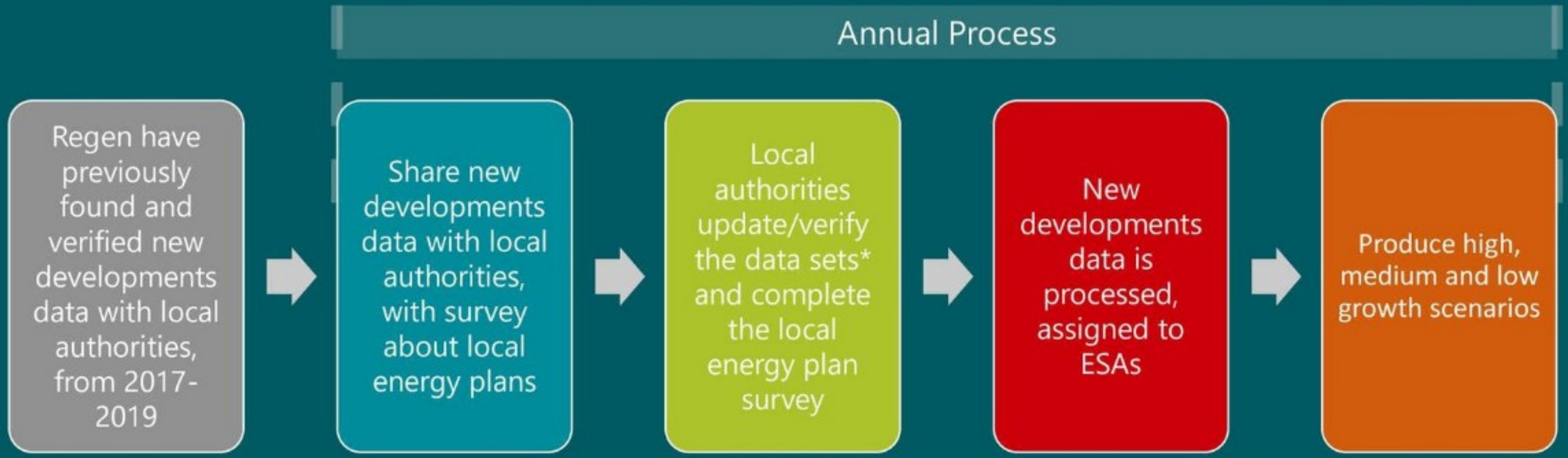
Example – Elms Park, North West Cheltenham

Plan for:

- Mixed-use urban extension,
- 4200 new homes,
- 23ha employment generating land,
- primary and secondary education,
- public transport hub

Source: https://lrmplanning.com/project/elms-park/

Methodology overview



*if unavailable or no response from LA, Regen will research planning policy documents

The data we collect

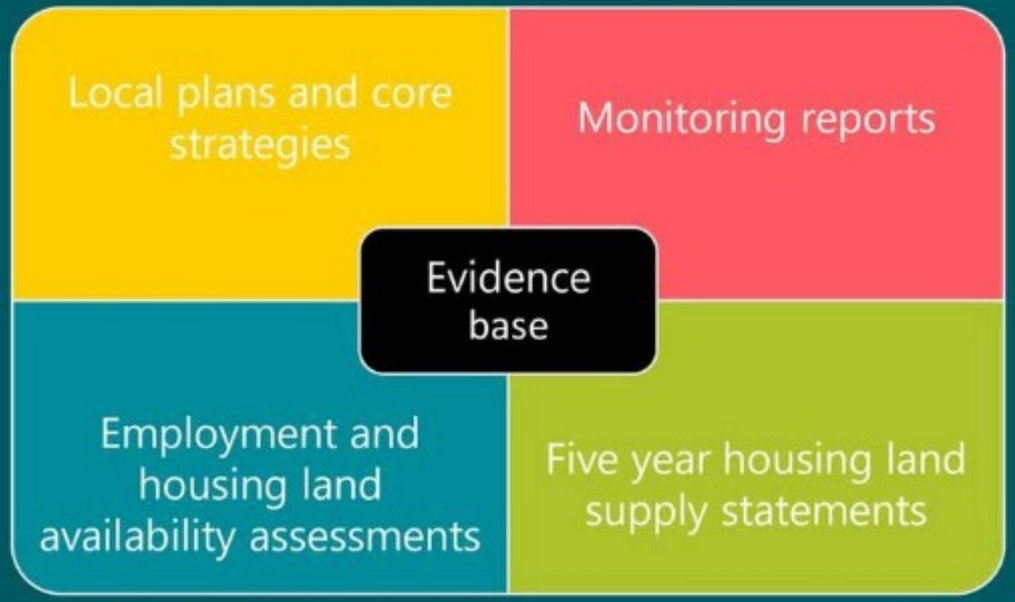
Allocated and planned:

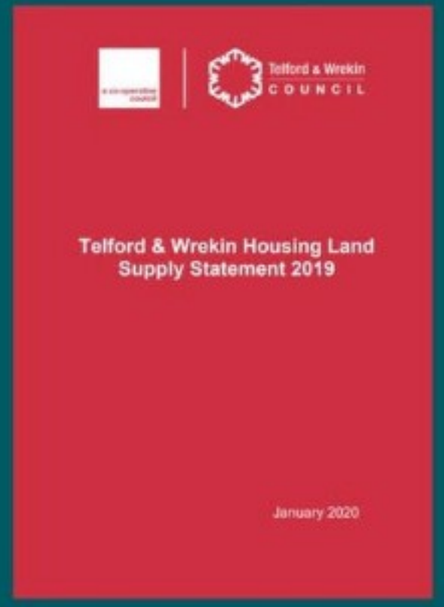
- Over 20 homes (domestic)
- Over 0.1ha site area (non-domestic)

To best estimate demand:

- Number of dwellings/site area
- Locational data (E/N)
- Category and floorspace (for non-domestic)
- Trajectory/build out rates
- Source information

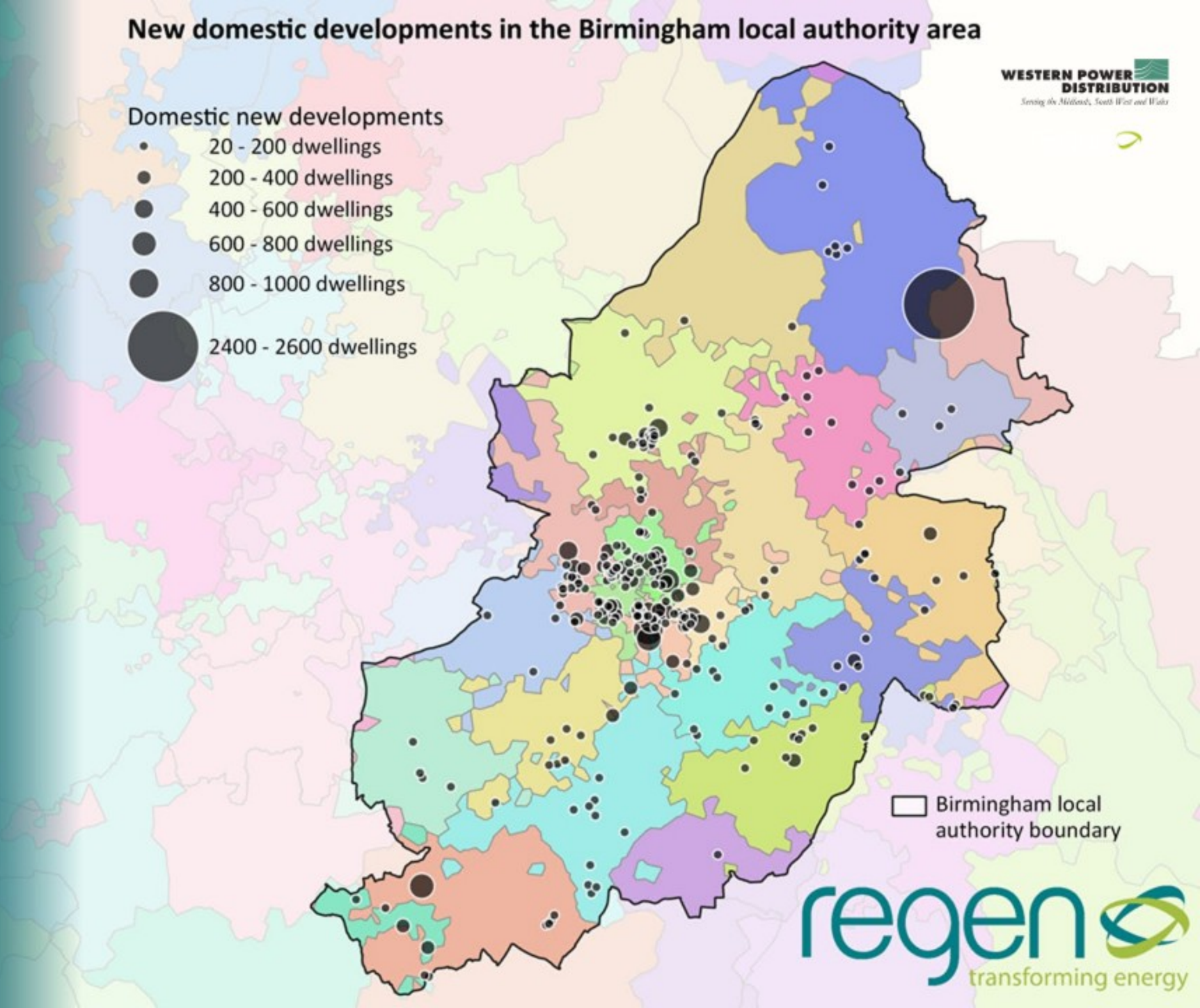
Data sources





Assigning sites to local distribution networks

Assigning to local distribution networks



Creating growth scenarios

Methodology – growth scenarios

Calculate and distribute the number of dwellings not captured by the >20 homes criteria

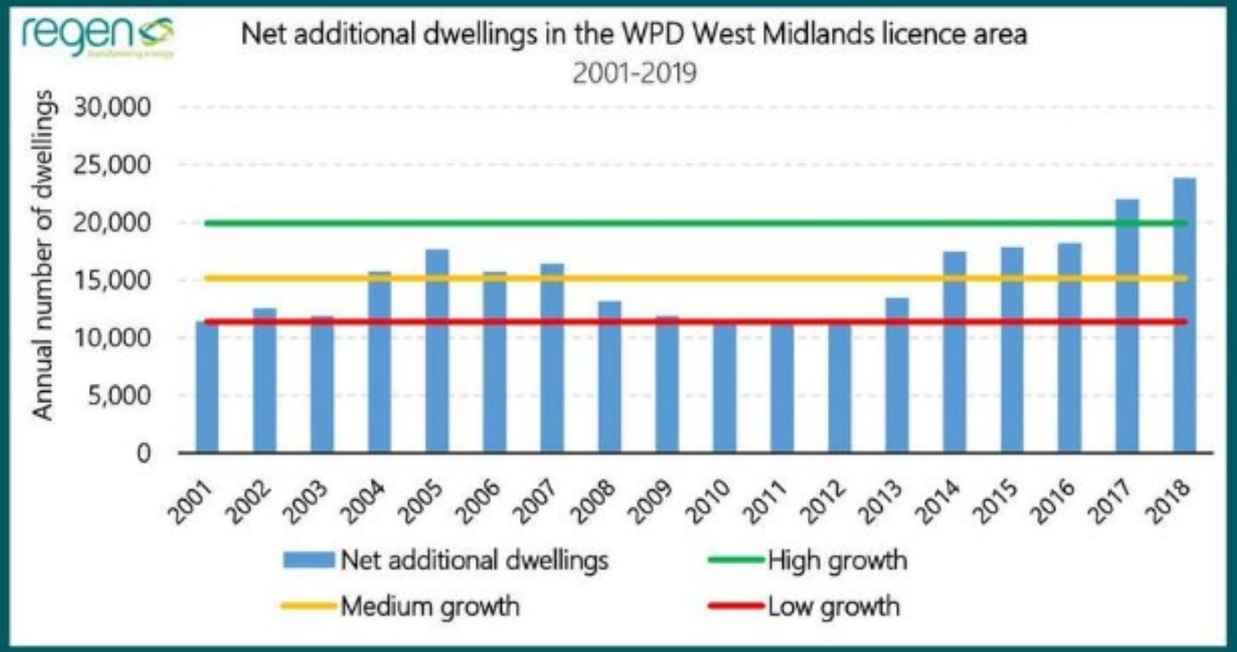
Using a threshold of 20 homes:

- 4% homes lost
- 38% of site reduction

Methodology – growth scenarios

Calculate and distribute the number of dwellings not captured by the >20 homes criteria

Analyse historic growth in the region



Source: UK GOV

Methodology – growth scenarios

Calculate and distribute the number of dwellings not captured by the >20 homes criteria

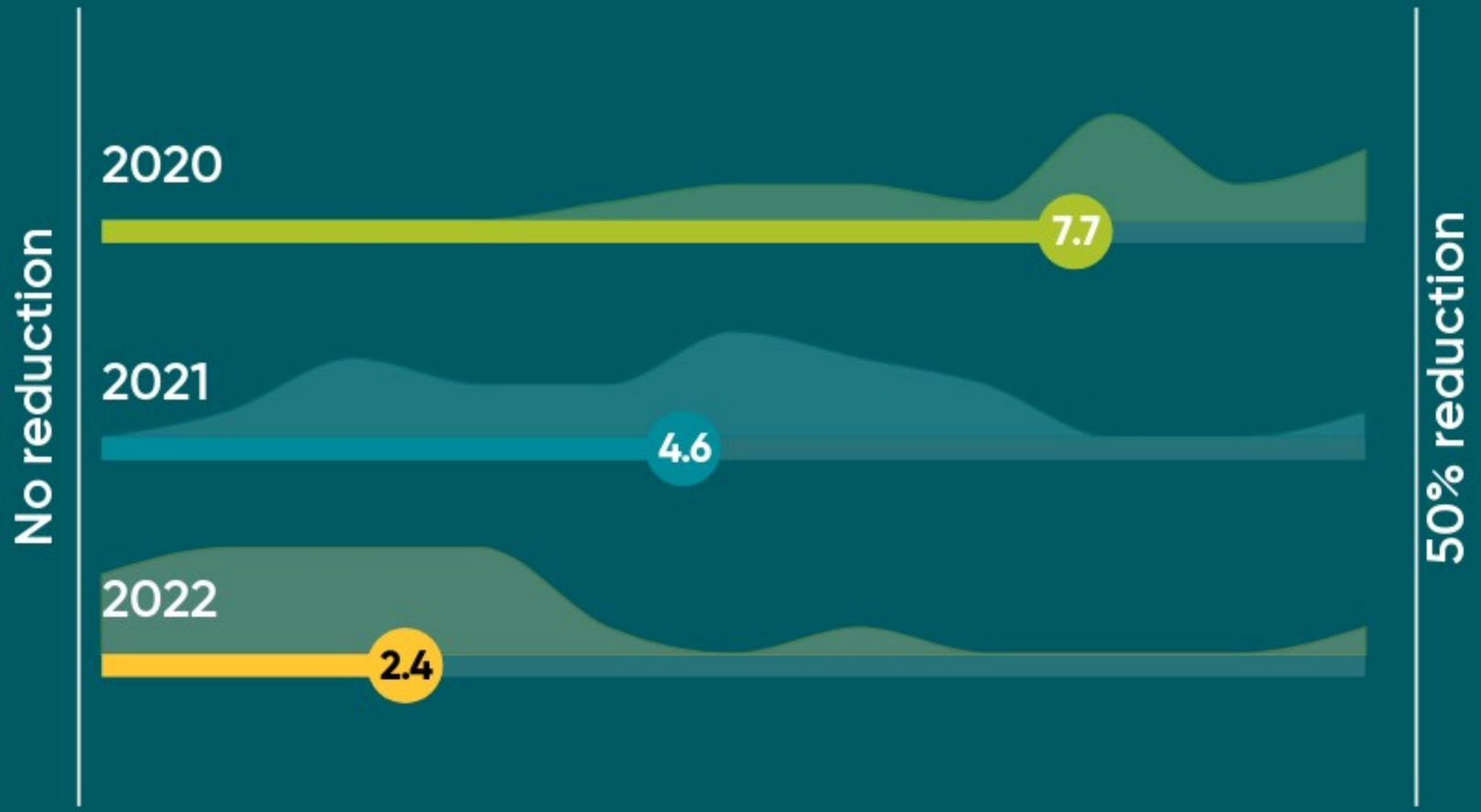
Analyse historic growth in the region

Offset trajectories

More trajectories on schedule

More trajectories delayed

What do you think the magnitude of the lapse in build rates will be, if any, due to COVID-19?



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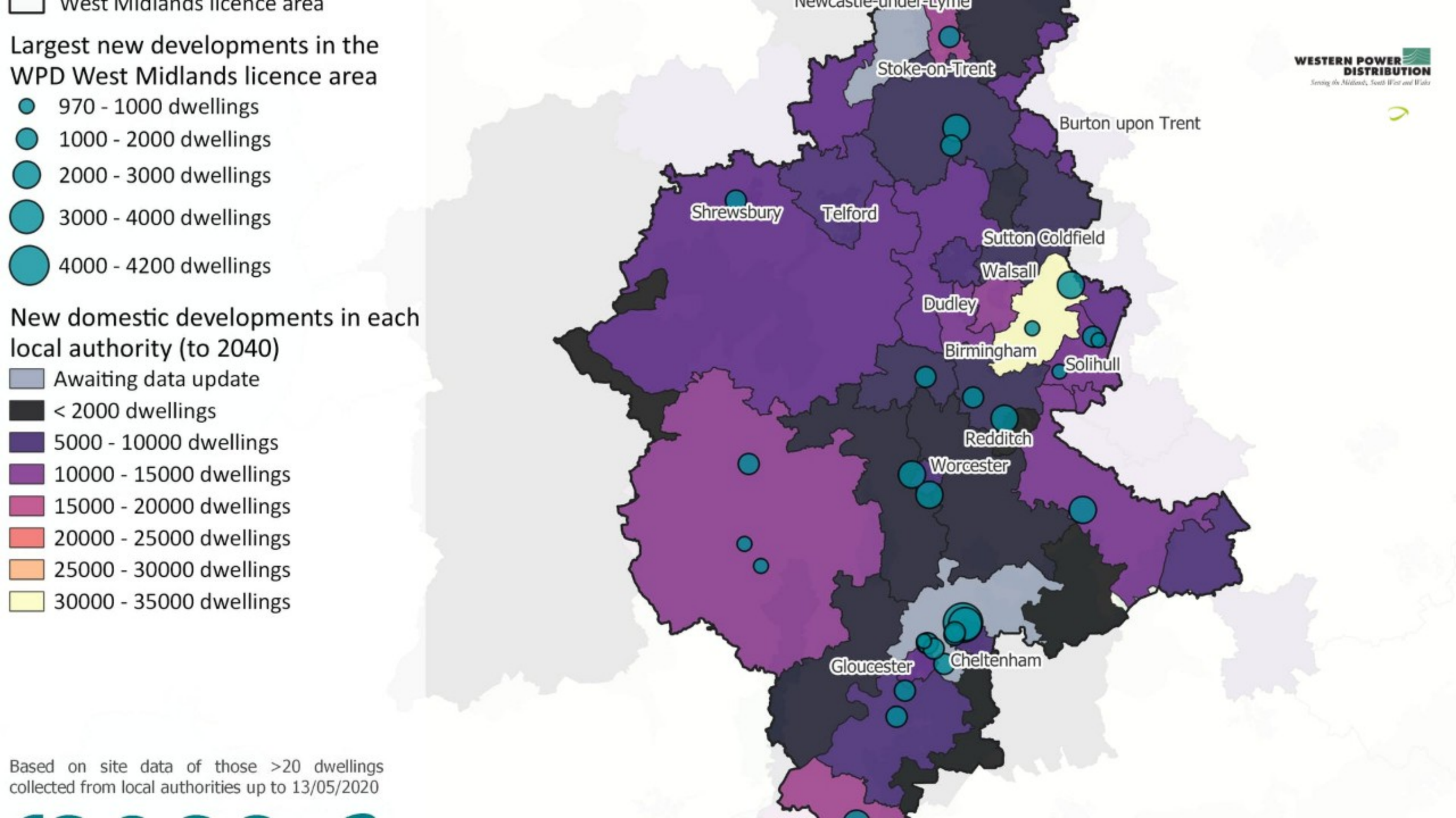
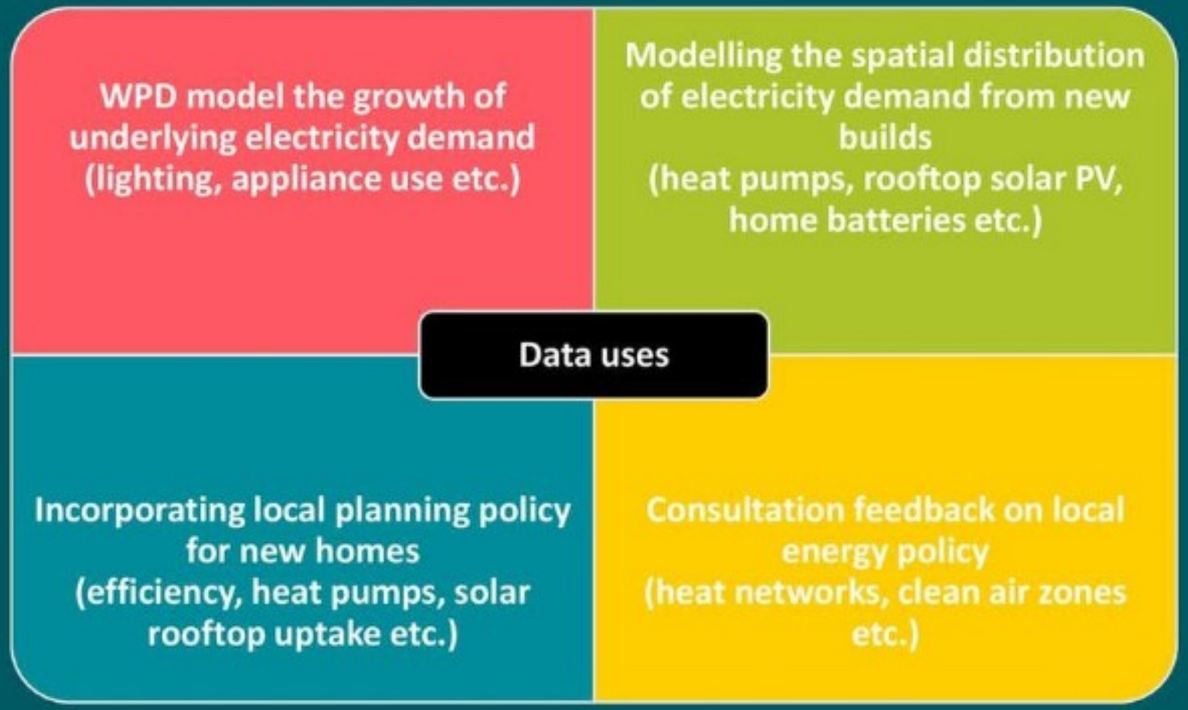
Preliminary results

Heat map of domestic developments to 2040, with the largest sites in West Midlands


West Midlands licence area
Largest new developments in the WPD West Midlands licence area
970 - 1000 dwellings
1000 - 2000 dwellings
2000 - 3000 dwellings
3000 - 4000 dwellings
4000 - 4200 dwellings
New domestic developments in each local authority (to 2040)
Awaiting data update
< 2000 dwellings
5000 - 10000 dwellings
10000 - 15000 dwellings
15000 - 20000 dwellings
20000 - 25000 dwellings
25000 - 30000 dwellings
30000 - 35000 dwellings
Based on site data of those >20 dwellings collected from local authorities up to 13/05/2020
Newcastle-under-Lyme
Stoke-on-Trent
Burton upon Trent
Shrewsbury
Telford
Sutton Coldfield
Walsall
Dudley
Birmingham
Solihull
Redditch
Worcester
Gloucester
Cheltenham
WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

Outcomes of the study



It's not too late to get involved

- Update your local authority's new-developments status by clicking on the SharePoint link in the email you have been sent from smills@regen.co.uk.

- Local authorities - please get in touch if you haven't had any contact via email, or are having issues using SharePoint.

- There is also a survey regarding local energy policy for each local authority to fill out.

- Cut off for new developments feedback was the 30th April, however we will incorporate further input until the end of May in light of the current circumstances. This is a yearly process so any new planning policy documents can be incorporated next year if not captured this time.

Final thoughts and comments?

Please leave questions and thoughts via the Mentimeter Q&A.

Next steps

- Thank you for your ongoing participation
- DFES publication timelines
- Further collaboration
- Contact WPD: wpdnetworkstrategy@westernpower.co.uk

Contact Regen:

For queries relating to the modelling of generation, storage, EVs and low-carbon heat:

Ben Robertson:
brobertson@regen.co.uk
Frankie Mayo:
fmayo@regen.co.uk

For queries relating to the Local Authority new developments study:

Silvia Mills:
smills@regen.co.uk

Although we have an office telephone number, this is unlikely to be answered during the current lockdown so please use the email addresses above.