Stakeholder consultation - WPD Distribution Future Energy Scenarios

South Wales licence area - 12 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 not answered in the time we can contact and answer separately.

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

- Yes, I've looked at the results
- Yes, but I haven't looked at the results
- No

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What do you want to get out of today?

0%	0%	0%	0%
Understand more about the future energy scenarios process	To feed into the modeling and assumptions behind the scenarios	Learn more about the deployment of renewables in South Wales	Hear from WPD about the distribution network in South Wales

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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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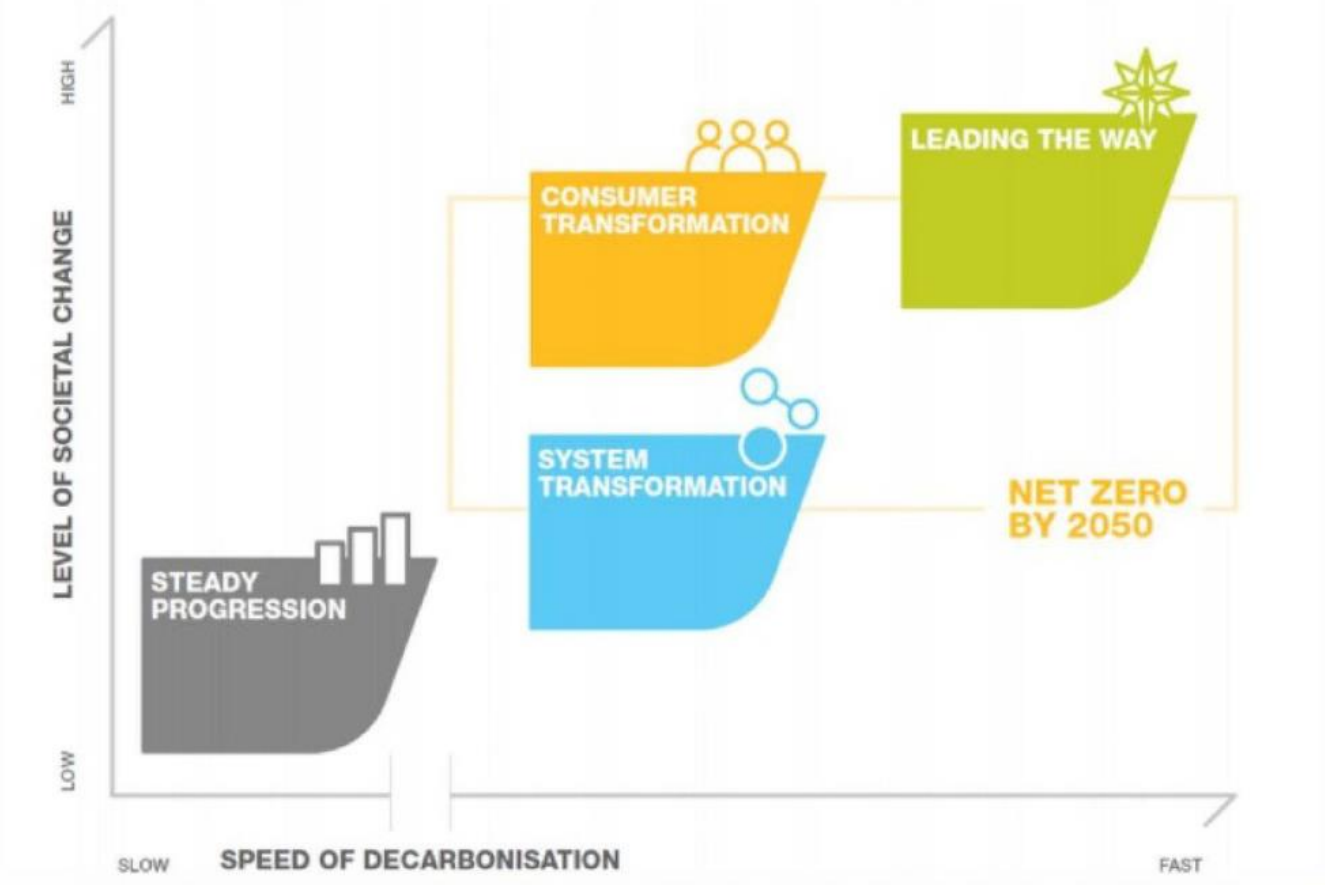
Industry Aligned Scenario Framework

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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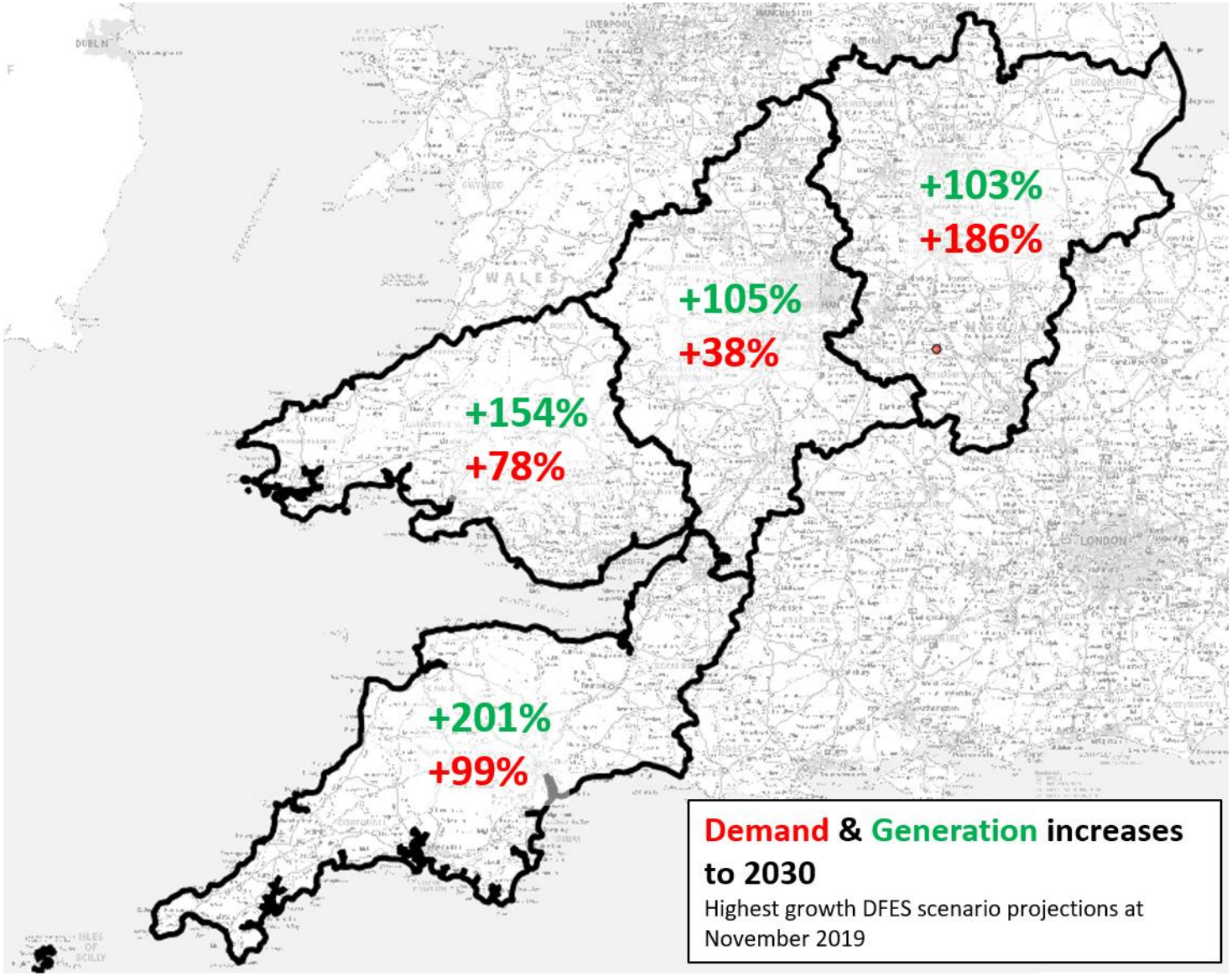
The need for regional scenarios



With reference to a 2019 baseline in each licence area.

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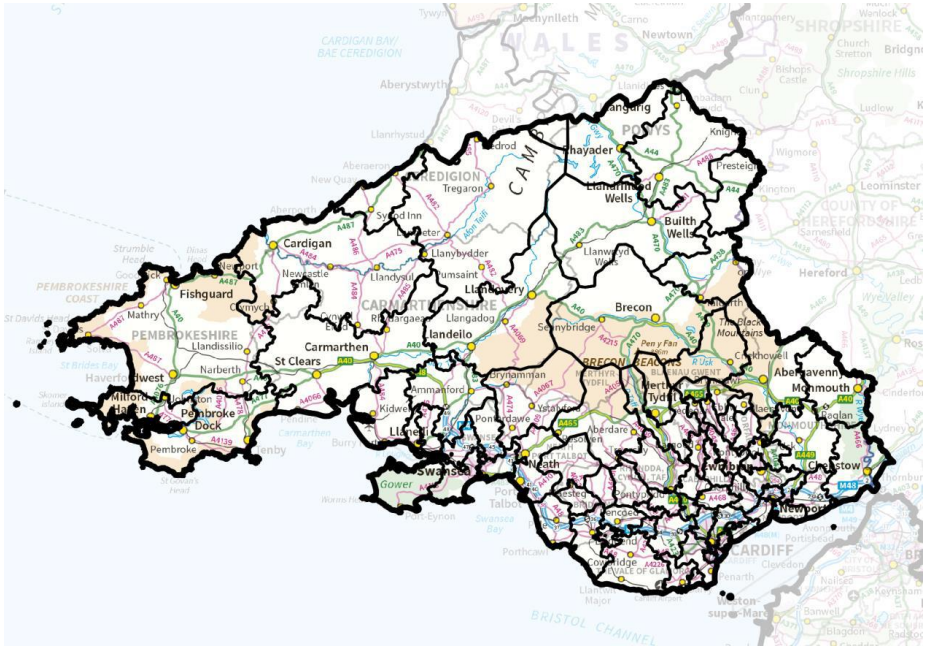
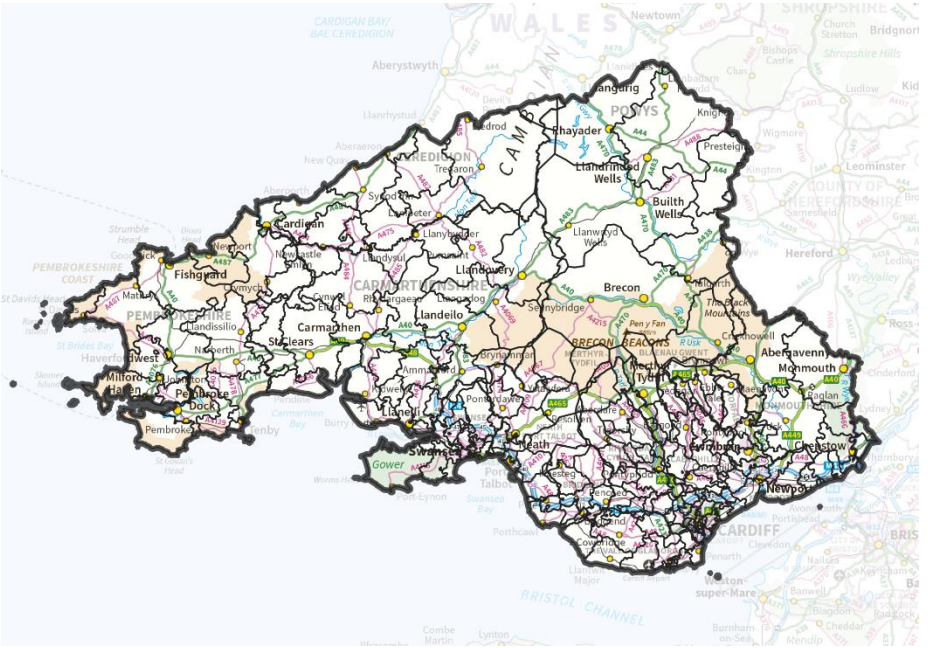
DFES Process – mapping forecasts to our network

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.

DFES Round 2



DFES Round 3



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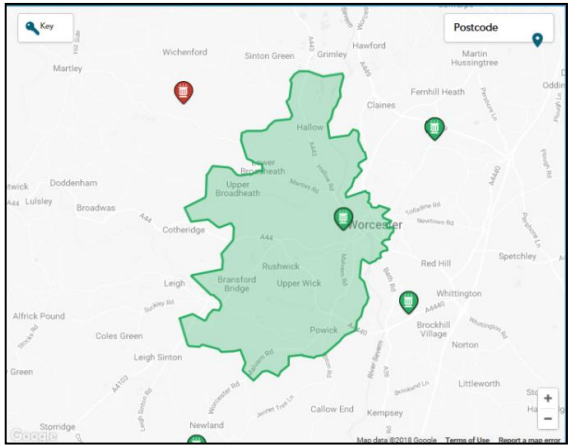
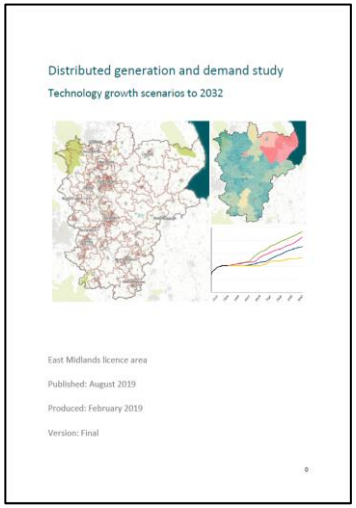
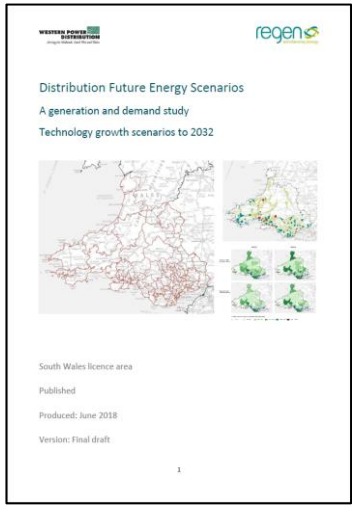
DFES Process – Study Outputs

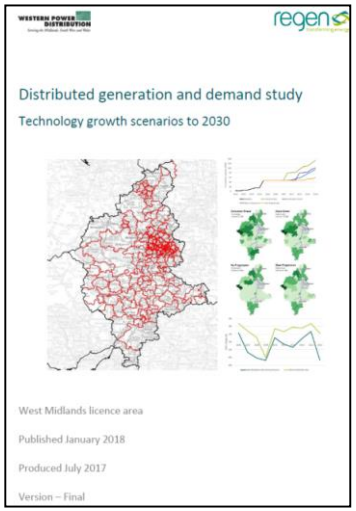
Dataset, with a growth projection for each unique combination of:

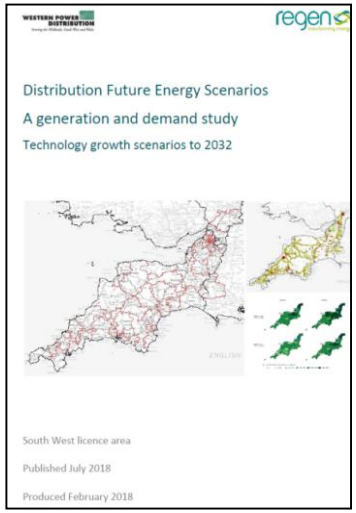
- Electricity Supply Area (~3000)
- Technology type (~50)
- Scenario (4)
- Year (20)











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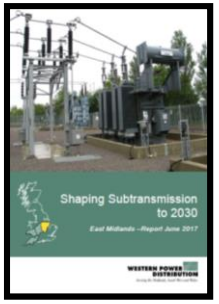
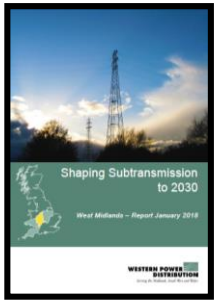
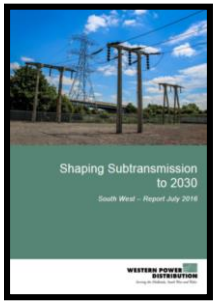
What is the DFES used for in WPD?

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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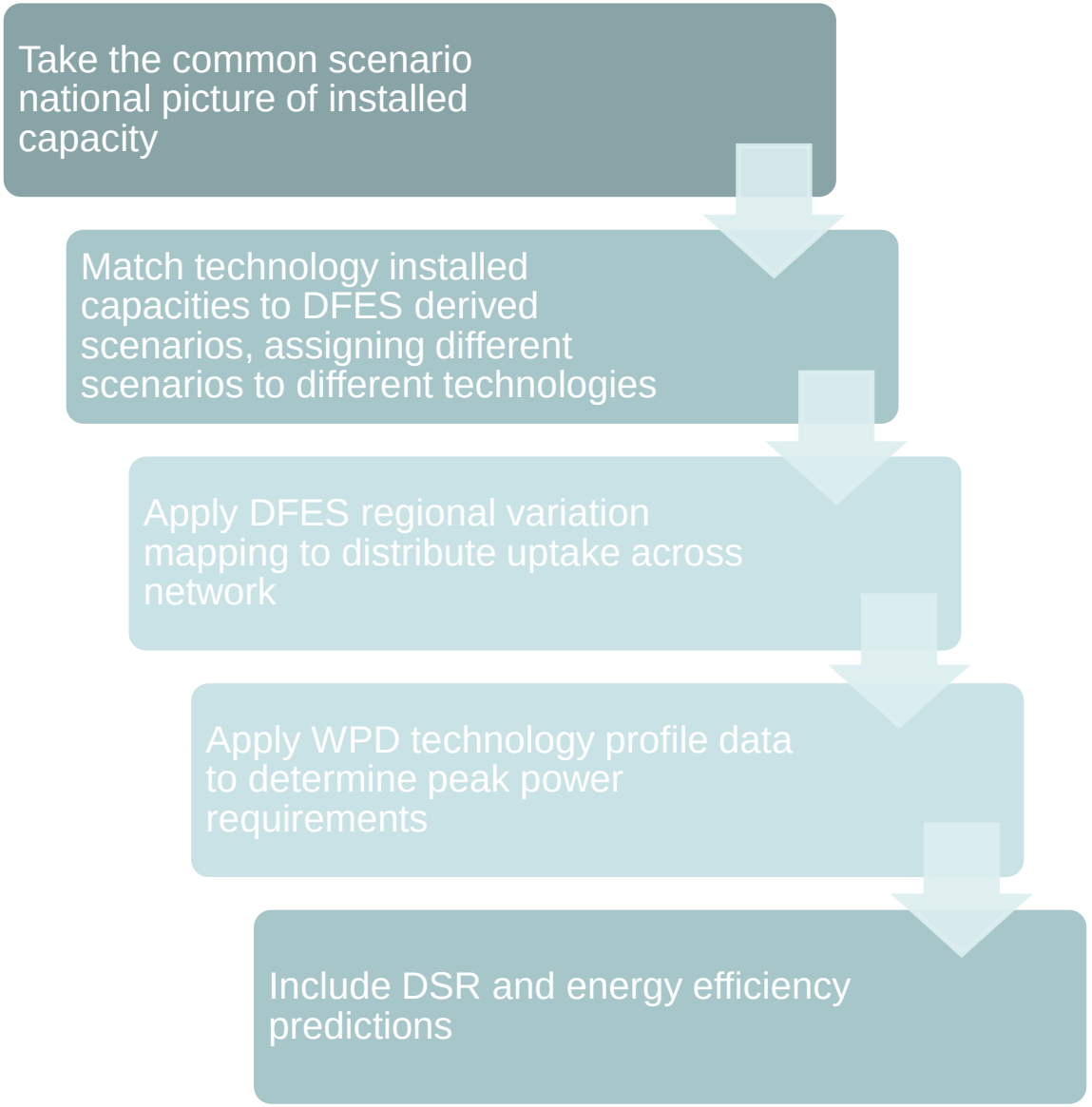
What is the DFES used for in WPD?



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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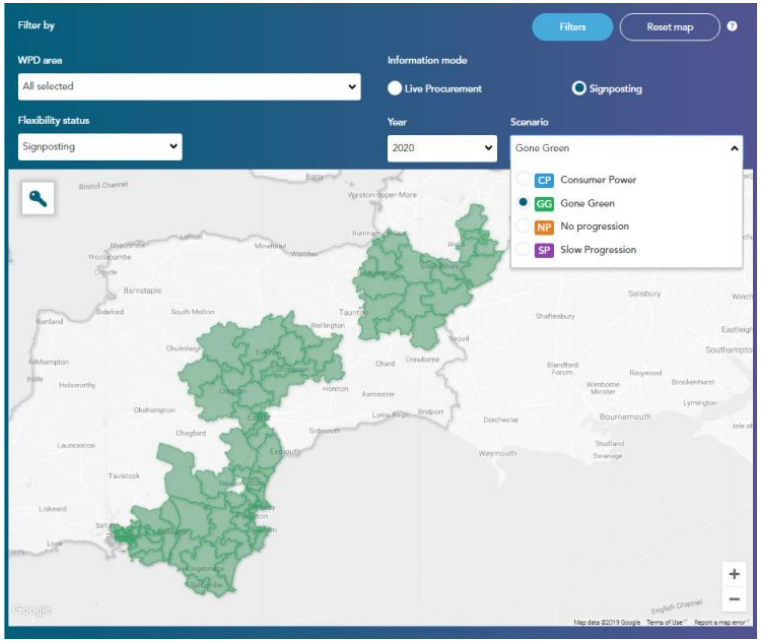
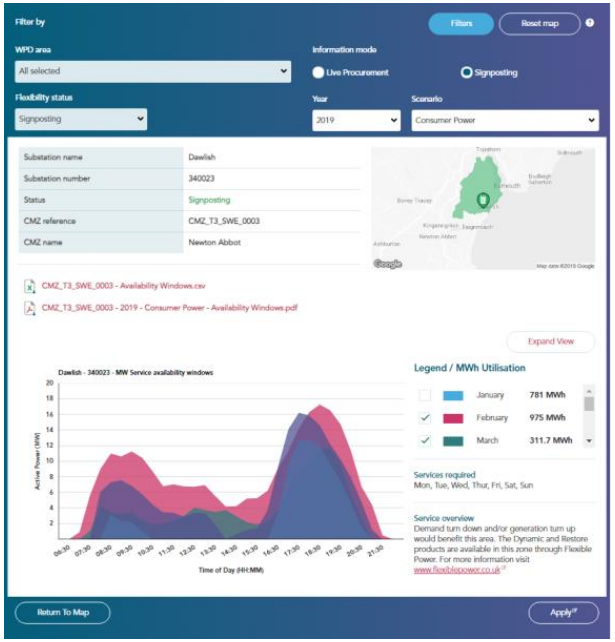
What is the DFES used for in WPD?

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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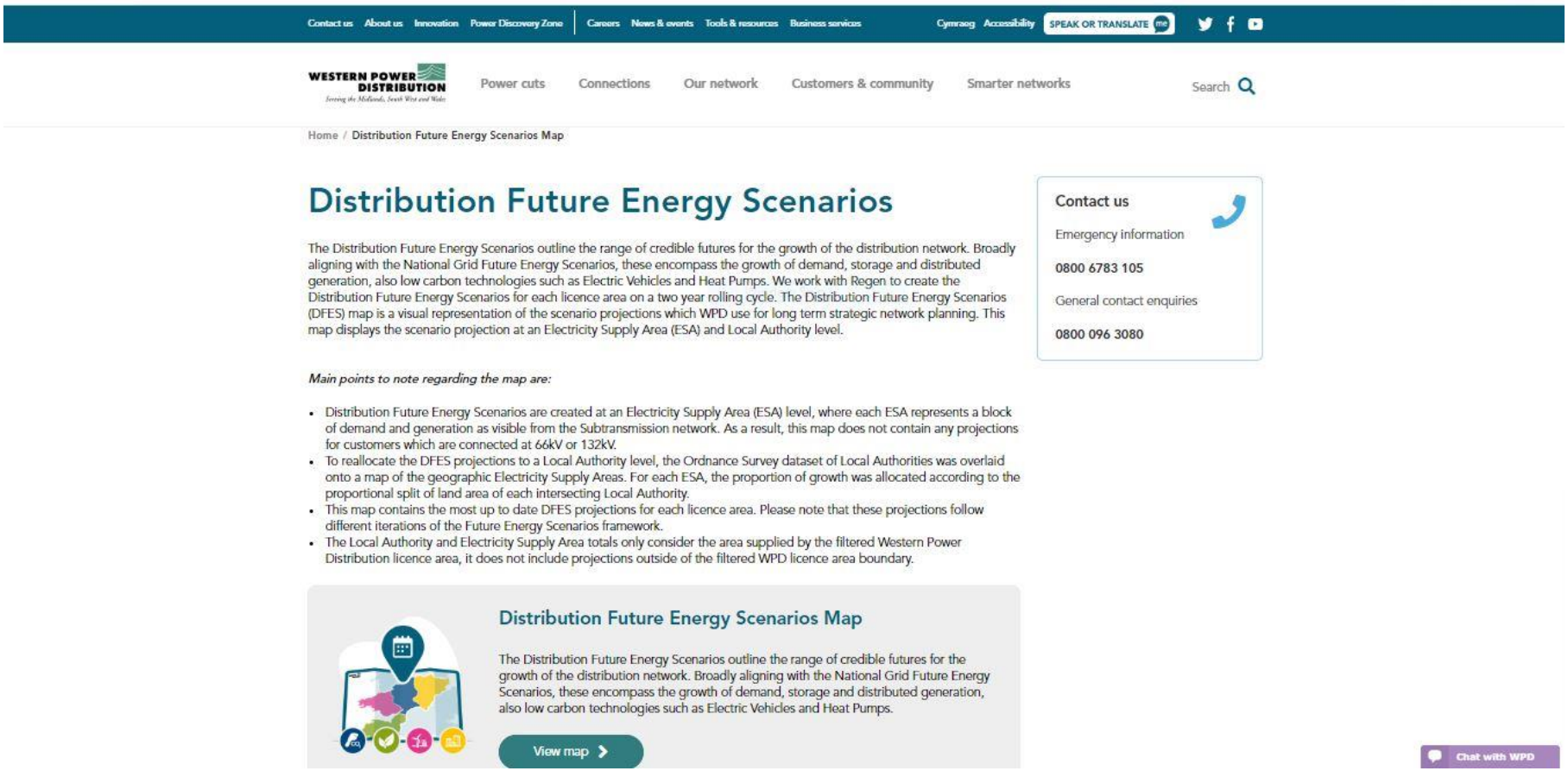
DFES Map



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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.

Contact us

Emergency information

0800 6783 105

General contact enquiries

0800 096 3080

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

Chat with WPD

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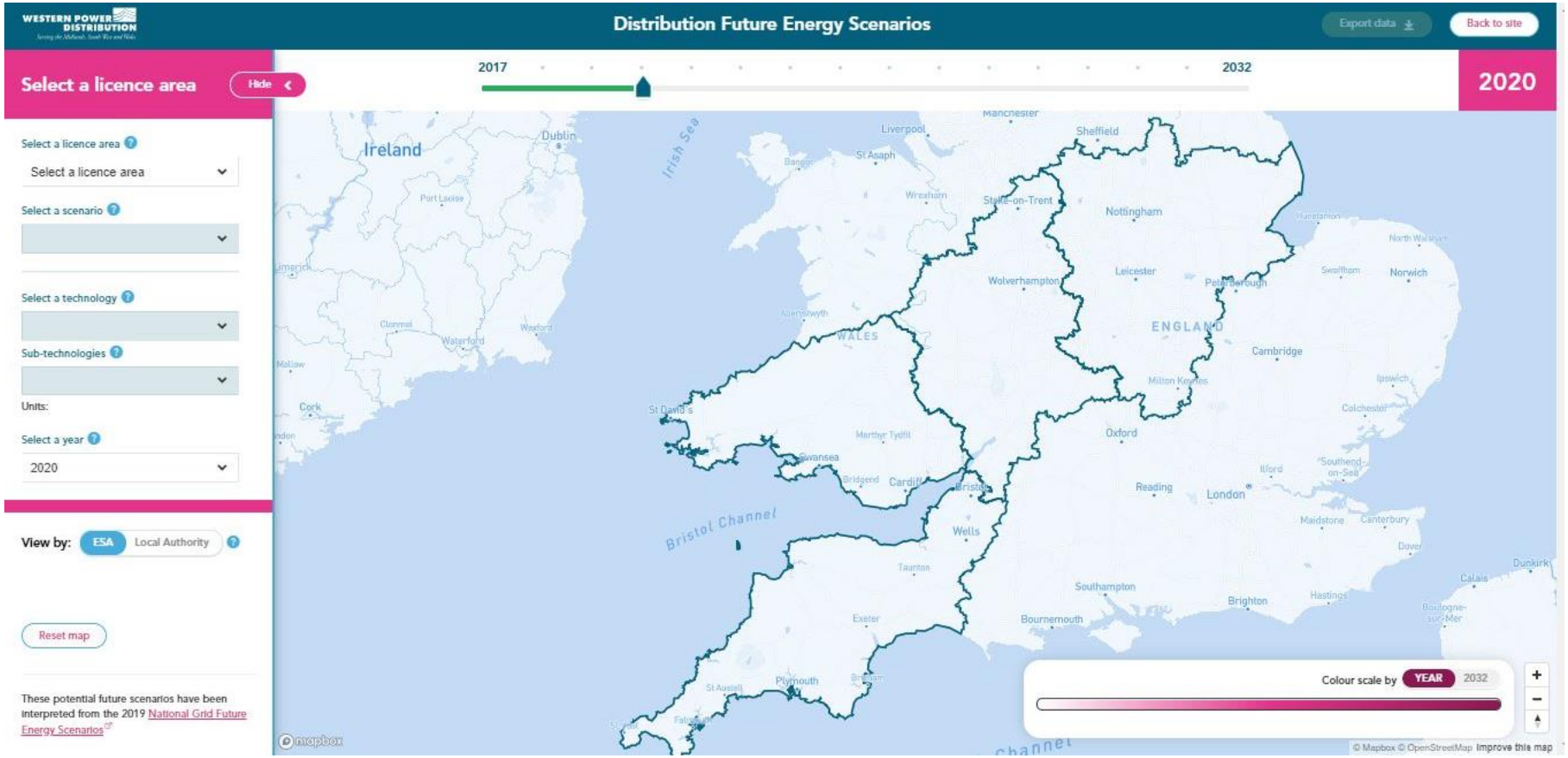
DFES Map



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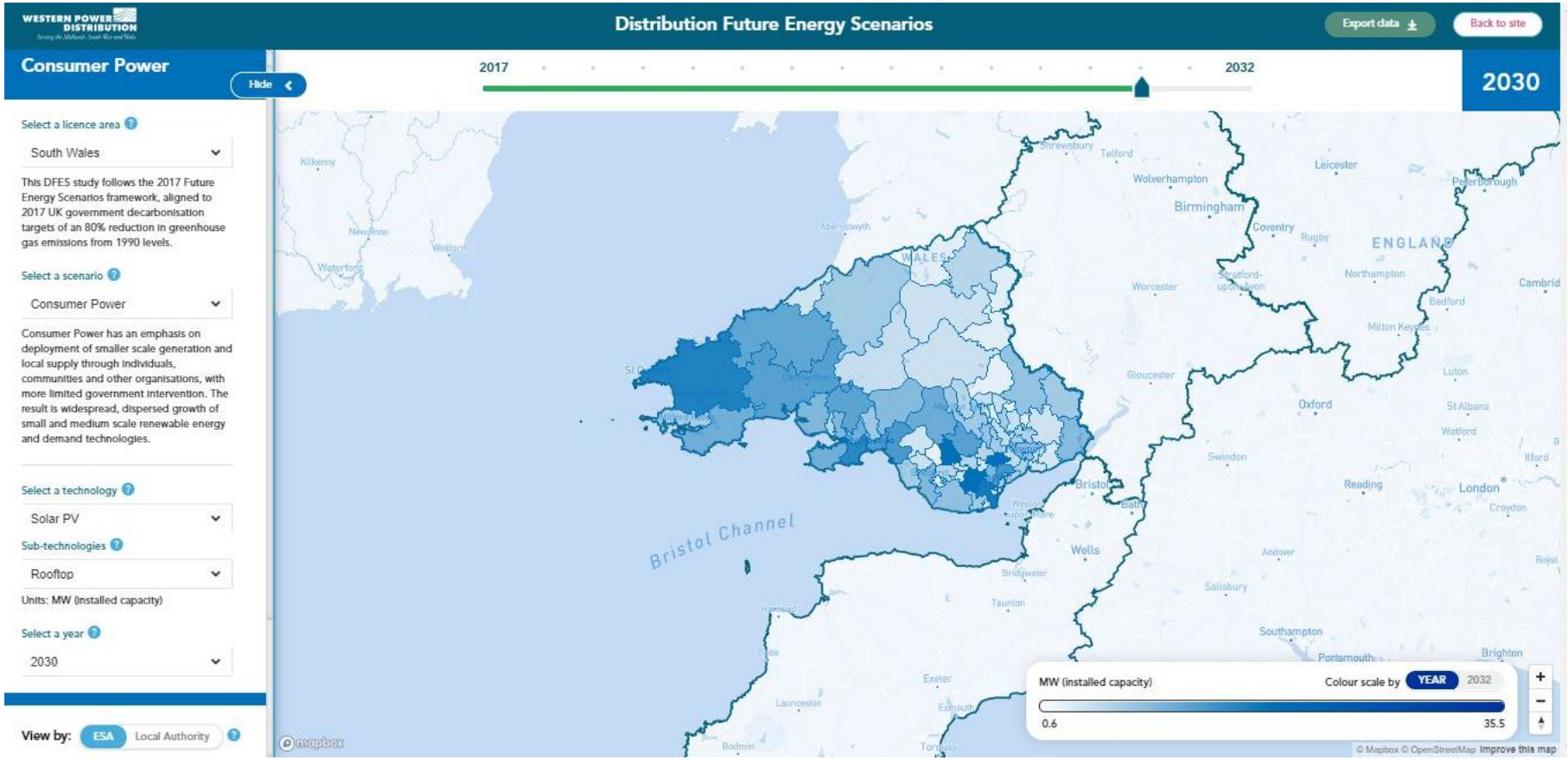

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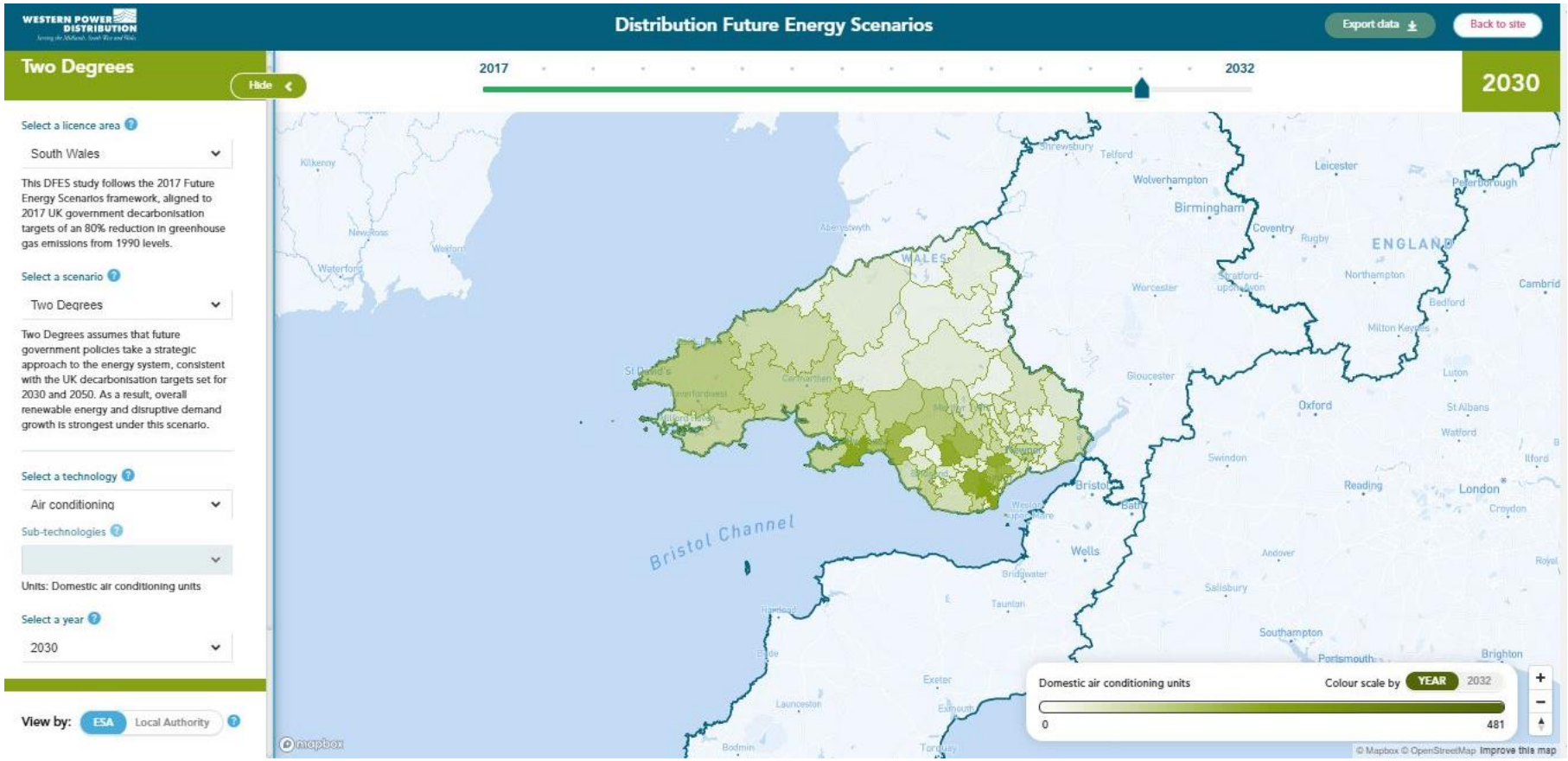

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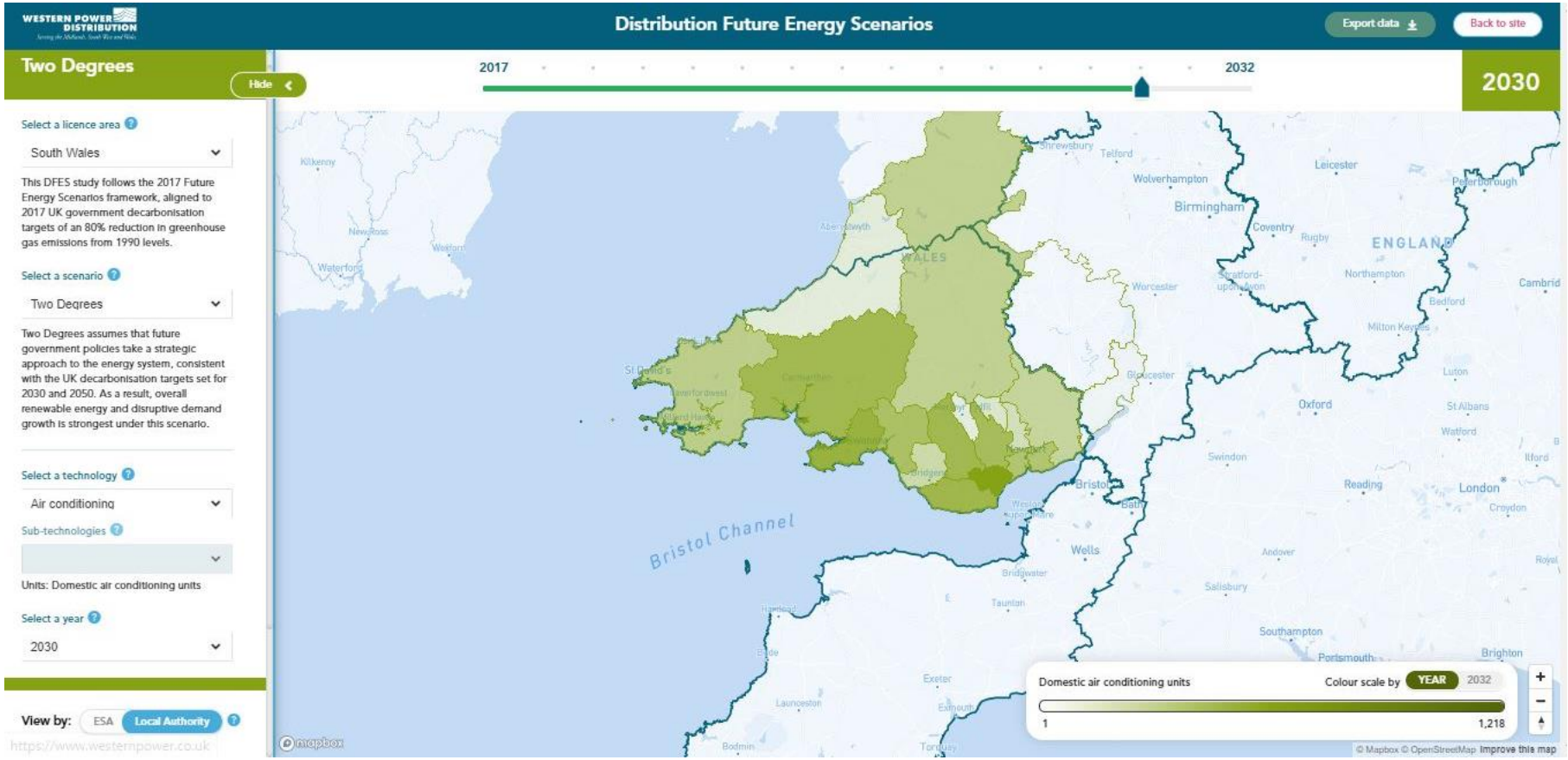

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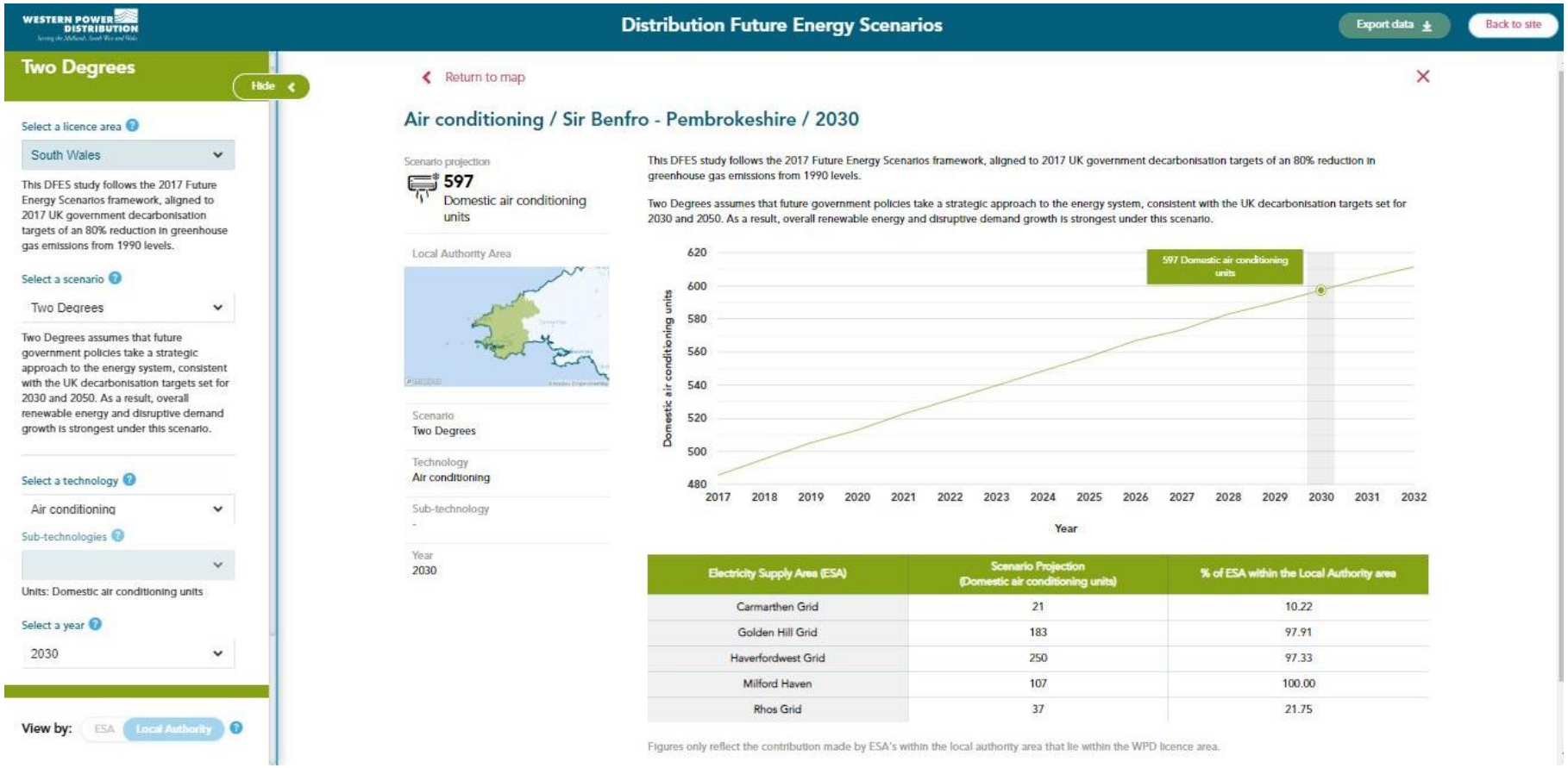

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Input into modelling the 2020 Future Energy Scenarios

Frankie Mayo - Senior 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

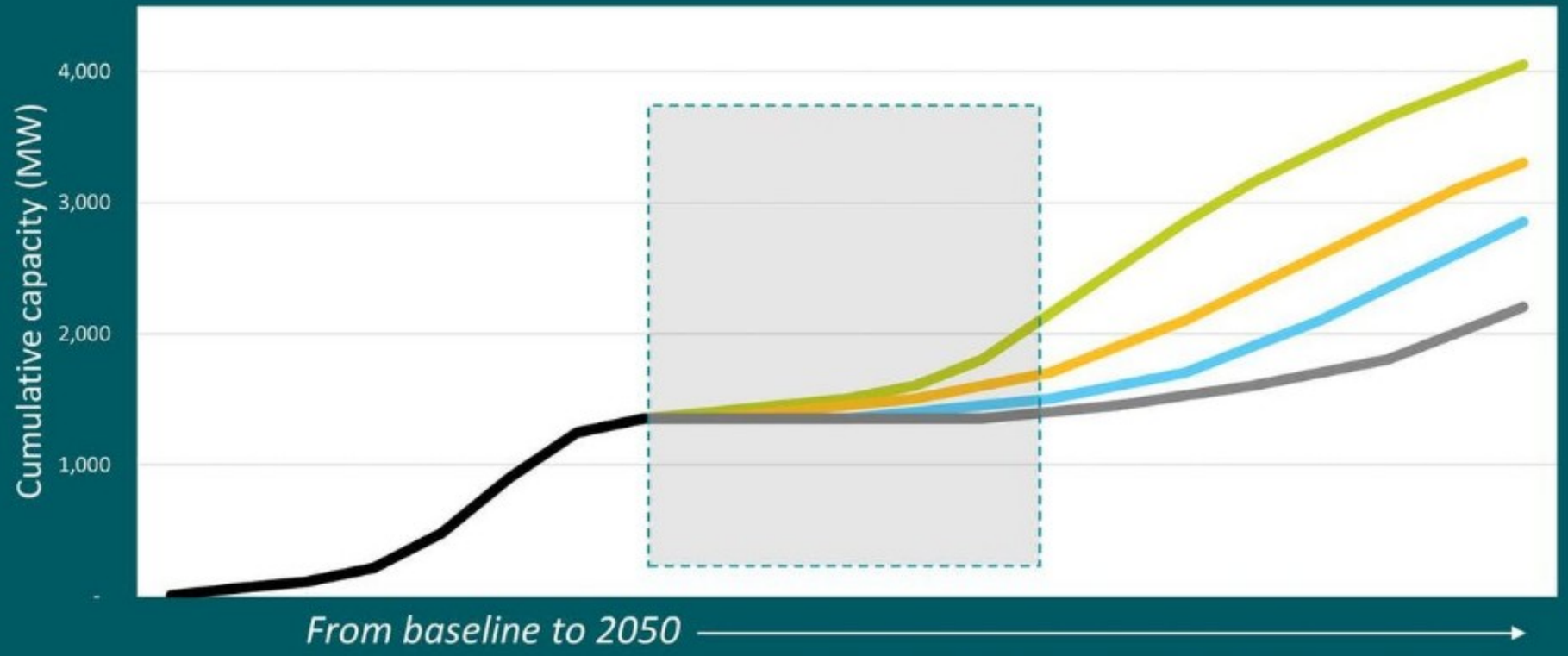
Supply Distributed electricity generation technologies
Solar PV (rooftop and ground-mounted)
Onshore wind
Hydropower
Energy from waste (incineration and ACT)
Anaerobic digestion
Diesel and gas generation

Demand Disruptive electricity demand technologies
Electric vehicles
Heat pumps (hybrid and single systems)
Air conditioning - domestic
New build developments (domestic)
New build developments (non-domestic)

Storage Electrical energy storage at distribution level
Response services
Reserve services
Energy trader
High energy user (behind the meter)
Own use and community
Co-location

Scope of work

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



The FES 2020 scenario framework

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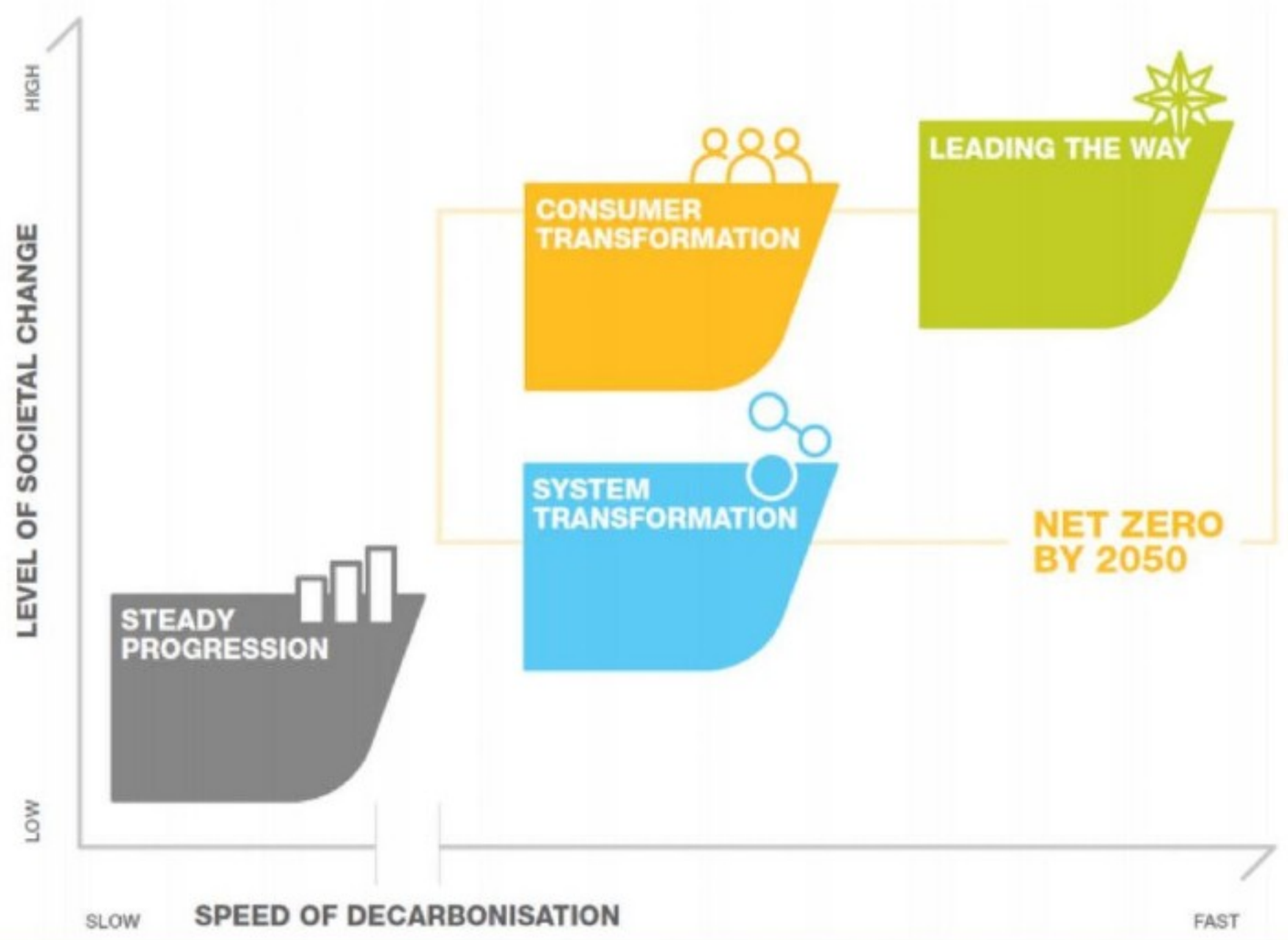


The Future Energy Scenarios set out by National Grid have changed since the last time this study was completed.

They incorporate recent changes, such as the UK net zero carbon emissions target for 2050.

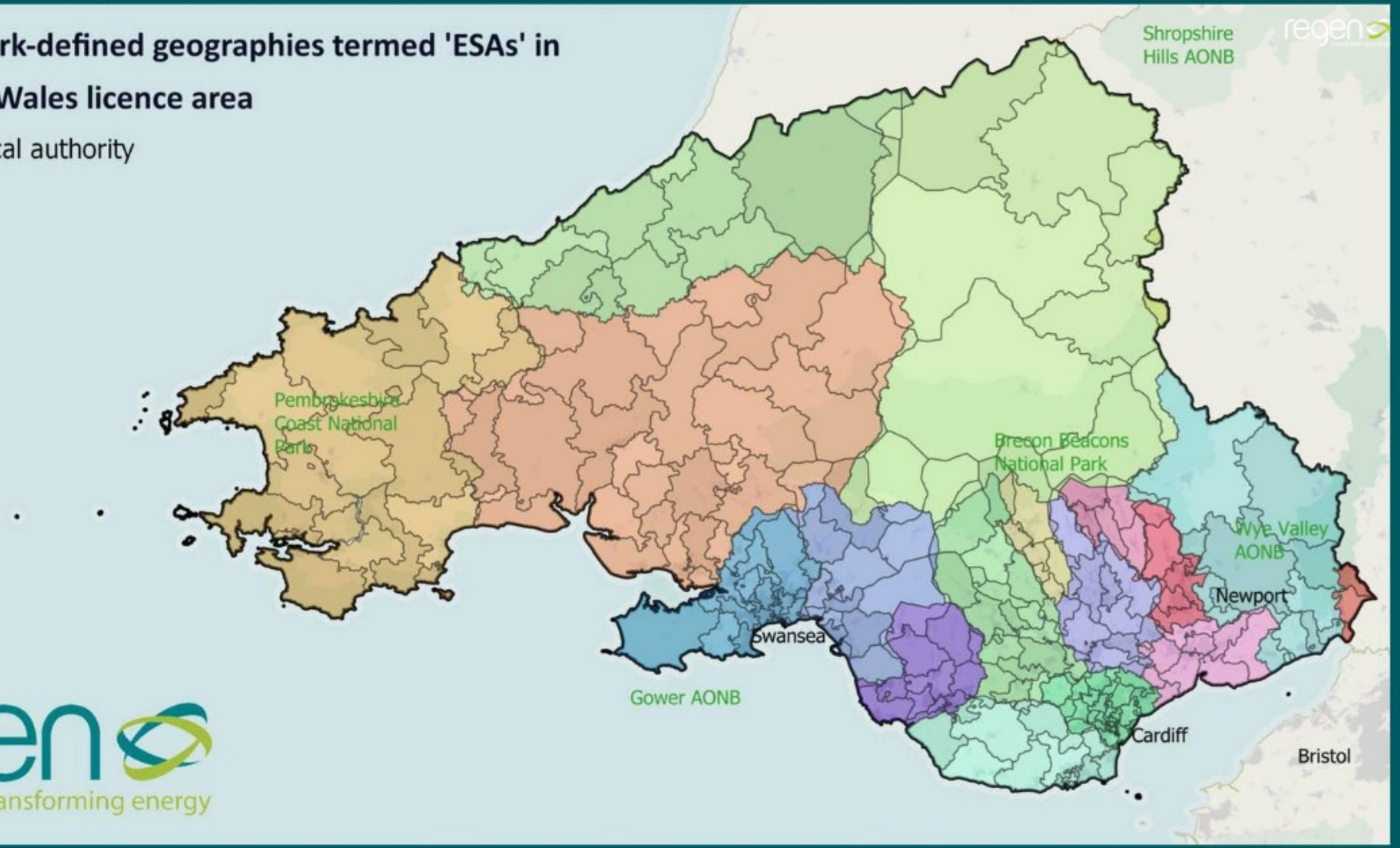
Geographical scope:

Local authority boundaries within the WPD South Wales licence area

Geographical scope:

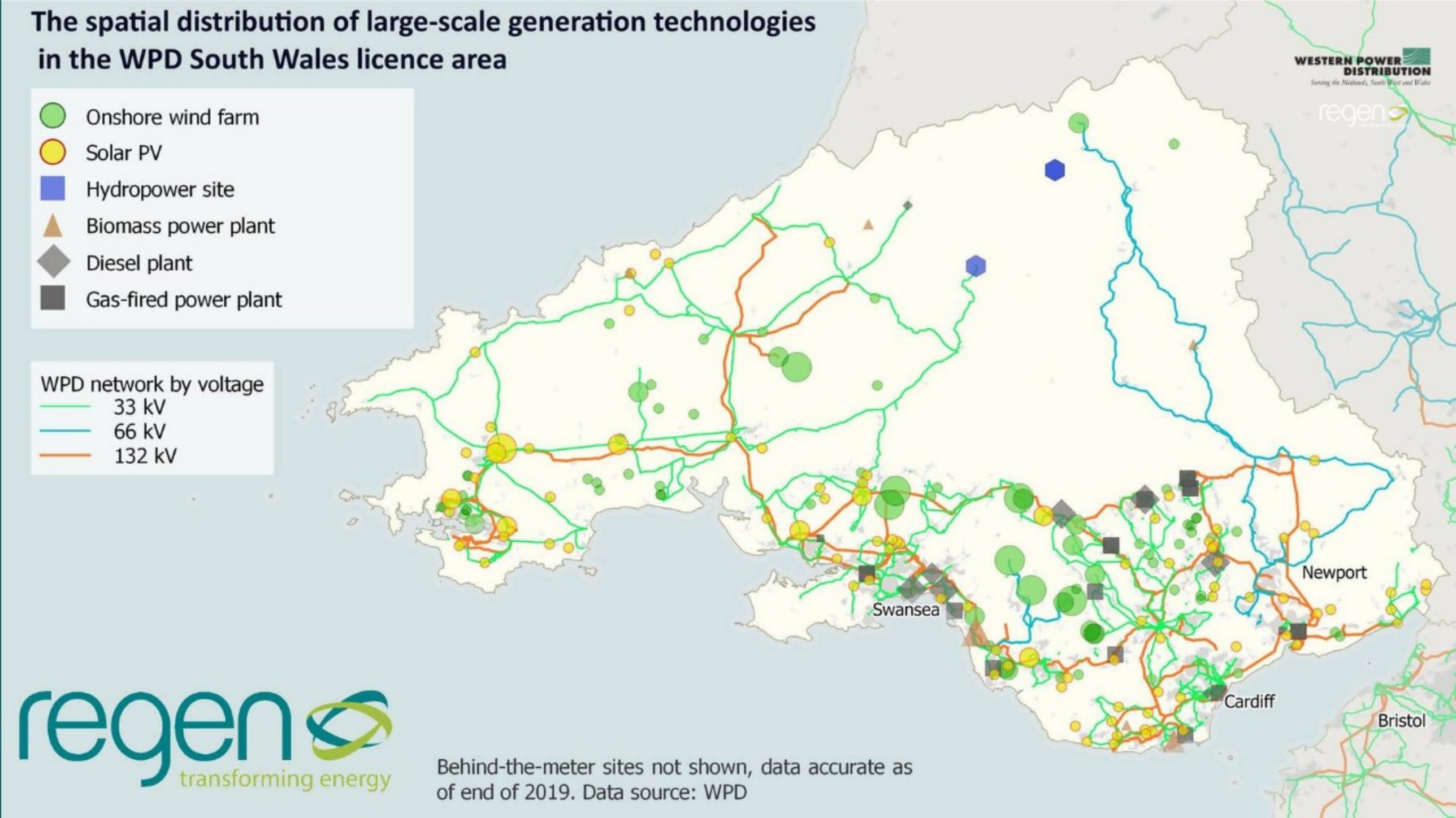
Small network-defined geographies termed 'ESAs' in WPD South Wales licence area

Coloured by local authority



The energy story in South Wales

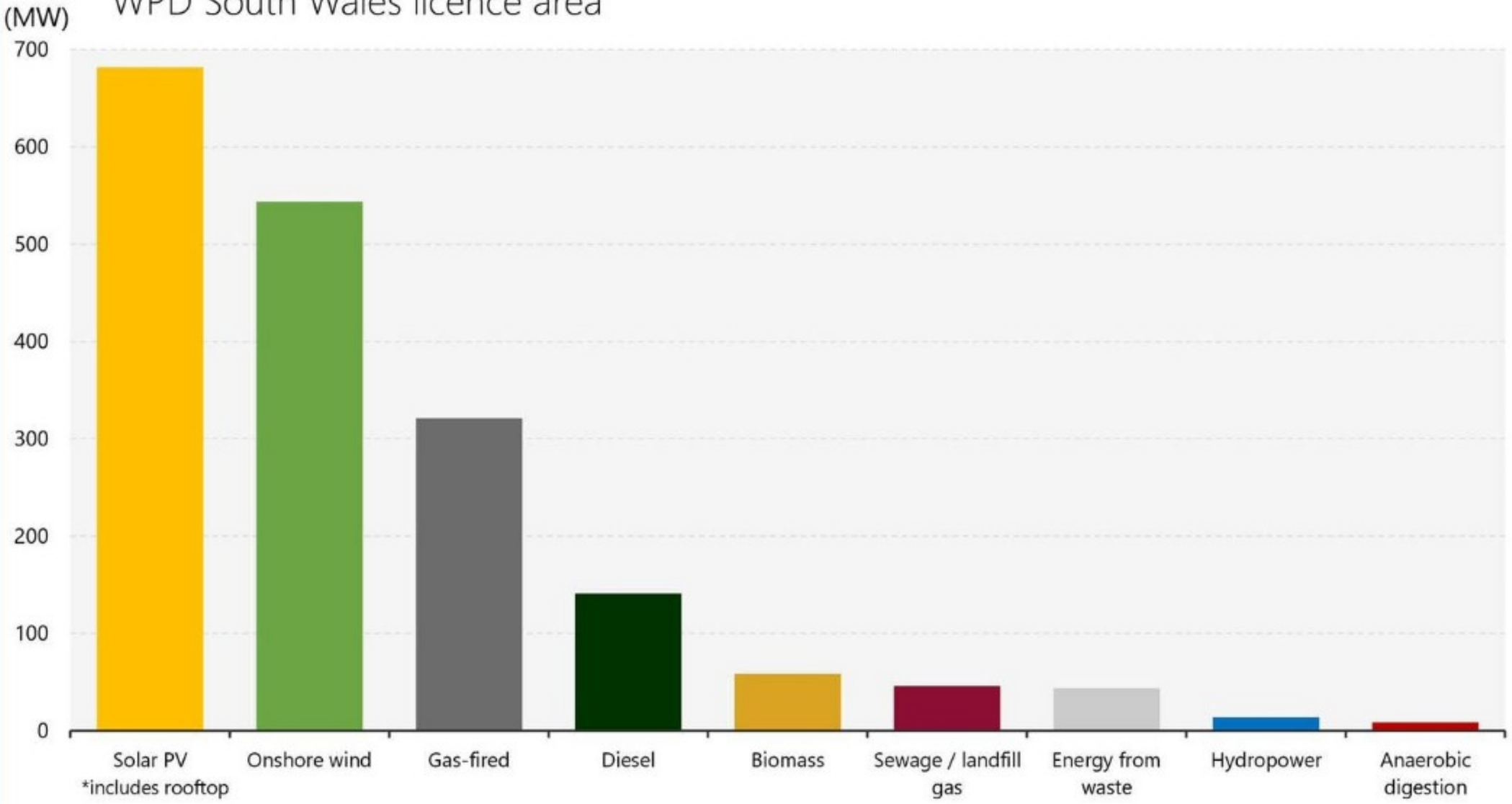
The spatial distribution of large-scale generation technologies in the WPD South Wales licence area



Behind-the-meter sites not shown, data accurate as of end of 2019. Data source: WPD

Total installed generating capacity by technology

WPD South Wales licence area



Pipeline of future projects

- Over 750 MW of solar PV with connection agreements
- Over 370 MW of onshore wind with connection agreements
- 2019/20 also saw the entry of hydropower and storage sites into the pipeline

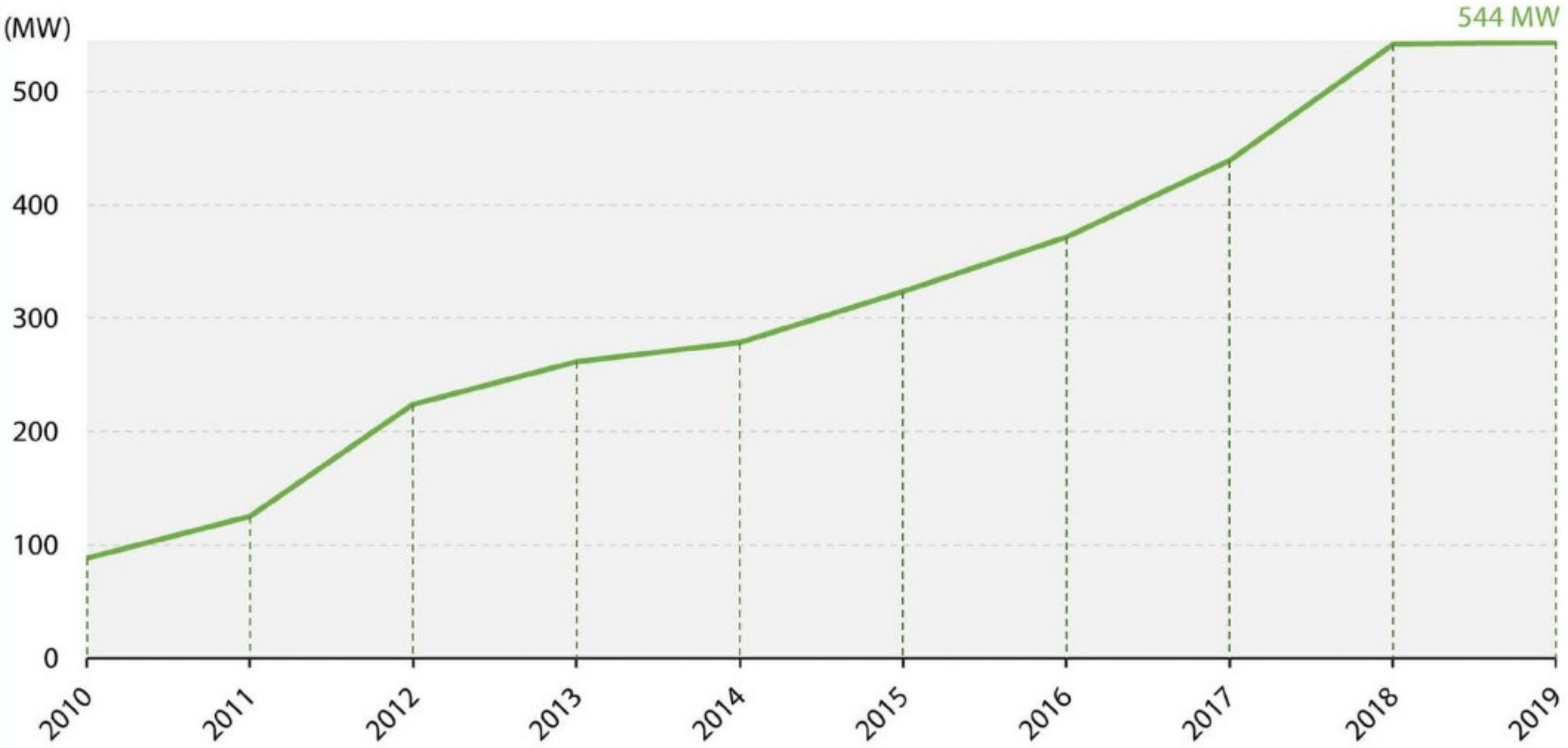
Future energy scenarios for onshore wind

Our consultation event in South Wales two years ago raised the following points:

- Only very large projects are currently viable
- That a review of the SSAs may change future growth prospects
- Smaller sites with behind the meter PPA business models may be an area of growth

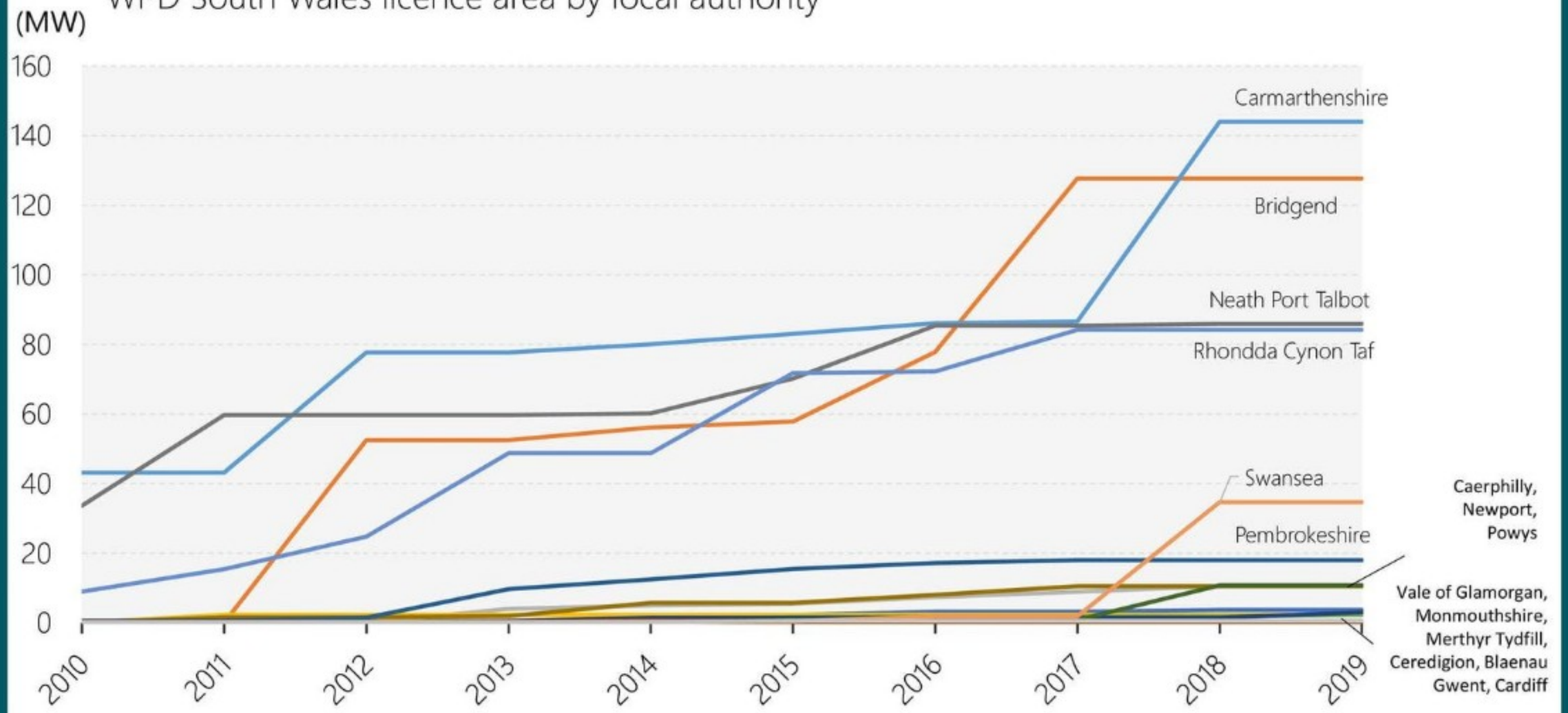
Currently installed onshore wind generation capacity

At end of 2019 for the WPD South Wales licence area



Currently installed onshore wind generation capacity

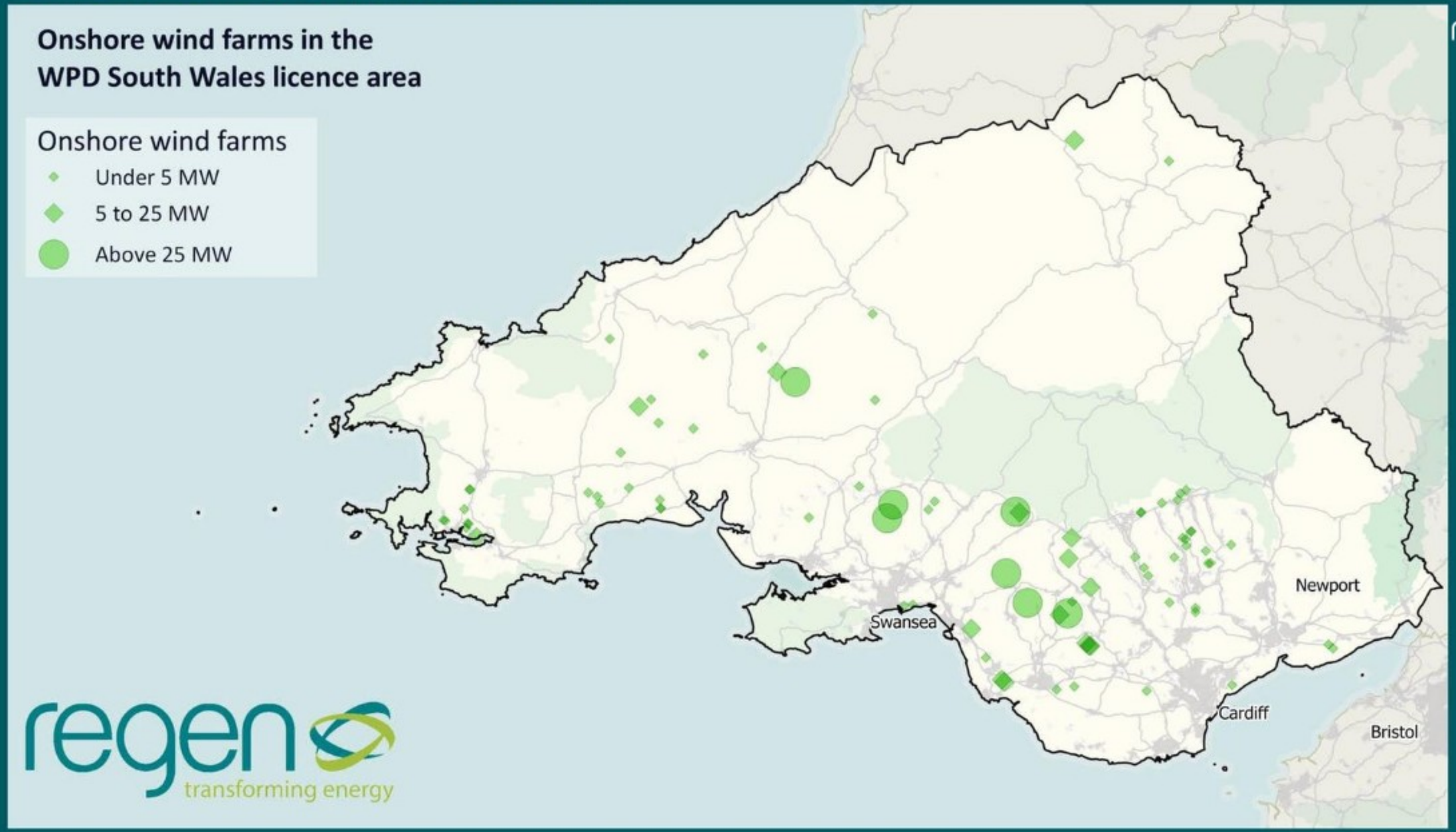
WPD South Wales licence area by local authority



Pipeline of onshore wind projects

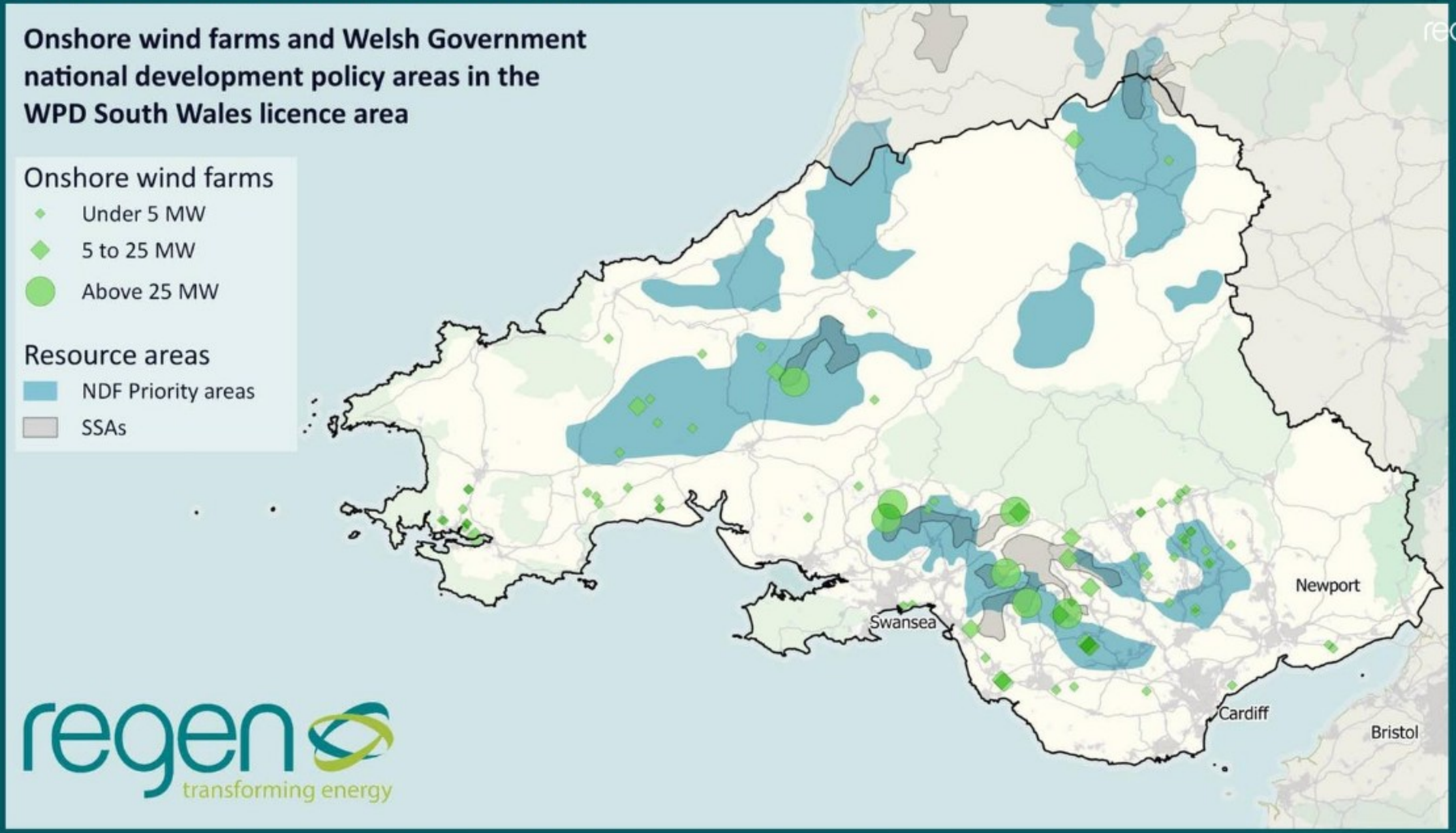
- Over 370 MW of onshore wind sites with a connection agreement
- 24 wind sites with a connection agreement
- 120 MW accepted connection agreement in 2019-2020

Current onshore wind baseline



Current onshore wind baseline

Onshore wind farms and Welsh Government national development policy areas in the WPD South Wales licence area



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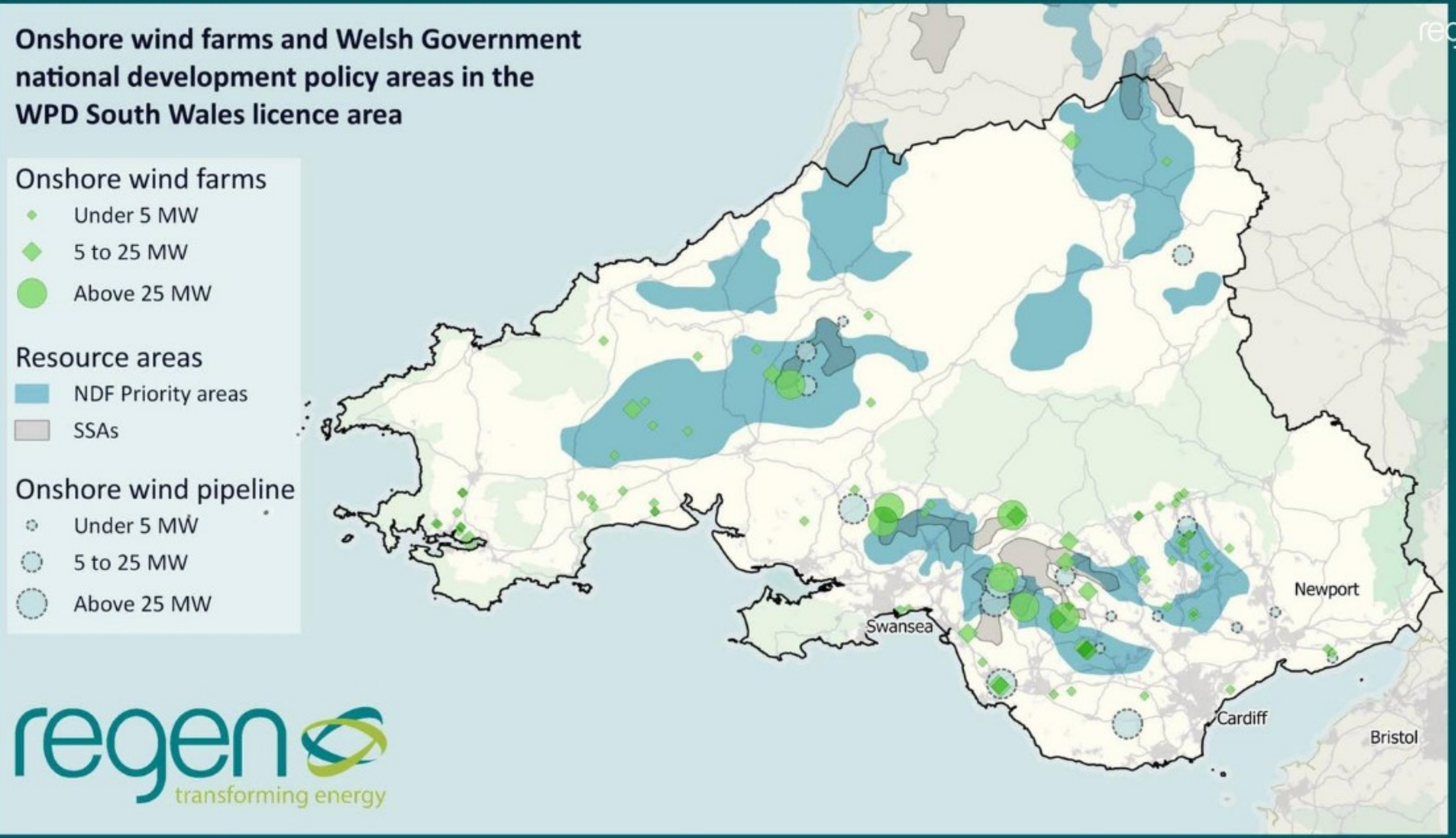

regen
transforming energy

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regen

The Welsh Government adopts a clear traffic light based approach to its policy on large scale wind and solar renewable energy projects.

These technologies are viable and deliverable, and have the greatest ability to make positive contributions to our renewable energy targets in the short-to-medium term:

RED: Large scale on-shore wind and solar energy development is not appropriate within National Parks and Areas of Outstanding Natural Beauty.

AMBER: Areas not within the Priority Areas. These will not carry explicit Welsh Government support and proposals will be determined on their individual merits.

GREEN: Priority Areas for Solar and Wind Energy where there is a presumption in favour of development and where the principle of landscape change is accepted.

The spatial distribution of new onshore wind farms reflecting the new 'priority areas'

Which do you agree with more?

- New wind farms will be limited to only the green priority areas.
- New wind farms will be more widely spread across green and amber areas, following wind speed and network provision

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The deployment of new onshore wind farms in the current SSAs in South Wales

Will the SSAs in South Wales continue to see high levels of deployment?

- Yes, there is still resource available, they will continue to attract deployment
- No, The SSAs in the south are becoming full, deployment will move elsewhere

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Subsidy-free onshore wind in south Wales, and the element of local ownership

Where will subsidy-free business models lead?

0%	0%	0%	0%
A few very large wind farms (> 50 MW) and little else	A few very large sites, and continued deployment of other sites	A few very large sites, then only smaller-scale PPA or community energy sites	Only medium scale (5-50 MW) sites and some smaller sites.

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Future energy scenarios for low-carbon heat

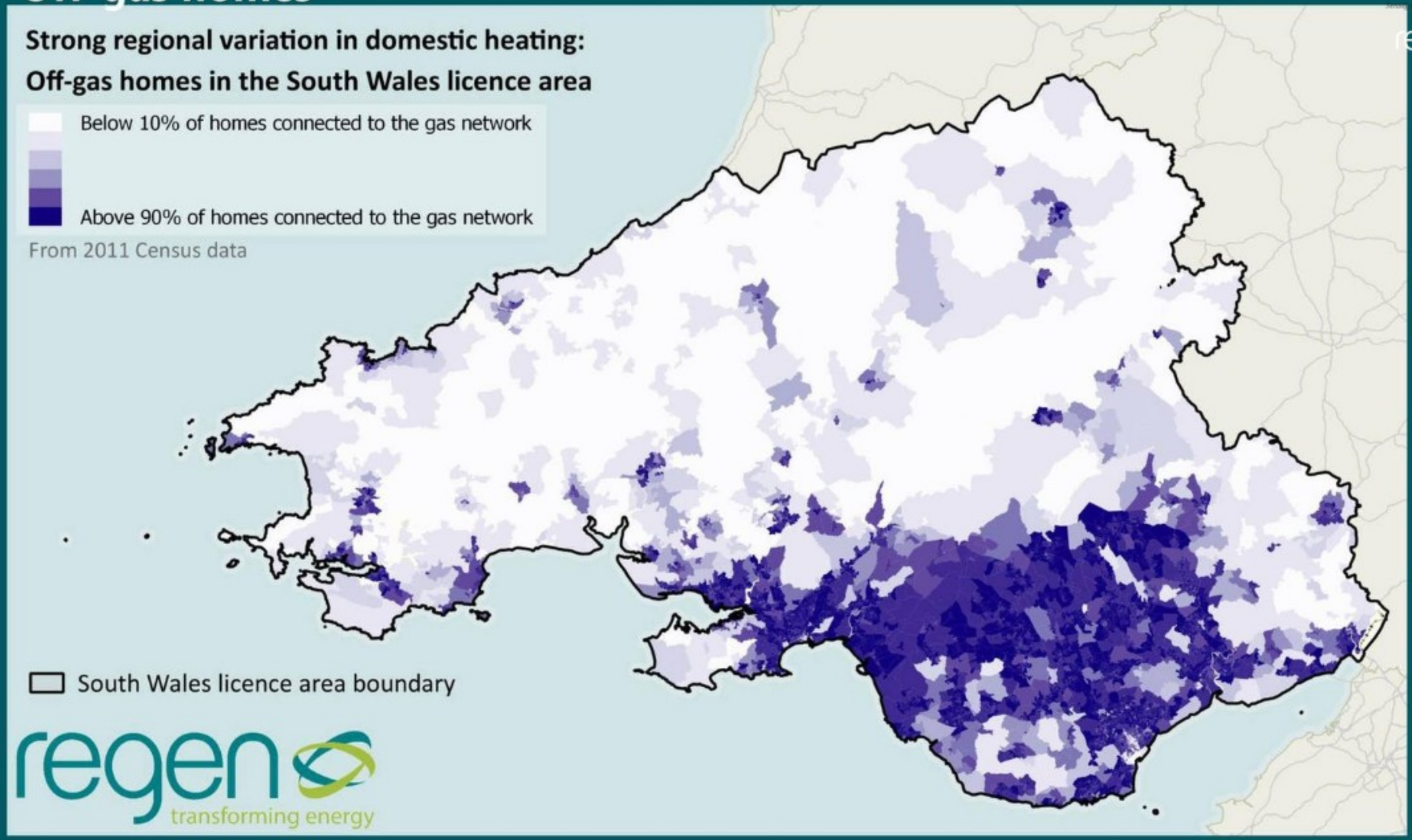
Heat pump figures - for the South Wales licence area

- Heat pumps are currently installed in around 0.4% of homes
- There are roughly double the number of air-source heat pumps than ground-source
- National FES numbers project around 10% of homes with heat pumps by 2030

Recently announced Gov't proposals for an RHI replacement

- Domestic RHI scheme extended until March 2022
- Replace the RHI with a Clean Heat Grant targeted at biomass boilers and heat pumps.
- A Green Gas Support scheme using a tariff approach to support biomethane production.

Off-gas homes



A focus on certain areas, and certain homes.

In the near term, assumptions about the relative fuel and installation costs, regulation, and policy measures all influence where we project high heat pump uptake.

In the near term, will heat pump uptake will be limited to certain households?

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How important are these factors in heat pump uptake?

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Speaking of new homes

Specific local and regional policies, as well as changes to national policy (e.g. the Future Homes Standard) influence the uptake and deployment of low-carbon heat in new build homes.

How might the 2025 Future Homes Standard impact low-carbon heating uptake?

- Gas boilers will continue to be installed right up until 2025, then largely replaced by heat pumps.
- Gas boiler numbers will reduce after 2025, but be replaced by direct electric storage heating not just heat pumps.
- The number of new homes with gas boilers will fall linearly towards 2025, replaced by heat pumps

Local plans, policies and schemes

We are researching local plans and policies in regards to heat and wider electricity supply and demand too. Are there any specific documents or plans you would direct us towards? For example for heat networks, clean air zones, new build policies etc.

Are there any specific documents or plans you would direct us towards? For example for the Swansea 'Homes as Power Stations' plan.

New developments study

- Joe Noble, Graduate Analyst at Regen

New developments overview

Why?

We carry out the new developments study to assess the scale and geographic spread of expected new demand on WPD's electrical networks.

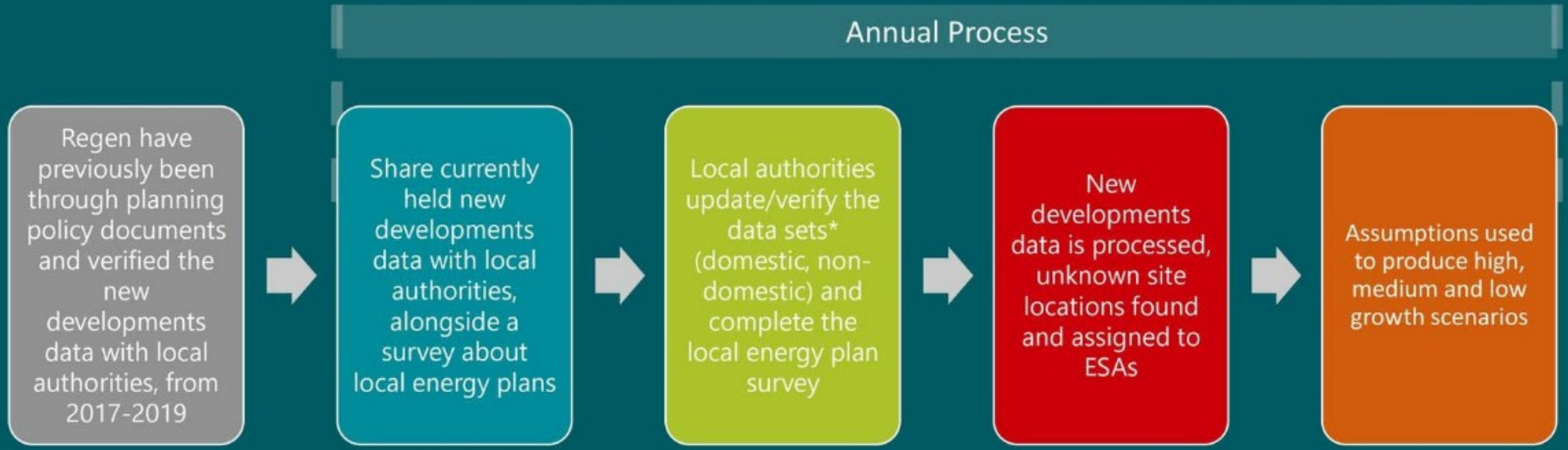
What?

We do this by collecting domestic and non-domestic planning policy data from local authorities in the WPD licence areas.

How?

We use this data to produce domestic and non-domestic growth scenarios. These are used to inform WPD of future network requirements, and are fed into disruptive demand models (EVs, heat pumps etc) to model the impact of technology uptake on the network capacity.

Methodology overview



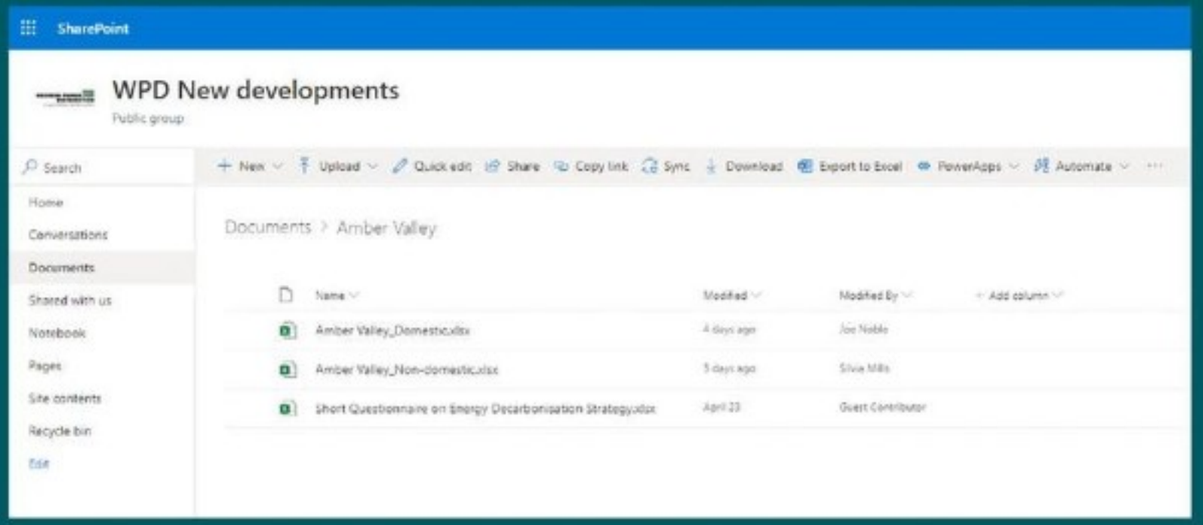
*if unavailable or no response from LA, Regen will research planning policy documents

Methodology – collecting data

Data from previous studies is collated and imported to SharePoint for each Local Authority

Local authorities are sent an mail-merged email, with brief explanation of the purpose of the new developments process, alongside data requirements and a link to the SharePoint file

Local authorities update/verify the data, or provide Regen with the required data via excel file, local plan etc.



Thank you to the local authorities which have already provided us with information!

Methodology – the data we collect

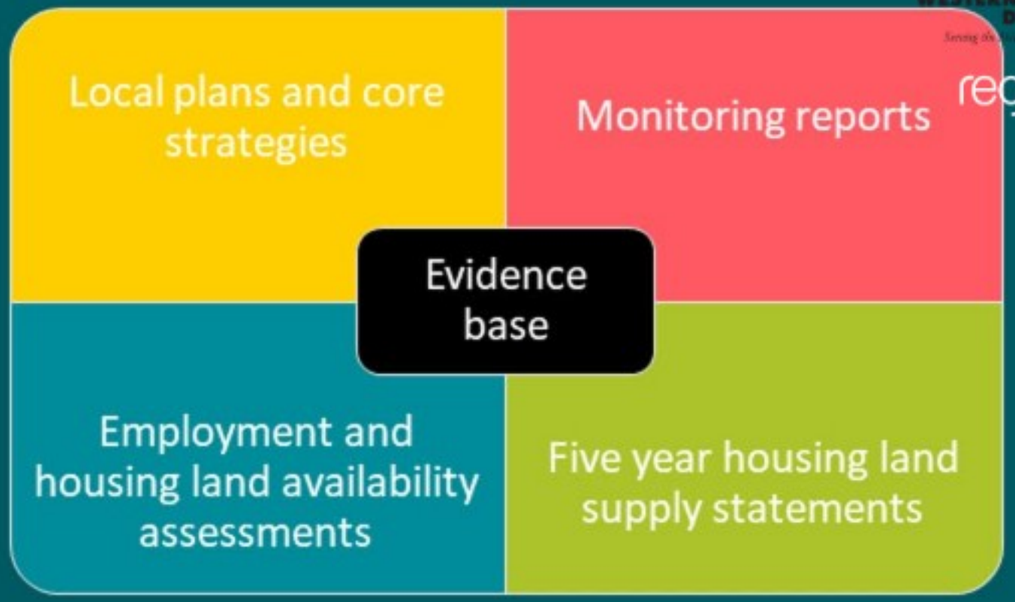
Allocated and planned new domestic and non-domestic sites:

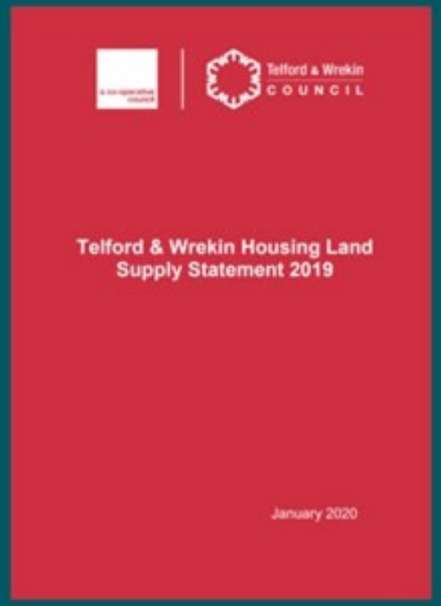
- Over 20 homes (domestic)
- Over 0.1ha site area (non-domestic)

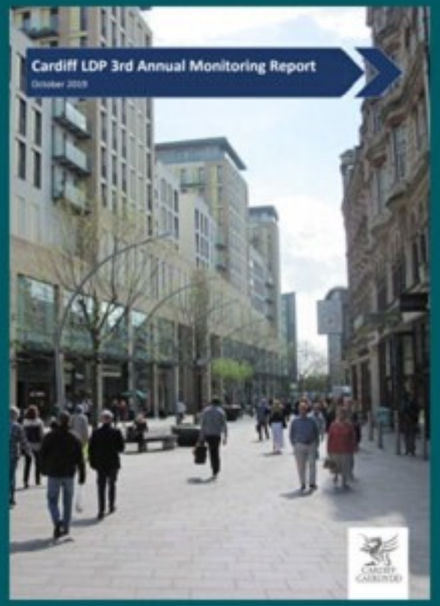
We need:

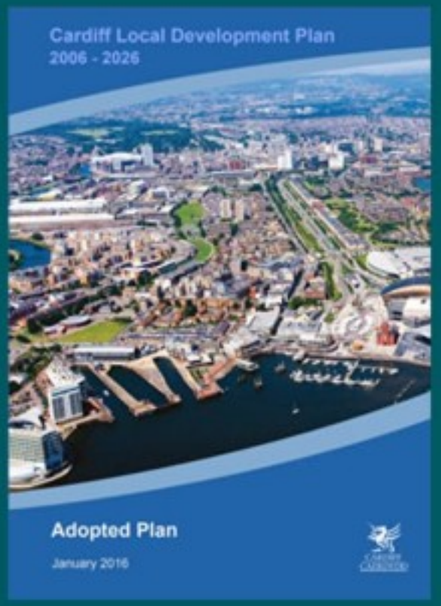
- Number of dwellings/site area
- Locational data (E/N)
- Category and floorspace (for non-domestic)
- Trajectory/build out rates
- Source information

Methodology – data sources









Do you think SharePoint is an effective way of sharing data with WPD?

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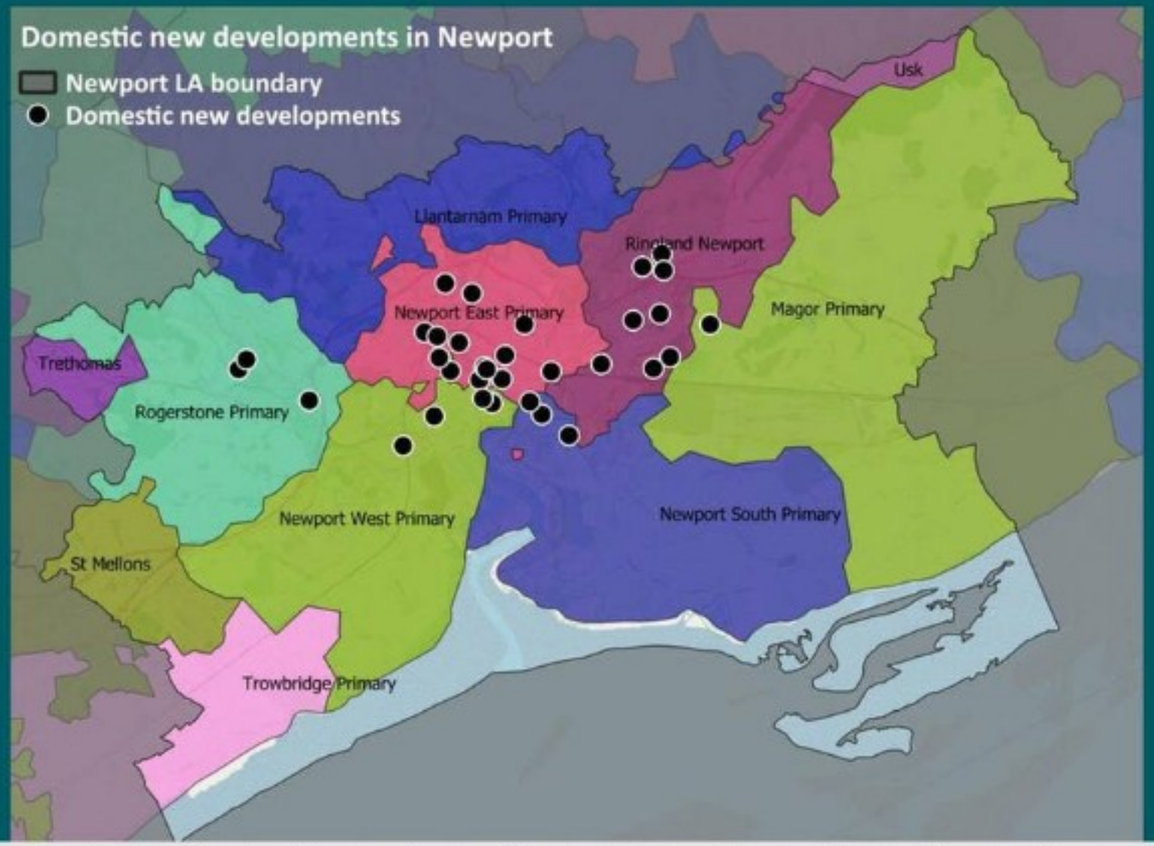
Methodology – assigning to ESAs

- Electricity supply areas (ESAs) are the approximate areas served by each electrical substation on the WPD distribution network.
- This is the geographical level of detail which we examine in this study.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Licence ar	Site name	Local auth	Easting	Northing	Number of homes	Notes	Developm	Land type	Source	Source yea	Source lin	2017	2018	2019	2020	2021	2022	2023	2024	2025
2	South Wal	Glan Llyn I	Newport	335722.00	190133.00	3287.00		Under con	Brownfield	Joint Hous	2019	http://ww		0.00	70.00	53.00	160.00	180.00	180.00	180.00	180.0
3	South Wal	Llanwern \	Newport	336723.00	188642.00	1015.00	Phase 2 is	Under con	Greenfield	Joint Hous	2019	http://ww		0.00	2.00	28.00	75.00	100.00	100.00	100.00	100.0
4	South Wal	Whitehea	Newport	330880.00	186787.00	529.00		Permissior	Brownfield	Joint Hous	2019	http://ww		0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.0
5	South Wal	Newport A	Newport	331425.00	188324.00	472.00	The club h	LDP alloca	Brownfield	Joint Hous	2019	http://ww		0.00	0.00	0.00	0.00	0.00	0.00	0.00	95.0

Methodology – growth scenarios

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Calculate and distribute the number of dwellings which are not captured by the >20 homes criteria used for this study.

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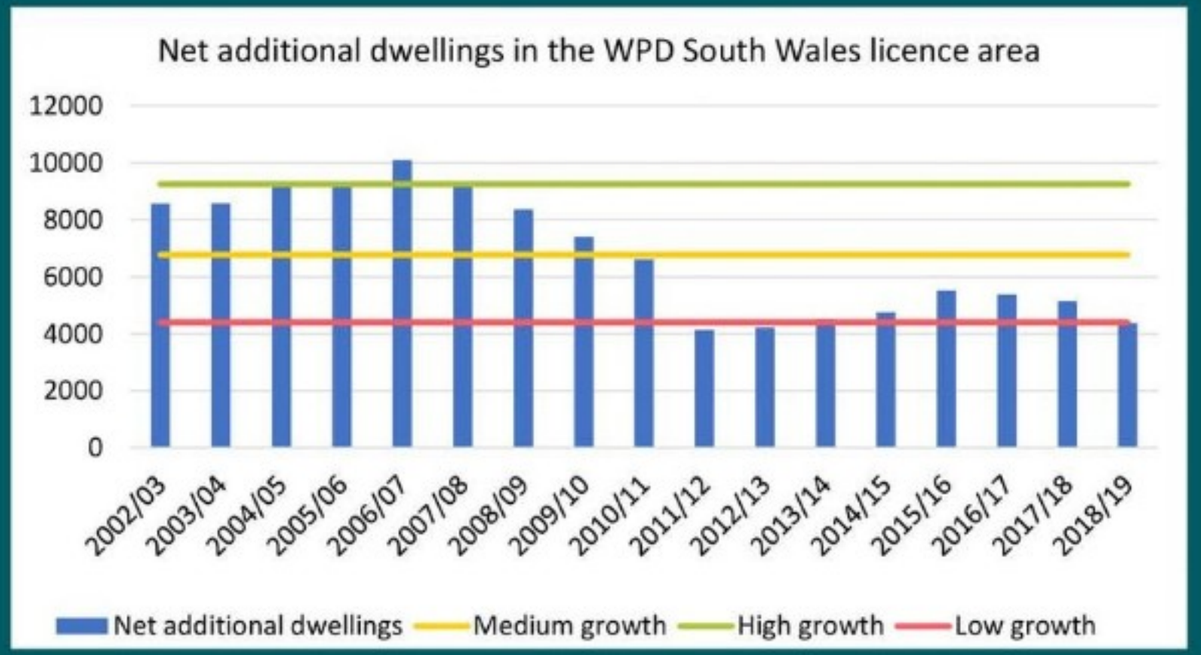
Calculate and distribute the number of dwellings which are not captured by the >20 homes criteria used for this study.

Analyse historic growth in the region to produce expected growth levels for high, medium and low scenarios



Source: UK GOV, StatsWales

Methodology – growth scenarios

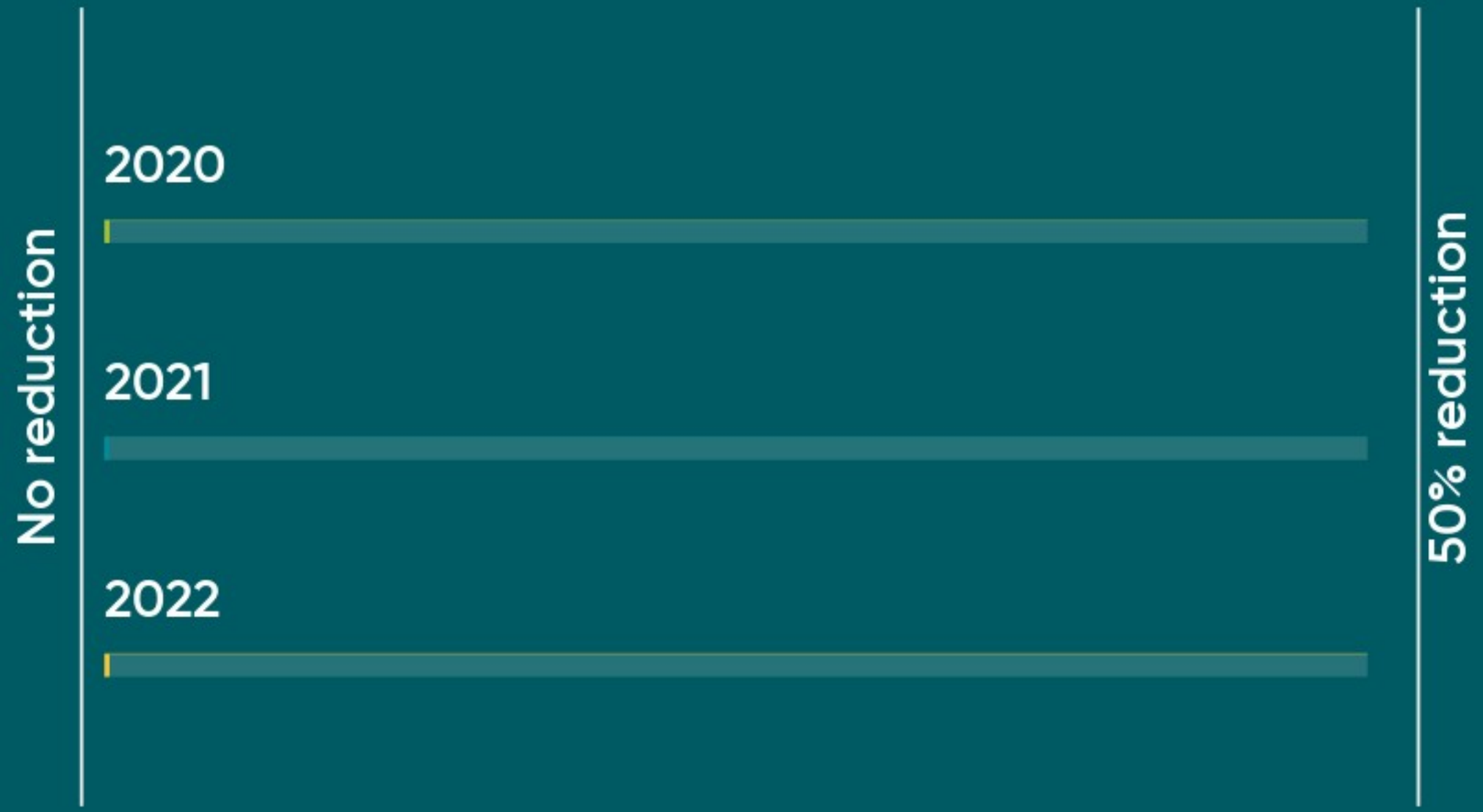
Calculate and distribute the number of dwellings which are not captured by the >20 homes criteria used for this study.

Analyse historic growth in the region to produce expected growth levels for high, medium and low scenarios

Offset trajectory data to varying levels based on the certainty of construction in each growth scenario to produce trajectories

Dwellings offset to later years	High growth		Medium growth		Low growth	
	% Planned sites built on schedule	% Planned sites delayed to later years	% Planned sites built on schedule	% Planned sites delayed to later years	% Planned sites built on schedule	% Planned sites delayed to later years
Imminent (Next year)	85%	15%	75%	25%	65%	35%
Short term (2-3 years)	80%	20%	55%	45%	40%	60%
Medium term (4 - 10 years)	65%	35%	40%	60%	20%	80%
Long term (11 - 15 years)	65%	35%	40%	60%	20%	80%

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



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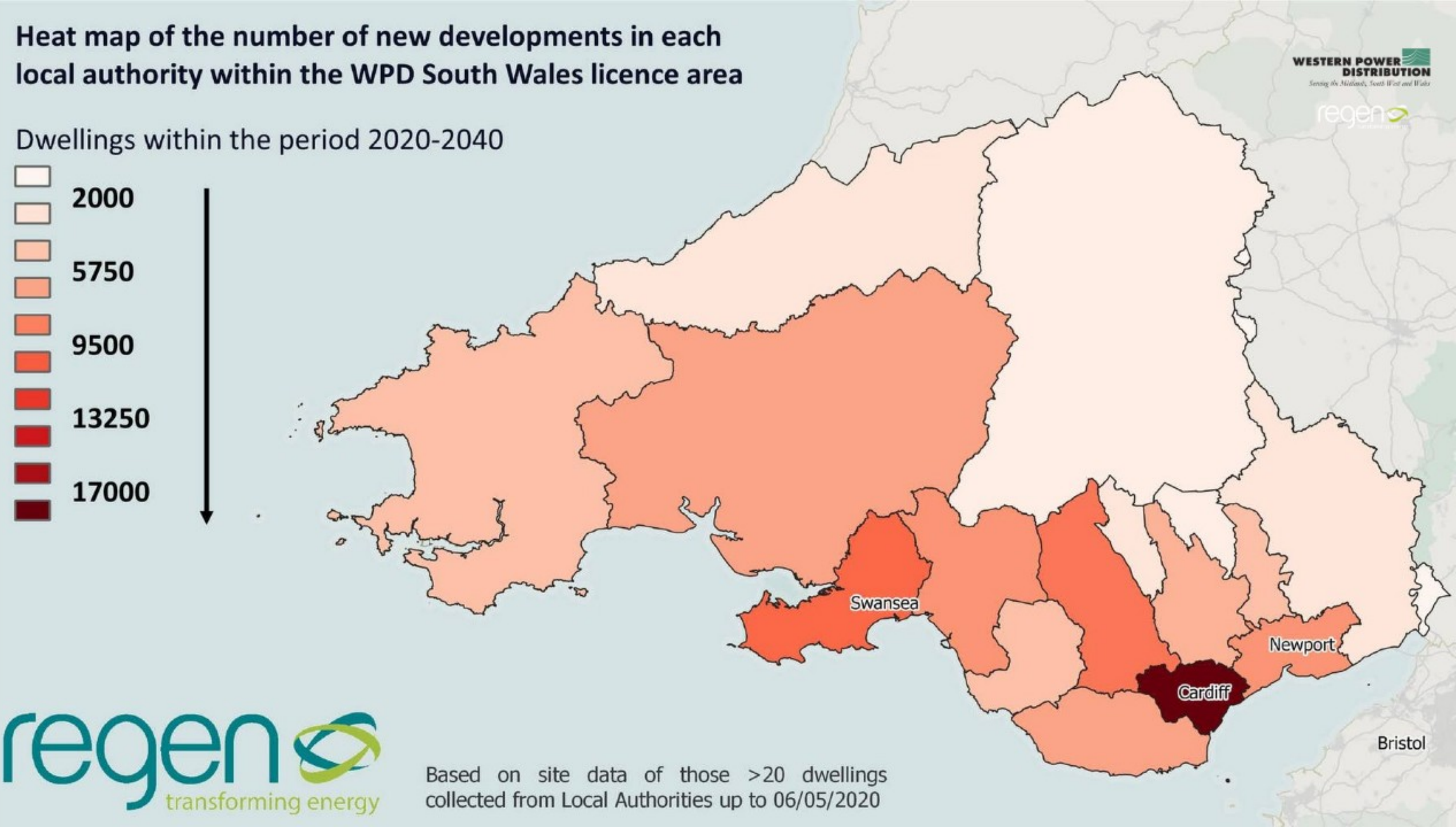
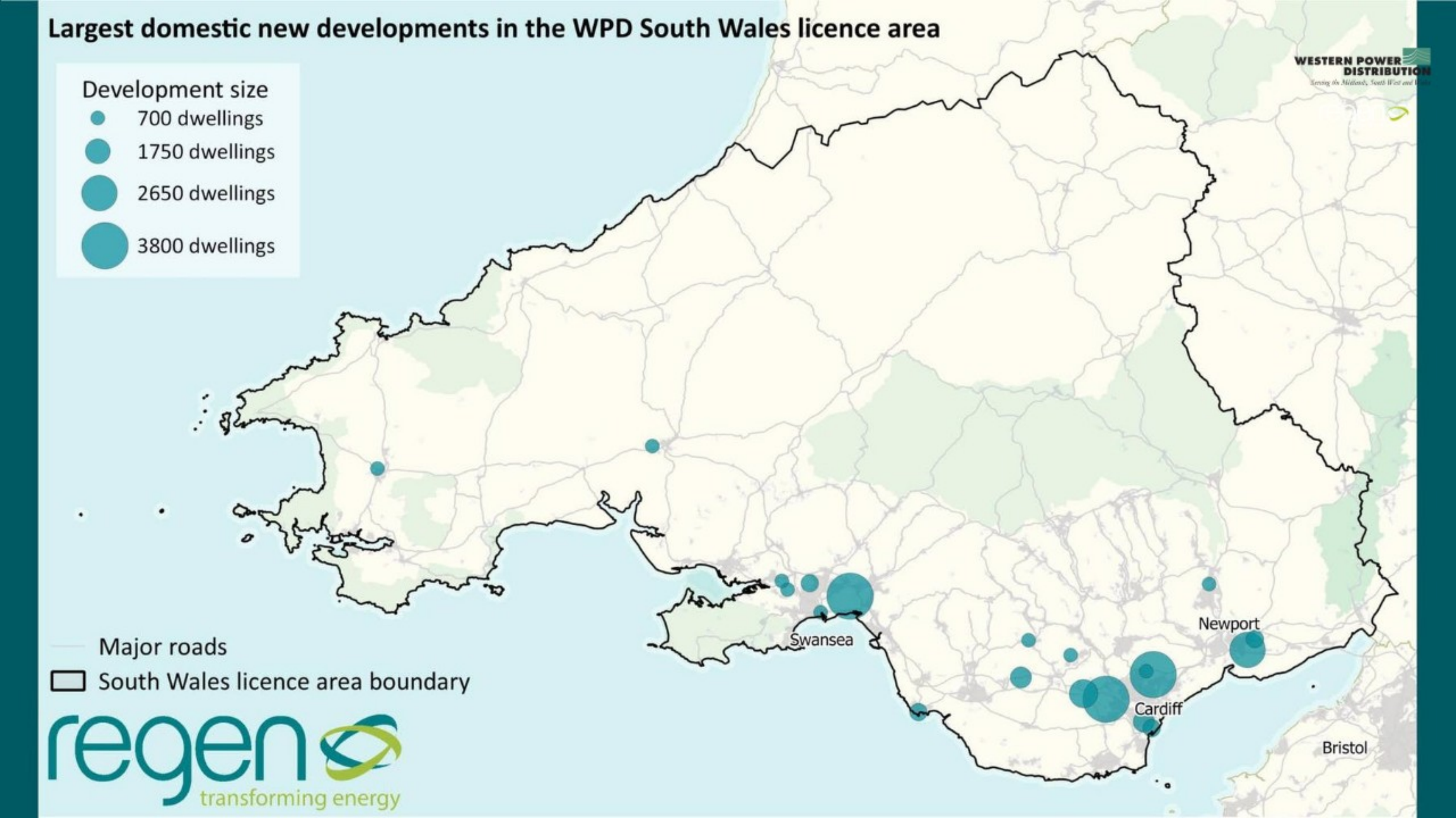
Preliminary results – domestic

Heat map of the number of new developments in each local authority within the WPD South Wales licence area



Based on site data of those >20 dwellings collected from Local Authorities up to 06/05/2020

Largest domestic new developments in the WPD South Wales licence area



Results and outcomes

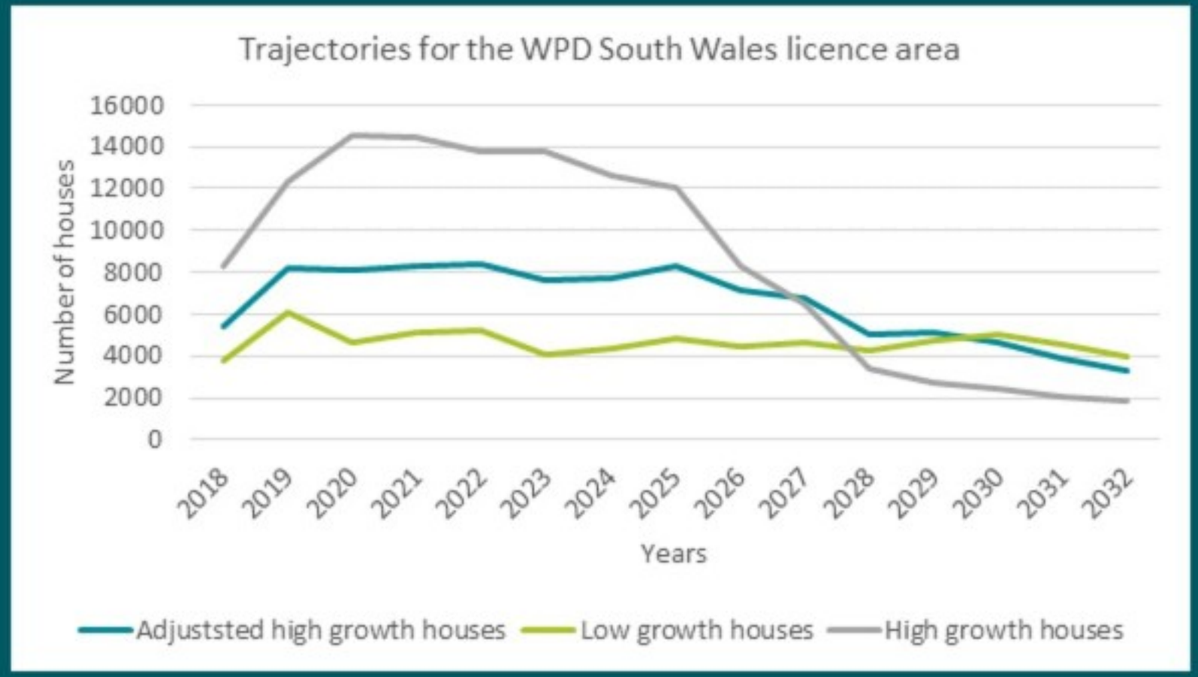
WPD model the growth of underlying electricity demand (lighting, appliance use etc.)

Modelling the spatial distribution of electricity demand from new builds (heat pumps, rooftop solar PV, home batteries etc.)

Data uses

Incorporating local planning policy for new homes (efficiency, heat pumps, solar rooftop uptake etc.)

Consultation feedback on local energy policy (heat networks, clean air zones etc.)



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.

- 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?

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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.