

# Distribution Future Energy Scenarios Stakeholder Consultation Event

WPD South West licence area  
Tuesday 22nd June 2021

# A bit about Regen...

Regen is a mission-led membership organisation, 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.



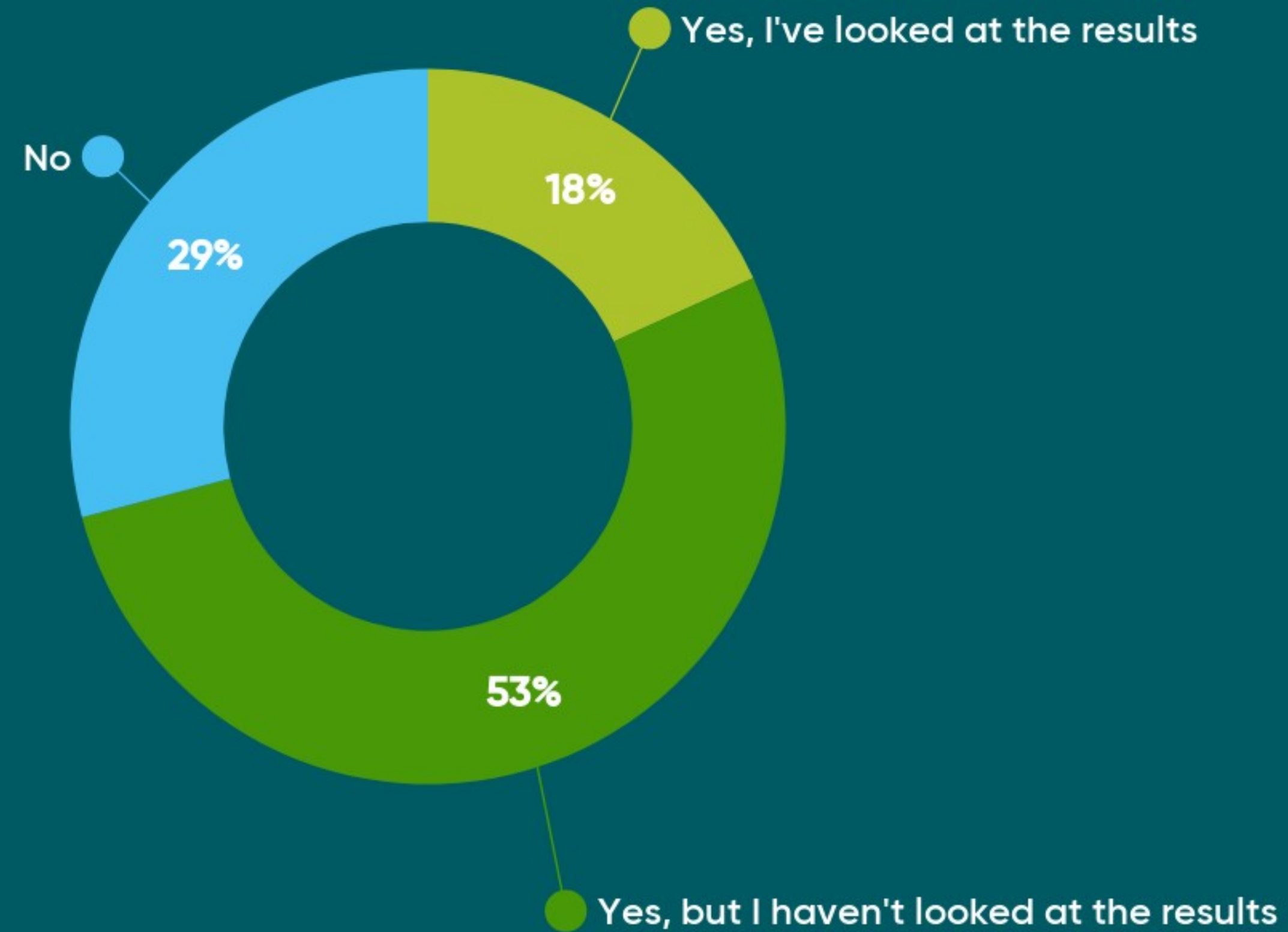


# Agenda

- WPD - Network strategy for net zero future energy scenarios
- Regen - Modelling the 2021 future energy scenarios and stakeholder consultation
- Q&A

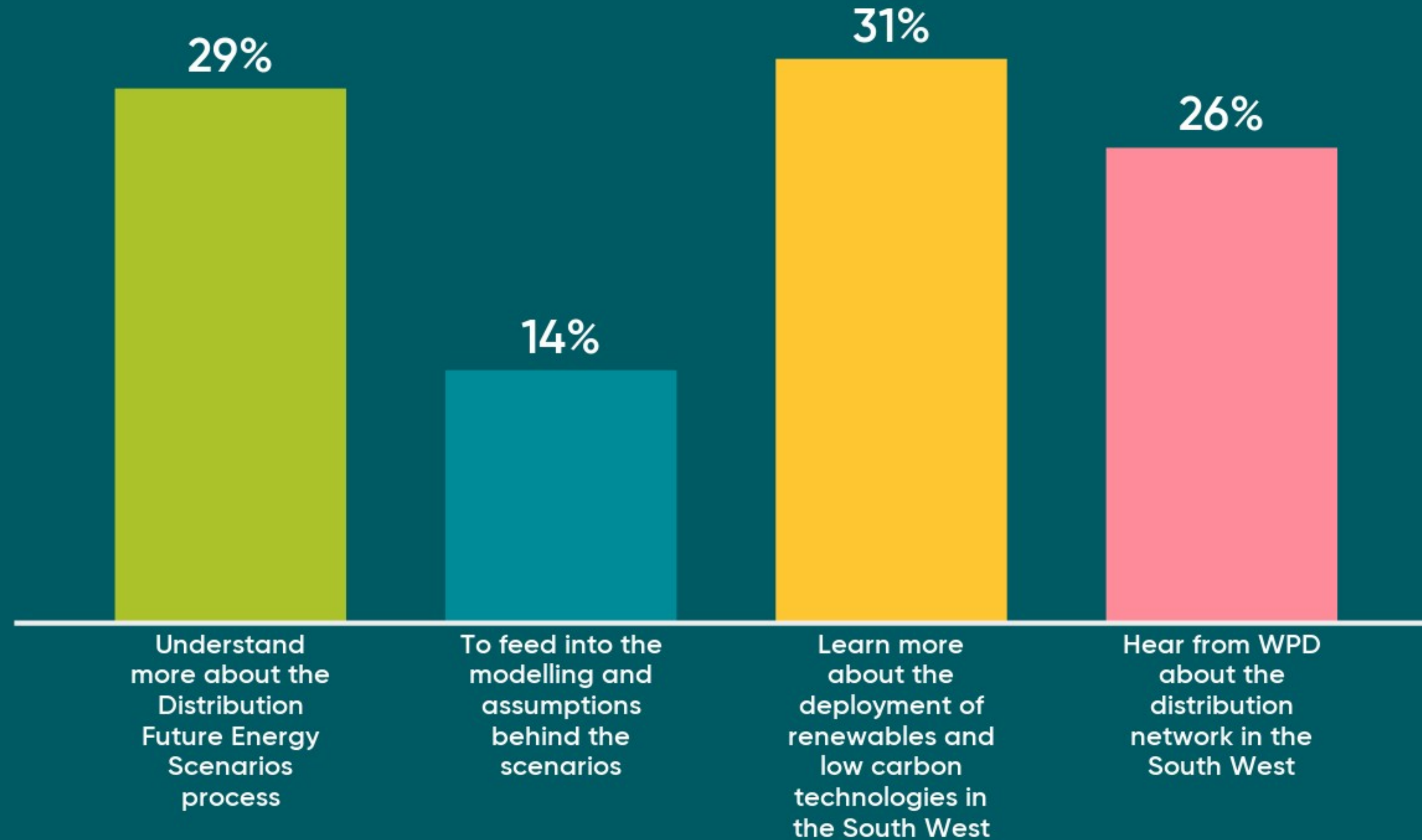


# Were you aware of the WPD Distribution Future Energy Scenarios process before today?





# What do you want to get out of today?

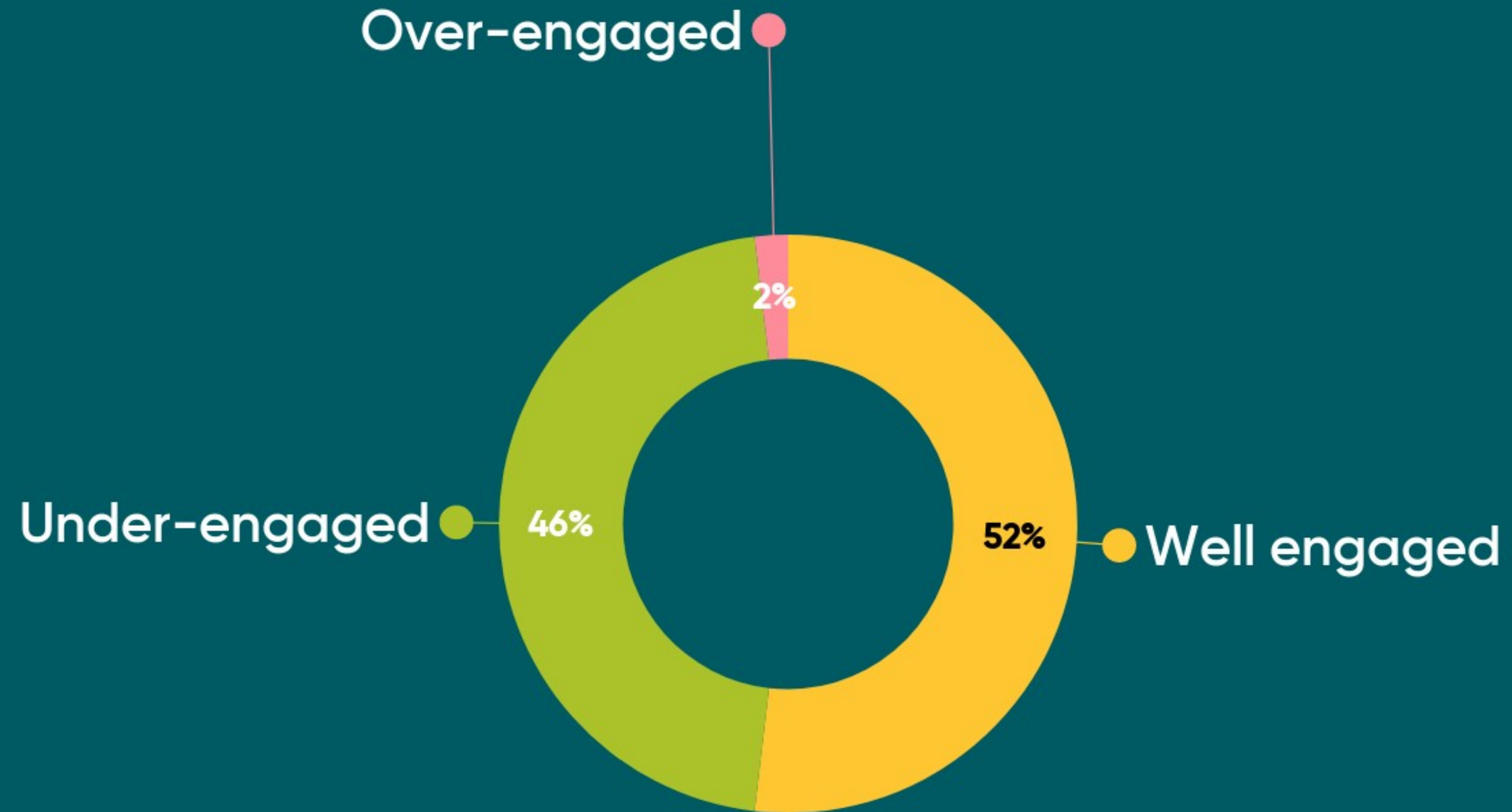


# WPD – Network strategy for net zero future energy scenarios

→ Ben Godfrey – DSO manager, WPD



# How would you rate your level of engagement with WPD?



# In your opinion, how well do you understand the relationship between National Grid FES, WPD DFES, and Local Area Energy Planning





# In addition to the current DFES outputs, what further outputs would you find useful?

## Current publications include:

- The DFES dataset
- The DFES online map
- A methodology slidepack
- Summary 'regional view' reports for each licence area
- Technology summaries by licence area

Keep increasing interactive online data, like the DFES maps

Summaries by local authority area

Quantity of additional generation by area required in next 5 years

A probability assessment of the likelihood of the various scenarios

Where there is renewable energy capacity

links to local plans

More accurate substaiton mapping with more meaningful capacity summaries and without missing substations

Where battery storage would be viable

Technology summaries for local authority areas. Summary reports for local authority areas.



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Support and guidance on developing LAEPs

Summary of assumptions, outputs and implications for each local planning authority area.

Where EV charging hubs could be connected

Potentially a view on how accurate historic predictions have been, if that data is available, because it allows customers to place confidence (or not) in the current data.

Highlight areas off gas where high energy demand for energy efficiency & renewable energy projects could happen.

?

Datasets

Solar PV

Data sets, advice



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Battery Storage

LAEP

heat pumps

electric vehicle v2g

battery storage

EVCP

energy storage

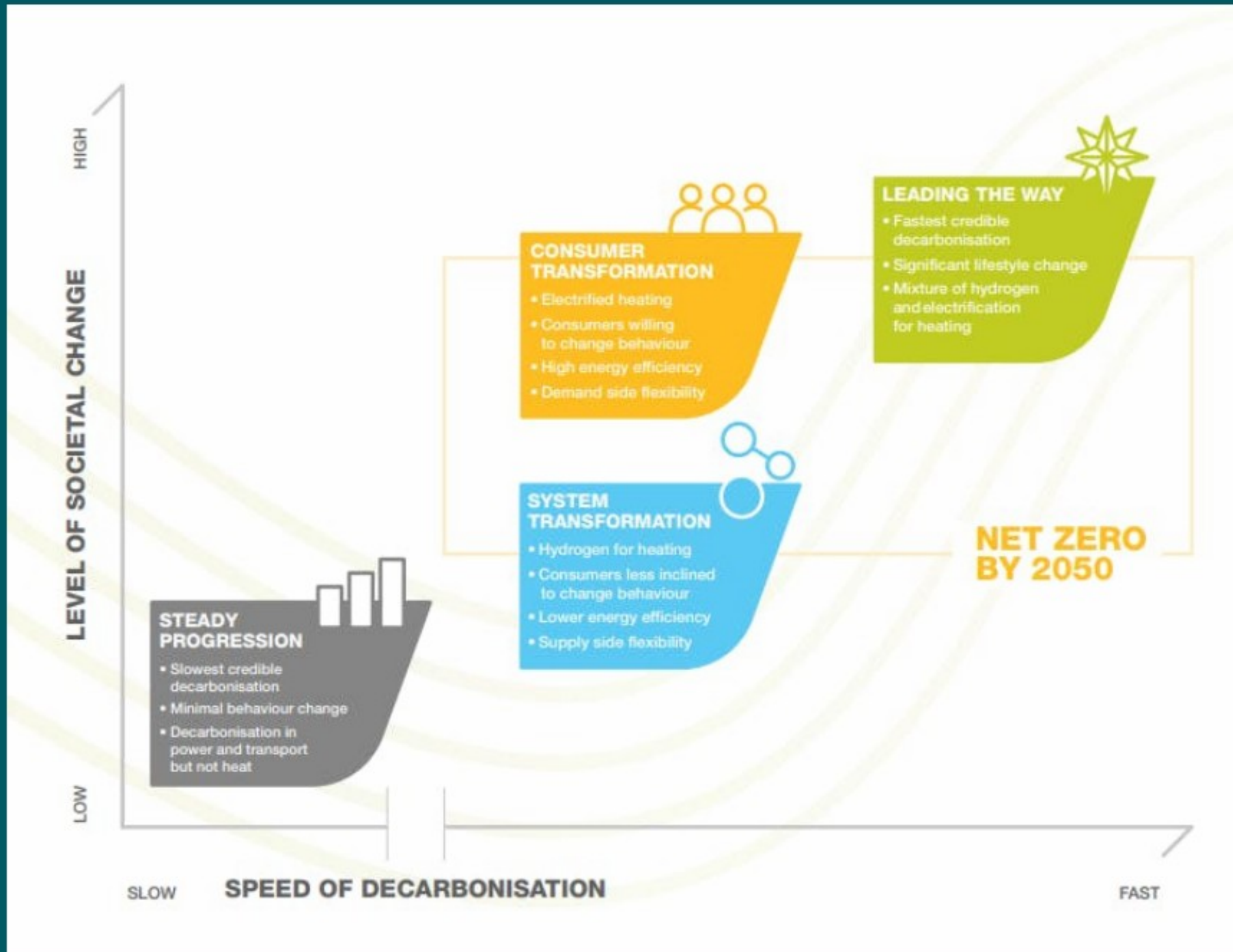
Distribution from local substations to households and capacity for new hoes

How to facilitate greater than 30 EV chargers at one point by use of software to control EV charger output

# Regen's role in Distribution Future Energy Scenarios

- Frankie Mayo - Senior energy analyst, Regen
- Grace Millman - Energy analyst, Regen



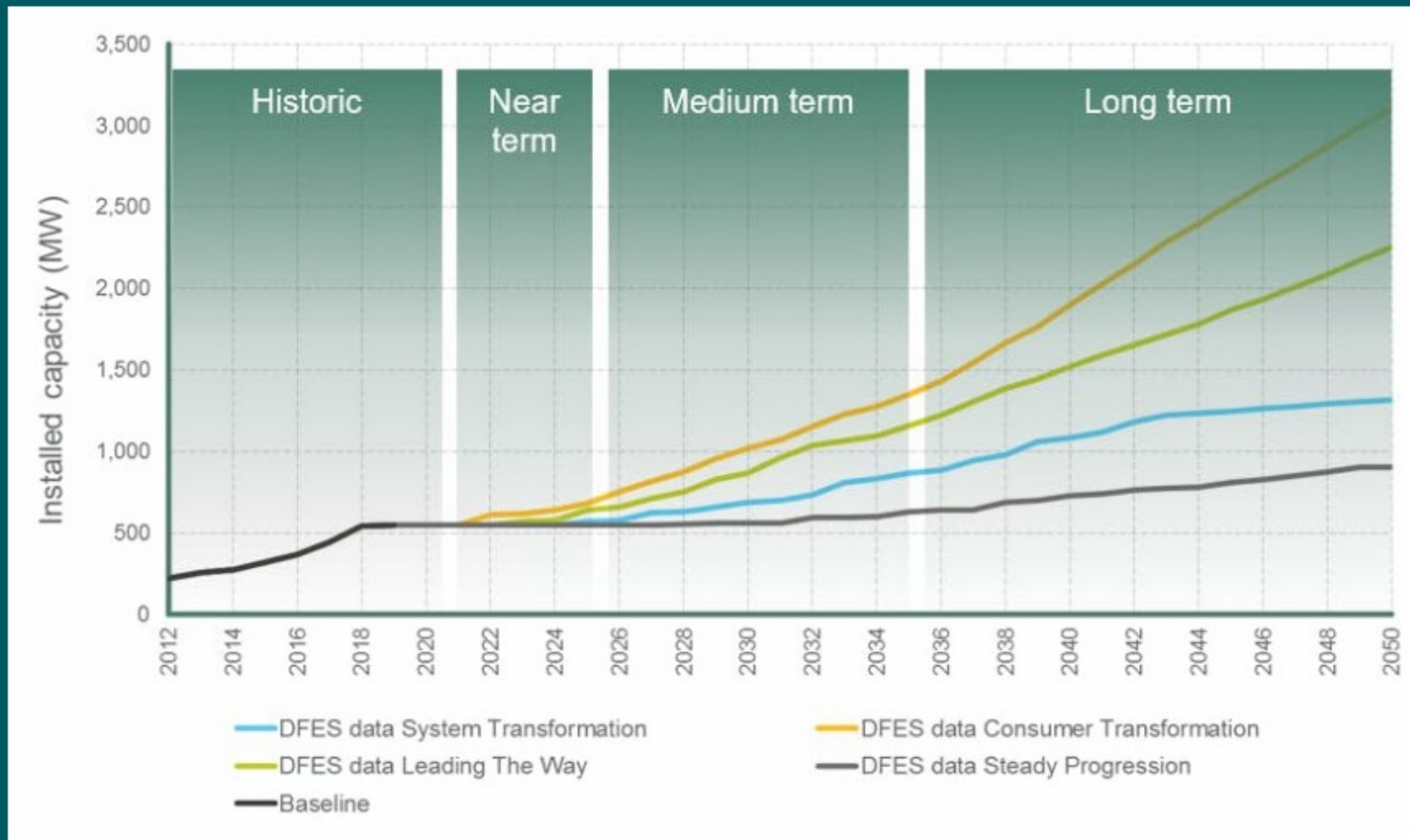


# National Grid ESO Future Energy Scenarios framework

- Underlying societal/economic framing of scenarios
- Future technology assumptions
- National UK trends
- Regional datasets (where available)







# The Distribution Future Energy Scenarios methodology

- Determine the existing baseline
- Assess the near-term pipeline
- Develop medium and long-term projections out to 2050
- Geographically distribute these technologies/capacities within the licence areas





### Distribution-connected electricity generation, such as:



- Onshore and offshore wind
- Ground-mounted and rooftop solar PV
- Hydropower
- Anaerobic digestion
- Landfill and sewage gas



- Gas- and hydrogen-fired power
- Gas-fired combined heat and power
- Diesel generation
- Waste incineration

### Distribution-connected electricity storage, such as:



- Battery storage for grid services, co-located with renewables, for high energy users and small-scale battery storage
- Non-battery storage, such as liquid air energy storage

### New sources of distribution-connected electricity demand, such as:



- Domestic heat pumps
- District heating heat pumps
- Direct electric heating
- Night storage heaters
- Thermal storage



- Electric cars and LGVs
- Electric HGVs
- Electric buses
- Electric vehicle chargers



- New housing developments
- New business space developments
- Hydrogen electrolysers

## The scope of Distribution Future Energy Scenarios





# The key role of stakeholders

- Reflecting regional variation and considerations
- Testing modelling assumptions
- Informing technology-specific projections
- Direct engagement on projects, developments and future possibilities
- Reflecting local authority new development plans and energy strategies







# South West licence area context and analysis input

- Frankie Mayo - Senior energy analyst, Regen
- Grace Millman - Energy analyst, Regen



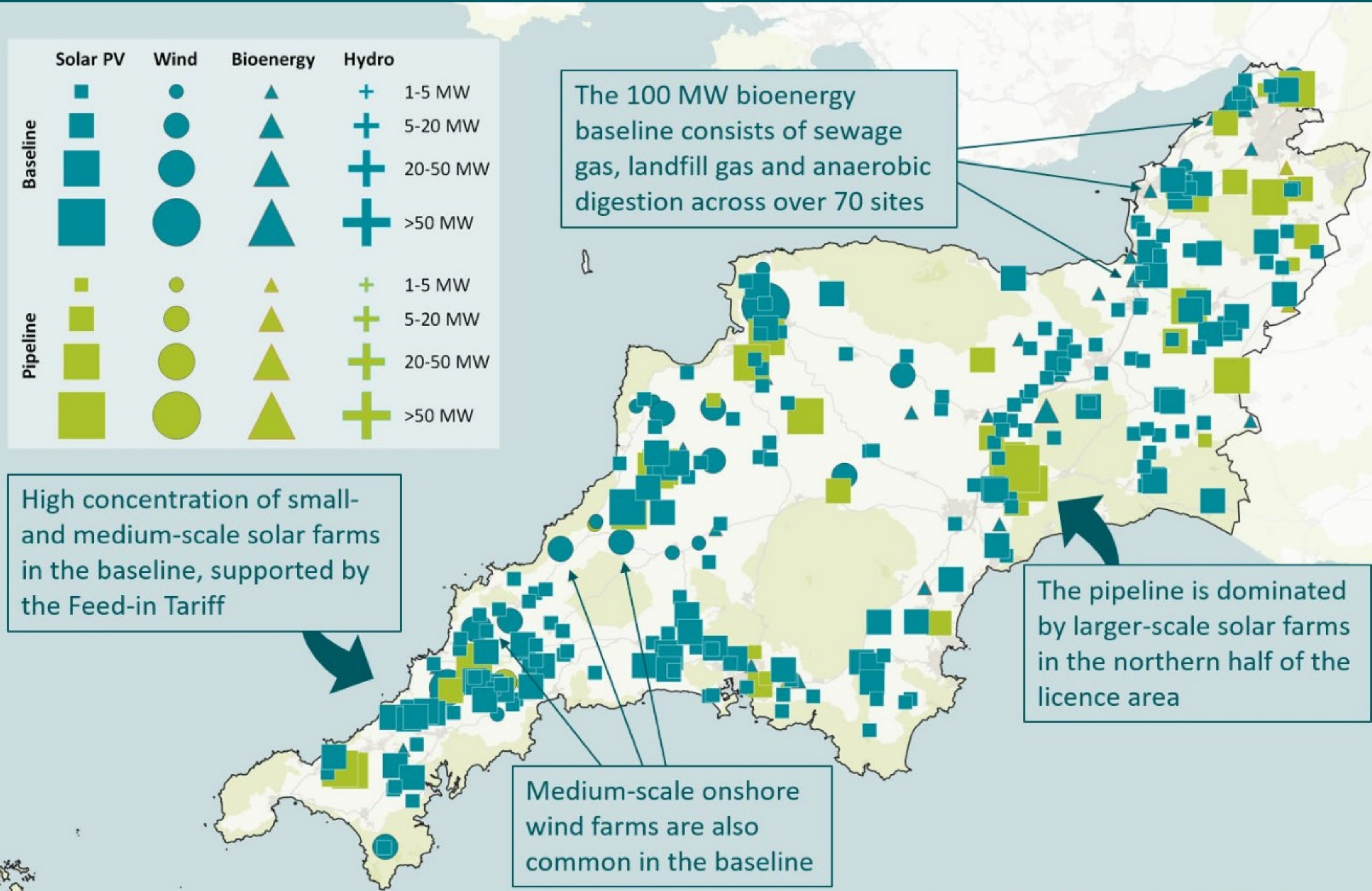


# Renewable generation

→ Frankie Mayo – Senior energy analyst, Regen

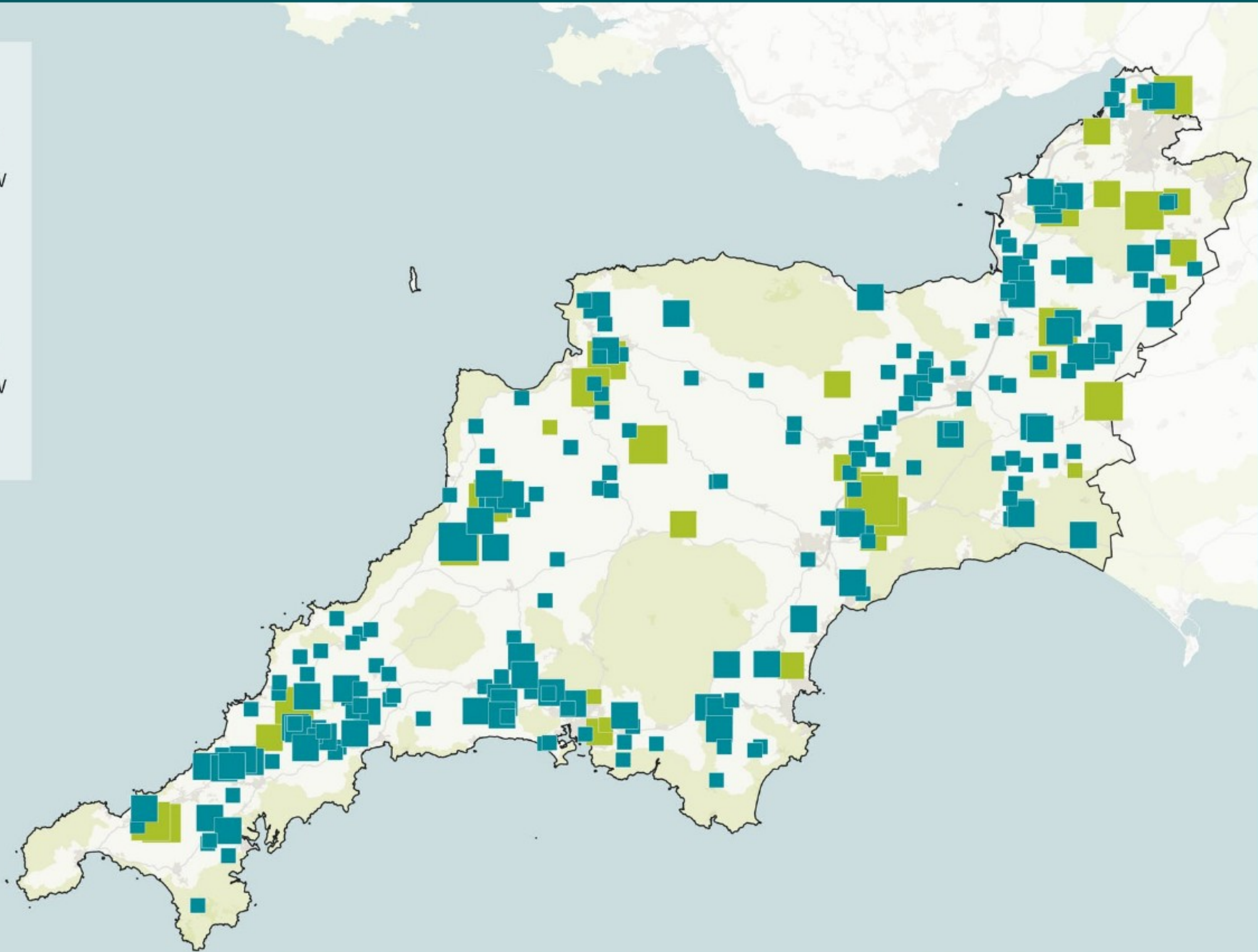






**DISTRIBUTION-CONNECTED RENEWABLE GENERATION**  
WPD SOUTH WEST LICENCE AREA



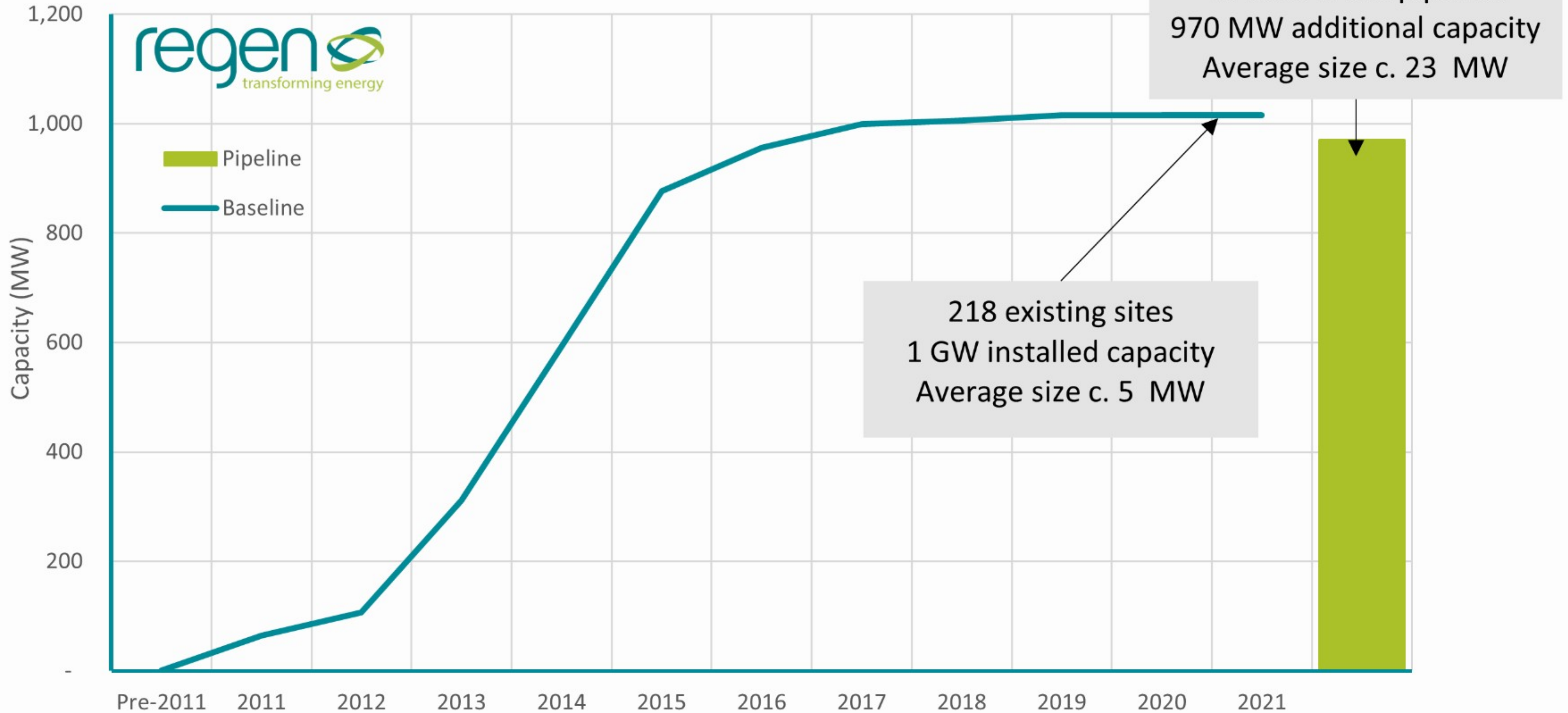


**DISTRIBUTION-CONNECTED GROUND-MOUNTED SOLAR PV**  
WPD SOUTH WEST LICENCE AREA



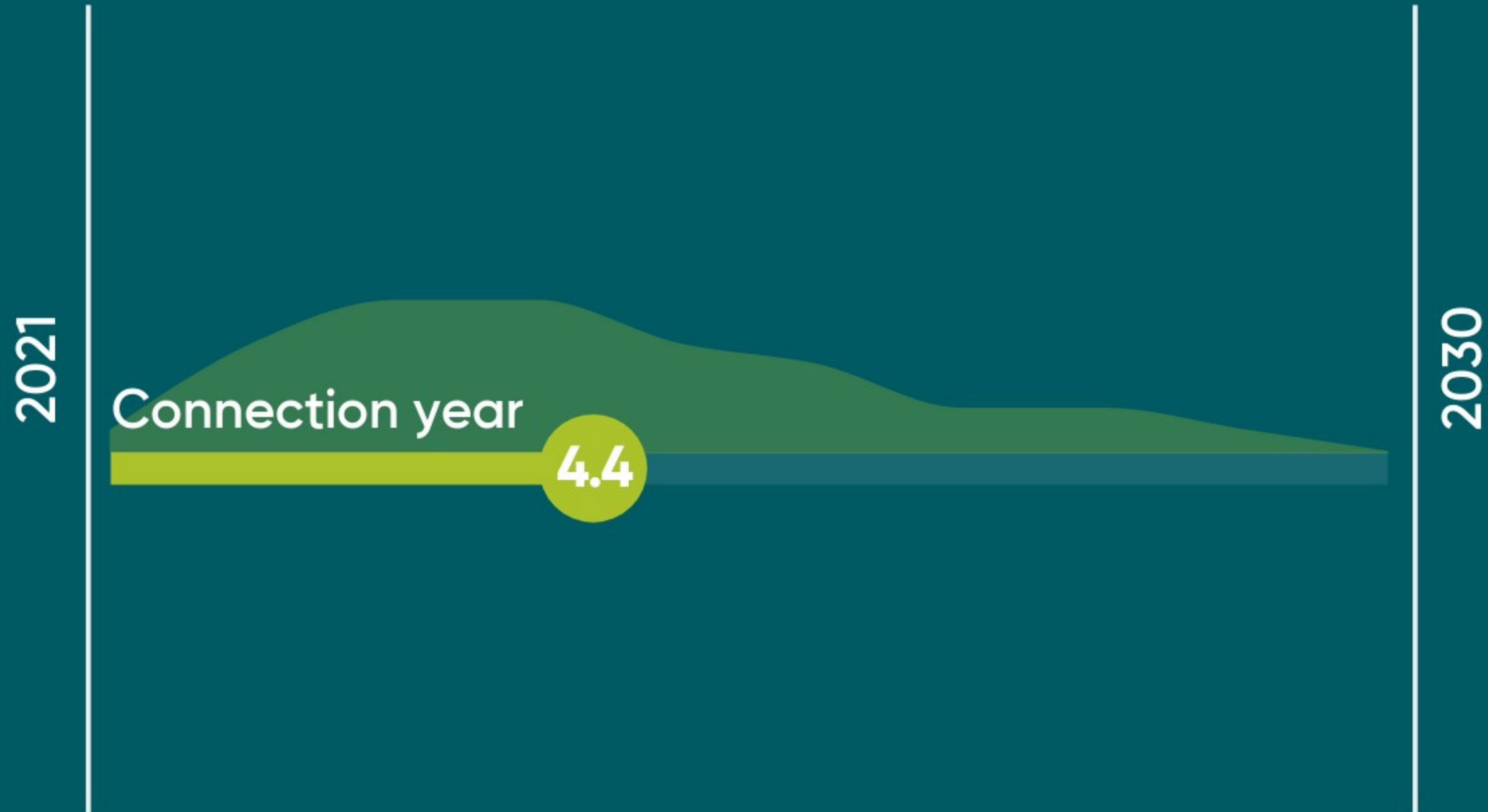


# Large scale solar PV capacity in the South West licence area



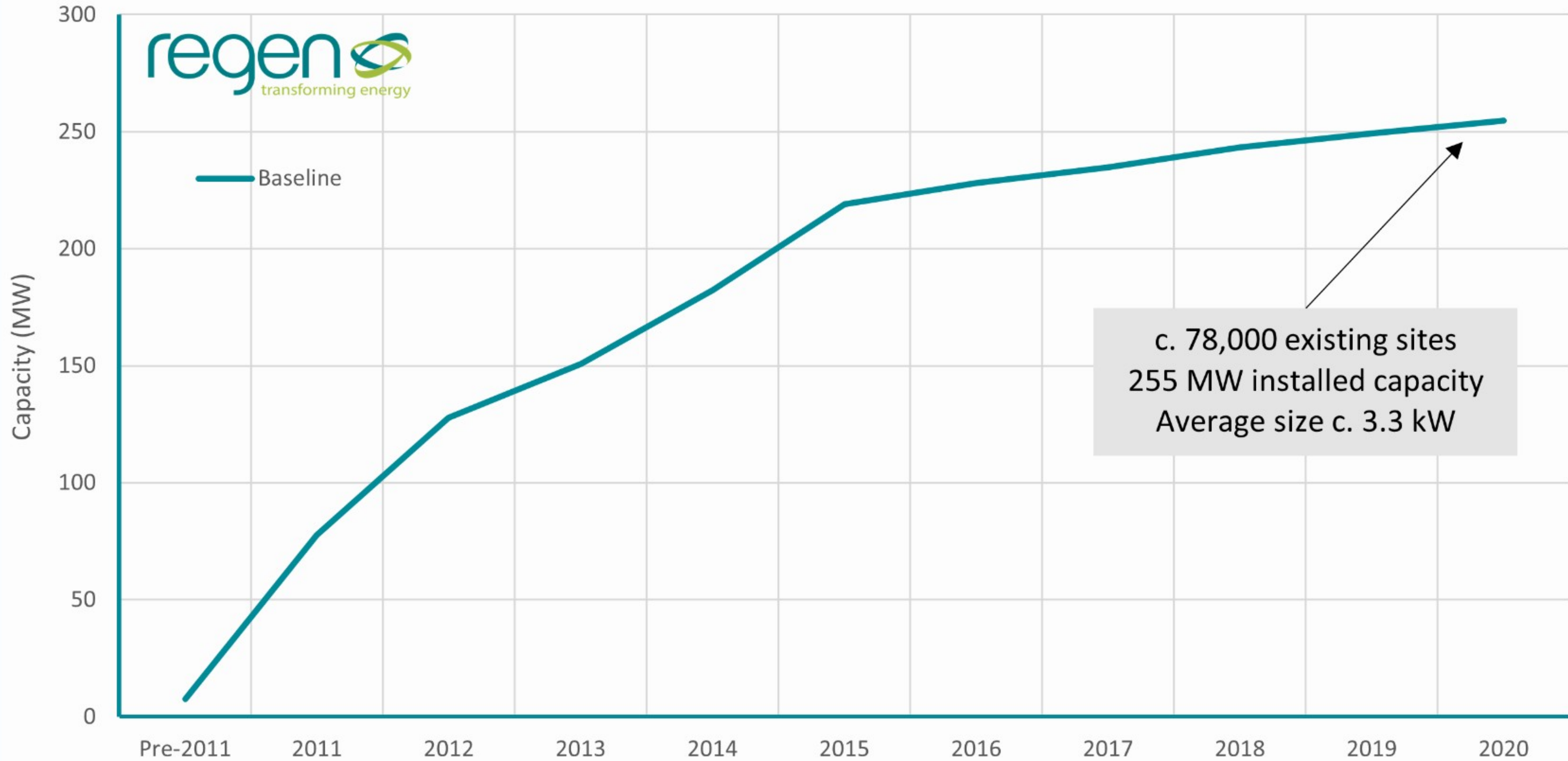


# When will the large-scale solar pipeline start connecting?



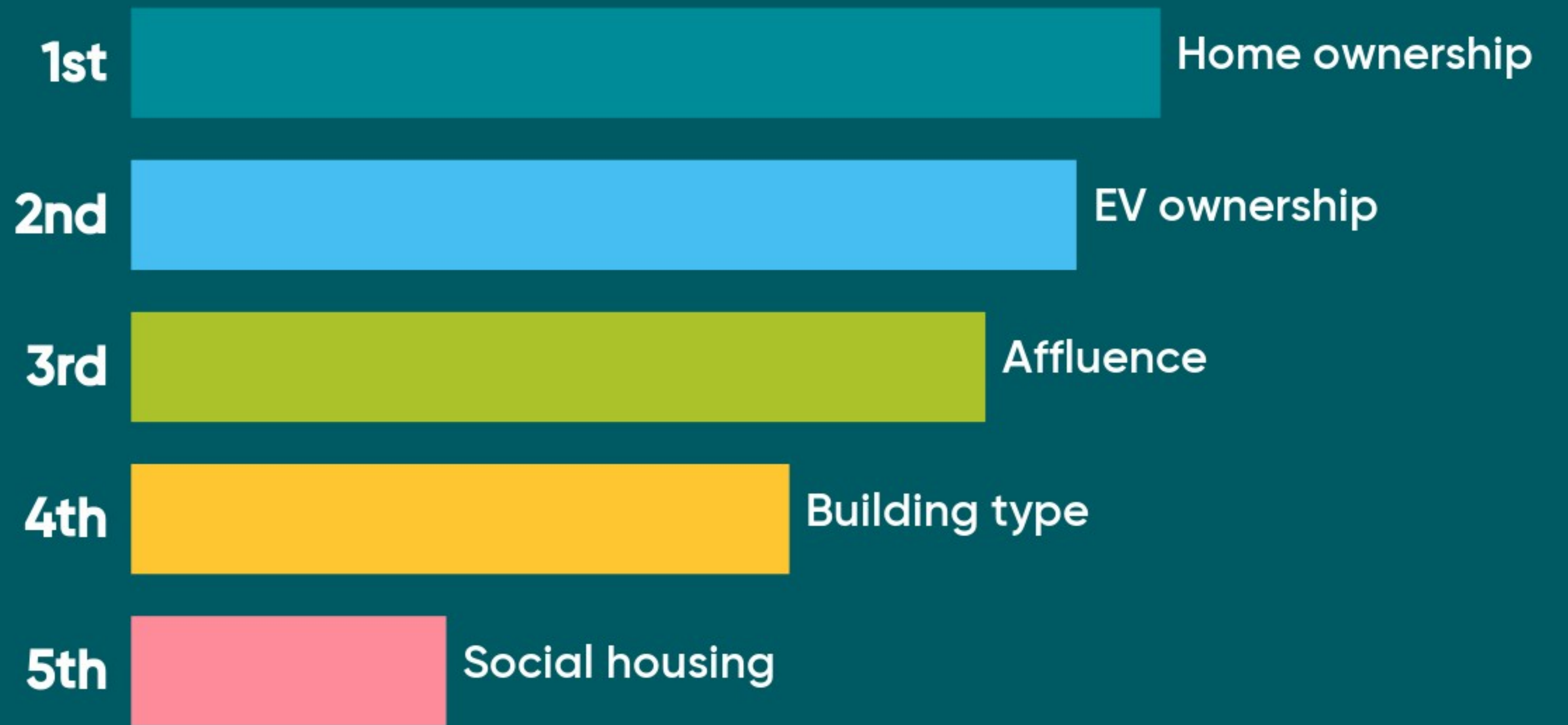


# Rooftop solar PV capacity in the South West licence area

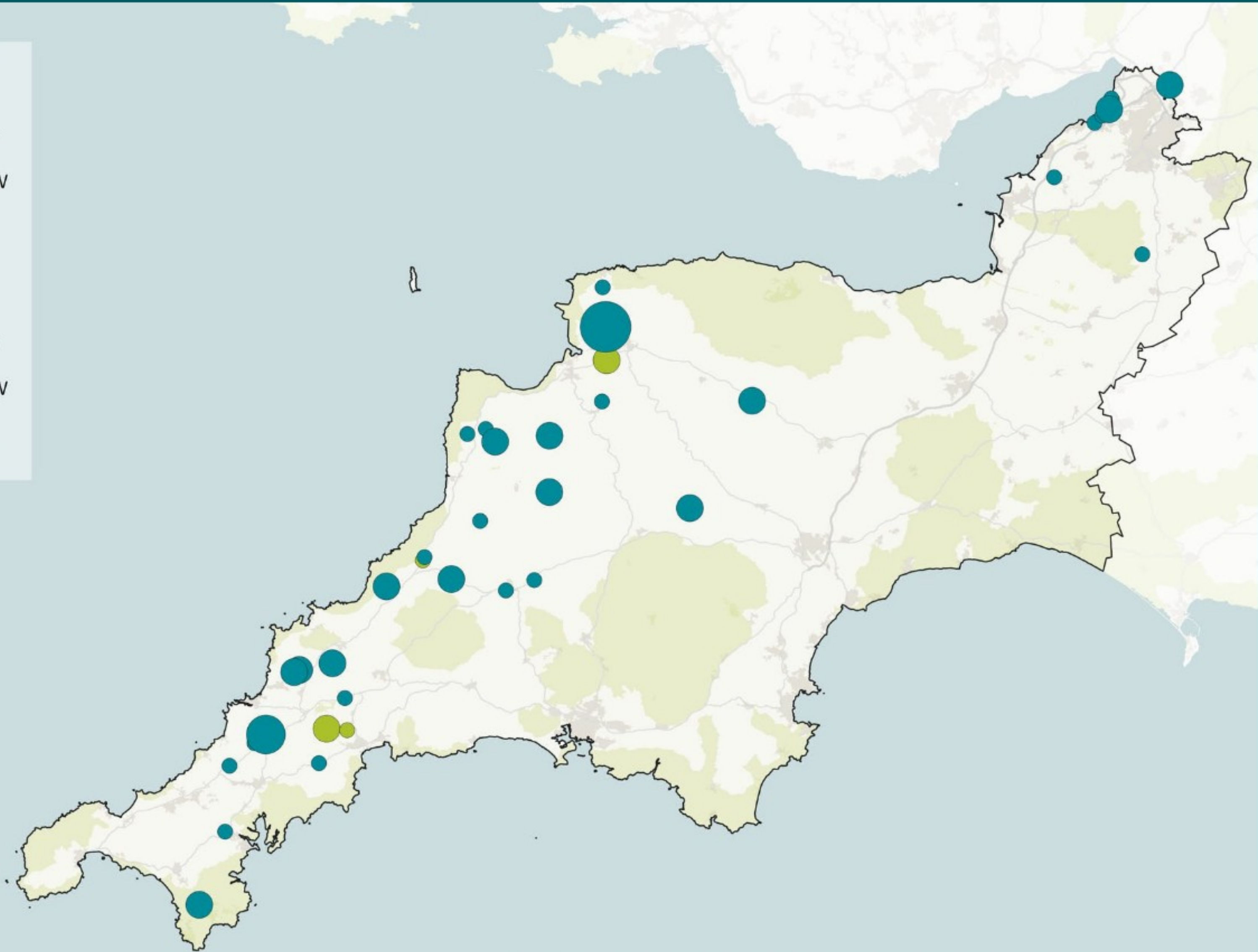




# What are the most influential factors impacting domestic rooftop solar installations over the next few years?



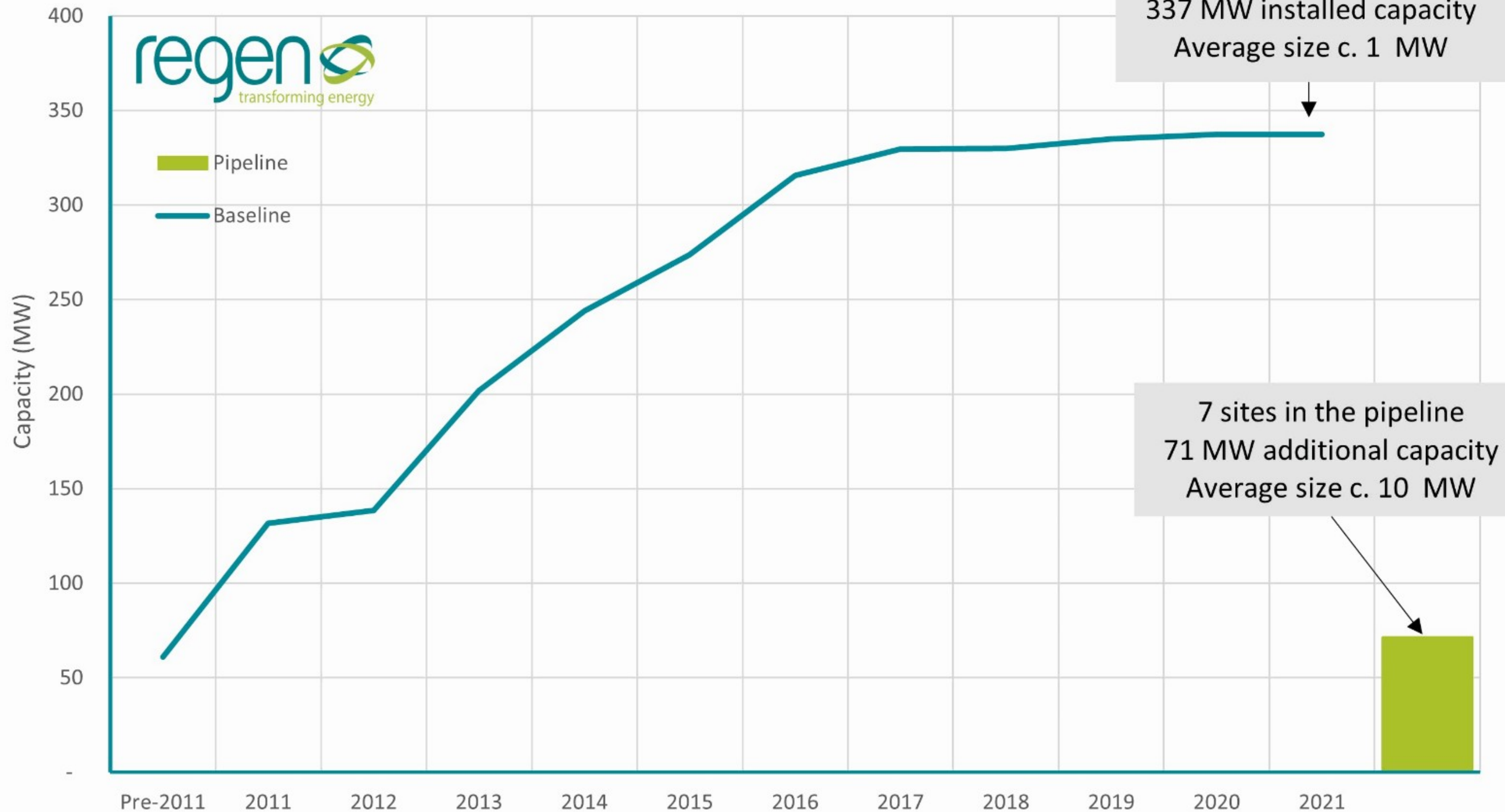




**DISTRIBUTION-CONNECTED ONSHORE WIND**  
WPD SOUTH WEST LICENCE AREA

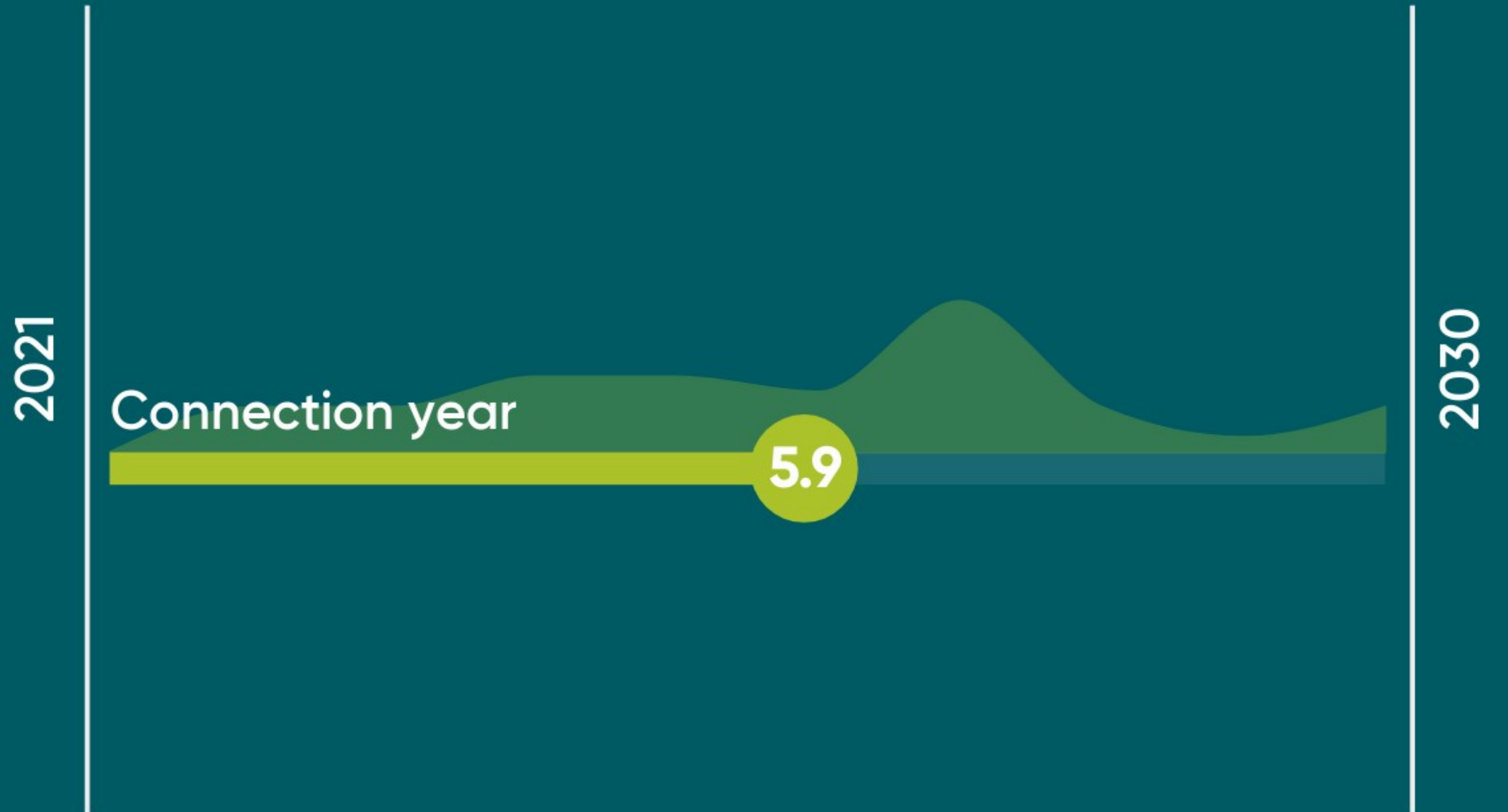


# Onshore wind capacity in the South West licence area





# When might distributed onshore wind deployment in England pick up again?





# Bioenergy

→ Grace Millman - Energy analyst, Regen





## Industrial and residential heat



BECCS

## Hydrogen production



Transport fuel for shipping,  
aviation and road transport



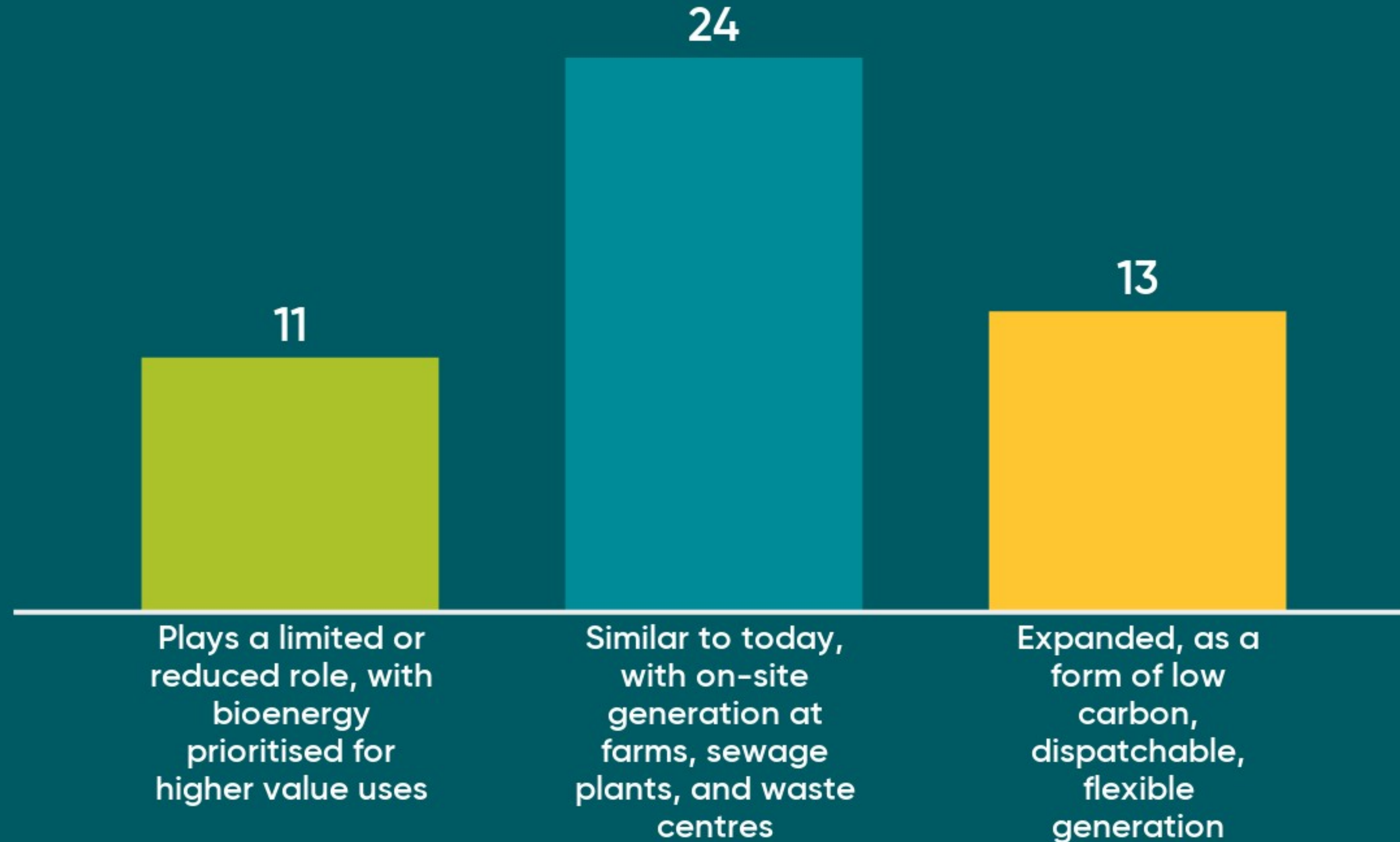
Power generation

Future bioenergy uses for net zero emissions





# What will be the long-term role of distribution-scale bioenergy electricity generation?



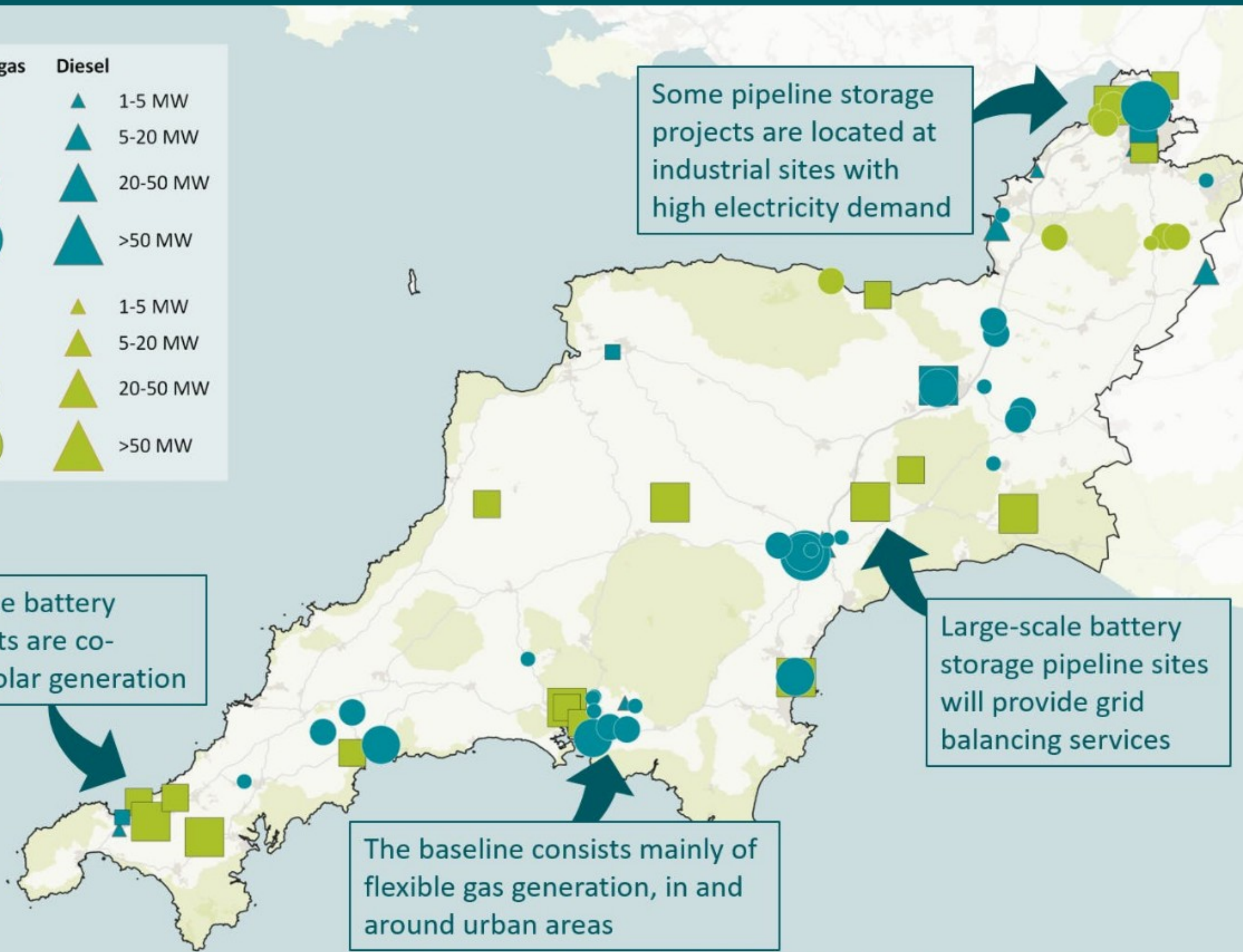
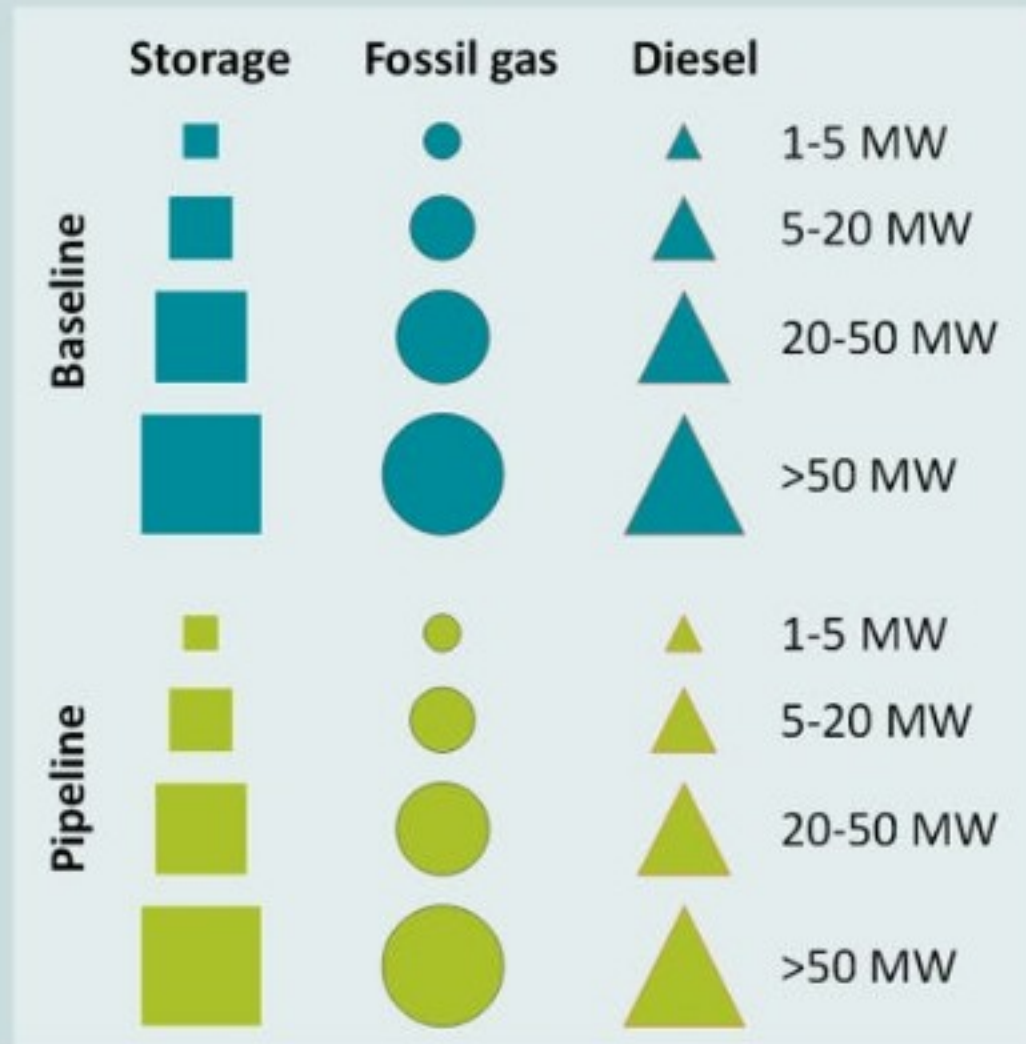


# Flexibility and storage

→ Grace Millman - Energy analyst, Regen







Some pipeline storage projects are located at industrial sites with high electricity demand

Several pipeline battery storage projects are co-located with solar generation

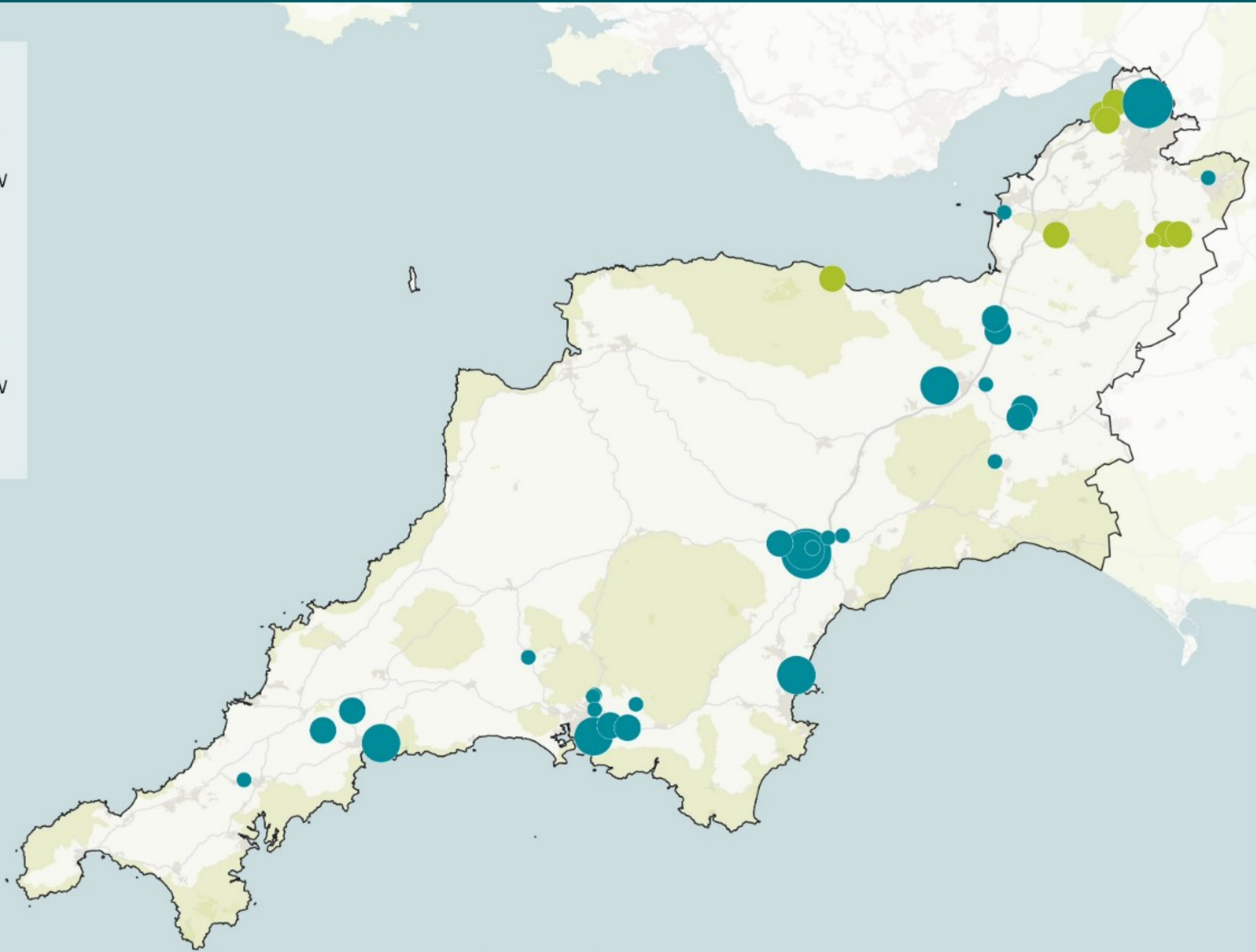
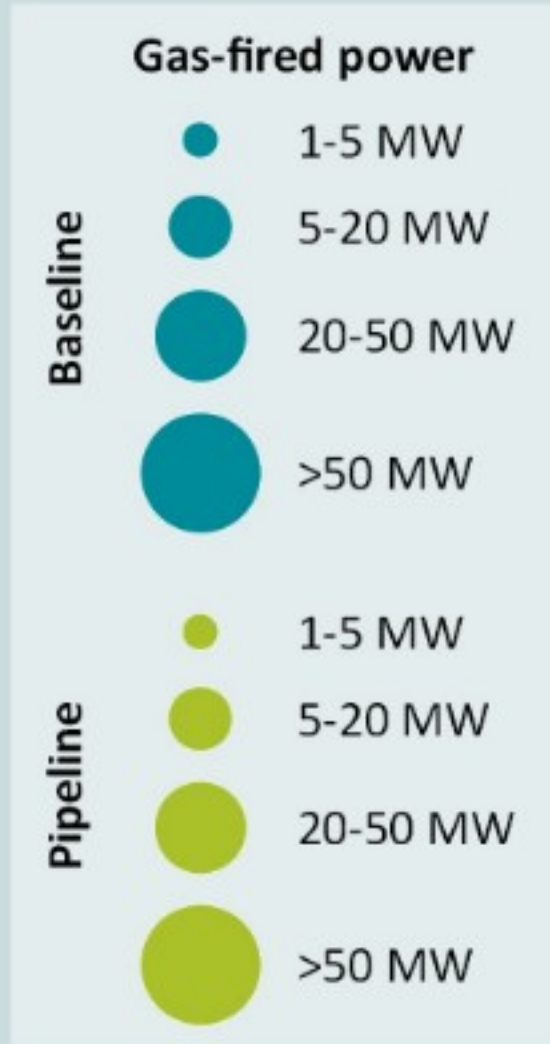
Large-scale battery storage pipeline sites will provide grid balancing services

The baseline consists mainly of flexible gas generation, in and around urban areas

**DISTRIBUTION-CONNECTED FLEXIBILITY AND STORAGE**  
WPD SOUTH WEST LICENCE AREA





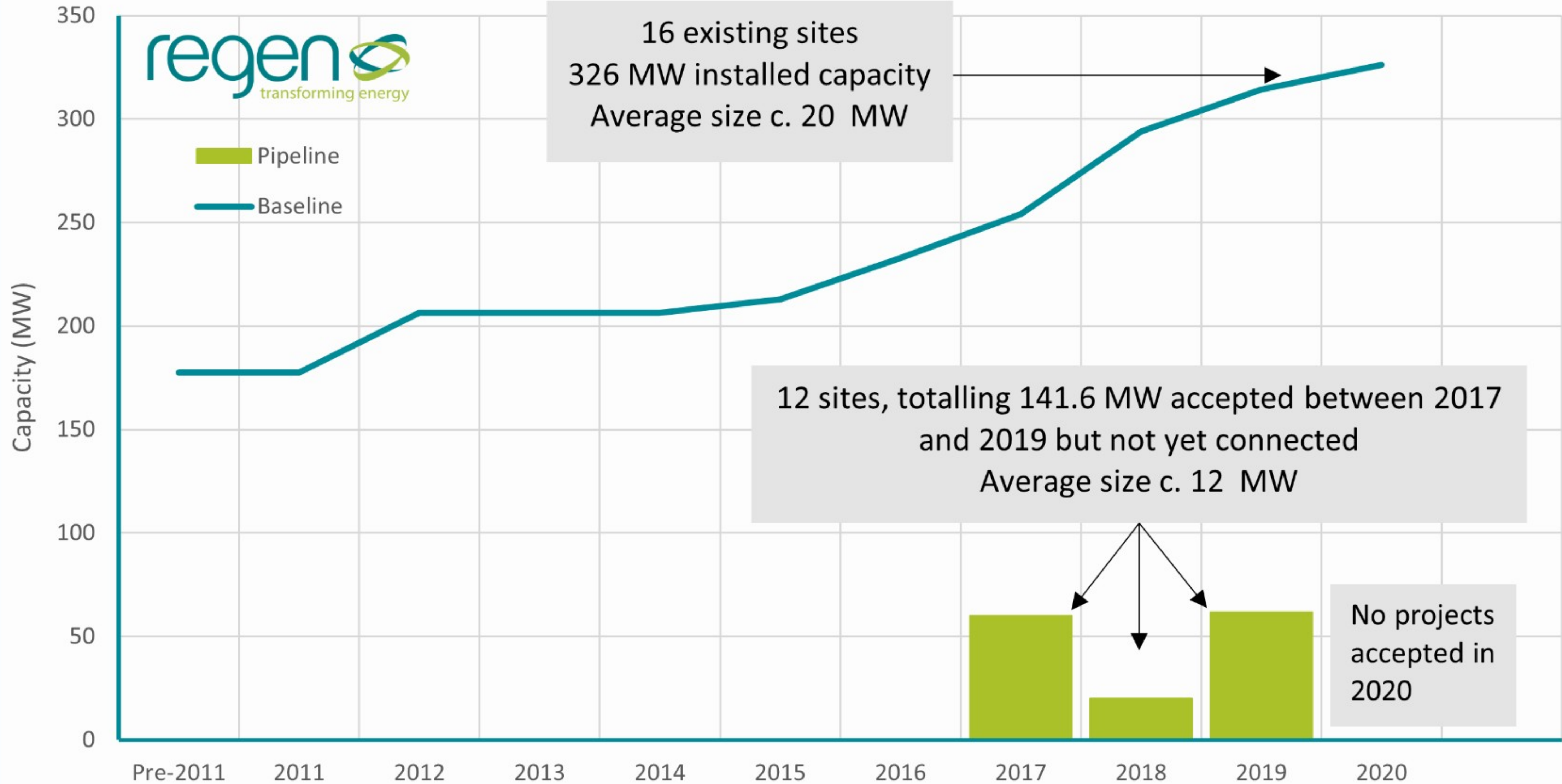


**DISTRIBUTION-CONNECTED GAS-FIRED POWER**  
WPD SOUTH WEST LICENCE AREA



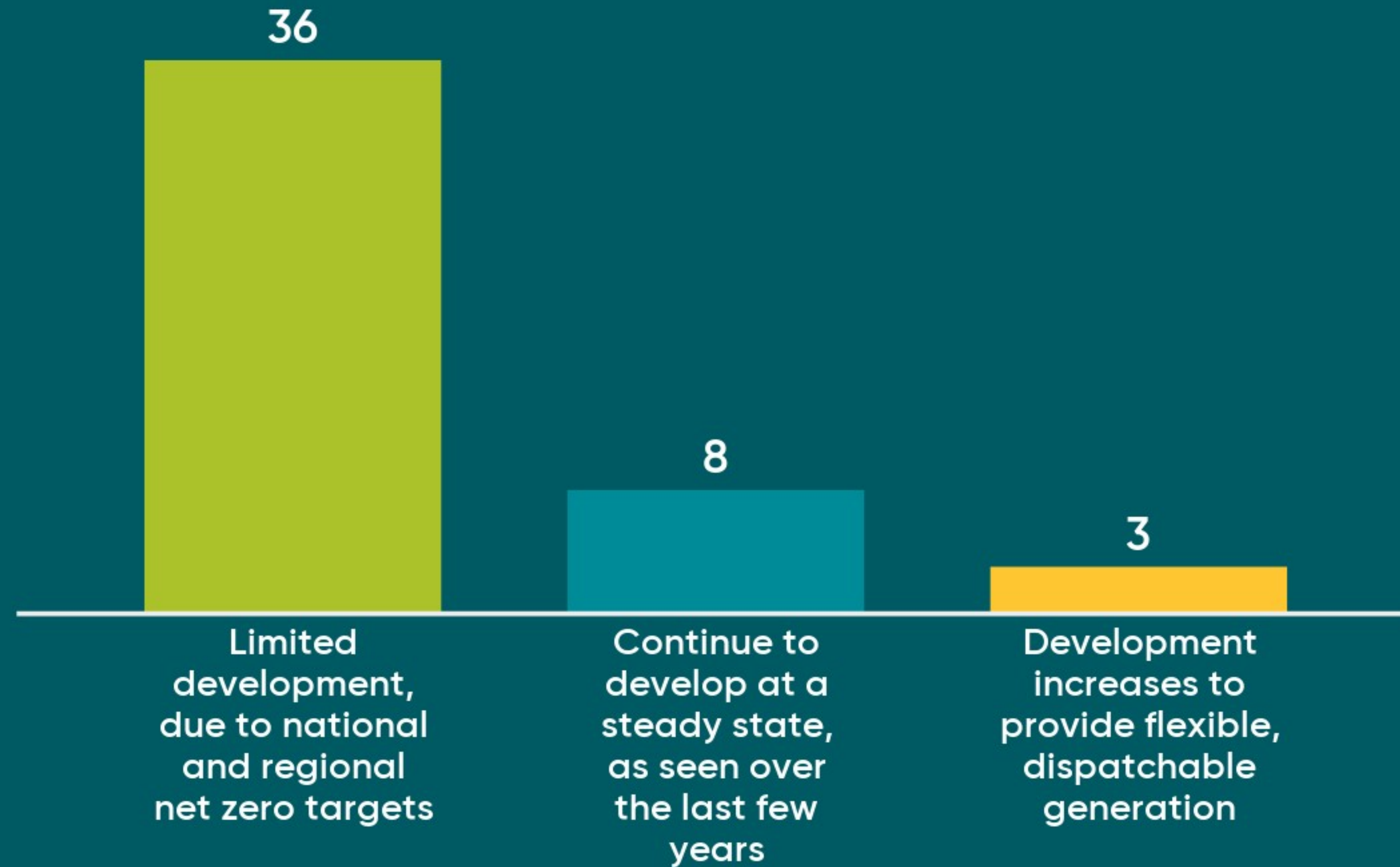


# Fossil gas generation capacity in the South West licence area





# How might flexible gas-fired generation to develop in the coming decade?





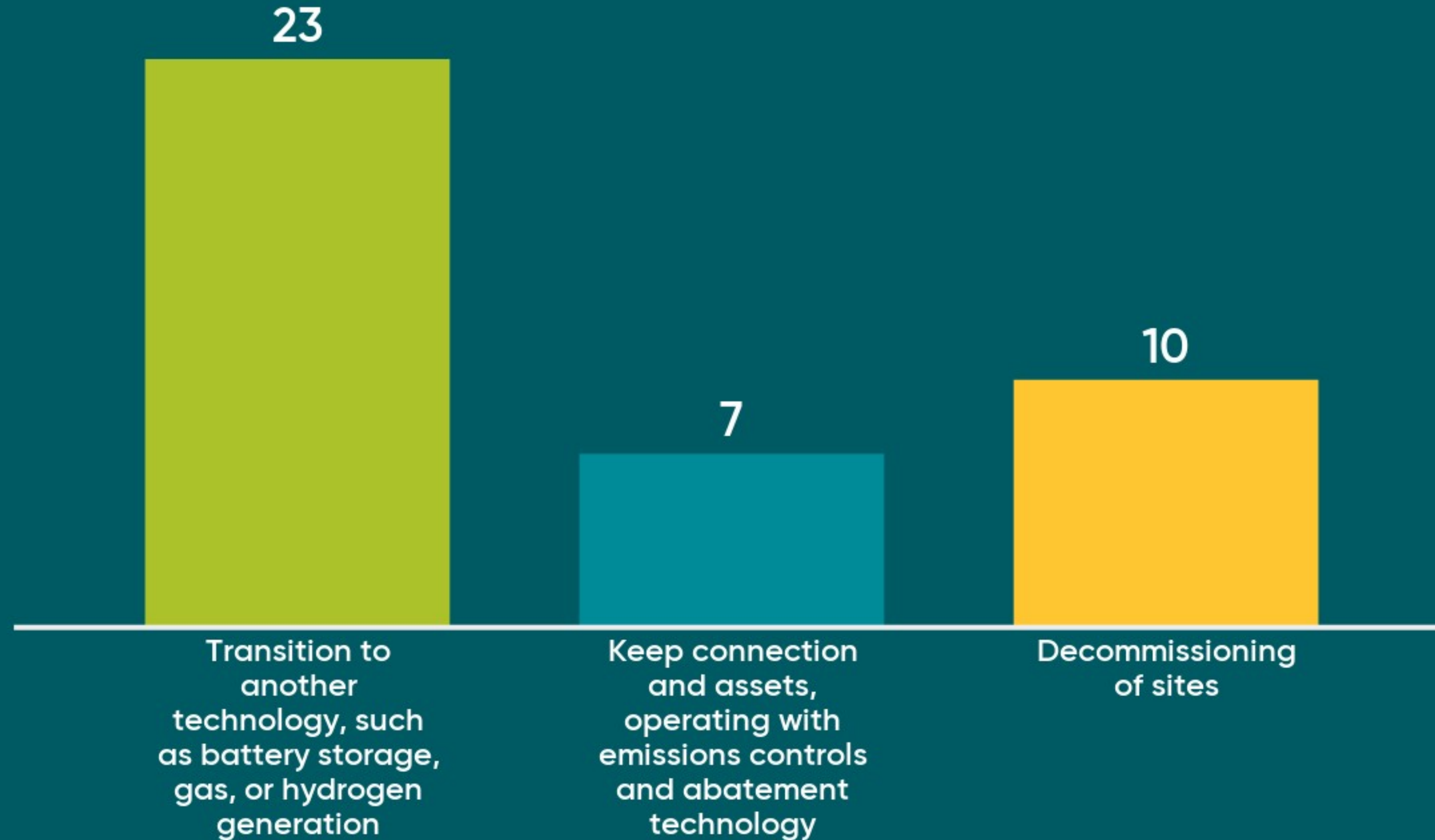
# Diesel generation

There are stringent environmental permitting regulations and ambitious emission reduction targets around commercial medium-scale diesel generators.

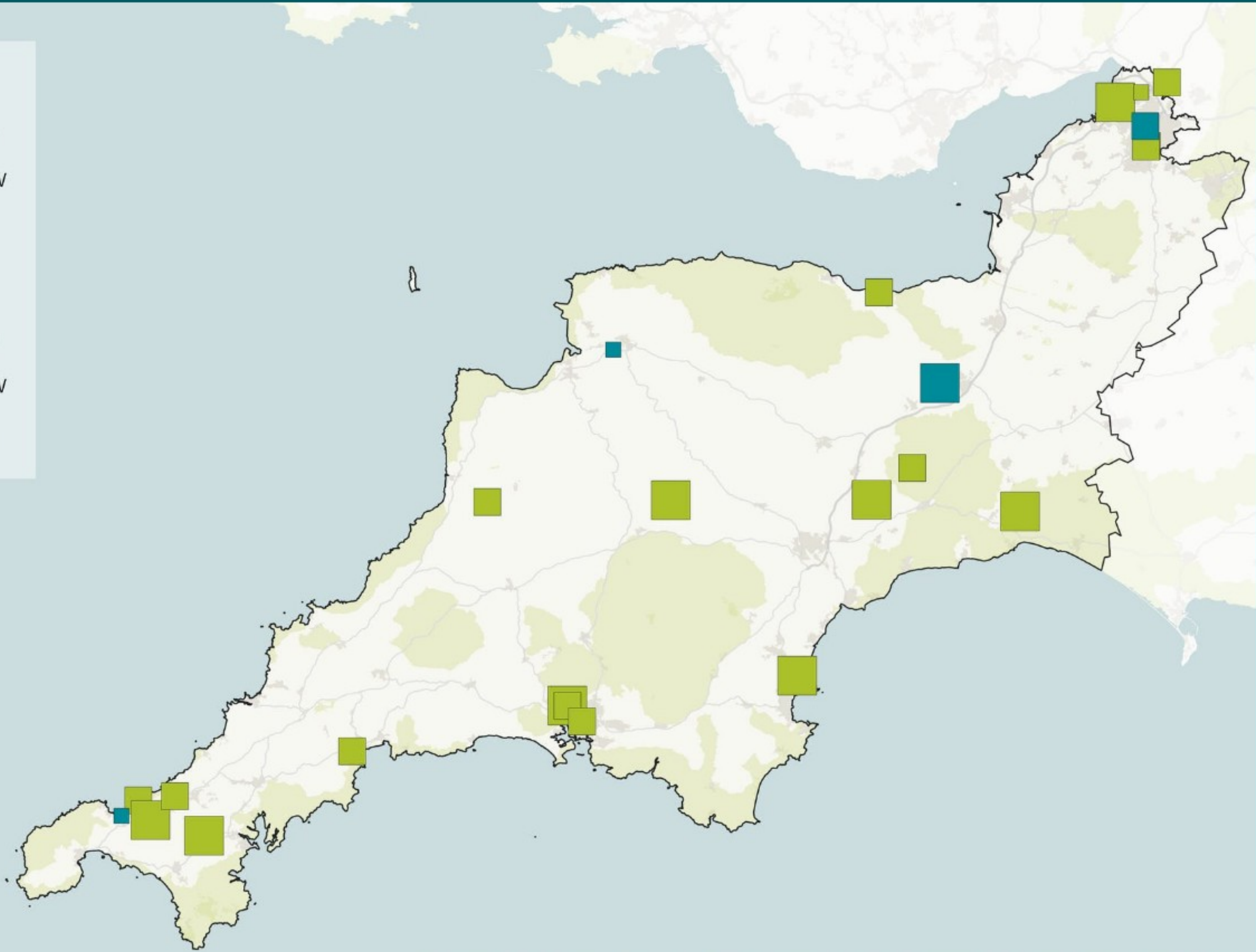
In particular, the permitting regulations and air quality requirements under the Medium Combustion Plant Directive (MCPD) have been passed into UK law.



# What will happen to current commercial medium-scale diesel generation sites that are impacted by the MCPD?



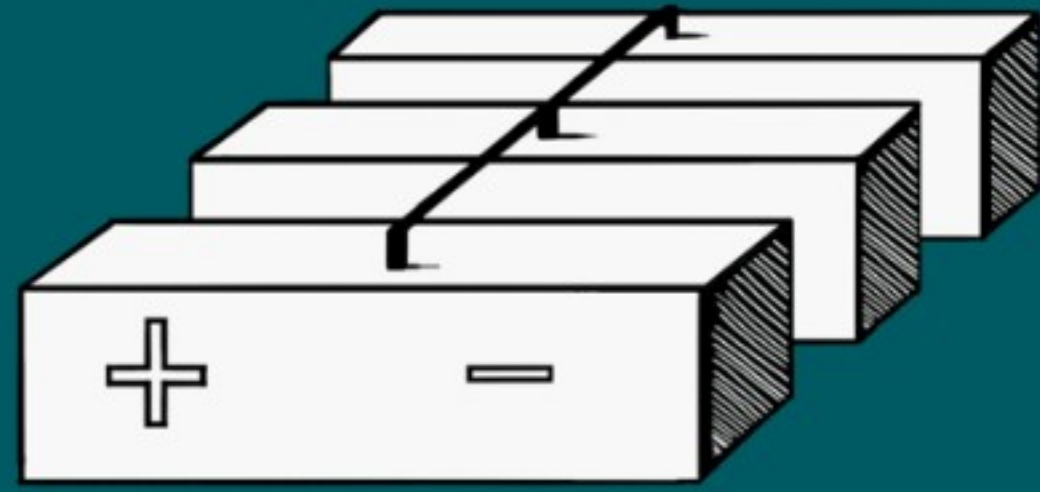




**DISTRIBUTION-CONNECTED ELECTRICITY STORAGE**  
WPD SOUTH WEST LICENCE AREA







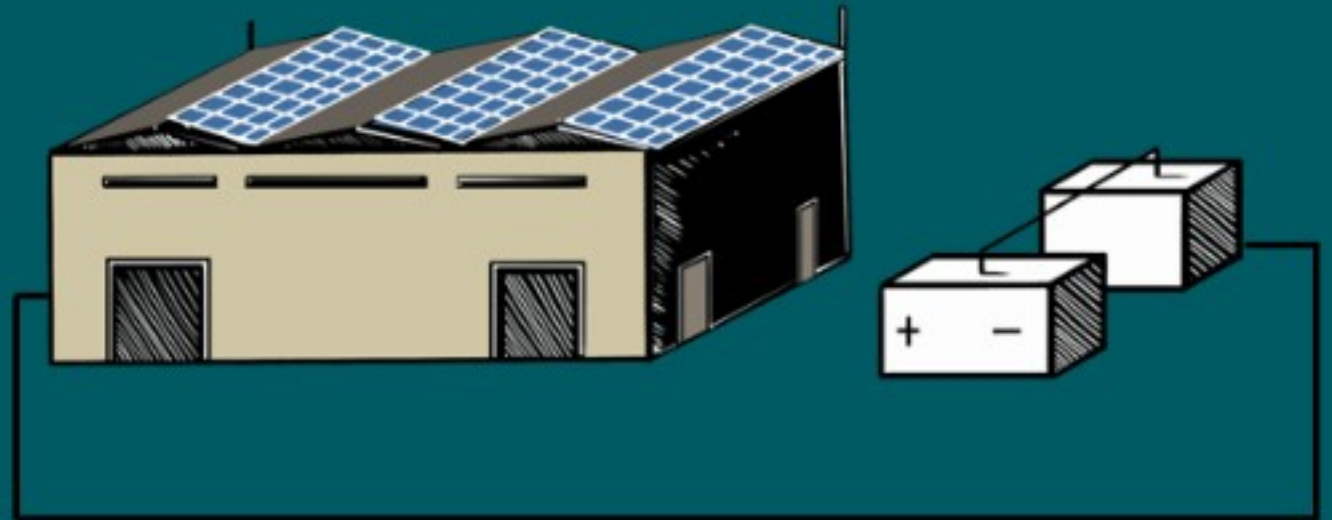
**Standalone network services**

Multi-MW scale batteries providing balancing, flexibility and support services to the grid

**Co-location**  
Multi-MW scale sited alongside renewable energy generation projects



**High energy user**  
Single MW scale sited at large energy user operational sites to support onsite energy management



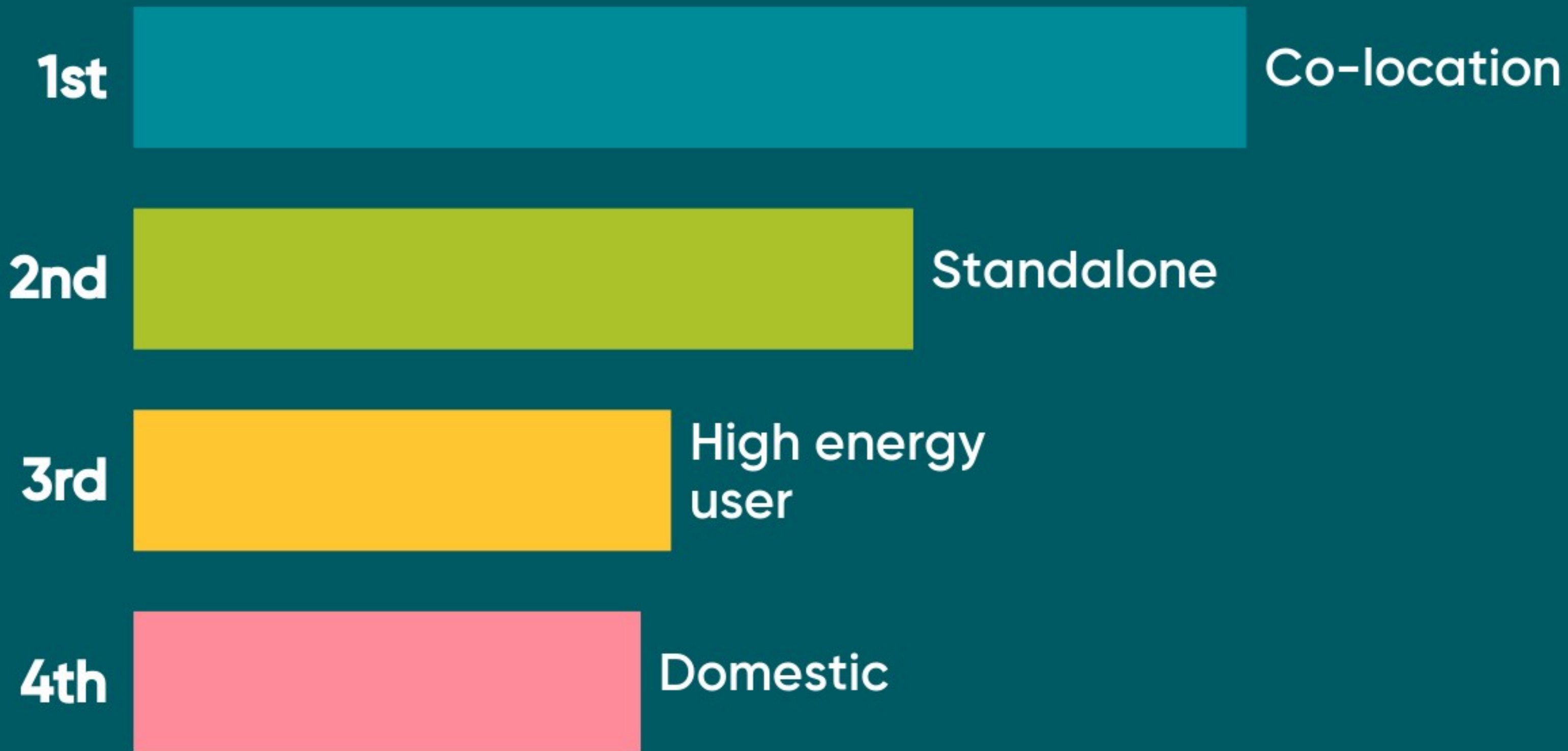
**Domestic**

10-20 kW scale batteries installed in households use alongside rooftop PV or provide back up services

**Electricity storage business models**

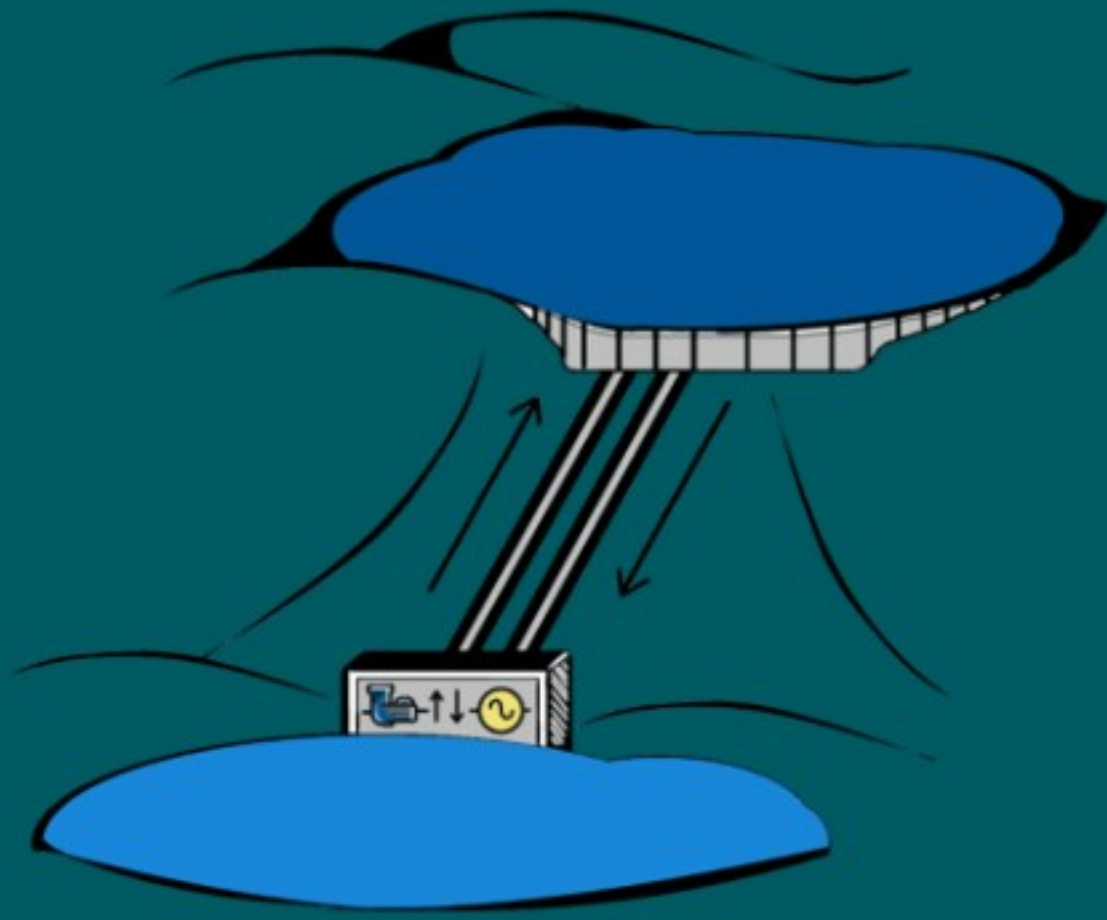


# Which storage business model will see the most growth over the near and medium term in the South West?





## Pumped hydro

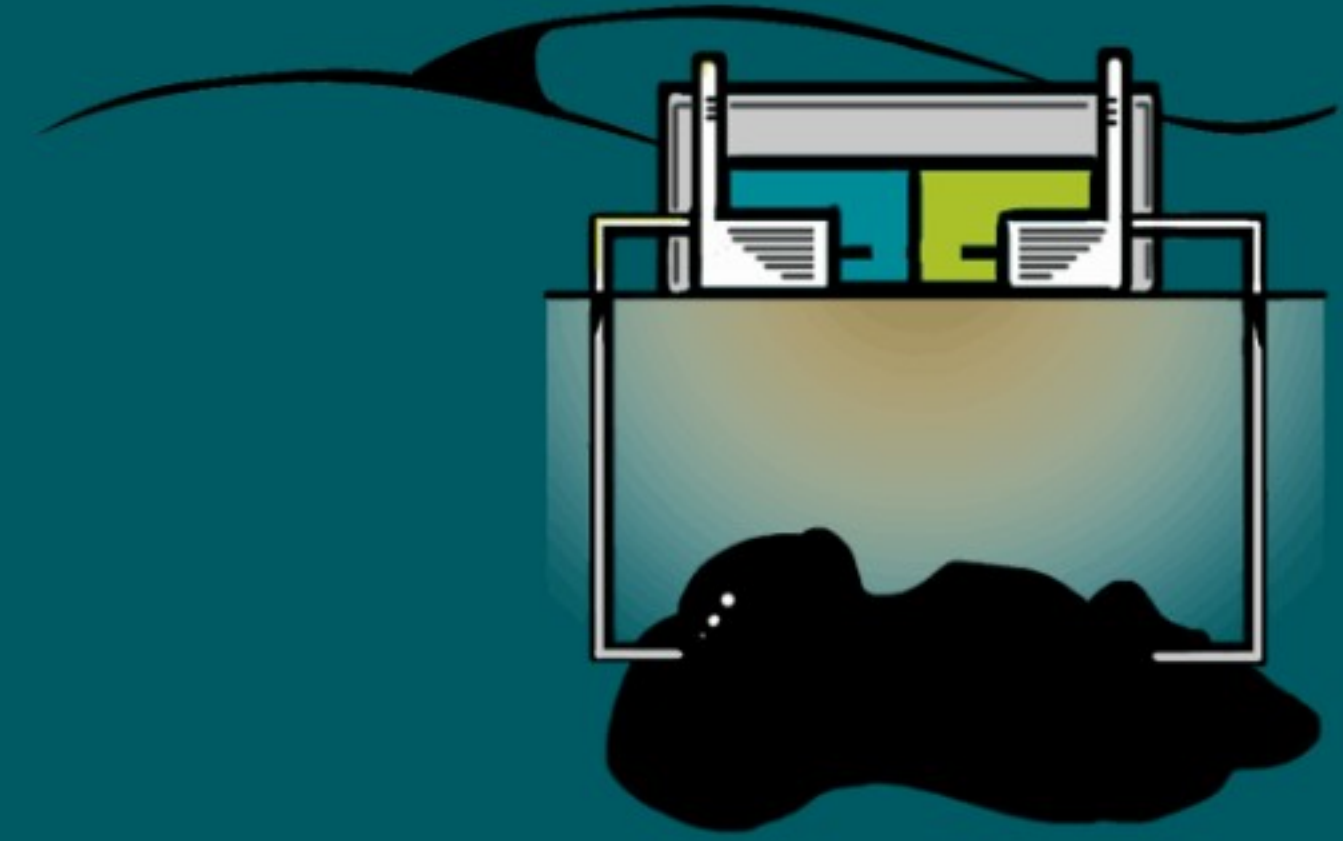


## Flywheels

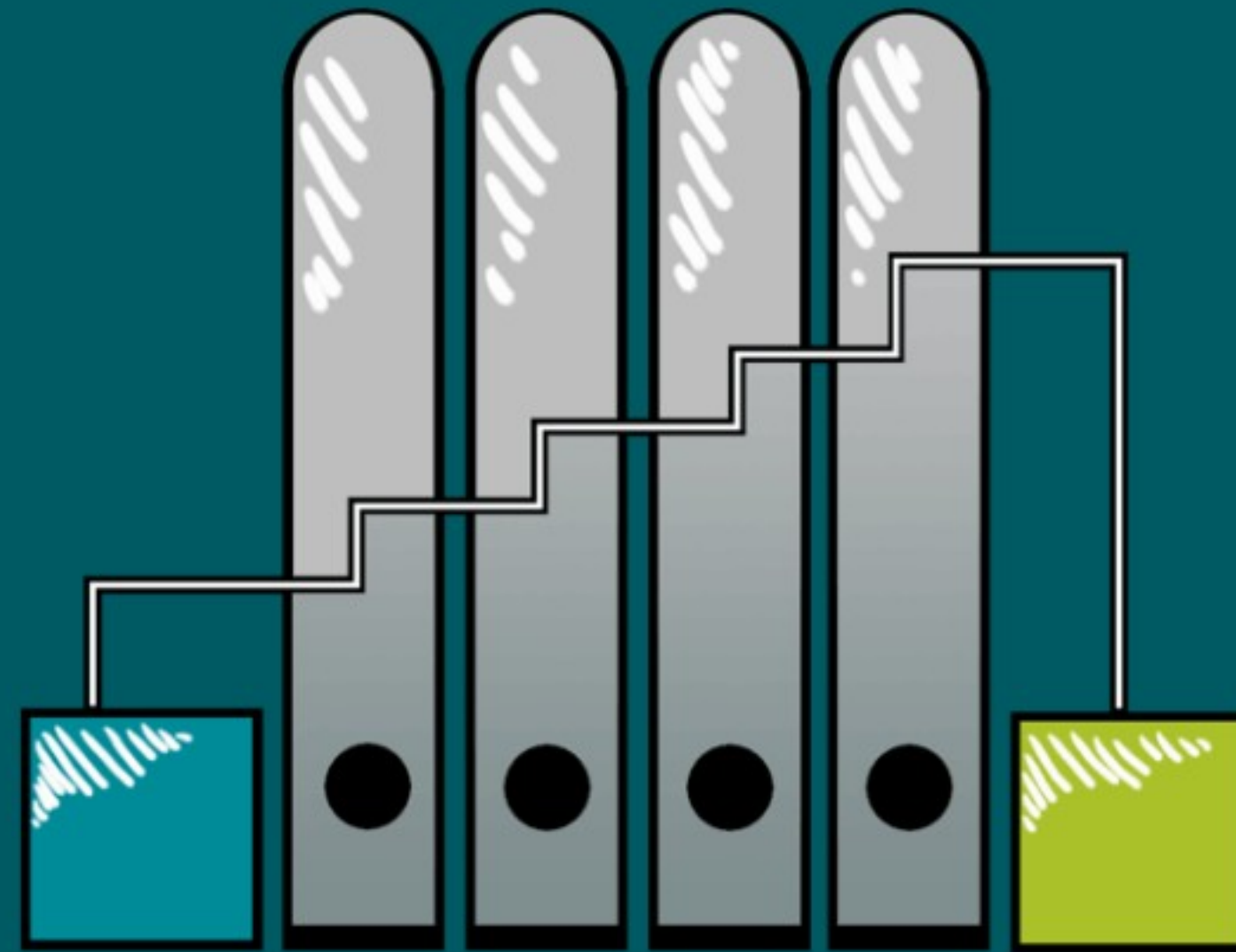
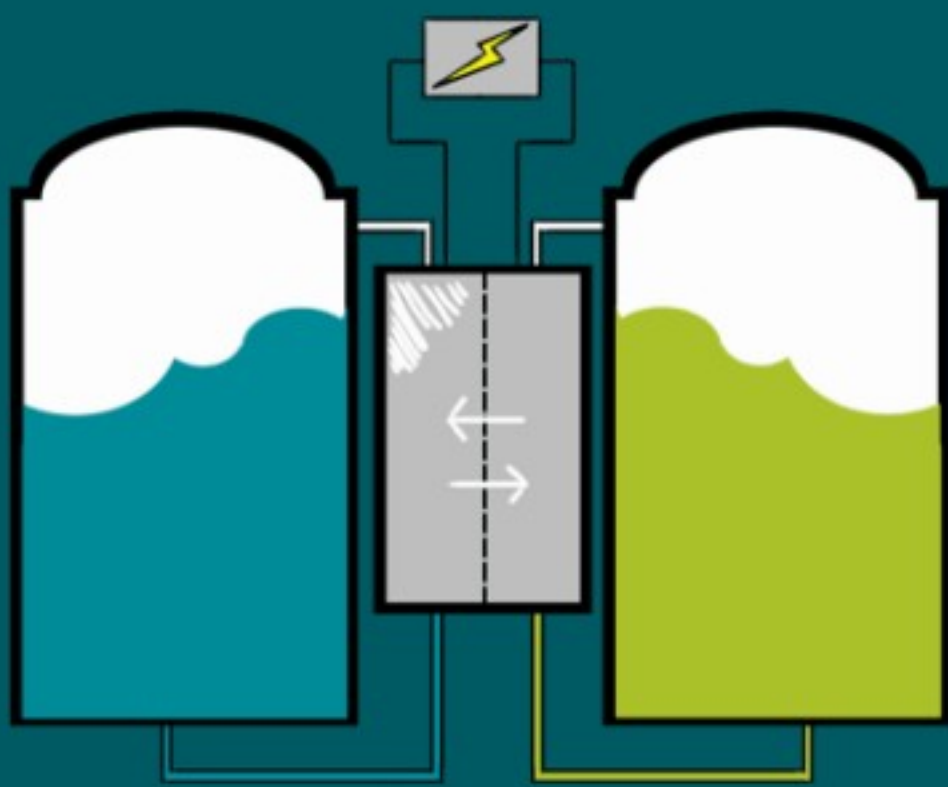


## Liquid air

## Compressed air



## Flow batteries



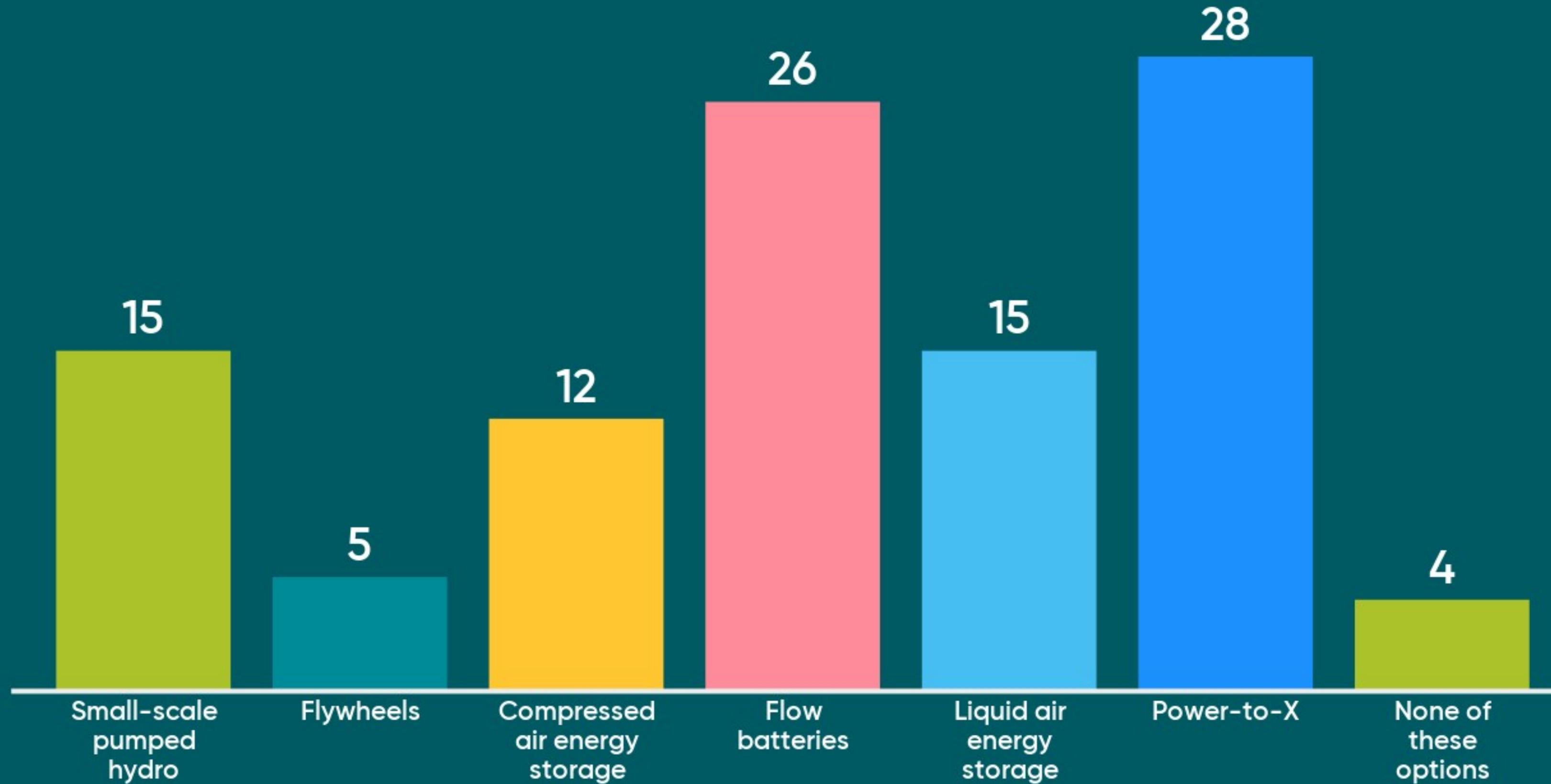
## Power-to-X



# Alternative energy storage technologies



# Which alternative storage technologies could see deployment on the distribution network in the future?





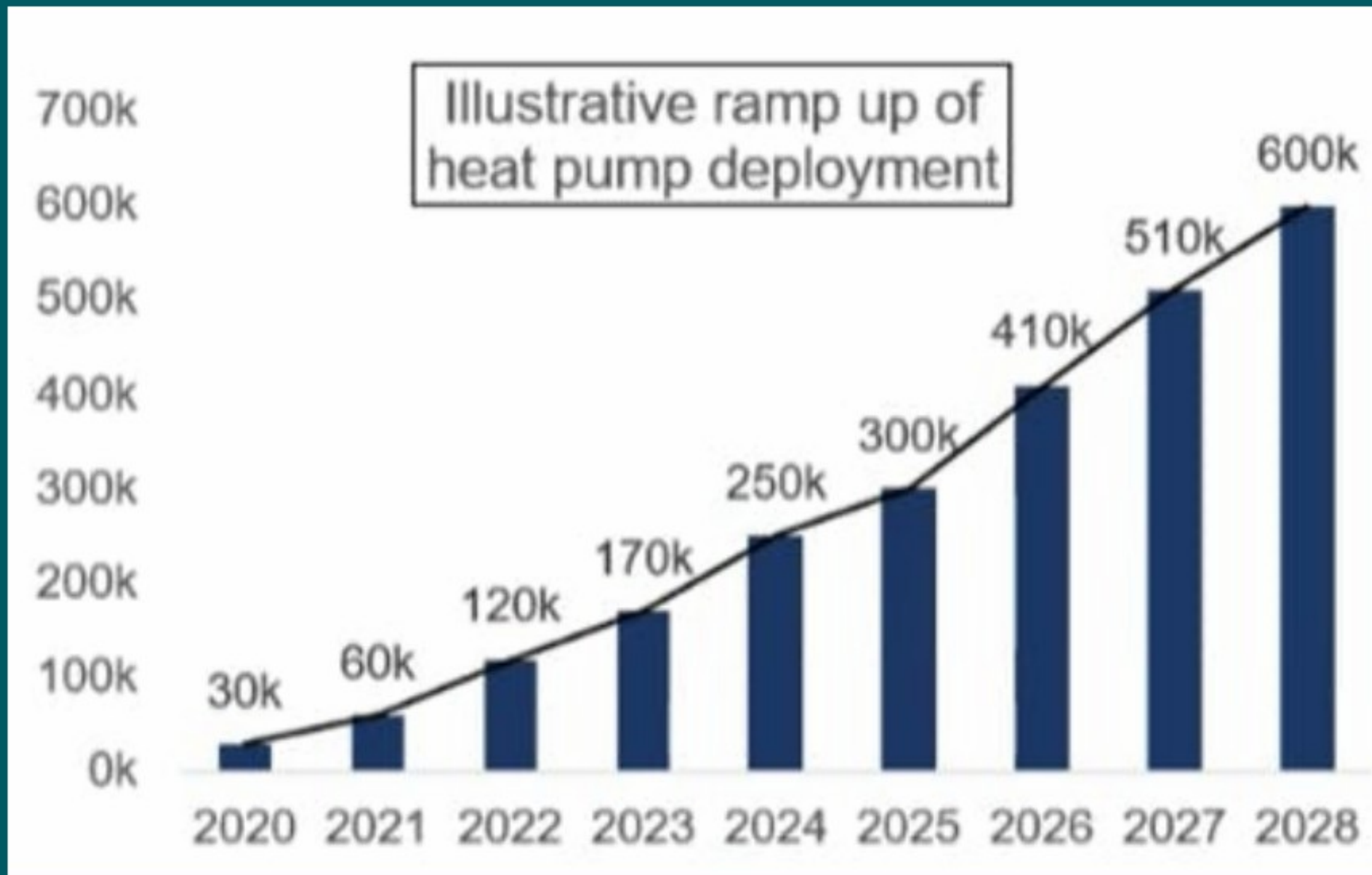
# Electrified domestic heat

→ Grace Millman - Energy analyst, Regen



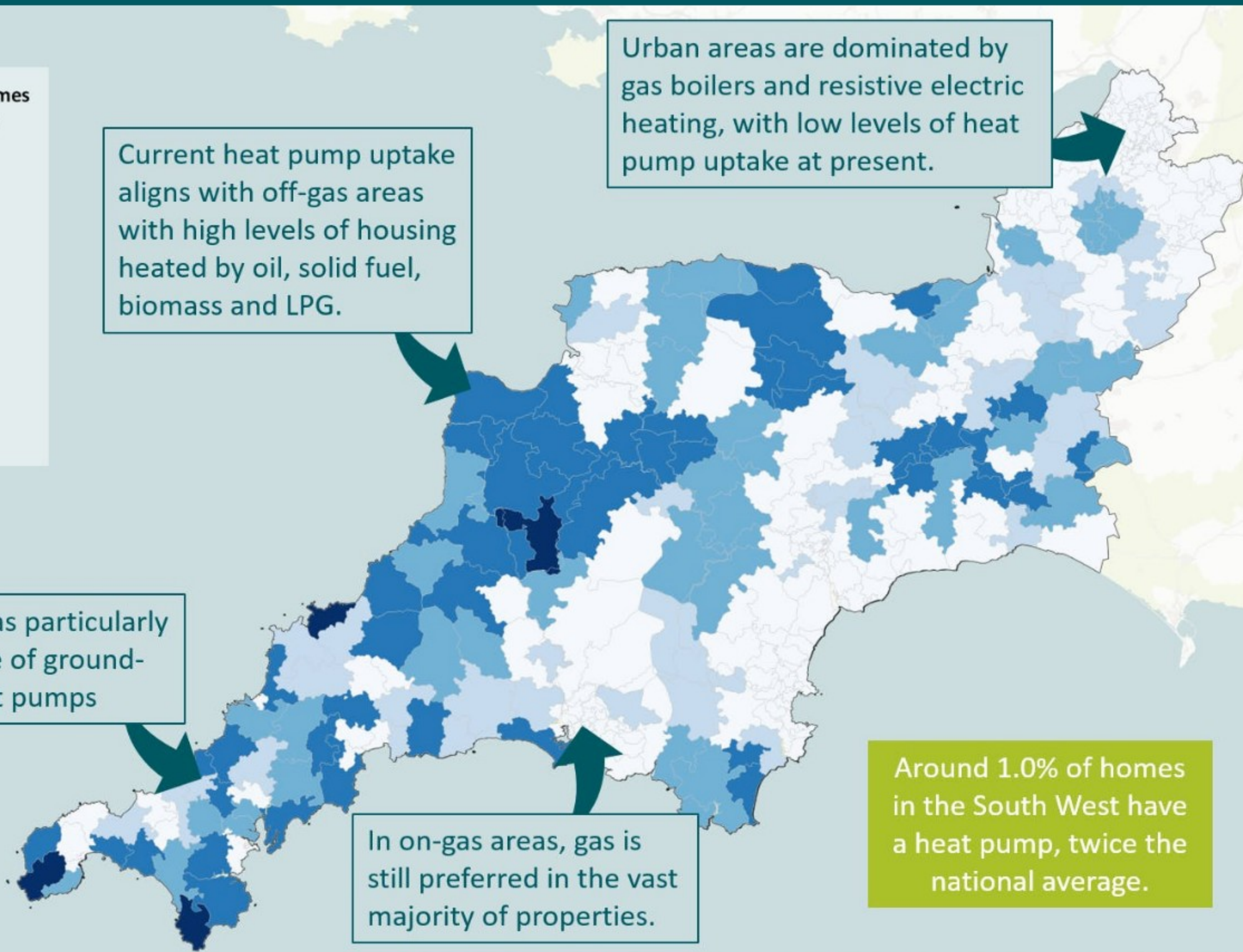
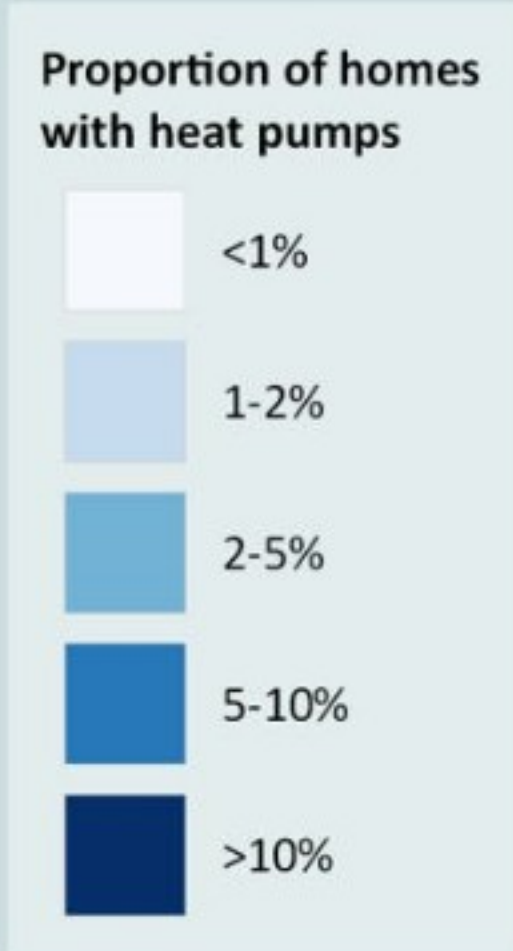


## Domestic heat policy context



- Government ambition to install 600,000 heat pumps per year by 2028 (currently around 30,000 per year)
- Government ambition to phase out high-carbon fossil heating in off-gas properties in the 2020s
- Future Homes Standard, which will require new build homes to install low carbon heating, expected to be in force from 2025
- Domestic RHI to close in March 2022 (to date has supported 55,000 heat pump installations)
- Clean Heat Grant proposed, but not yet confirmed, to support domestic low carbon heat installations
- Heat and Building Strategy expected from BEIS in the coming months

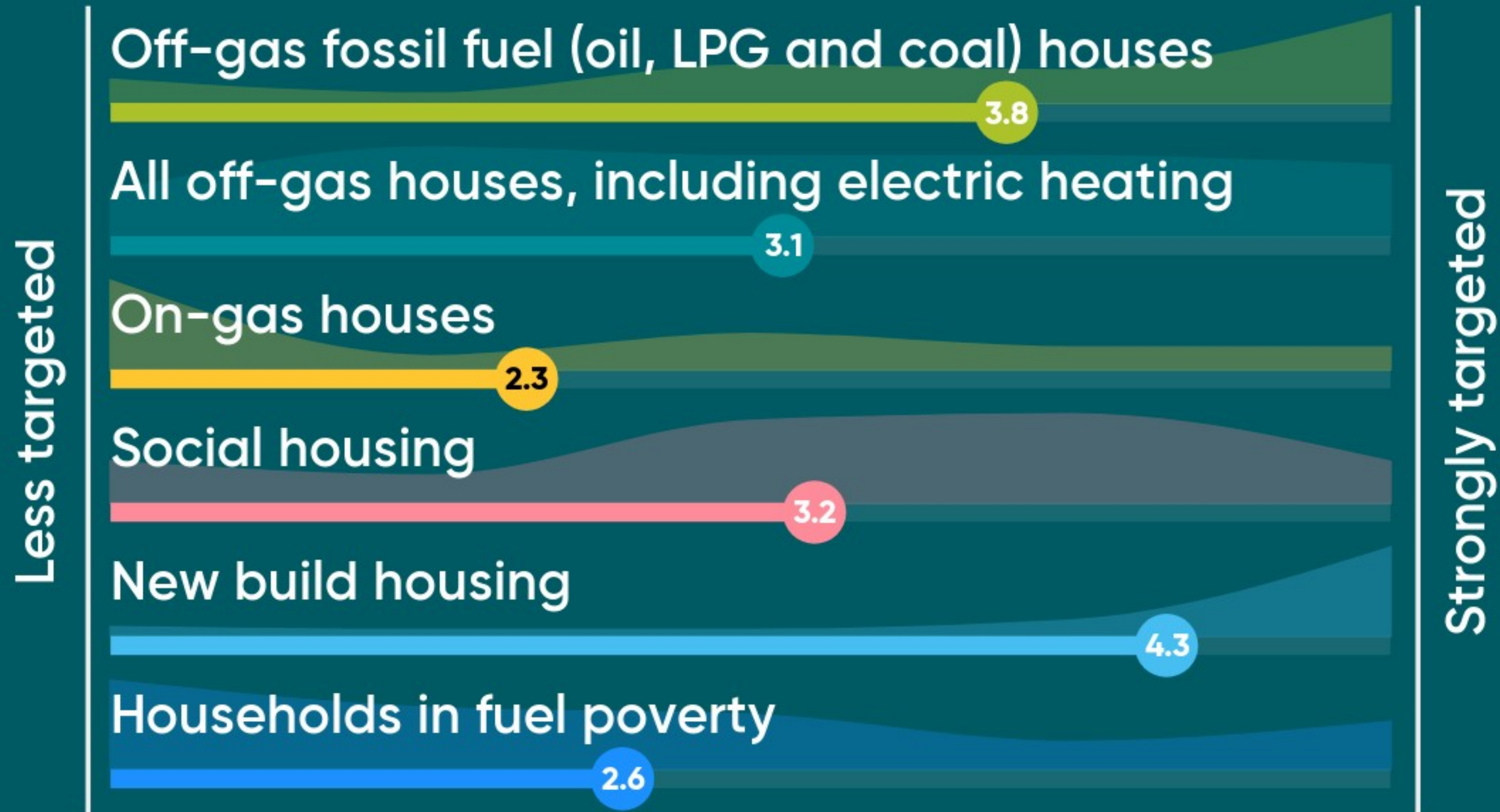




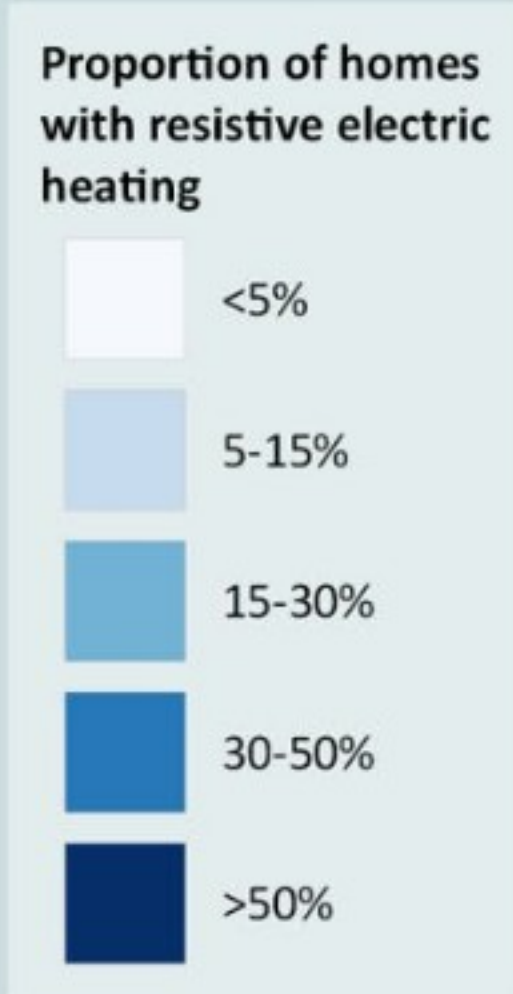
**PROPORTION OF HOMES WITH HEAT PUMPS (2019)**  
WPD SOUTH WEST LICENCE AREA



# As the government looks to achieve its target of 600,000 heat pumps installed per year by 2028, which of these areas will be targeted?





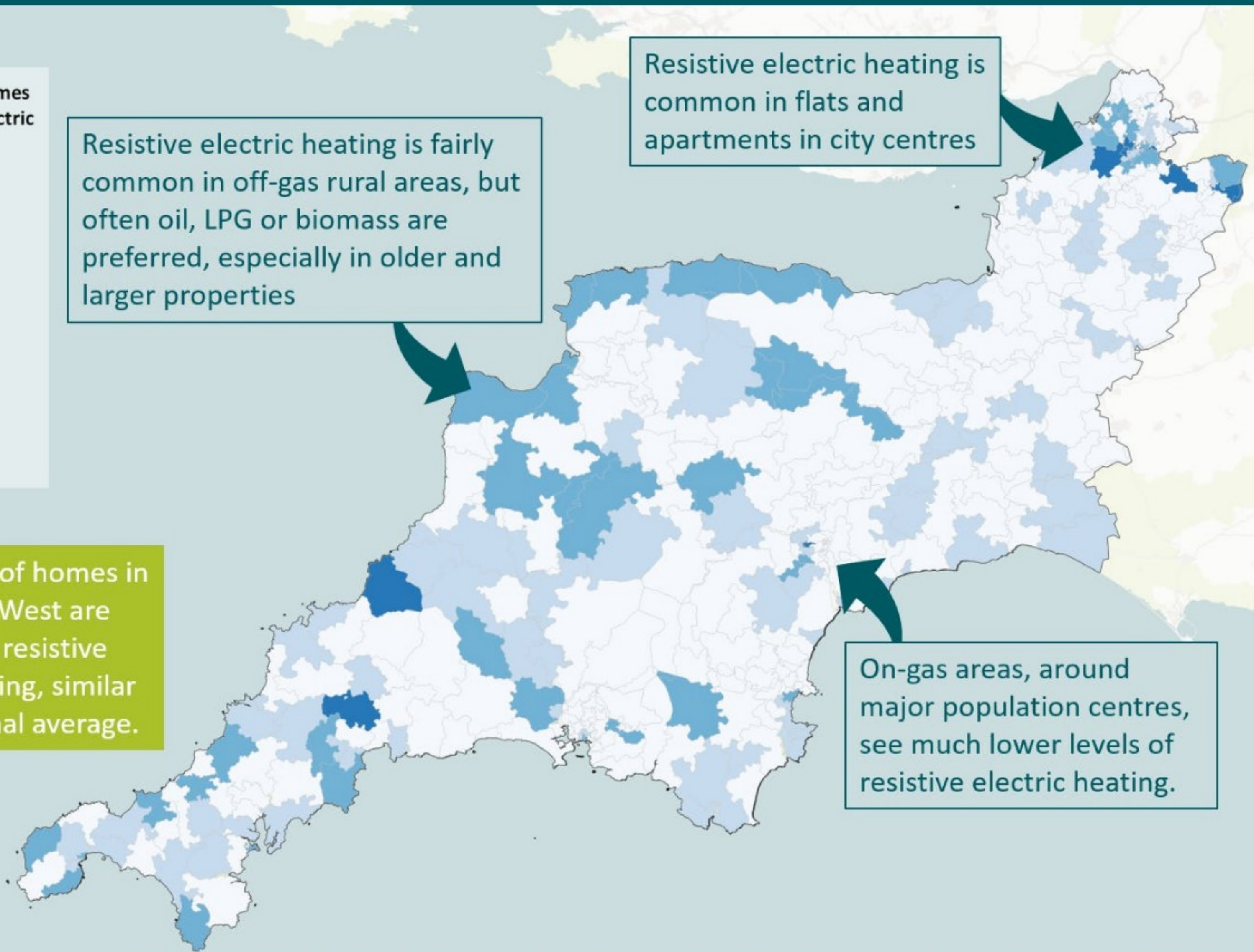


Resistive electric heating is fairly common in off-gas rural areas, but often oil, LPG or biomass are preferred, especially in older and larger properties

Resistive electric heating is common in flats and apartments in city centres

Around 6.7% of homes in the South West are heated by resistive electric heating, similar to the national average.

On-gas areas, around major population centres, see much lower levels of resistive electric heating.

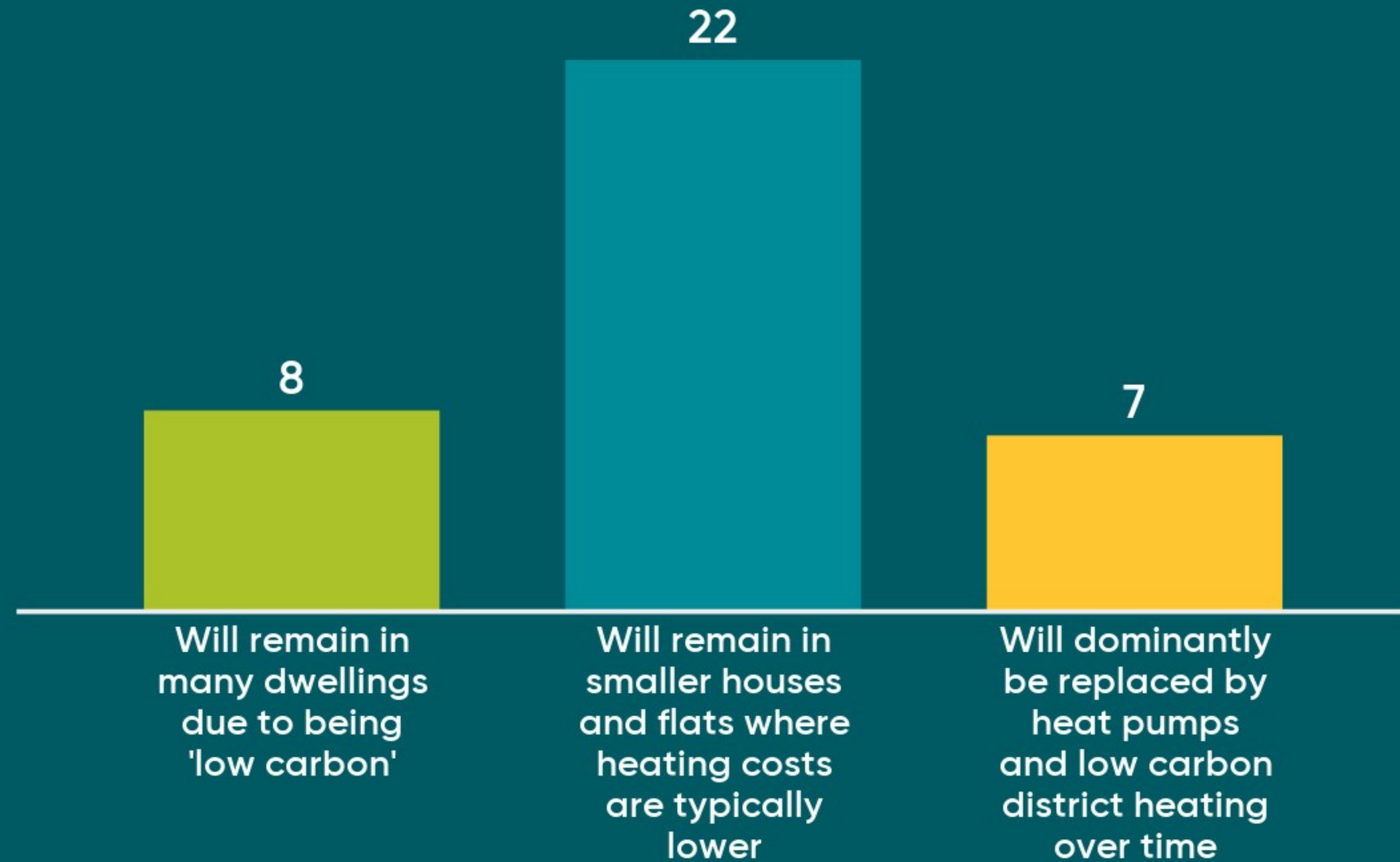


**PROPORTION OF HOMES WITH RESISTIVE ELECTRIC HEATING (2019)**  
WPD SOUTH WEST LICENCE AREA





# What is the role of resistive electric heating in a net zero future?





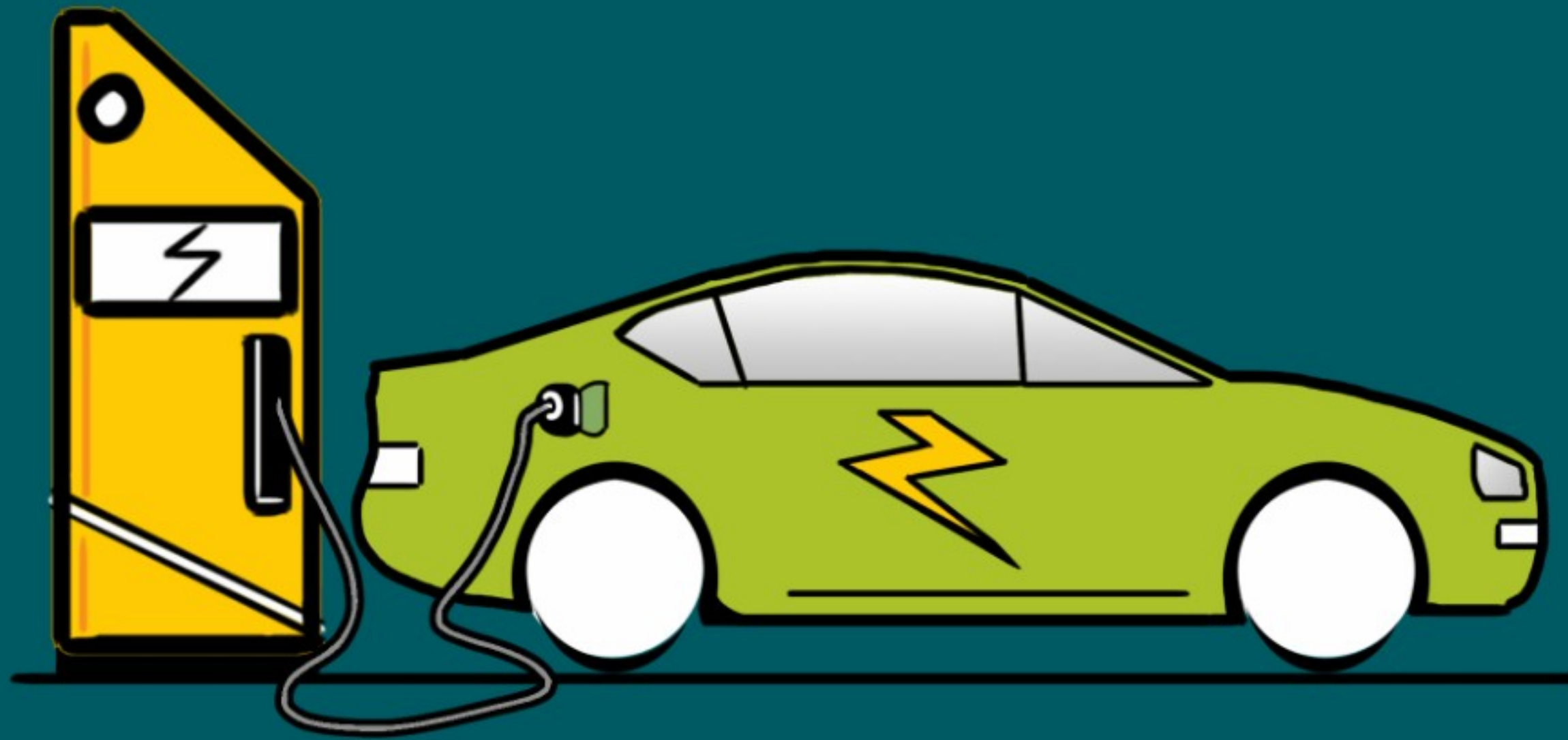
# Electric vehicles

→ Frankie Mayo – Senior energy analyst, Regen





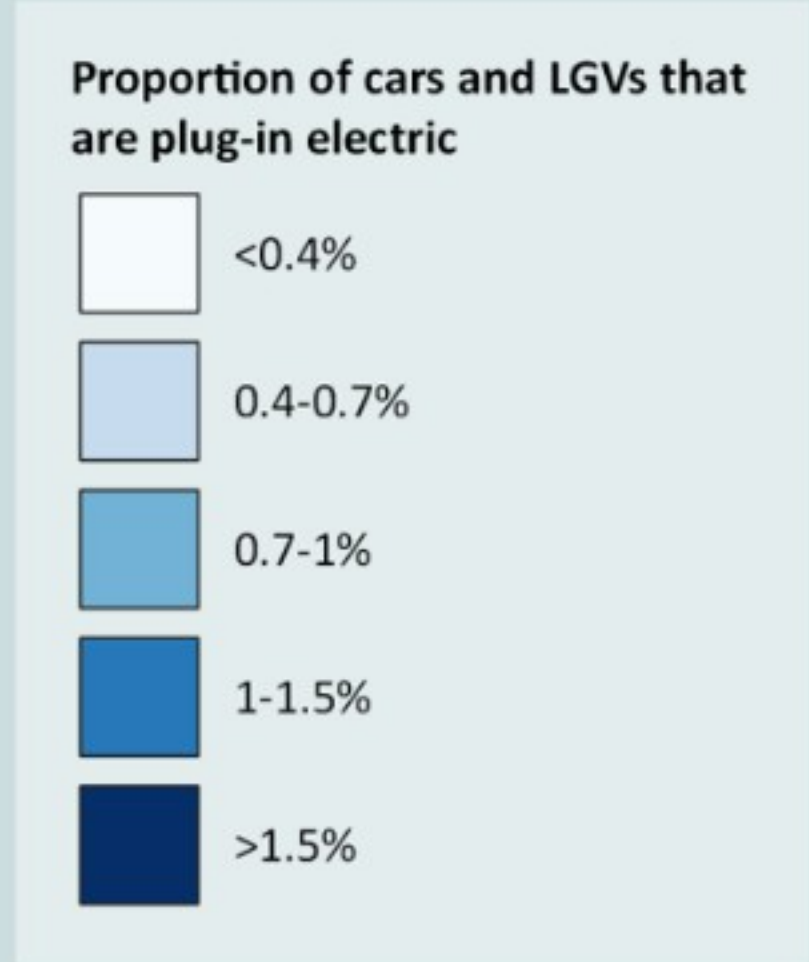
## UK policy on EVs and EV chargers



- End of the sale of new petrol/diesel cars and vans from 2030, with plug-in hybrid car and van sales allowed until 2035
- EV sales have increased dramatically since the start of the COVID-19 pandemic, with a more affordable second hand market also emerging
- Proposed changes to building regulations to increase the proportion of new and existing developments with chargepoints
- Installation of a national network of ultra-rapid charging hubs at motorway service areas
- Clean air zones becoming active in many cities, such as Bristol







Bristol EV uptake is high for both private and commercial vehicles, ahead of the imminent Clean Air Zone.

Affluent areas, which correlate strongly with multi-car households and off-street parking, see high levels of EV uptake.

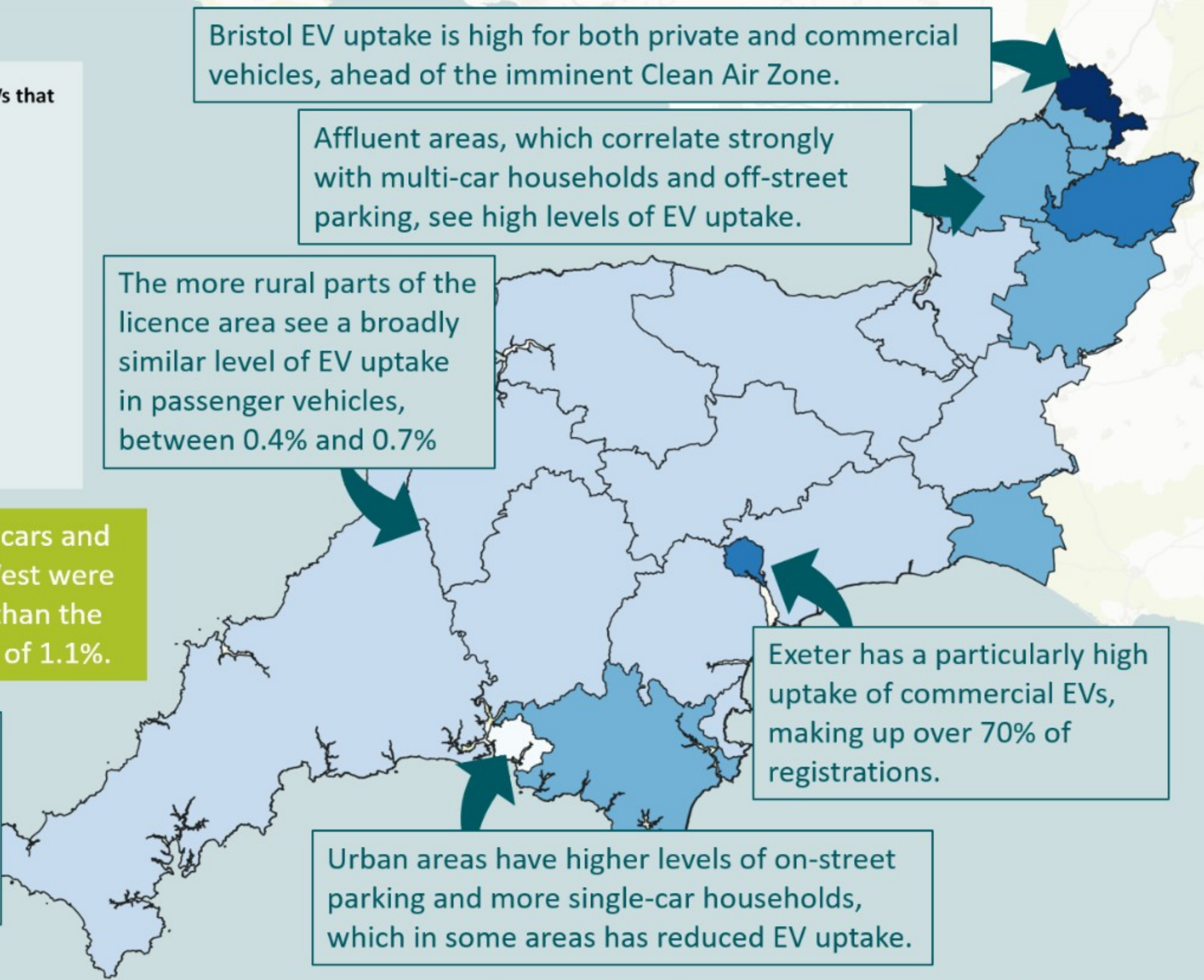
The more rural parts of the licence area see a broadly similar level of EV uptake in passenger vehicles, between 0.4% and 0.7%

As of 2019, 0.9% of cars and LGVs in the South West were EVs, slightly lower than the national proportion of 1.1%.

Exeter has a particularly high uptake of commercial EVs, making up over 70% of registrations.

The high petroleum prices and shorter journey lengths on the Isles of Scilly have led to high EV uptake.

Urban areas have higher levels of on-street parking and more single-car households, which in some areas has reduced EV uptake.



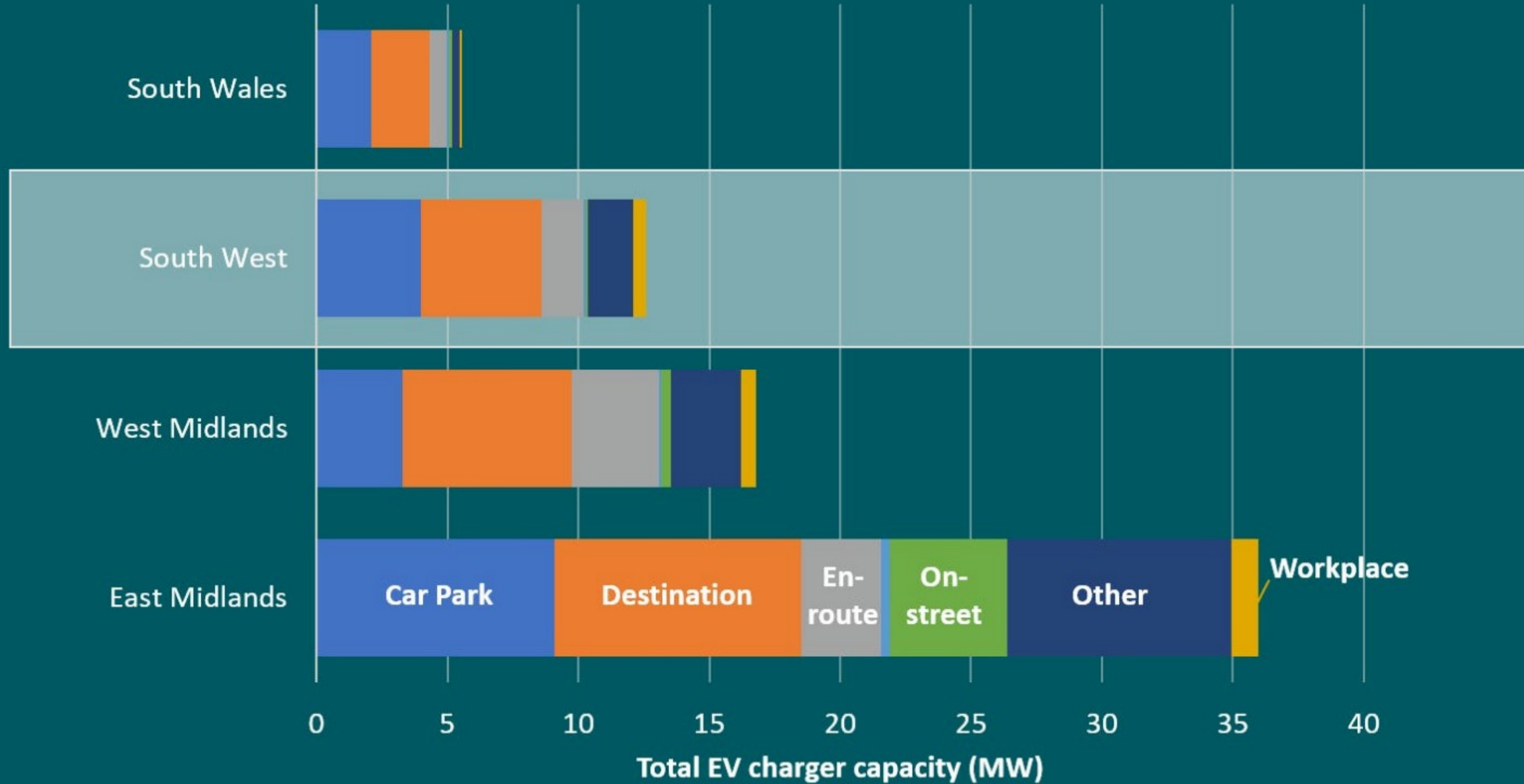
**ELECTRIC CARS AND LGVS RELATIVE TO TOTAL CARS AND LGVS (Q4 2020)**  
**WPD SOUTH WEST LICENCE AREA**





# EV charging capacity by location type in WPD's licence areas

Source: National Chargepoint Registry



## Uptake and type of non-domestic EV chargers in WPD's licence areas





# What will be the most and least popular solutions to EV charging for on-street parked vehicles?





# Further questions and Q+A

→ Frankie Mayo – Senior energy analyst, Regen





# How has the energy system and people's use of energy shifted as a result of the COVID-19 pandemic?

Used more domestic energy

More usage at home no doubt. More home heating that was previously a by product of waste heat in the office

Yes, but not as much as EV charging and electric domestic heating will play



**Is there anything else you'd like to highlight for our analysis?**



# Did you find the event today...

