Distribution Future Electricity Scenarios in SHEPD North of Scotland

SSEN Future Networks

Presenters
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Scottish & Southern Electricity Networks

Agenda

- Housekeeping
- Introduction by SSEN Future Networks
- Regen scenario methodology and high level results
- Next steps for SSEN

- Questions (c. 20 mins)

For questions please use https://www.sli.do/
Joining code: #North

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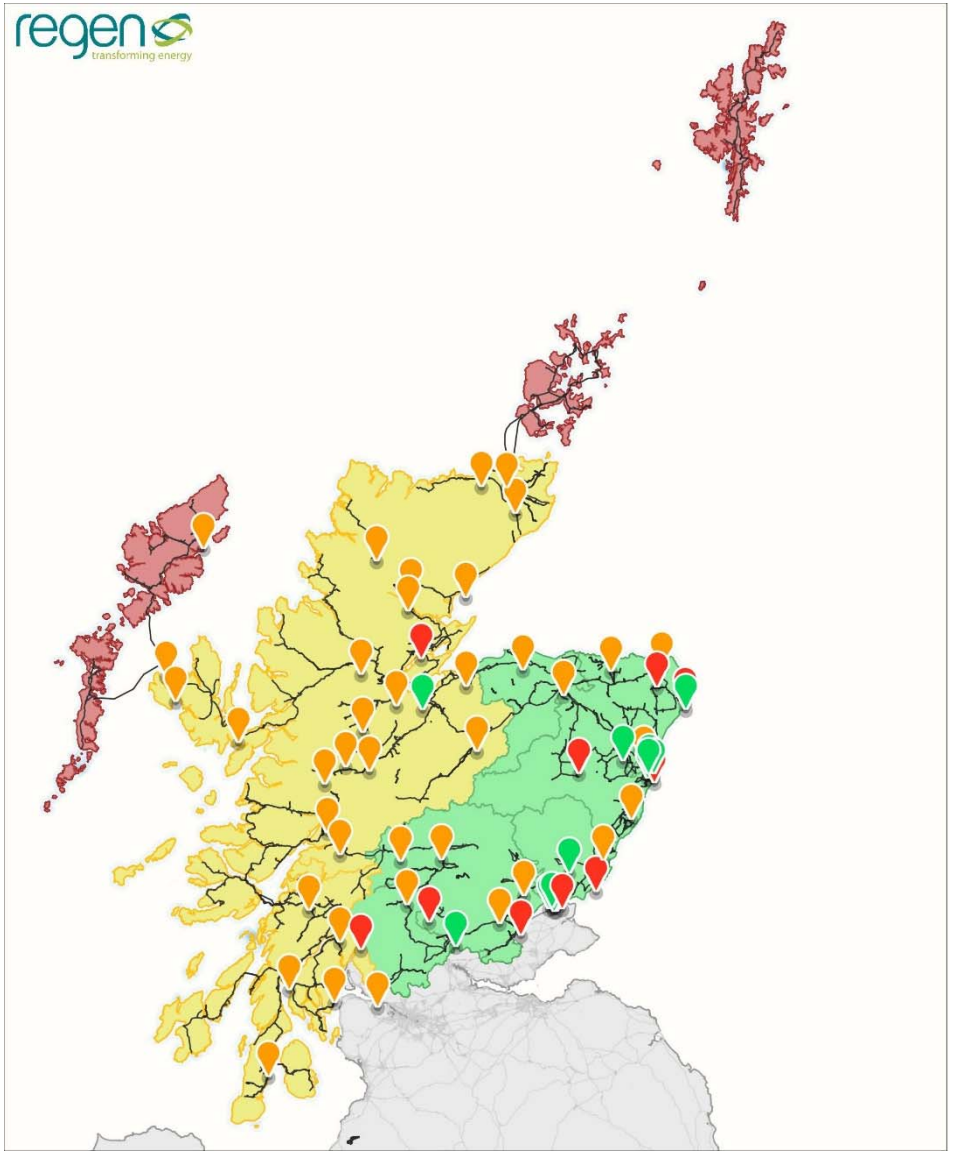
SSEN context and objectives

- A changing electricity grid - National Grid ‘Future Energy Scenarios’ show rapid change
- What does that mean for networks? – our assets, our business priorities, our stakeholders…
- Understanding the ‘local’ context...
- How should we invest?
- What role for flexibility?



Generation availability map showing levels of constraint for Grid Supply Points in the SSEN SHEPD area

- Green - Unconstrained GSP
- Amber - Partially constrained GSP
- Red - Constrained GSP
- Electricity network (33 kV and above)

Regions of the SHEPD

- Islands
- East coast
- West and Highlands

Distribution Future Electricity Scenarios in the North of Scotland

SSEN SHEPD licence area

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transforming energy

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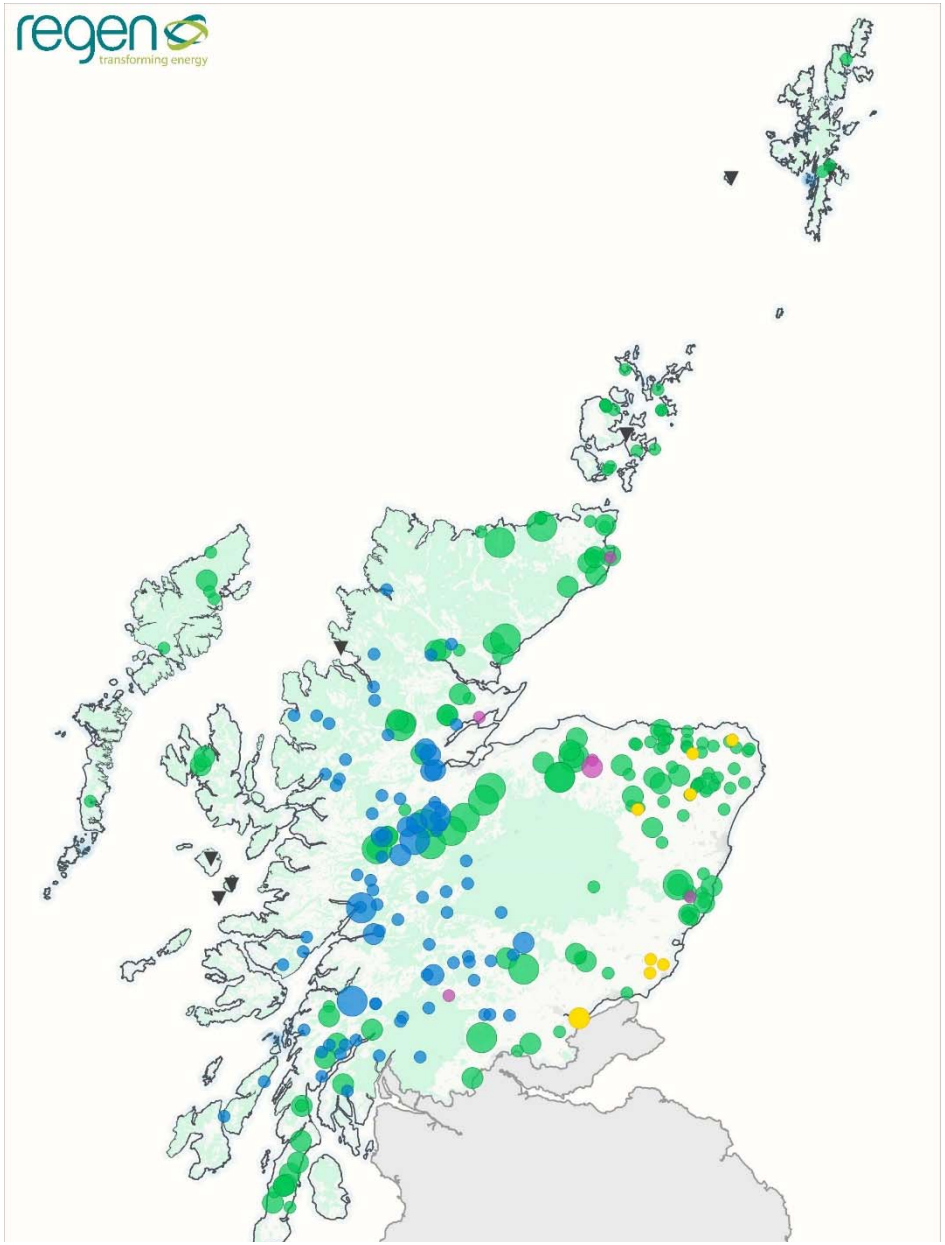
Scenarios introduction

Methodology overview

Results and findings

regen
transforming energy

Why scenarios?



The distribution of generation and storage technologies in the SSEN SHEPD licence area

Source data: BEIS renewable energy planning database

Solar PV	Biomass	Hydro	Onshore wind	Capacity (MW)
				1 - 10
				10 - 50
				50 - 440

Battery storage ▼ **0 - 2 MW**

Distribution network (33kV)

Natural designations

National parks, peatland, SSIs etc.

Scenarios introduction

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

These are reported down to a **specific areas** within the SSEN SHEPD North of Scotland area termed Electricity Supply Areas (ESAs), by year out to **2032**.

The analysis is informed by **local stakeholders**

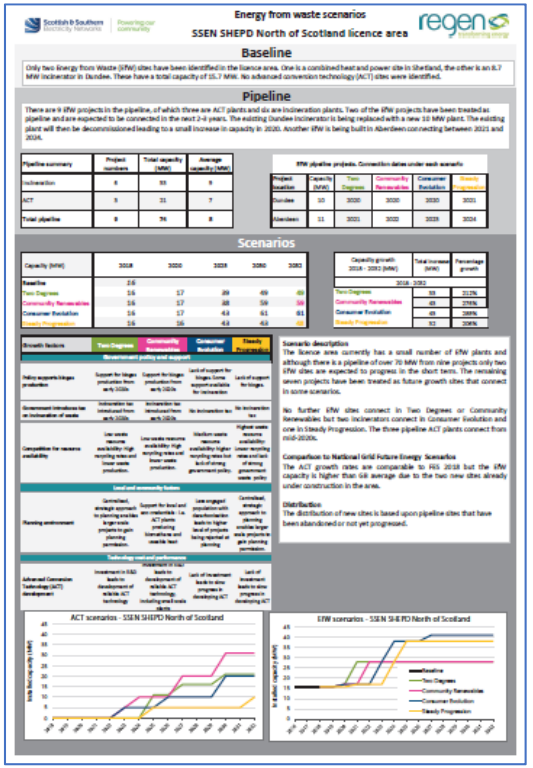
- Consultation event – Glasgow 25/06/19
- Developers and generation owners
- Local authorities and planning departments

the *what*

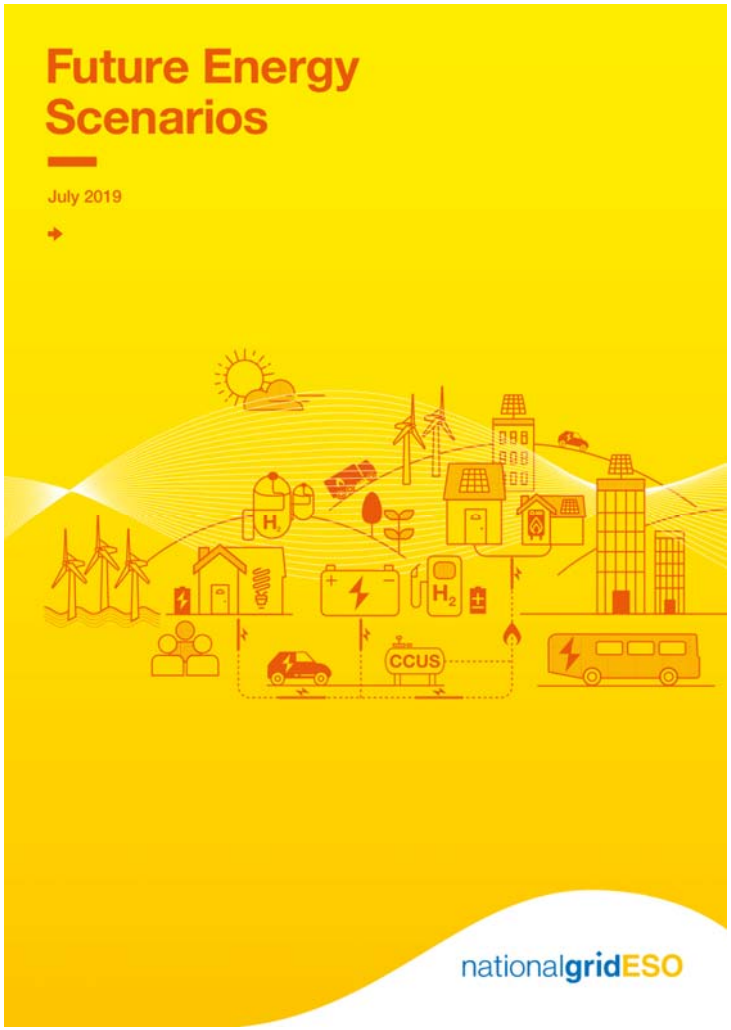
the *where*

the *when*

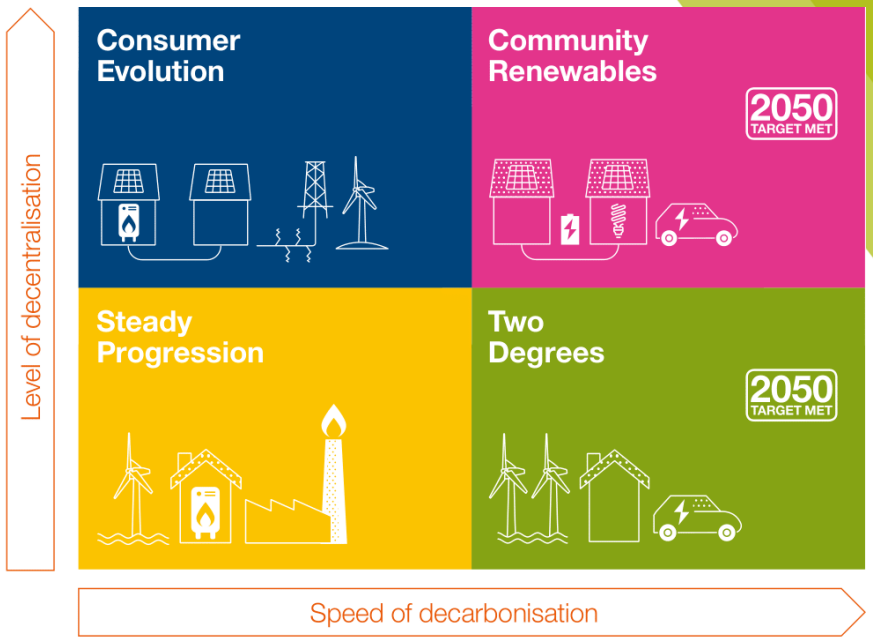
the *who*



National Grid FES

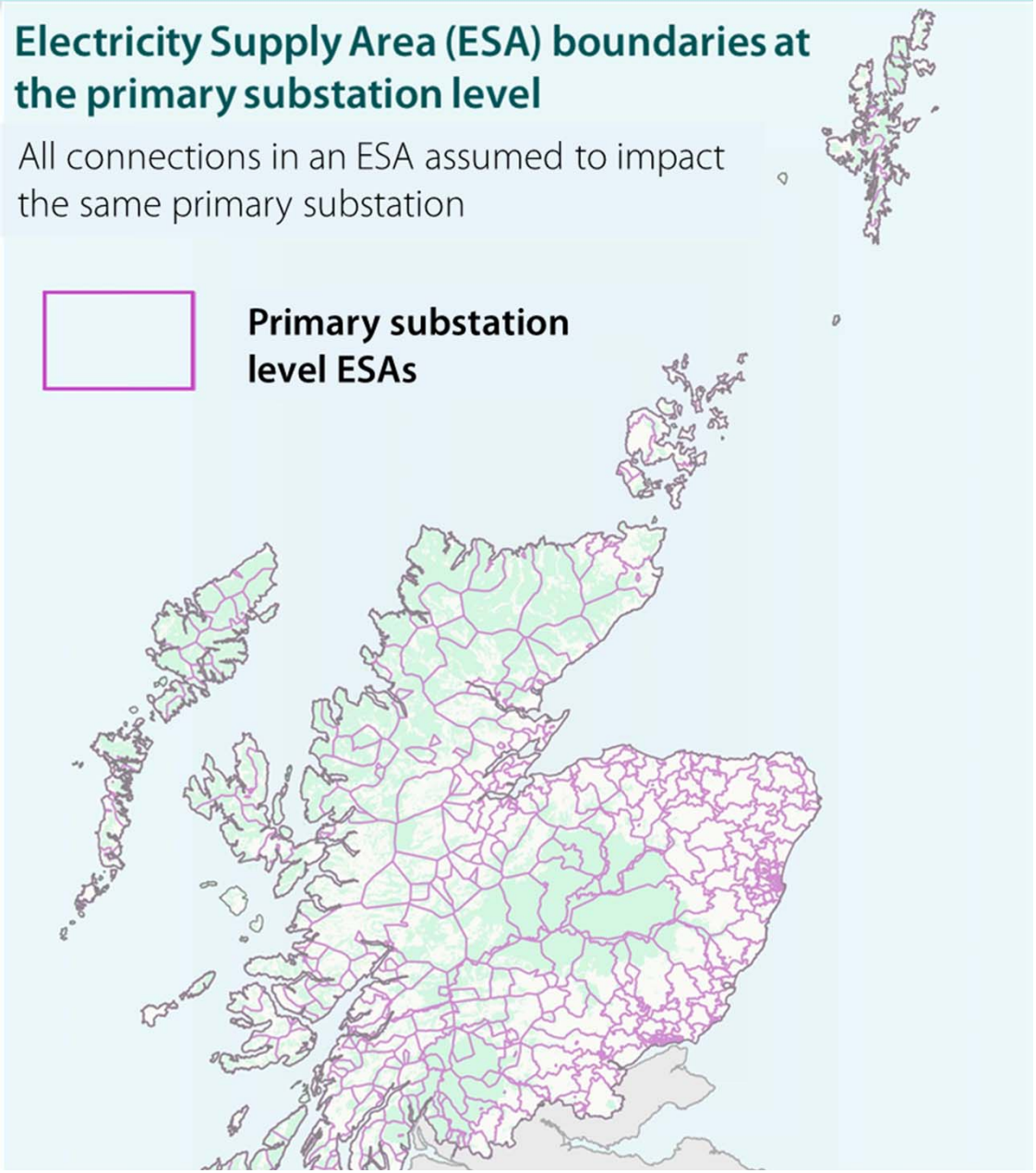


4 scenarios: varying levels of **decarbonisation** and **decentralisation**



Electricity Supply Areas (ESAs)

- Demand and generation within the ESAs impact the same upstream network
- Also cut by local authority areas
- 505 ESAs in SHEPD North of Scotland



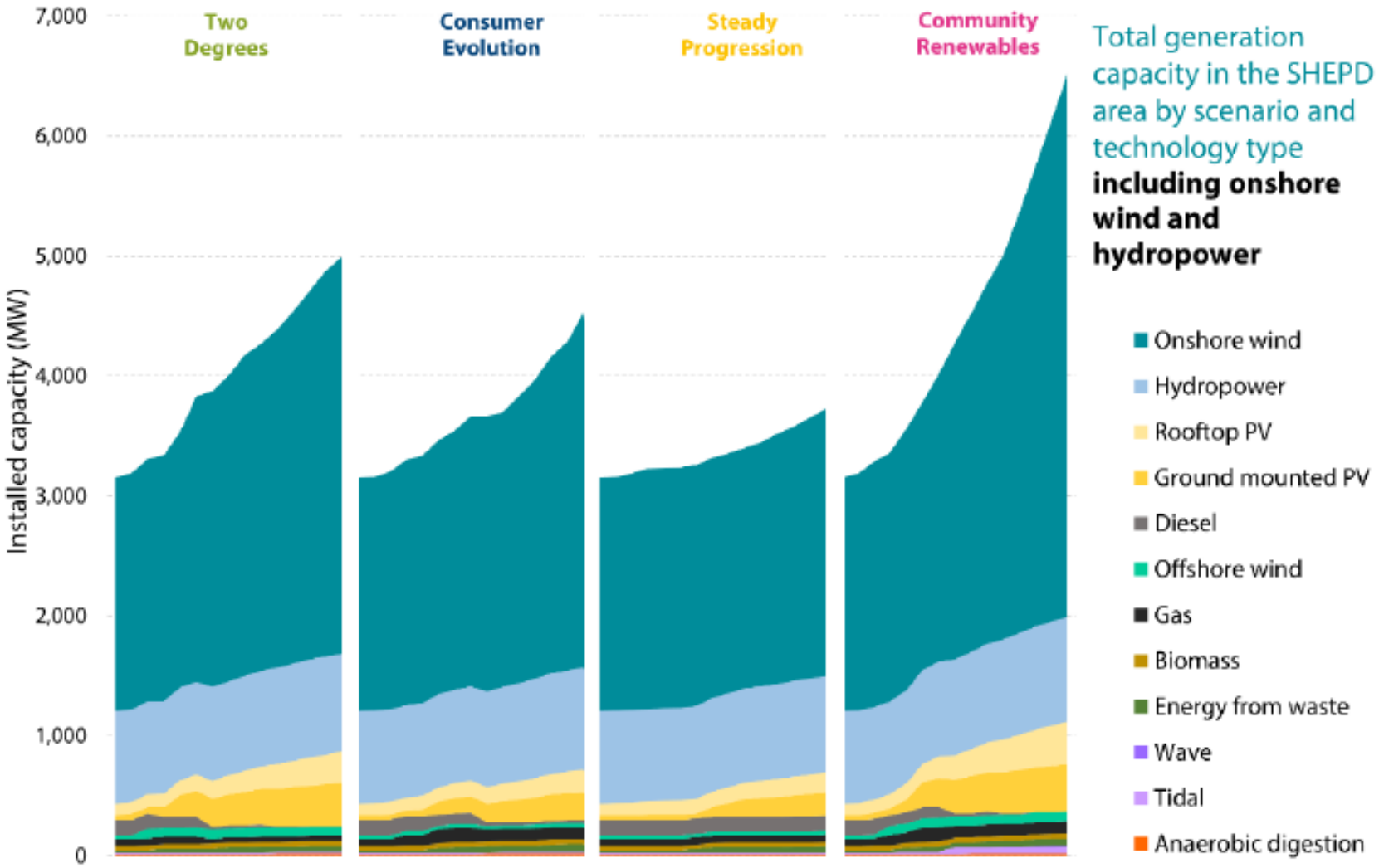
Technologies in analysis

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 Electric vehicle chargers
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

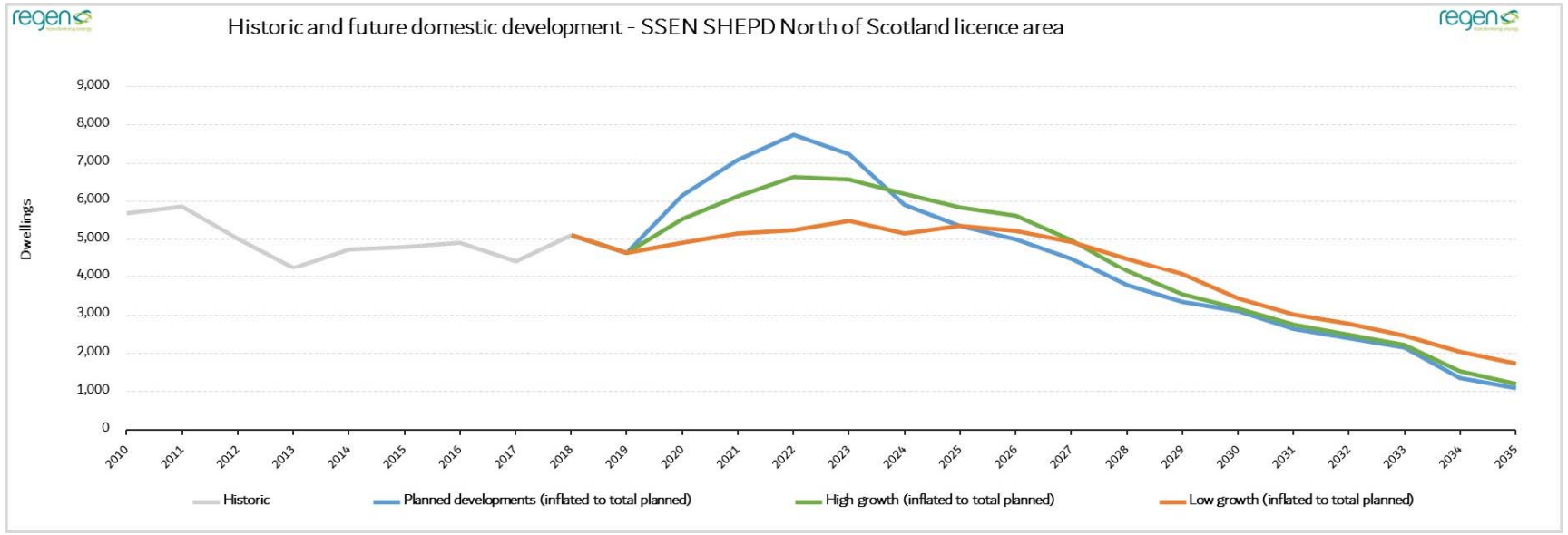
Distributed generation



Disruptive demand

Table 8-1: Percentage and numbers of households with low carbon technologies in 2032 by scenario

Percent by 2032	Electric vehicles (% of all cars)	Heat pumps	Rooftop solar PV
Baseline	0.4%	1.0%	3.0%
Two Degrees	56%	27.3%	7.2%
Community Renewables	57%	33.8%	9.7%
Consumer Evolution	17%	10.5%	5.4%
Steady Progression	17%	7.2%	4.8%



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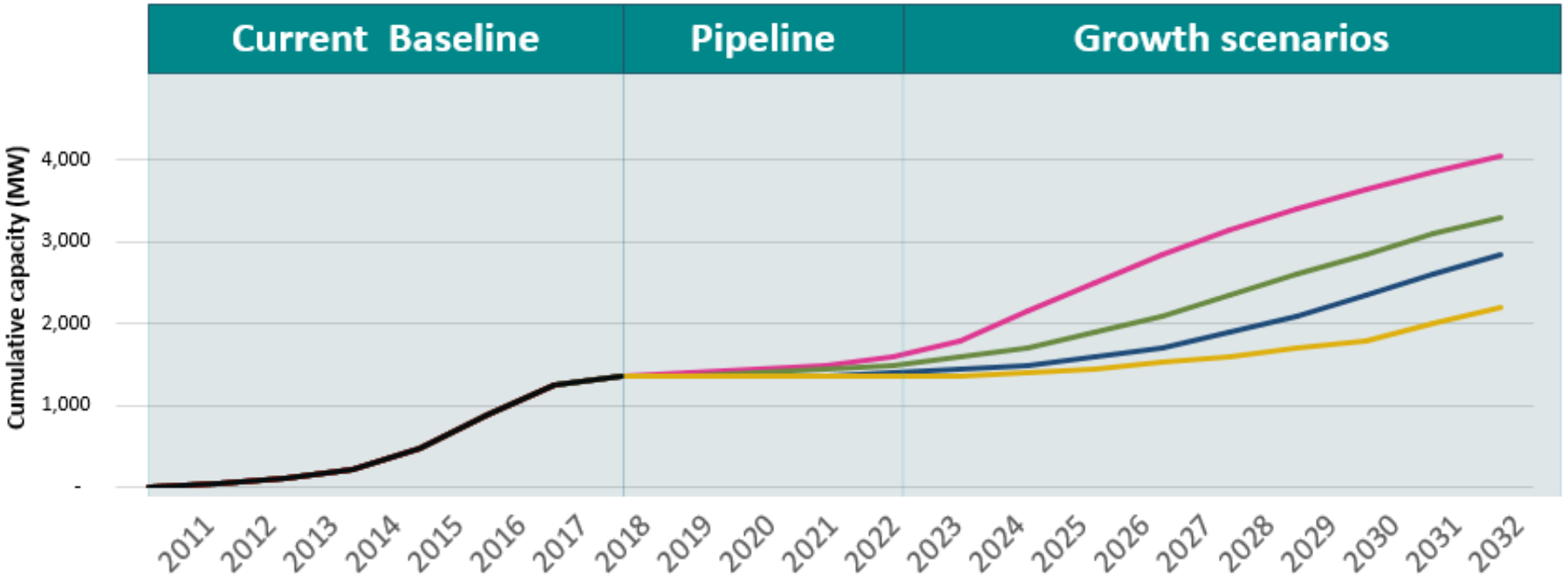
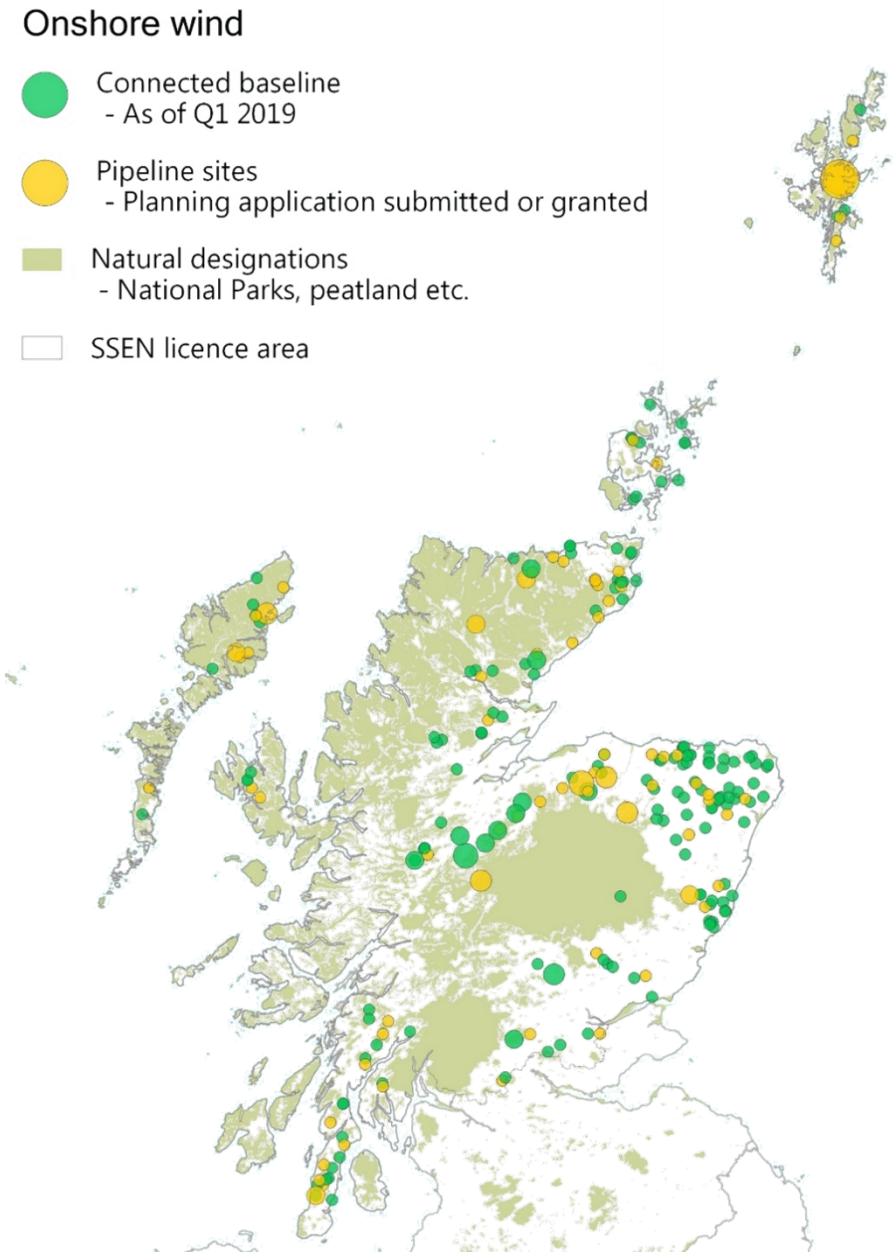
Methodology overview



Baseline → Pipeline → Scenarios → Distribution

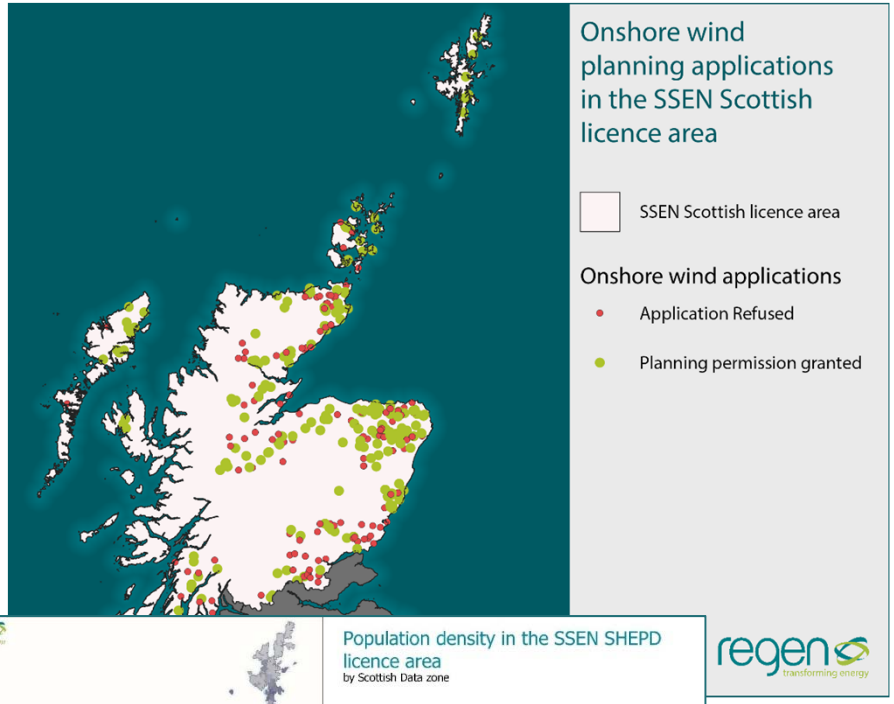
Baseline, pipeline and projections

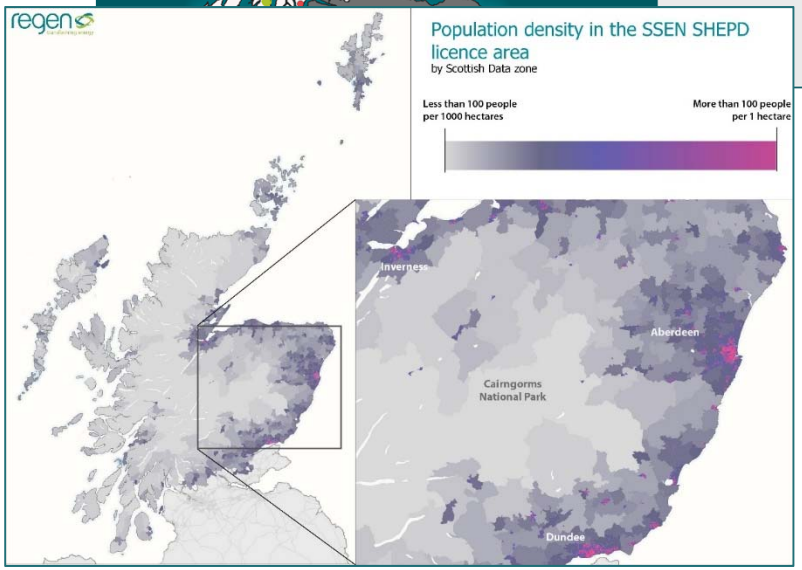


- SSEN connection data
- Additional baseline data sources (FIT, RHI, EPCs)
- Capacity Market auctions
- Local planning portals
- Individual sites and developers
- Stakeholder engagement events
- Scottish Government policies and plans

Distribution - spatial factors

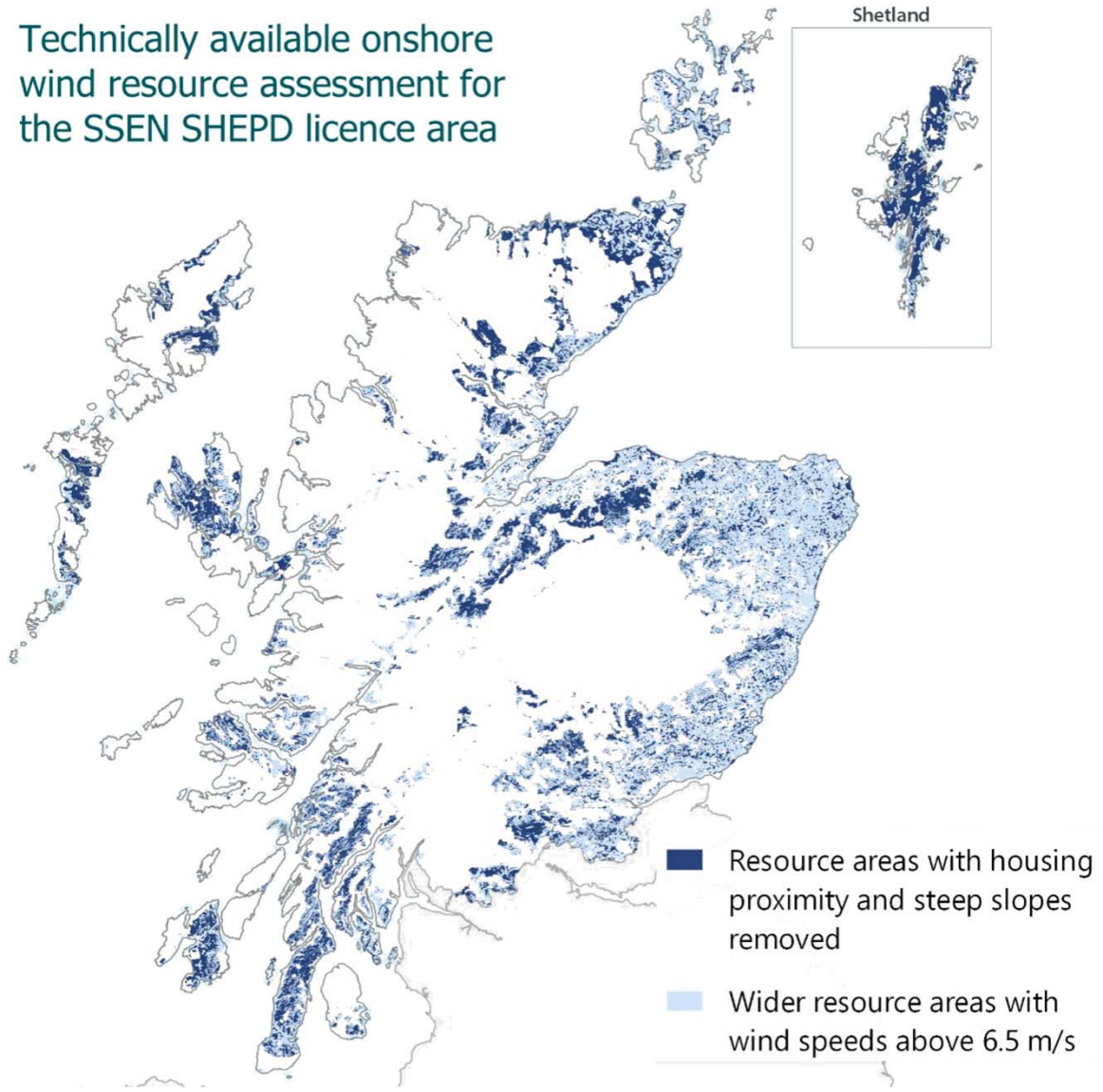
- Proximity to SSEN network
- Housing density
- House tenure and type
- Affluence
- On/off gas houses
- Agricultural land classes
- Urban land
- Business locations and type





Distribution – resource assessments

- Onshore wind
- Solar PV
- Hydropower



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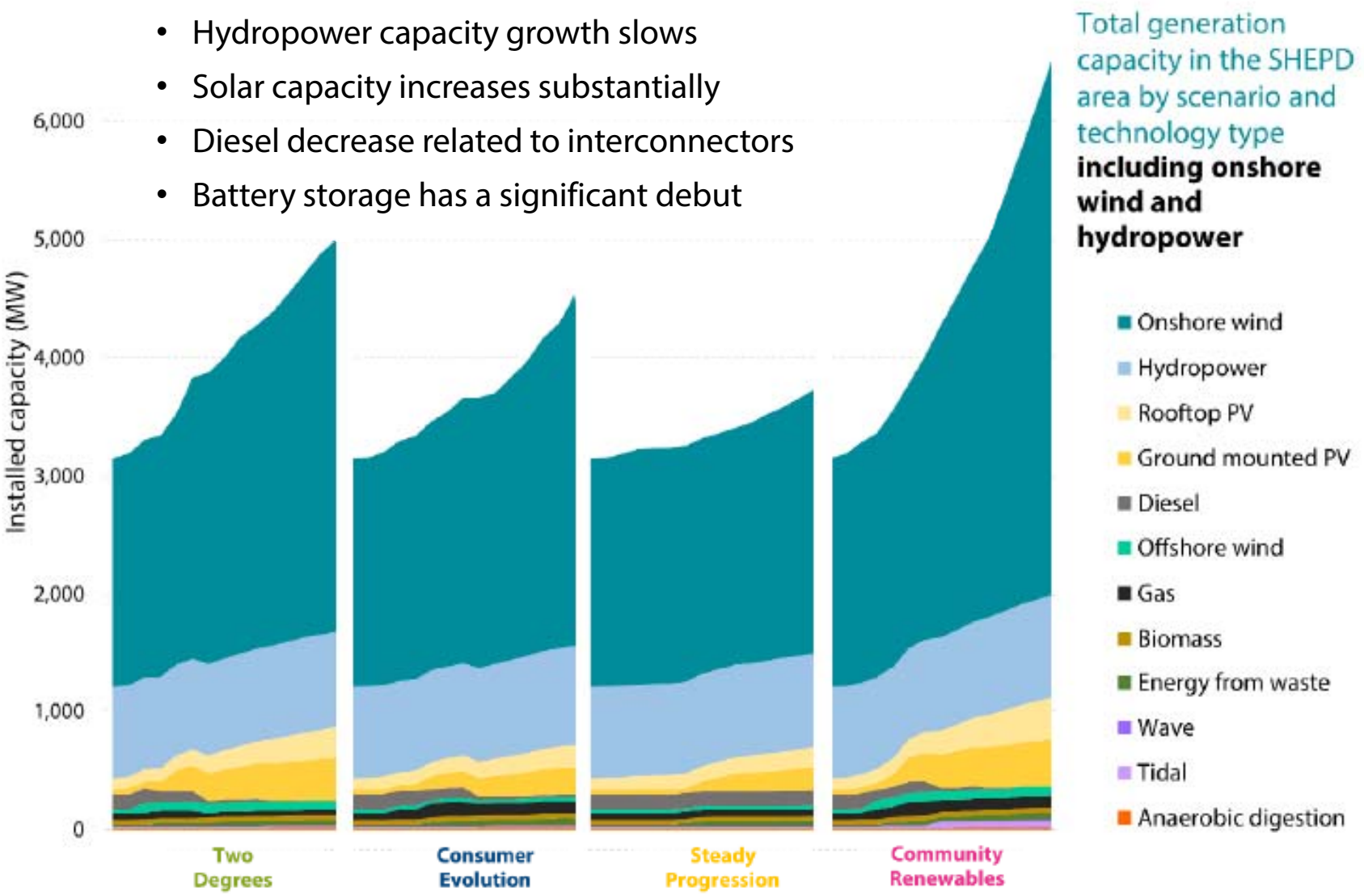
Distribution generation

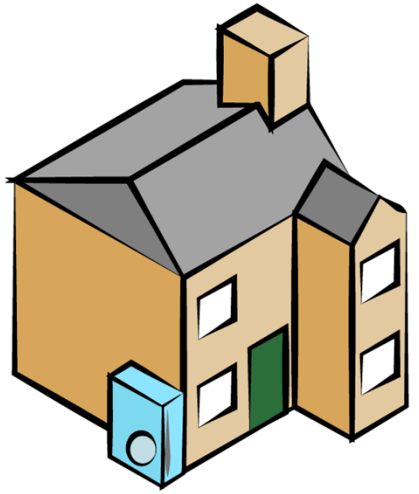
- Onshore wind remains dominant
- Hydropower capacity growth slows
- Solar capacity increases substantially
- Diesel decrease related to interconnectors
- Battery storage has a significant debut

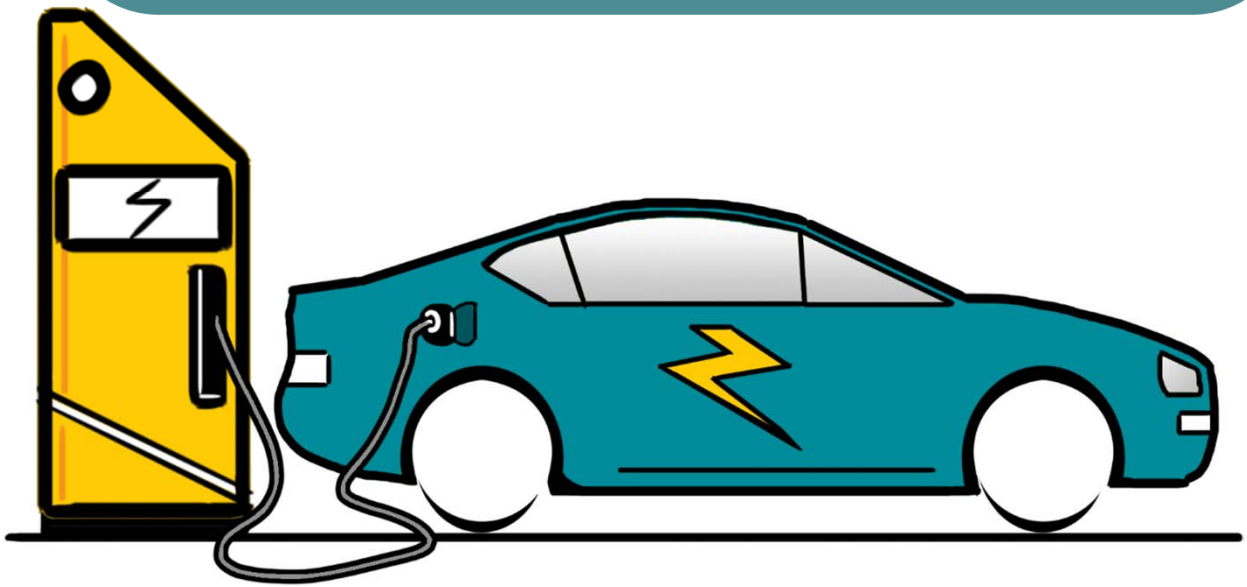


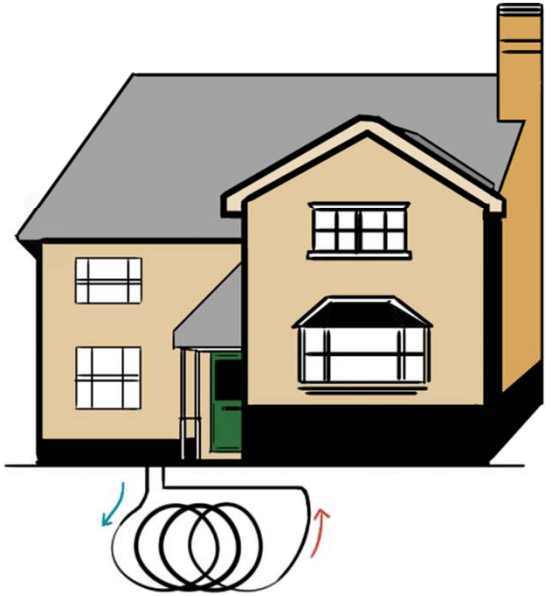
Disruptive demand

- A high proportion of off-gas homes (37%) in 2018
- Significant increase in heat pumps in green scenarios, up to 34% under Community Renewables by 2032.

- Baseline EV uptake is behind the UK average
- Over half of all cars electrified by 2032 in the green scenarios

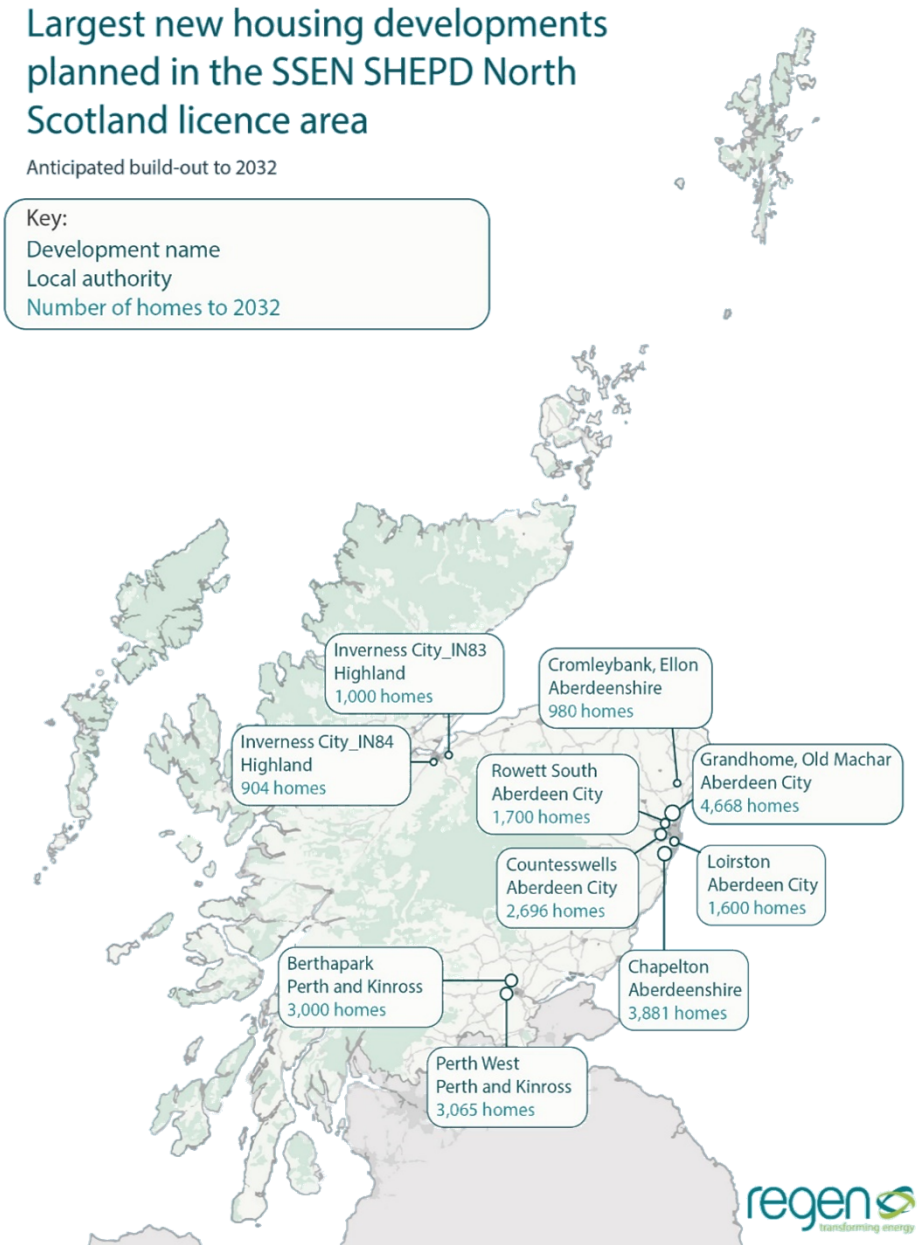






New developments

- Information collected from local authority plans
- The data tells us that by 2032:
  - Up to 70,000 new homes
  - 1189 hectares of commercial development to be built
  - Major developments in Aberdeen, Inverness and Perth



West and Highlands

1.6 GW of generation

- 873 MW onshore wind
- 660 MW of hydropower

Hydropower:

- Over 200 MW capacity built since 2015
- Likely to slow due to FIT closure

Onshore wind:

- Around half of licence area capacity
- Strong pipeline, could double capacity by 2032 under Community Renewables

East and Lowlands

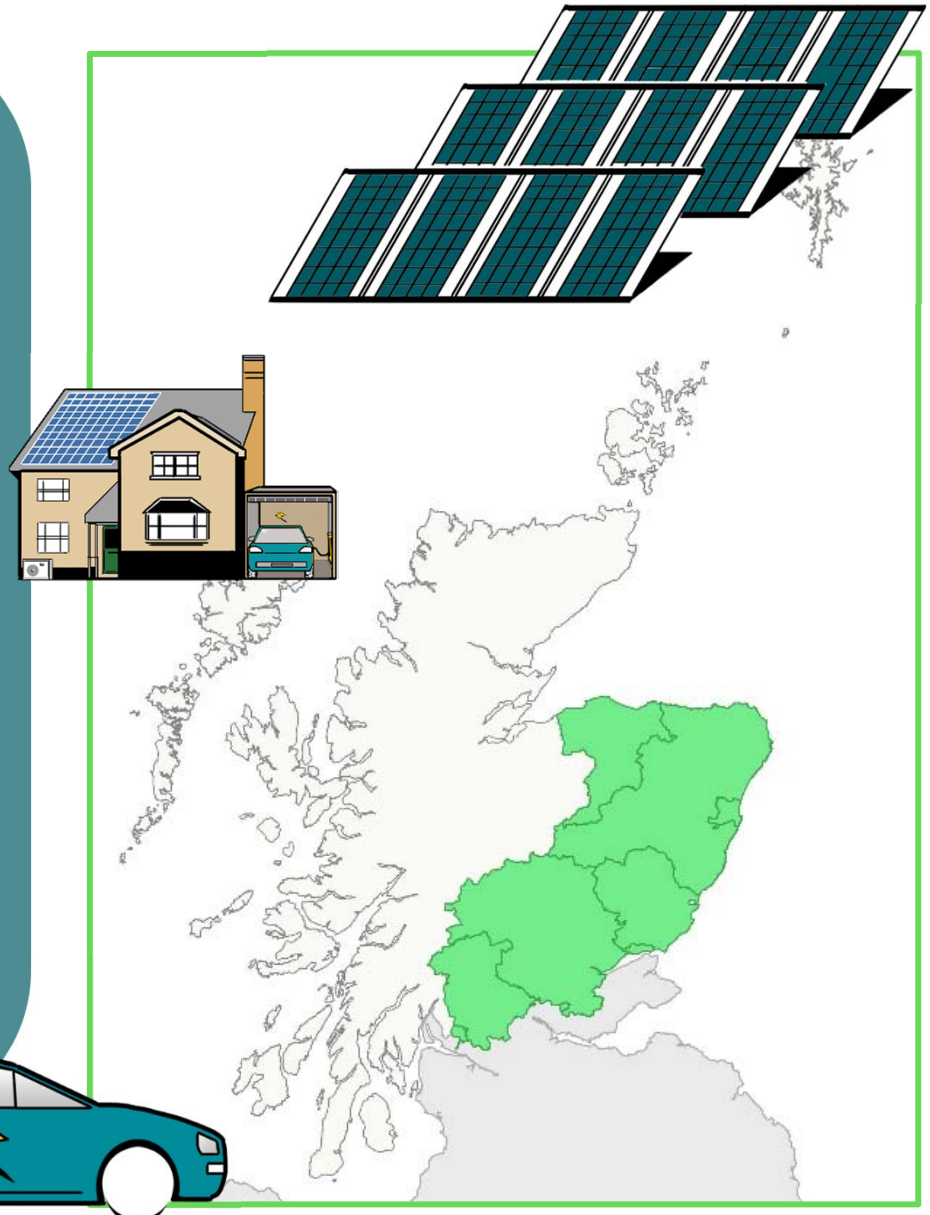
- 73% of licence area population
- 960 MW onshore wind

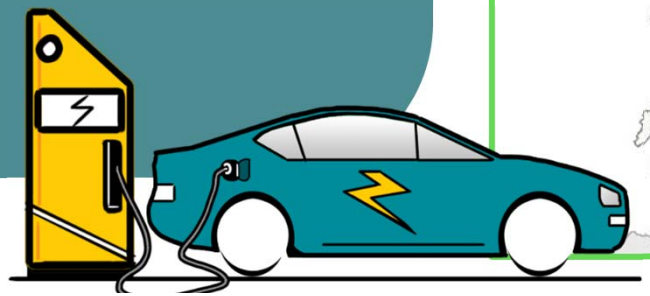
Electric vehicles

- 2,100 EVs registered in the area
- 50% of cars EVs by 2032 under green scenarios

Solar photovoltaics

- Rooftop solar on 3% of homes – similar to SSEN Southern area
- Between 200-400 MW capacity by 2032.





The Islands

- 120 MW diesel
- 5% of the license area population

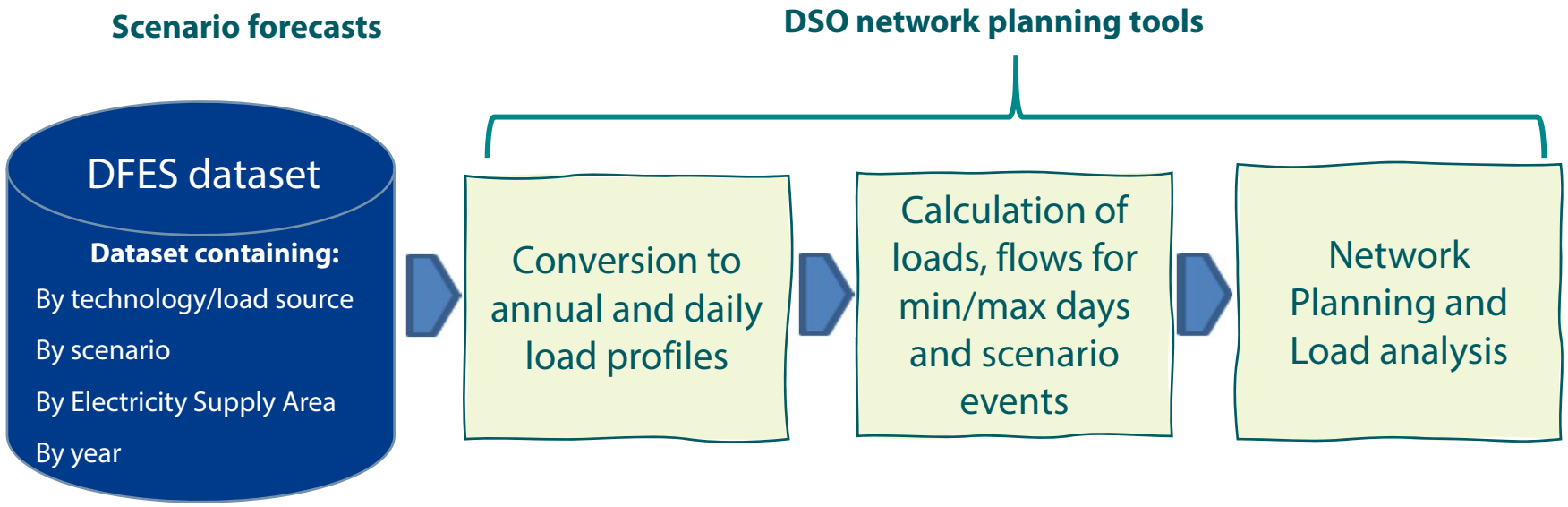
Heat pumps

- 95% of homes are off-gas, 1,000 HPs installer per year
- 50% of houses have heat pumps by 2032 under Two Degrees

Interconnectors and diesel

- New interconnectors unlock generation capacity and reduce need for diesel
- Interconnectors vary by scenario

Next steps



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Next steps

- The geographic forecasts can be combined with profile information to give Summer, Winter and Spring/Autumn daily forecasts
- This data will help with load forecasting processes we already carry out
- But also help SSEN identify strategic reinforcement or CMZ locations to procure flexibility
- Will help inform RIIO ED2

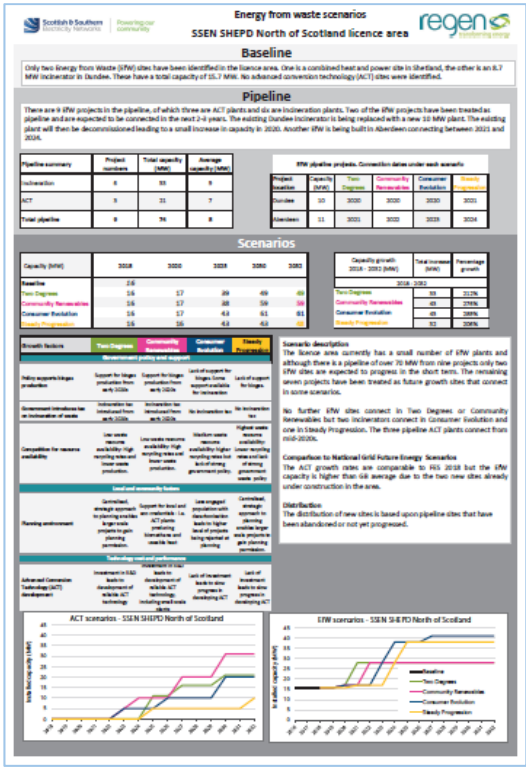
Community Renewables

	Distributed generation capacity (MW)			Battery storage (MW)			Electric vehicles (numbers of)			Heat pumps (numbers of)		
	2018	2025	2032	2018	2025	2032	2018	2025	2032	2018	2025	2032
Aberdeen City	39	113	140	-	35	72	434	10,421	59,327	98	8,919	38,422
Aberdeenshire	562	803	1,063	-	107	225	567	12,009	81,885	967	12,501	47,296
Angus	82	155	246	-	98	151	242	5,381	34,072	173	4,574	17,961
Argyll and Bute (73%)	634	804	1,184	-	71	157	151	3,331	19,690	645	4,488	15,301
Dundee City	27	38	49	-	47	70	266	6,311	36,305	73	5,224	21,003
Highland	953	1,292	2,099	-	148	361	513	10,961	68,609	2,428	13,830	49,737
Moray	287	432	561	-	45	115	200	4,282	27,113	337	4,066	15,302
Na h-Eileanan Siar	85	56	98	-	4	14	62	1,338	8,224	818	2,263	6,727
North Ayrshire (5%)	2	3	10	-	1	2	17	360	1,902	76	641	2,468
Orkney Islands	83	155	145	-	5	17	52	1,079	6,970	771	2,056	5,773
Perth and Kinross	185	275	505	-	201	303	319	6,944	44,121	482	7,457	30,582
Shetland Islands	103	21	225	-	2	7	55	1,082	7,090	307	1,557	5,723
Stirling (35%)	123	147	215	-	17	42	76	1,602	11,076	200	1,475	5,529
Total	**3,167**	**4,294**	**6,541**	**-**	**782**	**1,536**	**2,954**	**65,101**	**406,384**	**7,375**	**69,051**	**261,824**

Steady Progression

	Distributed generation capacity (MW)			Battery storage (MW)			Electric vehicles (numbers of)			Heat pumps (numbers of)		
	2018	2025	2032	2018	2025	2032	2018	2025	2032	2018	2025	2032
Aberdeen City	39	55	63	-	8	14	434	2,877	18,140	98	2,748	7,478
Aberdeenshire	562	569	639	-	57	72	567	3,365	24,305	967	4,825	10,265
Angus	82	85	142	-	31	38	242	1,503	10,256	173	1,432	3,055
Argyll and Bute (73%)	634	674	726	-	29	39	151	938	6,061	645	2,019	3,585
Dundee City	27	31	35	-	10	13	266	1,765	11,244	73	1,442	3,058
Highland	953	1,001	1,110	-	40	61	513	3,097	20,861	2,428	6,335	11,529
Moray	287	290	330	-	15	24	200	1,211	8,215	337	1,547	3,064
Na h-Eileanan Siar	85	86	88	-	2	3	62	383	2,538	818	1,287	1,811
North Ayrshire (5%)	2	2	4	-	0	0	17	104	611	76	277	492
Orkney Islands	83	84	84	-	2	3	52	311	2,117	771	1,260	1,731
Perth and Kinross	185	235	277	-	21	32	319	1,953	13,297	482	2,856	7,406
Shetland Islands	103	103	106	-	1	1	55	304	2,142	307	756	1,379
Stirling (35%)	123	123	138	-	6	9	76	445	3,270	200	546	934
Total	**3,167**	**3,340**	**3,743**	**-**	**222**	**309**	**2,954**	**18,256**	**123,057**	**7,375**	**27,330**	**55,787**

Slight variations in total figures may result from rounding



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Questions?

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