



Distribution Future Energy Scenarios (DFES)

Working together to facilitate regional decarbonisation

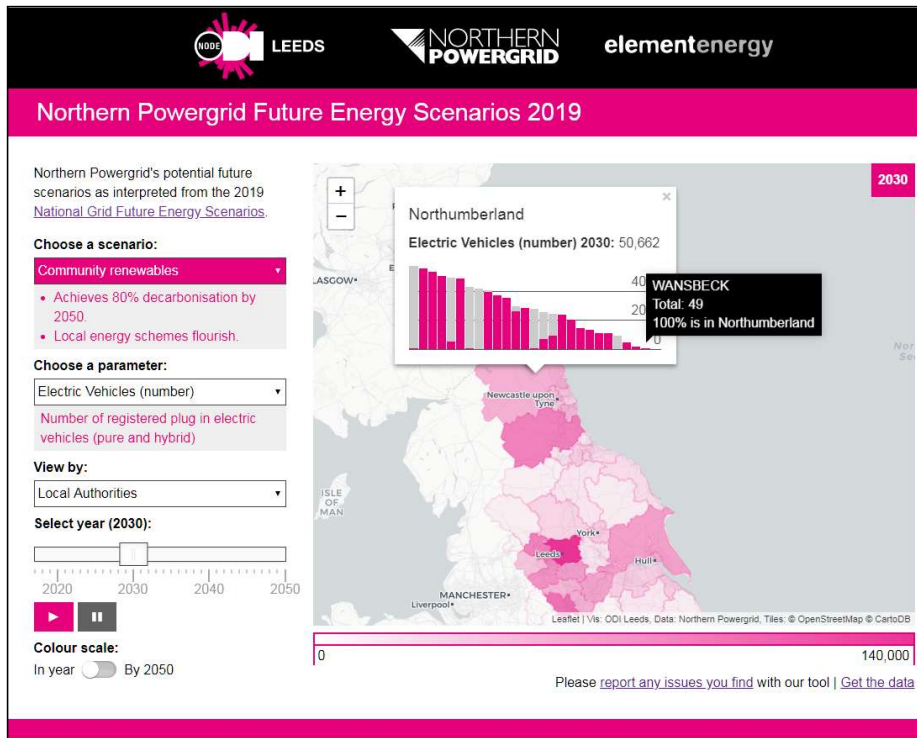
Northern Powergrid Customer Vulnerability Conference – 4th March 2020

Mary Black / Oliver Ricketts

System Planning / Policy and Markets

DFES Publication Overview

- We have recently published Distribution Future Energy Scenarios for Consultation.
- It takes the form of a visualisation tool, a summary document, and open data sets.



The screenshot shows the 'DATA MILL NORTH' website interface for 'Northern Powergrid DFES'. It includes a navigation bar with 'Data', 'Community', 'SMART LEEDS', 'ODI Leeds', and 'More'. The main content area displays the 'Northern Powergrid DFES' document, created 3 months ago and updated 10 days ago. It provides a summary of the document and lists several downloadable resources: 'Northern Powergrid DFES 2019 Document' (3.58 MB), 'Northern Powergrid DFES Qualitative Feedback Form' (21.41 kB), 'Northern Powergrid DFES 2019 - Quantitative Feedback Form' (48.03 kB), and 'Northern Powergrid Overall View - Data for DFES 2019 Document' (259.24 kB). Each resource has 'Preview' and 'Download' buttons.

DFES Visualisation

<https://odileeds.github.io/northern-powergrid/>

Forecasts for every major substation giving a regional view by local authority area

Northern Powergrid's potential future scenarios as interpreted from the 2019 [National Grid Future Energy Scenarios](#).

Choose a scenario:
Community renewables

- Achieves 80% decarbonisation by 2050.
- Local energy schemes flourish.

Choose a parameter:
 Electric Vehicles (number)

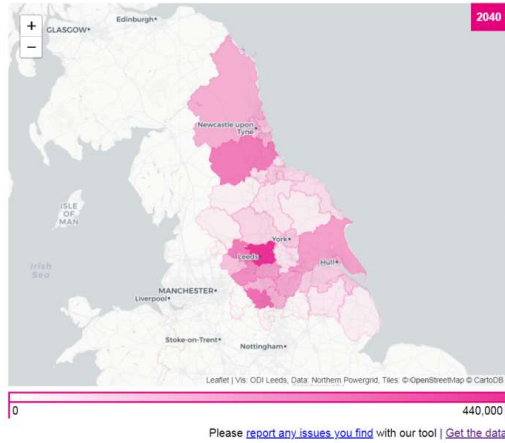
Number of registered plug in electric vehicles (pure and hybrid)

View by:
 Local Authorities

Select year (2040):

2020 2030 2040 2050

Colour scale:
 In year By 2050



Northern Powergrid's potential future scenarios as interpreted from the 2019 [National Grid Future Energy Scenarios](#).

Choose a scenario:
Steady progression

- Does not achieve 80% decarbonisation by 2050
- Pace of transition stays at similar rate to today

Choose a parameter:
 Domestic photovoltaic installed capacity

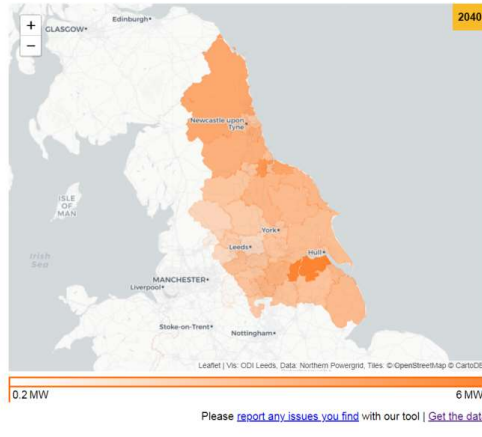
Capacity of solar PV panels on domestic roofs for installations less than 4kW

View by:
 Local Authorities

Select year (2040):

2020 2030 2040 2050

Colour scale:
 In year By 2050



Four scenarios:

- Community renewables
- Consumer Evolution
- Steady Progression
- Two degrees

Parameters – which do you need most?

- Electric vehicles (No.)
- Heat pumps (No.)
- Domestic PV (MW)
- Large scale PV (MW)
- Wind generation (MW)
- Other generation (MW)
- Energy storage (MW)
- Domestic underlying consumption (MWh)
- I&C underlying consumption (MWh)
- Total consumption (including electric vehicles and heat pumps - MWh)
- Peak demand at primary substations (MW)
 - Without customer flexibility
 - With customer flexibility
- Peak utilisation at primary substations (%)
 - Without customer flexibility
 - With customer flexibility

Northern Powergrid's potential future scenarios as interpreted from the 2019 [National Grid Future Energy Scenarios](#).

Choose a scenario:
Consumer evolution

- Does not achieve 80% decarbonisation by 2050.
- Shift towards local generation.

Choose a parameter:
 Heat Pumps (number)

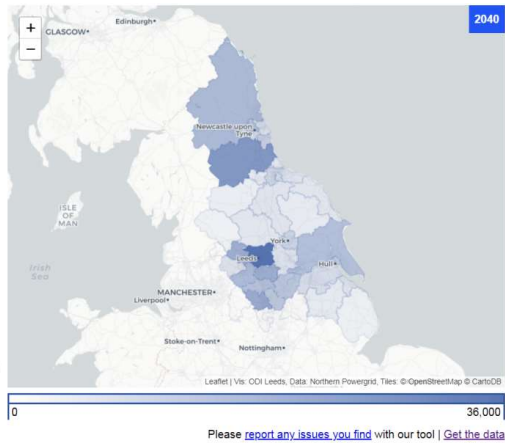
Number of heat pumps per residential household and commercial properties including from district heating schemes

View by:
 Local Authorities

Select year (2040):

2020 2030 2040 2050

Colour scale:
 In year By 2050



Northern Powergrid's potential future scenarios as interpreted from the 2019 [National Grid Future Energy Scenarios](#).

Choose a scenario:
Two degrees

- Achieves 80% decarbonisation by 2050.
- Large-scale centralised solutions.

Choose a parameter:
 Peak utilisation (%) at Primary Substati

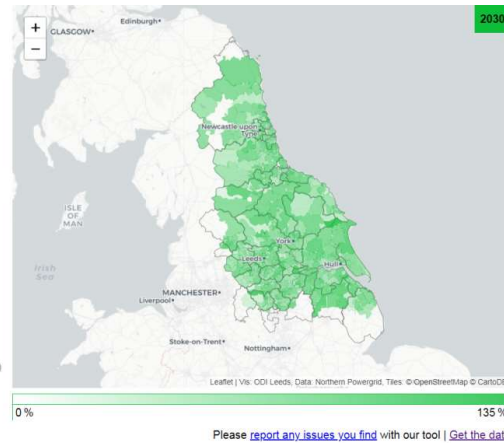
Peak half hourly demand within the year as proportion of primary substation capacity

View by:
 Primary Substations (with Local Author

Select year (2030):

2020 2030 2040 2050

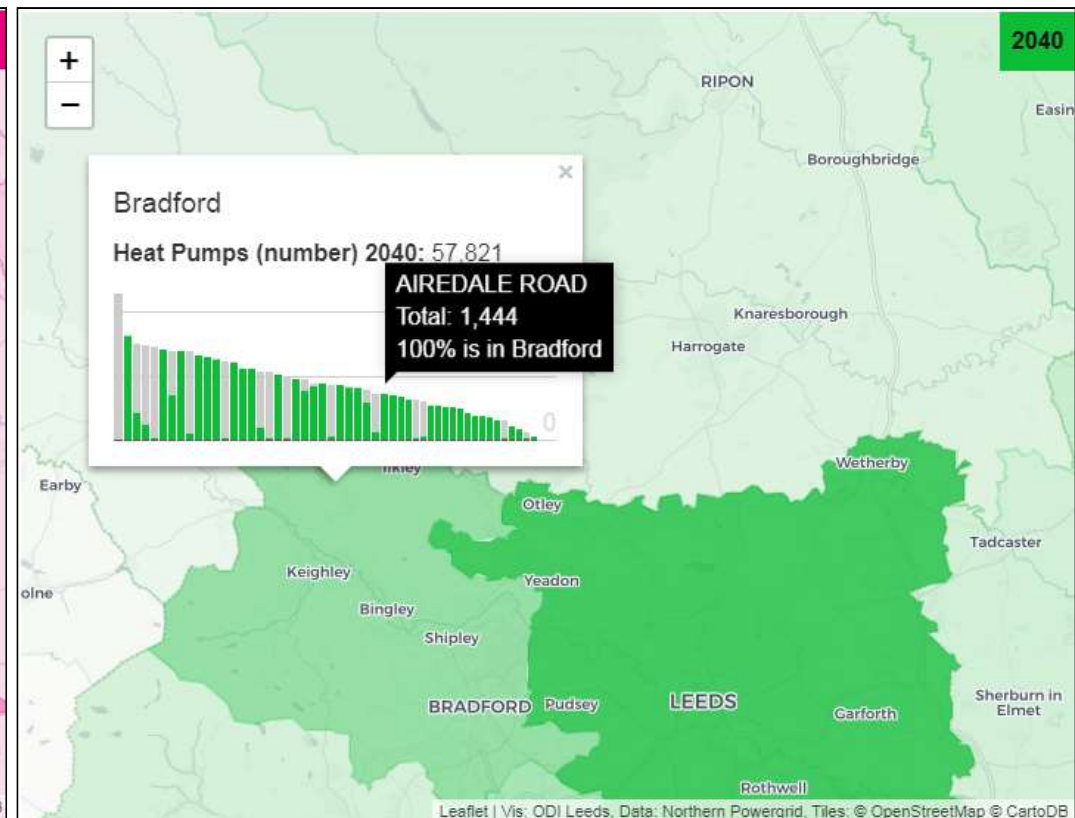
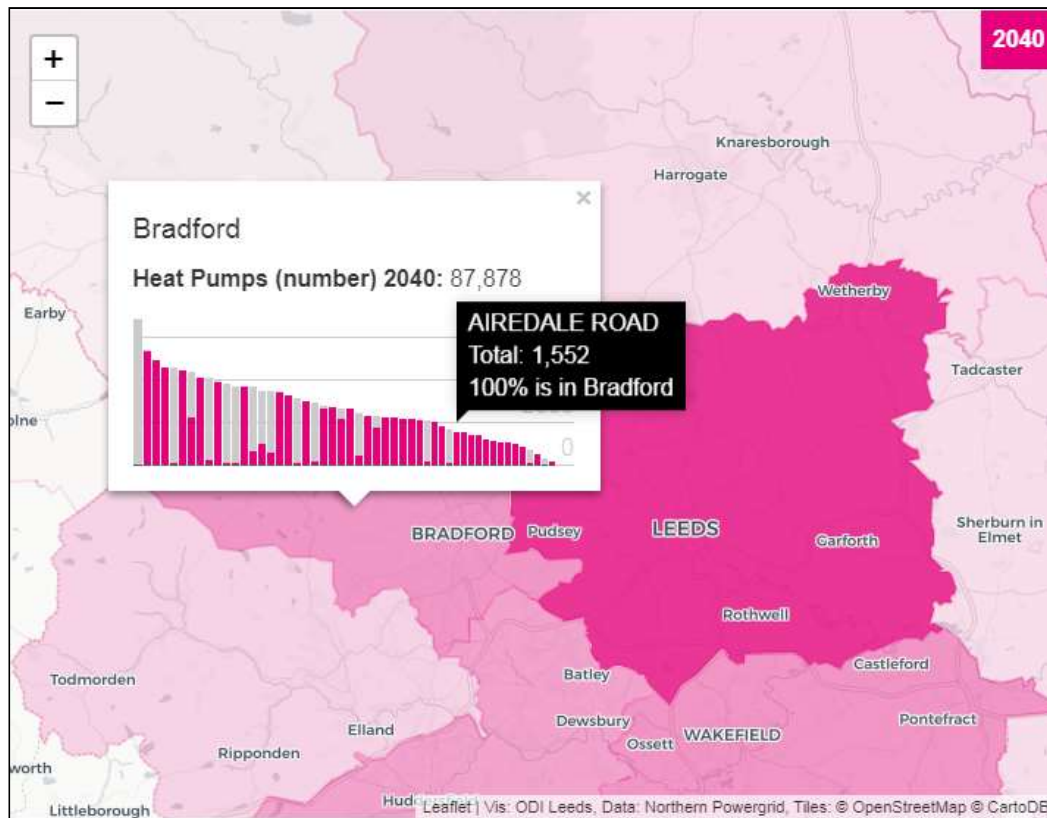
Colour scale:
 In year By 2050



DFES Visualisation

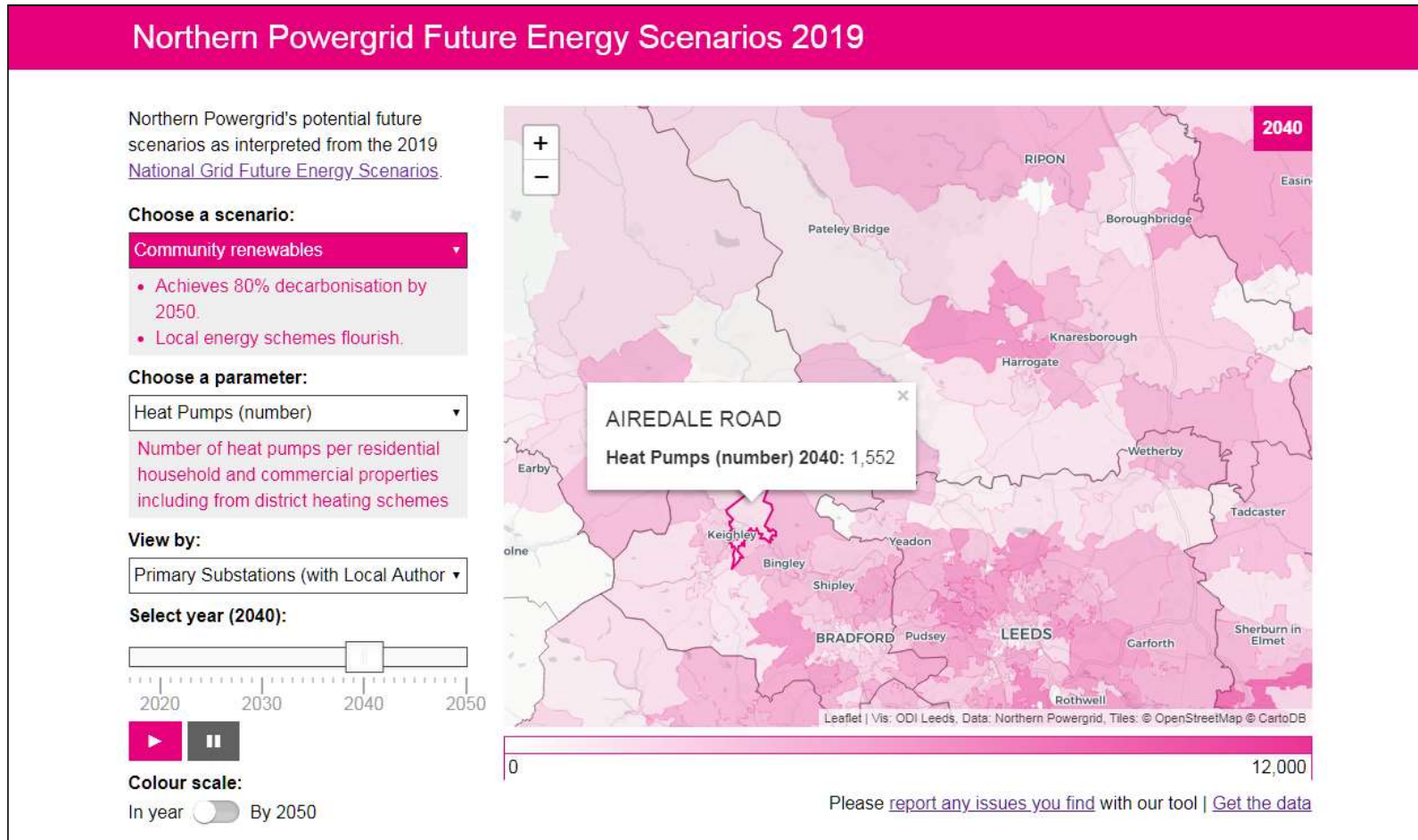
<https://odileeds.github.io/northern-powergrid/>

Clicking on a LA area displays values for all substations supplying the area



DFES Visualisation <https://odileeds.github.io/northern-powergrid/>

Zooming in for a substation view within Local Authority boundaries



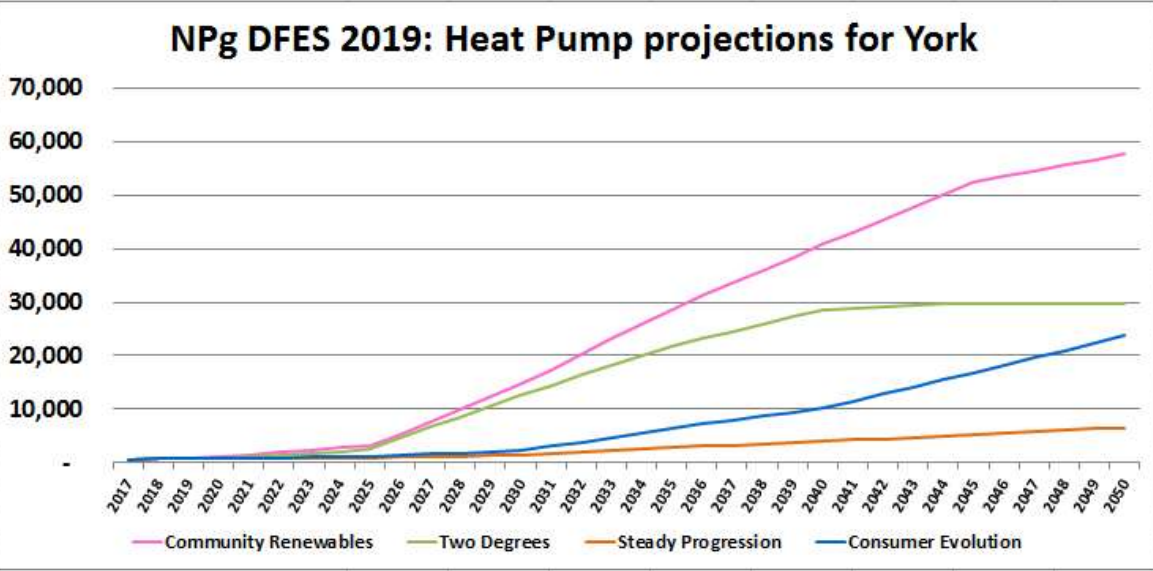
Accessing the data files

<https://datamillnorth.org/dataset/northern-powergrid-dfes>

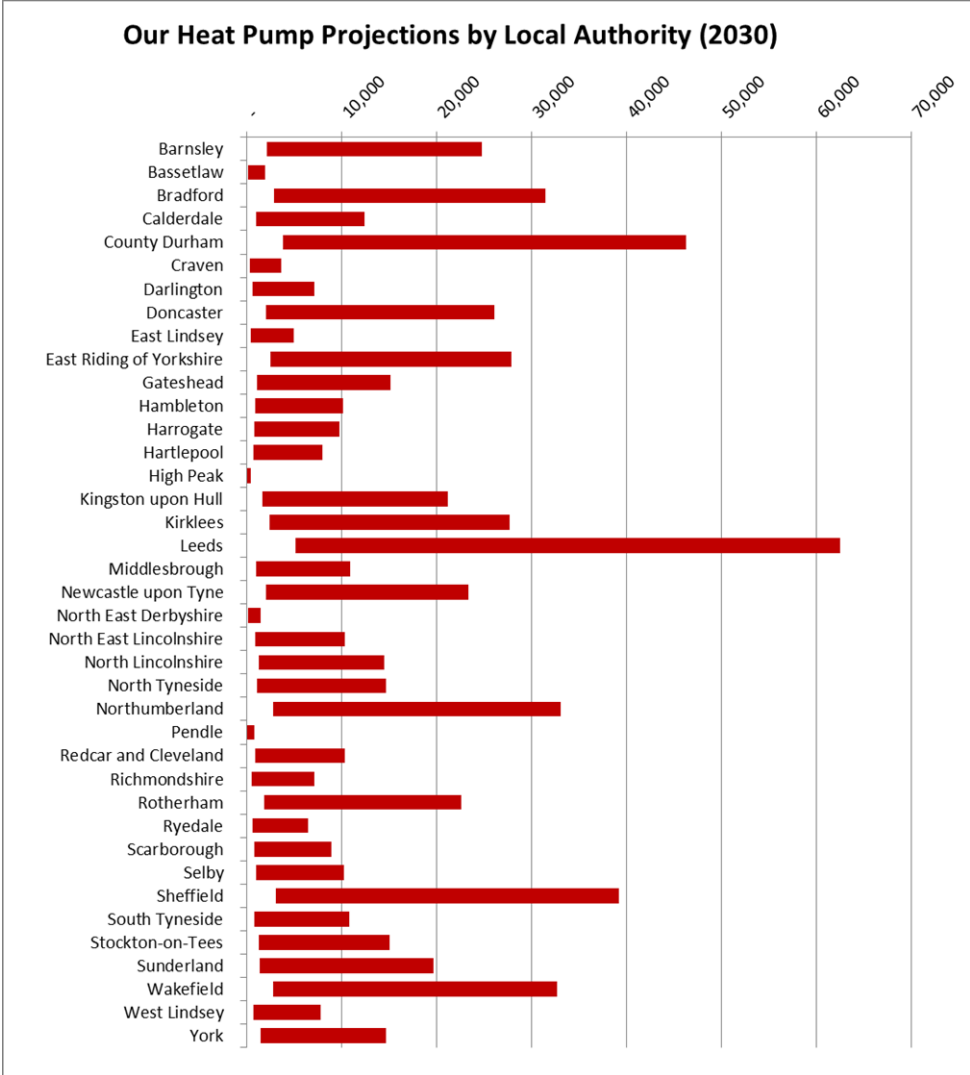
 Local Authority Charting Tool - Heat Pumps in Northern Powergrid DFES 2019 (135.38 kB)

Select Your Local Authority

York



NPg DFES 2019: Heat Pump projections	2017	2018	2019	2020	2021	2022	2023	2024
Community Renewables	656	704	850	1,018	1,427	1,904	2,334	2,798
Two Degrees	650	699	782	880	1,163	1,494	1,811	2,138
Steady Progression	650	699	726	757	802	844	884	926
Consumer Evolution	650	699	771	852	913	973	1,032	1,091



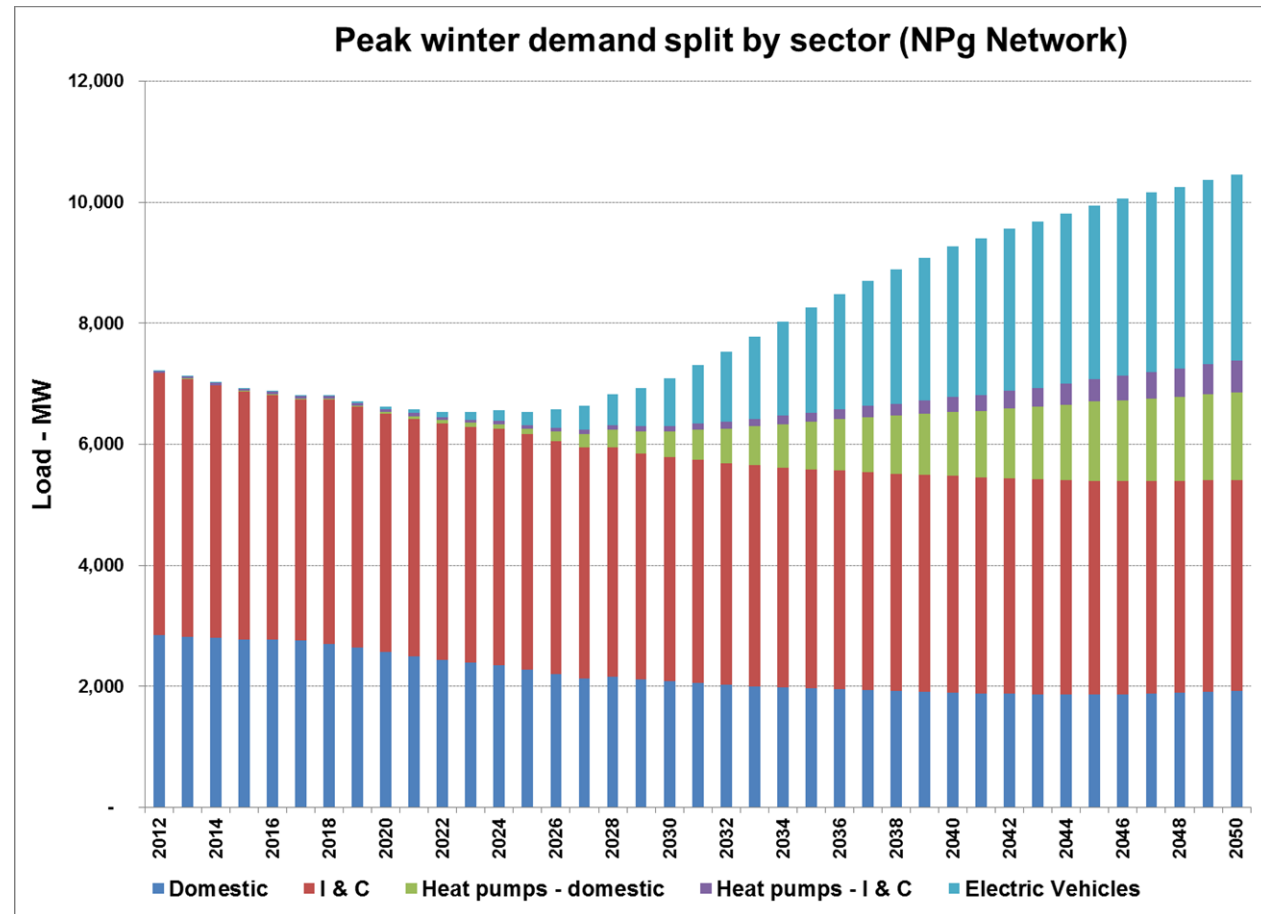


Northern Powergrid Overall View - Data for DFES 2019 Document (259.24 kB)

	A	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Local Authority - Heat Pumps in Community Renewables	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
2	Barnsley	1,363	1,698	2,533	3,351	4,192	5,013	5,841	9,907	13,636	17,342	21,047	24,751	29,169	33,732	38,216
3	Bassetlaw	115	150	233	298	369	438	506	844	1,127	1,409	1,685	1,955	2,263	2,598	2,918
4	Bradford	1,781	2,144	3,023	3,987	4,925	5,887	6,819	11,610	16,581	21,540	26,505	31,478	37,539	43,568	49,610
5	Calderdale	698	852	1,208	1,566	1,923	2,282	2,641	4,505	6,504	8,504	10,495	12,481	14,891	17,269	19,669
6	County Durham	2,522	3,183	4,771	6,265	7,843	9,357	10,927	18,572	25,548	32,494	39,424	46,323	54,729	63,025	71,503
7	Craven	236	283	399	516	625	741	843	1,392	1,956	2,513	3,069	3,622	4,288	4,964	5,633
8	Darlington	387	465	657	878	1,094	1,310	1,533	2,638	3,747	4,862	5,987	7,124	8,505	9,906	11,287
9	Doncaster	1,384	1,756	2,646	3,445	4,322	5,143	6,032	10,345	14,266	18,203	22,154	26,096	30,829	35,659	40,439
10	East Lindsey	355	449	656	829	975	1,149	1,275	2,040	2,770	3,485	4,184	4,870	5,652	6,495	7,303
11	East Riding of Yorkshire	1,711	2,135	3,095	3,995	4,823	5,725	6,528	10,893	15,127	19,374	23,635	27,917	33,121	38,356	43,598
12	Gateshead	709	866	1,257	1,666	2,104	2,511	2,975	5,280	7,720	10,189	12,673	15,176	18,187	21,251	24,225
13	Hambleton	657	825	1,202	1,543	1,851	2,193	2,476	4,065	5,613	7,144	8,665	10,173	12,008	13,803	15,646
14	Harrogate	593	723	1,018	1,299	1,568	1,851	2,111	3,544	5,089	6,644	8,204	9,768	11,652	13,567	15,433
15	Hartlepool	428	520	754	1,013	1,271	1,524	1,791	3,080	4,311	5,542	6,782	8,032	9,555	11,092	12,622
16	High Peak	31	40	56	69	77	90	97	149	206	261	314	364	418	478	535
17	Kingston upon Hull, City of	1,051	1,301	1,891	2,495	3,136	3,745	4,426	7,765	11,074	14,425	17,812	21,226	25,438	29,557	33,738
18	Kirklees	1,514	1,841	2,635	3,472	4,326	5,159	6,031	10,368	14,674	19,001	23,356	27,741	33,116	38,440	43,793
19	Leeds	3,180	3,863	5,520	7,286	9,058	10,811	12,590	21,832	32,030	42,212	52,378	62,504	74,829	86,904	99,128
20	Middlesbrough	574	694	998	1,342	1,681	2,019	2,366	4,079	5,785	7,483	9,185	10,891	12,961	15,045	17,123
21	Newcastle upon Tyne	1,179	1,405	1,973	2,633	3,266	3,912	4,539	7,873	11,801	15,700	19,559	23,382	27,954	32,566	37,101
22	North East Derbyshire	93	120	178	231	277	329	372	609	842	1,068	1,290	1,508	1,756	2,022	2,276
23	North East Lincolnshire	578	709	1,029	1,346	1,669	1,985	2,309	3,947	5,533	7,130	8,735	10,353	12,328	14,297	16,274
24	North Lincolnshire	874	1,094	1,608	2,080	2,535	3,011	3,457	5,787	7,964	10,140	12,322	14,507	17,129	19,809	22,467
25	North Tyneside	672	817	1,184	1,584	2,001	2,398	2,844	5,072	7,436	9,834	12,262	14,713	17,661	20,655	23,557
26	Northumberland	1,970	2,522	3,745	4,816	5,809	6,889	7,821	13,013	18,132	23,191	28,183	33,092	39,013	44,760	50,690
27	Pendle	56	69	99	124	149	174	200	326	449	573	695	816	961	1,109	1,256
28	Redcar and Cleveland	577	718	1,056	1,395	1,738	2,078	2,419	4,106	5,679	7,240	8,800	10,358	12,256	14,140	16,054
29	Richmondshire	445	578	864	1,092	1,305	1,538	1,729	2,848	3,963	5,061	6,135	7,181	8,439	9,642	10,899
30	Rotherham	1,160	1,440	2,131	2,818	3,544	4,237	4,986	8,637	12,094	15,578	19,087	22,628	26,956	31,273	35,605
31	Ryedale	428	532	767	991	1,196	1,420	1,607	2,626	3,611	4,583	5,545	6,497	7,658	8,806	9,981
32	Scarborough	590	728	1,052	1,354	1,647	1,952	2,228	3,654	5,004	6,337	7,651	8,948	10,527	12,070	13,665
33	Selby	673	836	1,218	1,585	1,907	2,272	2,560	4,184	5,721	7,237	8,739	10,231	11,989	13,836	15,634
34	Sheffield	1,948	2,371	3,393	4,473	5,587	6,663	7,815	13,677	20,038	26,425	32,822	39,218	47,061	54,698	62,469
35	South Tyneside	497	607	892	1,191	1,526	1,826	2,193	3,926	5,600	7,314	9,063	10,849	13,017	15,235	17,383
36	Stockton-on-Tees	769	930	1,339	1,804	2,271	2,728	3,210	5,574	7,909	10,260	12,639	15,050	17,982	20,965	23,891
37	Sunderland	893	1,096	1,611	2,136	2,726	3,257	3,903	6,996	10,096	13,255	16,461	19,720	23,654	27,667	31,554
38	Wakefield	1,746	2,151	3,159	4,186	5,240	6,271	7,328	12,556	17,598	22,633	27,679	32,732	38,840	45,006	51,131
39	West Lindsey	533	669	977	1,249	1,482	1,753	1,952	3,127	4,235	5,314	6,366	7,389	8,545	9,812	11,013
40	York	850	1,018	1,427	1,904	2,334	2,798	3,211	5,402	7,744	10,066	12,376	14,681	17,472	20,282	23,081

The mix of demand will evolve over time

- Underlying residential, industrial and commercial demand will continue to reduce with ongoing energy efficiency initiatives.
- Low carbon technologies will introduce new demand as heat and transport is decarbonised:
 - Electric vehicles
 - Residential heat pumps
 - I&C heat pumps
- The different scenarios assume different growth assumptions.



Community Renewables Scenario – No LV Customer Flexibility

- SUMMARY** - DFES Summary document - <https://www.northernpowergrid.com/asset/1/document/5276.pdf>
- Data visualisation screens - <https://odileeds.github.io/northern-powergrid/>
 - Downloadable data files and feedback forms - <https://datamillnorth.org/dataset/northern-powergrid-dfes>



If you want to contact us with any questions about DFES or the feedback process please feel free to contact us via our System Planning Mailbox or by phone

Email: Npg.system.planning@northernpowergrid.com

Mary Black 01977 605952 / 07889 764538

DFES Document <https://www.northernpowergrid.com/asset/1/document/5276.pdf>

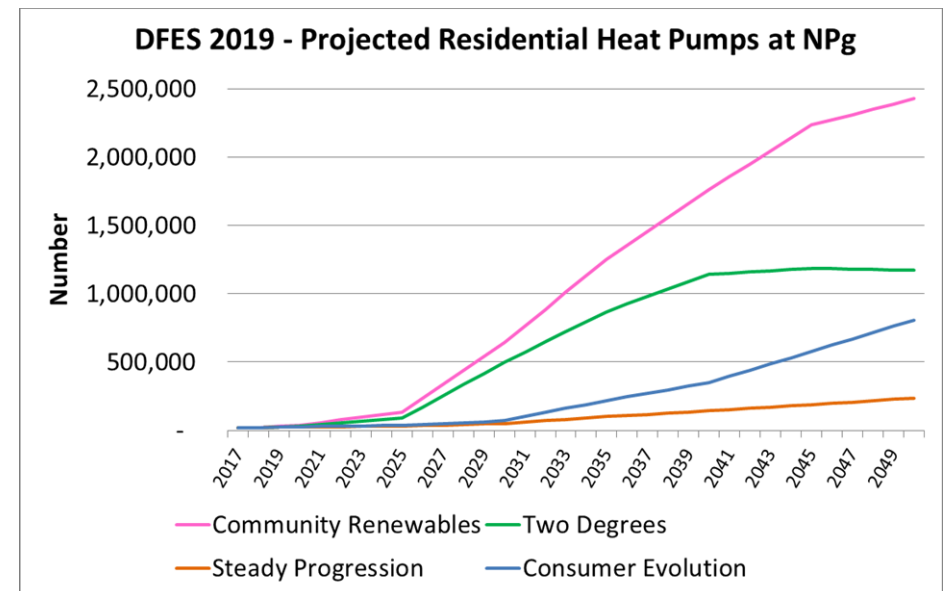
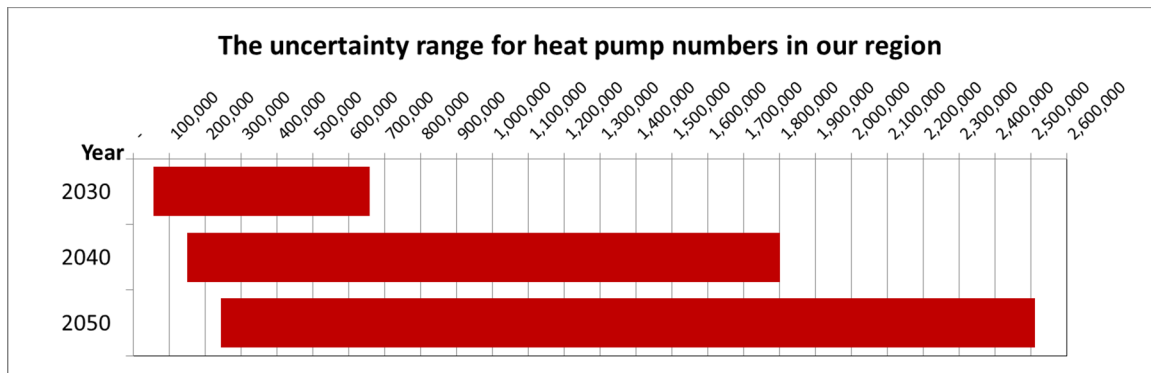
Background Data for Slido Questions (which scenario is most likely or none each for 2030 and 2040)

Northern Powergrid serves 3.9 million homes and businesses across the North East, Yorkshire and northern Lincolnshire - and powers approximately 27,500 Heat Pumps in 2019 <https://odileeds.github.io/northern-powergrid/>

Scenario	2030	Multiplier
Community Renewables	656,075	24x
Two Degrees	508,741	18x
Steady Progression	56,549	2x
Consumer Evolution	84,205	3x

Scenario	2040	Multiplier
Community Renewables	1,800,442	65x
Two Degrees	1,153,212	42x
Steady Progression	149,843	5x
Consumer Evolution	376,831	14x

The chart below illustrates the uncertainty for Heat Pump uptake, where each red bar shows the upper and lower estimates for the number of EVs across the four scenarios.



Roundtable discussions on Future Energy Scenarios

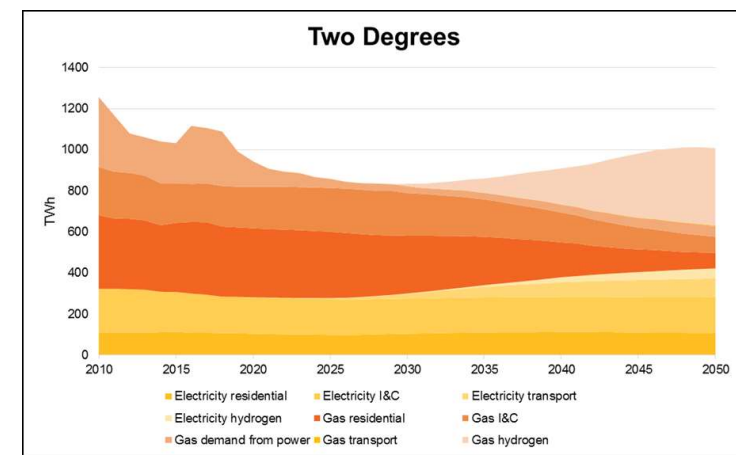
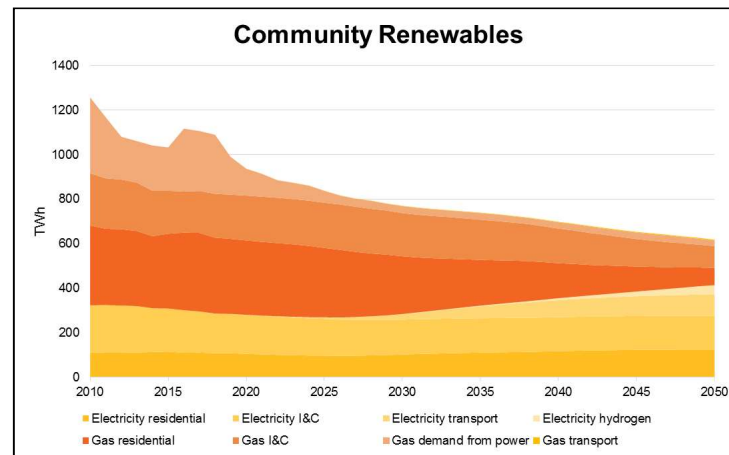
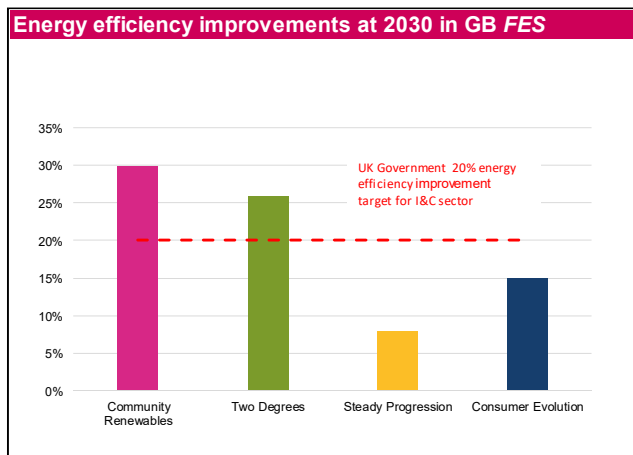
[#NPGFuelPoverty2020](#)

[#northpowergrid](#) [#poweringfutures](#) [#powergridcares](#)



Roundtable: Net Zero – the scale of the challenge

- Question - What's the challenge for achieving white goods and home insulation efficiencies for vulnerable customers? How might it be overcome?
- Community Renewables scenario is heat pump dominant – and relies on home insulation for these to be effective
- It shows a huge 40% energy reduction in gas and electricity energy consumption for an 80% carbon reduction target.
- The hydrogen dominant Two Degrees scenario does not rely on home insulation to the same extent.



Roundtable: What about Storage Heating and District Heating?

- The scenarios that achieve an 80% carbon reduction by 2050 significantly decrease storage heating.
 - **Question – would you share that view?**
- They also show an increase in District Heating schemes and assume high electrification within these.
 - **Question – What are your strategies for district heating, and what are their fuel sources?**

