WESTERN POWER DISTRIBUTION

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Distribution Future Energy Scenarios

Local Authority: Bassetlaw District

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What are Distribution Future Energy Scenarios?

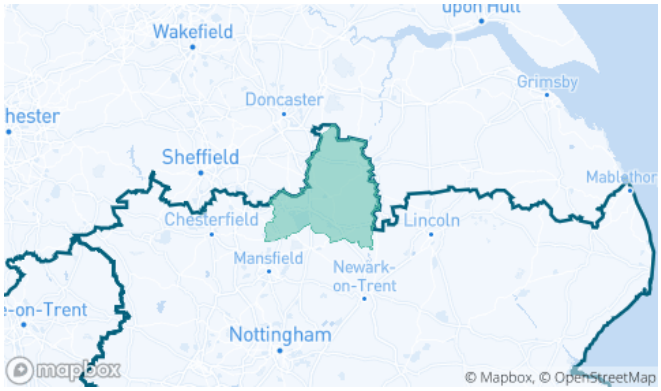
Western Power Distribution run Distribution Future Energy Scenarios (DFES) on an annual cycle for all licence areas, and represent a range of credible future scenarios of what could connect to the distribution network.

The scenarios use a scenario framework consistent with all electricity distribution network operators and the National Grid ESO Future Energy Scenarios. These aim to account for differing uptakes of Electric Vehicles, Heat Pumps, new domestic and I&C developments and distributed generation connections, that WPD use to assess the strategic development of our network.

A summary of the methodology and detailed reports are available on our website. DFES scenario projections are available on the interactive DFES map on the website here.

Geographic Area Covered

This report covers the area of Bassetlaw District covered by the WPD East Midlands licence area.



Scenario Summary

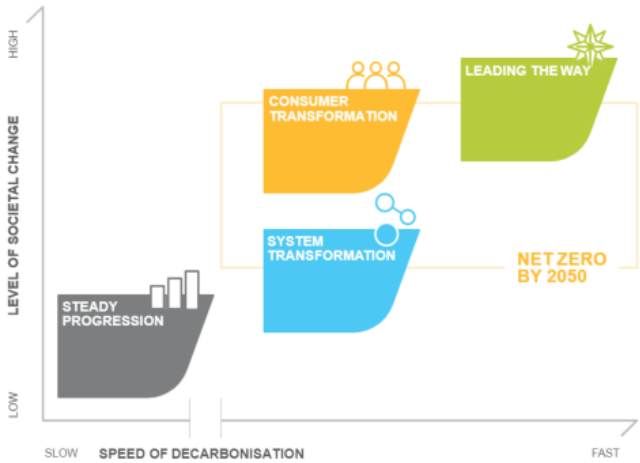
This DFES scenario framework includes three scenarios that are compliant with UK government targets of Net Zero greenhouse gas emissions by 2050. A summary of each scenario is below:

Steady Progression (SP) assumes non-compliance with the net zero emissions target. Low levels of decarbonisation and societal change.

System Transformation (ST) has high level of decarbonisation with lower societal change. Larger, more centralised solutions are developed. This scenario has the highest levels of hydrogen deployment.

Consumer Transformation (CT) has high levels of decarbonisation and societal change. Consumers adopt new technologies rapidly, and more decentralised solutions are developed. This scenario has significant electrification of domestic heat.

Leading the Way (LW) has very high levels of decarbonisation and societal change. Consumers adopt new technologies rapidly, and a mix of solutions are developed. This scenario aims for the "fastest credible" decarbonisation pathway.



Scenario Projections: at a glance

The DFES scenario projections at a Local Authority level include all customers connected to the distribution network within the area of the Local Authority at all voltage levels. Customers connected to the transmission network are not included in this analysis. The table below shows a breakdown of the total for Bassetlaw District for two specific years in the DFES analysis.

WPD also create a 5th 'Best View' scenario for the purposes of regulatory reporting. This is a hybrid scenario built on local stakeholder engagement, which maps which of the four DFES scenarios aligns most closely with regional ambition and delivery capabilities. The WPD Best View informs the likely amount of investment on the network across a licence area, and is supplemented by uncertainty mechanisms which can flex to accommodate changes in regional growth projections.

For the DFES 2020 analysis, Bassetlaw District has been assigned the Consumer Transformation scenario for the WPD Best View.

Technology	Units	Baseline Total	2030				2050			
			SP	ST	CT	LW	SP	ST	CT	LW
Air conditioning	Number of domestic air conditioning units	437	1799	1498	1498	484	32940	18593	18593	611
Direct electric heating	Number of customers with direct electric heating	1747	1956	1967	1952	2022	2817	2267	2079	2407
Domestic	Number of new dwellings	0	1936	2582	2582	3489	7918	11533	11533	14569
Electric vehicles	Number of electric vehicles	790	11589	14181	25355	27991	77206	72301	68670	53750
EV Charge Point	Number of EV charge points	352	5021	6658	16303	16967	39892	40238	41757	41598
Heat pumps	Number of heat pumps	728	1343	3793	11093	13406	9482	16244	40239	39439
Non domestic	Floorspace (metres squared) of new I&C developments	0.0	821952.0	1202990.0	1202990.0	1693012.0	3363481.0	3736182.0	3736182.0	3789515.0
Other Distributed Generation	MW (installed capacity)	26.5	79.4	29.6	29.8	24.6	86.9	20.1	21.4	11.1
Solar Generation	MW (installed capacity)	101.8	106.2	156.2	171.9	245.6	183.4	301.0	374.3	431.1
Storage	MW (installed capacity)	0.0	0.3	0.1	1.6	6.2	39.5	22.0	82.6	99.6
Wind	MW (installed capacity)	4.8	4.8	4.9	8.1	7.0	7.0	10.0	40.2	29.0

What does this mean for the local distribution network?

As the DFES scenario projections do not imply any electrical behaviour to the base units, electrical profiles are assigned to each technology type for different yearly snapshots. The profiled demand and generation outputs can be overlaid onto a network model and used to identify where there may be future network constraints on the Extra High Voltage (EHV) networks. The customer behaviour assumptions are summarised in the DFES: Customer Behaviour Report., and the detailed network review forms a key input to the Network Development Plan due to be published in 2022.

Incorporating your feedback

WPD is committed to continually improving the DFES process. Future work in 2021 will deliver projected energy consumption figures for each Local Authority alongside the volume projections. To validate the DFES process, we would like to sense check our scenario projections against the ambitions of the relevant Local Authorities in our area. WPD Distribution Managers will be engaging with local stakeholders throughout 2021 and any feedback will be incorporated in the 2021 Distribution Future Energy Scenarios analysis.

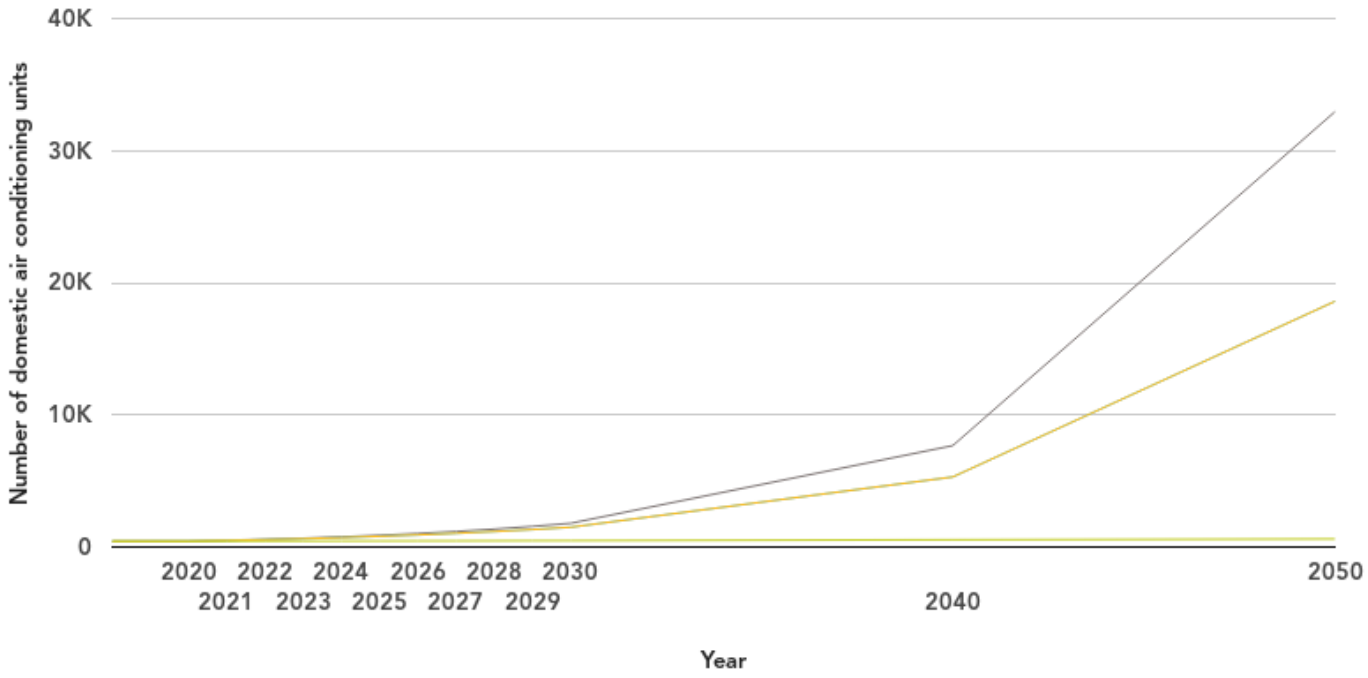
If you have any comments or queries regarding these reports, please contact wpdnetworkstrategy@westernpower.co.uk.

Technology Summary: Air conditioning

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	437	437	437	437
2020	438	439	439	440
2021	507	496	496	444
2022	580	561	561	445
2023	668	634	634	450
2024	773	716	716	456
2025	890	814	814	461
2026	1025	917	917	465
2027	1179	1038	1038	467
2028	1356	1174	1174	474
2029	1563	1325	1325	480
2030	1799	1498	1498	484
2040	7676	5305	5305	551
2050	32940	18593	18593	611

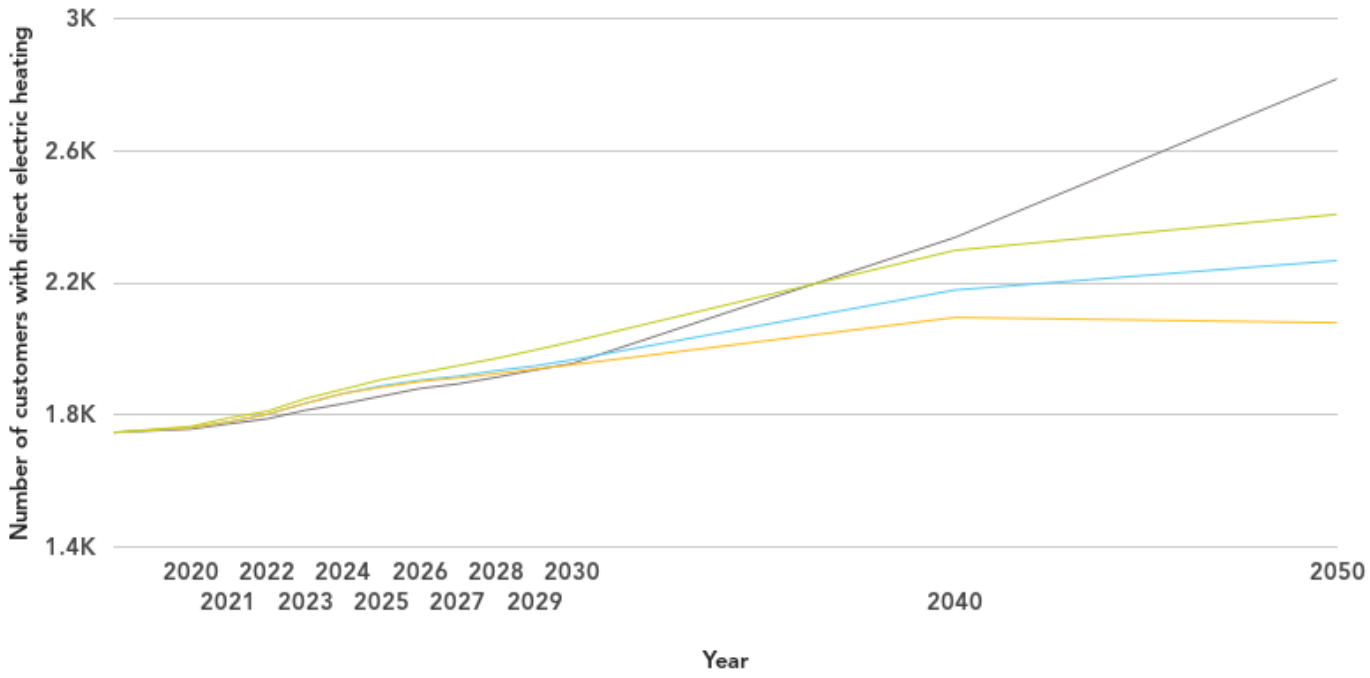


Technology Summary: Direct electric heating

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	1747	1747	1747	1747
2020	1757	1761	1761	1765
2021	1773	1779	1779	1791
2022	1788	1802	1802	1811
2023	1814	1835	1835	1849
2024	1834	1865	1865	1878
2025	1857	1888	1884	1907
2026	1880	1905	1901	1927
2027	1894	1917	1912	1949
2028	1914	1934	1925	1971
2029	1936	1948	1939	1996
2030	1956	1967	1952	2022
2040	2337	2178	2095	2298
2050	2817	2267	2079	2407

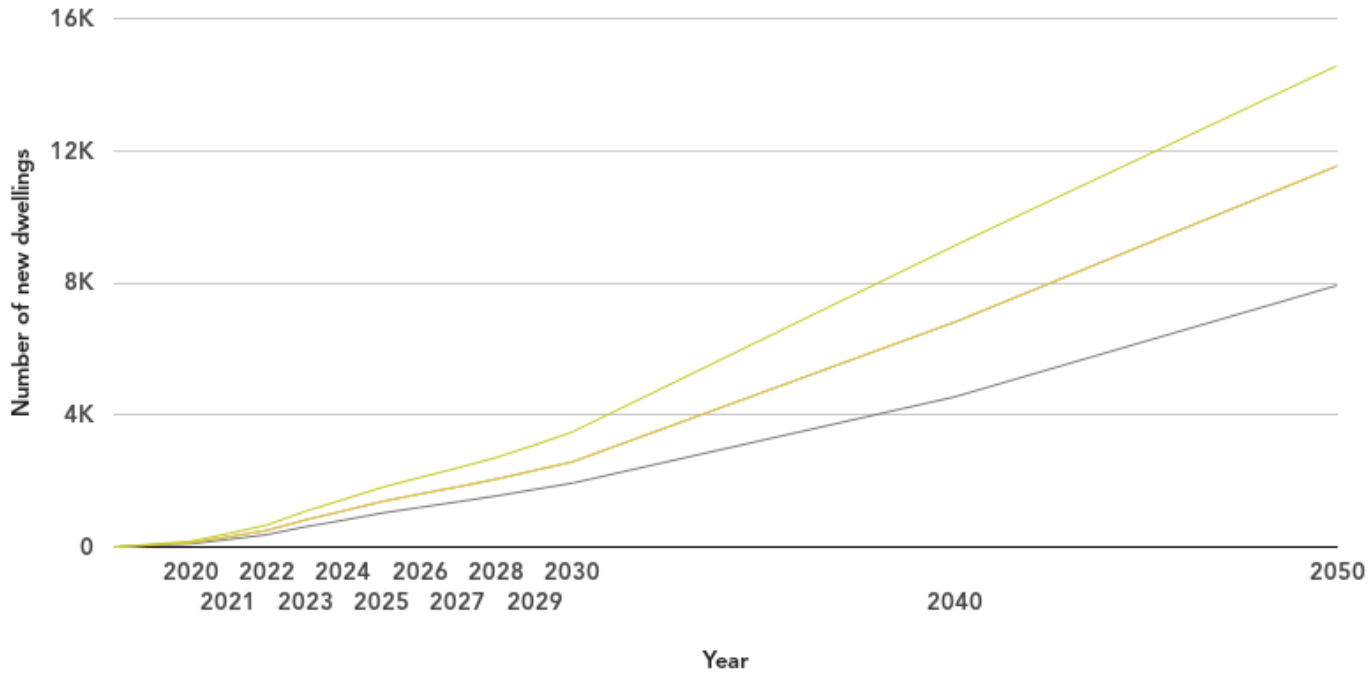


Technology Summary: Domestic

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	0	0	0	0
2020	96	128	128	172
2021	230	308	308	410
2022	377	505	505	667
2023	611	821	821	1083
2024	813	1095	1095	1438
2025	1026	1375	1375	1804
2026	1199	1607	1607	2105
2027	1369	1825	1825	2396
2028	1546	2056	2056	2713
2029	1742	2320	2320	3087
2030	1936	2582	2582	3489
2040	4546	6809	6809	9126
2050	7918	11533	11533	14569

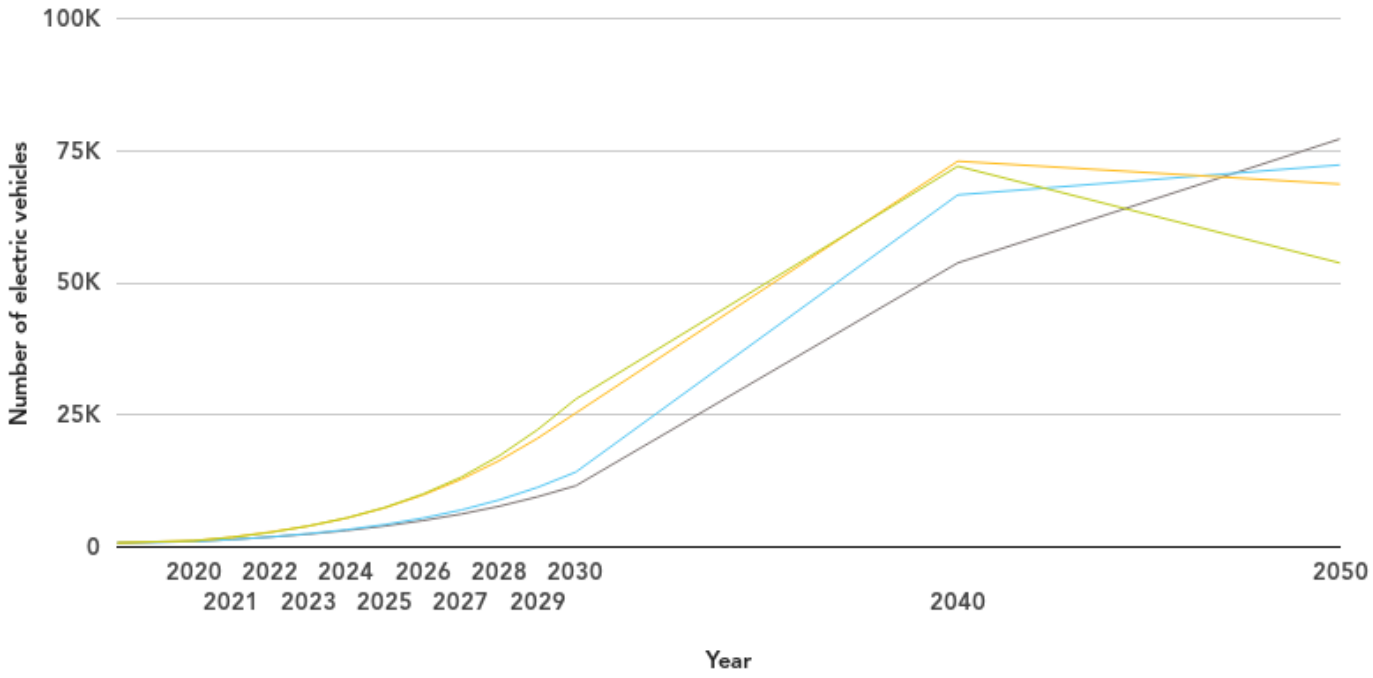


Technology Summary: Electric vehicles

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	790	790	790	790
2020	1051	1047	1193	1193
2021	1418	1414	1869	1837
2022	1892	1900	2837	2747
2023	2437	2521	3958	3982
2024	3130	3281	5469	5501
2025	3973	4246	7412	7483
2026	5011	5472	9838	10023
2027	6237	7001	12804	13215
2028	7721	8917	16368	17270
2029	9501	11289	20572	22207
2030	11589	14181	25355	27991
2040	53764	66633	73003	72050
2050	77206	72301	68670	53750

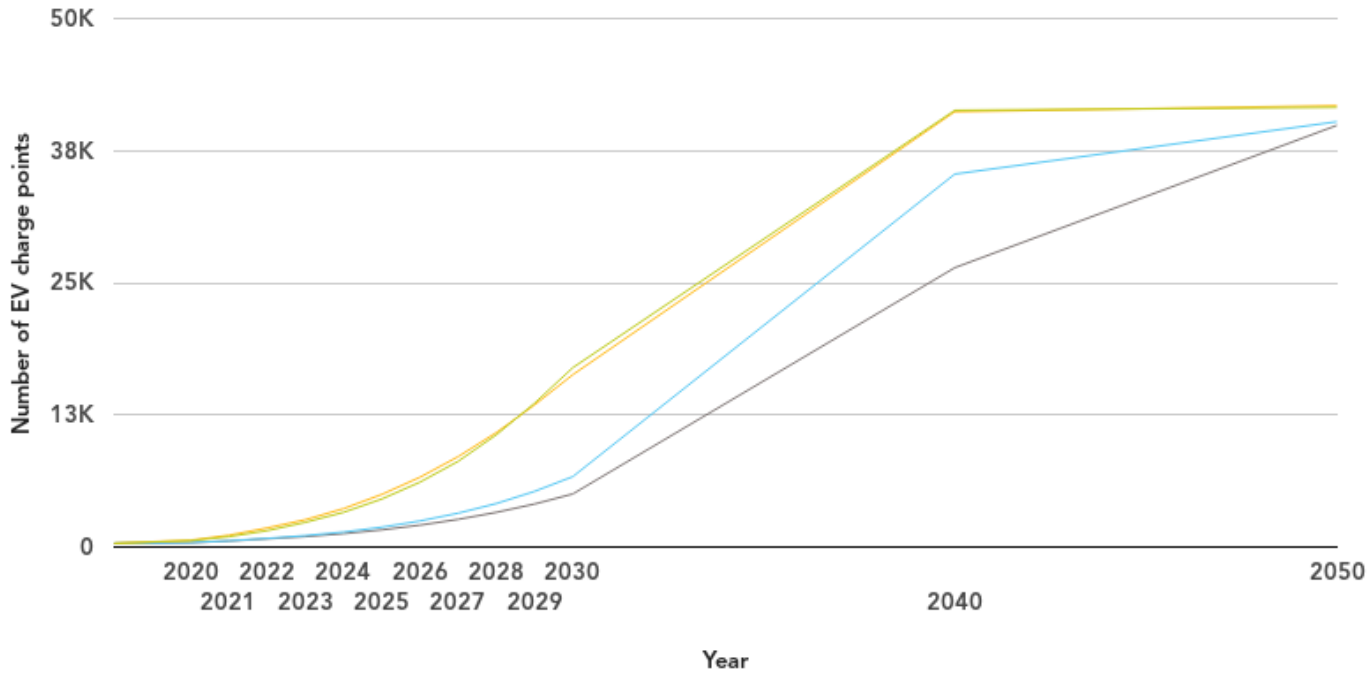


Technology Summary: EV Charge Point

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	352	352	352	352
2020	415	421	644	600
2021	568	587	1117	984
2022	781	817	1804	1551
2023	986	1080	2583	2338
2024	1267	1417	3634	3286
2025	1624	1876	4975	4542
2026	2072	2464	6605	6140
2027	2618	3203	8553	8108
2028	3280	4114	10834	10623
2029	4070	5266	13447	13604
2030	5021	6658	16303	16967
2040	26428	35286	41191	41315
2050	39892	40238	41757	41598

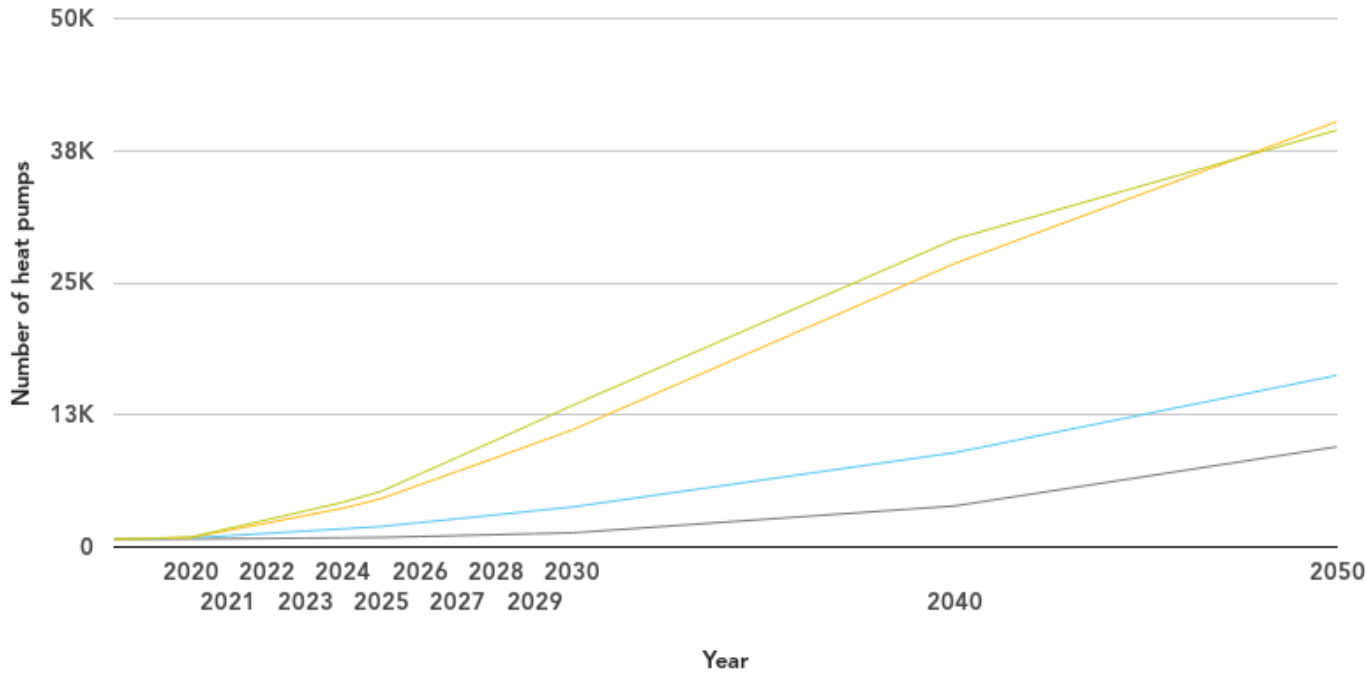


Technology Summary: Heat pumps

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	728	728	728	728
2020	756	854	893	933
2021	784	1068	1583	1751
2022	812	1290	2271	2579
2023	846	1505	2977	3412
2024	879	1720	3681	4246
2025	911	1945	4593	5285
2026	995	2315	5899	6907
2027	1081	2679	7182	8517
2028	1170	3049	8475	10131
2029	1258	3421	9784	11762
2030	1343	3793	11093	13406
2040	3887	8926	26827	29123
2050	9482	16244	40239	39439

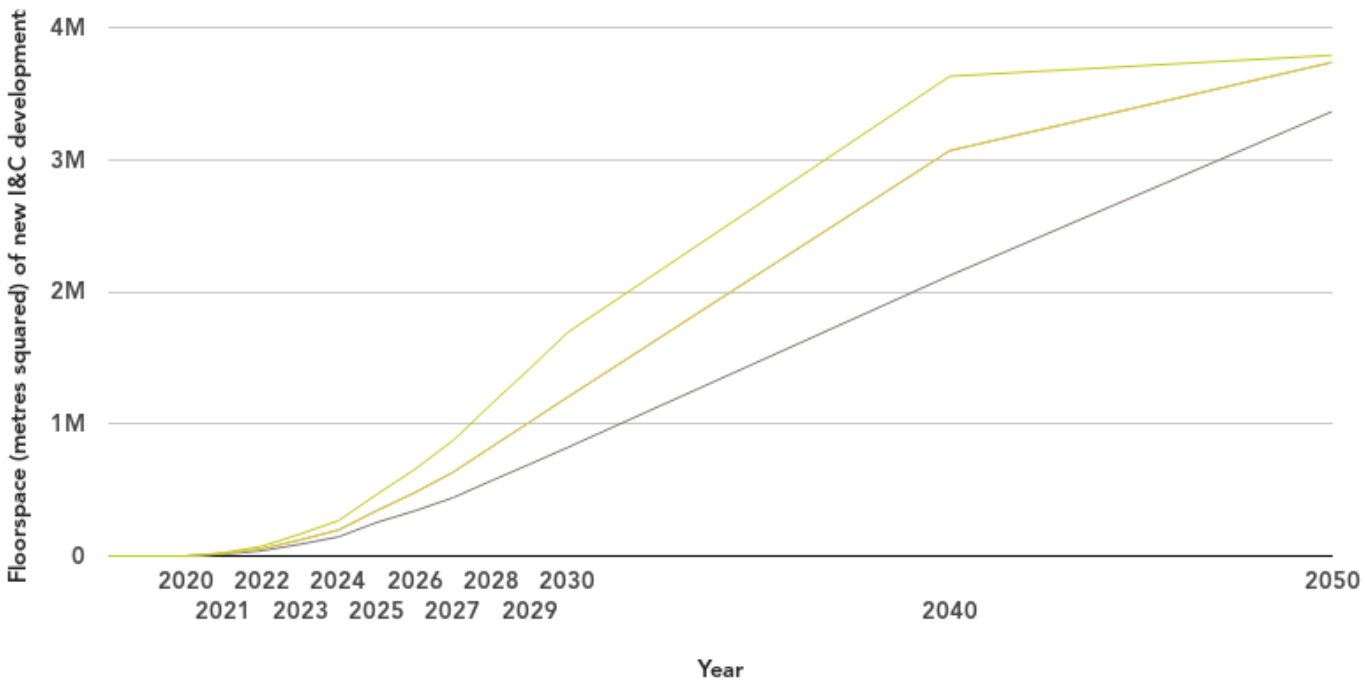


Technology Summary: Non domestic

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	0.0	0.0	0.0	0.0
2020	0.0	0.0	0.0	0.0
2021	13346.0	18351.0	18351.0	25024.0
2022	39566.0	54279.0	54279.0	73896.0
2023	89306.0	122304.0	122304.0	166301.0
2024	145227.0	196992.0	196992.0	268017.0
2025	254008.0	343201.0	343201.0	466013.0
2026	342223.0	480726.0	480726.0	656377.0
2027	441614.0	634324.0	634324.0	874710.0
2028	570046.0	824972.0	824972.0	1149914.0
2029	694258.0	1013507.0	1013507.0	1417299.0
2030	821952.0	1202990.0	1202990.0	1693012.0
2040	2122833.0	3068208.0	3068208.0	3631515.0
2050	3363481.0	3736182.0	3736182.0	3789515.0

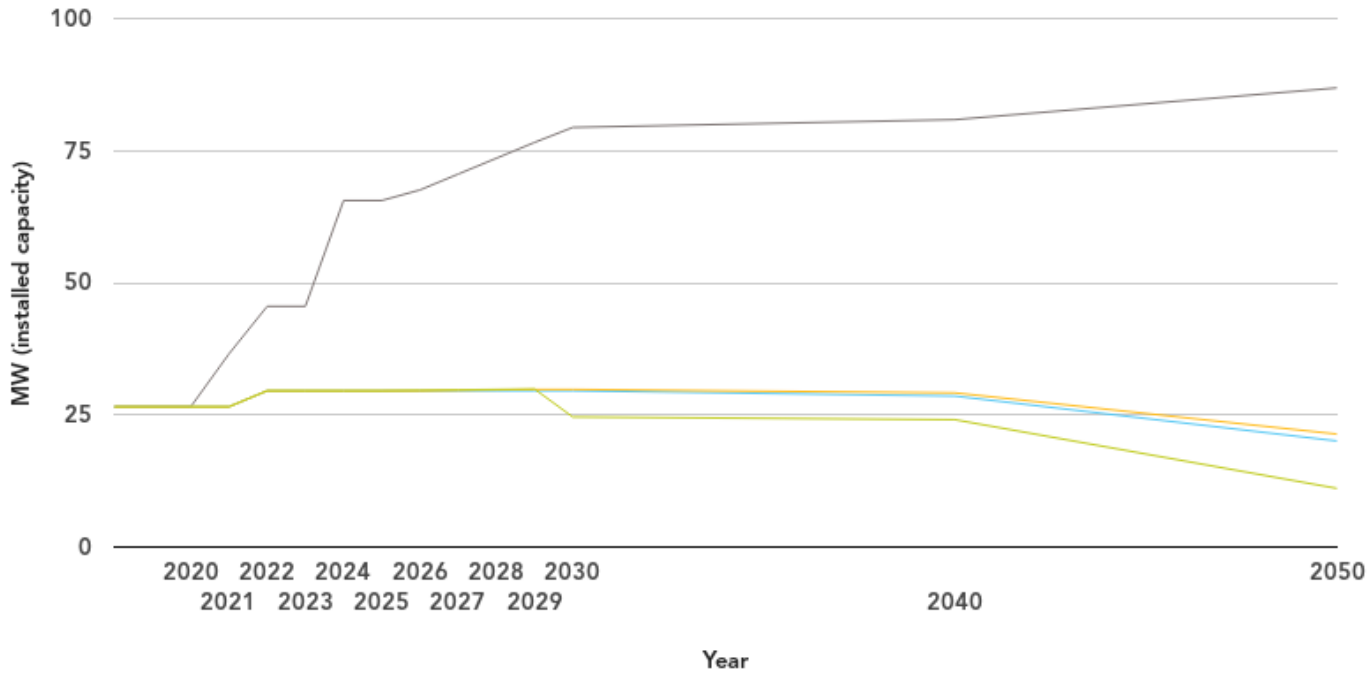


Technology Summary: Other Distributed Generation

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	26.5	26.5	26.5	26.5
2020	26.5	26.5	26.5	26.5
2021	36.5	26.5	26.5	26.5
2022	45.5	29.6	29.6	29.6
2023	45.5	29.6	29.6	29.6
2024	65.6	29.6	29.6	29.6
2025	65.6	29.6	29.6	29.6
2026	67.6	29.6	29.6	29.6
2027	70.6	29.6	29.6	29.7
2028	73.6	29.6	29.7	29.8
2029	76.6	29.6	29.8	29.9
2030	79.4	29.6	29.8	24.6
2040	80.9	28.6	29.2	24.1
2050	86.9	20.1	21.4	11.1

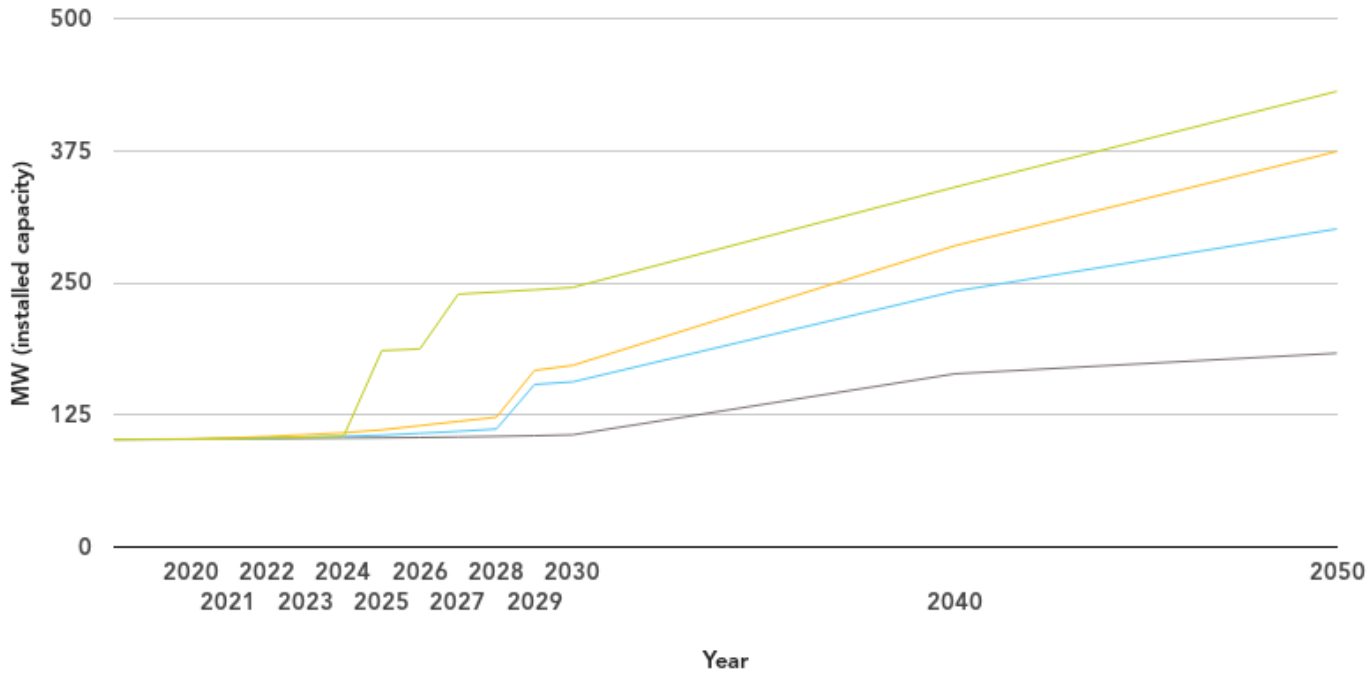


Technology Summary: Solar Generation

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	101.8	101.8	101.8	101.8
2020	101.9	102.0	102.3	102.0
2021	102.2	102.5	103.2	102.4
2022	102.5	103.1	104.5	103.0
2023	102.8	103.8	106.2	103.8
2024	103.1	104.7	108.1	104.7
2025	103.3	105.7	110.8	185.7
2026	103.7	107.6	114.8	187.5
2027	104.2	109.4	118.8	239.2
2028	104.7	111.6	122.8	241.3
2029	105.3	153.9	167.1	243.4
2030	106.2	156.2	171.9	245.6
2040	163.9	242.0	285.0	340.5
2050	183.4	301.0	374.3	431.1

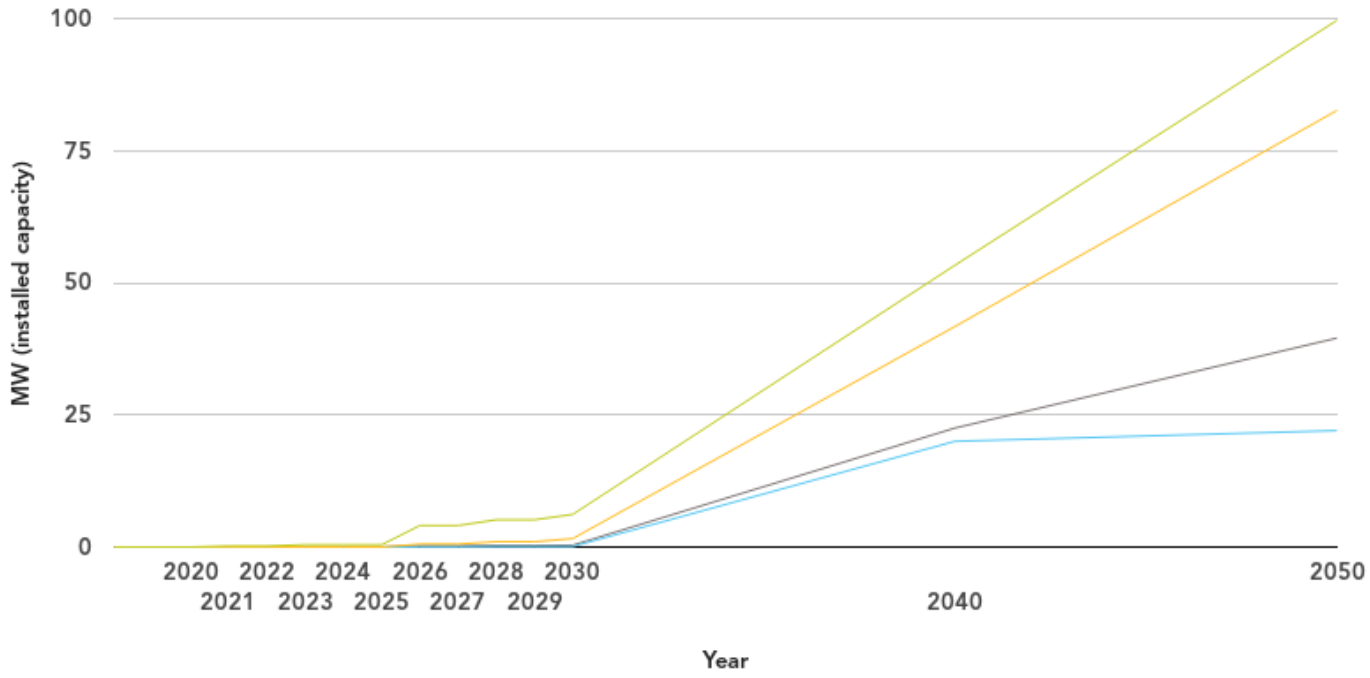


Technology Summary: Storage

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	0.0	0.0	0.0	0.0
2020	0.0	0.0	0.0	0.0
2021	0.0	0.0	0.0	0.2
2022	0.0	0.0	0.0	0.2
2023	0.0	0.0	0.0	0.4
2024	0.0	0.0	0.0	0.4
2025	0.0	0.0	0.0	0.4
2026	0.2	0.1	0.6	4.1
2027	0.2	0.1	0.6	4.1
2028	0.3	0.1	1.0	5.2
2029	0.3	0.1	1.0	5.2
2030	0.3	0.1	1.6	6.2
2040	22.5	20.0	41.7	53.3
2050	39.5	22.0	82.6	99.6

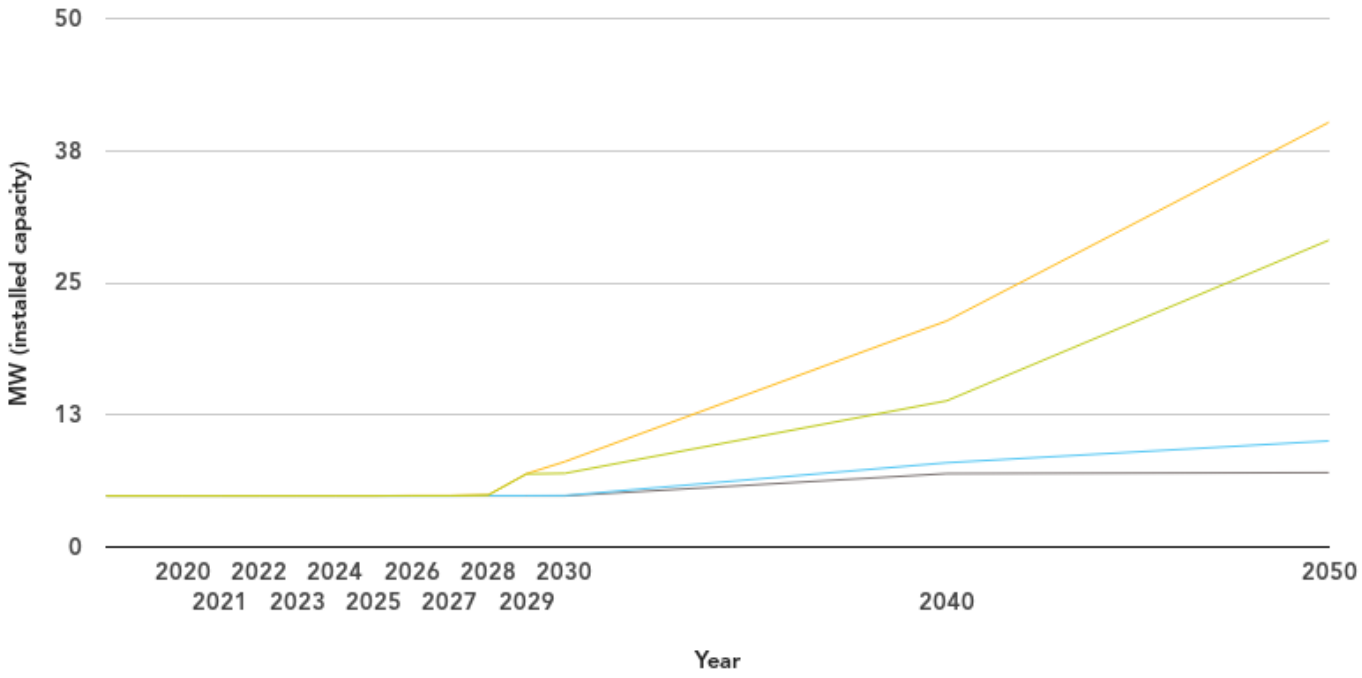


Technology Summary: Wind

The table and graph below show the scenario projections for each of the DFES scenarios.

WPD Best View scenario: aligned to Consumer Transformation

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	4.8	4.8	4.8	4.8
2020	4.8	4.8	4.8	4.8
2021	4.8	4.8	4.8	4.8
2022	4.8	4.8	4.8	4.8
2023	4.8	4.8	4.8	4.8
2024	4.8	4.8	4.8	4.8
2025	4.8	4.8	4.8	4.8
2026	4.8	4.8	4.9	4.8
2027	4.8	4.8	4.9	4.8
2028	4.8	4.9	4.9	4.9
2029	4.8	4.9	6.9	6.9
2030	4.8	4.9	8.1	7.0
2040	6.9	8.0	21.4	13.8
2050	7.0	10.0	40.2	29.0



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