WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales

Distribution Future Energy Scenarios

Local Authority: Rugby District (B)

What are Distribution Future Energy Scenarios?

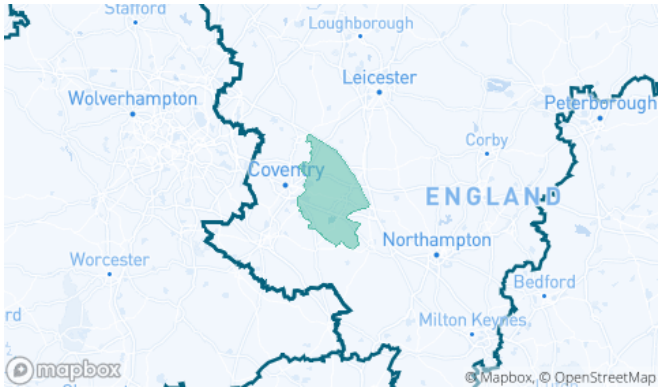
Western Power Distribution run Distribution Future Energy Scenarios (DFES) on an annual cycle for all licence areas, and represent a range of credible future scenarios of what could connect to the distribution network.

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 Rugby District (B) covered by the WPD East Midlands licence area.



Scenario Summary

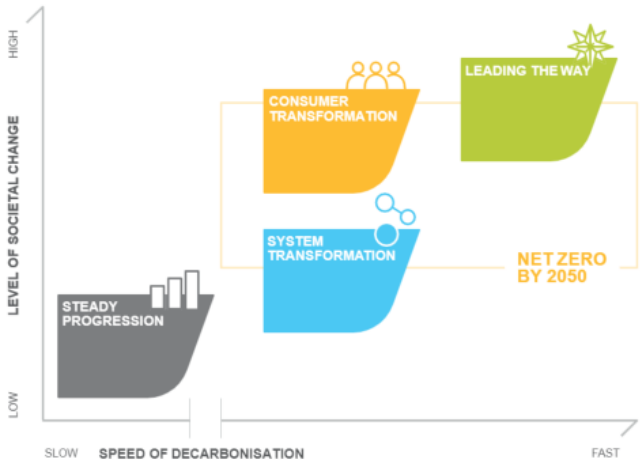
This DFES scenario framework includes three scenarios that are compliant with UK government targets of Net Zero greenhouse gas emissions by 2050. A summary of each scenario is below:

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 Rugby District (B) 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, Rugby District (B) has been assigned the Steady Progression 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	534	2374	2023	2023	664	44894	25762	25762	845
Direct electric heating	Number of customers with direct electric heating	799	1471	1616	1594	1772	2722	2246	2028	2385
Domestic	Number of new dwellings	0	6228	8298	8298	10461	17452	20934	20934	23536
Electric vehicles	Number of electric vehicles	850	12463	15007	27172	29416	72590	63869	59882	51394
EV Charge Point	Number of EV charge points	351	5470	7245	17926	18623	42675	43155	45304	45210
Heat pumps	Number of heat pumps	80	904	3181	13036	15273	8975	16332	48118	45554
Non domestic	Floorspace (metres squared) of new I&C developments	0.0	173796.0	226689.0	226689.0	290782.0	470822.0	546610.0	546610.0	549080.0
Other Distributed Generation	MW (installed capacity)	13.1	47.0	24.5	24.5	24.5	69.1	23.2	23.2	13.2
Solar Generation	MW (installed capacity)	9.8	11.9	19.1	26.6	71.8	28.9	113.7	144.5	162.8
Storage	MW (installed capacity)	0.0	0.2	0.0	0.8	1.9	2.9	1.2	13.9	14.5
Wind	MW (installed capacity)	0.1	0.1	0.1	2.4	0.2	0.4	5.3	41.1	28.7

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.

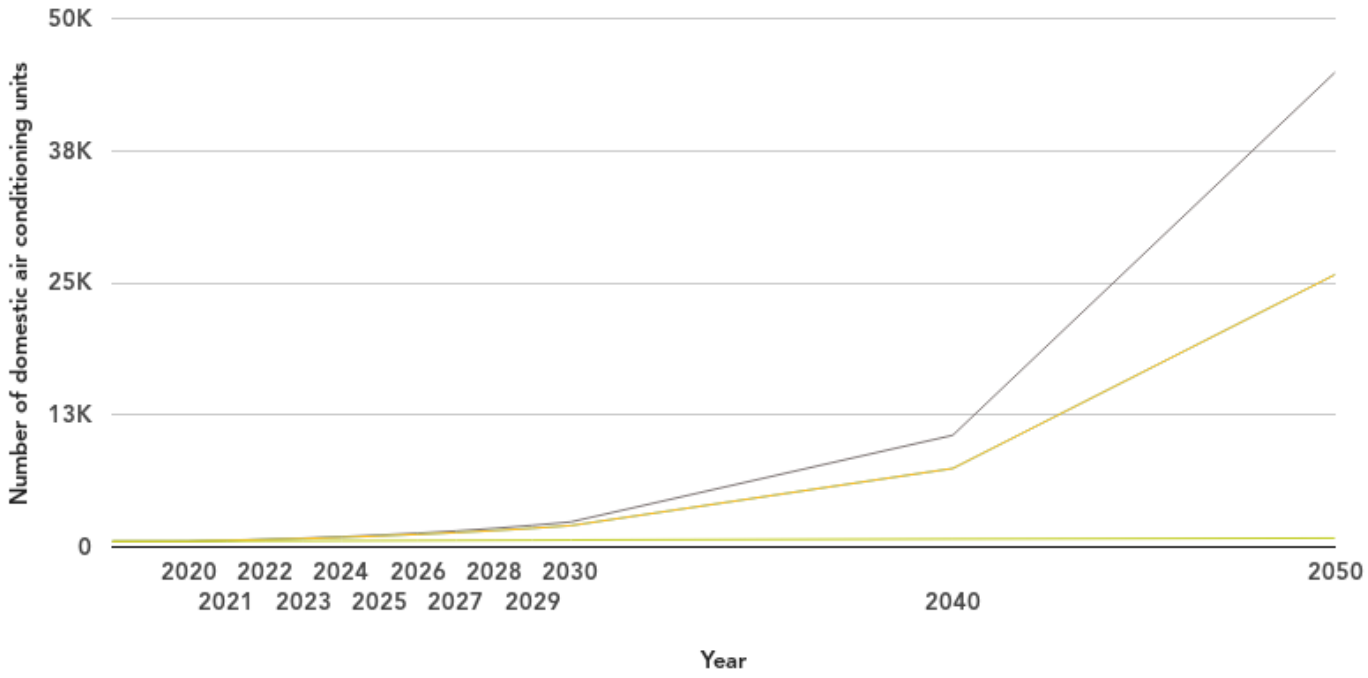
If you have any comments or queries regarding these reports, please contact wpdnetworkstrategy@westernpower.co.uk.

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 Steady Progression

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	534	534	534	534
2020	539	543	543	546
2021	630	622	622	558
2022	726	708	708	566
2023	843	804	804	577
2024	978	919	919	589
2025	1136	1049	1049	600
2026	1313	1195	1195	614
2027	1522	1361	1361	626
2028	1766	1553	1553	640
2029	2049	1772	1772	650
2030	2374	2023	2023	664
2040	10574	7436	7436	766
2050	44894	25762	25762	845

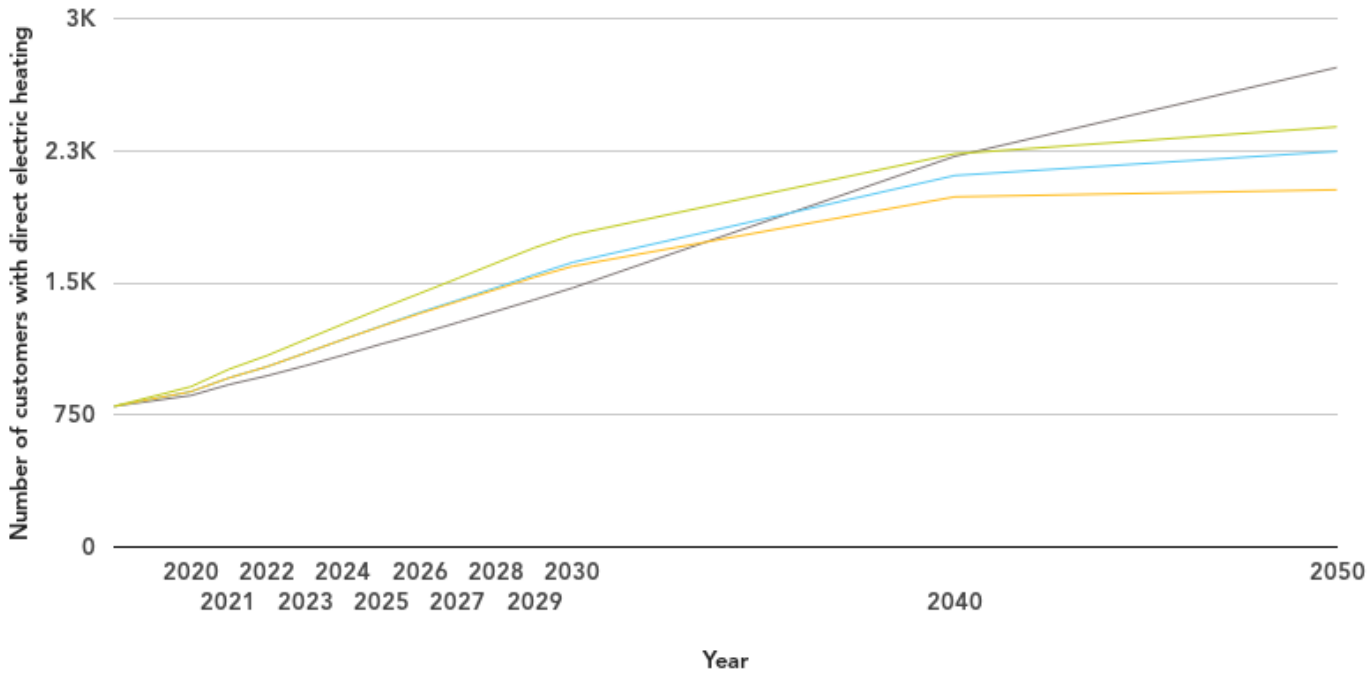


Technology Summary: Direct electric heating

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

WPD Best View scenario: aligned to Steady Progression

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	799	799	799	799
2020	860	882	882	910
2021	922	960	960	1009
2022	972	1024	1024	1087
2023	1029	1101	1101	1177
2024	1090	1179	1179	1267
2025	1153	1256	1254	1355
2026	1211	1332	1326	1440
2027	1275	1402	1395	1526
2028	1339	1473	1463	1613
2029	1404	1546	1532	1699
2030	1471	1616	1594	1772
2040	2218	2109	1988	2232
2050	2722	2246	2028	2385

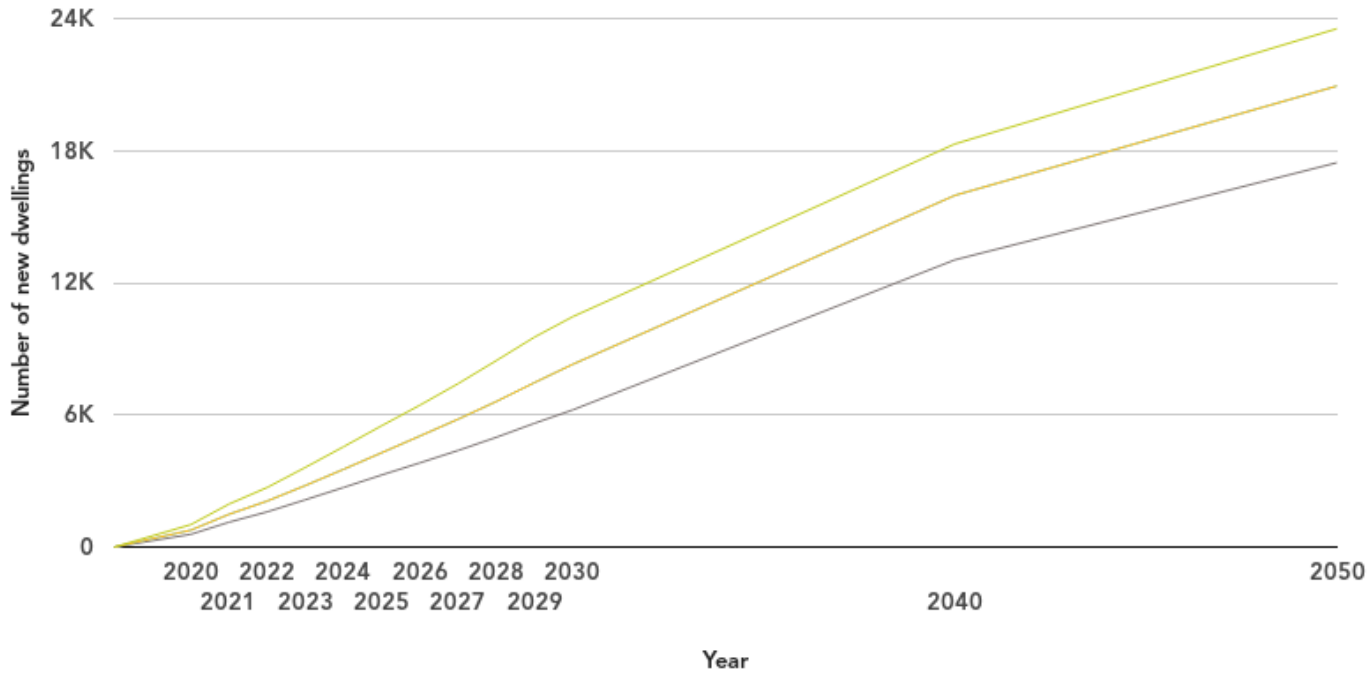


Technology Summary: Domestic

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

WPD Best View scenario: aligned to Steady Progression

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	0	0	0	0
2020	576	764	764	1017
2021	1127	1486	1486	1950
2022	1597	2087	2087	2704
2023	2146	2792	2792	3617
2024	2705	3530	3530	4554
2025	3273	4284	4284	5510
2026	3823	5043	5043	6443
2027	4387	5806	5806	7421
2028	4983	6610	6610	8468
2029	5620	7469	7469	9535
2030	6228	8298	8298	10461
2040	13040	15967	15967	18303
2050	17452	20934	20934	23536

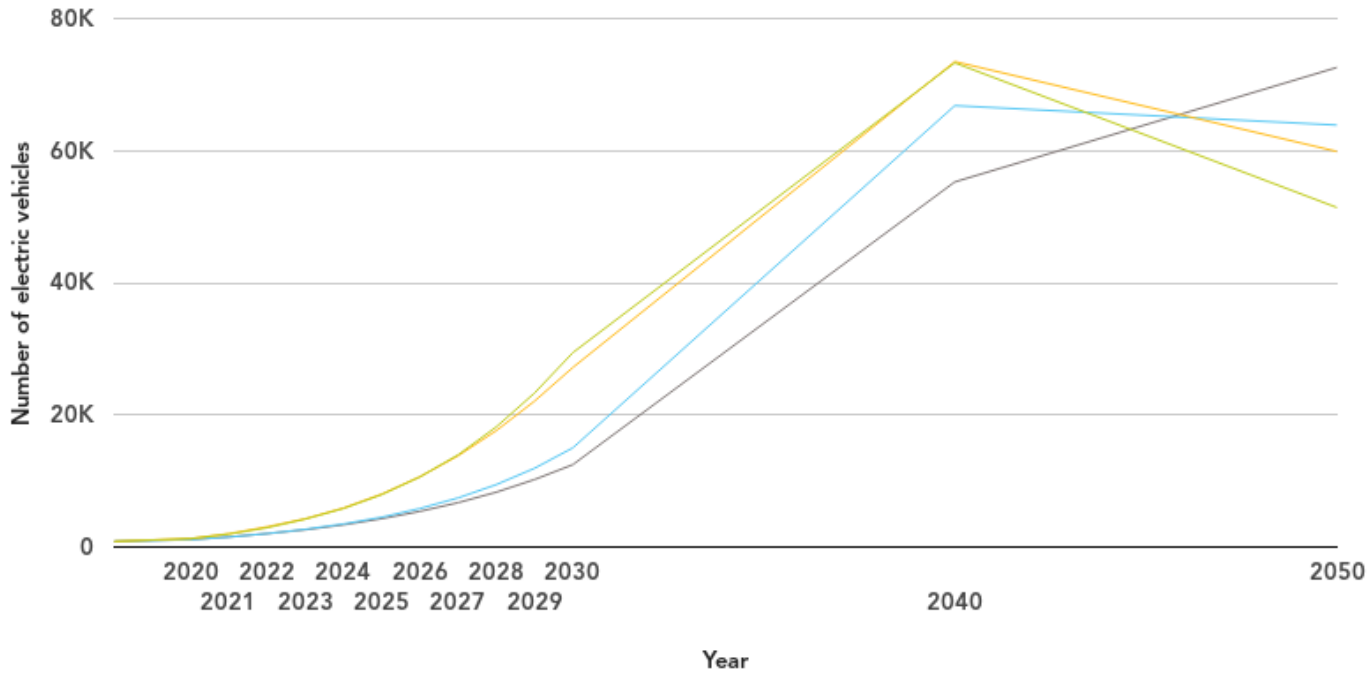


Technology Summary: Electric vehicles

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

WPD Best View scenario: aligned to Steady Progression

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	850	850	850	850
2020	1127	1122	1285	1279
2021	1524	1512	2015	1963
2022	2035	2030	3061	2924
2023	2621	2682	4277	4236
2024	3366	3498	5911	5843
2025	4291	4518	8016	7940
2026	5400	5832	10645	10620
2027	6716	7437	13818	13959
2028	8306	9454	17628	18191
2029	10220	11927	22091	23314
2030	12463	15007	27172	29416
2040	55271	66818	73481	73300
2050	72590	63869	59882	51394

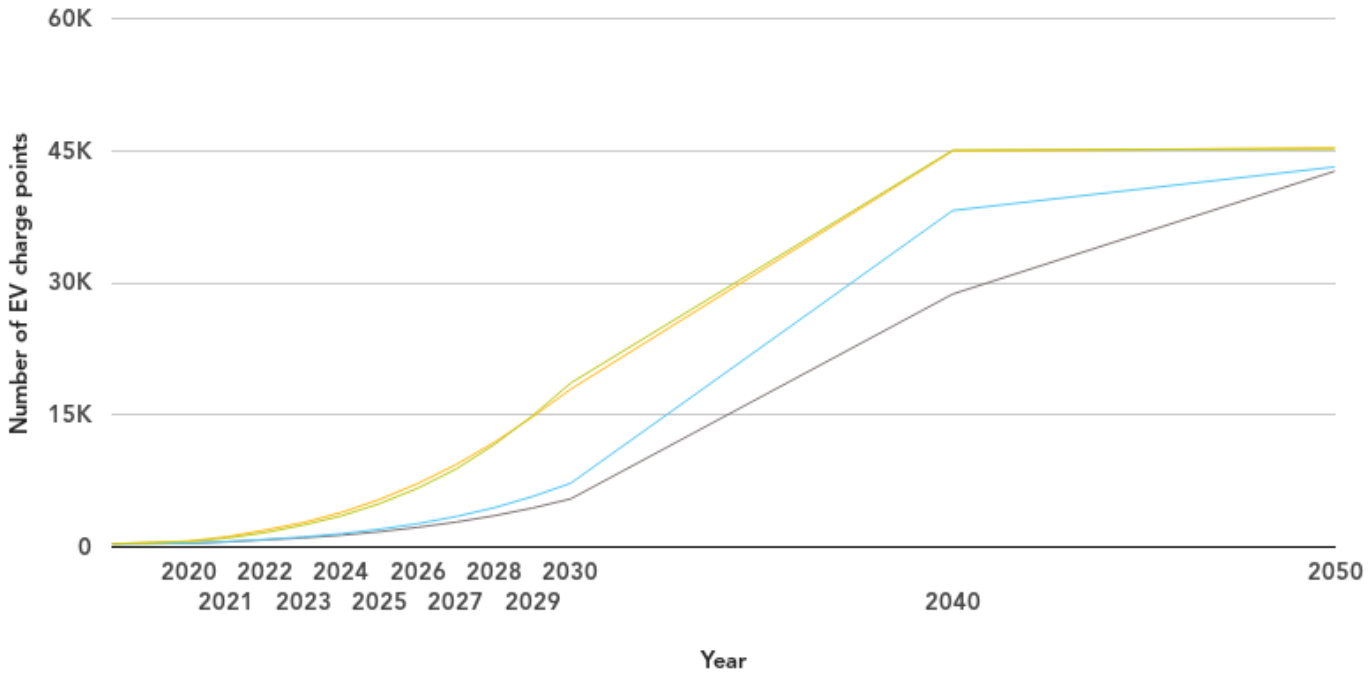


Technology Summary: EV Charge Point

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

WPD Best View scenario: aligned to Steady Progression

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	351	351	351	351
2020	414	420	668	617
2021	583	609	1170	1022
2022	814	855	1921	1639
2023	1039	1148	2777	2496
2024	1345	1513	3927	3546
2025	1739	2017	5407	4936
2026	2238	2655	7216	6687
2027	2834	3459	9360	8860
2028	3553	4463	11891	11627
2029	4430	5729	14774	14914
2030	5470	7245	17926	18623
2040	28721	38206	44963	45051
2050	42675	43155	45304	45210

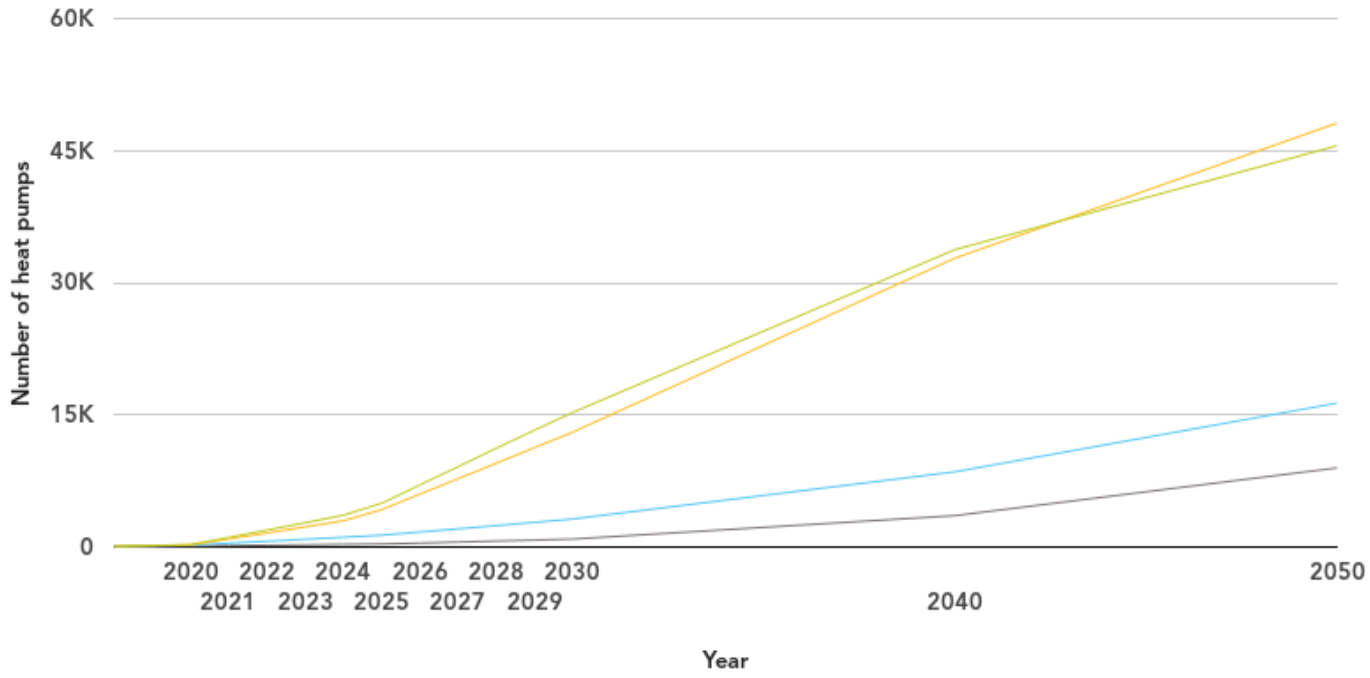


Technology Summary: Heat pumps

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

WPD Best View scenario: aligned to Steady Progression

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	80	80	80	80
2020	122	205	237	277
2021	164	430	913	1097
2022	208	653	1593	1921
2023	249	880	2284	2760
2024	295	1109	2986	3609
2025	339	1343	4237	4970
2026	448	1700	6008	7048
2027	560	2064	7753	9125
2028	672	2428	9510	11207
2029	786	2802	11283	13271
2030	904	3181	13036	15273
2040	3559	8532	32785	33756
2050	8975	16332	48118	45554

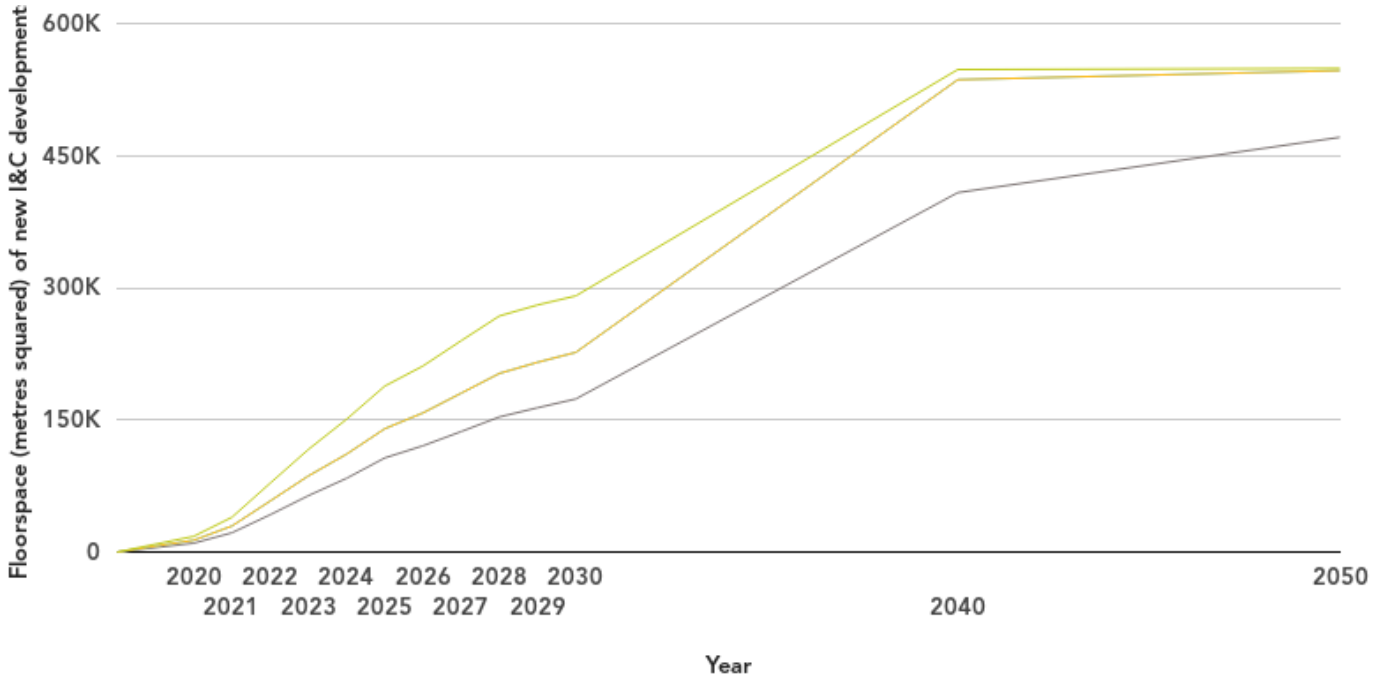


Technology Summary: Non domestic

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

WPD Best View scenario: aligned to Steady Progression

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	0.0	0.0	0.0	0.0
2020	10035.0	13380.0	13380.0	17840.0
2021	21877.0	29552.0	29552.0	39487.0
2022	42325.0	57901.0	57901.0	78147.0
2023	63989.0	86402.0	86402.0	116433.0
2024	83708.0	111136.0	111136.0	150758.0
2025	106848.0	139987.0	139987.0	188398.0
2026	120644.0	157981.0	157981.0	211230.0
2027	136756.0	180323.0	180323.0	239917.0
2028	153364.0	202767.0	202767.0	267991.0
2029	163789.0	215426.0	215426.0	280469.0
2030	173796.0	226689.0	226689.0	290782.0
2040	408057.0	536286.0	536286.0	547814.0
2050	470822.0	546610.0	546610.0	549080.0

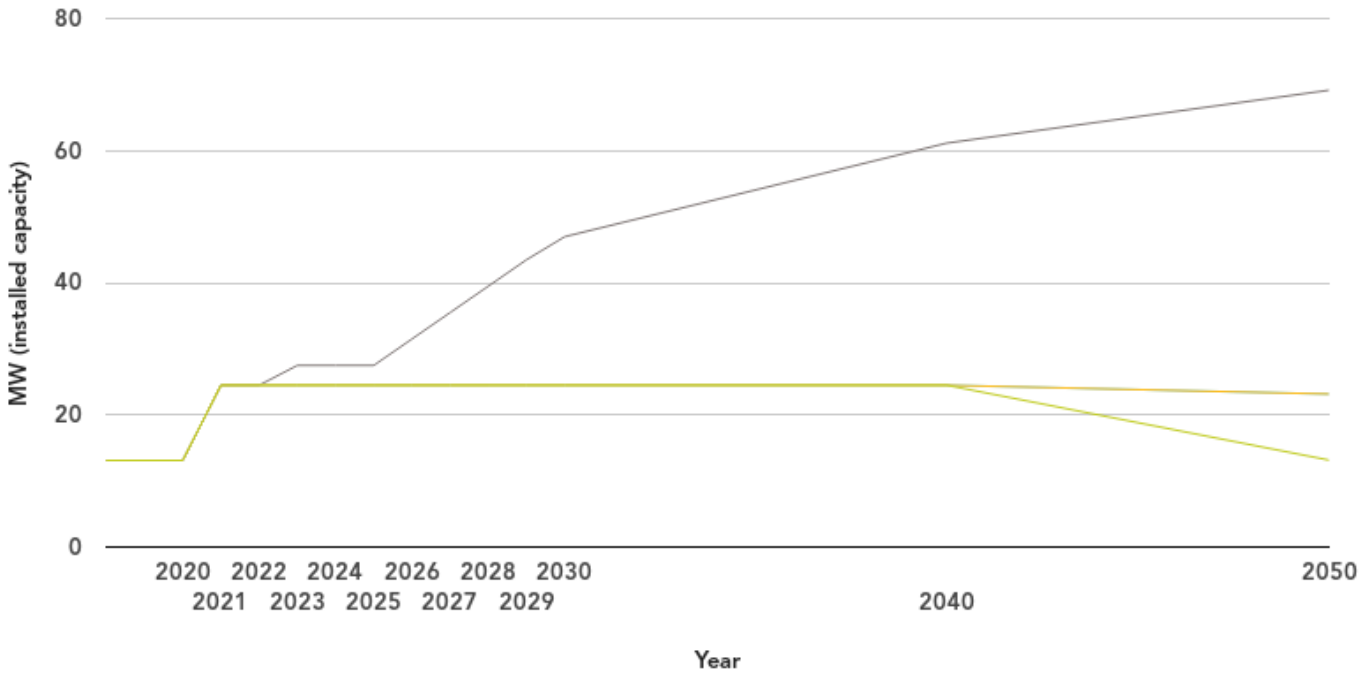


Technology Summary: Other Distributed Generation

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

WPD Best View scenario: aligned to Steady Progression

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	13.1	13.1	13.1	13.1
2020	13.1	13.1	13.1	13.1
2021	24.5	24.5	24.5	24.5
2022	24.5	24.5	24.5	24.5
2023	27.5	24.5	24.5	24.5
2024	27.5	24.5	24.5	24.5
2025	27.5	24.5	24.5	24.5
2026	31.5	24.5	24.5	24.5
2027	35.5	24.5	24.5	24.5
2028	39.5	24.5	24.5	24.5
2029	43.5	24.5	24.5	24.5
2030	47.0	24.5	24.5	24.5
2040	61.1	24.5	24.5	24.5
2050	69.1	23.2	23.2	13.2

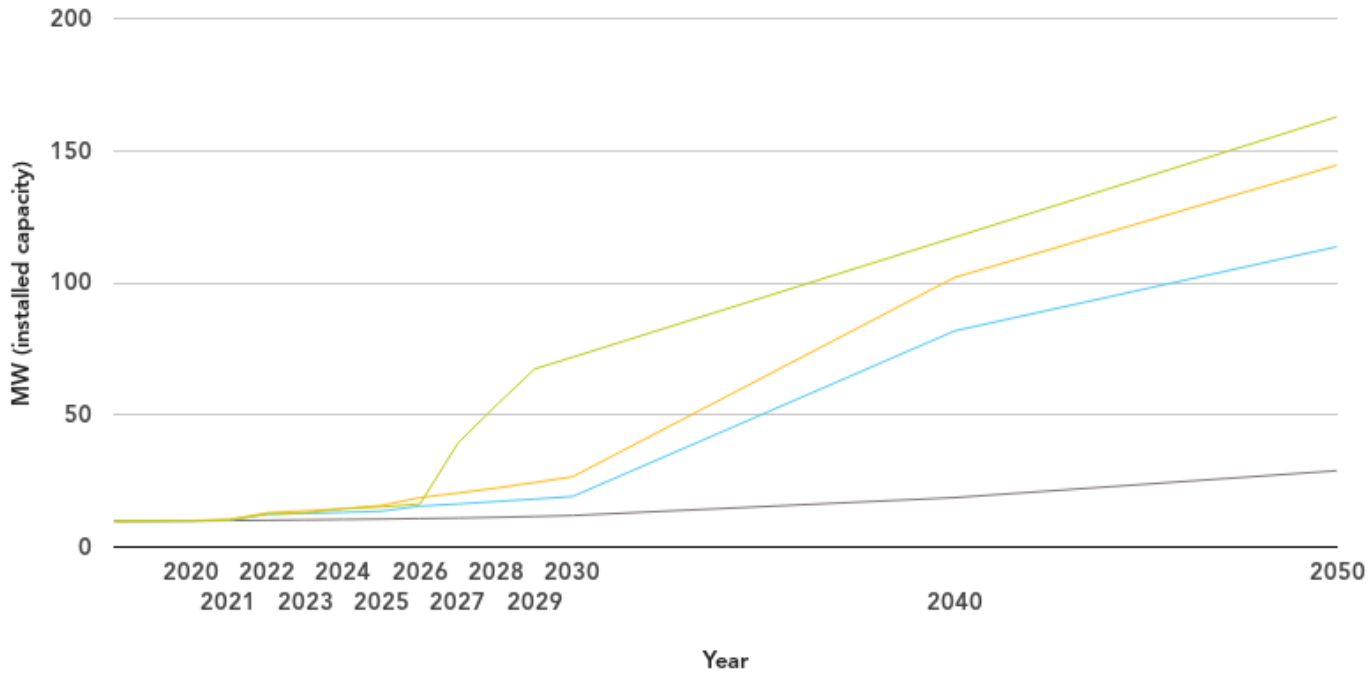


Technology Summary: Solar Generation

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

WPD Best View scenario: aligned to Steady Progression

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	9.8	9.8	9.8	9.8
2020	9.9	9.9	10.0	9.9
2021	10.0	10.1	10.4	10.2
2022	10.1	12.4	13.0	12.5
2023	10.3	12.7	13.7	12.9
2024	10.4	13.1	14.5	14.5
2025	10.6	13.6	15.8	15.2
2026	10.8	15.5	18.7	16.3
2027	11.0	16.3	20.5	39.4
2028	11.2	17.2	22.3	53.7
2029	11.6	18.1	24.4	67.4
2030	11.9	19.1	26.6	71.8
2040	18.7	81.8	102.0	117.2
2050	28.9	113.7	144.5	162.8

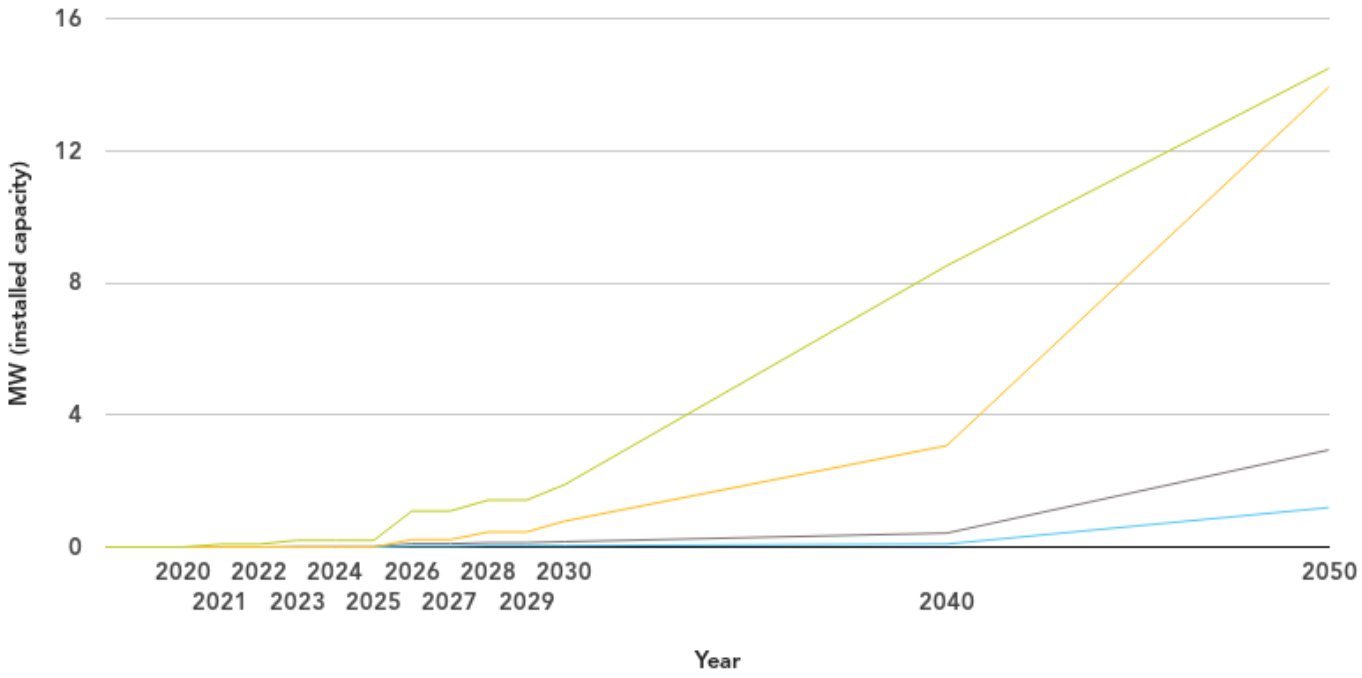


Technology Summary: Storage

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

WPD Best View scenario: aligned to Steady Progression

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	0.1
2022	0.0	0.0	0.0	0.1
2023	0.0	0.0	0.0	0.2
2024	0.0	0.0	0.0	0.2
2025	0.0	0.0	0.0	0.2
2026	0.1	0.0	0.2	1.1
2027	0.1	0.0	0.2	1.1
2028	0.1	0.0	0.5	1.4
2029	0.1	0.0	0.5	1.4
2030	0.2	0.0	0.8	1.9
2040	0.4	0.1	3.1	8.5
2050	2.9	1.2	13.9	14.5

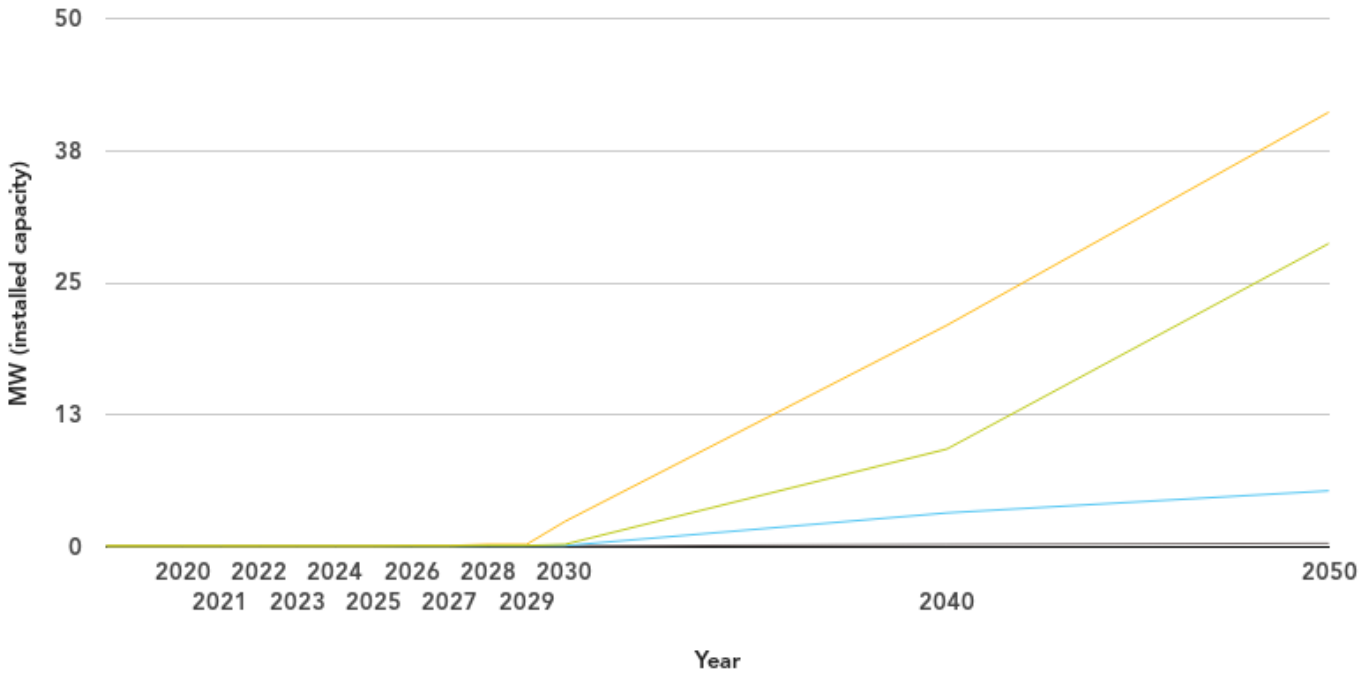


Technology Summary: Wind

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

WPD Best View scenario: aligned to Steady Progression

Year	Scenario			
	Steady Progression	System Transformation	Consumer Transformation	Leading the Way
Baseline	0.1	0.1	0.1	0.1
2020	0.1	0.1	0.1	0.1
2021	0.1	0.1	0.1	0.1
2022	0.1	0.1	0.1	0.1
2023	0.1	0.1	0.1	0.1
2024	0.1	0.1	0.1	0.1
2025	0.1	0.1	0.1	0.1
2026	0.1	0.1	0.1	0.1
2027	0.1	0.1	0.1	0.1
2028	0.1	0.1	0.2	0.1
2029	0.1	0.1	0.2	0.1
2030	0.1	0.1	2.4	0.2
2040	0.2	3.2	21.0	9.3
2050	0.4	5.3	41.1	28.7



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