

# Distribution Future Energy Scenarios 2022

Local Authority:  
Stoke-on-Trent

## What are Distribution Future Energy Scenarios?

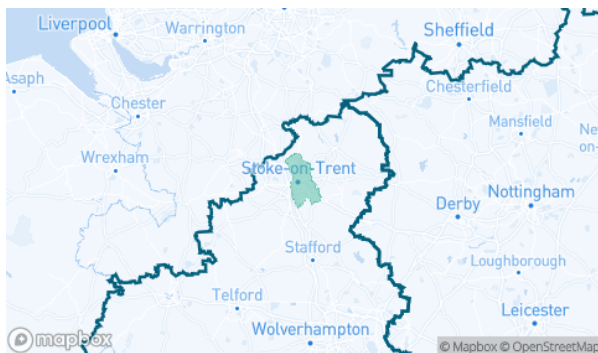
National Grid run Distribution Future Energy Scenarios (DFES) on an annual cycle for all licence areas, and represent a range of credible future scenarios of what could connect to the distribution network.

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 NGED 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 Stoke-on-Trent covered by the NGED licence areas.



## Scenario Summary

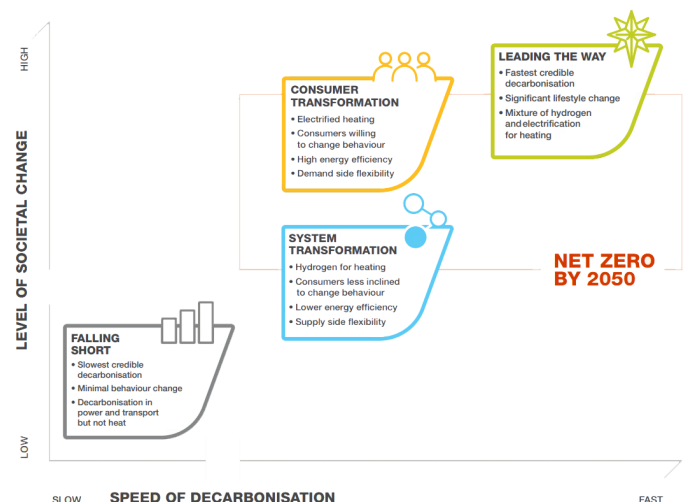
This DFES scenario framework includes three scenarios that are compliant with UK government targets of Net Zero greenhouse gas emissions by 2050. A summary of each scenario is below:

**Falling Short (FS)** 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 Stoke-on-Trent for two specific years in the DFES analysis.

NGED also created a 5th 'Best View' forecast for the purposes of regulatory reporting and strategic network planning. This is a hybrid forecast built on local stakeholder engagement and historic performance, which reflects local authority ambition for the technologies where its influence is greatest. The Best View informs the likely amount of investment on the network across a licence area; however, changes in regional growth projections that affect investment requirements are supported through the uncertainty mechanism funding process.

Technology	Units	Baseline Total	2030				2050			
			FS	ST	CT	LW	FS	ST	CT	LW
Air conditioning	Domestic air conditioning units	1549	4464	3829	3829	1549	75155	41096	41095	1549
Domestic	New dwellings	0	7214	8070	8070	9997	12422	12327	12327	12260
Electric vehicles	Electric vehicles	2531	20258	26954	49742	49947	160971	153719	151511	122808
EV Charge Point	EV charge points	1165	8338	13387	25544	27823	83628	87528	89913	90717
Heat pumps	Heat pump installations	140	5913	4643	19773	31717	63656	71956	121019	106197
Hydrogen electrolysis	MW (installed capacity)	0.0	0.2	2.8	0.2	2.6	1.0	4.8	1.9	7.2
Non domestic	Floorspace (metres squared) of new I&C developments	0	270688	323897	323897	339105	404349	404331	404331	404349
Other Distributed Generation	MW (installed capacity)	11.0	11.0	4.8	4.8	3.5	10.7	10.3	9.0	13.9
Resistive electric heating	Resistive electric heating units	12982	10729	10301	11020	10541	7110	2970	7153	7487
Solar Generation	MW (installed capacity)	26.6	36.0	47.5	66.3	67.3	63.2	114.3	191.9	195.6
Storage	MW (installed capacity)	0.0	0.9	2.4	5.0	7.2	8.0	20.2	47.0	57.0
Wind	MW (installed capacity)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2

## 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 NGED investment planning process, which includes the Network Development Plan and Distribution Network Options Assessment.

## Incorporating your feedback

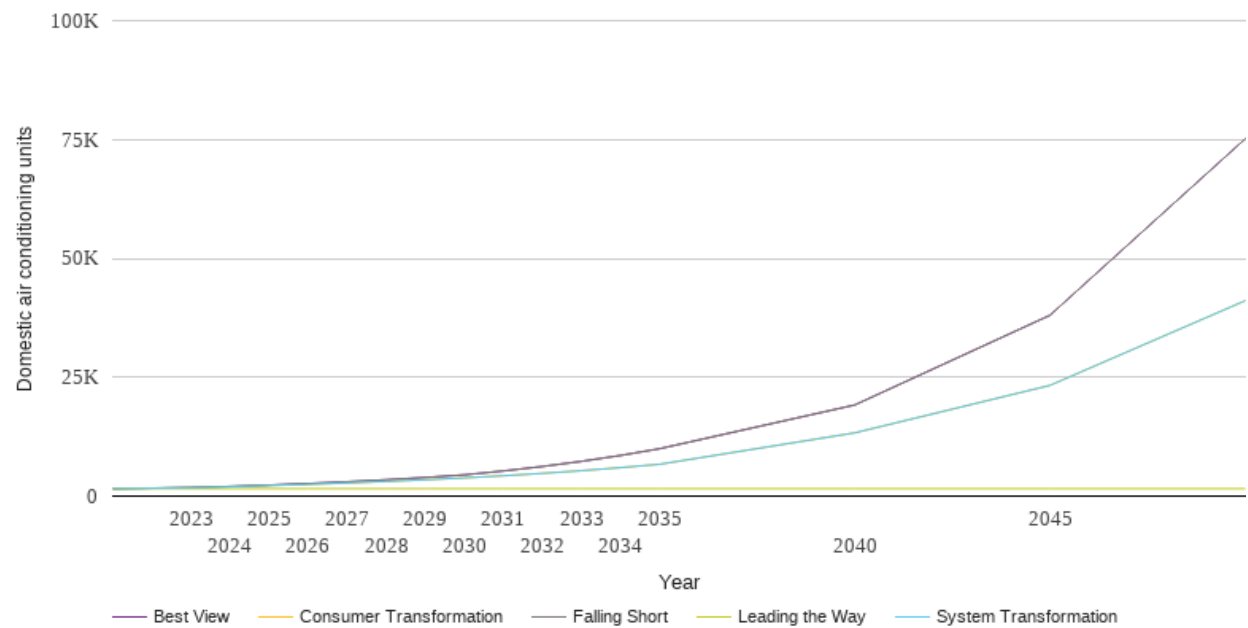
NGED is committed to continually improving the DFES process. To ensure the DFES projections fully capture local ambition, in 2022 we have appointed two DSO Strategic Engagement Officers to engage with local authorities. Any feedback will be incorporated into future Distribution Future Energy Scenarios analysis.

If you have any comments or queries regarding these reports, please contact [nged.energyplanning@nationalgrid.co.uk](mailto:nged.energyplanning@nationalgrid.co.uk).

# Technology Summary: Air conditioning

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

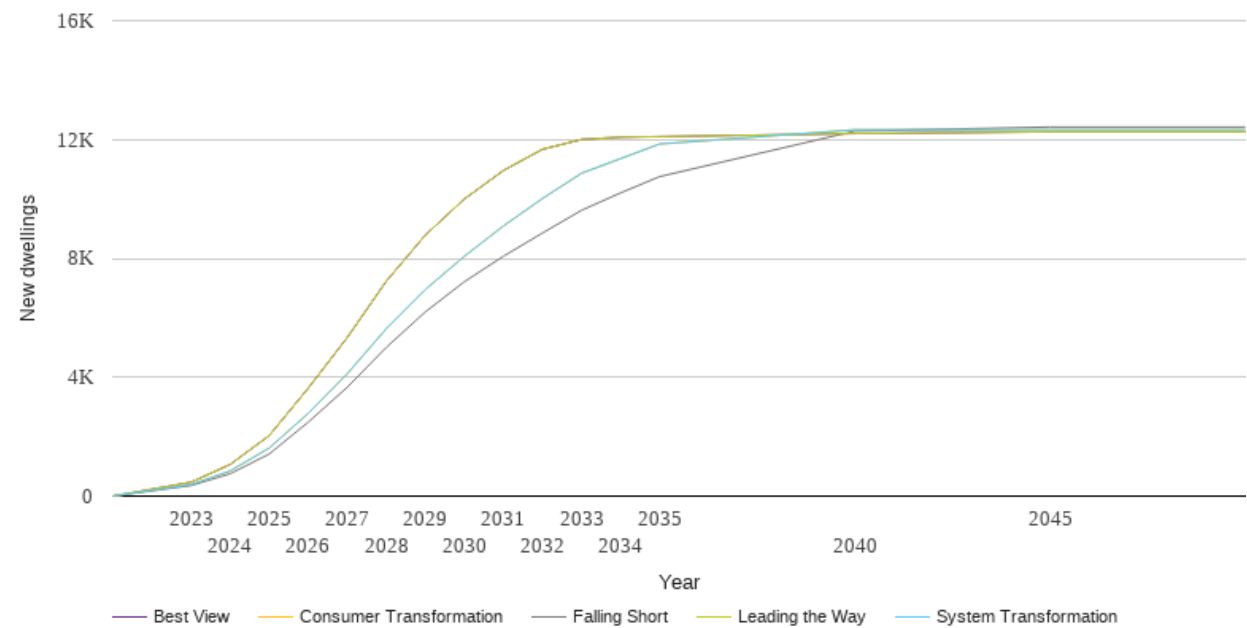
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	1549	1549	1549	1549	1549
2023	1785	1758	1758	1549	1785
2024	2029	1974	1974	1549	2029
2025	2314	2226	2226	1549	2314
2026	2638	2475	2475	1549	2638
2027	3008	2755	2755	1549	3008
2028	3425	3074	3074	1549	3425
2029	3914	3432	3432	1549	3914
2030	4464	3829	3829	1549	4464
2031	5284	4278	4278	1549	5284
2032	6226	4781	4781	1549	6226
2033	7307	5345	5345	1549	7307
2034	8545	5985	5985	1549	8545
2035	9962	6693	6693	1549	9962
2040	19168	13300	13300	1549	19168
2045	38037	23291	23291	1549	38037
2050	75155	41096	41095	1549	75155



# Technology Summary: Domestic

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

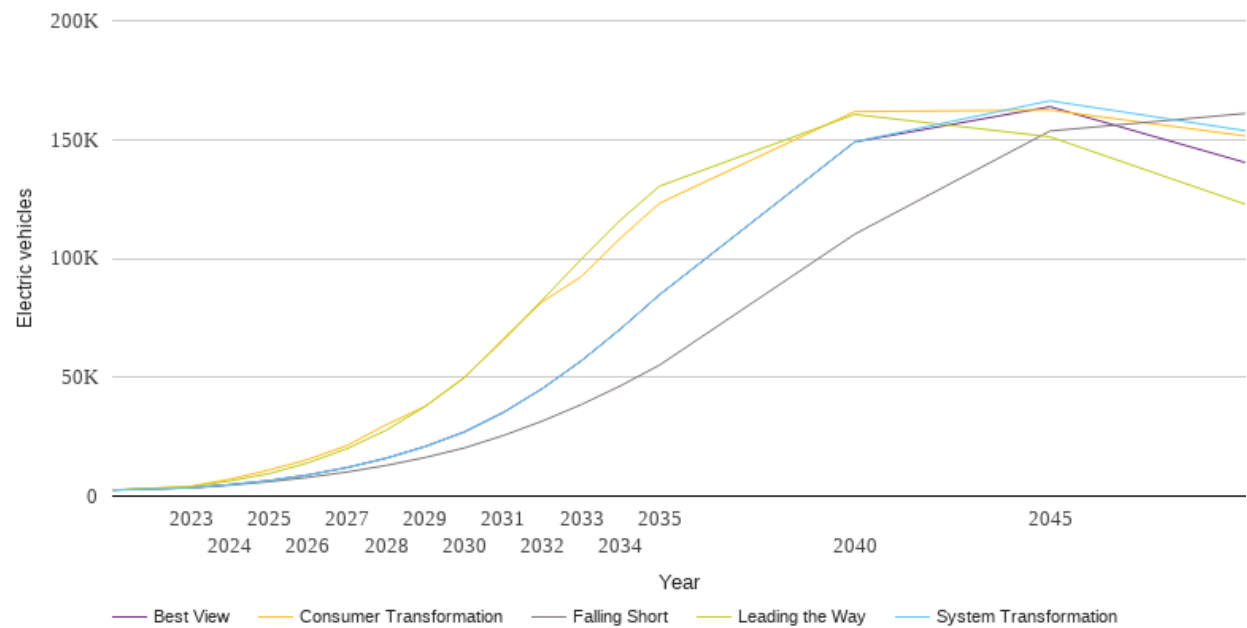
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0	0	0	0	0
2023	356	385	385	466	466
2024	752	845	845	1062	1062
2025	1415	1615	1615	2033	2033
2026	2486	2781	2781	3628	3628
2027	3661	4116	4116	5335	5335
2028	5005	5632	5632	7230	7230
2029	6198	6949	6949	8783	8783
2030	7214	8070	8070	9997	9997
2031	8071	9090	9090	10957	10957
2032	8852	10015	10015	11670	11670
2033	9618	10864	10864	12001	12001
2034	10204	11357	11357	12077	12077
2035	10752	11850	11850	12098	12098
2040	12281	12327	12327	12199	12199
2045	12422	12327	12327	12260	12260
2050	12422	12327	12327	12260	12260



# Technology Summary: Electric vehicles

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

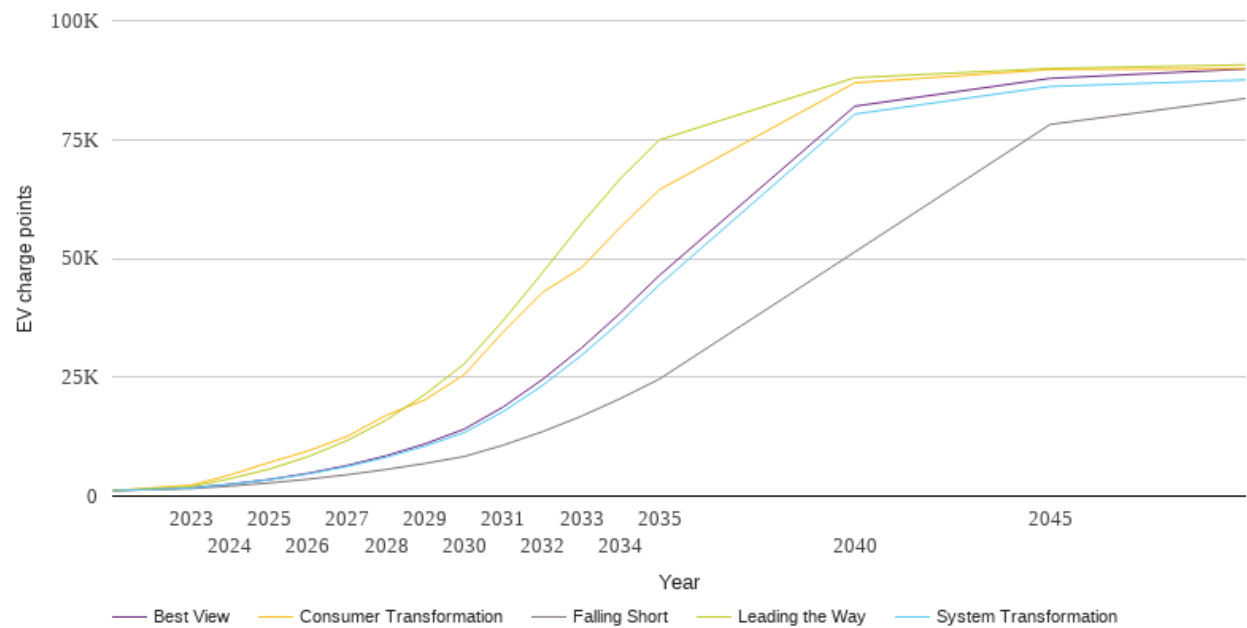
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	2531	2531	2531	2531	2531
2023	3432	3499	4147	3936	3502
2024	4593	4814	7135	6387	4818
2025	6053	6498	10972	9444	6503
2026	7868	8901	15419	13999	8908
2027	10139	12004	21328	19987	12015
2028	12898	15929	30008	27733	15944
2029	16248	20863	37787	37759	20885
2030	20258	26954	49742	49947	26988
2031	25491	35164	66267	65555	35213
2032	31579	45199	81766	82538	45253
2033	38532	56903	92378	99775	56965
2034	46404	70241	108546	116164	70309
2035	55109	84646	123222	130399	84715
2040	110195	149078	161774	160567	148994
2045	153587	166310	162387	151145	163794
2050	160971	153719	151511	122808	140342



# Technology Summary: EV Charge Point

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

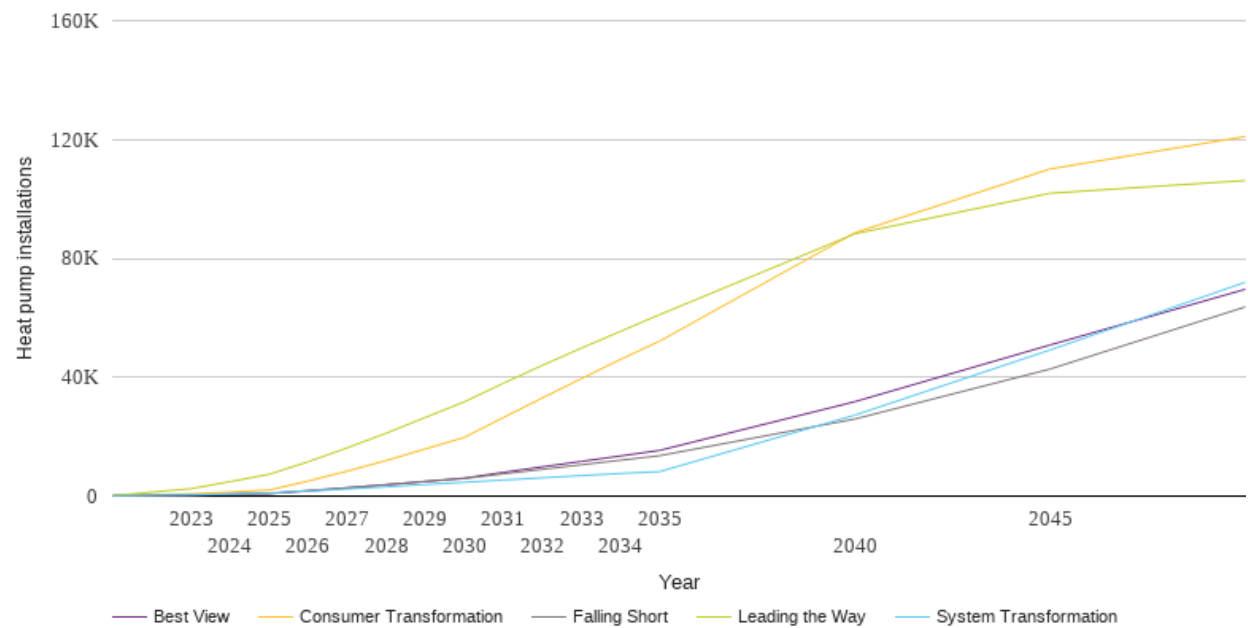
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	1165	1165	1165	1165	1165
2023	1576	1714	2292	2016	1724
2024	2102	2463	4446	3664	2498
2025	2760	3426	7067	5662	3501
2026	3552	4665	9498	8303	4798
2027	4495	6224	12574	11699	6441
2028	5598	8161	17008	15997	8491
2029	6870	10530	20286	21442	11014
2030	8338	13387	25544	27823	14095
2031	10721	17803	34549	36965	18774
2032	13547	23257	42840	46960	24518
2033	16813	29581	48013	57286	31138
2034	20530	36713	56601	66815	38525
2035	24644	44475	64470	74923	46449
2040	51338	80345	86926	87992	82005
2045	78163	86154	89711	89941	87857
2050	83628	87528	89913	90717	89840



# Technology Summary: Heat pumps

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

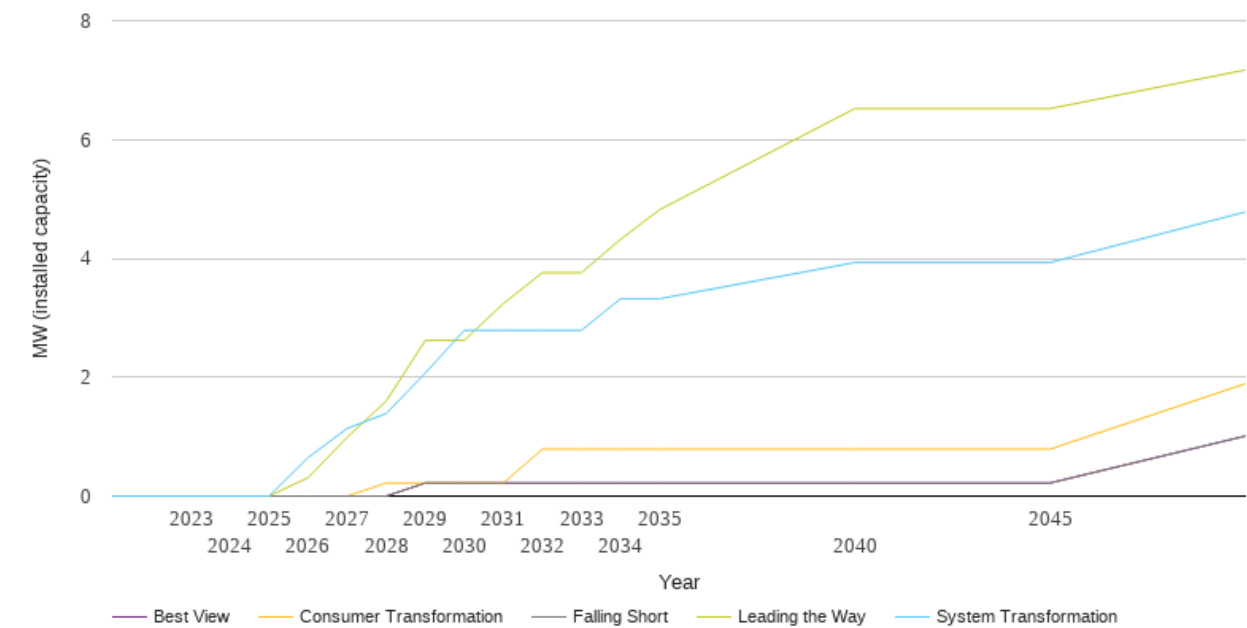
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	140	140	140	140	140
2023	371	407	734	2486	371
2024	611	705	1361	4870	611
2025	850	1046	2030	7324	850
2026	1826	1664	5064	11559	1749
2027	2826	2384	8398	16236	2741
2028	3848	3134	11979	21187	3800
2029	4888	3915	15874	26479	4931
2030	5913	4643	19773	31717	6038
2031	7470	5406	26441	37971	7982
2032	9006	6154	33029	43997	9840
2033	10540	6895	39545	49794	11675
2034	12072	7615	45996	55431	13511
2035	13587	8235	52121	61044	15375
2040	25935	27245	88596	88259	31766
2045	42744	49159	110085	101922	50850
2050	63656	71956	121019	106197	69583



# Technology Summary: Hydrogen electrolysis

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

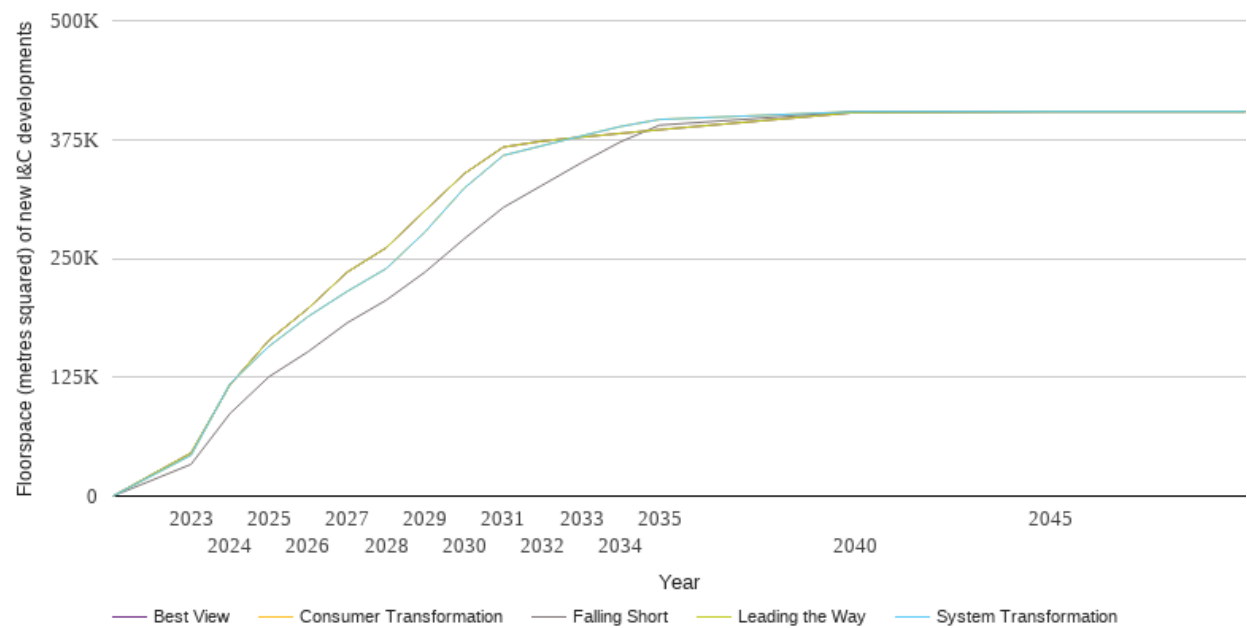
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0.0	0.0	0.0	0.0	0.0
2023	0.0	0.0	0.0	0.0	0.0
2024	0.0	0.0	0.0	0.0	0.0
2025	0.0	0.0	0.0	0.0	0.0
2026	0.0	0.6	0.0	0.3	0.0
2027	0.0	1.1	0.0	1.0	0.0
2028	0.0	1.4	0.2	1.6	0.0
2029	0.2	2.1	0.2	2.6	0.2
2030	0.2	2.8	0.2	2.6	0.2
2031	0.2	2.8	0.2	3.2	0.2
2032	0.2	2.8	0.8	3.8	0.2
2033	0.2	2.8	0.8	3.8	0.2
2034	0.2	3.3	0.8	4.3	0.2
2035	0.2	3.3	0.8	4.8	0.2
2040	0.2	3.9	0.8	6.5	0.2
2045	0.2	3.9	0.8	6.5	0.2
2050	1.0	4.8	1.9	7.2	1.0



# Technology Summary: Non domestic

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

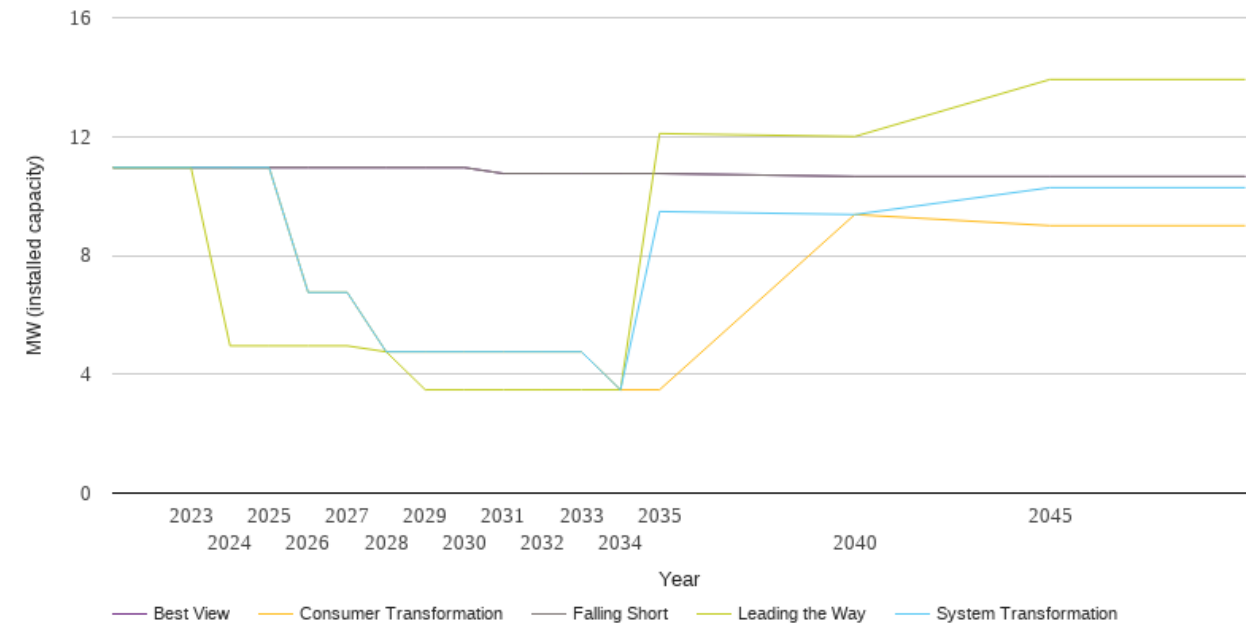
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0	0	0	0	0
2023	33400	42931	42931	45325	45325
2024	86926	118294	118294	117215	117215
2025	125642	157587	157587	164084	164084
2026	151875	188841	188841	197340	197340
2027	182208	215280	215280	235523	235523
2028	206064	239277	239277	261191	261191
2029	235795	278116	278116	300503	300503
2030	270688	323897	323897	339105	339105
2031	303578	358300	358300	367075	367075
2032	327062	368552	368552	373331	373331
2033	350583	378786	378786	377517	377517
2034	372562	388678	388678	381426	381426
2035	390117	396112	396112	385334	385334
2040	404349	404331	404331	403372	403372
2045	404349	404331	404331	404349	404349
2050	404349	404331	404331	404349	404349



# Technology Summary: Other Distributed Generation

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

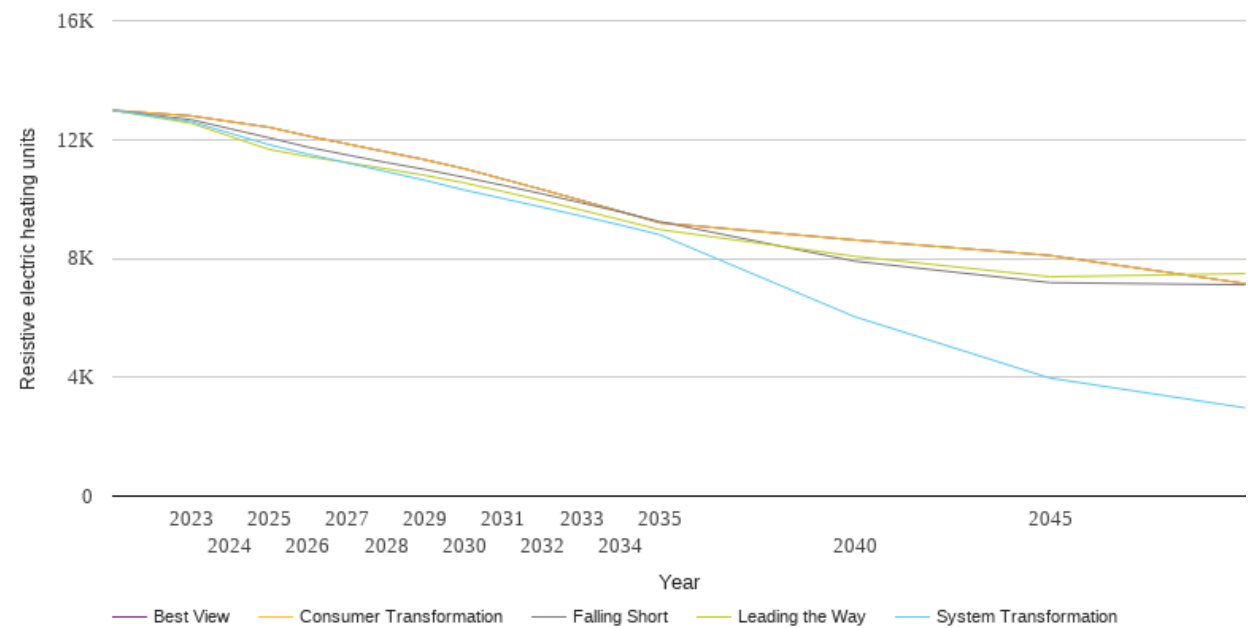
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	11.0	11.0	11.0	11.0	11.0
2023	11.0	11.0	11.0	11.0	11.0
2024	11.0	11.0	11.0	5.0	11.0
2025	11.0	11.0	11.0	5.0	11.0
2026	11.0	6.8	6.8	5.0	11.0
2027	11.0	6.8	6.8	5.0	11.0
2028	11.0	4.8	4.8	4.8	11.0
2029	11.0	4.8	4.8	3.5	11.0
2030	11.0	4.8	4.8	3.5	11.0
2031	10.8	4.8	4.8	3.5	10.8
2032	10.8	4.8	4.8	3.5	10.8
2033	10.8	4.8	4.8	3.5	10.8
2034	10.8	3.5	3.5	3.5	10.8
2035	10.8	9.5	3.5	12.1	10.8
2040	10.7	9.4	9.4	12.0	10.7
2045	10.7	10.3	9.0	13.9	10.7
2050	10.7	10.3	9.0	13.9	10.7



# Technology Summary: Resistive electric heating

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

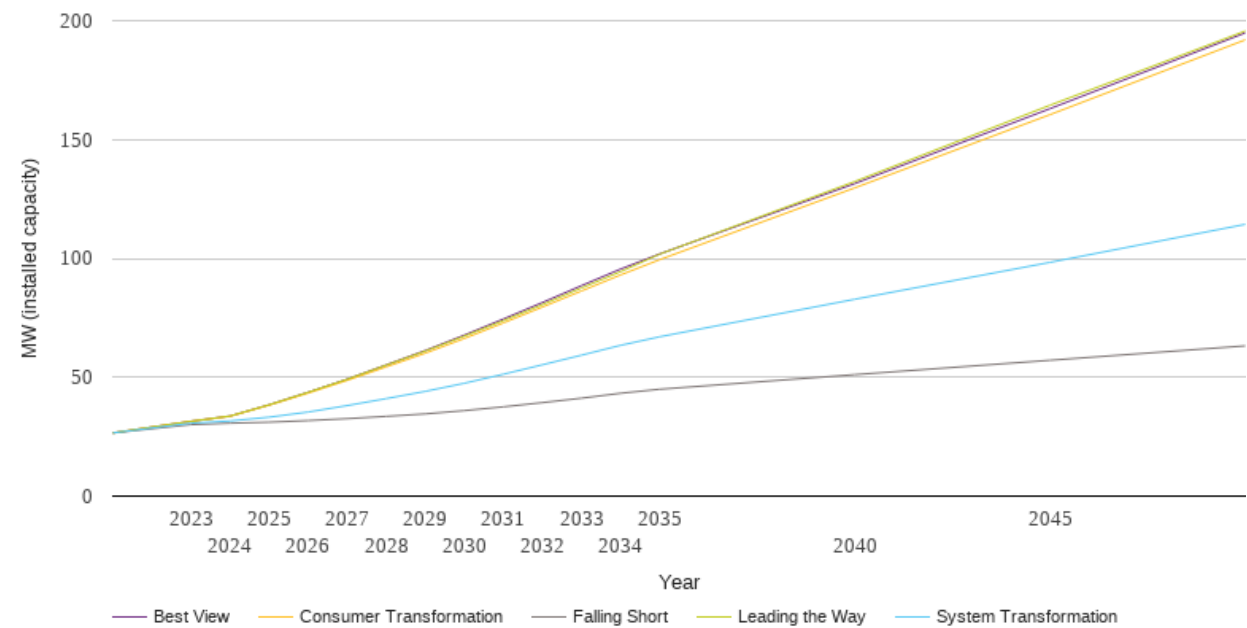
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	12982	12982	12982	12982	12982
2023	12670	12603	12798	12548	12798
2024	12363	12212	12605	12107	12605
2025	12059	11826	12413	11667	12413
2026	11743	11507	12120	11426	12120
2027	11480	11214	11852	11225	11852
2028	11227	10919	11585	11015	11585
2029	10992	10624	11317	10794	11317
2030	10729	10301	11020	10541	11020
2031	10458	10013	10668	10250	10668
2032	10170	9721	10313	9945	10313
2033	9870	9424	9950	9627	9950
2034	9565	9122	9581	9298	9581
2035	9240	8801	9199	8971	9199
2040	7905	6036	8621	8070	8621
2045	7184	3971	8100	7382	8100
2050	7110	2970	7153	7487	7153



# Technology Summary: Solar Generation

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

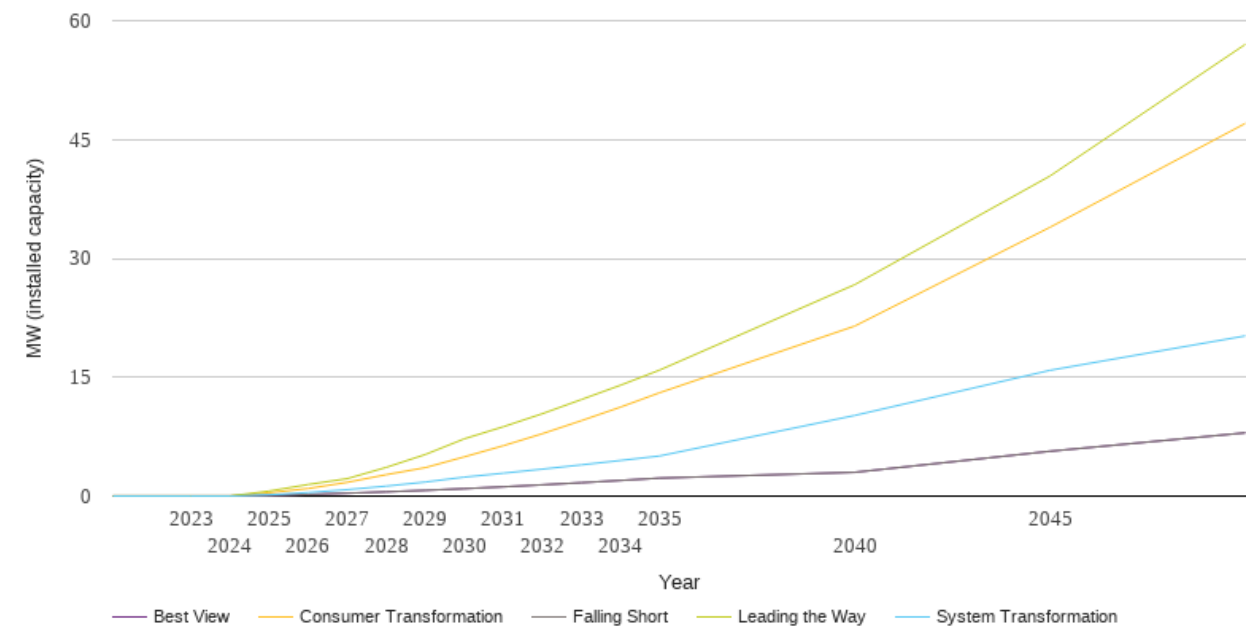
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	26.6	26.6	26.6	26.6	26.6
2023	30.1	30.7	31.4	31.5	31.5
2024	30.7	31.6	33.6	33.7	33.7
2025	31.1	33.2	38.2	38.4	38.4
2026	31.8	35.4	43.3	43.7	43.7
2027	32.6	38.1	48.7	49.2	49.2
2028	33.5	41.0	54.4	55.1	55.2
2029	34.6	44.1	60.1	61.0	61.2
2030	36.0	47.5	66.3	67.3	67.7
2031	37.5	51.3	72.9	73.8	74.5
2032	39.3	55.2	79.5	80.6	81.4
2033	41.2	59.3	86.3	87.6	88.5
2034	43.3	63.4	93.0	94.4	95.5
2035	44.9	67.0	99.4	101.7	101.9
2040	51.1	82.8	129.7	132.3	131.5
2045	57.1	98.3	160.5	164.4	163.0
2050	63.2	114.3	191.9	195.6	194.9



# Technology Summary: Storage

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

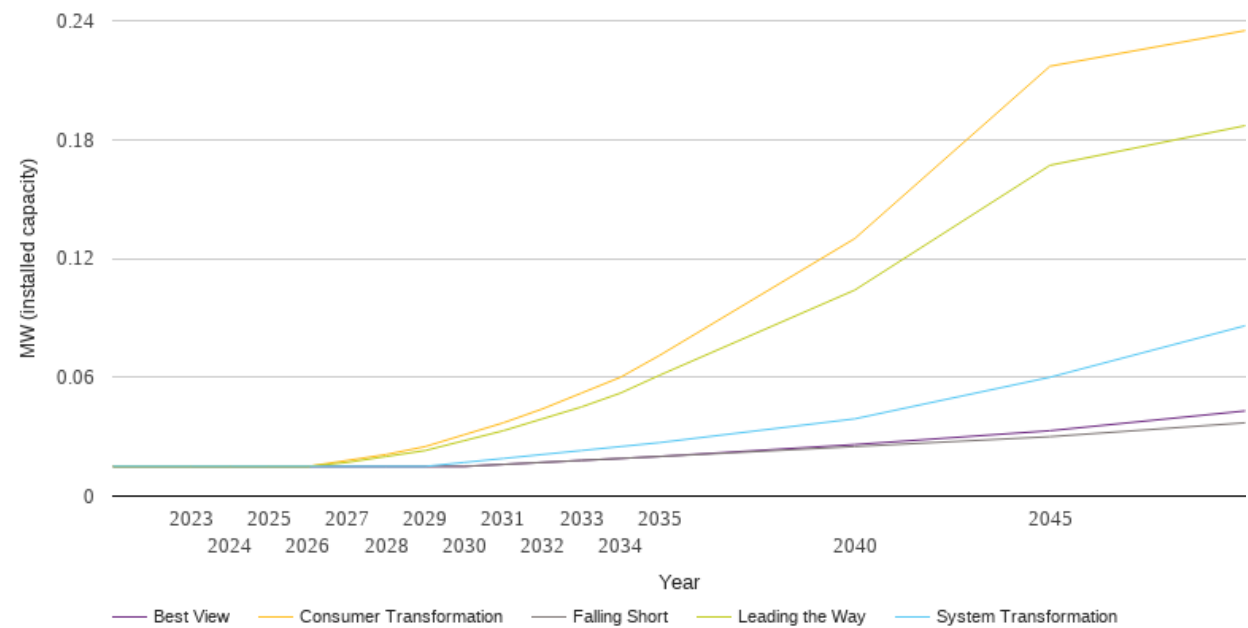
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0.0	0.0	0.0	0.0	0.0
2023	0.0	0.0	0.0	0.0	0.0
2024	0.0	0.0	0.0	0.0	0.0
2025	0.1	0.2	0.4	0.6	0.1
2026	0.2	0.4	1.0	1.5	0.2
2027	0.4	0.8	1.7	2.2	0.4
2028	0.5	1.3	2.7	3.6	0.5
2029	0.7	1.8	3.6	5.2	0.7
2030	0.9	2.4	5.0	7.2	0.9
2031	1.2	2.9	6.4	8.8	1.2
2032	1.4	3.4	7.9	10.4	1.4
2033	1.7	3.9	9.5	12.2	1.7
2034	2.0	4.5	11.2	14.0	2.0
2035	2.3	5.1	13.0	15.9	2.3
2040	3.0	10.2	21.5	26.7	3.0
2045	5.7	15.9	33.9	40.4	5.7
2050	8.0	20.2	47.0	57.0	8.0



# Technology Summary: Wind

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

Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0.0	0.0	0.0	0.0	0.0
2023	0.0	0.0	0.0	0.0	0.0
2024	0.0	0.0	0.0	0.0	0.0
2025	0.0	0.0	0.0	0.0	0.0
2026	0.0	0.0	0.0	0.0	0.0
2027	0.0	0.0	0.0	0.0	0.0
2028	0.0	0.0	0.0	0.0	0.0
2029	0.0	0.0	0.0	0.0	0.0
2030	0.0	0.0	0.0	0.0	0.0
2031	0.0	0.0	0.0	0.0	0.0
2032	0.0	0.0	0.0	0.0	0.0
2033	0.0	0.0	0.1	0.0	0.0
2034	0.0	0.0	0.1	0.1	0.0
2035	0.0	0.0	0.1	0.1	0.0
2040	0.0	0.0	0.1	0.1	0.0
2045	0.0	0.1	0.2	0.2	0.0
2050	0.0	0.1	0.2	0.2	0.0



National Grid Electricity Distribution PLC 09223384)  
National Grid Electricity Distribution (East Midlands) Plc (company number 02366923))  
National Grid Electricity Distribution (West Midlands) Plc (company number 03600574))  
National Grid Electricity Distribution (South West) Plc (company number 02366894))  
National Grid Electricity Distribution (South Wales) Plc (company number 02366985))  
(collectively, “NGED”)

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