

Distribution Future Energy Scenarios 2022

Local Authority:
Plymouth

What are Distribution Future Energy Scenarios?

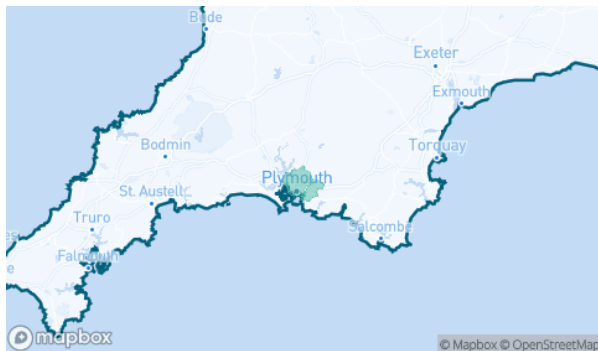
National Grid run Distribution Future Energy Scenarios (DFES) on an annual cycle for all licence areas, and represent a range of credible future scenarios of what could connect to the distribution network.

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 Plymouth covered by the NGED licence areas.



Scenario Summary

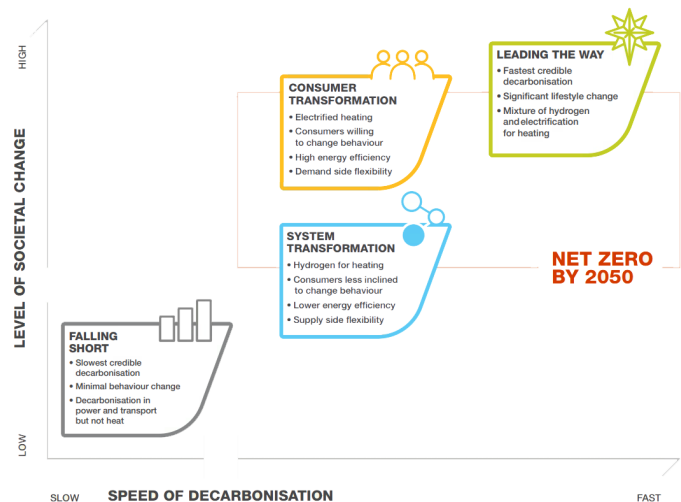
This DFES scenario framework includes three scenarios that are compliant with UK government targets of Net Zero greenhouse gas emissions by 2050. A summary of each scenario is below:

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 Plymouth 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	2102	6246	5292	5292	2107	69962	41853	41853	2110
Domestic	New dwellings	0	5835	6417	6417	7664	10140	10021	10021	9947
Electric vehicles	Electric vehicles	2749	22682	29055	53374	53235	175130	183888	184549	132119
EV Charge Point	EV charge points	1519	9866	14863	28577	30849	90048	90293	92096	96608
Heat pumps	Heat pump installations	155	6698	5621	19057	29772	64538	72134	117519	99836
Hydrogen electrolysis	MW (installed capacity)	0.0	0.0	1.6	0.0	2.1	1.1	11.7	7.7	16.9
Non domestic	Floorspace (metres squared) of new I&C developments	0	143994	197942	197942	204157	601131	600017	600017	601131
Other Distributed Generation	MW (installed capacity)	24.4	25.4	25.4	32.5	20.8	25.4	2.1	9.4	23.4
Resistive electric heating	Resistive electric heating units	16278	14067	13491	14077	13690	9394	4612	9693	9999
Solar Generation	MW (installed capacity)	36.0	42.0	54.0	75.6	76.8	65.9	125.1	216.4	228.2
Storage	MW (installed capacity)	0.1	0.4	2.2	5.4	7.0	6.8	17.5	49.3	64.0
Wind	MW (installed capacity)	0.0	0.0	0.1	0.3	0.2	0.1	0.4	1.9	1.6

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

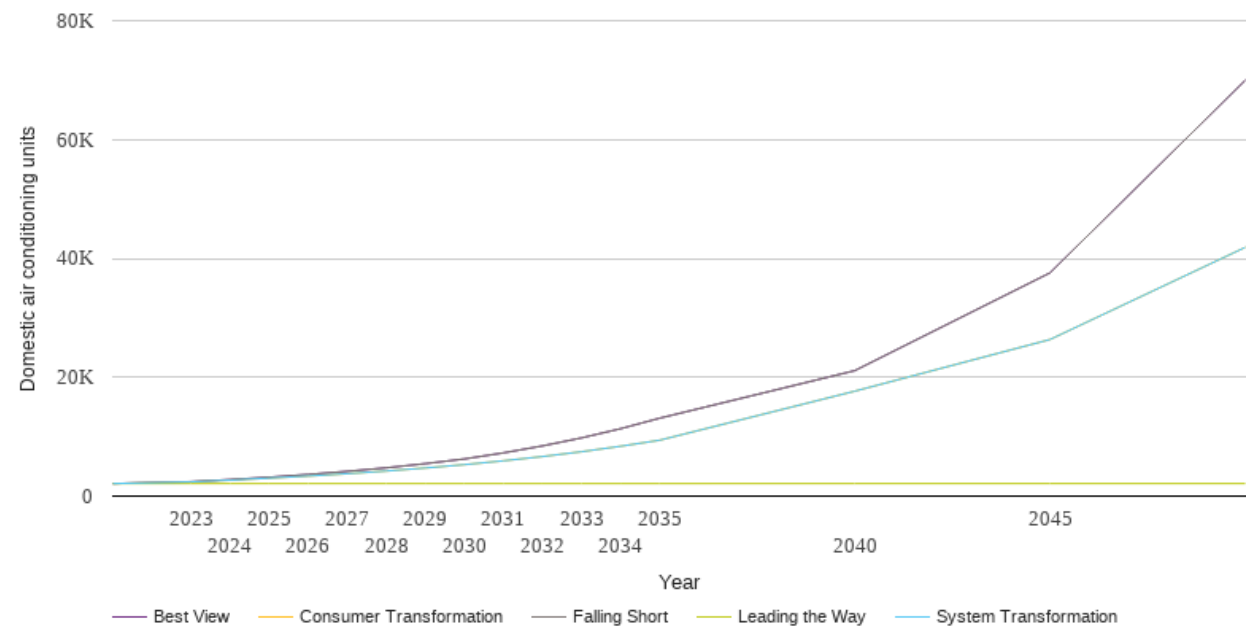
NGED is committed to continually improving the DFES process. To ensure the DFES projections fully capture local ambition, in 2022 we have appointed two DSO Strategic Engagement Officers to engage with local authorities. Any feedback will be incorporated into future Distribution Future Energy Scenarios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

If you have any comments or queries regarding these reports, please contact nged.energyplanning@nationalgrid.co.uk.

Technology Summary: Air conditioning

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

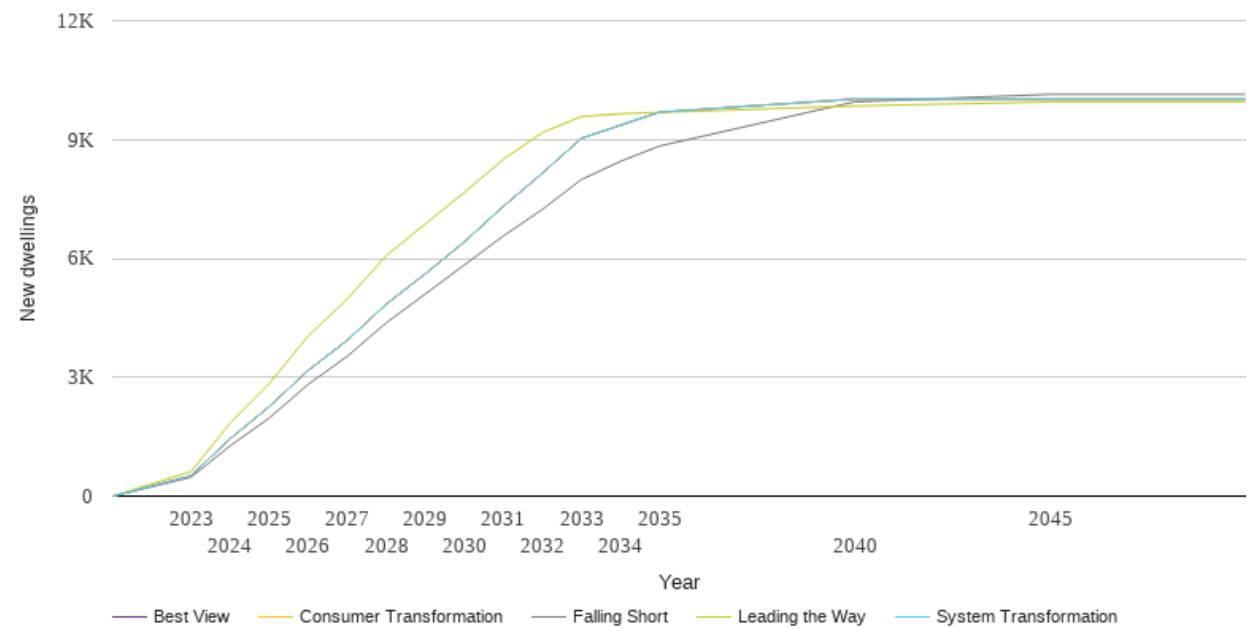
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	2102	2102	2102	2102	2102
2023	2422	2385	2385	2103	2422
2024	2767	2677	2677	2104	2767
2025	3171	3016	3016	2105	3171
2026	3633	3368	3368	2106	3633
2027	4160	3763	3763	2106	4160
2028	4757	4217	4217	2107	4757
2029	5458	4727	4727	2107	5458
2030	6246	5292	5292	2107	6246
2031	7269	5934	5934	2107	7269
2032	8441	6655	6655	2107	8441
2033	9789	7463	7463	2107	9789
2034	11335	8383	8383	2107	11335
2035	13105	9397	9397	2107	13105
2040	21110	17653	17653	2109	21110
2045	37563	26346	26346	2110	37563
2050	69962	41853	41853	2110	69962



Technology Summary: Domestic

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

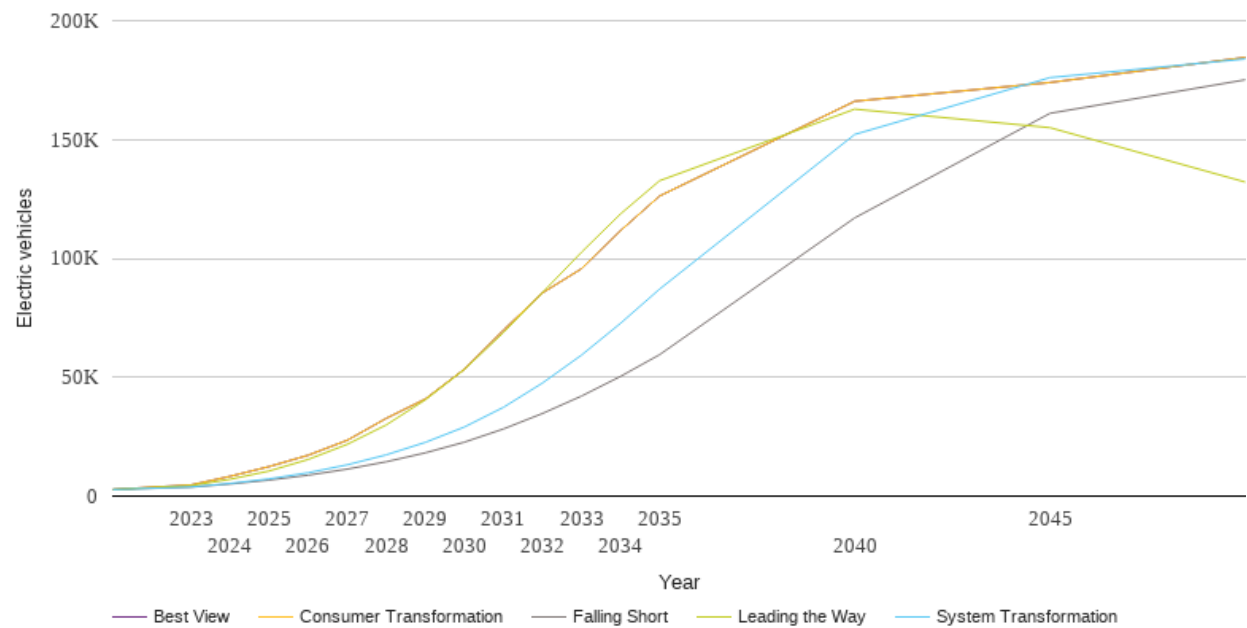
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0	0	0	0	0
2023	476	513	513	622	513
2024	1267	1445	1445	1842	1445
2025	1968	2257	2257	2837	2257
2026	2820	3173	3173	4041	3173
2027	3527	3930	3930	4973	3930
2028	4372	4845	4845	6067	4845
2029	5101	5609	5609	6870	5609
2030	5835	6417	6417	7664	6417
2031	6566	7314	7314	8500	7314
2032	7237	8151	8151	9176	8151
2033	7992	9031	9031	9580	9031
2034	8450	9361	9361	9651	9361
2035	8836	9691	9691	9683	9691
2040	9952	10021	10021	9848	10021
2045	10140	10021	10021	9947	10021
2050	10140	10021	10021	9947	10021



Technology Summary: Electric vehicles

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

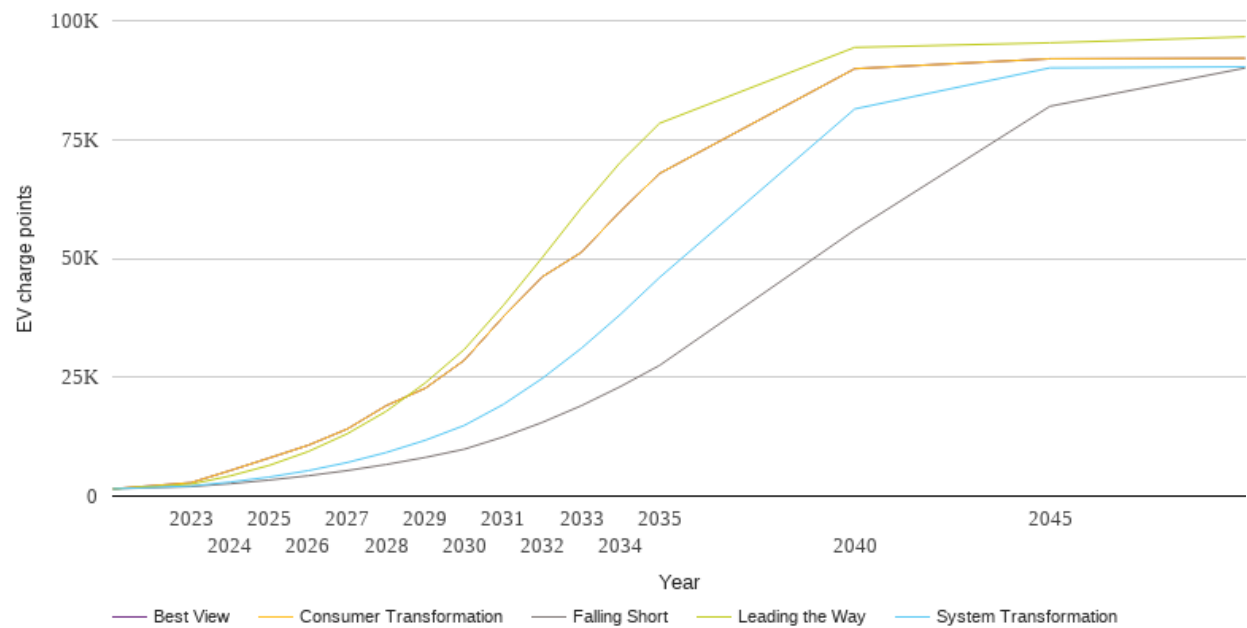
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	2749	2749	2749	2749	2749
2023	3769	3845	4679	4385	4679
2024	5093	5329	8311	7074	8311
2025	6737	7240	12415	10553	12415
2026	8790	9821	17185	15411	17185
2027	11344	13153	23478	21763	23478
2028	14440	17353	32711	29937	32711
2029	18196	22606	40836	40487	40836
2030	22682	29055	53374	53235	53374
2031	28231	37329	69836	68737	69836
2032	34745	47550	85464	85608	85464
2033	42070	59295	95650	102578	95650
2034	50354	72675	111672	118692	111672
2035	59481	87071	126231	132668	126231
2040	117054	152147	166102	162784	166102
2045	161016	176050	173989	154994	173989
2050	175130	183888	184549	132119	184549



Technology Summary: EV Charge Point

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

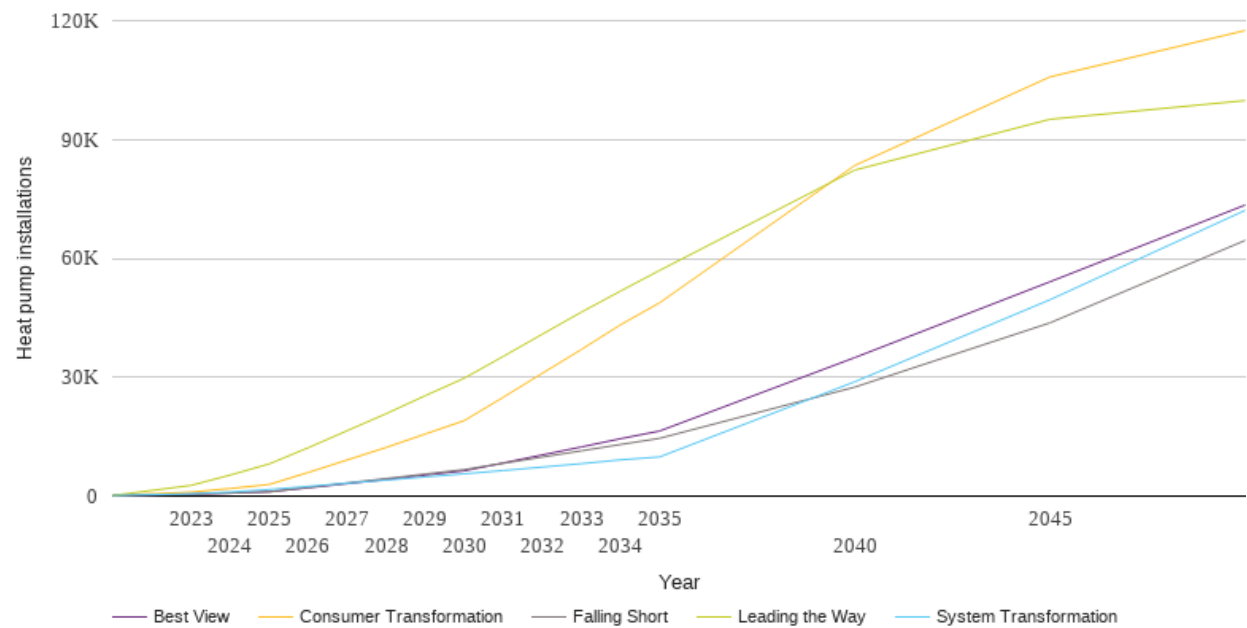
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	1519	1519	1519	1519	1519
2023	1991	2121	2822	2505	2822
2024	2599	2943	5365	4239	5365
2025	3366	3998	8007	6449	8007
2026	4277	5346	10687	9360	10687
2027	5364	7060	14106	13110	14106
2028	6647	9170	19030	17839	19030
2029	8136	11744	22690	23815	22690
2030	9866	14863	28577	30849	28577
2031	12456	19298	37754	40112	37754
2032	15509	24775	46144	50206	46144
2033	19032	31101	51284	60638	51284
2034	23048	38236	59944	70254	59944
2035	27483	45977	67856	78413	67856
2040	55981	81437	89899	94382	89899
2045	82002	90075	91986	95347	91986
2050	90048	90293	92096	96608	92096



Technology Summary: Heat pumps

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

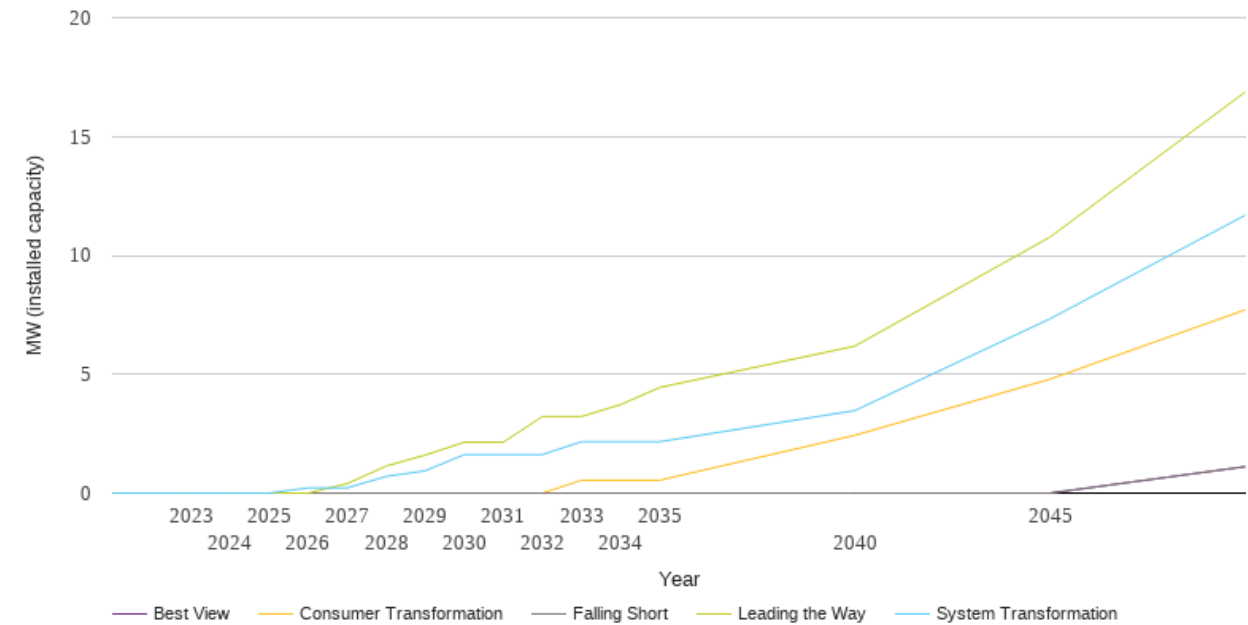
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	155	155	155	155	155
2023	459	578	1003	2701	459
2024	754	1034	1902	5301	754
2025	1084	1650	2938	8114	1084
2026	2188	2450	5955	12197	2093
2027	3309	3262	9121	16516	3147
2028	4432	4032	12285	20808	4194
2029	5568	4842	15676	25350	5289
2030	6698	5621	19057	29772	6375
2031	8272	6454	24962	35273	8367
2032	9856	7323	31004	40875	10393
2033	11426	8190	37005	46437	12408
2034	13019	9144	43239	51746	14481
2035	14577	9881	48770	56956	16421
2040	27499	28856	83456	82283	34957
2045	43724	49562	105808	95110	54094
2050	64538	72134	117519	99836	73471



Technology Summary: Hydrogen electrolysis

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

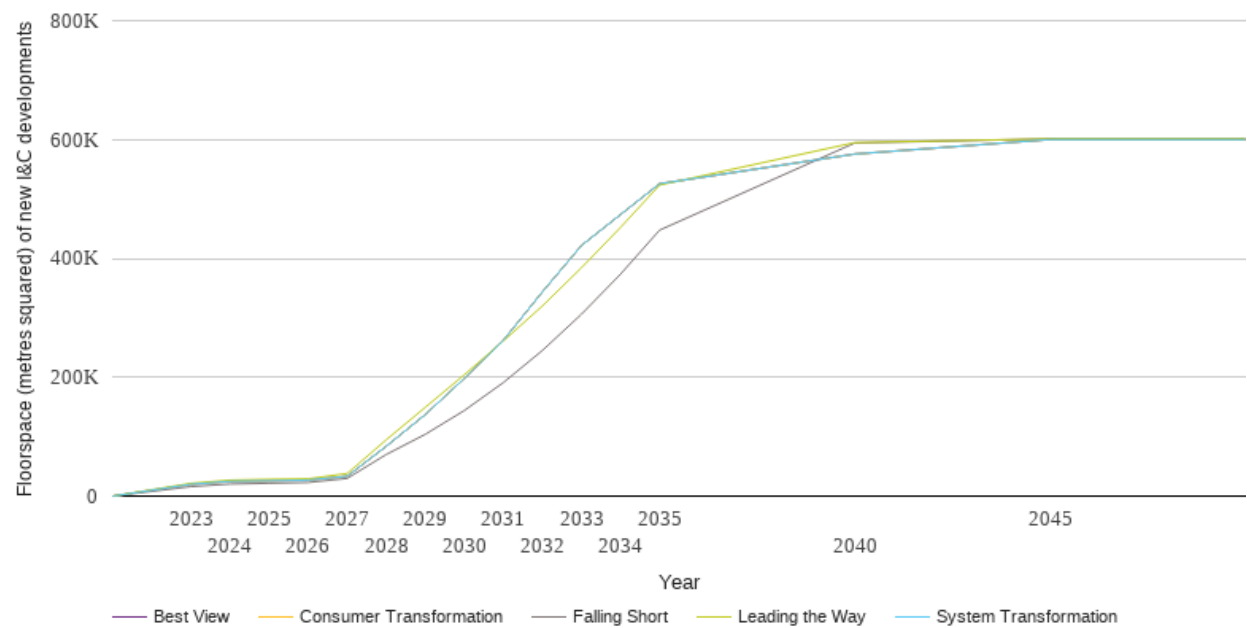
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0.0	0.0	0.0	0.0	0.0
2023	0.0	0.0	0.0	0.0	0.0
2024	0.0	0.0	0.0	0.0	0.0
2025	0.0	0.0	0.0	0.0	0.0
2026	0.0	0.2	0.0	0.0	0.0
2027	0.0	0.2	0.0	0.4	0.0
2028	0.0	0.7	0.0	1.1	0.0
2029	0.0	0.9	0.0	1.6	0.0
2030	0.0	1.6	0.0	2.1	0.0
2031	0.0	1.6	0.0	2.1	0.0
2032	0.0	1.6	0.0	3.2	0.0
2033	0.0	2.2	0.5	3.2	0.0
2034	0.0	2.2	0.5	3.7	0.0
2035	0.0	2.2	0.5	4.4	0.0
2040	0.0	3.5	2.4	6.2	0.0
2045	0.0	7.3	4.8	10.8	0.0
2050	1.1	11.7	7.7	16.9	1.1



Technology Summary: Non domestic

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

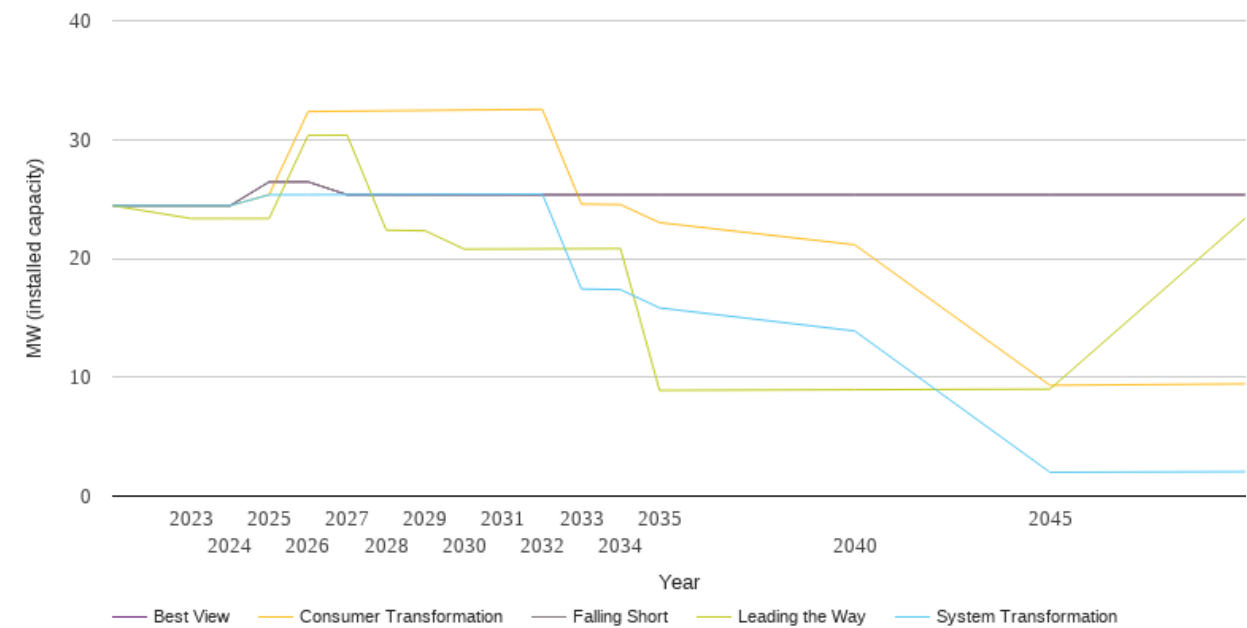
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0	0	0	0	0
2023	16037	19904	19904	21566	19904
2024	20351	24766	24766	26874	24766
2025	21672	25782	25782	28194	25782
2026	23026	26987	26987	29083	26987
2027	29809	33392	33392	38023	33392
2028	70000	83797	83797	94767	83797
2029	103931	137278	137278	149380	137278
2030	143994	197942	197942	204157	197942
2031	191037	262096	262096	261028	262096
2032	245059	343682	343682	319976	343682
2033	306060	421778	421778	384269	421778
2034	373376	473702	473702	452051	473702
2035	447507	525626	525626	523324	525626
2040	594152	575590	575590	594849	575590
2045	601131	600017	600017	601131	600017
2050	601131	600017	600017	601131	600017



Technology Summary: Other Distributed Generation

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

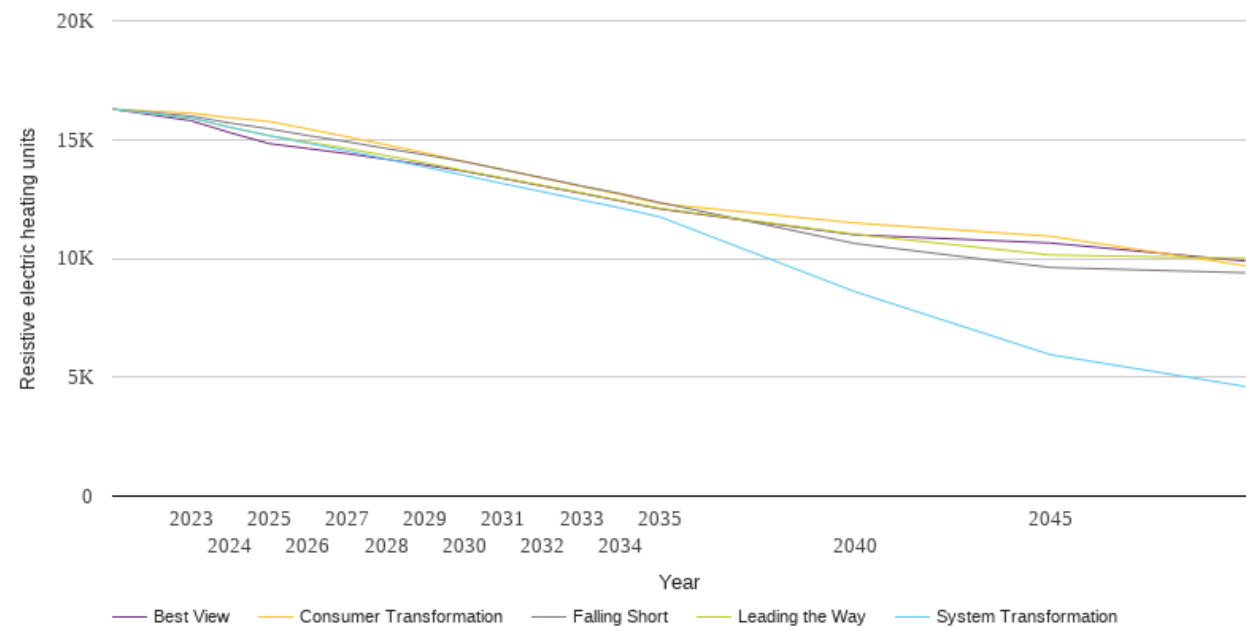
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	24.4	24.4	24.4	24.4	24.4
2023	24.4	24.4	24.4	23.4	24.4
2024	24.4	24.4	24.4	23.4	24.4
2025	26.4	25.4	25.4	23.4	26.4
2026	26.4	25.4	32.4	30.4	26.4
2027	25.4	25.4	32.4	30.4	25.4
2028	25.4	25.4	32.4	22.4	25.4
2029	25.4	25.4	32.4	22.3	25.4
2030	25.4	25.4	32.5	20.8	25.4
2031	25.4	25.4	32.5	20.8	25.4
2032	25.4	25.4	32.5	20.8	25.4
2033	25.4	17.4	24.6	20.8	25.4
2034	25.4	17.4	24.5	20.8	25.4
2035	25.4	15.8	23.0	8.9	25.4
2040	25.4	13.9	21.1	8.9	25.4
2045	25.4	2.0	9.3	9.0	25.4
2050	25.4	2.1	9.4	23.4	25.4



Technology Summary: Resistive electric heating

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

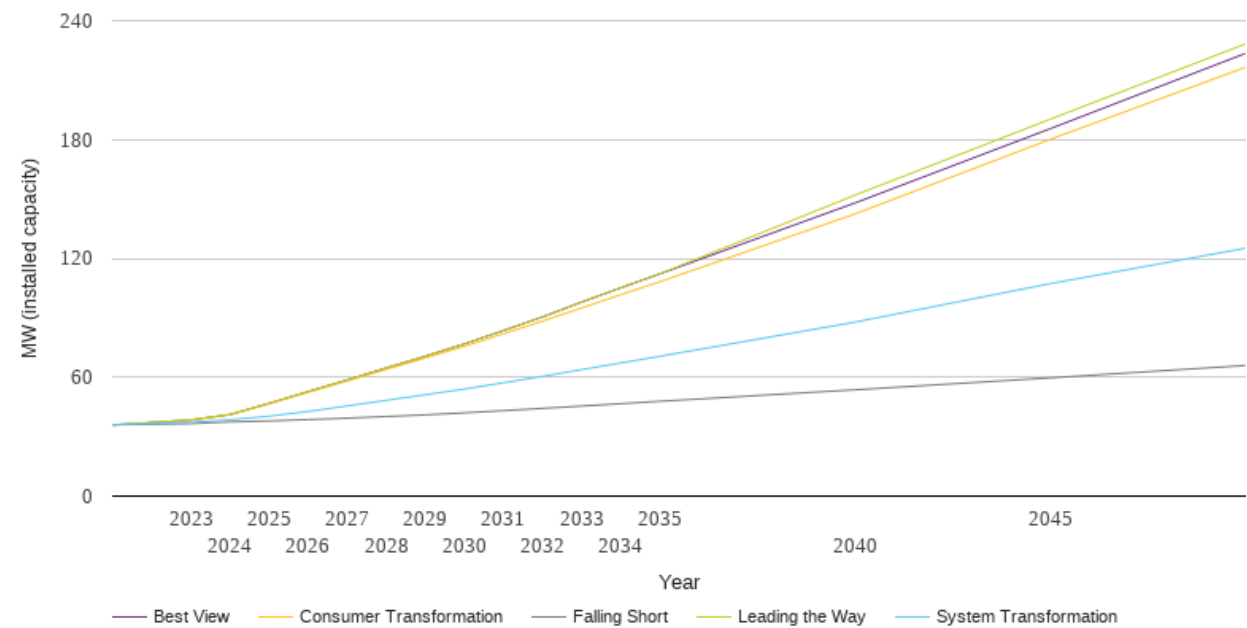
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	16278	16278	16278	16278	16278
2023	15986	15908	16110	15902	15791
2024	15695	15518	15918	15509	15288
2025	15451	15160	15760	15169	14830
2026	15167	14844	15442	14893	14619
2027	14907	14523	15118	14622	14408
2028	14623	14184	14776	14323	14171
2029	14356	13846	14435	14019	13929
2030	14067	13491	14077	13690	13666
2031	13732	13142	13728	13379	13358
2032	13394	12805	13375	13070	13047
2033	13049	12455	13025	12761	12739
2034	12725	12122	12687	12437	12415
2035	12353	11749	12307	12109	12084
2040	10627	8601	11491	11014	10992
2045	9619	5953	10932	10145	10648
2050	9394	4612	9693	9999	9888



Technology Summary: Solar Generation

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

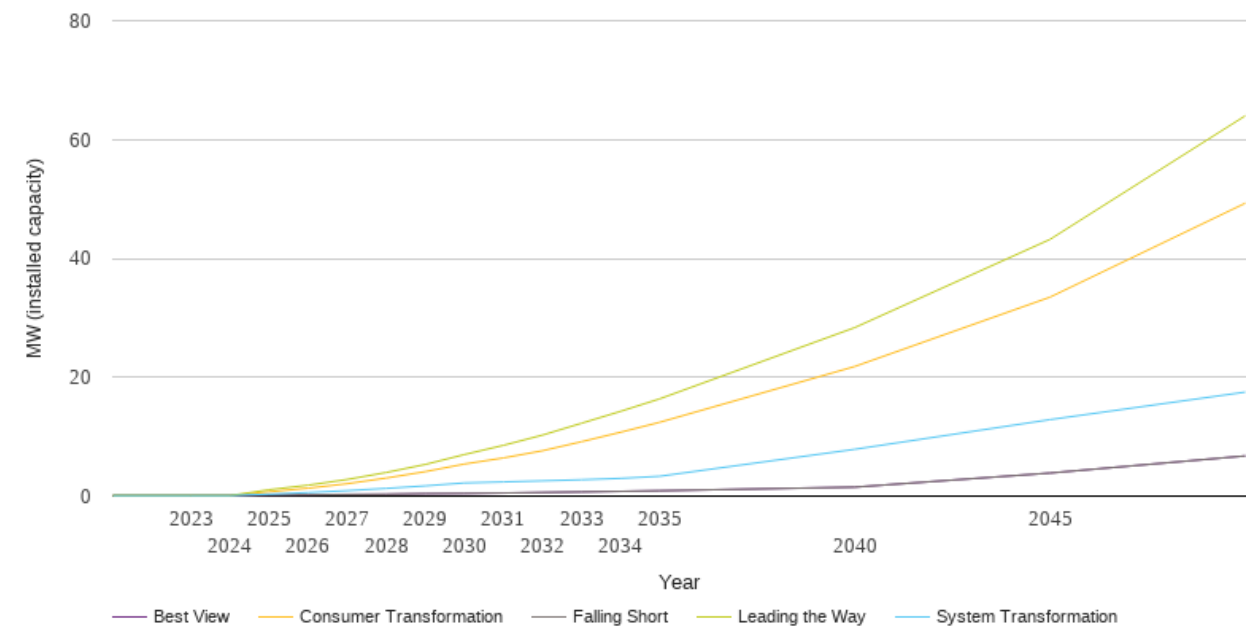
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	36.0	36.0	36.0	36.0	36.0
2023	36.6	37.4	38.3	38.4	38.4
2024	37.5	38.5	41.1	41.2	41.2
2025	38.0	40.4	46.6	46.8	46.8
2026	38.6	42.7	52.4	52.7	52.7
2027	39.3	45.5	58.1	58.6	58.6
2028	40.2	48.4	64.0	64.6	64.6
2029	41.0	51.2	69.7	70.6	70.6
2030	42.0	54.0	75.6	76.8	76.8
2031	43.1	57.2	81.9	83.5	83.5
2032	44.3	60.4	88.3	90.4	90.4
2033	45.4	63.8	95.0	97.9	97.9
2034	46.6	67.2	101.6	105.1	105.1
2035	47.8	70.5	108.1	112.1	112.1
2040	53.6	87.8	142.4	151.9	147.9
2045	59.7	107.2	180.0	190.2	185.4
2050	65.9	125.1	216.4	228.2	223.4



Technology Summary: Storage

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

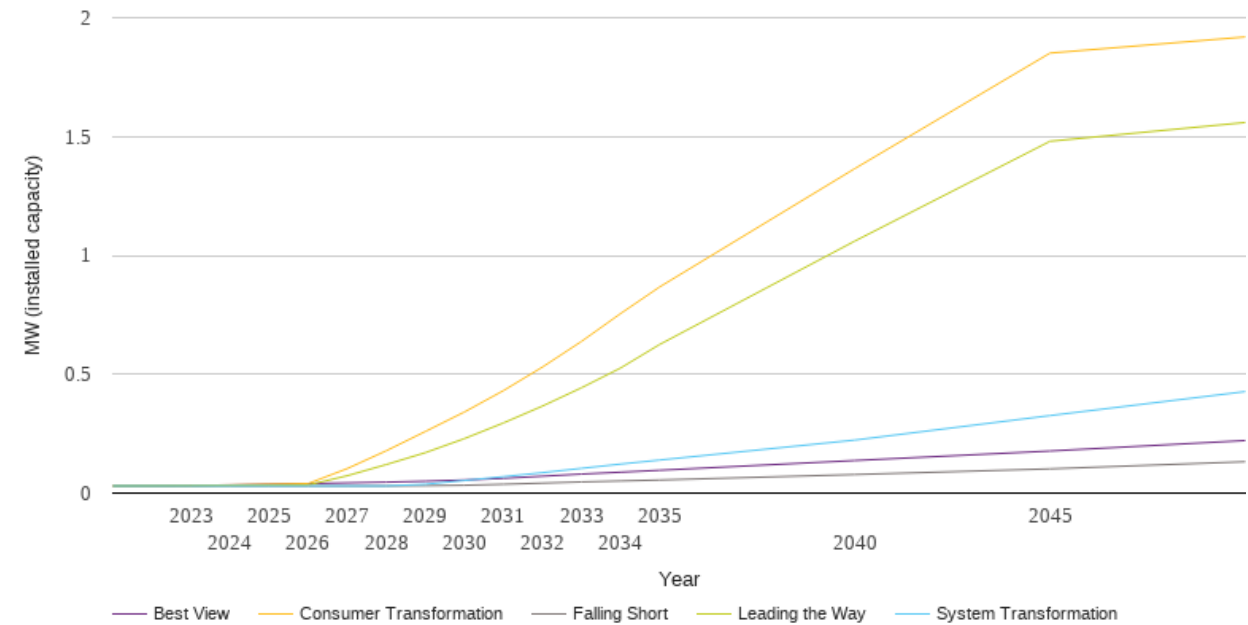
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0.1	0.1	0.1	0.1	0.1
2023	0.1	0.1	0.1	0.1	0.1
2024	0.1	0.1	0.1	0.1	0.1
2025	0.2	0.3	0.7	1.1	0.2
2026	0.2	0.6	1.3	1.8	0.2
2027	0.3	0.9	2.1	2.8	0.3
2028	0.3	1.3	3.0	4.0	0.3
2029	0.4	1.7	4.1	5.3	0.4
2030	0.4	2.2	5.4	7.0	0.4
2031	0.5	2.4	6.4	8.5	0.5
2032	0.6	2.6	7.6	10.3	0.6
2033	0.7	2.8	9.1	12.3	0.7
2034	0.8	3.0	10.7	14.3	0.8
2035	0.9	3.3	12.4	16.4	0.9
2040	1.5	7.9	21.8	28.4	1.5
2045	3.9	12.9	33.5	43.2	3.9
2050	6.8	17.5	49.3	64.0	6.8



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	0.1	0.1	0.0
2028	0.0	0.0	0.2	0.1	0.0
2029	0.0	0.0	0.3	0.2	0.0
2030	0.0	0.1	0.3	0.2	0.1
2031	0.0	0.1	0.4	0.3	0.1
2032	0.0	0.1	0.5	0.4	0.1
2033	0.0	0.1	0.6	0.4	0.1
2034	0.1	0.1	0.8	0.5	0.1
2035	0.1	0.1	0.9	0.6	0.1
2040	0.1	0.2	1.4	1.1	0.1
2045	0.1	0.3	1.9	1.5	0.2
2050	0.1	0.4	1.9	1.6	0.2



National Grid Electricity Distribution PLC 09223384)
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