

# Distribution Future Energy Scenarios 2022

Local Authority:  
Caerphilly

## What are Distribution Future Energy Scenarios?

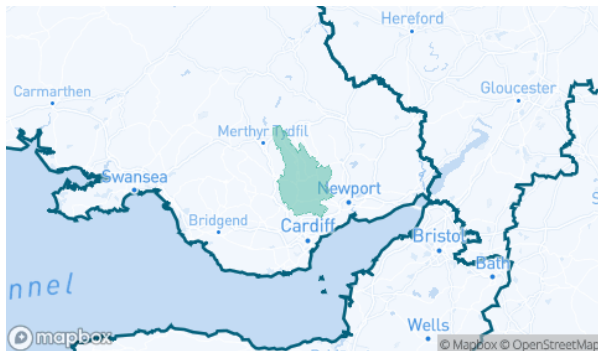
National Grid run Distribution Future Energy Scenarios (DFES) on an annual cycle for all licence areas, and represent a range of credible future scenarios of what could connect to the distribution network.

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 Caerphilly 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 Caerphilly 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	280	927	753	753	280	24546	12054	12054	280
Domestic	New dwellings	0	3465	3810	3810	4637	5621	5551	5551	5513
Electric vehicles	Electric vehicles	940	14411	18441	34451	34383	108486	100870	100170	80232
EV Charge Point	EV charge points	483	6387	9728	18543	20341	60204	60444	60617	63119
Heat pumps	Heat pump installations	125	2629	2805	10730	19416	40159	47180	80252	66834
Hydrogen electrolysis	MW (installed capacity)	0.0	0.0	0.3	0.0	0.8	2.2	5.9	4.0	6.9
Non domestic	Floorspace (metres squared) of new I&C developments	0	116352	148873	148873	155092	237141	236016	236016	237141
Other Distributed Generation	MW (installed capacity)	1.7	1.7	1.1	1.1	1.1	1.1	1.1	0.0	1.7
Resistive electric heating	Resistive electric heating units	2411	2443	2242	2315	2325	2116	1115	1860	1948
Solar Generation	MW (installed capacity)	18.2	24.7	35.1	49.0	55.7	70.6	131.2	189.6	194.3
Storage	MW (installed capacity)	0.0	0.5	1.8	3.9	5.7	7.7	16.9	43.5	55.0
Wind	MW (installed capacity)	10.6	10.8	11.2	29.3	15.5	16.2	32.4	94.1	69.5

## 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

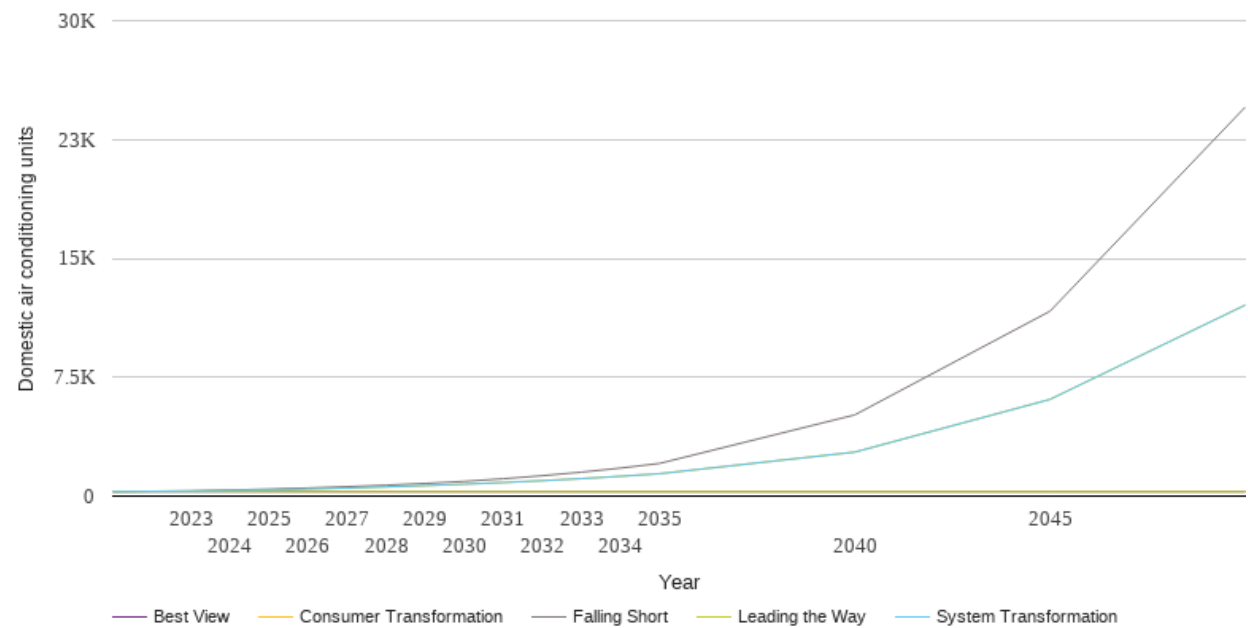
NGED is committed to continually improving the DFES process. To ensure the DFES projections fully capture local ambition, in 2022 we have appointed two DSO Strategic Engagement Officers to engage with local authorities. Any feedback will be incorporated into future Distribution Future Energy Scenarios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

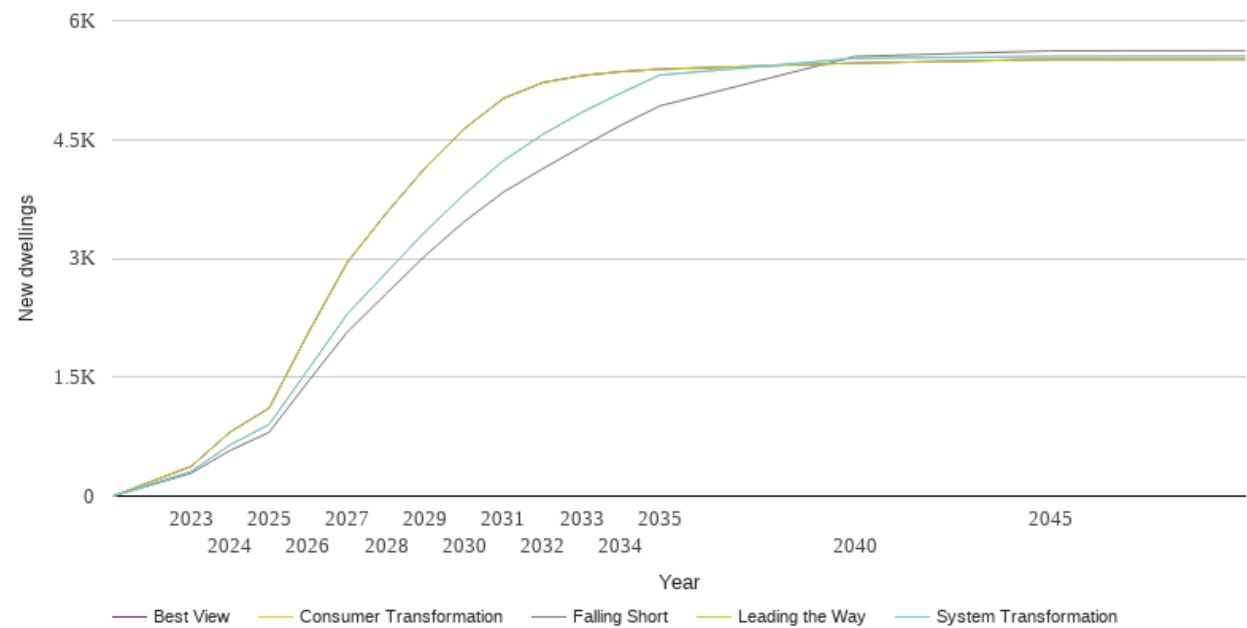
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	280	280	280	280	280
2023	321	315	315	280	280
2024	375	351	351	280	280
2025	439	394	394	280	280
2026	512	449	449	280	280
2027	594	511	511	280	280
2028	689	582	582	280	280
2029	801	663	663	280	280
2030	927	753	753	280	280
2031	1095	857	857	280	280
2032	1288	972	972	280	280
2033	1510	1102	1102	280	280
2034	1767	1250	1250	280	280
2035	2060	1413	1413	280	280
2040	5124	2775	2775	280	280
2045	11664	6102	6102	280	280
2050	24546	12054	12054	280	280



# Technology Summary: Domestic

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

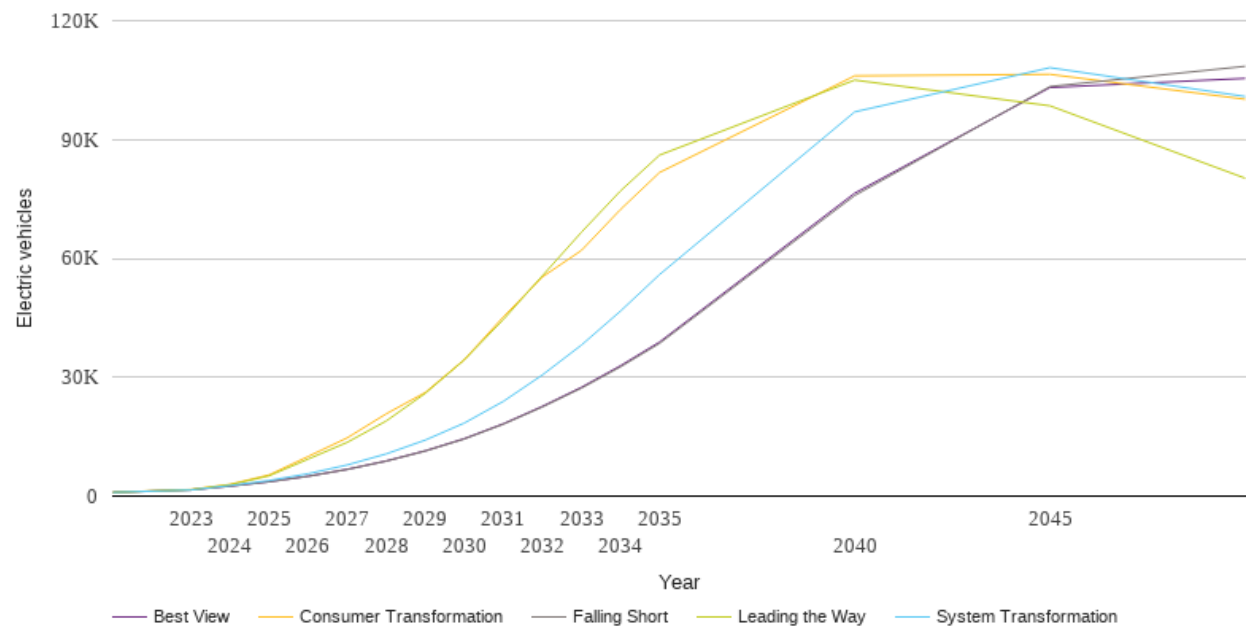
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0	0	0	0	0
2023	288	310	310	375	375
2024	576	646	646	808	808
2025	804	905	905	1111	1111
2026	1445	1598	1598	2056	2056
2027	2070	2296	2296	2949	2949
2028	2554	2820	2820	3569	3569
2029	3036	3339	3339	4145	4145
2030	3465	3810	3810	4637	4637
2031	3836	4233	4233	5018	5018
2032	4129	4562	4562	5217	5217
2033	4409	4841	4841	5306	5306
2034	4677	5083	5083	5356	5356
2035	4923	5313	5313	5388	5388
2040	5548	5525	5525	5465	5465
2045	5619	5549	5549	5511	5511
2050	5621	5551	5551	5513	5513



# Technology Summary: Electric vehicles

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

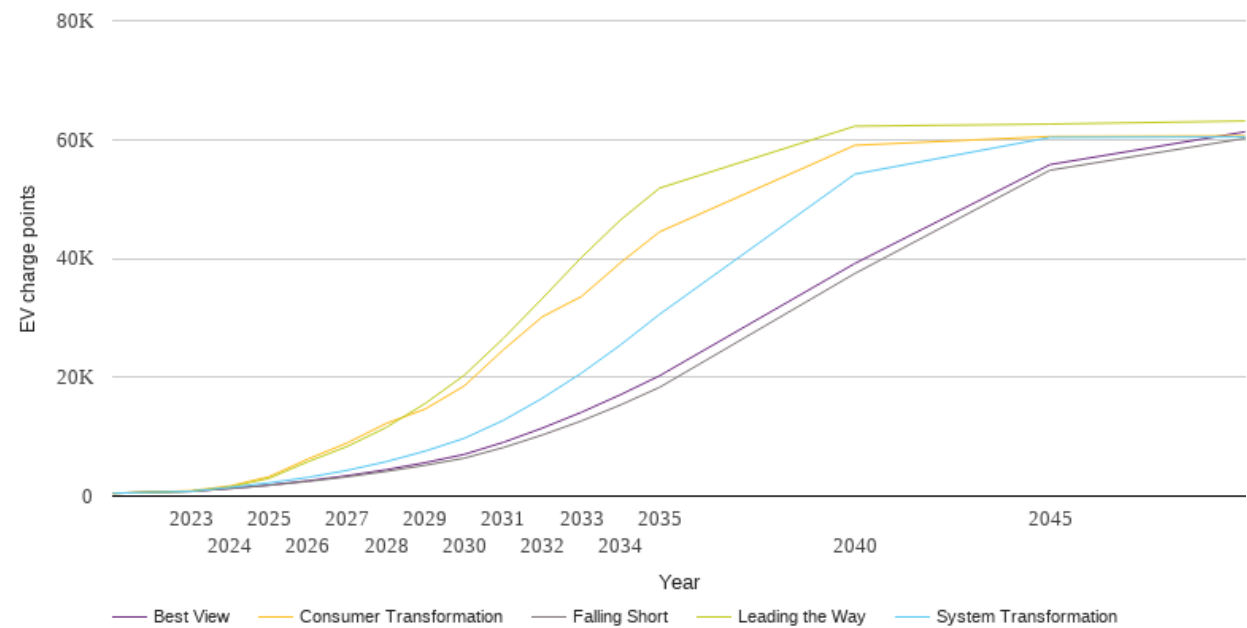
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	940	940	940	940	940
2023	1569	1552	1656	1610	1569
2024	2507	2664	2956	2871	2512
2025	3617	3936	5345	5111	3630
2026	4997	5649	10004	9343	5018
2027	6723	7860	14693	13564	6760
2028	8819	10651	20767	18963	8873
2029	11363	14140	26159	25939	11438
2030	14411	18441	34451	34383	14507
2031	18144	23911	45239	44576	18266
2032	22494	30583	55326	55612	22663
2033	27252	38122	62018	66613	27467
2034	32621	46694	72345	77042	32898
2035	38542	55921	81688	86074	38891
2040	75867	96983	106082	105007	76470
2045	103379	108138	106460	98512	103130
2050	108486	100870	100170	80232	105433



# 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	483	483	483	483	483
2023	787	802	896	807	785
2024	1272	1483	1707	1551	1278
2025	1812	2216	3269	2995	1856
2026	2469	3148	6258	5795	2582
2027	3241	4329	8950	8357	3429
2028	4152	5792	12240	11557	4439
2029	5190	7576	14661	15606	5627
2030	6387	9728	18543	20341	7020
2031	8173	12747	24617	26526	9047
2032	10287	16476	30181	33280	11443
2033	12648	20692	33591	40160	14109
2034	15337	25434	39270	46474	17061
2035	18300	30583	44464	51831	20244
2040	37443	54170	59029	62237	39138
2045	54831	60353	60512	62603	55778
2050	60204	60444	60617	63119	61308

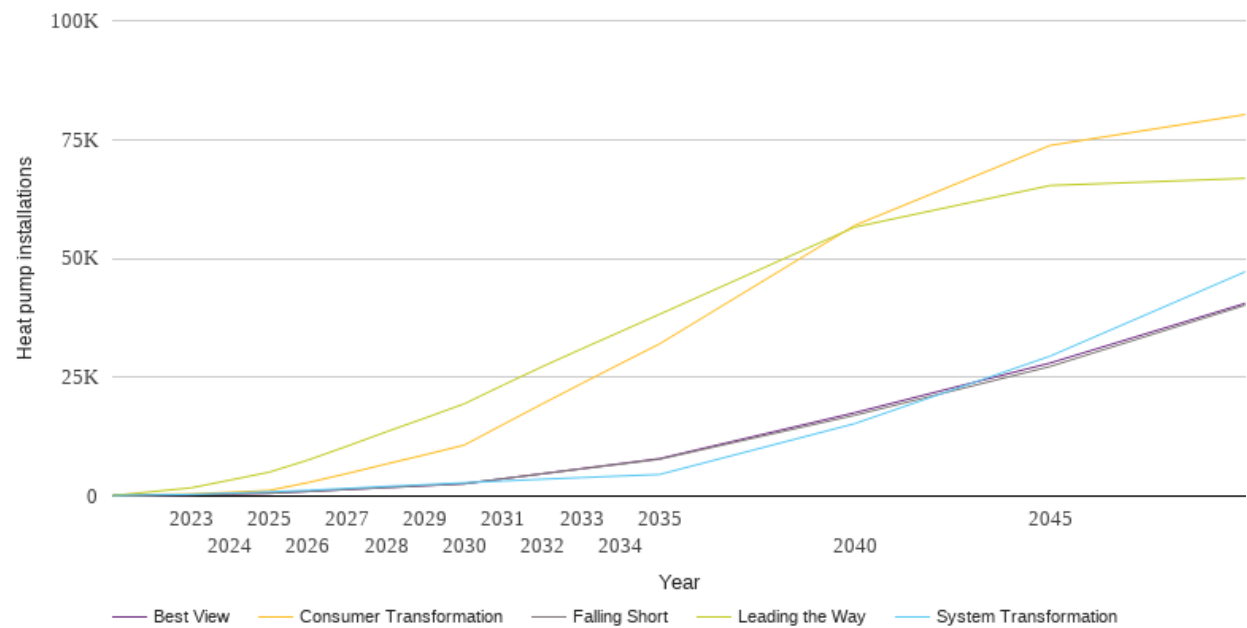




# Technology Summary: Heat pumps

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

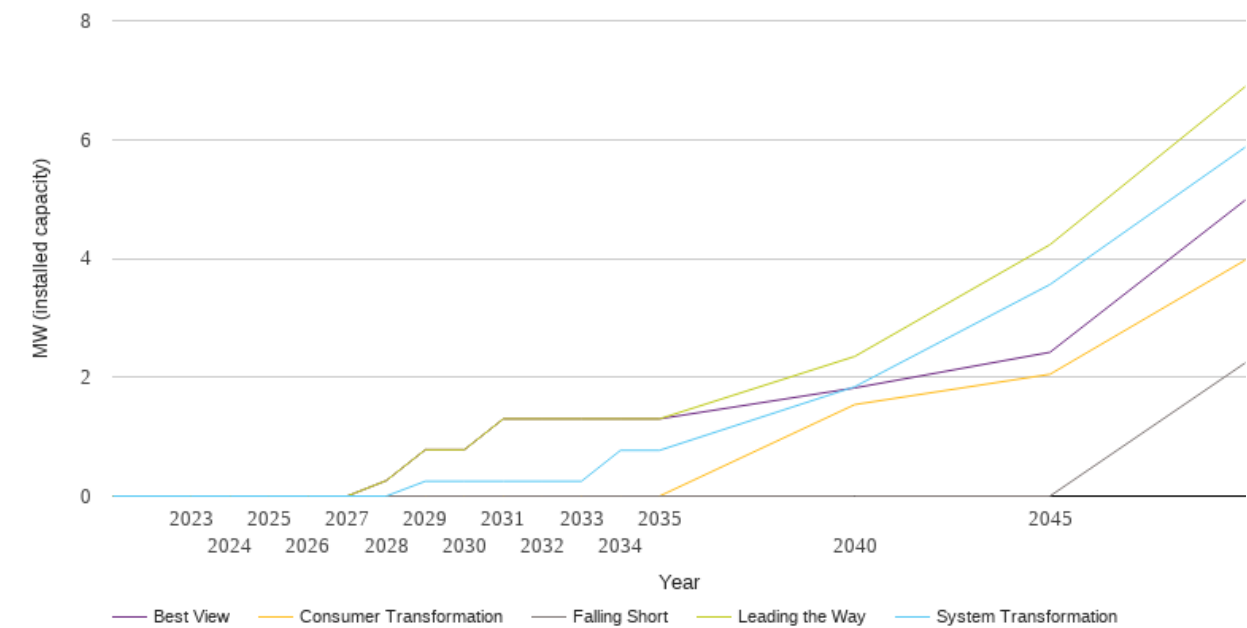
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	125	125	125	125	125
2023	278	366	461	1730	278
2024	442	627	812	3368	442
2025	604	905	1191	5024	604
2026	991	1219	2843	7591	980
2027	1405	1622	4747	10507	1389
2028	1823	2046	6750	13519	1794
2029	2229	2416	8705	16440	2190
2030	2629	2805	10730	19416	2582
2031	3667	3176	15090	23377	3658
2032	4696	3544	19413	27239	4712
2033	5714	3892	23655	30949	5770
2034	6733	4223	27845	34581	6819
2035	7755	4548	32014	38240	7878
2040	17000	15246	56945	56577	17528
2045	27251	29425	73756	65329	27975
2050	40159	47180	80252	66834	40533



# Technology Summary: Hydrogen electrolysis

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

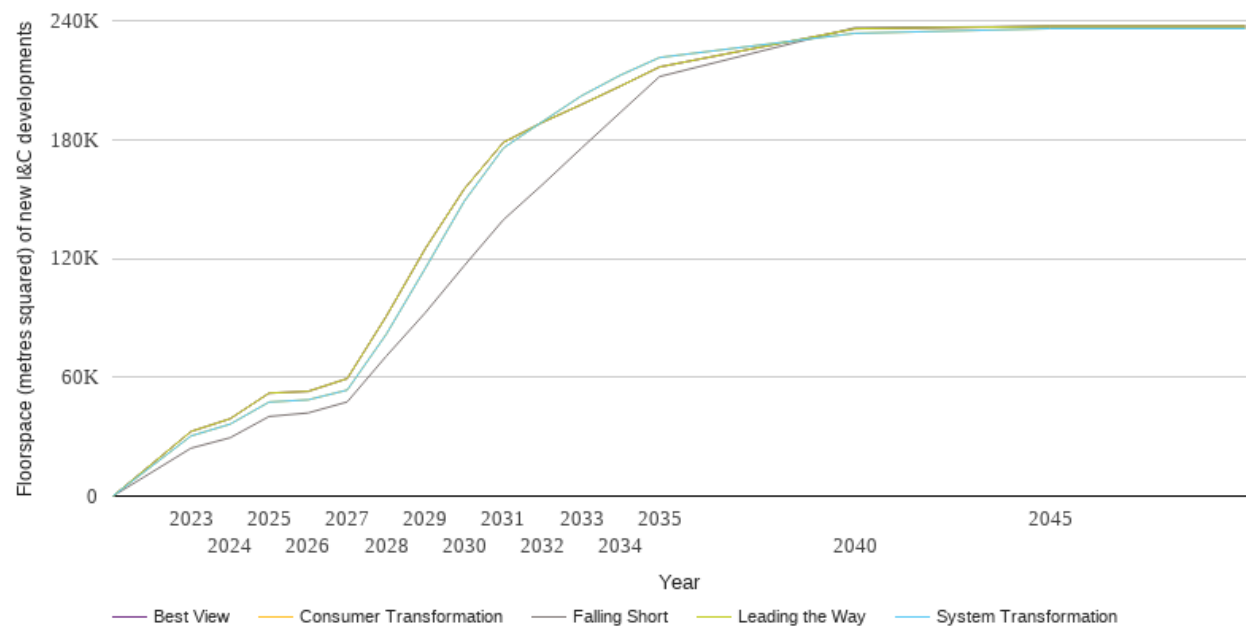
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0.0	0.0	0.0	0.0	0.0
2023	0.0	0.0	0.0	0.0	0.0
2024	0.0	0.0	0.0	0.0	0.0
2025	0.0	0.0	0.0	0.0	0.0
2026	0.0	0.0	0.0	0.0	0.0
2027	0.0	0.0	0.0	0.0	0.0
2028	0.0	0.0	0.0	0.3	0.3
2029	0.0	0.3	0.0	0.8	0.8
2030	0.0	0.3	0.0	0.8	0.8
2031	0.0	0.3	0.0	1.3	1.3
2032	0.0	0.3	0.0	1.3	1.3
2033	0.0	0.3	0.0	1.3	1.3
2034	0.0	0.8	0.0	1.3	1.3
2035	0.0	0.8	0.0	1.3	1.3
2040	0.0	1.8	1.5	2.3	1.8
2045	0.0	3.6	2.0	4.2	2.4
2050	2.2	5.9	4.0	6.9	5.0



# Technology Summary: Non domestic

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

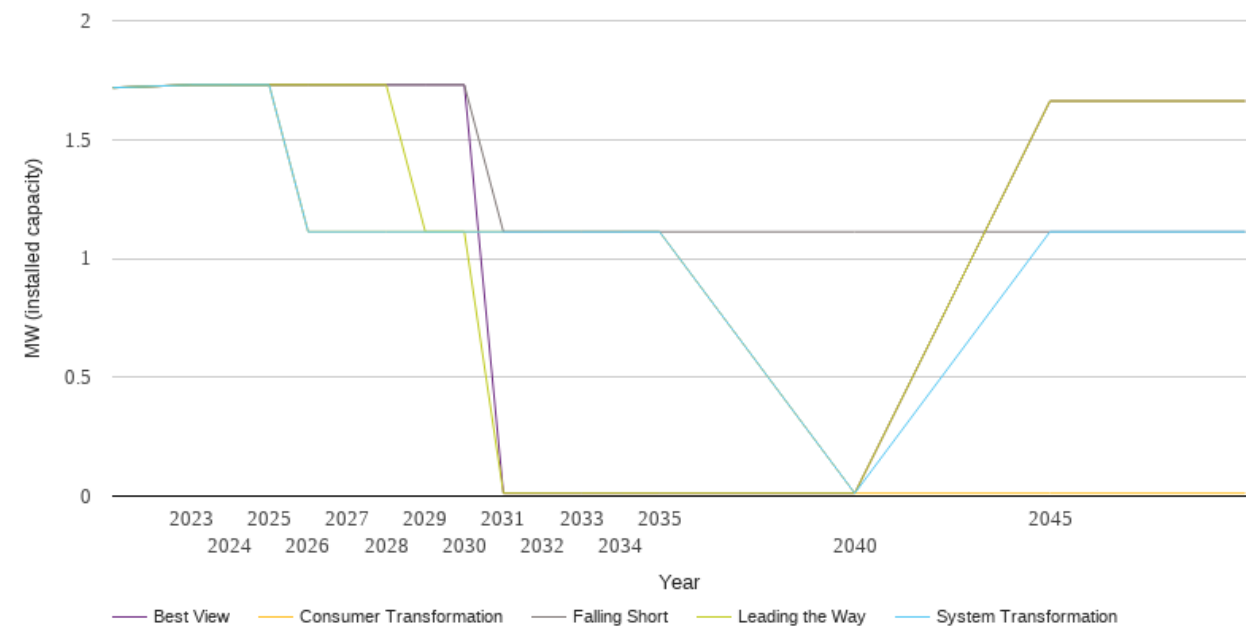
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0	0	0	0	0
2023	24188	30375	30375	32625	32625
2024	29438	36300	36300	39019	39019
2025	40208	47475	47475	51994	51994
2026	41978	48600	48600	52875	52875
2027	47541	53519	53519	59316	59316
2028	70625	81684	81684	90734	90734
2029	92557	114986	114986	124909	124909
2030	116352	148873	148873	155092	155092
2031	139477	175678	175678	178551	178551
2032	157223	189037	189037	188676	188676
2033	175654	202054	202054	197655	197655
2034	193755	212508	212508	206975	206975
2035	211782	221389	221389	216637	216637
2040	236457	233623	233623	235919	235919
2045	237141	236016	236016	237141	237141
2050	237141	236016	236016	237141	237141



# Technology Summary: Other Distributed Generation

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

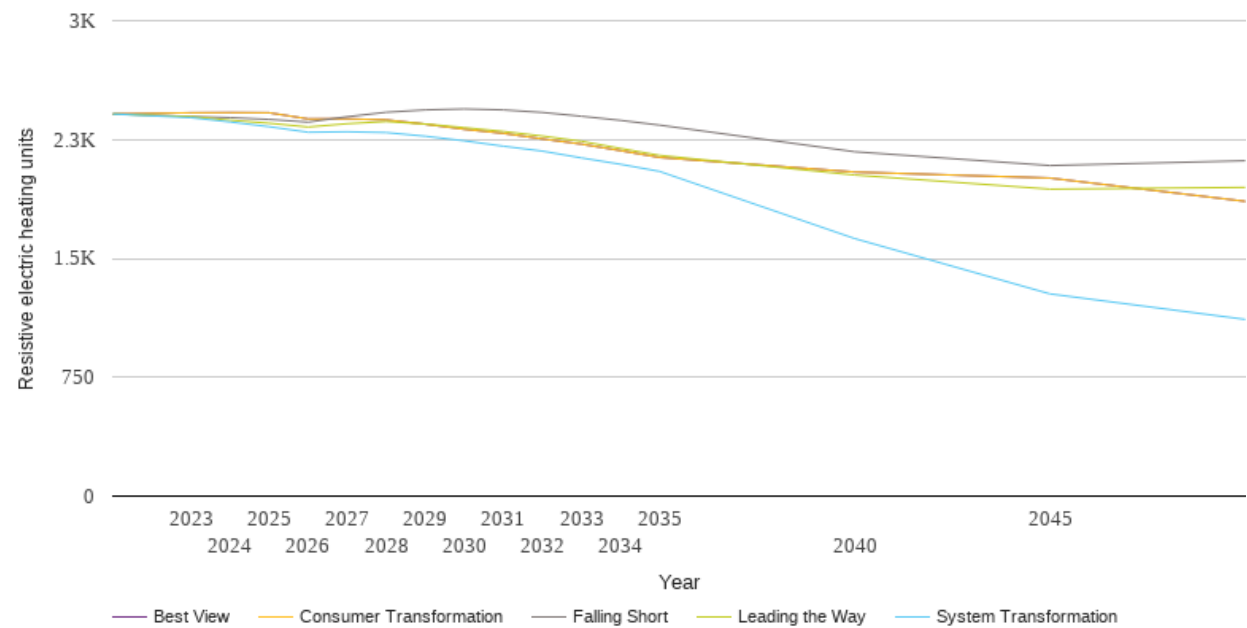
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	1.7	1.7	1.7	1.7	1.7
2023	1.7	1.7	1.7	1.7	1.7
2024	1.7	1.7	1.7	1.7	1.7
2025	1.7	1.7	1.7	1.7	1.7
2026	1.7	1.1	1.1	1.7	1.7
2027	1.7	1.1	1.1	1.7	1.7
2028	1.7	1.1	1.1	1.7	1.7
2029	1.7	1.1	1.1	1.1	1.7
2030	1.7	1.1	1.1	1.1	1.7
2031	1.1	1.1	1.1	0.0	0.0
2032	1.1	1.1	1.1	0.0	0.0
2033	1.1	1.1	1.1	0.0	0.0
2034	1.1	1.1	1.1	0.0	0.0
2035	1.1	1.1	1.1	0.0	0.0
2040	1.1	0.0	0.0	0.0	0.0
2045	1.1	1.1	0.0	1.7	1.7
2050	1.1	1.1	0.0	1.7	1.7



# Technology Summary: Resistive electric heating

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

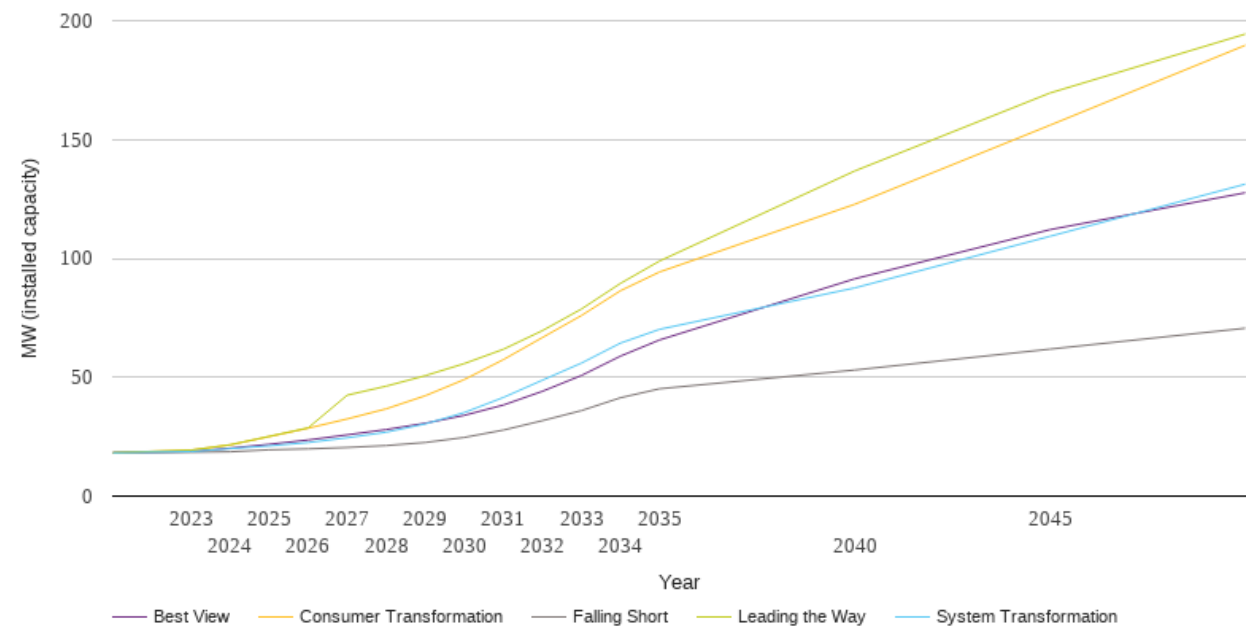
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	2411	2411	2411	2411	2411
2023	2395	2388	2419	2395	2419
2024	2388	2361	2420	2372	2420
2025	2377	2331	2419	2353	2419
2026	2360	2296	2380	2329	2380
2027	2394	2299	2381	2350	2381
2028	2422	2294	2374	2364	2374
2029	2437	2271	2347	2348	2347
2030	2443	2242	2315	2325	2315
2031	2437	2208	2289	2301	2289
2032	2421	2177	2254	2272	2254
2033	2397	2134	2221	2239	2221
2034	2371	2094	2180	2194	2180
2035	2341	2049	2137	2150	2137
2040	2173	1625	2045	2026	2045
2045	2086	1276	2007	1937	2007
2050	2116	1115	1860	1948	1860



# Technology Summary: Solar Generation

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

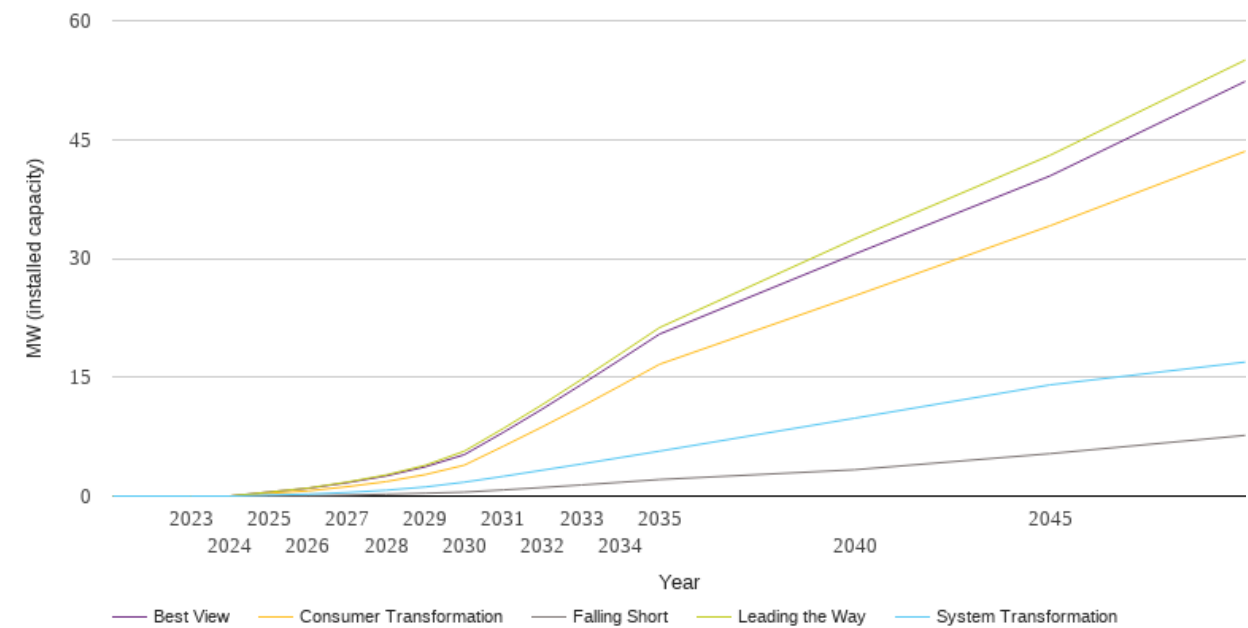
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	18.2	18.2	18.2	18.2	18.2
2023	18.4	18.7	19.3	19.3	18.8
2024	18.6	20.0	21.5	21.6	20.2
2025	19.5	21.1	25.0	25.1	21.8
2026	19.9	22.5	28.6	28.7	23.6
2027	20.5	24.5	32.5	42.5	25.8
2028	21.3	26.9	36.7	46.3	28.0
2029	22.6	30.4	42.2	50.7	30.6
2030	24.7	35.1	49.0	55.7	34.0
2031	27.8	41.5	57.4	61.8	38.3
2032	31.7	48.8	66.7	69.6	44.1
2033	36.0	56.0	76.0	78.7	50.7
2034	41.4	64.4	86.4	89.5	58.9
2035	45.1	70.2	94.3	98.9	65.7
2040	53.0	87.6	122.8	136.8	91.4
2045	61.8	109.3	156.0	169.6	112.1
2050	70.6	131.2	189.6	194.3	127.6



# Technology Summary: Storage

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

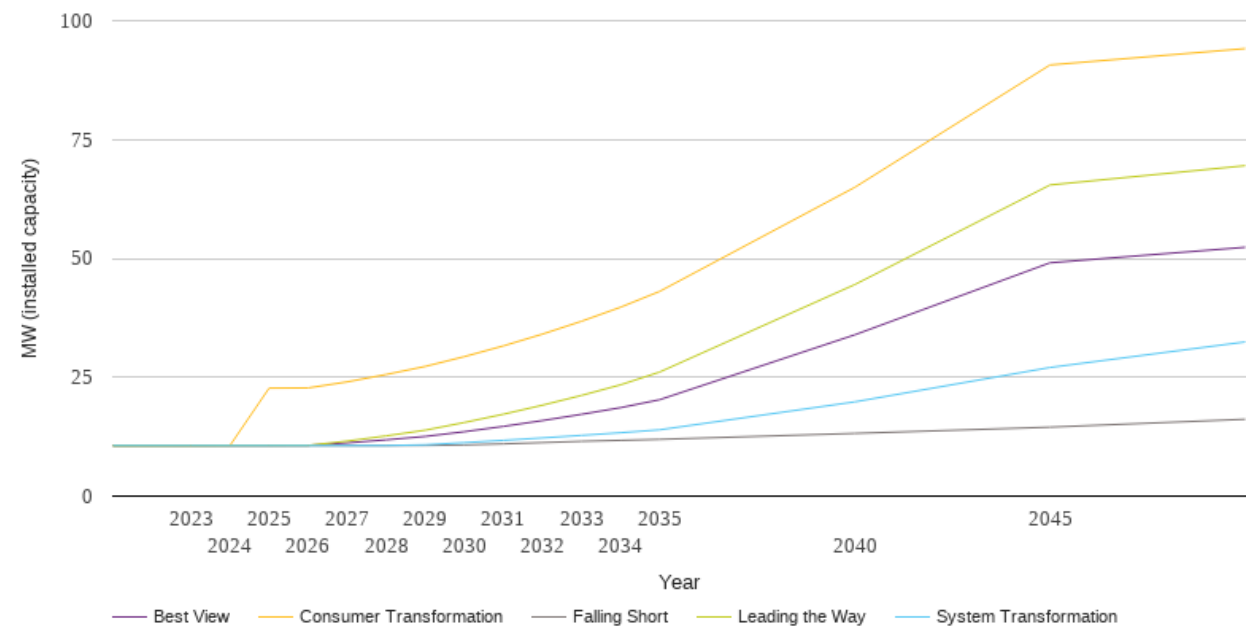
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0.0	0.0	0.0	0.0	0.0
2023	0.0	0.0	0.0	0.0	0.0
2024	0.0	0.0	0.0	0.0	0.0
2025	0.0	0.1	0.3	0.5	0.5
2026	0.1	0.2	0.7	1.0	1.0
2027	0.1	0.5	1.2	1.8	1.7
2028	0.2	0.7	1.8	2.7	2.5
2029	0.4	1.2	2.7	3.9	3.7
2030	0.5	1.8	3.9	5.7	5.2
2031	0.8	2.5	6.3	8.5	8.0
2032	1.1	3.3	8.7	11.5	11.0
2033	1.4	4.0	11.3	14.7	14.1
2034	1.7	4.9	13.9	18.0	17.2
2035	2.1	5.7	16.6	21.3	20.4
2040	3.3	9.8	25.3	32.5	30.5
2045	5.4	14.0	34.1	43.0	40.4
2050	7.7	16.9	43.5	55.0	52.3



# 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	10.6	10.6	10.6	10.6	10.6
2023	10.6	10.6	10.6	10.6	10.6
2024	10.6	10.6	10.7	10.6	10.6
2025	10.6	10.6	22.7	10.6	10.6
2026	10.6	10.6	22.8	10.7	10.7
2027	10.6	10.6	24.0	11.6	11.2
2028	10.6	10.6	25.6	12.7	11.8
2029	10.7	10.8	27.3	13.9	12.6
2030	10.8	11.2	29.3	15.5	13.5
2031	11.0	11.7	31.6	17.2	14.7
2032	11.2	12.2	34.1	19.1	15.9
2033	11.5	12.8	36.8	21.2	17.2
2034	11.7	13.3	39.7	23.4	18.6
2035	11.9	13.9	43.0	26.1	20.3
2040	13.2	19.8	64.9	44.5	33.9
2045	14.5	27.1	90.7	65.4	49.1
2050	16.2	32.4	94.1	69.5	52.3





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