

Distribution Future Energy Scenarios 2022

Local Authority:
Birmingham

What are Distribution Future Energy Scenarios?

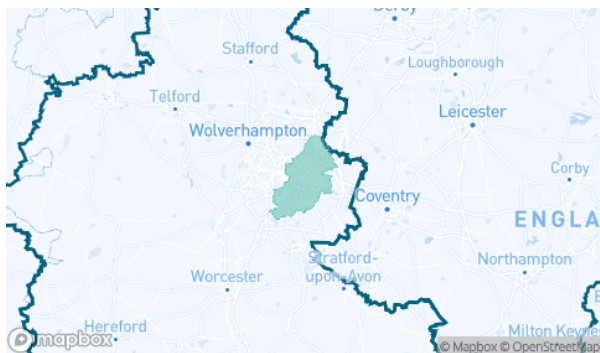
National Grid run Distribution Future Energy Scenarios (DFES) on an annual cycle for all licence areas, and represent a range of credible future scenarios of what could connect to the distribution network.

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 Birmingham 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 Birmingham 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	12111	34074	29441	29441	12165	379952	230415	230412	12273
Domestic	New dwellings	0	16416	17727	17727	20618	28573	28047	28047	27679
Electric vehicles	Electric vehicles	11202	92391	115357	212664	212571	677090	642839	650347	498305
EV Charge Point	EV charge points	5175	39801	58009	110582	119632	348107	339213	352548	357370
Heat pumps	Heat pump installations	557	21838	15218	67452	105940	230724	259989	437981	383398
Hydrogen electrolysis	MW (installed capacity)	3.0	3.2	7.5	3.9	8.8	4.8	11.9	6.9	17.7
Non domestic	Floorspace (metres squared) of new I&C developments	0	1685854	1942591	1942591	2116056	2477686	2466068	2466068	2477686
Other Distributed Generation	MW (installed capacity)	59.9	66.5	36.3	36.3	18.8	57.3	47.1	18.4	70.0
Resistive electric heating	Resistive electric heating units	71725	60249	58085	60794	58755	40512	19619	42061	43495
Solar Generation	MW (installed capacity)	30.5	51.5	87.2	152.9	155.1	129.0	293.5	569.7	589.6
Storage	MW (installed capacity)	0.4	2.9	7.1	15.5	21.5	24.4	61.1	150.6	186.5
Wind	MW (installed capacity)	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.9	0.7

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

Incorporating your feedback

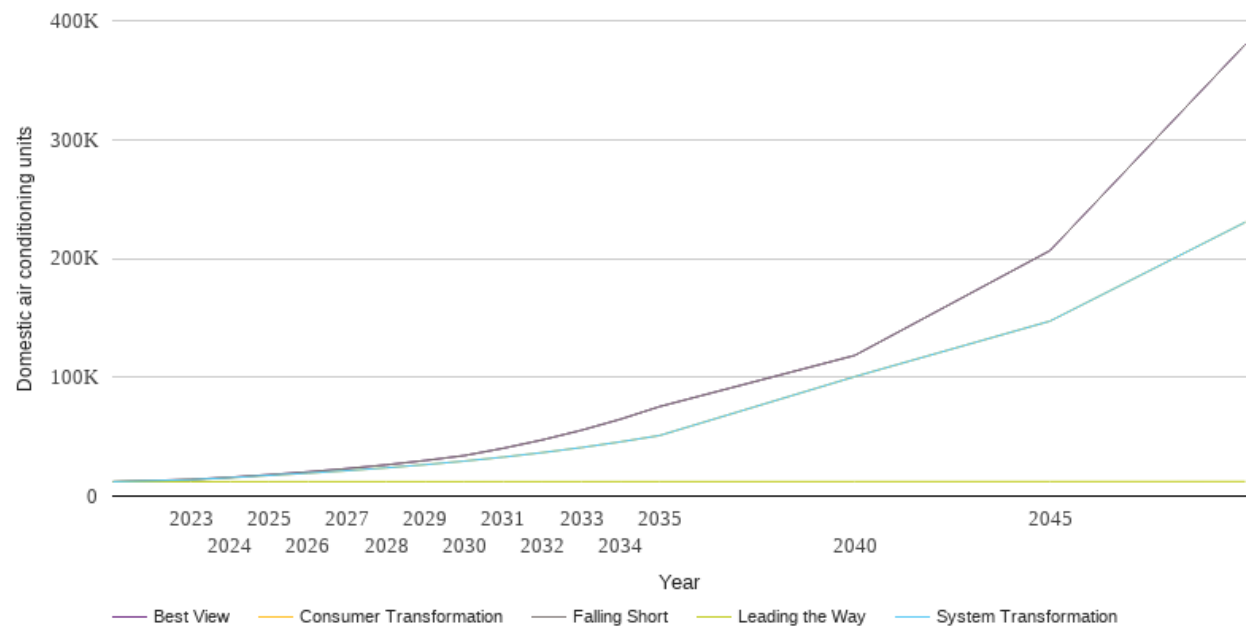
NGED is committed to continually improving the DFES process. To ensure the DFES projections fully capture local ambition, in 2022 we have appointed two DSO Strategic Engagement Officers to engage with local authorities. Any feedback will be incorporated into future Distribution Future Energy Scenarios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

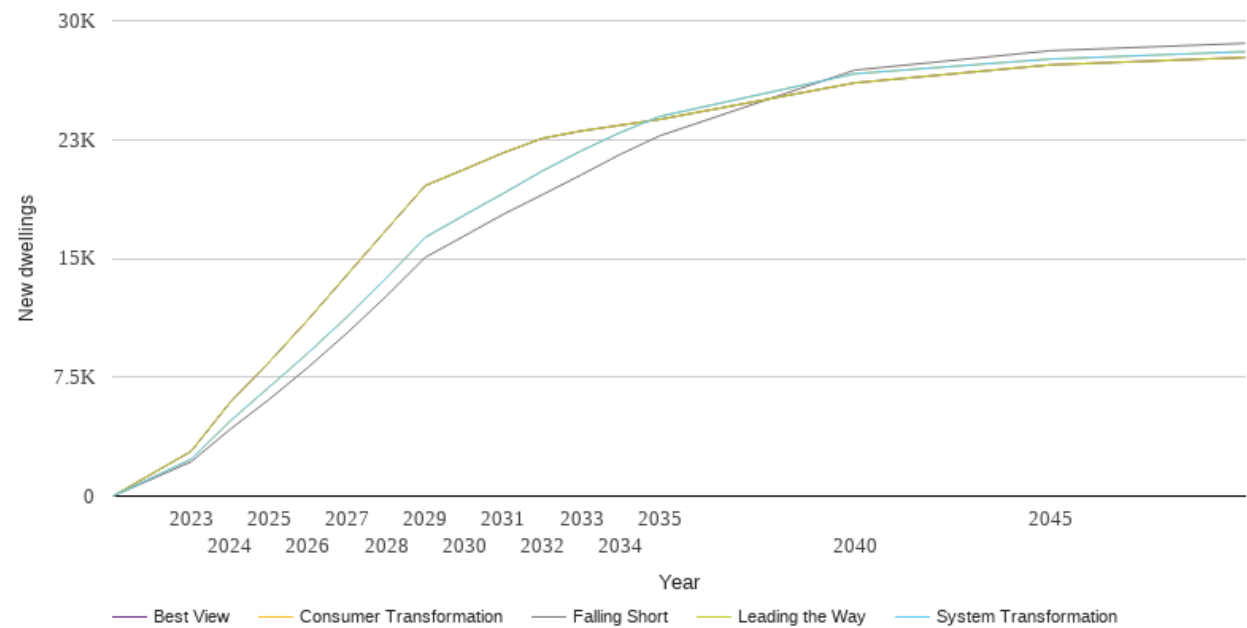
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	12111	12111	12111	12111	12111
2023	13968	13745	13745	12120	13968
2024	15802	15438	15438	12129	15802
2025	17935	17410	17410	12138	17935
2026	20364	19281	19281	12147	20364
2027	23149	21387	21387	12147	23149
2028	26283	23784	23784	12156	26283
2029	29948	26469	26469	12165	29948
2030	34074	29441	29441	12165	34074
2031	40239	32817	32817	12174	40239
2032	47296	36593	36593	12183	47296
2033	55398	40826	40826	12183	55398
2034	64686	45634	45634	12192	64686
2035	75308	50944	50944	12192	75308
2040	118354	100500	100500	12225	118354
2045	206532	147215	147213	12246	206532
2050	379952	230415	230412	12273	379952



Technology Summary: Domestic

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

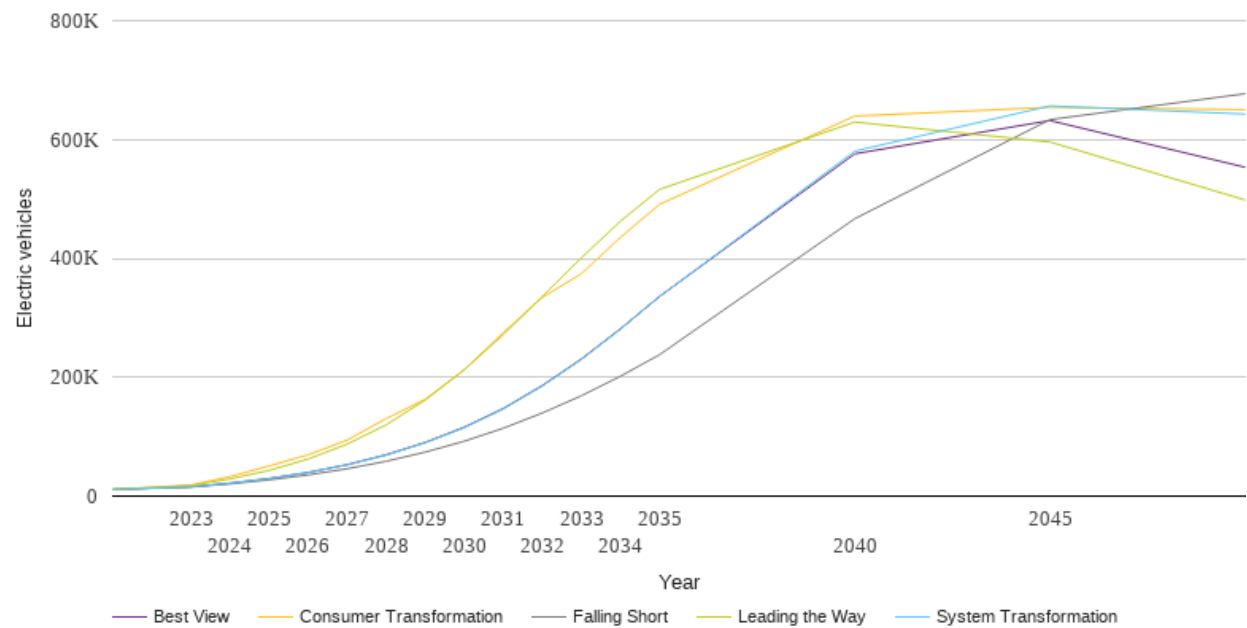
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0	0	0	0	0
2023	2162	2327	2327	2822	2822
2024	4211	4727	4727	5911	5911
2025	6103	6877	6877	8449	8449
2026	8127	9033	9033	11137	11137
2027	10297	11317	11317	13971	13971
2028	12615	13753	13753	16797	16797
2029	15070	16331	16331	19594	19594
2030	16416	17727	17727	20618	20618
2031	17785	19107	19107	21663	21663
2032	19017	20520	20520	22574	22574
2033	20280	21795	21795	23043	23043
2034	21573	22949	22949	23404	23404
2035	22729	23955	23955	23766	23766
2040	26878	26650	26650	26075	26075
2045	28103	27577	27577	27209	27209
2050	28573	28047	28047	27679	27679



Technology Summary: Electric vehicles

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

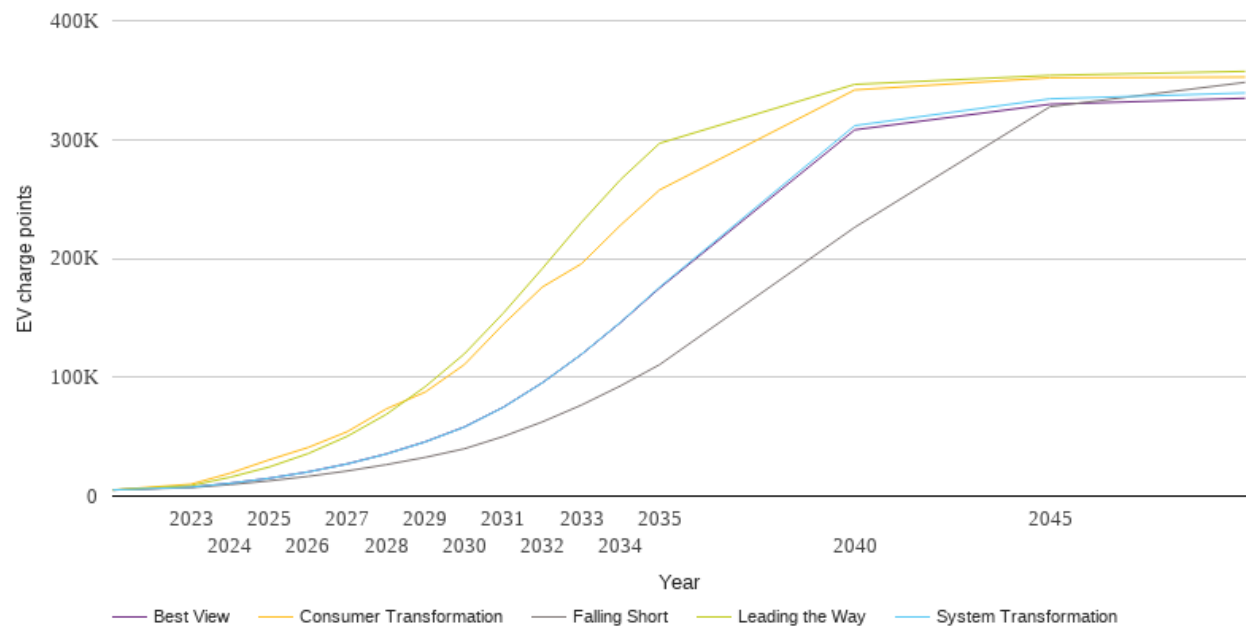
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	11202	11202	11202	11202	11202
2023	15298	15629	18707	17603	15631
2024	20597	21693	32754	29003	21694
2025	27278	29484	50793	43220	29537
2026	35603	39601	69459	62388	39750
2027	45996	52663	94209	87491	52879
2028	58650	69177	130592	119912	69478
2029	74005	89868	162912	161802	90276
2030	92391	115357	212664	212571	115896
2031	114284	146774	275222	271781	147463
2032	139896	185357	334427	336214	186094
2033	168915	230030	374285	401101	230798
2034	201723	280813	435454	462674	281516
2035	237936	335505	490998	516082	336015
2040	466771	580507	639438	629416	575964
2045	633537	656537	654260	595854	631961
2050	677090	642839	650347	498305	553303



Technology Summary: EV Charge Point

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

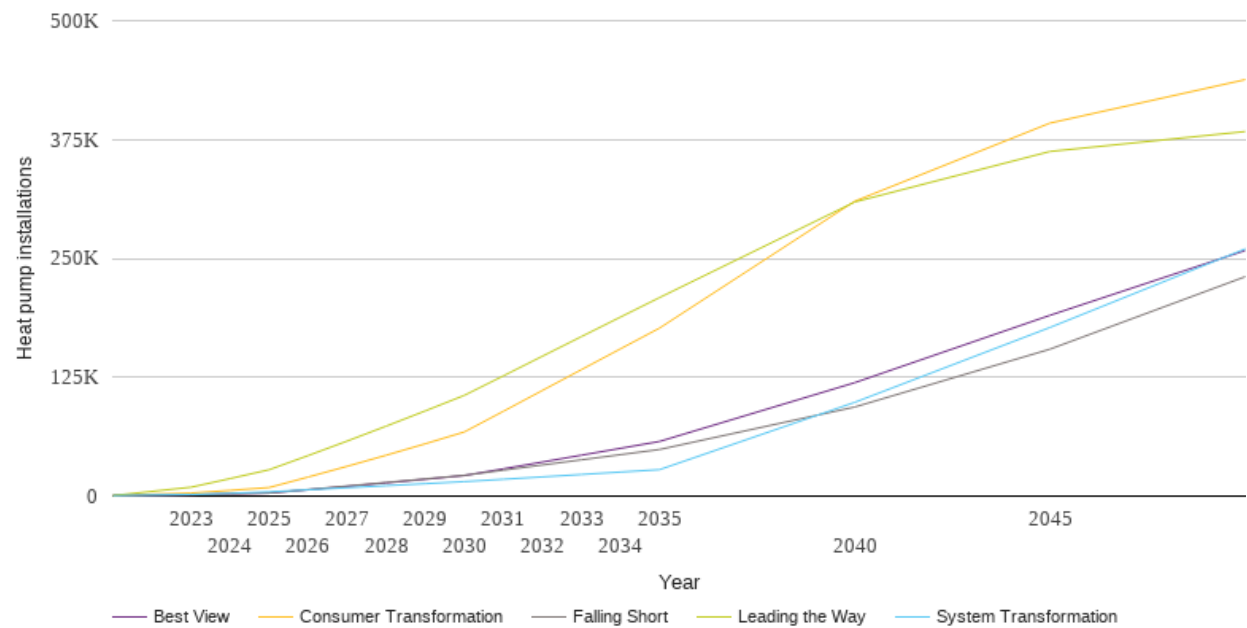
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	5175	5175	5175	5175	5175
2023	7147	7534	10028	8817	7544
2024	9653	10761	19250	15882	10793
2025	12793	14933	30486	24437	14985
2026	16605	20291	40913	35756	20361
2027	21151	27030	54171	50311	27122
2028	26462	35368	73340	68729	35483
2029	32599	45573	87583	92085	45730
2030	39801	58009	110582	119632	58180
2031	50179	74697	144600	153954	74849
2032	62448	95341	175922	191500	95418
2033	76602	119295	195473	230372	119223
2034	92727	146327	227903	266257	145989
2035	110574	175761	257594	296811	175019
2040	226167	311703	341750	346406	308158
2045	327593	334260	351978	353999	329673
2050	348107	339213	352548	357370	334728



Technology Summary: Heat pumps

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

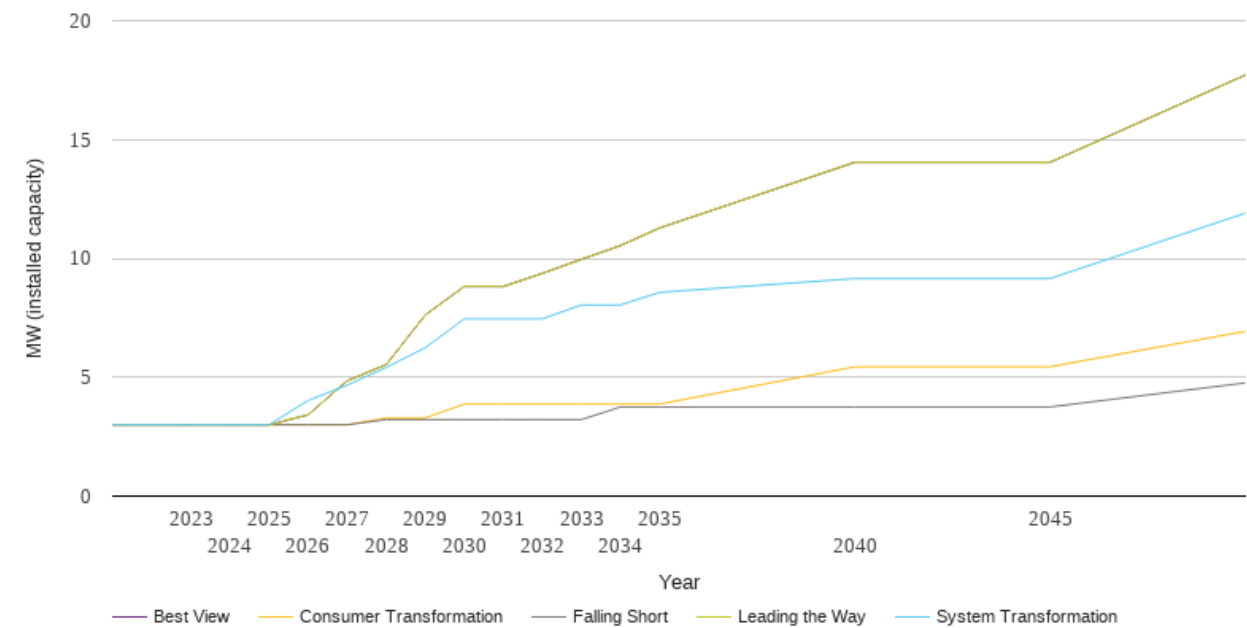
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	557	557	557	557	557
2023	1424	1661	3178	9340	1424
2024	2313	2943	5977	18373	2313
2025	3217	4450	8998	27716	3217
2026	6905	6620	20036	42612	6649
2027	10607	8767	31339	57894	10210
2028	14333	10922	42997	73596	13902
2029	18076	13067	55020	89609	17705
2030	21838	15218	67452	105940	21619
2031	27274	17678	89194	126448	28669
2032	32714	20190	111115	147112	35819
2033	38152	22725	133024	167751	43018
2034	43582	25268	154885	188307	50227
2035	49017	27814	176708	208792	57468
2040	93684	98623	310106	309338	119292
2045	154524	177352	392291	362444	190134
2050	230724	259989	437981	383398	258268



Technology Summary: Hydrogen electrolysis

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

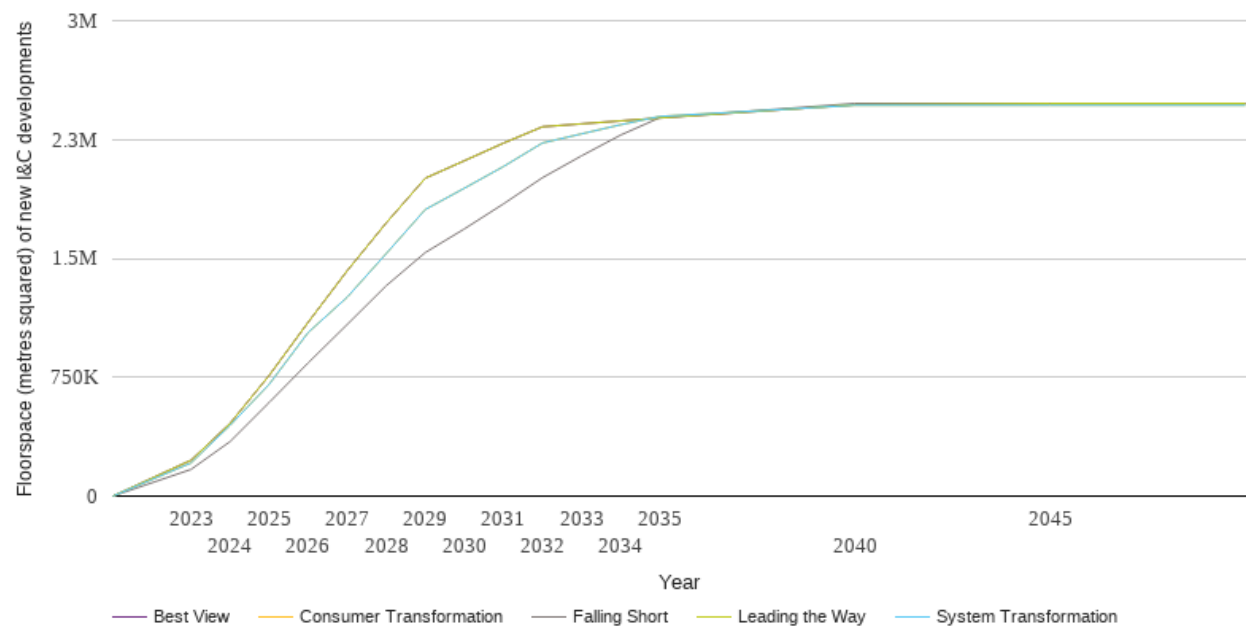
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	3.0	3.0	3.0	3.0	3.0
2023	3.0	3.0	3.0	3.0	3.0
2024	3.0	3.0	3.0	3.0	3.0
2025	3.0	3.0	3.0	3.0	3.0
2026	3.0	4.0	3.0	3.4	3.4
2027	3.0	4.7	3.0	4.9	4.9
2028	3.2	5.4	3.3	5.5	5.5
2029	3.2	6.2	3.3	7.6	7.6
2030	3.2	7.5	3.9	8.8	8.8
2031	3.2	7.5	3.9	8.8	8.8
2032	3.2	7.5	3.9	9.4	9.4
2033	3.2	8.0	3.9	10.0	10.0
2034	3.8	8.0	3.9	10.5	10.5
2035	3.8	8.6	3.9	11.3	11.3
2040	3.8	9.2	5.4	14.0	14.0
2045	3.8	9.2	5.4	14.0	14.0
2050	4.8	11.9	6.9	17.7	17.7



Technology Summary: Non domestic

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

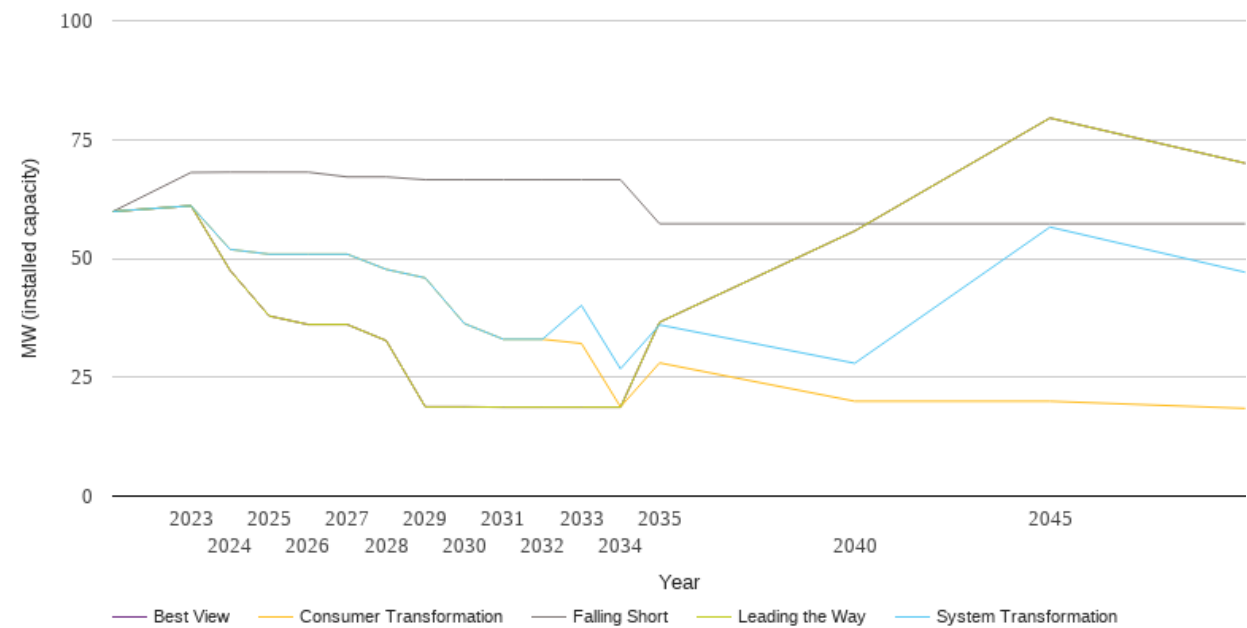
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0	0	0	0	0
2023	168466	209130	209130	226558	226558
2024	343903	446145	446145	458925	458925
2025	590393	705141	705141	761227	761227
2026	840536	1032408	1032408	1096924	1096924
2027	1082999	1255016	1255016	1422218	1422218
2028	1327571	1530341	1530341	1723895	1723895
2029	1536871	1808457	1808457	2006019	2006019
2030	1685854	1942591	1942591	2116056	2116056
2031	1843575	2079293	2079293	2226974	2226974
2032	2008933	2228162	2228162	2330356	2330356
2033	2146878	2285656	2285656	2348976	2348976
2034	2277853	2343151	2343151	2367597	2367597
2035	2387322	2395676	2395676	2386217	2386217
2040	2477686	2466068	2466068	2469312	2469312
2045	2477686	2466068	2466068	2477686	2477686
2050	2477686	2466068	2466068	2477686	2477686



Technology Summary: Other Distributed Generation

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

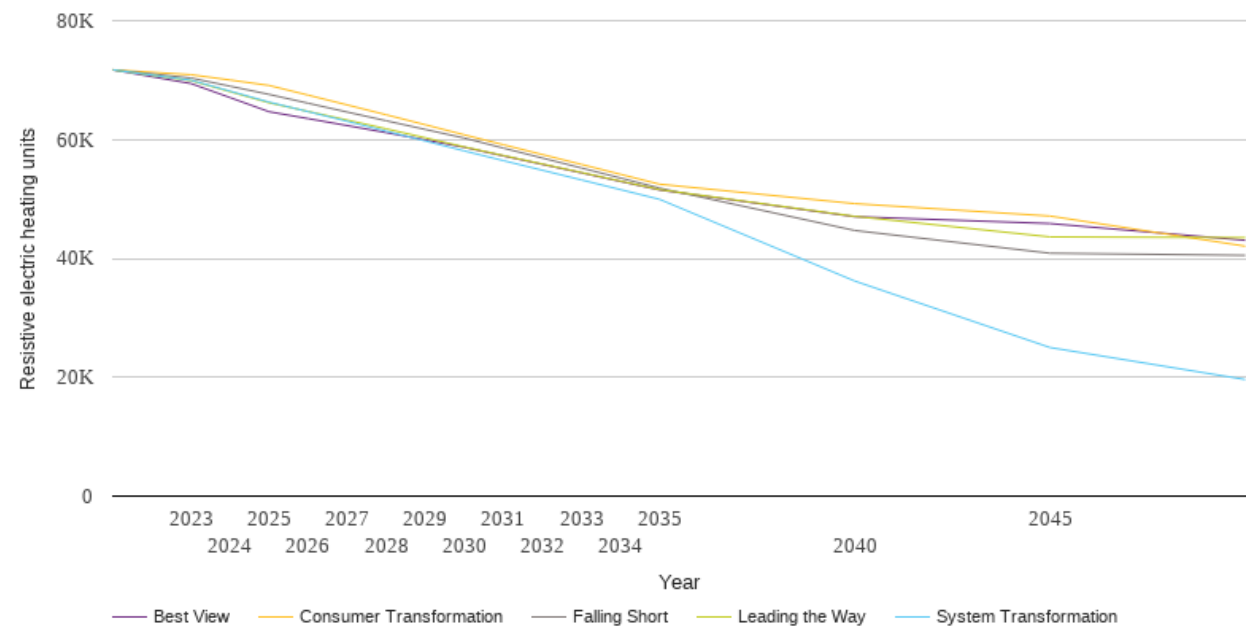
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	59.9	59.9	59.9	59.9	59.9
2023	68.1	61.1	61.1	61.1	61.1
2024	68.1	51.9	51.9	47.5	47.5
2025	68.1	50.9	50.9	37.9	37.9
2026	68.1	50.9	50.9	36.1	36.1
2027	67.1	50.9	50.9	36.1	36.1
2028	67.1	47.7	47.7	32.7	32.7
2029	66.5	45.9	45.9	18.8	18.8
2030	66.5	36.3	36.3	18.8	18.8
2031	66.5	33.0	33.0	18.7	18.7
2032	66.5	33.0	33.0	18.7	18.7
2033	66.5	40.1	32.1	18.7	18.7
2034	66.5	26.8	18.8	18.7	18.7
2035	57.3	36.0	28.0	36.6	36.6
2040	57.3	27.9	19.9	55.8	55.8
2045	57.3	56.6	19.9	79.5	79.5
2050	57.3	47.1	18.4	70.0	70.0



Technology Summary: Resistive electric heating

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

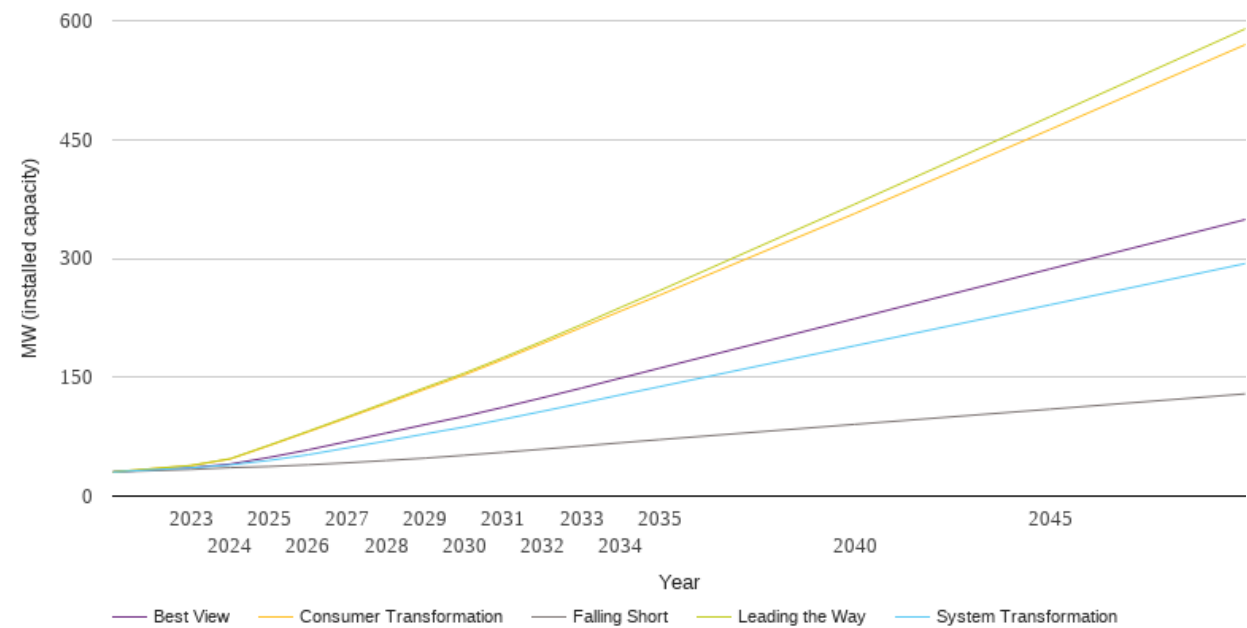
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	71725	71725	71725	71725	71725
2023	70354	69977	70908	69915	69420
2024	68979	68150	70017	68056	67059
2025	67594	66300	69097	66180	64680
2026	66108	64691	67474	64730	63522
2027	64624	63065	65825	63275	62352
2028	63160	61418	64166	61801	61162
2029	61701	59759	62489	60292	59939
2030	60249	58085	60794	58755	58695
2031	58558	56452	59127	57311	57249
2032	56889	54831	57472	55880	55822
2033	55213	53203	55814	54456	54396
2034	53529	51575	54151	53012	52954
2035	51835	49941	52485	51576	51515
2040	44696	36189	49211	47077	47016
2045	40866	25003	47126	43616	45862
2050	40512	19619	42061	43495	43046



Technology Summary: Solar Generation

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

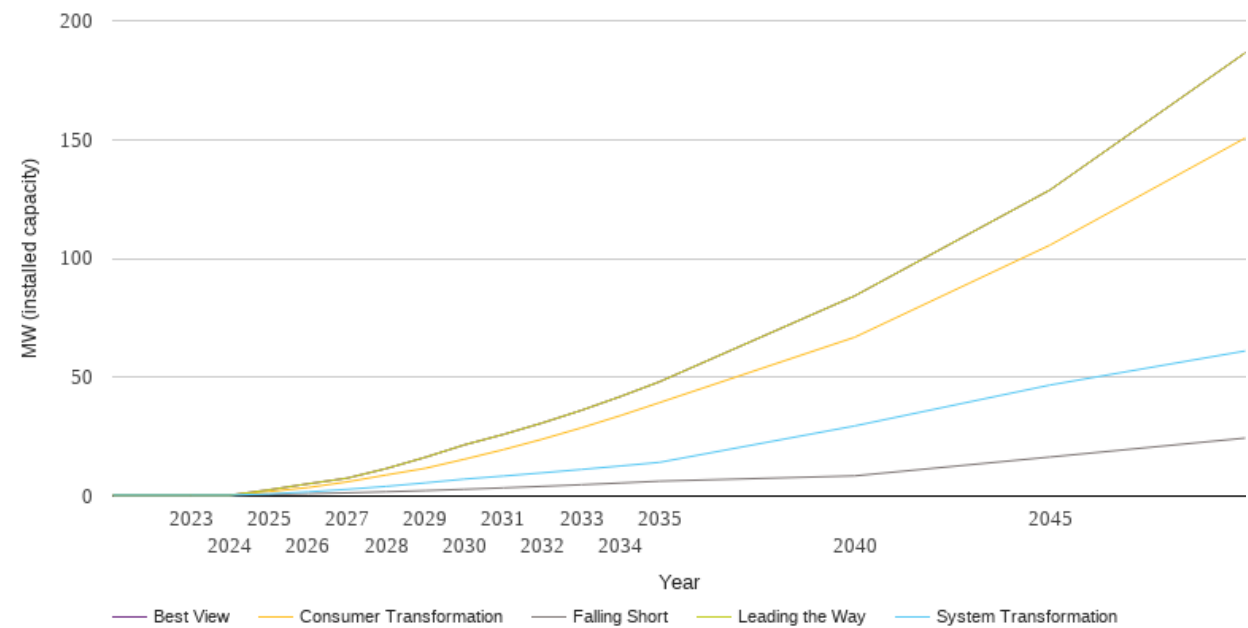
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	30.5	30.5	30.5	30.5	30.5
2023	33.6	35.7	38.5	38.7	35.9
2024	35.9	39.3	46.7	47.1	40.4
2025	37.3	45.0	63.6	64.2	48.8
2026	39.5	52.2	81.0	81.9	58.3
2027	42.0	60.8	98.7	99.9	68.9
2028	44.9	69.5	116.6	118.3	79.6
2029	47.9	78.5	135.0	137.0	90.3
2030	51.5	87.2	152.9	155.1	100.7
2031	55.3	96.9	172.5	174.9	112.2
2032	59.2	107.0	192.5	195.4	124.0
2033	63.1	117.2	212.8	216.4	136.2
2034	67.3	127.7	233.4	238.0	148.8
2035	71.2	138.1	253.6	259.3	161.4
2040	90.5	189.7	356.6	368.4	223.9
2045	109.7	241.4	462.6	478.8	286.6
2050	129.0	293.5	569.7	589.6	349.0



Technology Summary: Storage

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

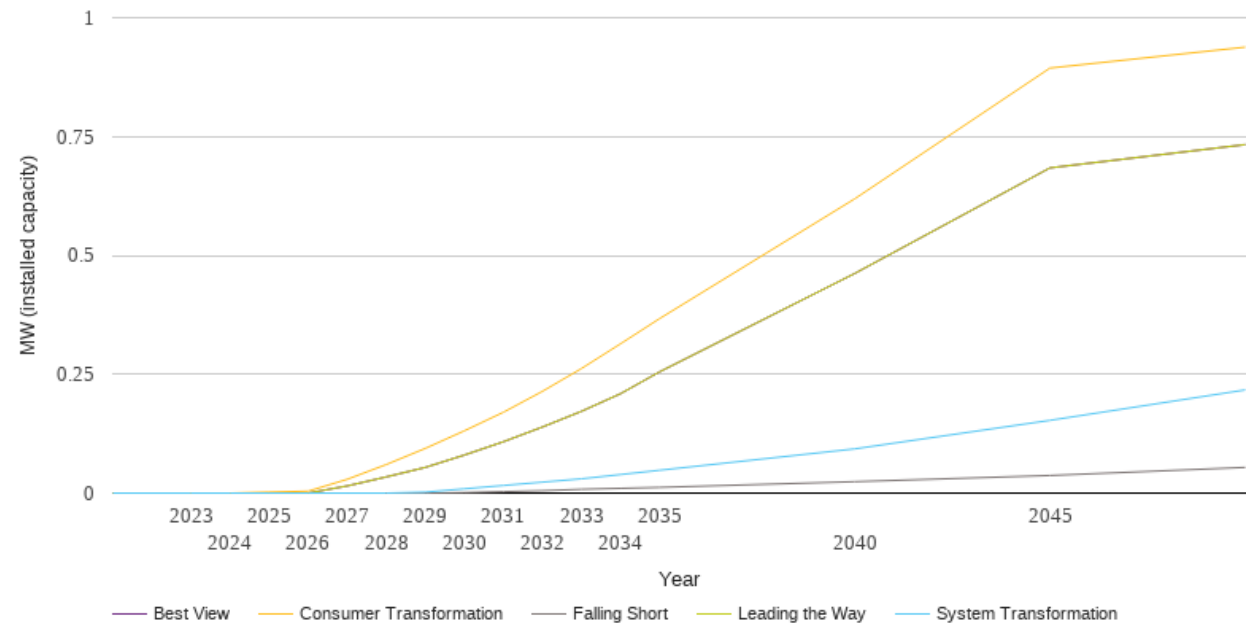
Year	Scenario				
	Falling Short	System Transformation	Consumer Transformation	Leading the Way	Best View
Baseline	0.4	0.4	0.4	0.4	0.4
2023	0.4	0.4	0.4	0.4	0.4
2024	0.4	0.4	0.4	0.4	0.4
2025	0.6	0.9	1.9	2.6	2.6
2026	1.0	1.8	3.6	5.2	5.2
2027	1.4	2.8	6.0	7.5	7.5
2028	1.8	4.1	8.9	11.6	11.6
2029	2.3	5.6	11.7	16.3	16.3
2030	2.9	7.1	15.5	21.5	21.5
2031	3.5	8.4	19.5	25.9	25.9
2032	4.1	9.8	23.9	30.8	30.8
2033	4.8	11.2	28.7	36.1	36.1
2034	5.5	12.7	33.9	41.9	41.9
2035	6.3	14.2	39.3	48.1	48.1
2040	8.5	29.5	66.8	84.2	84.2
2045	16.4	46.7	105.6	128.8	128.8
2050	24.4	61.1	150.6	186.5	186.5



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	0.1	0.0	0.0
2029	0.0	0.0	0.1	0.1	0.1
2030	0.0	0.0	0.1	0.1	0.1
2031	0.0	0.0	0.2	0.1	0.1
2032	0.0	0.0	0.2	0.1	0.1
2033	0.0	0.0	0.3	0.2	0.2
2034	0.0	0.0	0.3	0.2	0.2
2035	0.0	0.0	0.4	0.3	0.3
2040	0.0	0.1	0.6	0.5	0.5
2045	0.0	0.2	0.9	0.7	0.7
2050	0.1	0.2	0.9	0.7	0.7



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”)

nged.networkstrategy@nationalgrid.co.uk

