Germany

Germany has a fully-fledged plan for its renewable energy adoption, even though it is spread throughout various policy documents. The Integrated National Energy and Climate Plan (NECP) is still in effect, however, many of the targets have been updated and are included in the target section.

Targets

The overarching target for Germany is a 55% reduction in emissions from 1990-levels by 2030.[1] This is then divided into two core targets of 30% renewable energy of the gross energy consumption[2] and a 30% reduction in the primary energy consumption compared to 2008. Both of these goals are to be achieved by 2030.[3] For electricity, the renewable targets are 40-45% (Renewable Energy Law of 2017) or 48-54% (projection) for 2025 and 65% in 2030.[4] The renewable energy target for electricity generation is also specified. This can be seen in Table 1. While these are the NECP targets, they have been updated, with the numbers being displayed Table 1, labelled as revised.

Table 1: Indicative technology specific share of renewable energy in electricity generation[5]

	Power generation 2030	**Installed capacity 2030**	**Revised capacity 2030**	**Revised capacity 2035**	**Revised capacity 2040**	**Revised capacity 2045**
Wind onshore	140-145 TWh	67-71 GW	115 GW[A]		160 GW[A]	
Wind offshore	79-84 TWh	20 GW	30 GW[A]	40 GW[A]		70 GW[A]
Photovoltaic	90 TWh	98 GW	215 GW[A]		400GW[A]	
Hydro and others	21 TWh	6 GW				
Biomass	42 TWh	8.4 GW				

A: Bundesministerium für Wirtschaft und Energie. 'Aktualisierung des integrierten nationalen Energie- und Klimaplans'. 29 August 2024, pp. 19-20.

[1] Bundesministerium für Wirtschaft und Energie, 'Integrierter Nationaler Energie- Und Klimaplan Deutschland', 16.
[2] Bundesministerium für Wirtschaft und Energie, 'Integrierter Nationaler Energie- Und Klimaplan Deutschland', 17.
[3] Bundesministerium für Wirtschaft und Energie, 'Integrierter Nationaler Energie- Und Klimaplan Deutschland', 16.
[4] Bundesministerium für Wirtschaft und Energie, 'Integrierter Nationaler Energie- Und Klimaplan Deutschland', 48.
[5] Bundesministerium für Wirtschaft und Energie, 'Integrierter Nationaler Energie- Und Klimaplan Deutschland', 50.

Energy demand projections

There does not seem to be a breakdown for electricity demand, but the NECP includes energy demand projections by sectors. The 'With Existing Measures,' WEM, scenario is found in Table 2. The 'With Additional Measures,' WAM, scenario is found in Table 3.

Table 2: Energy demand projections 2021 to 2040 [WEM][6]

	Primary Energy Consumption (PEC)	Final Energy Consumption (FEC)	Industry	Transportation	Household	Services
2025	10916	8294	2329	2582	2272	1111
2030	10148	7883	2385	2437	2082	979
2035	9410	7247	2325	2142	1896	884
2040	8925	6767	2312	1926	1740	789
2045	8799	6463	2303	1834	1613	713
2050	8843	6366	2373	1795	1532	666

Table 3: Energy demand projections 2021 to 2040 [WAM][7]

	Primary Energy Consumption (PEC)	Final Energy Consumption (FEC)	Industry	Transportation	Household	Services
2025	10915	8288	2329	2575	2272	1112
2030	10152	7815	2384	2427	2071	933
2035	9309	7107	2326	2129	1867	785
2040	8826	6627	2313	1913	1695	706
2045	8717	6336	2307	1823	1567	639
2050	8768	6238	2375	1785	1477	601

Transportation

The transportation sector in the German NECP explicitly includes rail, sea, and aviation.[8] According to the NECP, the target level of EVs for 2030 was 7-10 million.[9] This has later been adjusted to 15 million.[10] The NECP does not include information on charging

[6] Bundesministerium für Wirtschaft und Energie, 'Aktualisierung des integrierten nationalen Energie- und Klimaplans', 323.
[7] Bundesministerium für Wirtschaft und Energie, 'Aktualisierung des integrierten nationalen Energie- und Klimaplans', 353.
[8] Bundesministerium für Wirtschaft und Energie, 'Integrierter Nationaler Energie- Und Klimaplan Deutschland', 51.
[9] Bundesministerium für Wirtschaft und Energie, 'Integrierter Nationaler Energie- Und Klimaplan Deutschland', 89.
[10] EMU, '15 Millionen E-Autos in Deutschland bis 2030 als Ziel'.

station roll-out. In addition, by 2030, about 1/3 of heavy vehicles, like lorries and vans, will be electric or CO_2 free.[11]

Heat pumps

The NECP expects that a third of all new-built homes would be furnished with heat pumps.[12] This has later been changed to 500 000 yearly installations from 2024 on.[13] However, this target was not met in 2024, seeing a clear fall in new units sold compared to 2023.[14]

Hydrogen and batteries

Germany is developing a 'Power-to-X,' PtX, strategy. PtX refers to technologies that transform surplus electricity (usually renewable energy) to other forms of energy, usually chemical products. One of the most common transformations is to create hydrogen. Germany's strategy is mainly focused on storage capacity and use in transportation.[15] In 2023, Germany updated its Hydrogen Strategy, which doubled the target of nationally installed hydrogen capacity from 5 to 10 GW by 2030.[16] Germany does not, however, have any clear targets for building out battery capacity, even if the Electricity Storage Strategy emphasise batteries and pumped hydro as important for reaching Germany's electricity targets.

[11] Bundesministerium für Wirtschaft und Energie, 'Integrierter Nationaler Energie- Und Klimaplan Deutschland', 90.
[12] Bundesministerium für Wirtschaft und Energie, 'Integrierter Nationaler Energie- Und Klimaplan Deutschland', 34.
[13] Bundesministerium für Wirtschaft und Klimaschutz, 'Breites Bündnis will mindestens 500.000 neue Wärmepumpen pro Jahr'.
[14] tagesschau, 'Heizen in Deutschland'.
[15] Bundesministerium für Wirtschaft und Energie, 'Integrierter Nationaler Energie- Und Klimaplan Deutschland', 39.
[16] Bundesministerium für Wirtschaft und Klimaschutz, 'Fortschreibung Der Nationalen Wasserstoffstrategie', 2–3.