DIW Weekly Report 30+31 2026

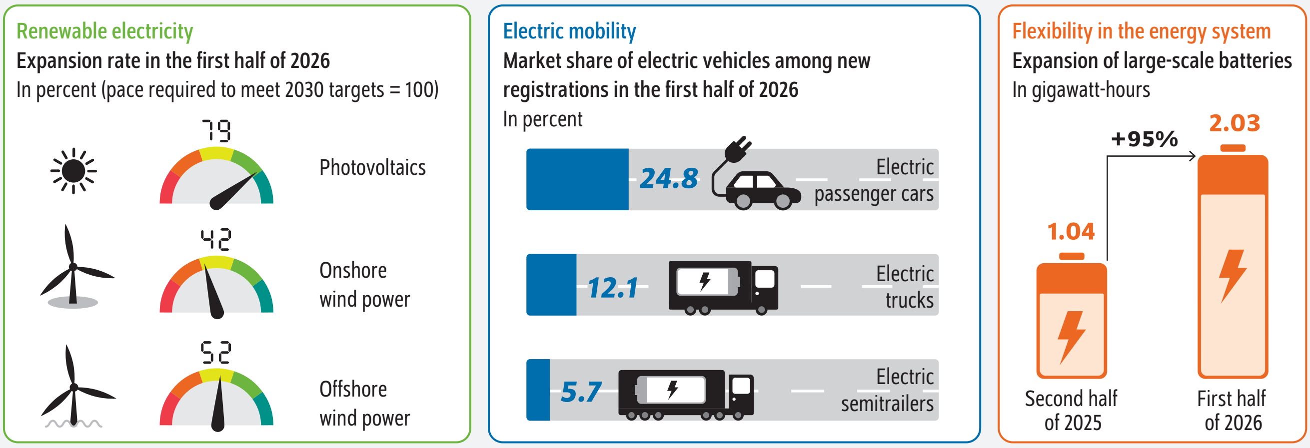
AT A GLANCE

Energy Transition Monitor: Momentum Is Still Insufficient for the Expansion of Renewables, Electrification, and Storage

By Wolf-Peter Schill

- The expansion of solar and wind energy is progressing, but it is not fast enough to meet the 2030 statutory targets
- The heating transition is stalling: Heat pumps make up half of all newly sold heating systems, yet many fossil-fuel heaters are still being installed
- Electric vehicles are gaining ground in all categories, but internal combustion engines continue to dominate new registrations
- Electricity price trends show that the flexibility of the power system is growing more slowly than electricity generation from renewables
- The expansion of large-scale battery storage is gaining momentum, nearly doubling in the first half of 2026

DIW Energy Transition Monitor: Large-scale batteries leap forward; Renewables and electric mobility progress too slowly



Sources: Federal Network Agency's Market Master Data Registry, Federal Motor Transport Authority; Open Energy Tracker.

FROM THE AUTHORS

"The energy transition is making progress, but not fast enough. A real breakthrough has yet to materialize, particularly with heat pumps and electric vehicles, which is also necessary to reduce dependence on oil and gas imports."

— Wolf-Peter Schill —

MEDIA

Audio Interview with Wolf-Peter Schill (in German)
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Energy Transition Monitor: Momentum Is Still Insufficient for the Expansion of Renewables, Electrification, and Storage

By Wolf-Peter Schill

ABSTRACT

Electricity generation from solar and wind energy is set to expand massively in Germany in order to replace fossil fuels through electrification across all sectors. The DIW Energy Transition Monitor paints a mixed picture for the first half of 2026: Renewable energy is expanding, but must be accelerated further to meet 2030 targets. This includes photovoltaics: Despite earlier successes, it is currently falling short of its rising targets. The heating transition is progressing slowly, with many new gas heating systems still being installed. The share of newly registered electric vehicles has continued to rise for both passenger cars and commercial vehicles compared to the second half of 2025. However, their shares of the total fleets remain low. In the electricity sector, the need for flexibility is growing, as indicated by the trend in wholesale prices. The expansion of large-scale battery storage has shown positive development. The number of new installations nearly doubled in the first half of 2026. The conditions for accelerating the pace of the energy transition remain very favorable across all technologies. Policymakers should capitalize on this and, in particular, set the course for faster electrification—not least to reduce dependence on fossil fuel imports.

The energy transition is a central pillar of Germany's climate protection strategy. It encompasses not only the expansion of wind and solar energy but also the use of renewable electricity in the heating, transportation, and industrial sectors. This electrification is also known as sector coupling. It makes it possible to replace fossil fuels and reduce greenhouse gas emissions. To achieve this, additional electricity consumers—such as electric vehicles and heat pumps—and variable renewable electricity generation must be integrated flexibly and efficiently into the energy system, a process in which various types of storage solutions, among other things, can play a key role.

The DIW Energy Transition Monitor provides regular updates on current developments in three key areas: renewable electricity, sector coupling, and flexibility for the energy system.[1] This report focuses on trends from the first half of 2026, thereby updating the Wochenbericht from this January.[2] It is based on the Open Energy Tracker, an open platform that provides continuously updated data on the energy transition in Germany.[3]

Expansion of renewable energy needs more momentum

For photovoltaics (PV) and wind power, there are short- and long-term expansion targets enshrined in the Renewable Energy Act (EEG) and the Offshore Wind Act. The following section compares the current expansion status with the 2030 targets. First, we look at the absolute installed capacity, then at the pace of expansion in the first half of 2026.

1 The DIW Energy Transition Monitor does not cover all areas of the energy transition. Supplementary data on the status of transmission grid expansion is provided by the Federal Network Agency (in German; available online; accessed on July 1, 2026. This also applies to all other online sources cited in this report, unless otherwise noted). Trends in electrolysis are covered, among other sources, by dena (in German; available online); the Federal Network Agency regularly provides updates on the status of transmission grid expansion (in German; available online).

2 Wolf-Peter Schill (2026): Energiewende-Monitor: positiver Trend, aber noch mehr Tempo nötig. DIW Wochenbericht no. 7, 91–99 (in German; available online). Interactive figures are also available on the DIW Energy Transition Monitor website.

3 See Open Energy Tracker (available online). The data was collected and processed as part of the Ariadne research project (Fkz 03SFK5N0-2), funded by the Federal Ministry of Research, Technology, and Space (BMFTR).

DOI: https://doi.org/10.18723/diw_dwr:2026-30-1

Still a long way to go to meet 2030 targets

By mid-2026, just under 126 gigawatts (GW) of photovoltaic capacity had been installed in Germany, representing 58 percent of the 2030 target (Figure 1). For onshore wind power, installed capacity stood at 70 GW, which corresponds to 61 percent of the target.[4] For offshore wind power, the figure was just under 11 GW, or 36 percent of the 2030 target. In recent years, photovoltaics has grown faster than wind power. In 2022, PV expansion was only about one-third of its 2030 target, but falling module prices and rising electricity prices triggered a veritable solar boom.[5] Wind power, by contrast, has grown more slowly. One reason for this is long planning times, especially for offshore wind power.

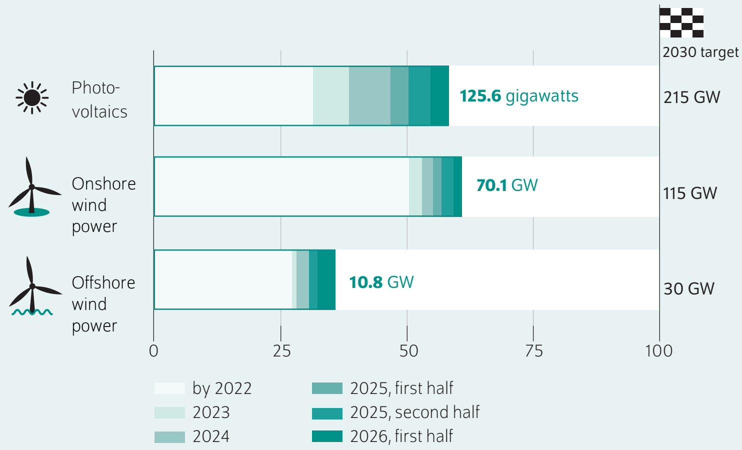
Photovoltaics risks falling behind

To assess the momentum of renewable energy deployment, the expansion rate over the past six months is compared to the average rate that is necessary to reach the 2030 target from the current level.[6] When comparing the three technologies, photovoltaics still grew the fastest. However, its expansion has stagnated while the target path has risen: According to the EEG, 9 GW and 13 GW of net capacity were to be added in 2023 and 2024, respectively; in reality, the figures were significantly higher. Starting in 2026, 22 GW are to be added annually. Relative to these rising targets, the pace of photovoltaic expansion has recently slowed: In the first half of 2026, it stood at 79 percent of the pace now required to reach the 2030 target (Figure 2). In the second half of 2025, it was still 88 percent.[7] Thus, current momentum is insufficient to reach the 2030 target. Nevertheless, installed photovoltaic capacity currently remains above the target path. However, this lead could be exhausted as early as 2027, causing the installed capacity to fall below the target path.

Within the PV segment, the share of rooftop systems among new installations continued to decline to 43 percent in the first half of 2026, as they were significantly overtaken by ground-mounted systems (53 percent).[8] If the expansion of rooftop installations continues to decline, the expansion of ground-mounted systems—which is driven by tenders—will have to grow even more rapidly to meet the EEG target. In

Figure 1

Electricity generation capacity from renewable energy sources in Germany
In percent

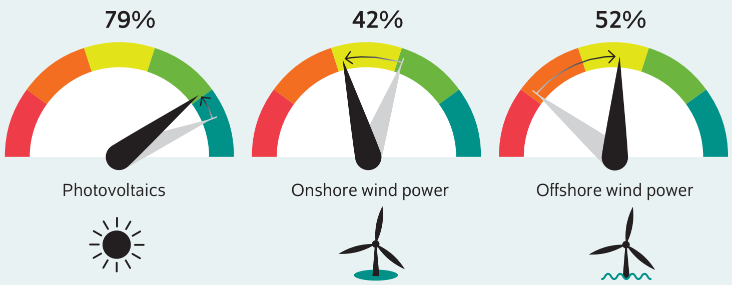


Source: Federal Network Agency's Market Master Data Register; Open Energy Tracker.

By mid-2026, solar and onshore wind power had reached about 60 percent of their 2030 targets, while offshore wind power had reached just over one-third.

Figure 2

Expansion rate of solar and wind energy in the first half of 2026 compared to the previous half-year
As a percentage of the pace required to reach the 2030 target



Example: The expansion rate of photovoltaics in the first half of the year was 79 percent of the average rate required in the future to achieve the 2030 target from now on. It has slowed compared to the second half of 2025.

Source: Federal Network Agency's Market Master Data Register; Open Energy Tracker.

While offshore wind power grew, the relative expansion rate of photovoltaics and onshore wind power slowed.

4 The data as of the query in the Market Master Data Register is July 15, 2026. It can therefore be assumed that not all plants connected to the grid at that time are already included in the register. For photovoltaics—based on correction methods also used by the Federal Network Agency—the figures reported for June 2026 were adjusted upward by 15 percent; for onshore wind power, the adjustment was five percent.

5 Felix Schmidt, Alexander Roth, and Wolf-Peter Schill (2024): Ausbau der Solarenergie: viel Licht, aber auch Schatten. DIW Weekly Report no. 33, 507–517 (in German; available online).

6 The same methodology was previously used in the DIW Berlin's "Traffic Light Monitor for the Energy Transition." See Wolf-Peter Schill, Alexander Roth, and Adeline Guéret (2022): Traffic Light Monitor Shows: Energy Transition Must Be Significantly Accelerated. DIW Weekly Report no. 26/27/28, 171–179 (available online).

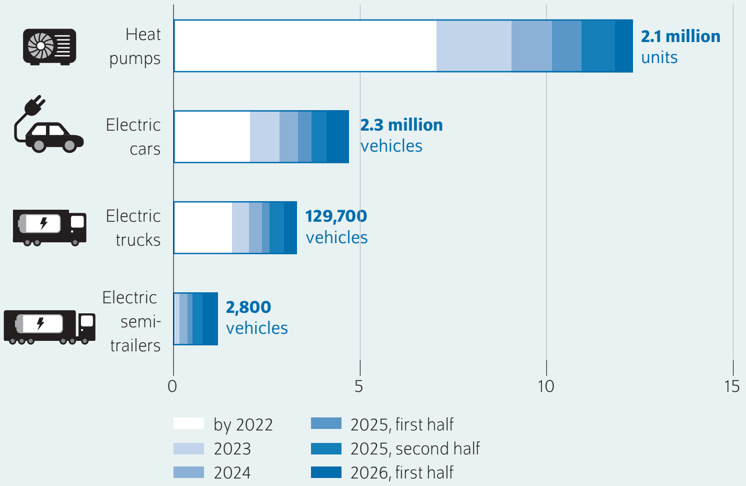
7 The comparison of relative expansion rates between the last two half-years is also influenced to a small extent by the adjustments made for outstanding late reports in the market master data registry.

8 A background page on the Open Energy Tracker contains much more detailed information on photovoltaic expansion (available online).

Figure 3

Heat pumps and electric vehicles in Germany

As a percentage of the respective reference[1]



1 Reference for heat pumps: long-term installed base in UBA climate neutrality scenarios; reference for electric vehicles: current fleet size in the respective segment across all drive types.

Note: Data for heat pumps as of the first quarter of 2026, excluding air-to-air heat pumps. Interpretation example: The current 2.1 million heat pumps correspond to just over 12 percent of the long-term installed base required upon completion of the heating transition.

Source: AGEE-Stat; Federal Association of the German Heating Industry; Federal Motor Transport Authority; Open Energy Tracker.

The electrification of heating and transportation is still in its relatively early stages.

any case, there has consistently been an oversupply in these tenders since 2023.[9]

Waiting for the onshore wind power boom

The expansion of onshore wind power is progressing slowly. In the first half of 2026, the pace was only 42 percent of the speed needed to meet the 2030 target. This represents a slowdown compared to the second half of 2025, when 61 percent of the target was achieved. Compared to the first half of 2025, the relative pace remained roughly the same. This is likely due to a seasonal effect: expansion is typically stronger in the second half of the year. At the same time, the previously lower expansion targets alongside the lengthy planning and permitting processes are still having an impact. When the tender volumes rose significantly in 2023 due to the higher EEG expansion targets, many auctions were initially heavily undersubscribed. In other words, significantly fewer wind power projects were offered than were put out to tender.[10] Since May 2024, however, a reverse trend has emerged: all tenders have been oversubscribed. At the same time, the number of permits issued has continued to set new records, which is also attributable to streamlined permitting processes.[11] If all projects that have already been approved were implemented immediately at the pace typically seen in recent years, the rate of wind power expansion would increase sharply, and the EEG target path could be exceeded as early as mid-2028.[12]

Uncertainties and delays in offshore wind power

Offshore wind power in Germany saw little growth for a long time, but recently many new turbines have been connected to the grid. The first half of 2026 achieved 52 percent of the expansion rate required to meet the 2030 target, a significant increase compared to the 22 percent in the second half of 2025. However, the pace depends heavily on the commissioning of single large wind farms,[13] so figures are likely to continue fluctuating significantly between individual half-years. Further, project development for offshore wind power takes even longer than for onshore wind, meaning that expansion requires a particularly long lead time. Grid connection, in particular, is very time-consuming, and there are also reports of supply chain issues.[14] Achieving the 2030 target currently appears uncertain. Although nearly 18 GW of capacity has been successfully auctioned since 2023, these plants have not yet been built and, for some projects, the final investment decision is still pending. This is due to rising construction costs and less favorable electricity market forecasts, which have dampened investor expectations since the auctions.[15] Auctions planned for 2026 have been postponed to next year.[16]

Sector coupling remains sluggish

Electric vehicles and heat pumps are key technologies for decarbonizing transportation and heating using renewable electricity. However, unlike photovoltaics and wind power, there are no clear, legally mandated targets for them. Therefore, their deployment trends cannot be meaningfully compared with 2030 targets. Instead, the current installed number of heat pumps is compared with the long-term projected figure of just under 17 million units from climate

9 Data on tenders and other developments in photovoltaics is available on a background page on the Open Energy Tracker (available online).

10 A background page on the Open Energy Tracker provides data on tenders and other developments in wind power (available online).

11 Wind and Solar Agency (2026): Permits (in German; available online).

12 This is illustrated by an interactive figure on the Open Energy Tracker (available online). See also Wolf-Peter Schill, Nicolas Aichner, and Alexander Roth (2026): Favorable Conditions Allow Accelerating the Renewable Energy Transition. DIW Weekly Report no. 3, 13–22 (available online).

13 In the first half of 2026, many turbines at the two large wind farms "He Dreiht" and "Borkum Riffgrund 3" in the North Sea were connected to the power grid.

14 Institute for Energy Economics at the University of Cologne/BET Consulting (2025): Energy Transition. Making It Efficient. Monitoring Report on the Start of the 21st Legislative Period. September (in German; available online). See also Felix Fliegner (2026): The Weakest Link? A Spatial Planning Perspective on Supply Chain and Resilience Risks for Europe's Offshore Wind Ambitions. Energy Policy 209, 114970.

15 See press release from the German Offshore Wind Energy Association (BWO) dated May 20, 2026: Return of Offshore Wind Areas: BWO Presents Proposal to Secure the Expansion Path (available online).

16 See the website of the German Federal Network Agency Bundesnetzagentur (in German; available online) neutrality scenarios by the Federal Environment Agency.[17] The focus here is on decentralized heat pumps, not those used for district heating.[18] Electric vehicles are compared with the entire current vehicle fleet.[19] To capture the dynamics in both sectors, the market shares of heat pumps in total heating system sales and the share of new electric vehicle registrations are examined.

Relatively few heat pumps and electric vehicles in Germany

By the end of the first quarter of 2026, there were approximately 2.1 million heating heat pumps installed across Germany.[20] This corresponds to just over twelve percent of the long-term installed number in climate protection scenarios of the Federal Environment Agency (Figure 3).[21]

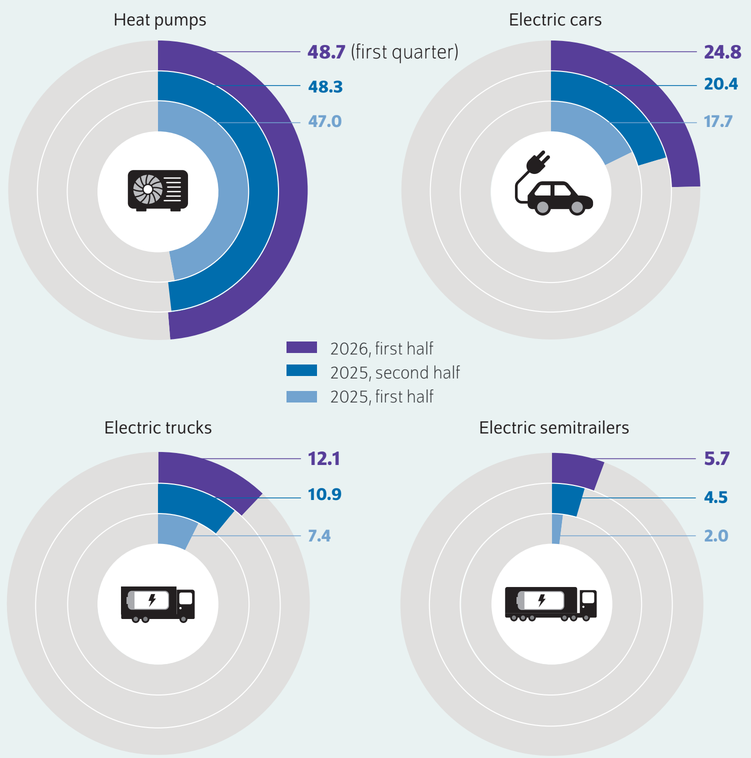
Electric vehicles are still relatively uncommon. About 2.3 million purely battery-electric passenger cars accounted for just under five percent of the total passenger car fleet. Among trucks, the share of purely electric vehicles was just over three percent and, among semitrailers, it was just over one percent of their respective fleets.[22]

Market shares are growing slowly

In the first quarter of 2026, nearly half of all heating systems sold were heat pumps (Figure 4). Their market share was slightly higher than in the second half of 2025. Thus, many fossil-fuel-based heating systems continue to be sold, which is slowing the heating transition.

Figure 4

Market shares of heat pumps in heating system sales[1] and of electric vehicles in new vehicle registrations
In percent



1 Data for heat pumps as of the first quarter of 2026, excluding air-to-air heat pumps.

Source: Federal Association of the German Heating Industry; Federal Motor Transport Authority; Open Energy Tracker.

The market share of battery-electric vehicles is growing, but internal combustion engines continue to dominate new registrations.

The share of new electric vehicle registrations also continued to rise in the first half of 2026. Approximately one in four new cars was a battery-electric vehicle (24.8 percent).[23] For trucks and semitrailers, the figures were 12.1 and 5.7 percent, respectively. Thus, the growth rate for semitrailers—which were previously considered particularly difficult to electrify—remained exceptionally high. However, despite growing market shares across all vehicle categories and the ongoing upward trend, most newly registered vehicles still have an internal combustion engine.

Flexibility is not keeping pace with renewables

The increase in electricity generation from intermittent wind and solar energy, combined with the additional electricity demand from heat pumps and electric vehicles, requires greater flexibility in the energy system. Solutions for this

17 It is assumed that, in the long term, Germany will reach a total of 16.8 million heat pumps (excluding large-scale heat pumps in district heating networks). This figure represents the average of two greenhouse gas neutrality scenarios developed by the Federal Environment Agency (UBA) for the year 2045, which are also relevant in the context of the UBA's greenhouse gas projections. See Federal Environment Agency (2026): Ambitious Pathways to Greenhouse Gas Neutrality in Germany: CARESupreme and CARETech (in German; available online). This benchmark has been revised compared to the previous DIW Energy Transition Monitor.

18 In the district heating sector, the share of renewable energy is generally still well below the targets of at least 30 percent for 2030 and 80 percent for 2040, although there are significant regional differences. Further information on district heating is available on the Open Energy Tracker (available online).

19 It is thus implicitly assumed that, in the long term, the entire current fleet must consist of purely battery-electric vehicles. Other technologies now appear to be of little relevance, even in heavy-duty transport; see Wolf-Peter Schill et al. (2024): The Future Is Battery Electric: Climate Change Mitigation in Road Freight Transport. DIW Weekly Report no. 47/48, 287–297 (available online). However, the vehicle fleet could also shrink in the future through modal shift and traffic avoidance.

20 Data for the second quarter are not yet available. The fleet size has decreased slightly compared to the previous DIW Energy Transition Monitor, as an improved data set is now being used. Furthermore, data are available only for water-based heating systems and not for air-to-air heat pumps (air conditioners).

21 This figure is not directly comparable to the previous DIW Energy Transition Monitor, as both the installed base and the reference value have been adjusted.

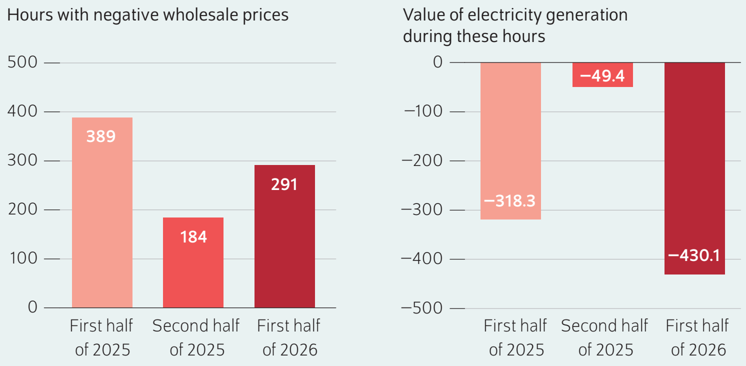
22 The statistics from the Federal Motor Transport Authority distinguish between trucks with fixed bodies and semitrailers. Trucks include both light- and heavy-duty vehicles, whereas semitrailers are generally used only in heavy-duty transport. For more details, see Wolf-Peter Schill (2026): Electric Mobility in Germany: Untapped Potential. DIW Weekly Report no. 9, 67–75 (available online).

23 In June 2026, the share of new registrations reached 28.4 percent, the third-highest monthly figure on record.

Figure 5

Hours with negative electricity prices and the calculated value of electricity generation during these hours

Left: Number; Right: In million euros



Note: The right-hand side of the figure shows the calculated market revenues for all electricity generated during hours with negative prices.

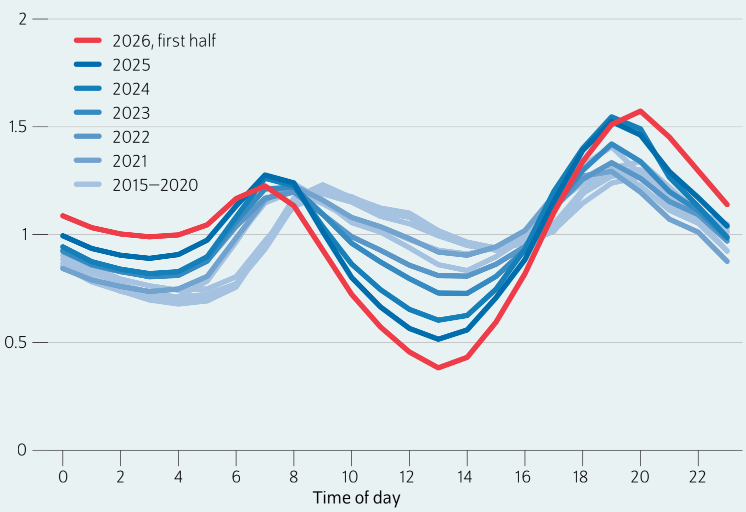
Source: SMARD data from the Federal Network Agency; Open Energy Tracker.

Negative prices continue to be an ongoing challenge for the electricity market in the first half of 2026.

Figure 6

Distribution of average electricity market prices throughout the day

Wholesale prices relative to the annual average (= 1)



Source: SMARD data from the Federal Network Agency; Open Energy Tracker.

Electricity prices continue to fall during the midday hours and rise in the evening.

include controllable power plants, shifting electricity demand over time—particularly among large consumers[24]—and various energy storage technologies.[25] There is no single metric that fully describes the temporal and spatial flexibility requirements of the electricity system. One indicator of imbalances between supply and demand is the number of hours with negative electricity prices. In addition, the average distribution of electricity market prices over the course of the day is examined. The expansion of electricity storage capacity is highlighted as a key flexibility technology. There are neither concrete policy targets nor clear demand analyses for future storage capacity. Instead, storage capacities are compared to average electricity demand to put the figures into context.[26]

No clear trend in negative electricity market prices

Negative prices on the wholesale electricity market primarily occur when an oversupply of solar power from unregulated rooftop systems meets low demand.[27] Such prices can lead to losses for electricity generators and increase EEG subsidy costs.[28] In the first half of 2026, negative prices occurred on the electricity market for 291 hours (just under seven percent of all hours; Figure 5). This was significantly more than in the second half of 2025 (184 hours), but less than in the first half of 2025 (389 hours).

Multiplying the hourly wholesale price by the corresponding electricity generation yields the calculated market revenues of all electricity generators during that hour. Calculating this value for the hours with negative prices indicates how much electricity was theoretically available on the market and at what negative price level. In the first half of 2026, the hours with negative prices resulted in a total negative revenue of 430 million euros—a record high. This represented a sharp increase compared to the second half of 2025 and was also significantly higher than the figure for the first half of 2025. Although seasonal effects are likely at play, the figures suggest that the issue of negative electricity prices is not yet resolved. While new rules for rooftop systems exclude

24 See Franziska Klaucke et al. (2026): An Advanced Reliability Reserve Incentivizes Flexibility Investments While Safeguarding the Electricity Market. iScience 29(6), 116176 (available online).

25 For more information and details on this topic, see Wolf-Peter Schill et al. (2025): Background: What Role Do Storage Systems Play in the Energy Transition? Kopernikus Project Ariadne, Potsdam (in German; available online).

26 For context, storage power is compared with the average annual electricity demand (load), and energy storage capacity is compared with the average daily electricity demand. These are plausible benchmarks from an energy economics perspective, but they should not be interpreted as "storage requirements."

27 The Open Energy Tracker (available online) offers many interactive charts on electricity prices and the shares of various electricity generators during hours with negative prices.

28 Under the EEG, renewable energy plants receive market premiums (larger and newer plants that market their electricity directly) or feed-in tariffs (small or older existing plants whose electricity is marketed by the grid operators). EEG subsidy costs are the difference between these payments and the revenue grid operators generate from marketing the electricity. Older rooftop systems, in particular, receive the full feed-in tariff even during hours with negative prices, while the electricity can only be sold at a loss. Consequently, EEG subsidy costs rise when prices are negative.

feed-in tariffs during hours with negative prices, this applies only to new systems and not to existing ones.[29]

Average electricity market prices throughout the day have changed significantly over the past ten years (Figure 6).[30] Previously, prices were lower at night than during the day, with two peaks in the morning and evening hours. With the expansion of photovoltaics in particular, prices have fallen more and more sharply on average around noon, while the evening price peak has risen. The trend continued in the first half of 2026. This suggests that temporal flexibility in the electricity system has not grown as quickly as photovoltaics. In particular, there are too few market-oriented electricity storage facilities.

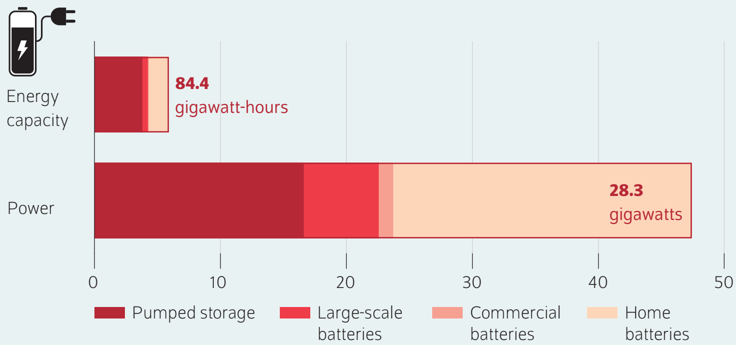
Home storage systems dominate storage power, while pumped-storage still dominates energy capacity

When it comes to electricity storage systems, a distinction must be made between power and energy capacity. Power, measured in watts, indicates how much electricity a storage system can deliver or absorb at any given moment. Energy capacity, measured in watt-hours, indicates how much energy it can store in total.

Figure 7

Installed power and energy capacity of electricity storage systems in the first half of 2026

As a percentage of electricity demand[1]



1 Storage power is shown relative to average annual electricity demand, and energy capacity relative to average daily gross electricity consumption.

Source: Federal Network Agency's Market Master Data Register; Open Energy Tracker.

Pumped-storage plants still dominate storage energy capacity, while home batteries account for the largest share of storage power.

By the end of the first half of 2026, electricity storage systems with a total power of around 28 gigawatts had been installed in Germany, which corresponds to about 47 percent of average electricity demand (Figure 7).[31] Half of these were home storage batteries coupled with rooftop solar systems. However, these do not respond to electricity market prices but rather serve to increase the self-consumption of solar power. This is because most rooftop solar systems are subsidized through fixed feed-in tariffs that are independent of the wholesale price. Furthermore, Germany long lacked the smart metering systems necessary for market-oriented storage operation. Their rollout progressed only slowly.[32] As a result, the power and energy capacity of home storage systems can only be partially compared with other technologies.

The operation of large-scale batteries, on the other hand, follows a different logic. In the past, they were primarily used to stabilize the power grid in the short term by providing fast frequency control reserves. Today, they are increasingly being used for so-called arbitrage transactions in the electricity market: When wholesale market prices are low, electricity is stored so it can be resold when prices are higher.[33] Large-scale batteries now account for 13 percent of total installed storage power. In addition, there are commercial batteries, which make up two percent of the total and are only partially operated based on market prices.[34] Pumped-storage facilities, which have been in use for decades, still account for the second-largest share of installed storage power at just over one-third.

Total installed storage energy capacity most recently stood at just over 84 gigawatt-hours (GWh), which corresponds to about six percent of average daily electricity consumption. Two-thirds of this was still accounted for by pumped-storage plants,[35] but batteries were catching up here as well.

Large-scale batteries are on the rise

The growth of large-scale batteries accelerated sharply in the first half of 2026, while the expansion of home batteries slowed (Figure 8). In terms of both power and energy capacity, nearly twice as many large-scale batteries were installed as in the second half of 2025. Their total grid-connected capacity has grown by nearly half over the past six months. The reasons for this include sharply falling battery prices and significantly greater price fluctuations in the electricity market (Figure 6).

29 Federal Law Gazette (2025): Act Amending Energy Industry Law to Prevent Temporary Generation Surpluses. February 24, 2025 (in German; available online).

30 An animated version of this figure, also known as the "duck curve," can be found on the Open Energy Tracker (available online).

31 To calculate this, the total gross electricity demand for the year 2025 of just under 522 terawatt-hours was divided by 8,760 hours.

32 Federal Network Agency (2026): Rollout of smart metering systems (in German; available online).

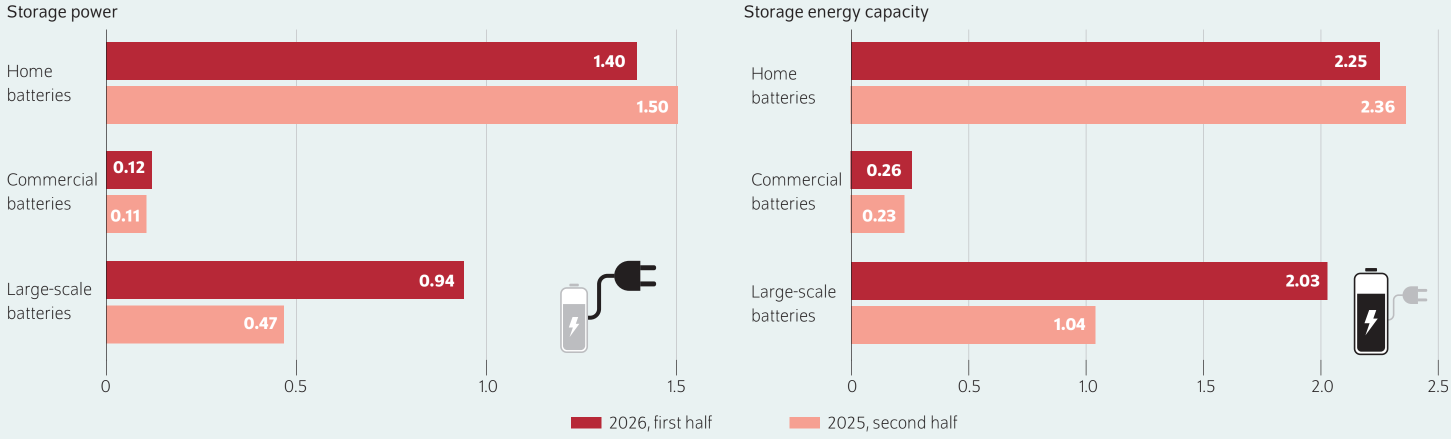
33 This is vividly illustrated by an interactive figure on the Open Energy Tracker that compares storage operations and electricity prices (available online).

34 The classification into home, commercial, and large-scale storage follows the Battery Charts from RWTH Aachen University (available online).

35 This also includes pumped-storage facilities in Luxembourg and Austria that are directly connected to the German transmission grid. Some of the storage capacity figures are estimates.

Figure 8

Expansion of storage power and energy capacity
Left: In gigawatts; Right: In gigawatt-hours



Note: The figures for the first half of 2026 could increase further due to late reports.

Source: Federal Network Agency's Market Master Data Register; Open Energy Tracker.

The expansion of large-scale batteries has accelerated significantly, while that of home batteries has slowed somewhat.

Grid connections remain the main obstacle to even stronger growth in large-scale battery storage. Project developers submit applications for these connections, which must then be reviewed on a case-by-case basis by transmission or distribution system operators, formalized with a grid connection agreement, and finally implemented technically. Grid connection requests for storage projects are reaching new records, partly due to multiple requests for different locations. But the number of approvals is also rising: By 2024, grid operators had already granted connection commitments for battery storage systems totaling approximately 25 GW of power and 46 GWh of capacity—significantly more than the current installed capacity of large-scale batteries.[36] For 2025, further approvals on a similar scale appear plausible. Consequently, even more significant growth in large-scale batteries is expected in the future.

Pumped-storage plants, on the other hand, are stagnating. Unlike large-scale batteries, which can be easily scaled, pumped-storage plants are large individual projects requiring high investment, involving lengthy approval processes, and often facing local acceptance issues.

Conclusion: accelerating renewables, electrification, and storage together

Current developments in the key technologies of the energy transition paint a mixed picture. While the energy transition is advancing in all areas, the necessary acceleration toward greater climate protection and energy security has yet to materialize. In the expansion of photovoltaics, the current lead over the EEG targets is at risk of dwindling. The share of rooftop systems is declining and could fall even further in the future if—as planned in the current EEG amendment—the feed-in tariff for these systems is abolished. To avoid market distortions, it is advisable to spread the phase-out of feed-in tariffs across a defined transition period.

Onshore wind power is poised for strong growth: Many approved projects and successful tenders make the EEG targets seem achievable. Additional tenders for 12 GW, as announced in the 2026 Climate Protection Program, are likely to foster this development.[37] For offshore wind power, on the other hand, it is crucial that the projects already awarded through auctions are actually implemented and that challenges in the supply chains are overcome. Long-term predictability as well as stable expansion and grid connection planning are helpful in this regard.

When it comes to heat pumps, further impetus seems necessary to advance the heating transition in existing buildings as well. However, the recently adopted Building Modernization Act, which replaces the Building Energy Act of the former “traffic light” coalition government, is unlikely to provide such support. In fact, the switch to heat

36 Federal Network Agency (2025): Status Quo of Battery Storage Applications in 2024 (available online). More recent data is not yet available.

37 Federal Ministry for the Environment, Climate Action, Nature Conservation, and Nuclear Safety (2026): Climate Action Program 2026. Cabinet decision of March 25, 2026 (in German; available online).

pumps could be further delayed, as the installation of new gas and oil heating systems remains permitted under certain conditions.[38]

Electric mobility is benefiting from favorable conditions: more affordable vehicles, new purchase incentives for private individuals, and rising fuel prices are driving growth. However, the federal government's push to soften the phase-out of internal combustion engines at the European level and its adherence to the ideal of technology neutrality could slow the transition to electric mobility. Greater technological clarity would provide the industry and car buyers with more guidance.[39]

Storage shows a clearly positive trend, particularly for large-scale batteries. However, if grid connections were made available more quickly, battery storage could grow even more dynamically. Flexible Connection Agreements (FCAs), under which grid operators are permitted to temporarily limit usable capacity, have proven to be a step forward, even though questions regarding their design remain controversial. The extended exemption from grid fees for electricity drawn from storage systems, which the Federal Network Agency grants for newly constructed facilities, is likely to have a significantly positive impact.[40]

38 Listen to episode #40 of the DIW Energy Transition Podcast "fossilfrei" (in German; available online).

39 See Wolf-Peter Schill (2026): Watering Down the Phase-Out of Internal Combustion Engines: An Own Goal in Climate and Industrial Policy: Commentary. DIW Weekly Report no. 3, 36 (in German; available online).

40 See the Federal Regulatory Agency's press release of May 27, 2026 (in German; available online).

The pace of the energy transition must accelerate across all technologies considered here in order to make Germany climate-neutral by 2045 while simultaneously reducing its dependence on fossil fuel imports. The conditions for this are favorable, not least due to improved framework conditions and ongoing technological advances in key technologies.[41] It appears particularly important to accelerate the electrification of the heating and transportation sectors through heat pumps and electric vehicles. This is by no means a uniquely German approach, but rather a broad international trend.[42] The EU is also driving electrification forward, including through the European Commission's Electrification Action Plan, which sets a target for the share of electricity in Europe's final energy consumption for the first time: The target for 2030 is 32 percent, while a substantially higher target of 46 percent has been proposed for 2040.[43] In Germany, the share of electricity in final energy consumption was only around 20 percent in 2025,[44] and there is not yet a specific national target. The federal government should resolutely capitalize on this development at the European level and drive electrification forward much more vigorously in Germany than it has recently. At the same time, it should adhere to the ambitious expansion targets set in the EEG for solar and wind energy to ensure that sufficient renewable electricity is available for heat pumps and electric vehicles in the future.

41 See also Wolf-Peter Schill et al. (2025): Germany should accelerate its renewable energy transition. Communications Earth & Environment, 6, 859 (available online).

42 See, among other sources, the "Electrify Now" initiative by the European Commission and other partners (available online).

43 See the European Commission's website (available online).

44 According to the Working Group on Energy Balances (available online), final energy consumption of electricity in 2025 amounted to 460 terawatt-hours (TWh), while total final energy consumption stood at 2,292 TWh.

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JEL: Q41, Q42, Q48

Keywords: Energy transition; solar PV; wind power; heat pumps; electric vehicles; storage

LEGAL AND EDITORIAL DETAILS

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Volume 16 July 29, 2026

ISSN 2568-7697