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Will Germany reach 80% renewables in power consumption by 2030?

The energy transformation in Germany, widely known as the “Energiewende”, is the country’s planned long-term energy transition towards a low-carbon economy (Von Hirschausen, 2014) and represents the country’s national strategy to meet its commitments under the Paris agreement.

The main goal of the Paris Agreement is to limit global warming to well below 2°C and signatories of the agreement must submit their Nationally Determined Contributions (NDCs) which outline their climate targets (UNFCCC, 2015). Germany does not submit its own NDC but is included in the collective EU NDC document and implements several national policies to deliver the collective NDC targets.

Much of the focus within Germany’s climate policies has been on decarbonizing the electricity sector; The Atomic Energy Act mandated the phase-out of nuclear electricity production (Federal Ministry of Justice, 2023), which was completed 2023, and the Coal Phase-Out Act mandates that the last coal-fired power station in Germany must close no later than 2038 (Bundesregierung, 2020).

While nuclear electricity is out of the picture and coal power is being phased out, the Renewable Energy Sources Act (EEG) states that Germany aims to achieve a share of 80% renewables in power consumption by 2030.

To put the target into context, the share of renewables in power consumption reached 56% in 2024 (Fraunhofer ISE, 2024). Over the past nine years, the share of renewables has increased by an average of 2.3 percentage points each year, and if this trend continues, it will reach 69% by 2030, well below the 2030 target.

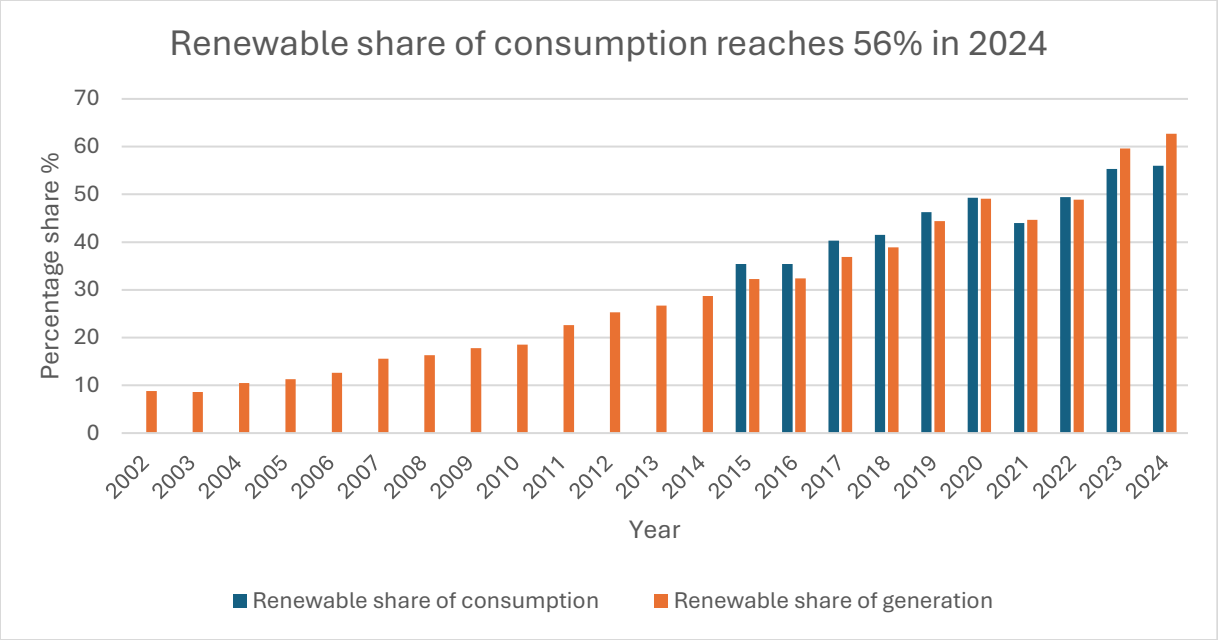

Figure 1: Annual renewable share of consumption and generation in Germany (Fraunhofer ISE, 2024)

To reach the 80% target by 2030, the share of renewables in power consumption therefore needs to increase at a faster pace than it has done over the past nine years. To see whether this is likely to happen, this essay will first make a case for why the target **will be** achieved, then a case for why it **will not be** achieved. Thirdly, it will discuss which viewpoint is more plausible, arguing that it is more likely not to be achieved.

Why Germany will its renewables target by 2030

The case presented here for why Germany will reach its 2030 renewables target is based on the following: solar capacity additions are on a strong upward trend and battery deployment is set to expand, supporting the utilisation of solar capacity additions.

Consider first that the share of renewables in German power consumption is driven by:

1. Domestic power consumption
2. Domestic renewable power generation
3. Renewable power imports

Power imports account for a small share of supply, 1.9% in 2023 (IEA, 2024a), therefore the impact of imports on reaching the 2030 target will be considered negligible.

As for power consumption, it is on a slight downward trend. Between 2013-2023, consumption dropped by an average of 1% each year and is currently near 500TWh/year. (Ember, 2024).

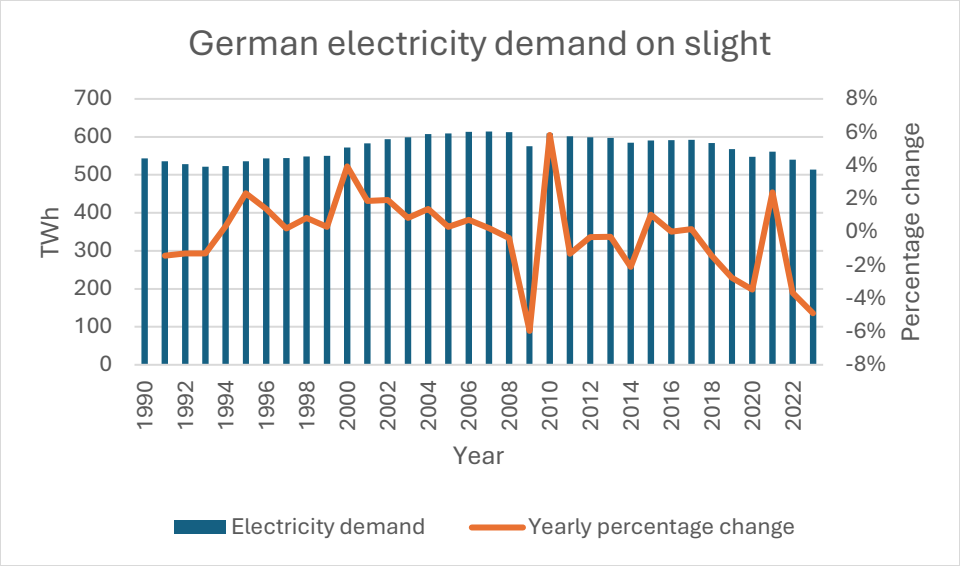

Figure 2: Annual electricity demand in Germany (Ember, 2024)

With relatively minor imports and a flattish/negative consumption trajectory, the main factor impacting the share of renewables in consumption by 2030 will be domestic renewable power generation. And renewable power generation in Germany is primarily driven by combined installed capacity of wind and solar, as demonstrated by **Figure 3**.

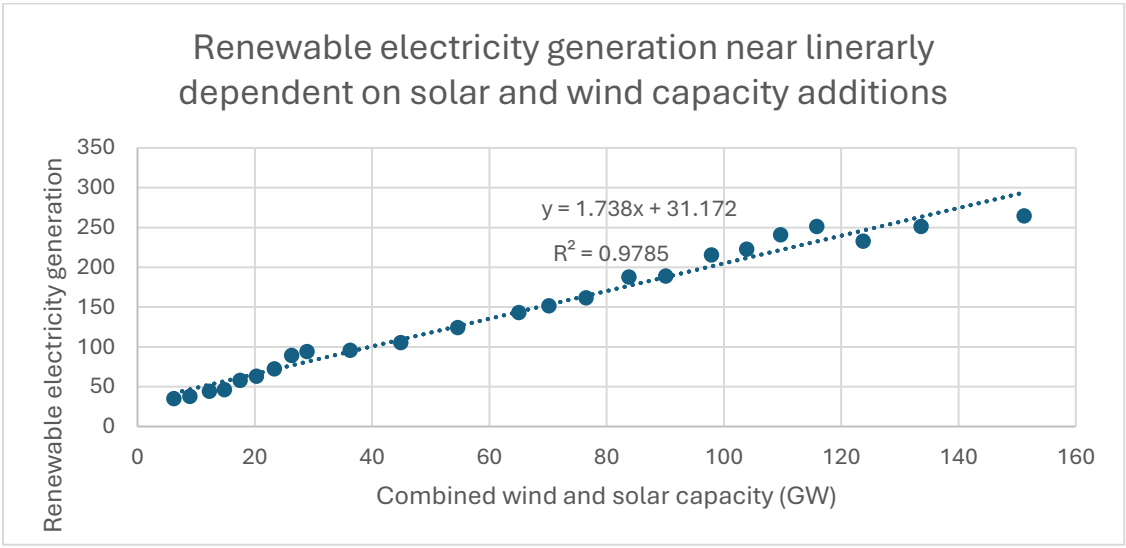

Figure 3: Wind and solar capacity against renewable electricity generation in Germany for the years 2000-2023 (Ember; Energy Institute, 2024)

Therefore, meeting the 2030 target will rely on accelerating wind and solar capacity additions. In recent years, wind capacity additions in Germany have stalled but solar capacity additions are on a strong upward curve.

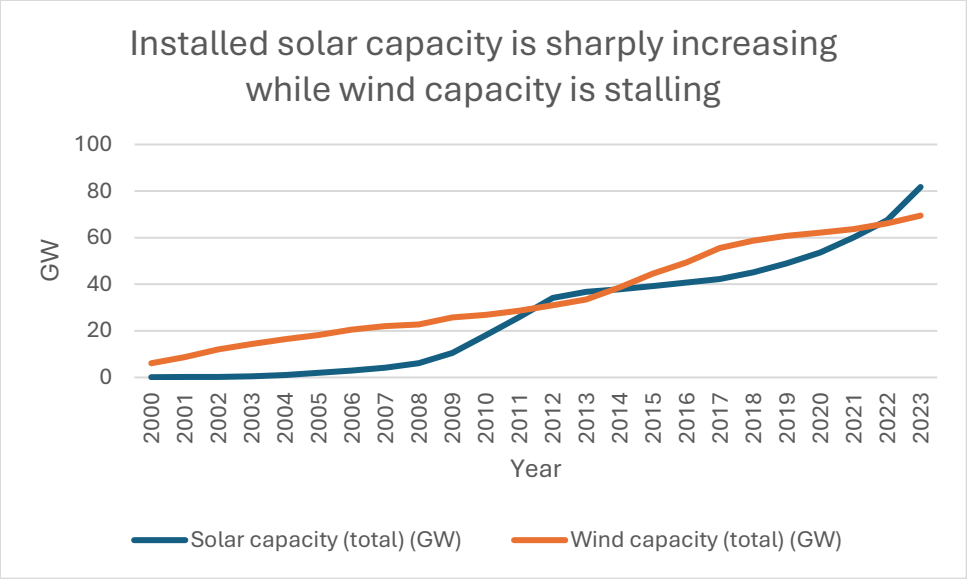

Figure 4: Total solar and wind capacity in Germany (IRENA, 2024)

For the years 2015-2023, the rate of solar capacity additions is described by the equation in **Figure 5,** which projects solar capacity to reach 190GW by 2030.

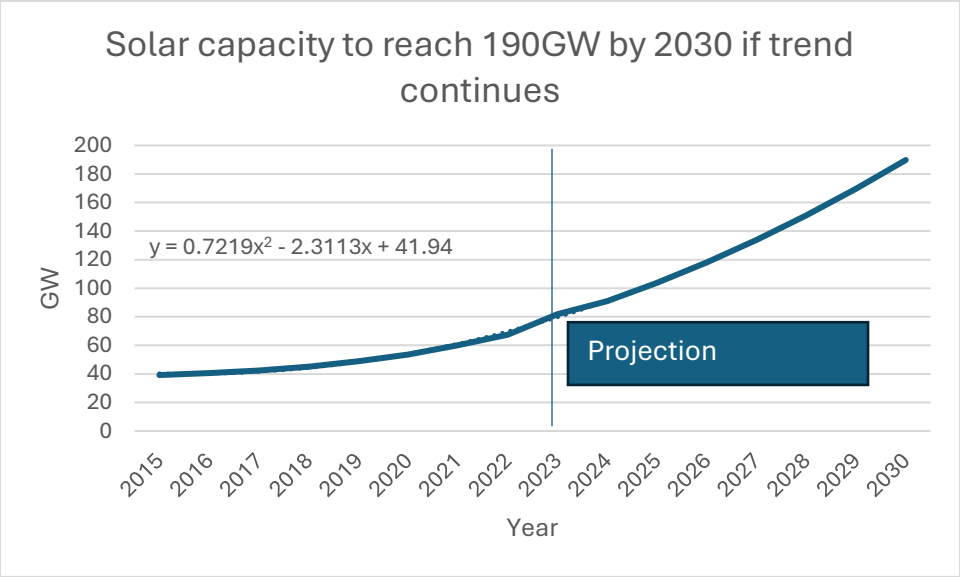

Figure 5: Polynomial trend line projection based on 2015-2023 data (IRENA, 2024)

Under this projection, assuming wind capacity remains unchanged at 69GW, the total wind/solar capacity in 2030 will be 259GW. Substituting this into the equation from **Figure 3**, which relates capacity to generation, results in projected renewable generation in 2030 of 482TWh. This is more than 90% of current yearly electricity demand and since demand is on a negative trend, it will likely be more than 90% of demand in 2030 as well.

The key objection against this projection is that the equation which relates capacity to generation could change as capacity increases, with lower utilisation of capacity the higher capacity gets.

However, the deployment of batteries can counteract this effect by making it possible to utilise more of overall capacity.

The outlook for battery deployment is positive amid declining costs and volatile electricity markets. For these reasons, the German Solar Industry Association expects large-scale battery capacity to increase rapidly in the near-term, from 1.8GWh in 2024 to 8.8GWh in 2026 (Bundesverband Solarwirtschaft, 2024).

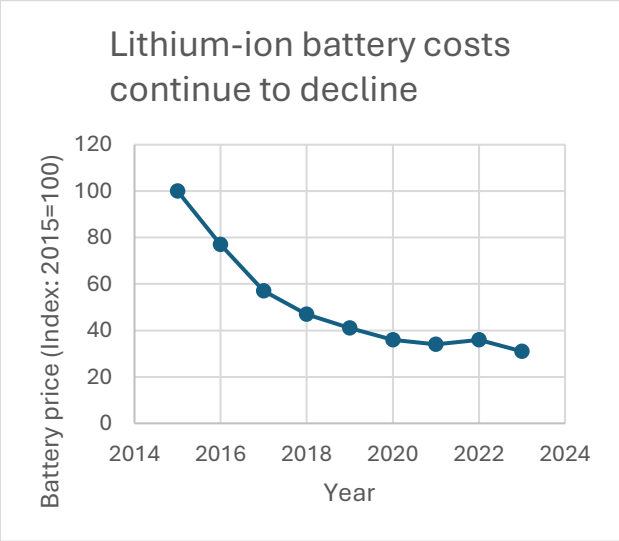

Figure 6: Battery costs (IEA, 2024b)

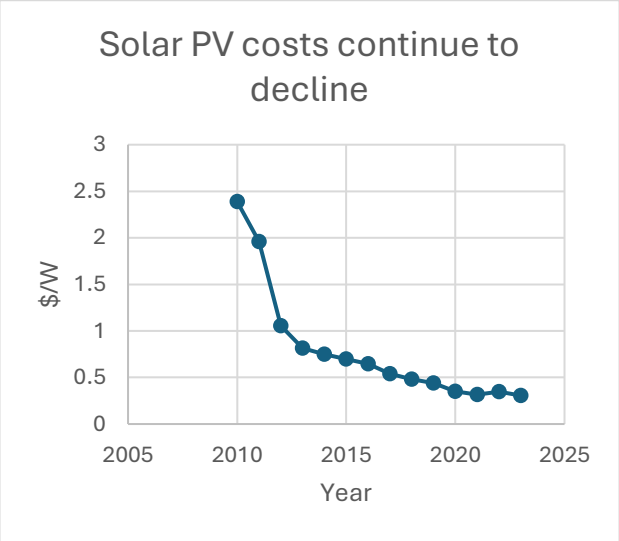

Figure 7: Solar PV costs (IRENA, 2024; Nemet, 2009; Farmer and Lafond, 2016)

The combination of surging solar capacity additions and fertile ground for expansion of large-scale batteries together present the best argument for why Germany will reach its target of 80% renewables in power consumption by 2030. There is momentum in solar capacity additions and as battery deployment ramps up, renewable power generation can make large gains.

Why Germany will not reach its target by 2030

The case against Germany reaching its 2030 target is based on the following: the German government is not prepared to provide the subsidies required to counteract the increasingly risky nature of renewable power investment and rising power system costs.

From a political perspective, Germany is in a highly uncertain state. In November 2024, the German government collapsed, following the dismissal of then-finance minister Christian

Lindner by the chancellor of Germany, Olaf Scholz (Tagesschau, 2024a). The dismissal was prompted by Lindner's proposal to adhere to the country's debt brake, which limits budget deficits to 0.35% of GDP, and to cut public spending, including spending allocated to climate action and energy (Tagesschau, 2024c).

As a result of the government collapse, snap elections are set to be held in February 2025 (Tagesschau, 2024b). In the lead up to these elections, two parties are making particularly striking gains: Alternative for Germany (AfD) and the Sahra Wagenknecht Alliance (BSW).

AfD was founded in 2013, received 10% of the votes in the 2021 elections (Federal Returning Officer, 2021) and are now polling at 20% as of December 2024 (Politico, 2025a), making it the country's second largest party after the CDU/CSU union. The party has a platform of climate change denial, wants to scrap the EEG and cut public spending (Deutscher Bundestag, 2021). The AfD chancellor candidate Alice Weidel has even said that all wind turbines will be demolished if "they are at the helm" (BDEW, 2025).

On the other side of the political spectrum, BSW originated as a split from the socialist party The Left, as Sahra Wagenknecht disagreed with the party consensus to turn away from Russian gas (Der Spiegel 2022), arguing that traditional fuels such as gas are important for Germany's industry-heavy economy (Clean Energy Wire, 2024). BSW was founded only a year ago, on 8 January 2024, but is already polling above both The Left and the FDP, at 7% as of December 2024 (Politico, 2025a).

The popularity of climate-sceptic parties on both sides of the political spectrum is likely pressuring the CDU/CSU union leadership. In January 2025, Friedrich Merz, leader of the CDU/CSU and likely Germany's next chancellor said that Germany's economic policies during Scholz's reign were "almost exclusively geared toward climate protection", adding "I want to say it clearly as I mean it: We will and we must change that" (Politico, 2025b).

These political pressures and trends make it exceedingly unlikely that the German government will ramp up investment in renewable energy. This is an issue because a ramp up in investment is required for Germany to reach its 2030 target, for two main reasons: The first reason is that the more intermittent capacity is introduced into the power system, the larger the investment required in transmission and balancing infrastructure (DIW Berlin).

The second, more important, reason is that as intermittent solar and wind capacity on the system increases, prices during sunny/windy hours, when renewable developers generate most power, start to collapse – this is known as the cannibalisation effect (Tselia, 2022). This means that renewable power producers get less revenue/MWh as renewable capacity on the system increases. **Figure 8** below shows the drastic decline in solar capture rates in

Germany over the past four years, defined as the percentage of the solar capture price relative to the average price of the day-ahead market.

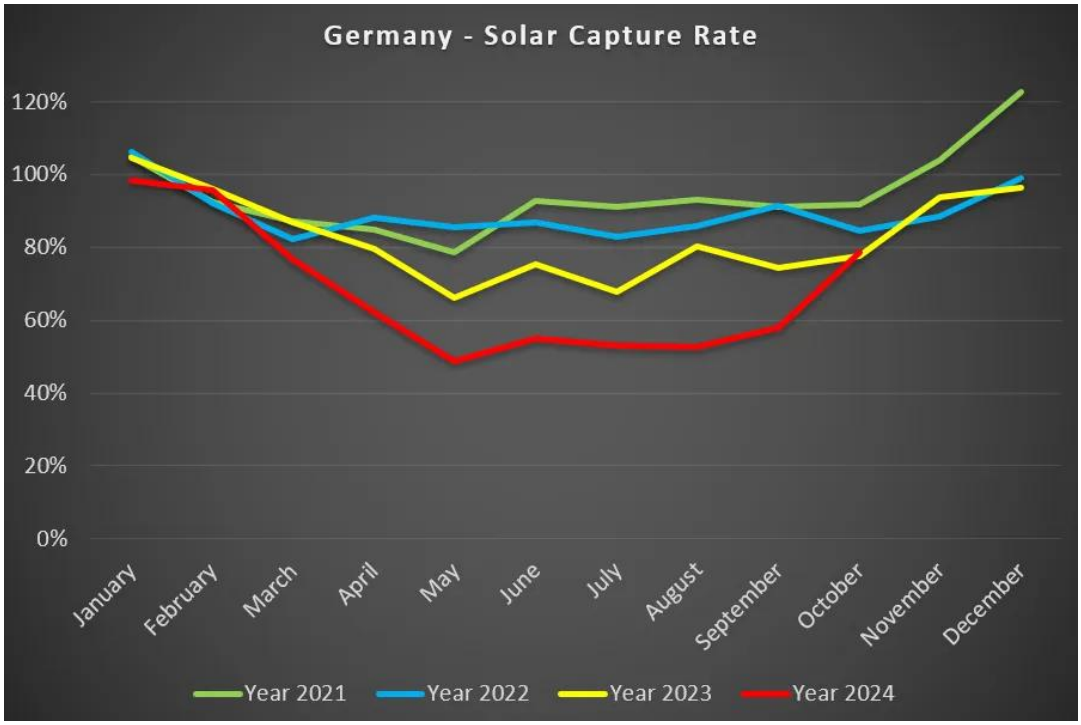

Figure 8: Solar capture rate in Germany (GEM Energy Analytics, 2024)

For large parts of 2024, renewable power producers got only half of the average Day-ahead price for their power, and this issue is only set to get worse. This makes future investment in renewable power riskier and is set to weigh on renewable power capacity additions.

Increasing government subsidies to new renewable power developers could counteract this, but this is unlikely to happen given the current political environment in Germany. In fact, cuts to subsidies have already started. A government report from July 2024 said: “In order to reduce the costs of EEG funding in the short term, the federal government will, as agreed in the growth initiative, generally suspend funding for new plants when prices are negative from January 1, 2025” (Bundesfinanzministerium, 2024).

Therefore, in the absence of rising subsidies, increasing the share of renewables in the system will become increasingly challenging, due to rising system costs and progressively riskier nature of renewable capacity investment, such that the 2030 target is unlikely to be met.

Discussion – which viewpoint is more plausible?

The following two cases have been made for the target of 80% renewables in power consumption by 2030:

1. The target **will be** achieved, due to strong momentum in solar capacity additions and a positive outlook for deployment of batteries.
2. The target **will not be** achieved, since public investment will be required to rise as the share of renewables increases, and the political environment in Germany makes this infeasible.

There is an inherent uncertainty about what will happen in Germany from a political perspective, however it is clear that the country is in a stagnating economy (European Commission 2024) with calls to cut public spending and renewable investment funding is a prime target for cuts.

This essay therefore considers a near-term ramp-up in renewable power investment unlikely. The question then becomes, can the 2030 target be achieved without increasing government investment?

On one hand, solar PV and lithium-ion battery costs are decreasing, and on the other hand, capture rates are dropping due to insufficient transmission and storage capacity.

If capture rates continue to drop, this will certainly weigh on renewable investment, as prices available for renewable power producers will be less than half of those available for conventional power producers. In such a scenario, this essay considers it unlikely the 2030 target will be achieved, no matter what happens to solar PV and battery costs.

To prevent capture rates from accelerating downward, transmission capacity, battery storage and/or demand-side flexibility need to improve. Improving transmission capacity requires large-scale public funding and is therefore unlikely to happen. Demand-side flexibility requires large-scale changes in human behaviour which is unlikely to materialise in the relatively short time span of six years.

Therefore, increasing battery storage capacity has the most potential in stabilising the grid in the short-term. Industry forecasts for expansion are optimistic, however the starting point of capacity is so low that even a “five-fold increase in two years” (Bundesverband Solarwirthschaft, 2024), amounts to 8.8GWh of large-scale storage capacity. This is 0.6% of average daily demand of around 1.4TWh – unlikely sufficient to prevent capture rates from declining.

Recall from the introduction that for Germany to reach its 2030 target, a significant increase in the pace of renewable generation expansion is required. In conclusion, this is unlikely to happen amid rapidly declining solar capture rates and a weak outlook for government subsidies to support expansion.

It is true that solar capacity additions are on a strong trend and costs are getting lower, but the challenge of increasing capacity is set to get more difficult, and politics in Germany are not primed to help.

Future analysis would benefit from more data about large-scale battery developments, more information about the relationship between renewable capacity and generation, and a crystal ball predicting the results of the German elections.

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