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Higher Renewable Energy Targets in Germany

How Will the Industry Benefit?

Gilles LEPESANT

► Key Takeaways

- The level of ambition of the Federal government for the *Energiewende* has dramatically increased with the new coalition elected in 2021, the share of renewables to be reached in the power mix by 2030 being set at 80% (against 47% in 2022).
- The German wind industry has however been affected by a slowdown of the expansion of capacities, several rounds of onshore wind and solar auctions being in 2022 undersubscribed. The added value of the *Energiewende* in terms of job creation has been ambivalent so far.
- The country's current industrial geography might be partly reshaped with the efforts made by northern and eastern States to deploy renewables and green hydrogen at large scale. Stakes are high for southern Germany since new spatial patterns are emerging in the automotive sector too.
- While Chinese competition in the solar and wind manufacturing sectors is tough, the Inflation Reduction Act has reinvigorated discussions around a stronger industrial policy.

Introduction

“Deutschland – Einstieg in die Deindustrialisierung?” – “Germany, the beginning of deindustrialisation?” asked the German economic newspaper *Handelsblatt* in the context of the spike in energy prices that has put at risk thousands of companies across Germany in 2022¹. Whereas some sectors such as steel, glass and chemicals have been seriously hit, the manufacturing industries operating in the areas linked to the energy transition (such as renewable energies and hydrogen production) should benefit from decisions taken to reach climate neutrality. The level of ambition of the Federal government has indeed dramatically increased with the new coalition elected in 2021, the share of renewable energy sources (RES) to be reached in the power mix by 2030 being set at 80% (against 47% in 2022).

Will the German industry benefit from the ambitious commitments agreed by the new coalition? The boom and bust of the solar sector in 2011 are a reminder that a strong internal demand does not necessarily translate into strong and resilient supply chains on the national territory. In the context of generous support schemes, several companies emerged in the 2000s benefiting from the strong demand for solar panels before being overwhelmed by Asian competitors. Nowadays, more than 90% of solar panels are imported from China.

A strong push for more renewables

In the aftermath of the Ukraine invasion by Russia, Federal authorities doubled down on their pledge to increase the share of RES at the expense of fossil fuels, notably doubling the country's onshore wind capacity to 115 gigawatts (GW) by 2030, meaning that the number of turbines built each week must rise from currently 8 to about 30². Solar PV (photovoltaics) installations and offshore wind additions will also have to increase sharply (see table 1) as well as green hydrogen production and imports.

1. *Handelsblatt*, September 7, 2022.

2. Jan Ulland, Press conference of BDEW, *Energiewirtschaft bei den Klimazielen weiterhin auf Kurs*, December 21, 2021, available at: www.bdew.de (accessed on February 2, 2022).

Table 1. Targets for the energy transition

	Target stated by the former coalition	Target set in 2021	Target set in 2022	Stand in January 2022
Share of RES in the power mix	65% by 2030	80% by 2030	80% by 2030	46.4%
Onshore wind	75 GW by 2030	Around 100 GW by 2030	115 GW by 2030	57 GW
Offshore wind	20 GW by 2030	30 GW by 2030	30 GW by 2030, 40 GW by 2035, 70 GW by 2045	8 GW
Solar	100 GW by 2030	200 GW by 2030	215 GW by 2030	63 GW
Electrolyzers	5 GW	10 GW	10 GW	-

Source: Federal Ministry for Economy and Climate

Beyond the new targets set, the expansion of RES will be given priority over other issues (such as biodiversity protection). New conditions shall be provided to communities to benefit financially from wind parks and ground-mounted solar PV nearby and spatial planning laws will reserve 2 percent of the country's surface area for onshore wind power (more than twice the area currently designated)³. The challenge now is to enforce at the State level the initiatives adopted at the national level and to ensure that the German economic ecosystem can benefit from the ambitions set.

However, 2022 has been disappointing in terms of capacity expansion. The federal government was aiming to auction 4.5 GW of onshore wind capacity as well as 3 GW of solar capacity. However, several bids attracted far fewer bidders than expected. At the end of the year, only 3.2 GW of onshore wind capacity and 2.4 GW of solar capacity were effectively awarded.⁴ However, rooftop solar installations have picked up.

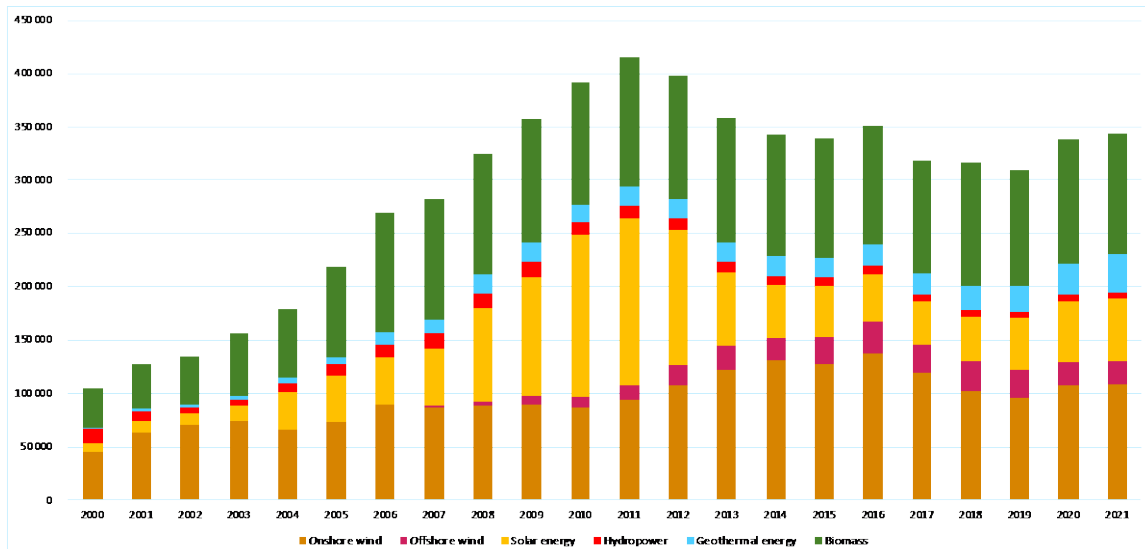
The added value of the *Energiewende* in terms of job creation has been so far ambivalent. Between 2000 and 2021, the number of jobs in the sector of RES has been multiplied by three but Germany has today 60 000 fewer jobs in this sector than ten years ago. Two crises have had a negative impact on employment. Starting in 2011, competition from Asia led to a sharp increase of bankruptcies in the German solar sector leading to a loss of jobs that has never been offset since (see graph. 1). The wind sector has proved to be more resilient, but the sector was providing fewer jobs in 2021 than in 2016 and in the biomass sector, jobs creations have been significant, but no

3. Minimum distance rules will be allowed to remain in force only if the state fulfils its contribution to national wind power buildout targets. Changes to grid planning at the federal level have also been adopted and administrative procedures have been simplified to shorten time needed to implement projects aiming at climate neutrality.

4. Bundesnetzagentur (Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway), available at: www.bundesnetzagentur.de.

sharp increase is in sight. The renewable energy sector supports around 350,000 jobs (780,000 in the case of the automotive industry).

Graph. 1. Number of employees in the renewable energy sector from 2000 to 2021



Source: DIW/DLR/GWS, 2020, available at: www.erneuerbare-energien.de (accessed on October 10, 2022).

The bust and revival of the solar industry

In 2007, Germany produced every fourth solar cell worldwide. In 2021, Europe contributed only 3% to global PV module production while Asia accounted for 93%, of which China made 70%⁵. In the aftermath of Germany's Renewable Energy Act in the year 2000, German solar companies ascended to global leadership and 150 000 jobs had been created by 2011. A solar cluster emerged in the south of the former GDR (German Democratic Republic) against the backdrop of generous support schemes, a supportive industrial legacy in the silicon sector as well as the support of R&D institutions (such as the Fraunhofer-Center für Silizium-Photovoltaik CSP in Halle). Overall, financial support to solar R&D has increased in past years to reach about 90 million EUR, notably under public-private support schemes⁶.

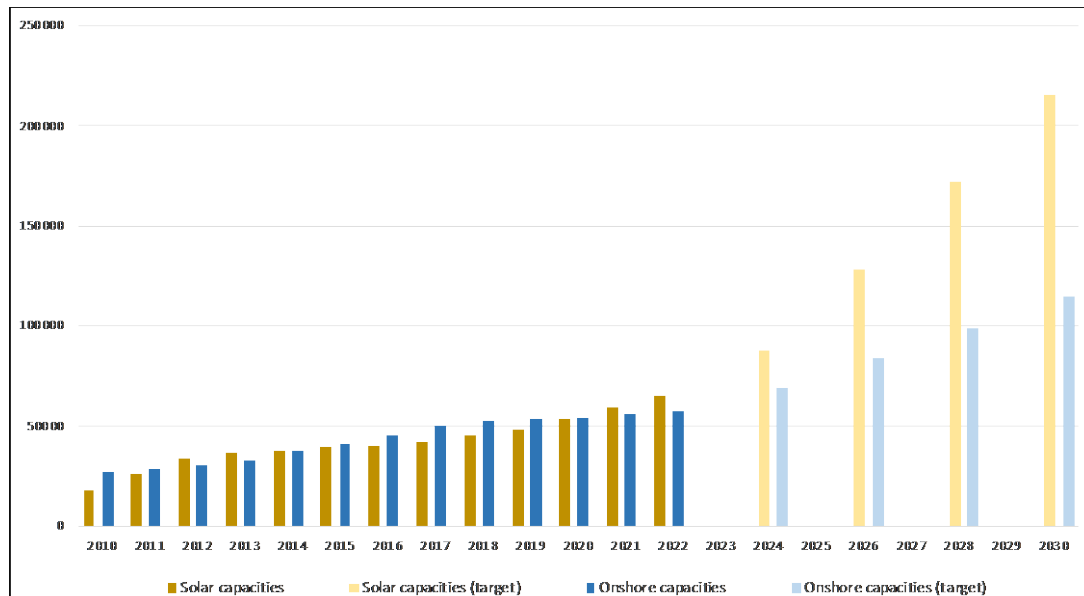
Imports from Asia added to a parallel drop in guaranteed remuneration stopped the expansion of the solar industry. Several companies such as Q-Cells, Solar World, Solon and Conergy went bankrupt or cut their production and the number of jobs plummeted to 45 000 in 2016. Trade barriers adopted at the EU level in 2013 were lifted in 2018 as if the priority was at that stage given to lowering the cost of solar energy. Whereas most companies dropped out of business, the cost of solar energy indeed went down (5 cents per kilowatt hour (kWh) in 2021 auctions) and around 95% of solar cells are imported from China.

5. Harry Wirth, *Recent Facts about Photovoltaics in Germany*, Fraunhofer institute, December 16, 2021.

6. Available at: www.ifri.org, pp. 39-45.

A revival would be even more important that capacities added in the solar sector every year overtook those added in the wind sector in 2021 and that ambitions are higher in the photovoltaic sector than in the wind sector (see graph. 2).

Graph. 2. Solar and wind capacities installed and planned, 2010-2030



Source: Bundesnetzagentur, *Statistiken ausgewählter erneuerbarer Energieträger zur Stromerzeugung*, September 2022

Solar power companies that offer digital services (for example for home storage) see rising turnover. Whereas world market leaders are focused on large-scale projects that yield high returns, small-scale prosumers have become a key market for SMEs. Storing and sharing (or trading) solar energy has triggered a new wave of solar power investments in the country. Regarding the manufacturing of solar panels, automation should help since the difference in labor costs between China and Europe will play a minor role in the near future.

Obstacles remain. A shortage of skilled labor for installing panels could slow down the revival of the industry. According to BSW (German Solar Industry Association), the sector has 25,000 workers but twice more will be needed by the second half of the 2020s⁷. Price competitiveness remains an issue as Chinese competitors have relied on a big domestic market, on integrated industrial clusters, on support from local and national authorities, on low energy prices and – according to the European Parliament - on forced labor⁸. Reliance on cheap hardware supply from China is also not without caveats. The bulk of solar panels being still imported from China means that tensions over Taiwan or other issues could affect the roll-out of the *Energiewende*.

7. "Neue Chancen für die deutsche Solarindustrie", *Handelsblatt*, August 6, 2022.

8. European Parliament, Joint motion for a resolution on the human rights situation in Xinjiang, including the Xinjiang police files (2022/2700(RSP)), RC-B9-0310/2022, June 8, 2022, available at: www.europarl.europa.eu

In such a context, mass production of solar cells in Germany would alleviate fears of over supplience on China⁹. Construction of large-scale production lines requires however significant volumes of investment that might be out of reach for most market players across Europe for whom being focused on the most-advanced parts of the supply chain might seem more relevant. Against this backdrop, the government is working on a new solar strategy¹⁰.

The wind sector: a success story at risk?

Over the last few years, the German wind industry has been affected by a slowdown of the expansion of wind capacities (see graph. 2). Hence the slow increase of jobs in the wind sector that occurred after a dynamic period (see graph. 1). In 2022, upward pressure on the price of inputs and shipping have hit several companies such as Siemens Gamesa which has closed its fiscal-year 2022 with a net loss of €940m¹¹. Offshore wind has however helped to strengthen the position of northern States in the German industrial geography.

80% of world offshore wind turbines are in the North Sea thanks to convenient natural conditions (shallow waters, strong and regular wind regimes) and an appropriate regulatory framework set in neighboring countries. Offshore wind has helped revitalize many coastal cities and seaports affected by the decline in shipbuilding in the 1980s.

Assembly work being more cost-effective if done close to the site, coastal areas have indeed become very attractive for different companies. The industry benefited from the transfer of know-how from other industries (modularisation in aeronautics for example). A windfarm requesting around several thousand mechanical parts, the strong interactions between different stakeholders in the mechanical sector at different levels have also supported the competitiveness of the sector. Regionally available competencies in steel construction, electronics and maritime logistics have helped (as well as training and education institutions), and sound conditions have been provided by local and regional authorities (the city-state of Bremen started its offshore wind energy support policy in 2001).

Offshore wind has however helped to strengthen the position of northern States in the German industrial geography.

9. Riham Alkousaa, "Germany's Solar Valley Could Shine Again as Europe Strives to Close Energy Gap", *Reuters*, October 28, 2022.

10. www.bmwk.de

11. Shotaro Tani, "Siemens Gamesa Calls for Quotas on EU-Made Wind Turbines", *Financial Times*, October 17, 2022.

In Hamburg, insurance and certification companies expanded into new business areas and the city is now being regarded as the brain port of offshore wind energy in northern States thanks to its R&D institutions¹². In December 2020, Germany and Denmark agreed on “energy hubs” that would enable more offshore wind development and green hydrogen production with possible connections to other countries. At the end of the day, a consolidation might occur in the offshore sector with few global leaders having a strong grip on the market as oil and gas utilities today have.

Challenges faced by the industry are however numerous. The cumbersome permitting processes hold back faster deployment of onshore wind energy. The legislation proposed by the European Commission (EC) to reduce permitting times, by identifying areas suitable for wind farms and then fast-tracking approvals in those areas, could in this respect prove helpful. A stronger demand won't be enough. German manufacturers such as Nordex SE, Enercon GmbH and Siemens Gamesa have strong positions in the German market but the increasing reliance on Chinese suppliers is a cause of concern. Selling entire turbines to European customers might prove difficult for Chinese rivals, but more than 80% of the components of some European turbine manufacturers are sourced in China. As an example, wind turbine hubs and gearboxes are supplied to Nordex from China¹³. “The relocation of production capacities abroad, which we have seen in recent years, must not continue – said the German minister of economy Robert Habeck – otherwise, our wind sector will experience a repeat of the decline that hit German PV in the past decade”¹⁴.

Such a scenario is indeed not unlikely as shown by a report from the Energy Economics & Financial Analysis (IEEFA) on the capacity of Chinese competitors to disrupt non-Chinese markets¹⁵. Chinese competitors are starting to expand outside of China and look at opportunities in onshore as well as in offshore wind sectors. In 2022, Ming Yang Smart has been selected for the first floating project to receive a contract for difference (CfD) in the UK. It also supplied turbines for Italy's first offshore wind farm and plans to invest in blade-manufacturing and turbine assembly factories in the UK and possibly in Germany¹⁶. Hence, Siemens Gamesa's chief executive Jochen Eickholt is calling for quotas for European wind turbine manufacturers to create a level playing field¹⁷.

12. Dirk Fornahl, Robert Hassink, Claudia Klaerding, Ivo Mossig, Heike Schröder, “From the Old Path of Shipbuilding onto the New Path of Offshore Wind Energy? The Case of Northern Germany,” *European Planning Studies*, 20:5, 835-855, 2012.

13. Bernd Radowitz, “The Threat is Coming: Is Europe's Wind Power Industry Heading for a China Crisis?”, *Recharge News*, November 16, 2022.

14. *Ibid.*

15. Norman Waite, *Chinese Offshore Wind Goes Global*, Institute of Energy Economics and Financial Analysis, September 5, 2022.

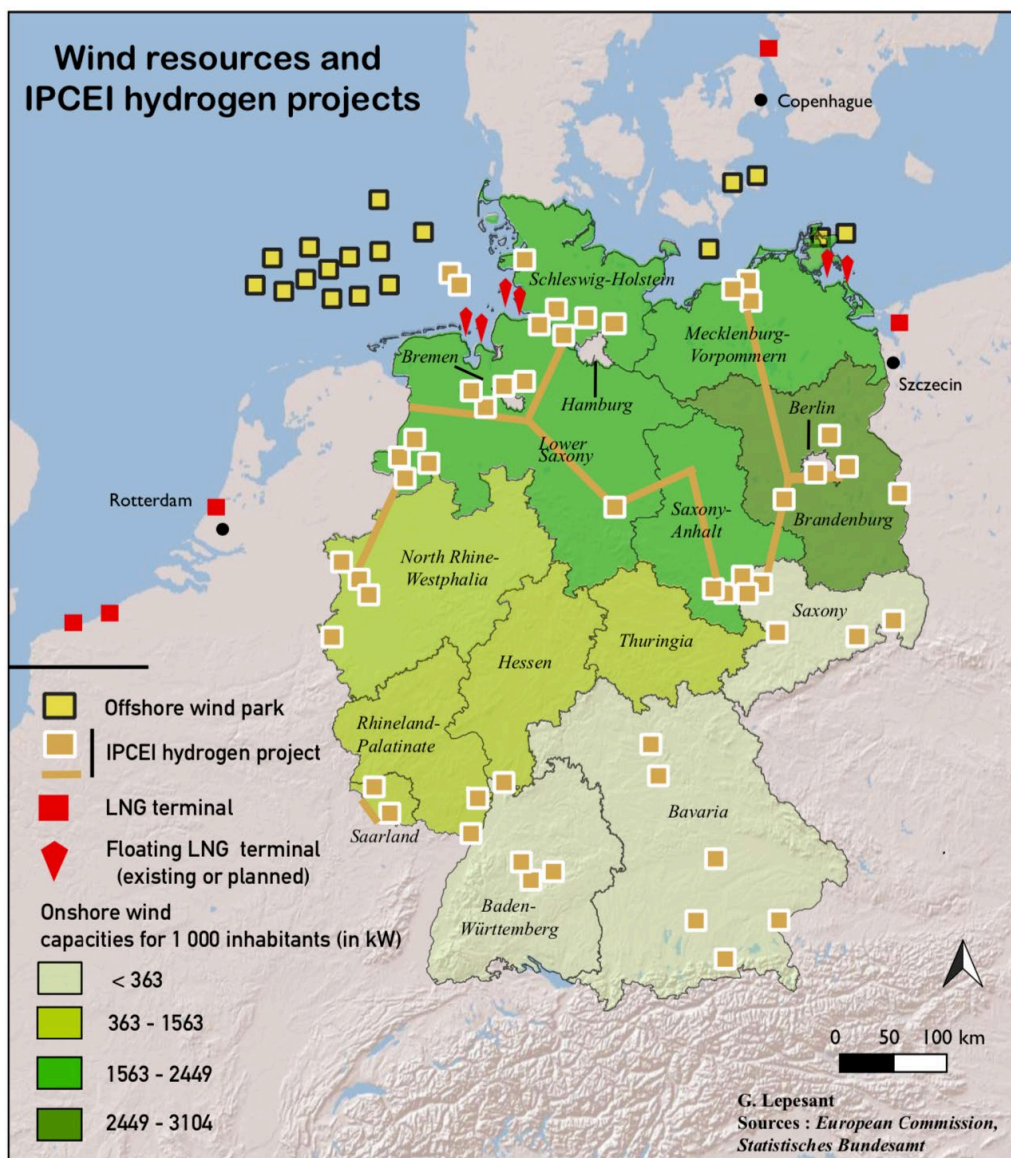
16. Ian Griggs, “MingYang Continues European Expansion with UK Floating Offshore Wind Deal”, *Windpowermonthly*, September 22, 2022, available at: www.windpowermonthly.com

17. Shotaro Tani, “Siemens Gamesa Calls for Quotas on EU-Made Wind Turbines”, *op. cit.*

Hydrogen deployment could benefit lagging regions

Significant new solar and wind capacities should contribute in a near future to the production of green hydrogen and the related equipment. The country plans to establish up to 5 GW of generation capacity including the offshore and onshore energy generation facilities needed for this. An additional 5 GW are to be added by no later than 2040¹⁸. Several State governments also have defined hydrogen strategies or roadmaps, especially those where the RES potential is the most significant, which could trigger some new dynamics regarding the industrial geography of the country.

Map. Wind resources and IPCEI hydrogen projects



18. Isabelle Huber, *Germany's Hydrogen Industrial Strategy*, CSIS, October 28, 2021.

From the geographical point of view, the deployment of RES has indeed been very different from one State to another. Lower Saxony, Schleswig-Holstein, Brandenburg, North Rhine-Westphalia, and Saxony-Anhalt have benefited the most from the expansion of wind capacities (see map below). States policy initiatives have played a role but weather conditions, low demographic densities have been instrumental. Auction's procedures being designed to favor low prices over other criteria, developers have given the priority to the most profitable projects where regular and strong winds as well as cheap land are available.

In the South, Bavaria and Baden-Württemberg are leading in solar energy installations and biomass facilities. They account for almost half of the photovoltaic installations in the country. Wind expansion has stalled and interconnections with the North have met resistance, leaving this part of the country exposed to the consequences of the phasing-out of nuclear and coal energy, and to the fact they are distant from ports where hydrogen and byproducts such as ammonia could be imported. This has triggered calls to postpone the closure of nuclear power plants, to invest in gas power plants and has led State authorities to reconsider the H10 rule that has stopped the deployment of wind over the last decade¹⁹. In turn, access to RES and possibly cheaper electricity (such as through PPAs) might help northern and Eastern Germany to catch up with the South and the West of the country where the bulk of the industrial heart is currently located. Hydrogen production might be an opportunity in this respect and many of the 62 IPCEI projects selected by Germany authorities are located in these so far relatively disadvantaged regions²⁰. In the north-west of Germany, greening of the steel industry shall benefit from the proximity of offshore wind resources and of seaports. One IPCEI project ("Clean Hydrogen Coastline") aims at building 400 megawatts of electrolysis capacity generated by offshore electricity to be used for steel production in Bremen with connections with Dutch partners.

Northern German States could even more benefit from imports of green hydrogen that LNG terminals planned along the coast shall in the future be retrofitted for this purpose. The transport of hydrogen being expensive, industrial clusters should emerge in different coastal areas. Europe's hydrogen strategy is precisely geared towards establishing "hydrogen valleys" or hubs (e.g. ports or cities). Such a scenario would provide further opportunities for northern German cities to take advantage of the *Energiewende*. "Industry follows energy" said the Minister-president of Lower Saxony²¹ and northern States are supporting a split of the country into two different power price zones that would grant lower prices to regions with abundant renewable power.

19. In 2014, Bavaria implemented the so called "10 H Rule" in the building code. It requires a minimum distance of ten times the height of the wind turbine to the next residence.

20. Diana-Paula Gherasim, "A Guide to Solve EU's Hydrogen Dilemmas", *Notes de l'Ifri*, Ifri, September 2022.

21. Hannah Schwär and Lutz Meier Stephan Weil: "Industrie folgt Energie" Interview with Stephan Weil, Ministerpräsident des Landes Niedersachsen", *Capital*, June 14, 2022.

The northern German Hydrogen strategy agreed in 2019, set up by Bremen, Hamburg, Mecklenburg-Vorpommern, Lower-Saxony and Schleswig-Holstein, as well as HY-5 which puts together related business development organisations since 2020 illustrate this willingness of northern States to make use of the excess of green energy provided by wind installations

In the South, a similar alliance didn't emerge before 2022 when Bavaria and Baden-Württemberg signed up an agreement. The same year, Bavaria committed to invest 500 million euros in RES and hydrogen production projects with the aim of developing an efficient infrastructure and constructing hydrogen electrolyzers "in every district". Southern States also eye gas and possibly green hydrogen supplies from the Iberian Peninsula (through the BarMar or "H2Med" project) as well as from Austria and from Croatia (through the Krk LNG terminal²²). Concerns over southern Germany lagging behind and its industries moving away to where hydrogen is available and more competitive are mounting: "Tomorrow's Bavaria will be called Mecklenburg-Western Pomerania" (the latter having one of the lowest GDP/capita in Germany), warned the Head of industry chamber IHK Schwaben (located in Bavaria)²³.

The need for an industrial policy

Overall, the German green industry is facing headwinds and is now challenged by the adoption of the Inflation Reduction Act (IRA) in the United States which involves large incentives and tax credits for investments in green technologies. Providing a similar kind of support would be difficult for the EU as subsidies are constrained by state aid rules. Since subsidies available only to domestic producers would not comply with WTO (World Trade Organization) rules, a subsidy race might raise legal and political hurdles. Public support for R&D helps (around 750 million € have been spent on R&D solar projects by Federal authorities between 2012 and 2021 and around 620 million € on wind projects)²⁴ but this is not enough to ensure a level playing field. Moreover, Europeans have found that even the concept of "friend-shoring" promoted by US leaders might prove irrelevant as shown by the concerns raised by the IRA among US trade partners.²⁵

The solar industry is not calling for new trade barriers like those implemented until 2018. Market players have instead called for an EU initiative such as the EU hydrogen strategy and the EU battery alliance. In response, the EC has endorsed an EU Solar Industry Alliance, launched in December 2022 and indeed modeled on the EU battery alliance. In all these cases, Important Project of Common European

22. Andreas Glas, "Söder auf der Suche nach neuen Energiequellen", *Süddeutsche Zeitung*, November 24, 2022.

23. Stefan Stahl, "Energiepolitik: IHK-Chef warnt vor Rückfall Bayerns hinter Ostdeutschland", *Ausburger Allgemeine*, March 9, 2022.

24. Ministry of Economy, *Bundesbericht Energieforschung 2022, Forschungsförderung für die Energiewende Bundesbericht*, June 2022.

25. Janet Yellen, "US Treasury Secretary on the Next Steps for Russia Sanctions and 'Friend-Shoring' Supply chains", *Atlantic Council*, April 12, 2022, available at: www.atlanticcouncil.org (accessed on November 7, 2022).

Interest (IPCEIs) shall pool public and private resources for cross-border projects while complying with State aid rules.

The Solar Industry Alliance aims at scaling up solar manufacturing to reach 30 GW of annual solar energy manufacturing capacity by 2025 (against a current capacity of around 4.5 GW per year). Commissioner Breton also announced new environmental and social “criteria” for solar panel manufacturing to be put forward by mid-2023²⁶. Introducing sustainability criteria such as CO₂ footprint of renewable energy components in bidding procedures (a tool already existing in France) “so that wind turbines or solar panels would not have to be transported halfway around the world” is indeed backed by the Economy Minister Robert Habeck²⁷.

Market players have instead called for an EU initiative such as the EU hydrogen strategy and to the EU battery alliance.

A revival of Saxony's Solar Valley might happen as suggested by the decision of Switzerland's Meyer Burger to open a solar module and cell plants in Saxony in 2021²⁸. Beyond Saxony, the supply chain seems now more dispersed across Germany than ever with key actors holding strong positions for inverters, mounting structures and tracker systems in different parts of the country.

The German industry is supportive of the initiatives taken at the EU level but worries about the lack of funding and rising manufacturing costs caused by high energy prices. Some point out to gaps in the EU's approach and called for a strategy across the whole value chain of green technologies. As an example, lowering energy costs should be part of the solution as stressed by Wacker Chemie AG, a leading manufacturer of polysilicon (used in solar PV modules)²⁹.

According to VDMA Power Systems (which represents the manufacturers and suppliers of power and heat generation plants), strict local content rules could reduce the incentive to innovate, as “buy American” measures for the US car industry in the past have shown. CO₂ price or other standards that need to be fulfilled could be better options. Siemens Gamesa's head of offshore technology management has mentioned some measures such as emissions or energy consumption rules or tendering criteria that could be used to support local production. A soft version of local content rules is already being implemented in some European countries. The UK offshore wind industry included in 2018 a commitment to seek 60% UK content in projects (although no

26. Frédéric Simon, “EU Commission Launches Industry Alliance for ‘Made in Europe’ Solar PV”, *Euractiv*, December 9, 2022.

27. Riham Alkousaa, “Germany Mulls State Guarantees for Renewable Energy Production”, *Reuters*, November 21, 2022.

28. Kathrin Witsch, “Neuer Materialengpässe bremsen Solarboom in Deutschland”, *Handelsblatt*, September 9, 2022.

29. Bernd Radowitz, “The threat is coming: Is Europe's Wind Power Industry Heading for a China Crisis?”, *op. cit.*

binding commitment was requested). Poland followed the UK's model with its own sector deal in 2021³⁰. The likes of Siemens Gamesa or Nordex however stress the need for an EU-wide approach and more funding could be provided. The so-called European Chips Act, proposed in February 2022 by the EC could also serve as a template.

Last but not least, less complex regulation on the European side would be very much needed, especially since the IRA is not only providing the industry with generous tax credits but also with less stringent rules on what green hydrogen means³¹.

Conclusion

New opportunities have been noticed in sectors relevant to the energy transition, even in the solar industry. If confirmed, this trend could help to alleviate fears associated with the phasing-out of fossil fuels and the transformation of the automotive sector. It could also support the social acceptance of the costs induced by the energy transition.

Yet it is too early to predict that the manufacturing industry would reap the benefits of the strong demand induced by the upgraded policies, especially in the context of high energy prices, supply chain disruptions and stronger global competition.

A new and major development though is that industrial policy is gaining momentum not only in Brussels but also in Berlin. Various pieces of legislation such as CBAM (Carbon Border Adjustment Mechanism) could in theory help the European industry to address simultaneously competitiveness and decarbonization challenges³². However, more will have to be done to ensure that the Green Deal serves the European industry³³.

At the German level, the current industrial geography might be partly reshaped with the efforts made by northern and eastern States to provide access to RES and hydrogen (as well as in some cases to cheap land and cheap housing).

Energy access and especially the proximity to coal deposits has been a key factor for the location of economic activity in Europe since the industrial revolution. An industrial relocation might occur in Europe in the context of the energy transition although "sticky" effects (whereby layers of economic activity agglomerate around existing strongholds) should not be underplayed³⁴.

30. *Ibid.*

31. Andrew Lee, "Renewables Executives Warn Europe 'Don't Miss the Boat' as US Impresses on Green Hydrogen", *Recharge News*, September 27, 2022.

32. Carole Mathieu, "The EU's Carbon Border Adjustment Mechanism: A Piece in the Industry Decarbonization Puzzle", *Briefings de l'Ifri*, Ifri, March 9, 2022.

33. Marc-Antoine Eyl-Mazzega and Diana-Paula Gherasim, "The European Green Deal, Three Years On: Acceleration, Erosion or Fragmentation?", *Briefings de l'Ifri*, Ifri, November 14, 2022.

34. Ben McWilliams, Georg Zachmann, "A new economic geography of decarbonisation?", *Bruegel Blog*, November 8, 2021, available at: www.bruegel.org

Stakes are high for southern Germany since new spatial patterns are emerging in the automotive sector too. Several investments related to the ecosystem of the electric vehicle are taking place in the east and in the north of the country, while in the south and in the south-east of the country, some traditional suppliers of the sector face an uncertain outlook.

However, northern States might be affected by the slowdown seen in the expansion of the wind industry since 2019 whereas southern States, and especially Bayern, have enjoyed a sharp increase of solar installations in the context of the Russian invasion of Ukraine. A shift in the industrial geography would also suppose that the demographic situation in former GDR improves, which is not yet the case (it might lose 10% of its active population by 2040).

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