



Changing course: Poland's energy in 2023

Poland hit renewables records and noticed a strong coal decline in 2023, paving the way for the new government to deliver a long awaited clean energy transition.

Published date: 7/2/2024

Lead author: dr Paweł Czyżak

About

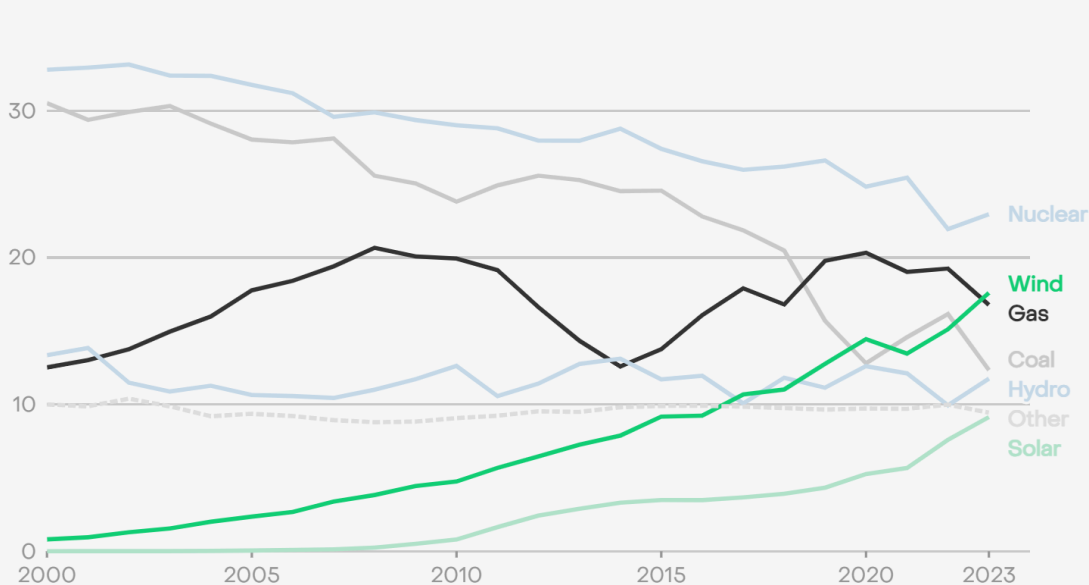
This analysis looks at Poland's progress on electricity transition in 2023, and challenges and opportunities going forward. The data and analysis is based on Ember's European Electricity Review 2024, which analyses full-year electricity generation and demand data for 2023 in all EU-27 countries to understand the region's progress in transitioning from fossil fuels to clean electricity.

A year of records

The year 2023 brought record renewables growth and fossil fuels decline all across Europe. EU coal generation fell by 26% in 2023 (-116 TWh) to its lowest level ever (333 TWh). Coal plant closures temporarily slowed during the energy crisis, but coal's structural decline continues. A fifth of the EU's coal fleet is estimated to shut down by 2025.

Wind produced more electricity in the EU than gas for the first time in 2023

Share of EU electricity generation, by source (%)



Source: Annual electricity data, Ember
 'Other' includes bioenergy, other fossil and other renewables

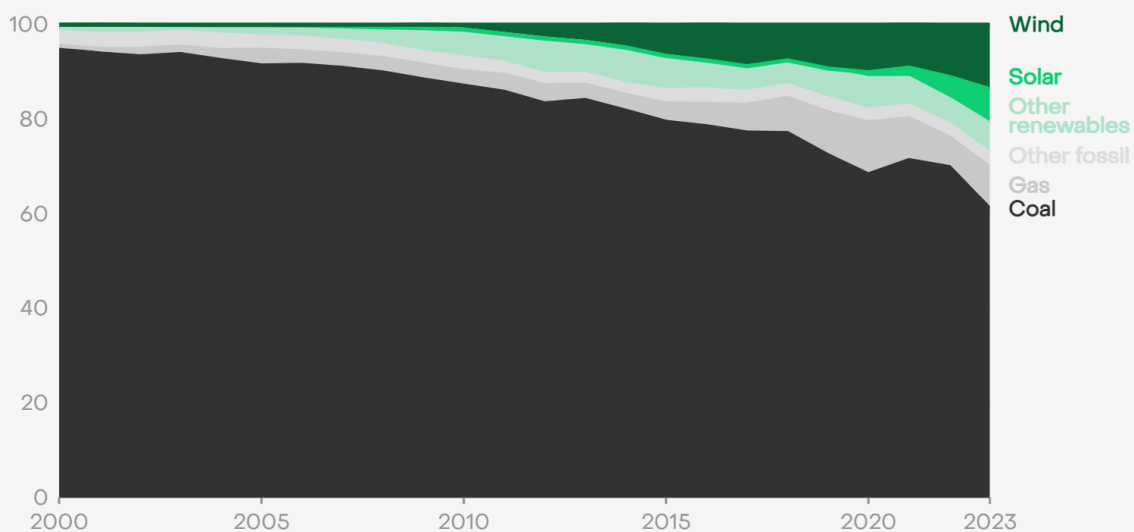


Contrary to common expectations, and assumptions behind the [gas expansion plans of Poland's previous government](#), the collapse in coal in the EU is not resulting in a rise in gas. In fact, gas generation fell by 15% (-82 TWh) in 2023 to 452 TWh, the fourth consecutive year of gas generation decline. On the other hand, generation from the EU's wind fleet surpassed that from gas for the first time. In 2023, 44% of the EU's electricity came from renewable sources.

Poland broke records as well: for the first time wind and solar generated over a fifth of the country's electricity at 21% in 2023, up from 16% in 2022. The share of renewables reached 27% in 2023 (up from 21% in 2022), not far from the still-official goal of 32% by 2030 (40% of that coming from the yet-to-be deployed offshore wind). Coal generation dropped by a record 22 TWh, down to an all-time low of 61% of Poland's electricity generation in 2023. This was a substantial fall from the previous low of 70% set in 2020.

Renewables produced 27% of Poland's electricity, pushing coal down to a record low 61%

Share of PL electricity generation, by source (%)



Source: Annual electricity data, Ember

The decrease in coal generation in Poland was caused by growth in wind and solar (+7 TWh), a minor increase in gas (+3 TWh), but also by a 10 TWh reduction in domestic power generation. This was due to a 5 TWh (-3%) drop in demand and the 2 TWh of exports in 2022 switching to 3 TWh of imports in 2023, as Poland returned to its pre-2022 power importer role.

The need for a strategy

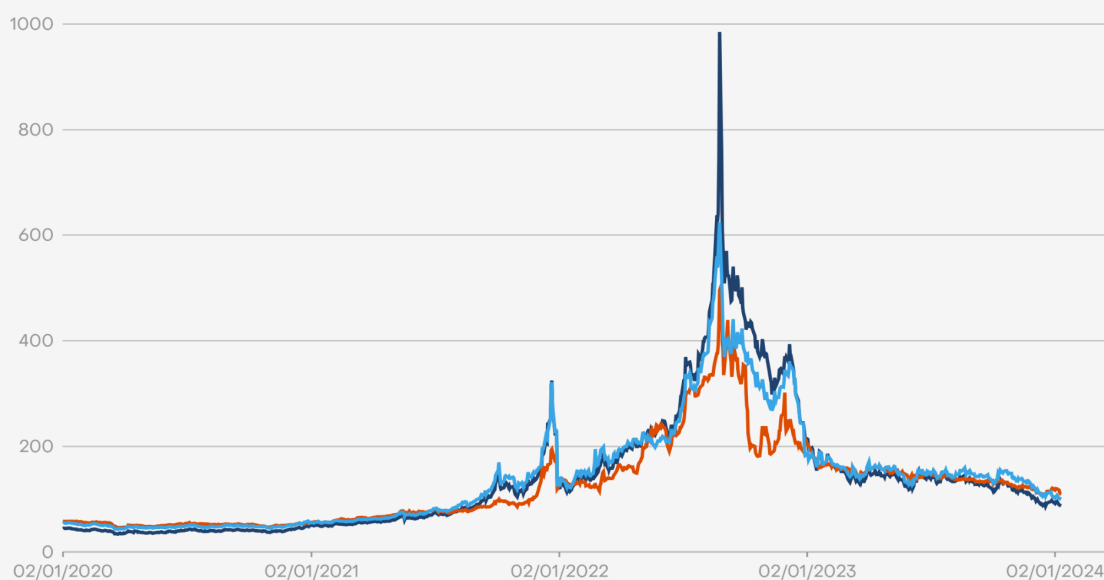
Despite the positive developments, a dark cloud is still hanging over Poland's energy future. Poland is one of just three EU Member States that have not submitted a draft [National](#)

[Energy and Climate Plans \(NECPs\)](#), due last year in June 2023. For years, [experts](#) have been calling for an update of the [NECP](#) and [Poland's Energy Policy until 2040 \(PEP2040\)](#), a reevaluation of the unrealistic 2049 [coal phase out date](#), and the transposition of key European legislation such as the 2018 Clean Energy Package.

European electricity prices are returning to pre-gas crisis levels

Year-ahead electricity price, €/MWh

Germany Poland Italy



Source: Front calendar year electricity prices from Montel

EMBER

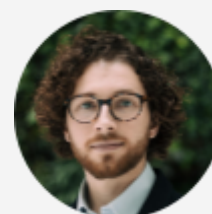
This lack of strategic direction, vision and planning will compromise [just transition](#) efforts in coal regions, weaken Poland's position among neighbours and the wider EU, and slow down the further deployment of renewable electricity. Early signs of the latter are already visible. Grid expansion plans based on the outdated PEP2040 and NECP have resulted in grid underinvestment, leading to a rapid rise of [grid connection declines](#) for wind and solar projects. The late implementation of the Clean Energy Package not only negatively impacted the development of energy communities or virtual energy prosumers, but also caused delays to the introduction of the central energy data platform (CSIRE) that aimed to increase system flexibility through dynamic tariffs or demand management.

Ember's modelling shows that accelerating renewables and connectivity can bring important benefits. Poland could reduce wholesale power prices by [27%](#) compared to a 2030 business-as-usual scenario, resulting in hundreds of zlotys saved per year by an average

[household](#). With coal electricity back to being more expensive than gas, Poland is once again an electricity importer and a pricey power market. This will pose a threat to the country's economic competitiveness, unless wind and solar are deployed quickly.

The new Polish government finds itself on the verge of perhaps the most dynamic period in the history of Poland's energy system. Just a few decisions will steer the country towards regional and European leadership, and a thriving economy fueled by clean power, or push Poland towards long-term reliance on fossil fuel imports, skyrocketing costs of living and declining industry. Swift action is required to enable a bright future, and this action starts with setting ambitious renewables targets, bringing the coal phaseout to a more realistic 2035 timeline, the update of strategic documents and removal of permitting and grid bottlenecks.

Dr Paweł Czyżak
Regional Lead - CEE, Ember



The updated PEP2040 and NECP should therefore set ambitious targets for renewable energy. By 2030, the country could generate almost [70%](#) of electricity from renewables as shown by multiple [modelling studies](#). By 2040 a target of at least [100 GW](#) of renewables capacity is achievable. This is an important milestone given the recent announcement of ambitious EU-wide 2040 targets by the European Commission.

These strategic energy planning processes should add up to a broader political vision of a country fueled by cheap and clean electricity, attractive for foreign investments, supportive of new industries and with low inflation.

A change in energy transition strategy could come with a regional leadership role. With experience both in Brussels and Warsaw politics, Prime Minister Tusk is perfectly positioned to represent the interests of Central and Eastern Europe (CEE) in the EU, and repair relations with Poland's neighbours where those are weakened. Poland is the largest energy market in

the region and has the biggest chance of becoming a regional power hub – transporting offshore wind electricity from Estonia, Latvia and Lithuania to demand centres in Silesia, Czechia, Slovakia and Hungary. Strengthening transmission lines and cross-border interconnectors will bring [benefits across CEE](#) and vastly increase security. This could be Poland's contribution to the largest regional partnership, the Three Seas Initiative, ahead of the Three Seas Summit in April 2024.

Gas does not equal security

Security is now the focus of almost any energy discussion in Central and Eastern Europe. Russia's attacks on Ukrainian energy infrastructure have shown that distributed generation and interconnection can provide resilience in times of war. Poland needs to move away from centralised power system planning with [single points of failure](#) like Bełchatów, where one incident almost led to a country-wide blackout in 2021.

The [gas expansion plans](#) of the previous government are not a secure replacement for coal – not only because of their centralised nature, but also because the gas will have to be imported. Regardless of the supplier, Poland will always be prone to global fuel price fluctuations, contract renegotiations, and competition from more wealthy buyers, as experienced by [Pakistan in 2022 and 2023](#). Pressure on global gas markets is increasing, as the Biden administration moves to [suspend approvals for liquified natural gas \(LNG\) exports](#) responding to research on the [negative climate impacts of LNG](#). Putting Poland's energy security in the hands of imported LNG is a security threat in itself.

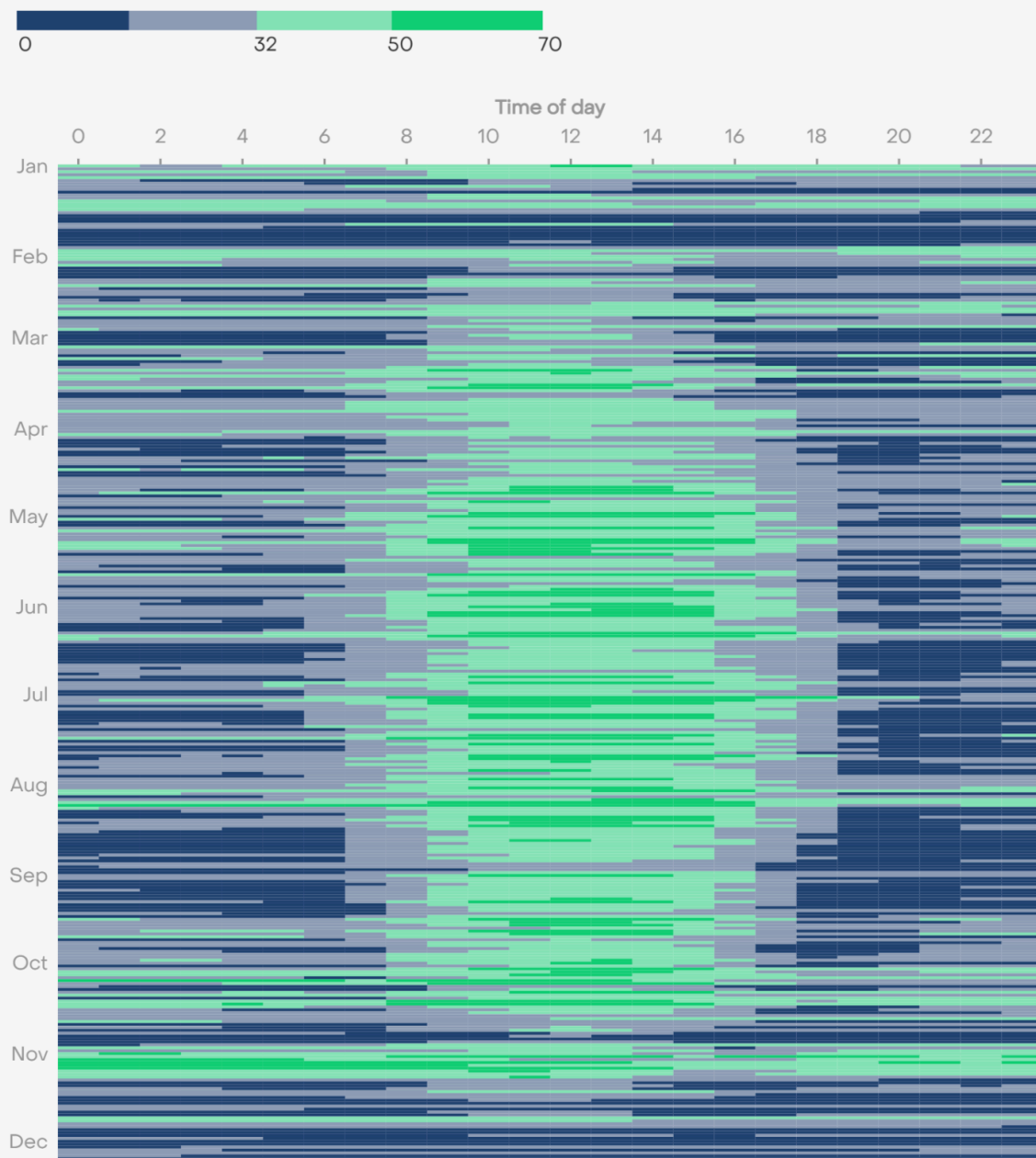
Poland's appetite for gas was fueled mainly by worries about power system balancing. However, data from 2023 shows that Poland's electricity system can already manage high renewable shares. Hourly shares of renewable electricity have peaked at 66%, far exceeding the 50% barrier that was treated by some as impenetrable. A third of the hours in 2023 already showed a renewable electricity share above 32%, the still-official 2030 target.

Windless winter nights will still require support from a peaking power source. But even if that peaking capability comes from gas, this would be a completely different role for gas compared to a baseload one that is outlined in the previous PEP2040. The replacement of

large-scale gas units with smaller ones that are able to ramp their generation up or down more quickly would result in lower gas consumption, lower emissions and higher system flexibility.

A third of the hours in 2023 had a renewable electricity share higher than the existing 32% target for 2030

Share of renewables in hourly electricity generation in Poland (%) compared to potential 2030 targets



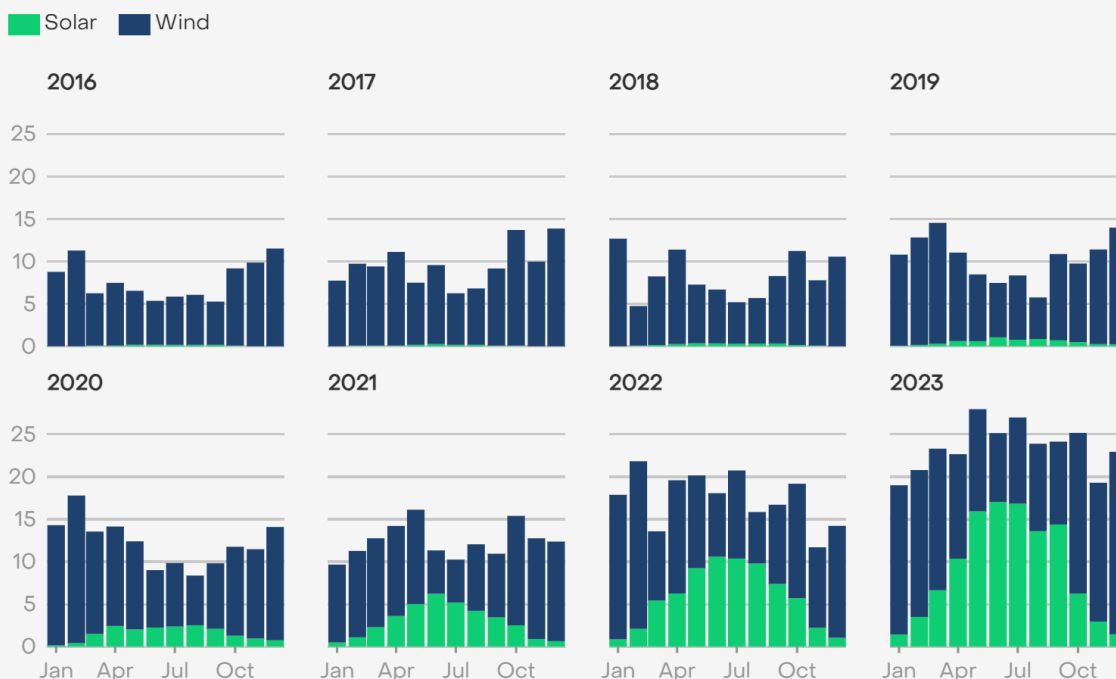
Source: Ember
 Color ranges correspond to potential 2030 targets as indicated in Poland's Energy Policy until 2040 (PEP2040), the draft PEP2040 update from 2023, and modelling results by Ember and InStrat

It's time for more flexibility

Multiple sources of flexibility are available for power system operators: including demand side flexibility, in which consumers shift their demand (e.g. heat pump usage, electric vehicle charging, industrial processes) onto times of lower system load, battery and pumped-hydro storage, and peaking generators such as open-cycle gas units. Interconnection and grid expansion contribute to higher flexibility as well, making it easier to transport electricity from places where it's generated to places where it's consumed. Gas was assumed to be the default solution for power system balancing, but its role might soon be declining. Wind and solar are complementing each other throughout the year, reducing the need for seasonal electricity storage and gas power generation.

Wind and solar complement each other across seasons

Share of Poland's monthly generation (%)



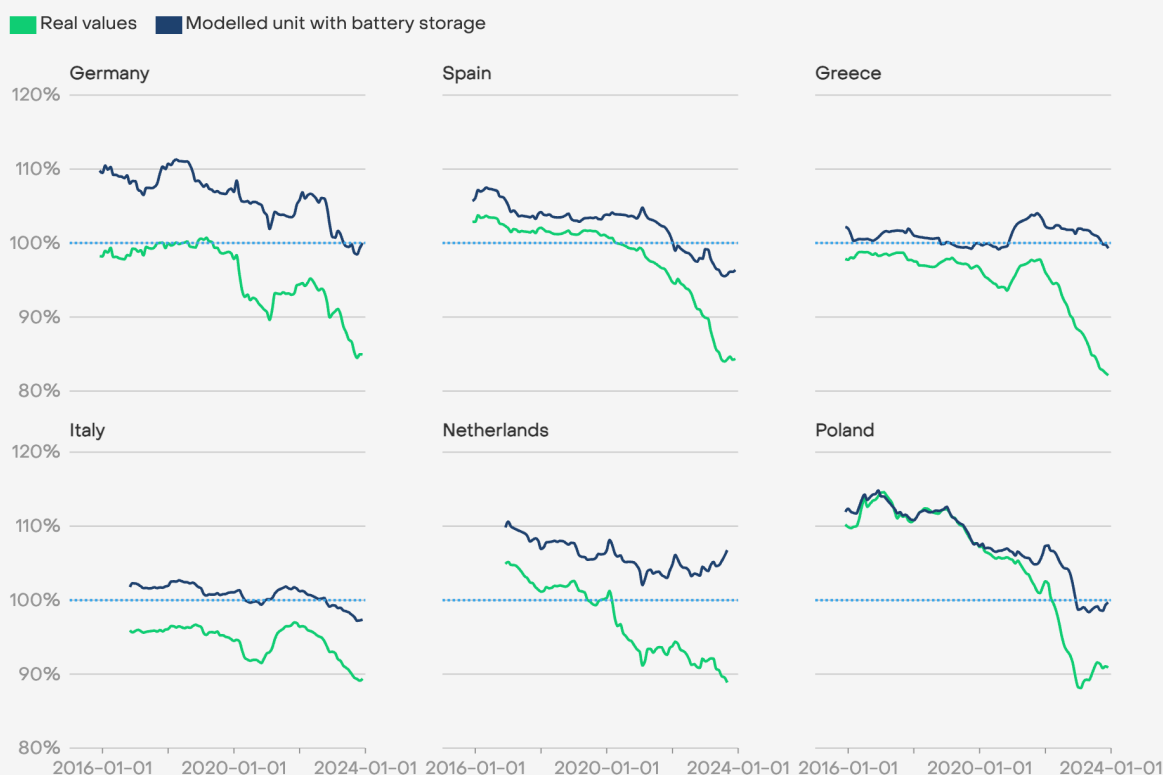
Source: Monthly electricity data, Ember

There were positive developments for storage in the latest capacity auction: [1.7 GW of energy storage units secured contracts](#), a 10-fold increase compared to the previous auction. But their implementation is not yet certain, due to the fact that their business model relies on the enabling of revenue streams from the balancing, flexibility and ancillary services markets.

Until that is resolved, the flexibility of the Polish power system remains low. This has already led to curtailment events. In December 2022, a 400-800 MW reduction of wind generation was needed and in September 2023, Poland noticed a 8 GW surplus of electricity production, which was partially managed by emergency exports, but still required a 1-2 GW forced reduction in solar generation.

Battery storage makes solar electricity more valuable

Market value of solar as a % of the base price of electricity (1 year rolling mean)



Sources: ENTSO-E, Agora Energiewende, Energy-Charts, Terna, CBS, Solcast, ARE, InStrat, OpenMeteo
 Battery model is for a 100 MW solar array with a 60 MW 2 hour battery. It is for a marginal unit, and assumes that electricity prices are not affected by the existence of the battery. It therefore does not reflect what value factors would be captured if a large amount of such units was added. Discharge is not optimised, so is an underestimate of true value. For full details, see Ember - European Electricity Review 2023

A more structural result of system inflexibility is becoming visible too. Capture prices – the price received for electricity in each given hour compared to the baseload price over the whole day – are dropping for solar, threatening business cases. More short-term battery storage and [interconnection](#) is needed to stabilise wind and solar revenues and avoid curtailment.

Recommendations

Several actions need to be taken by the government to enable a lasting and effective clean power transition and reap the economic, social and security benefits that it will bring:

1. Build a vision for Poland's energy system around clean power and use it as a foundation for the updated PEP2040 and NECP.
2. Timely implementation of the REPowerEU Recovery Plan chapter, which provides guidelines for the mid-term, until the PEP2040 and NECP are finalised.
3. Set a realistic coal phaseout date of 2035 (aligned with capacity market contracts), with coal generation already reduced to a minimum by 2030.
4. Become a leading voice for regional collaboration, initiating cross-border interconnection that will lower power prices and increase security across the region. Facilitate more wind, solar and interconnection ambitions within the Three Seas Initiative.
5. Remove existing barriers to renewables, such as the 700m onshore wind setback distance, delays in grid investments or smart meter implementation, and the lack of storage and demand flexibility incentives.
6. Ensure the timely delivery of the first wave of offshore wind projects.
7. Reconsider the deployment of large-scale gas CCGT units, shifting the focus to flexibility solutions, storage and peaking power plants.
8. Provide a backup scenario for large scale nuclear units, given the severe delays experienced by projects elsewhere (such as Hinkley Point C in the UK).

Supporting Materials

Acknowledgements

Cover photo

Nick Night via Unsplash

Reviewers

The author would like to thank Sarah Brown and Ali Candlin from Ember, and Aleksander Śniegocki from the [Reform Institute](#) for their valuable comments.

© Ember, 2023

Published under a Creative Commons ShareAlike Attribution Licence (CC BY-SA 4.0). You are actively encouraged to share and adapt the report, but you must credit the authors and title, and you must share any material you create under the same licence.