



PEP2040: Progress or disappointment?

Poland could double renewables ambition and halve gas expansion in its upcoming PEP2040 energy strategy.

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About

A revision of the Polish energy strategy to 2040 (PEP2040) was announced in March 2022, predominantly to address energy security concerns. This report analyses the government's draft plans for renewable energy expansion, showing that they are significantly under-ambitious. The low share of renewables puts Poland on a path to being the last EU economy producing the majority of its power from fossil fuels by 2030, endangering the country's security and prosperity.

Highlights

22 GW

Poland reached 22 GW of renewable capacity in 2022, meeting the 2030 government target eight years early

1/2

Poland requires only half its planned gas-fired electricity generation to cover 2030 power demand

100 GW

Poland could reach 100 GW of renewables capacity by 2040, double the target proposed by the government

Executive Summary

Will Poland take the opportunity to step up its renewables targets?

The Polish government has a chance to set new, ambitious targets following a disappointing energy strategy launched in 2021. Will it seize the opportunity?

A revision of the Polish energy strategy, PEP2040, is about to be published. [Draft assumptions](#) were published in 2022, but these failed to address both energy security and climate concerns. Under this proposed path, by 2030 Poland will be the last EU economy producing the majority of its power from fossil fuels. A revised plan to instead rapidly expand renewables would avoid the negative consequences of continued fossil fuel reliance that poses risks to energy security, prices and the competitiveness of Poland's economy.

01 Poland could deliver double the renewables by 2040 compared to current ambition

Recent studies show that Poland could aim for 100 GW of renewables capacity without exceeding historical trends. The draft energy policy assumptions propose only a 50% share of renewables in the power sector in 2040, resulting in around 50-60 GW of capacity by 2040. By 2040, the Polish power sector will need to achieve more than 90% emission reductions compared to 2015, significantly more than the currently planned 58%.

02 Poland risks being the last EU economy based on fossil fuels

By the 2030s, most countries in the EU will get the vast majority of their electricity from clean energy sources, with the whole EU aiming for a net-zero power system by 2040. As it stands Poland will be the last major EU economy generating over 50% of its electricity from coal and gas (alongside Malta, a much smaller economy with minor power demand). With this Poland risks dependence on foreign imports, exposure to volatile prices, high inflation and vanishing competitiveness on global markets.

03 Expanding renewables makes the coal vs. gas debate obsolete

The energy policy debate in Poland is focused on choosing between two costly options: extending operations of coal plants or replacing them with new gas plants. Instead, the focus should be on ensuring the rapid deployment of wind and solar, which will permanently reduce costs from fossil fuels as the role of coal and gas becomes limited to reserve capacities. To unlock that growth, Poland will need to address barriers in permitting and grid development.

To deliver on commitments to increase energy security, the Polish government needs to substantially increase renewables ambition, enable conditions for rapid renewables deployment and reduce gas expansion plans. For these goals, the new PEP2040 document should aim for above 50% of renewable electricity generation by 2030 as well as 100 GW of renewables capacity and a net zero power system by 2040.

Rapidly increasing renewable electricity production in Poland is the only way out of the fossil fuel crisis. Without a strong push to remove formal and infrastructural barriers to wind and solar investments, we will be locked in futile debates on which fossil fuel is less harmful for Polish competitiveness and security.

Aleksander Śniegocki
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Poland's new energy strategy

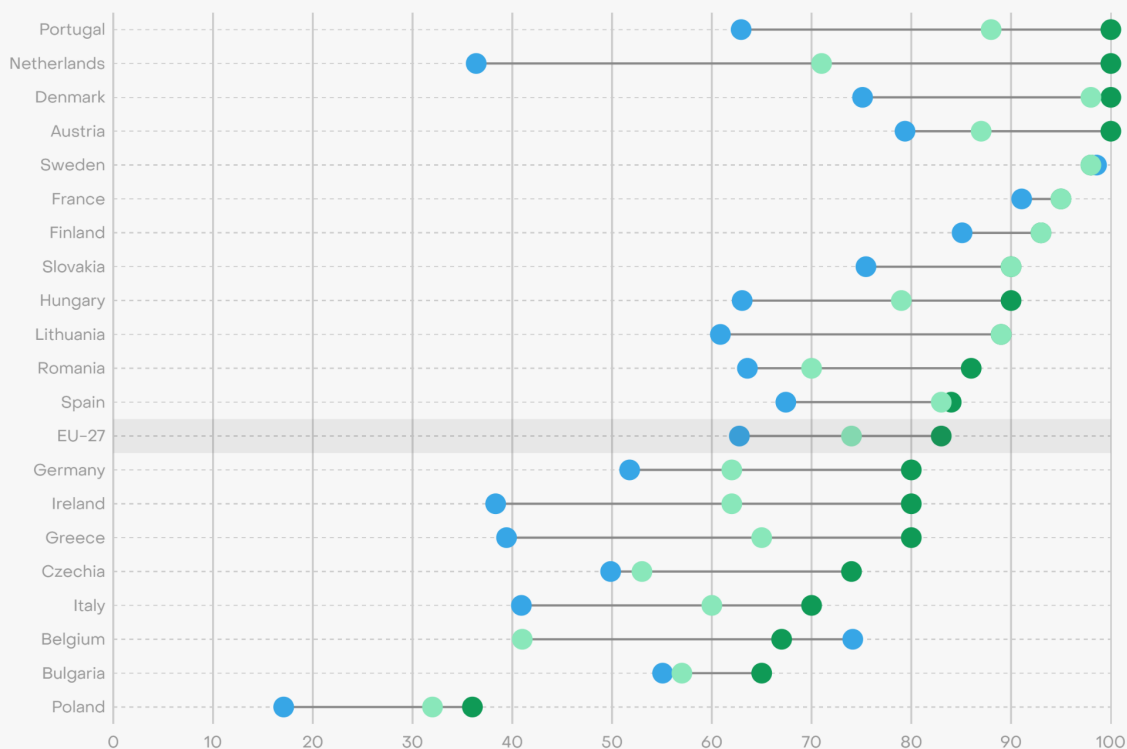
Poland current plans put it at risk of being the last EU economy based on fossil fuels

Poland is among the last European countries that have not significantly [accelerated](#) deployment of renewables following Russia's invasion of Ukraine. This poses a threat to the country's security. The last year has illustrated how reliance on coal and gas for power leaves countries vulnerable to volatile prices and shortages of fossil fuels.

Poland will be the last major EU economy with less than 50% clean power in 2030

2021 and 2030 planned share of clean sources in electricity generation (%)

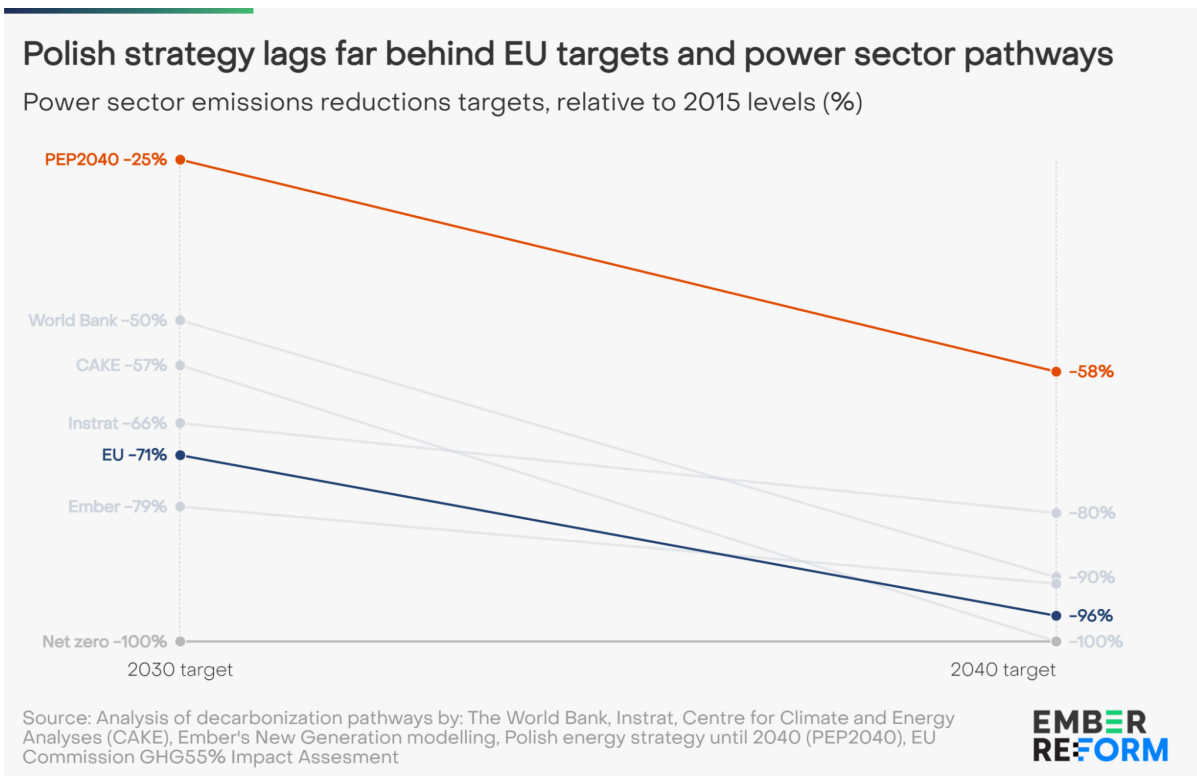
● 2021 values ● Previous 2030 target ● Latest 2030 target



Source: Ember's EU power sector target tracker
Previous = National Energy and Climate Plans (NECPs) from 2019; Latest = latest national policy announcements. The countries displayed account for >97% of EU-27 electricity consumption. Updated: 18/10/2022

Without further action from the government to remove barriers holding back investments into renewables, Poland will be the only country in the EU other than Malta generating above 50% of its electricity from fossil fuels in 2030, with other countries aiming for 65-100% clean power and a net zero power sector by 2040 at the latest. Under the draft plan, Poland will generate between 32-50% of power from clean sources by 2030.

According to EU climate law, greenhouse gas emissions in the EU should drop by 55% by 2030 compared to 1990. This will mean that EU power sector emissions should be reduced [by 69-76% compared to 2015](#); and the share of renewables in electricity production should reach at least [65-66%](#) and up to [69%](#) according to the European Commission’s RePowerEU proposal. By 2040, the EU should achieve a [96%](#) reduction in power sector emissions compared to 2015, essentially requiring a net zero power system across all Member States by that time.



Power system models in line with EU emissions reduction targets show Poland achieving a nearly net zero power system by 2040, with emissions reductions of 90% or more compared to 2015. This stands in contrast to the current PEP2040 that reaches only 58% emissions reductions over the same period.

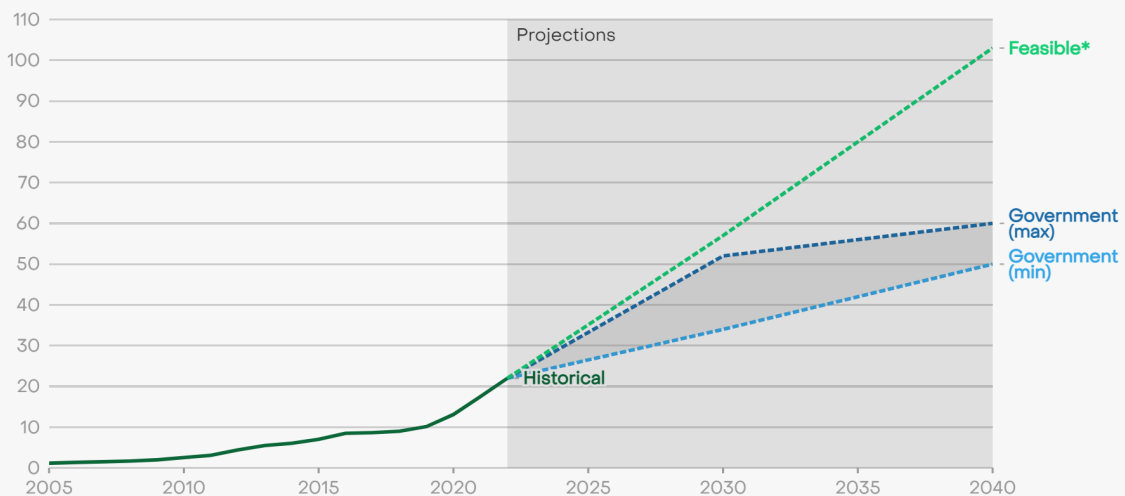
Maintaining high emissions and an excessive reliance on fossil energy in the 2030s will continue to expose Poland to coal, gas and oil price volatility and supply disruption risks. In turn, this is a threat to Poland's economy. Alongside high energy prices putting pressure on domestic companies and investment decisions, many [businesses are already demanding green energy](#) to deliver their own decarbonisation plans. This trend will only accelerate, and by the early 2030s most companies will be unable or unwilling to locate new investments in Poland as neighbouring countries provide cheaper and cleaner power.

Poland could deliver double its renewables ambition

The Polish government is due to publish an [update to the national energy strategy](#), PEP2040. The current version of PEP2040 published in 2021 falls short of mapping out an energy pathway that meets climate targets and ensures Poland's energy security, with [unambitious renewables targets](#), and the [largest increase of gas in power](#) in the EU.

Poland could double its renewables ambition by 2040

Installed capacity of renewable energy sources under different scenarios (GW)



Source: Analysis by Ember and Reform Institute, draft assumptions for the PEP2040 update
*Feasible = the most ambitious of eight decarbonization scenarios analyzed by Ember

Considering the current geopolitical landscape, including [Russia's halt to gas exports](#) and continued global gas price and supply volatility, swapping the proposed gas expansion with more renewables ambition will help Poland ensure a stable and secure electricity system.

The PEP2040 draft assumptions published last year only increase the renewables share in power generation from 40% to 50% by 2040. This would mean aiming for just 50-60 GW of renewables in 2040. Even [according to officials](#), this number could be achieved by 2030 and doubled by 2040 without exceeding historical deployment levels. The current 2040 target is just 28.7 GW. This will most likely be met in 2023.

Decarbonization pathways for Poland's power sector

RES capacity and share in generation across different scenarios

| Source | Objective | Share of renewables in electricity generation in 2030 (%) | Share of renewables in electricity generation in 2040 (%) | RES capacity in 2030 (GW) | RES capacity in 2040 (GW) |
|---|---------------|---|---|---------------------------|---------------------------|
| Instrat (2021) | GHG55% | 71% | 83% | 57 | 100 |
| Ember (2022) | 2050 net zero | 66% | 78% | 52 | 103 |
| Agora Energiewende (2021) - GHG55% Policy Measures | GHG55% | 65% | N/A | 54 | N/A |
| Forum Energii (2022) | Fuel savings | 54% | N/A | 57 | N/A |
| PSE (2022) | Grid planning | 50% | N/A | 47 | N/A |
| Centre for Climate and Energy Analyses (2022) - NEU | 2050 net zero | 47% | 68% | 40 | 84 |
| World Bank (2022) | 2050 net zero | 45% | 67% | 45 | 88 |
| European Commission (2021) - MIX | GHG55% | 44% | N/A | 45 | N/A |

Source: Analysis of decarbonization pathways by Forum Energii, Instrat, the European Commission, Agora Energiewende, Centre for Climate and Energy Analyses (CAKE), Polish TSO (PSE), World Bank, Ember.

Instead, Poland could realistically plan to reach 100 GW of renewable capacity by 2040. According to think-tank InStrat, if policy barriers are lifted and grids are modernised, [a 100 GW renewables capacity in 2040 is possible](#), with 36 GW of onshore wind, 18 GW of offshore wind, 44 GW of solar PV and the existing hydro and bioenergy capacity of around 1 GW each. Similar results were achieved in Ember's [New Generation](#) modelling in 2022, with the renewables capacity reaching 103 GW in 2040. Even more conservative pathways reach a similar conclusion: a late 2022 report from the [World Bank](#) projects 88 GW of renewables in 2040, another 2022 publication by the governmental [Center for Climate and Energy Analyses](#) indicates 84 GW of renewables in 2040 as optimal under the climate neutrality (NEU) scenario, under the assumption that nuclear and carbon capture and storage technologies will also be available to complement the energy mix. Nearing 100 GW of renewable capacity by 2040 is slowly becoming a consensus among institutions interested both in Poland's economic growth and how to reduce emissions. Poland's renewables capacity exceeded 22 GW in 2022, already meeting the current PEP2040 target for 2030, showing just how low ambition is in the Polish strategy.

Poland has failed to propose ambitious targets for renewable energy deployment in the past. With the country's security on the line, it is now time to step up and join the major European economies in building a clean energy based future.

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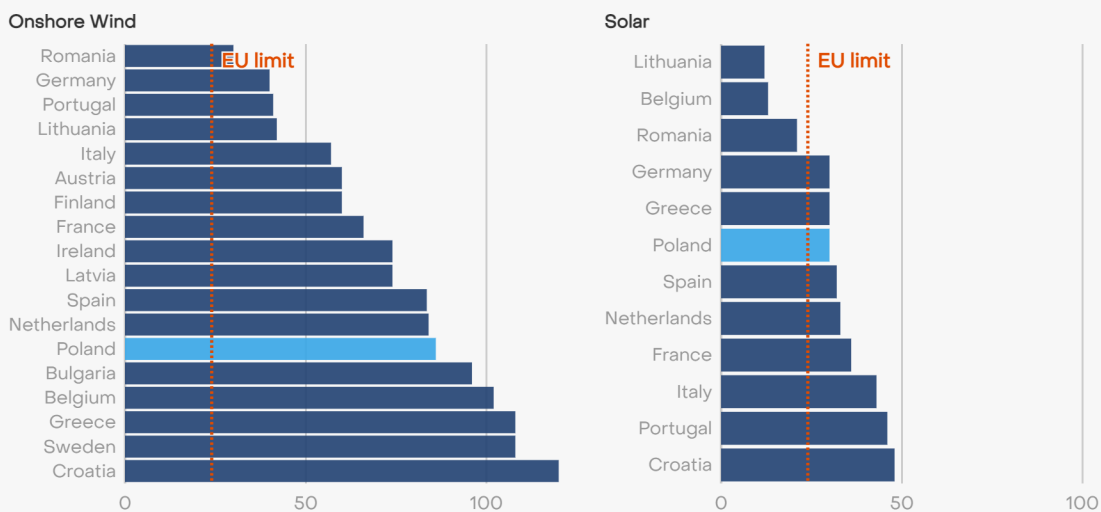
Poland is currently targeting a 32% share of renewables in electricity generation by 2030. Among recent power sector transformation pathways for Poland analysed by Ember and Reform Institute, the average proposed renewables share in 2030 is 50%. The most ambitious pathways aim for 65-71% of renewables in domestic electricity generation in 2030, which is up to twice what would be achieved by the updated PEP2040. According to the analysed scenarios, by 2040 renewables should account for 67-83% of power generation, again doubling the current PEP2040 target and significantly exceeding the 50% proposed in the updated PEP2040 assumptions. Crucially, this higher level of renewable energy would lead to [lower household electricity tariffs](#), while simultaneously increasing energy system security - through higher dispatchable capacity and lowered imports.

An action plan for renewables deployment is necessary

While fast renewables expansion in Poland is feasible, it will not happen without the government delivering [enabling conditions](#) in two areas: permitting procedures and grid development.

Wind and solar permitting times in Poland exceed EU limits

Permitting times in chosen countries (months)



Source: Own analysis based on WindEurope data and investor surveys
 EU limit of 24 months is stated in the Renewable Energy Directive (2018/2001). Countries analysed make up 96% of installed 2021 wind capacity and 91% of installed 2021 solar capacity and were chosen according to available data quality

A major remaining barrier is the [restrictive spatial planning rule](#) (10H) which effectively blocks onshore wind potential. Revisions are under discussion, but the process of relaxing these rules is [not yet finalised](#). The last-minute changes to the wind law amendment introduced by the Polish parliament in January 2022 will [reduce its potential positive impact by half](#), which is yet another example of the weakness of energy policy that lacks clearly defined targets and evidence base. However, Poland's permitting challenges extend beyond this. The current length of [permitting procedures](#) does not meet the 24 month standard set by the 2018 [EU renewables directive](#), even before accounting for the [upcoming push](#) to

accelerate the process within the REPowerEU plan. The government has not yet signalled any intention to work on this issue, which may leave the renewables industry with too little time to deliver the projects needed for 2030 targets.

To harness the full potential of wind and solar in Poland, the government will need to deliver the right conditions. Short-term improvements to the permitting and grid connection process could immediately unlock capacity. And a long term energy transition plan would be a step towards preparing our network infrastructure for massive growth in cheap renewables.

Aleksander Śniegocki
CEO
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Another obstacle is Polish grid infrastructure, which is rapidly becoming a bottleneck for renewables expansion. The volume of potential renewable projects which have been denied grid connection [is growing rapidly](#), reaching nearly 15 GW in 2021 alone. Addressing this barrier requires [more flexible and transparent grid connection](#) procedures as well as better long-term [grid expansion planning](#), which has previously failed to anticipate the renewables boom. Ensuring the delivery of 50 GW or more of renewables by 2030 requires reforms to grid management, including clear rules for cable pooling and direct line connection between renewable electricity suppliers and energy consumers. Despite the urgency, the government is proceeding slowly with any changes, which are also [considered inadequate](#) by the industry.

Recent steps taken by the EU to address the energy crisis provide the perfect leverage for domestic energy policy to accelerate renewables deployment. In December 2022, EU institutions [agreed to provide additional dedicated funding](#) to the Member States to address the crisis. These funds require an update to national Recovery Plans with a new REPowerEU chapter, which should include a concrete list of reforms and investments designed to tackle barriers to clean investments. EU policies form a clear framework which both encourages and enables a major shift in Polish energy policy towards renewables. The Fit for 55 plan offers [incentives](#) and tools to deliver clean investments. Necessary permitting and grid

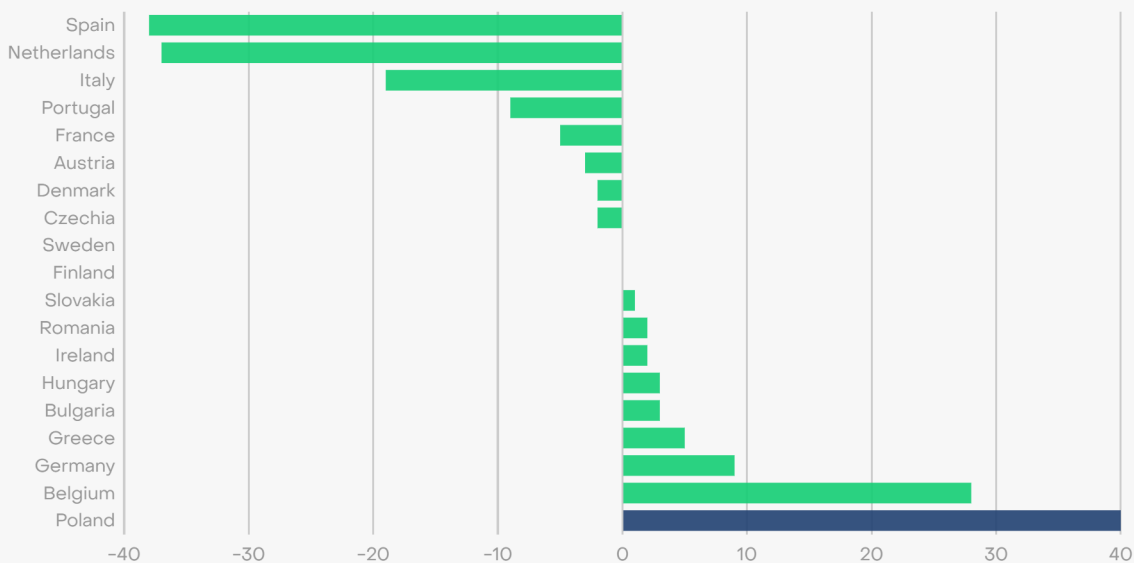
development reforms are a good fit to be included in the Polish REPowerEU chapter. And more ambitious targets will need to be provided in Poland’s revised [National Energy and Climate Plans](#), which are required in 2023 to reflect new European targets for 2030.

Prioritising renewables makes the coal vs gas debate obsolete

With limited renewables expansion plans, the current PEP2040 assumes a slow decrease in coal share from around 70% in 2022 to 37% in 2030 (under the high CO2 prices scenario) and a [four-fold increase of fossil gas](#) in power generation by 2030. Since around [87% of natural gas comes from imports](#) this is a significant threat to energy security, even if the dependence on Russia is replaced with other suppliers.

Poland plans the EU's largest growth in fossil gas

Expected change in electricity generation from fossil gas from 2019 to 2030 (TWh)



Source: Poland's Energy Policy until 2040, National Energy and Climate Plans (NECPs)
The 19 countries displayed account for > 97% of EU-27 electricity consumption.

At the same time, reverting to production from coal power plants will not solve the energy dependence issue. The domestic hard coal mining continues its long-term decline ([3.9% drop in production in 2022](#) despite record prices) and sees a sharp increase in its production costs ([nearly tripling](#) in 2021-2023 for the largest mining company, PGG), which will further [deteriorate its competitiveness](#) against imports in the coming years. In this situation, the continued utilisation of fossil fuel plants is a key security concern, and renewables are the only option to reduce import dependence and ensure [stable economic growth](#) in the coming years.

While some combination of coal and gas capacities [will be necessary](#) to balance the system in the coming years, renewables can help minimise how much of those fuels is actually burned. As shown by a [recent modelling study](#), Poland could balance its power system with 29 TWh of gas generation in 2030, half of the 53 TWh assumed in the PEP2040, while also limiting the share of coal electricity to 12%. Thus, while policy debates in Poland have focused on which fossil technology to choose in the short term to ensure [sufficient dispatchable capacities in the system](#), the key priority for the Polish Energy Policy should be to ensure rapid renewables expansion so that the actual fuel use in these plants decreases rapidly.

The planned gas fleet expansion will have dire consequences for electricity consumers. Over 10 GW of gas plant projects are currently under discussion, with 4-5 GW already having secured capacity contracts. With the record-high capacity market prices in 2021 and 2022, these projects will [cost billions in taxpayer money](#), while producing very expensive electricity. This will result in power price increases by 2-4 times compared to 2021 (depending on gas TTF prices varying between 50-100 EUR/MWh), and will negatively impact the competitiveness of Poland's economy.

Conclusion

Poland needs a more ambitious energy strategy

Targets for renewables expansion in the upcoming PEP2040 could be doubled with gas electricity generation halved, increasing energy security and the competitiveness of Poland's economy.

Poland's energy strategy was widely criticised for being outdated and unambitious at the time when it was published. An update is coming, giving the government a unique opportunity to step up renewables ambition and withdraw from risky gas expansion plans, answering the pan-EU call to reduce fossil fuel dependency.

Studies show that by 2030 Poland could aim for over 50 GW of renewables capacity and a 50%+ share of RES in power generation. By 2040, Poland could aim for 100 GW of renewables, tripling the current PEP2040 target and doubling what was announced for the upcoming update. With most of Europe's power sector set to become 100% clean in the 2030s, it is in Poland's interest to decarbonize as quickly as possible to avoid the negative economic and security implications of being left behind.

Supporting Materials

Methodology

Recent trends in renewable energy deployment

Since 2018 Poland has been experiencing a solar energy boom - from 1.5 GW in 2019, the capacity increased to 4 GW in 2020 and [12 GW in 2022](#), noticing additions of [2.5 - 5 GW](#) yearly. The 10 GW milestone was met mid-2022, doubling the 2030 goal from the current PEP2040.

While a 3-4 GW/year PV increase might be difficult to sustain due to grid connection issues, even keeping a modest 2 GW/year pace would mean reaching around [30 GW](#) of solar capacity by 2030 and up to [50 GW by 2040](#).

An increase in ambition is also possible in the onshore wind segment. Due to some of the [most restrictive spatial planning rules](#) in Europe, onshore wind capacity additions in Poland slowed down recently after a period of strong growth between 2010 and 2015, when up to 1.2 GW were added per year. Removing the policy restrictions could open up a [potential of 15-18 GW in 2030](#) and over [30 GW of onshore wind capacity by 2040](#). An amendment to the current onshore law is ready and should be passed by the parliament immediately to ensure energy security, lower prices, and compliance with climate targets.

The area where the Polish government's ambition does match technical and social potential is offshore wind, with 5.9 GW of projects already underway and expected to be deployed by 2030. Another round of projects is preparing for auctions in 2025. Still, the government estimates that the total offshore wind potential is around 10 GW, while an analysis of the maritime planning documents, wind conditions and sea bed depth shows that over [30 GW of offshore wind could be possible](#) on Polish waters, with up to 18 GW deployed by 2040.

Estimating 2040 renewables capacity in the updated PEP2040

The [draft PEP2040 assumptions](#) don't contain detailed renewables deployment plans, but suggest between [34 and 52 GW](#) of capacity by 2030 and a 50% share of renewables in electricity generation by 2040. Using data from the current PEP2040, as well as the TSO's latest [planning document](#), we've estimated the possible renewables capacity in 2040 under the updated PEP2040 assumptions.

The TSO plan slightly increases net electricity demand forecasts for 2040, from 204 TWh in the PEP2040 to 215-231 TWh depending on the scenario. We've combined those demand projects with the maximum 2030 renewables capacity assumption in the draft PEP2040 assumptions: 29.5 GW of solar PV, 12.7 GW of onshore wind, 1.1 GW of hydro and 2.2 GW of bioenergy, as well as the existing offshore wind expansion plan—up to 9.6 GW by 2040. This yields a total renewables capacity of 55 GW in 2040 and a 53-57% renewable share in electricity generation depending on the demand scenario. Alternatively, a pessimistic scenario assumes a much lower 6.9 GW of onshore wind capacity, the same as the current PEP2040, due to the further delays around the loosening of the 10H rule. This results in 49 GW of renewable capacity and a 45-49% renewable share in the power mix depending on the demand scenario.

Summing up, although the expected 2040 renewable capacity was not provided by the government, this would have to be in the range of 50-60 GW to match the 50% renewable share assumption. This would mean almost zero expansion of renewables in the years 2030-2040, a vision hard to justify given EU climate policy, but also economic and security concerns.

Capacity factors for all technologies were derived from the current PEP2040 generation and installed capacity data.