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Poland's Energy Transition: Caught Between Lobbying and Common (Economic) Sense

Support for Coal Continues Despite High Cost Compared With Low-Carbon Alternatives

Executive Summary

Poland is the most coal-dependent country in the European Union (EU), relying on the fuel for 70% of its power generation. In 2020, it was responsible for almost one-third of all coal-fired electricity in the EU.[1] Poland's government has been reluctant for years to determine a clear policy direction for energy transition, to the frustration of local environmental campaigners (as documented in this video during the last IEEFA Energy Finance Conference).[2]

Part of Polish reluctance to determine a clear policy direction comes from seeing the difficulties that its neighbor Germany has faced with the energy transition, in terms of security of electricity supply, system stability and large fluctuations in electricity prices.[3] The Polish government also has been considering coal jobs and mining tradition, trade union pressures and miners' votes. There is also a strong aversion to relying on Russia for coal and gas imports. The latter explains Poland's efforts to build an alternative gas infrastructure to facilitate gas imports from other countries.[4]

Dependence on coal is costing Polish taxpayers dearly.

IEEFA has found that dependence on coal is costing Polish taxpayers dearly and that Poland should phase out coal-fired power as soon as possible. Analysis suggests that **if a coal phase-out is achieved by 2030, the resulting savings could enable Poland to build twice as much clean electricity generation than currently outlined in its national plan "PEP2040."** In addition to rising pressure from the EU and United Nations to produce greener electricity,[5] Poland is faced with many

[1] Ember. A German 2030 exit will isolate remaining EU coal power polluters. November 2021.
[2] IEEFA. Energy Finance Conference. 2021.
[3] McKinsey & Company. Germany's energy transition at a crossroads. November 21, 2019.
[4] Poland has built an LNG terminal in the Baltic port of Swinoujscie to allow it to access supplies from countries such as the U.S. It also is building a pipeline under the Baltic Sea that will give it access to Norway's gas fields.
[5] UN Climate Change Conference UK 2021. Global Coal to Clean Power Transition Statement. November 4, 2021.

obsolete coal installations that require national subsidies. **A coal phase-out by 2030 would save at least €141 billion for Polish taxpayers and help move Poland from the list of most-polluting EU nations.**

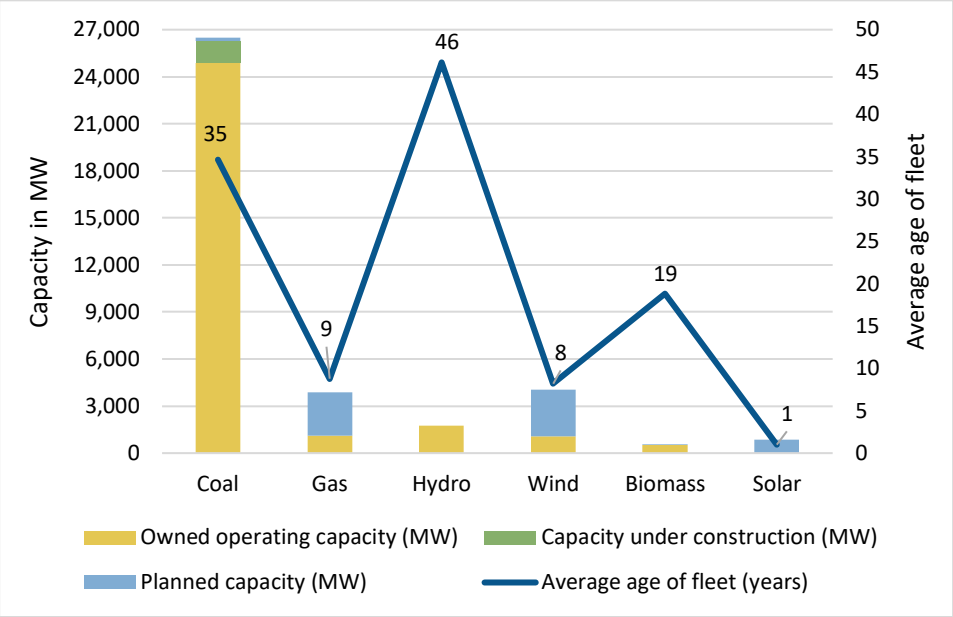
Poland's Planned Restructuring Shifts Coal Costs to Taxpayers

In December 2020, a new binding target was set across all EU countries to cut greenhouse gas emissions by 55% by 2030, compared to 1990 levels. In April 2021, three of Poland's partly state-owned companies—PGE, Tauron and Enea—announced the transfer of their stranded coal assets to a yet-to-be-formed national energy security agency (abbreviated NABE) that would give them easier access to markets for financing the energy transition.[6] The asset transfer is planned to occur during 2022. However, the publicly available data do not support such reasoning. NABE seems to be a repeat of the state bailout solution that was applied to Polish mines, when Polish mining group (Polska Grupa Górnicza S.A.) was formed to take over coal mines from indebted Kompania Weglowa in 2016 and Katowicki Holding Węglowy in 2017.[7,8] The justification for creating NABE is that it would free the energy utilities of their coal assets and give them better access to financial markets. This would enable them to invest more into renewables and other low carbon solutions. However, the question is whether such a maneuver makes the energy transition more expensive compared to a faster coal phase-out by the utilities themselves.

As Figure 1 shows, coal assets represent 85% of the total installed capacities in PGE, Tauron and Enea, which have an average coal fleet age of 35 years. Since the lifetime of a coal plant is typically 40 to 60 years, the three companies should immediately prioritise new investment cycles. Removing the fossil fuel businesses to a separate agency would leave the companies with less than 5 gigawatts (GW) of installed capacity (Figure 1), but with significant shares in domestic electricity distribution and supply (Table 1).

[6] S&P Global. Poland to buy coal assets from utilities, create state energy company in 2022. April 19, 2021.
[7] Noerr. Agreement on Establishment of Polish Mining Group Signed. April 25, 2016.
[8] PGE. Agreement on financial investment in Polska Grupa Górnicza sp. z o.o. Annual report 2017.

Figure 1: Combined Capacity of PGE, Tauron and Enea



Source: S&P Global, data as of October 20, 2021.

Under the plan, which lacks detailed information, taxpayers would pay €6.7 billion to the three utilities for their stranded coal assets (including lignite mining, hard coal-fired and lignite-fired power plants, but excluding hard coal mining).[9] Combined long-term debt of €6.1 billion and other non-current liabilities of almost €2.6 billion at the end of 2020 would then be substantially reduced, increasing financial strength to enable further investments.[10] **Taxpayers would not only pay for deleveraging the energy utilities, but would continue paying for the operational and maintenance costs of the unprofitable coal power plants until 2049**, absent government intervention.[11] Already, the Polish Mining Group asked for €1.5 billion in government help due to Covid-19 recession,[12] and the Polish Mining Company generated more than €100,000 in losses every hour for the first nine months of 2020.[13] The question is whether paying for the assets that should be

[9] PGE group would get PLN 31 billion as a result of restructuring. See: Instrat & ClientEarth. Poland's planned coal monopoly – who pays the price? December 2020. Fitch estimates that at the end of 2020, the Polish energy utilities had PLN 32 billion of outstanding loans and bonds related to coal assets. See: Fitch Ratings. Coal Spin-Off Plan Positive for Polish Utilities. April 22, 2021.

[10] All companies had problems with liquidity with moderate room for further indebtedness (debt/assets ratio has been 47% in PGE, 56% in Enea and 58% in Tauron in 2020.

[11] Greenpeace estimated in its analysis published in August 2020 that Poland could phase out most of its coal assets by 2035 in business-as-usual scenario. For details see: Greenpeace. Poland could phase out coal by 2035 as business as usual – It needs to speed up. August 2020. Similarly, Instrat and ClientEarth's scenario propagates coal phase-out by 2037. For details see: Instrat & ClientEarth. Poland's planned coal monopoly- who pays the price? December 2020.

[12] Energy Monitor. Weekly data: Polish plan to nationalise coal plants unlikely to push energy transition. April 26, 2021.

[13] CAN Europe. Poland goes all out on coal rescue against EU's higher climate goal. December 23, 2020.

written off (subsidizing unprofitable business), paying for excess CO_2 emissions and combating health problems related to fossil fuels is worth more than phasing out coal as soon as possible, investing more in renewables, pushing the coal regions to alternative industries and helping the unemployed train for other jobs.

Table 1: Installed Capacities, Electricity Generation, Distribution and Supply in Polish Market, 2020

Company Name	Installed Capacity		Electricity Generation		Distribution		Supply	
	GW	Share (%)	TWh	Share (%)	TWh	Share (%)	TWh	Share (%)
PGE	17.8	36.1%	47.1	41.0%	26.3	26.4%	30.5	31.6%
Tauron	5.2	10.5%	8.7	7.6%	35.8	35.9%	23.7	24.5%
Enea	6.3	12.8%	18.5	16.1%	14.3	14.4%	14.7	15.2%
Total PGE, Tauron and Enea	**29.3**	**59.4%**	**74.3**	**64.7%**	**76.4**	**76.7%**	**68.9**	**71.3%**
Energa	1.4	2.8%	2.2	1.9%	16.1	16.2%	13.9	14.4%
Other	18.6	37.7%	38.3	33.4%	7.1	7.1%	13.8	14.3%
Total market	**49.3**	**100.0%**	**114.8**	**100.0%**	**99.6**	**100.0%**	**96.6**	**100.0%**

Source: PGE Annual Report, 2020.

The investment plans of the companies, as shown by the planned capacity in Figure 1, follow the strategy of the government, which owns 57% of PGE, 51.5% of Enea and a 30% stake of Tauron. The annual report does not show the state's plans to invest more funds into new nuclear power plants than into renewables in the next two decades; Poland has been exploring options with several potential suppliers.[14] The nuclear investments would be realized by a separate entity, formerly PGE EJ1, that was acquired by the Polish state in 2021.[15]

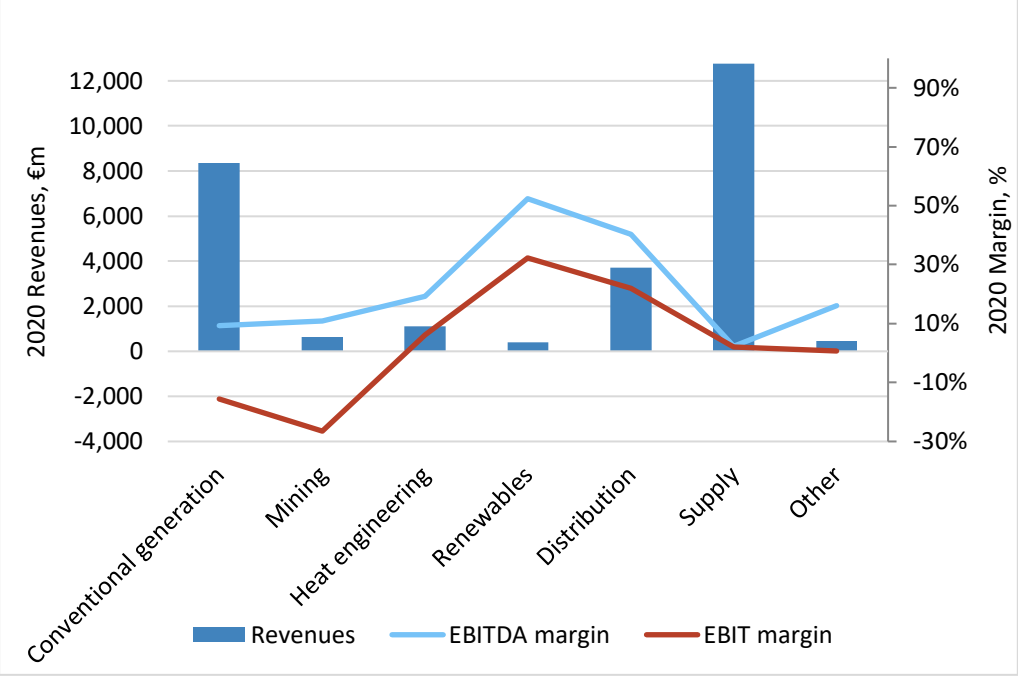
Segment results in Figure 2 show that it does not make financial sense to keep coal assets running at any of the companies or NABE once they have been written off.

The combined EBITDA of the companies has been rising slightly until 2019, primarily owing to the Distribution and Renewables segment. The highest combined EBITDA has been earned on Distribution (€1.5 billion in 2020), followed by Traditional electricity generation (€780 million in 2020), while it has continuously declined in Mining (€70 million euro earned in 2020). Tauron reported losses before income taxes, depreciation and amortization in its Mining segment from 2017-20.

[14] Poland signed the agreement with US Westinghouse to deliver design plan for 6-9 GW nuclear power plants to be built between 2033 and 2043; See Agreement between the United States of America and Poland. In force as of February 24, 2021. The French company EDF has recently signed the industrial agreement with potential suppliers in Poland after submitting an unbinding offer on nuclear power plant construction in October 2021. In addition, Korea is also interested to deliver its solution. See: NUCNET. Poland / EDF Signs Key Agreements with Potential New-Build Suppliers. December 1, 2021.

[15] Polish News. Nuclear power plant in Poland. The State Treasury took over all the shares in the PGE EJ1 company. March 26, 2021.

Figure 2: Combined Segment Results of PGE, Tauron and Enea, 2020



Source: S&P Global, data as of October 20, 2021.

The companies also have significant problems with an excess workforce; about half of their 83,500 employees worked in the Traditional electricity generation segment in 2020. However, an early retirement program makes it possible for 8,000 employees to retire annually, which could enable a coal phase-out much faster than the currently promised 2049.[16]

Table 2: PGE is the Largest Company, Followed by Tauron and Enea

Company Name	Assets, €bn	Revenues, €bn	Number of Employees	Government Ownership Stake
PGE	16.9	15.1	More than 40,000	57%
Tauron	8.1	6.8	More than 26,000	30%
Enea	4.9	5.5	About 17,200	51.5%

Source: S&P Global, data as of October 20, 2021.

Figure 2 clearly shows that conventional electricity generation and mining segments should be blamed for negative net income, while the distribution segment contributed most to the positive results of the companies.

The utilities had most traditional assets (€11.3 billion in conventional electricity generation plants and almost €1 billion frozen in mining), followed by assets in the distribution segment (€11.1 billion) at the end of 2020.

[16] Institut Jagielloński and Ecofys. The German energy transition and the Polish energy system factsheet. 2017.

What Is the Reasoning Behind Continued Support for Coal?

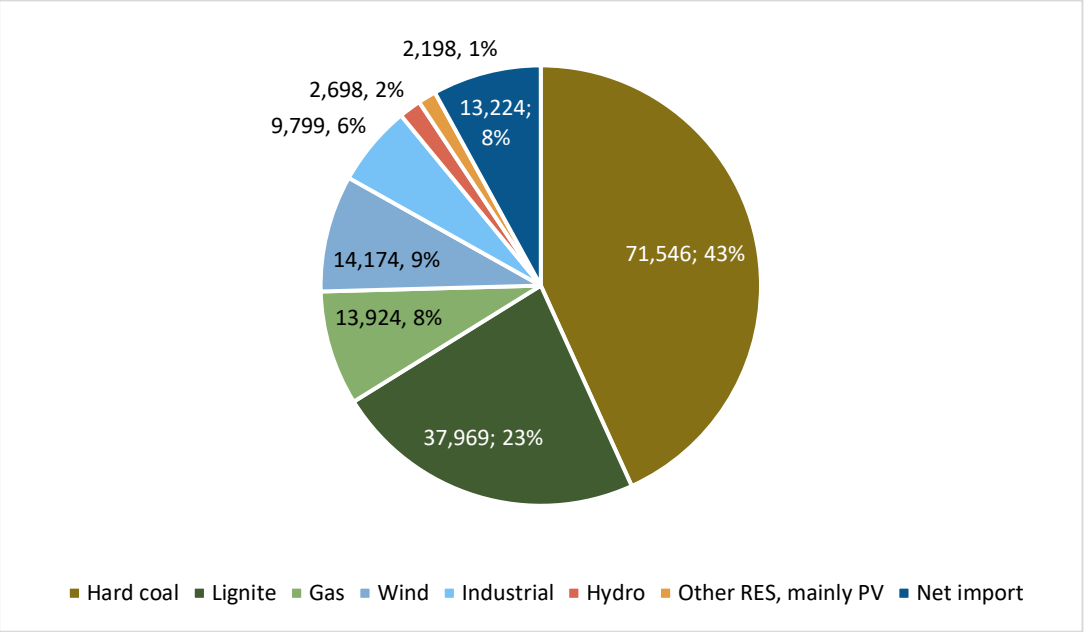
Electricity supply security stands out as the only reason for keeping relatively flexible coal assets despite the resulting pollution, costs of carbon emission allowances and health costs of the population. The rationale is not the often-cited employment in coal regions. Direct employment in conventional generation and mines of the three companies comprised only 0.2% of total employment in Poland during the second half of 2021.[17] The Polish government statements on unemployment concerns due to coal phase-out should be analyzed in the context of overall unemployment. The highest unemployment rate per region (voivodeship) has not exceeded 6% in the second quarter of 2021,[18] and it should be noted that many people in the coal industry could continue working in the renewable electricity generation segment. Any political reasoning for postponing a coal phaseout can also be dismissed; the ruling Law and Justice Party that argues a coal phaseout had only 30% to 50% support in coal regions in the last elections held in October 2019.[19]

But Poland is severely concerned with the security of electricity supply. The country imported 8% of its electricity in 2020. Abandoning coal and adding more renewables could endanger its electricity supply as Poland, apart from coal and some gas power plants, would not be able to hold the electricity base load (Figure 3). Poland is also deeply aware of the possible electricity supply problems that Germany may face after abandoning nuclear energy and coal. Germany is likely to become a net importer of electricity after 2023.[20] For this reason, the Polish government is looking to other Visegrád countries (Czechia, Slovakia and Hungary) that have nuclear energy in their electricity mix (Table 3).

Poland is severely concerned with the security of electricity supply.

[17] Moody's Analytics. Economic indicators. June 30, 2021.
[18] Statista. Unemployment rate of persons aged 15-89 years in Poland in 2021, by voivodeship. 2021.
[19] Warsaw Institute. Poland's 2019 Parliamentary Election. November 5, 2019.
[20] McKinsey & Company. Germany's energy transition at a crossroads. November 21, 2019.

Figure 3: Electricity Consumption by Source in Poland, in GWh, 2020



Source: PSE (taken from S&P Global).

Poland imports electricity from Sweden, Germany, the Czech Republic, Lithuania, Ukraine, and Slovakia. While Sweden relies on nuclear, hydro and wind for its electricity generation, other countries mostly rely on nuclear and natural gas, combined with either coal (Germany and Czechia) or renewables (Lithuania).[21] With a lack of hydro and nuclear energy, Poland is severely dependent on coal and natural gas. Its electricity generation mix resembles that of Turkey or China. However, there is plenty of room to move towards renewables (especially solar PV).

Table 3: Electricity Generation by Source in Selected Countries, 2020

Fuel	Germany	Sweden	Czechia	Slovakia	Hungary	Lithuania	Poland 2020	Poland PEP2040
Coal	26%	1%	40%	7%	11%	0%	72%	28%
Natural gas	17%	0%	8%	13%	26%	34%	10%	
Nuclear	11%	32%	37%	54%	46%	0%	0%	14%
Wind	23%	18%	1%	0%	2%	31%	9%	40%
Solar	9%	1%	3%	2%	7%	3%	0%	
Biofuels	8%	0%	6%	5%	6%	0%	5%	
Hydro	4%	46%	4%	16%	1%	22%	2%	
Waste	2%	2%	0%	0%	1%	4%	0%	
Oil	1%	0%	0%	0%	0%	2%	1%	
Other	0%	0%	0%	2%	0%	4%	0%	

Source: IEA (Energy supply – Electricity generation by source), PEP2040.

[21] International Energy Agency. Sweden.

Projected installed capacities would differ in Poland by 2030 and 2040 compared to today's levels as proposed by PEP2040 (Table 4). However, after PEP2040, Poland would only reach Germany's current share of renewables in electricity in 20 years; Germany plans to have 100% renewables by 2040.[22] A major novelty is the construction of nuclear reactors to be combined with renewables (a strategy similar to Czechia's).

Table 4: Poland's Electricity Generation Capacity Mix and PEP2040 Targets

Source of Electricity	Installed Capacity	PEP2040 Projected Installed Capacity	
	2020	2030	2040
Wind energy	5.9 GW	9.8 GW	10.3 GW
Photovoltaics	3.9 GW	5-7 GW	10-16 GW
Coal	31.2 GW, 63% share of installed capacity	37.5%-56% max. share (depending on the price of emission allowances)	11%-28% max. share (depending on the price of emission allowances)
Nuclear energy	0 GW		6 blocks of 1-1.6 GW = 6-9.6 GW (commissioned from 2033 thereon); 14-16% share
Natural gas	2.8 GW, 6% share	29% share	33% share

Source: Poland – Country Commercial Guide; PEP2040.

Poland agreed to phase out coal by 2049, and it is one of the countries pushing the European Commission to define nuclear technology as a sustainable technology.[23] While adding nuclear reactors to the Polish electricity mix is not a new idea—dating to 2012—Poland had already started and abandoned the construction of a nuclear power plant in the 1980s in Żarnowiec.[24] PGE, Tauron and Enea will take over investment in renewables. The higher the expected price of carbon emission allowances, the more investment is required into renewables, since polluters would be required to pay more for clean air. **Postponing the energy transition could cost Poland even more than necessary, since maintaining existing capacities and investing in renewables at the same time is not financially sustainable for Polish utilities.**

Instrat, a Polish think tank, predicts Poland could achieve a 71% renewable sources (RES) share in its overall electricity generation mix by 2030, as opposed to 32% proposed by PEP2040.[25] Poland already employs more than 90,000 workers in photovoltaics. The number should increase as solar PV capacities increase.[26] Both wind and photovoltaics farms may add more jobs than Poland loses by replacing

[22] Clean Energy Wire. German power sector could achieve 100% renewables by 2040 – economy minister. January 14, 2021.
[23] Euractiv. 10 EU countries back nuclear power in EU green finance taxonomy. October 12, 2021.
[24] Daily Mail. Pictures show Polish Zarnowiec nuclear power station 25 years after Chernobyl disaster halted construction. November 23, 2015.
[25] Instrat. What's next after coal? RES potential in Poland. June 2021.
[26] Konkurs. Polska europejskim liderem w liczbie instalatorów fotowoltaiki. November 9, 2021.

coal mining and generation. Similar to an existing program in Germany,[27] Poland could establish retraining programs for fossil fuel workers to work on renewables installations.

Under the NABE plan, Tauron and Enea would first transfer its coal assets to PGE, which would subsequently transfer them to NABE.[28] The three companies then would merge under the PGE umbrella to facilitate the energy transition and achieve a dominant market share in electricity distribution, district heating and electricity generation from renewables. The creation of NABE, however, only shifts debt from corporate balance sheets to the state, with fossil fuel-related costs picked up by the taxpayers. Stranded coal assets would be financed by taxpayers who fund NABE's work. PGE's vision to provide 100% renewable energy to its customers by 2050 is not ambitious at all, even though its investment potential should be enhanced after transferring its coal-related debt to NABE. If Poland is to meet the EU's plans to reduce greenhouse gas emissions 55% by 2030 and completely by 2050, PGE will need to move much faster.

What Is the Real Cost of Poland's National Energy Plan?

Tables 5 and 6 show the amount of total and/or average yearly costs for keeping the electricity generation mix as it is today.

Table 5: Operational Costs and Capex of Polish Utilities in 2020, €bn

Company Name	Operational Costs for Mining and Conventional Electricity				Capex for Fossil Fuels				Capex for Renewables
	2020	2021-2030	2031-2040	2041-2049	2020	2021-2030	2031-2040	2041-2049	2020
PGE	5.8	50.2	25.0	17.2	0.53	4.6	2.3	1.6	0.16
Tauron	1.8	15.5	6.0	2.5	0.38	3.3	1.3	0.5	0.01
Enea	2.8	25.4	10.7	4.2	0.25	2.3	1.0	0.4	-
Total	**10.4**	**91.0**	**41.7**	**23.9**	**1.16**	**10.1**	**4.5**	**2.5**	**0.17**

Source: S&P Global; IEEFA calculations.

If a transfer of assets to NABE happens during 2022, it will leave taxpayers funding decades of operational costs related to conventional electricity and mining. Our estimates of operational costs and capex for fossil fuels, disclosed in Table 5, are based on a gradual reduction of coal capacities until 2040, compared to 2020 levels.[29] In Table 6, we estimated additional costs of keeping fossil fuel-related assets longer than necessary. State subsidies that support fossil fuels, although significantly reduced in recent years, are still large. According to estimates shown in

[27] Siemens, for example, has 2-year training program for workers on wind power plants. See: The Guardian. What will happen to oil and gas workers as the world turns carbon neutral? Aug 27, 2015.
[28] Biznes Alert. Baca-Pogorzelska: Plan reorganizaciji energetyki jest na papierze. Nie wszystkim sie podoba. July 5, 2020.
[29] Instrat & ClientEarth. Poland's planned coal monopoly – who pays the price? December, 2020.

Table 6, coal-related costs could average €16.7 billion annually this decade, including the additional costs to the health system. Over 28 years, the costs could exceed €291 billion, especially if coal assets are run longer or the cost of carbon rises.[30]

Poland will receive €3.8 billion from the EU budget to mitigate the effects of the energy transition and move away from coal by 2027. However, it is not clear if these funds would be used to support NABE.[31] Poland might also receive €13 billion from the Fit for 55 Fund from 2025-2032 for climate protection investments support—more than triple the amount of support to phase out coal.[32] The current EU policy is to support renewables rather than coal; meanwhile, Poland continues to support coal and has huge indirect costs as a consequence.

Phasing out coal by 2030 would spare at least €141 billion in taxpayer funds.

Phasing out coal by 2030 would spare at least €141 billion in taxpayer funds, transferred from the government to remedy the consequences of coal electricity generation. Poland could build **twice as many clean capacities compared to PEP2040 plan if it phases out coal assets by 2030**. That is not the entire bill; according to PGE estimates,[33] which were made when carbon was much cheaper, if Poland's level of emissions was maintained, it would cost Poland €68.5 billion to buy up the necessary emissions permits by 2030 to comply with the 55% emission reduction target. IEEFA estimates are in line with this figure, noting significant upside risk. Even conservatively assuming a fixed carbon price of €80 per tonne, and a phaseout of its coal power by 2040, NABE would spend €63 billion on carbon allowances over the next nine years. Perhaps more realistically, if carbon prices rise by just €5 each year, or if NABE takes longer to retire its plants, then the cost could easily be €80 billion to €90 billion.

Some of the increased costs that utilities face from high coal, gas and carbon prices are now being passed on to ordinary citizens. The Polish energy regulatory office, URE, has approved a power price hike for consumers from January 2022. URE estimates the hike will mean a 24% increase in average monthly household power bills.[34]

[30] An earlier analysis by IEEFA showed that PGE profitability (and hence profitability of other energy utilities) is almost entirely driven by investment in renewables. See: IEEFA. How to Create a Profitable Polish Electricity System. February 2020.
[31] International Trade Administration. Poland – Country Commercial Guide. Energy Sector.
[32] European Parliament. Social climate fund: Fit for 55 package. November 2021.
[33] Financial Times. Critics hit out at 'stupid' cuts to EU's green transition fund. July 26, 2020.
[34] Notes from Poland. Gas bills to rise 54% and electricity 24% in new year says, says Polish regulator. December 18, 2021.

Table 6: State Subsidies and Other Coal-Related Costs, Compared With Energy Transition Investments, in €bn

	2022-2030	2031-2040	2041-2049
Coal-Related Subsidies and Costs			
Health costs due to coal-related diseases[35]	63.0	39.0	14.6
Pension subsidies for miners[36]	16.5	25.0	27.0
Fine to the European court of Justice for Turow mine[37]	0.9	-	-
Excess funds paid for takeover of stranded coal assets (over their value) to Polish energy utilities[38]	1.0	-	-
NABE budget and expected losses of NABE[39]	5.9	6.5	5.9
NABE carbon allowances (IEEFA lower bound)	63.0	23.4	-
Total annual public direct and indirect coal-related costs	**150.2**	**93.9**	**47.5**
Energy Transition Investment			
EU support, Just Transition Fund 2021-2027[40]	3.0	-	-
State investment in nuclear program under PEP2040 (33 billion total)	14.9	16.5	-
Investment in offshore wind under PEP2040 (28.3 billion total)	12.6	14.0	-
PGE (merged with Tauron and Enea) investment into renewables from 2021-2030 (EUR 12.2 bn total)	12.2	-	-
Total annual energy transition investments	**42.7**	**30.5**	**-**

Source: IEEFA calculations.
Note: 1 euro = 4.6 PLN, 1 euro = 1.16 USD

[35] Health and Environment Alliance (HEAL) estimated annual health costs from coal up to USD 39.2 billion. See: HEAL. Hidden Price Tags. 2017. Schaible et al. estimated annual health costs from fossil fuels from EUR 8-16 billion. See: European Environmental Bureau. Lifting Europe's Dark Cloud – How Cutting Coal Saves Lives. 2016.
[36] Health and Environment Alliance (HEAL). Hidden Price Tags – How ending fossil fuel subsidies would benefit our health. July 2017.
[37] Politico. EU Court fines Poland EUR 500K a day over refusal to shut down coal mine. September 20, 2021.
[38] Instrat & ClientEarth. Poland's planned coal monopoly – who pays the price? December 2020.
[39] Europe Beyond Coal. No Reason for European Commission to Greenlight Polish Hard Coal Subsidies. December 2, 2021.
[40] EU Observer. Poland keeps controversial mine open to 2044 despite lawsuit. May 3, 2021.

According to PEP2040, strategic projects in the coming period include a transition of coal regions; the Polish nuclear power program; implementation of offshore wind energy; prosumer power generation; and construction of the gas Baltic Pipe and oil Pomeranian Pipeline. **These costs could be completely covered with resources saved by committing to an earlier coal phaseout.** The obsolescence of the existing fossil-fuel power plants, a well-accepted prosumer investment program into solar PV, rapid development of new technologies for electricity storage and renewable energy plants, and the steadily rising price of carbon under the EU ETS all support the energy transition in Poland.

These costs could be completely covered with resources saved by committing to an earlier coal phaseout.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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