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REPORT

THE POOREST will pay

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Costs of introducing the Emissions Trading Scheme for residential buildings and transport

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Synthesis

- Under the EU's climate policy, there are plans to introduce an emissions trading system that would cover residential heating and transportation.
- The structure of the new system is similar to that of the old ETS and, like the old system, promotes the activity of speculators. What is particularly significant is the lack of free allowances and trading only through auctions.
- Emissions under the new system add up to more than 6 tons of CO2 per statistical household.
- If it is assumed that the "soft cap" (delicate protection of the level of 45 euros) on the price, as proposed by the EC, will have the expected effect, then the cost of the new system will amount per statistical Polish household to about PLN 1560 in 2030. If the release of an additional pool of allowances does not deter investors (e.g., if they have sufficiently large funds), then the cost will rise to PLN 7100 in 2030.
- In total for the entire economy, these costs add up to 21,2 billion zlotys and 96,5 billion zlotys, respectively.
- The most affected by the changes will be the poorest households in the rural areas.
- Urban households will not be as affected by the introduction of ETS 2, as they receive energy and heating from the district heating, bearing the costs of the EC's climate policy, but indirectly according to the schedule of payments.
- In theory, the negative consequences of the EU's climate policy are to be mitigated through the Climate Social Fund. However, disbursements from this fund will require approval of the national plan by the European Commission. Experience with the NRRP (National Recovery and Resilience Plan) shows that receiving funds may be more difficult than we expect.
- The EC estimates the amount of CSF disbursements for Poland at about 17 percent

of the total. Following the Commission's assumption that the size of the fund will be €87 billion, this brings it to €15.3 billion, i.e., less than 70 billion zlotys. As indicated above,

The annual cost of implementing ETS 2 will cost households approx. PLN 21 billion. Since residential buildings and private transportation are covered by the system from 2029, the system's costs will add up to 63 billion zlotys by 2032. To this amount must be added the expenses that will be incurred by businesses (ETS 2 will first cover commercial buildings and commercial transport). This means that Poland, as a result of the introduction of this system, will be at a loss, even if CSF disbursements were made without interruption.

An opportunity for the Polish capital market may lie to make the Warsaw Stock Exchange one of the main markets for trading new allowances. However, it is unlikely that the members of the Old Union will abandon Leipzig, where EU allowances are currently traded. Nevertheless, the New Union may seek to create a second trading venue. In the case of EU allowances, before Brexit, it was London. Warsaw is a natural candidate.

Costs of introducing climate policy in the European Union

- It is impossible to propose a unique set of climate policies that meet the interests of all of the 27 EU members. These are countries with different levels of economic development (e.g. Germany and Poland) and climate (e.g. Poland and Italy). Nevertheless, the defense of national interests is rare in the EU.
- One of the key tools of EU climate policy is the EU Emissions Trading Scheme (EU ETS). It imposes a quasi-tax on carbon dioxide emissions, currently amounting to about €100 per ton. CO_2 is emitted as a result of fuel combustion, hence high-emitting industries are, for example, steel production, cement production, and, in the case of countries such as Poland, primarily the power and heating industries.
- The cost of an emission allowance in the EU ETS has almost tripled since 2020. This is a much faster pace than the EC has considered necessary to achieve its emission reduction targets. A possible reason for this is the activity of financial investors, who take advantage of the system's structure to safely "gamble" on the price rise.

The European Union's climate policy affects the lives of its citizens. This impact may be positive in the future. For the time being, however, the costs of its implementation are significant, and societies are increasingly protesting against the forced changes. One may ask why then is climate policy being promoted so intensively. The traditional rationale for its introduction is to reduce emissions, which in turn is primarily to stop the dynamics of climate change caused by human activity[1].

PPro-climate ideas are usually prepared by the European Commission. They are then processed according to the normal legislative path and are,

[1] In this paper, I do not intend to address the broad topic of human impact on global warming.

with cosmetic changes at most, implemented. Most EU parliamentarians and the Council of Europe support the idea of reducing emissions. The EC's proposals in the field of energy can be considered to satisfy the expectations of primarily pro-climate elites of wealthier countries. I deliberately use such a distinction, because even the division between wealthier and less wealthy countries is no longer valid. For example, the Netherlands, a country with a GDP per capita roughly three times higher than Poland. The country's political representatives have usually followed the policy of fighting for the climate, but they may soon lose the social mandate themselves. In the Netherlands, there are rising protests of farmers, whose businesses are being hurt by climate policy.

THE EC'S PROPOSALS IN THE FIELD OF ENERGY CAN BE CONSIDERED TO SATISFY THE EXPECTATIONS OF PRIMARILY PRO-CLIMATE ELITES OF WEALTHIER COUNTRIES.

In the recent elections in March, they won 15 seats in the 75-member Senate. They also won in five of the twelve provincial assemblies[2].

This does not necessarily mean that the Dutch pro-climate policy will change, but it does indicate that even in the wealthy countries of Western Europe there is a growing opposition to the "fight against the climate," or rather to its current course, which is now more like throwing the baby out with the bathwater. The bathwater is cold, we would add since the warmth is also subject to EU levies.

However, for now, many member states are afraid to express their objections to the EC's ideas. Perhaps the reason is the fear of displeasing the Commission and the countries supporting the initiative. The argument of "loss of reputation" or "deterioration of relations," is often mentioned in the media by journalists and experts who favor the proposed reforms.

Perhaps, the fault, in contrast, lies with the negotiators, who are not willing to negotiate more courageously in defense of the national interest, as they count on opportunities to continue their careers in the Brussels institutions. However, even the veto, considered a "nuclear option," is only one of the negotiating tools and does not, after all, determine the ultimate fate of a given project. Its use is simply a strong expression of disapproval: the current proposal is unacceptable for them and they expect a more favorable one. It does not imply rowdiness or a desire to break off negotiations but only a firm defense of one's interests.

Moreover, it is strange to give up when one can defend their interests. In an institution that brings together 27 countries with vastly different interests, fighting for one's own interest should be a common thing. It is impossible to reconcile the interests of nearly thirty countries with one set of policies, on such important issues as climate policy and the energy security that is inextricably linked to it.

The member states are, after all, in different climate zones, with different levels of economic development and wealth of citizens. It is completely unreasonable to expect any reform proposal to satisfy the interests of all countries.

There is no escape for Poles from the ever-increasing costs of Brussels' climate policy. It is doubtful, however, that they realize this. Surveys from a few years ago show how numerous is the percentage of citizens with contracts of employment who are convinced that they do not pay taxes. This does not only apply to tributes that are "exotic" from the point of view of the common man, such as corporate income tax (CIT). Several percent of the employed are convinced that they do not pay personal income tax (PIT). Given such surveys, awareness of paying the costs of a system such as the EU ETS must be low[3]

[2] https://www.theguardian.com/world/2023/mar/16/rural-populist-party-farmer-citizen- movement-big-winner-dutch-elections.

[3] Yet the awareness would have to be checked by an independent survey with a representative sample.

These do exist, however, but are hidden in the tariffs that the consumer pays for energy and electricity from the grid and the electric network. Explaining how the EU ETS works, however, is probably best to start at the beginning. The ETS is one of the main tools of pro-climate policy. Its premise was as follows: to impose a quasi-tax on carbon dioxide emissions. That one is emitted through the combustion of fuels. Heavily emitting, therefore, are industrial sectors such as power generation, heating and steel production. Transportation is also emissive. In the power or heating industry, the emissivity depends on the so-called mix, i.e. the share of individual sources in a country's energy production. These can be zero-emitting (wind, photovoltaic, nuclear) or emit CO_2 in the process of burning fuel (coal, gas, diesel, etc.). Due to the large share of coal-fired units, the emissivity of the Polish power and heating sector is quite high, amounting in 2022 to 761 kg per MWh[4]. Poles pay the price of EU allowances indirectly, as it is "hidden" in electricity and heating tariffs.

The EU ETS was made so that the number of available allowances would decrease from year to year by a so-called Linear Reduction Factor (LRF) of 1.74 percent in Phase III and currently 2.22 percent[5]. At the same time, the Market Stability Reserve (MSR) mechanism prevented the purchase of allowances in stock. This was to prevent a heavily emitting company from stocking up on a large surplus of allowances at a time when the price was low, and then using them on an ongoing basis.

The system was supposed, through a constantly limited supply, to help reaching the set carbon emission reduction targets. In recent years, the price of EU allowances (for industry, in addition to them, there are also EU aviation allowances in circulation) has increased several times, from a level of about 20-30 euros as recently as 2020 to the current almost 100 euros per ton. One explanation for this increase is the possible activity of financial investors, who are taking advantage of rigid demand from some buyers to gamble on price increases. Regardless of the reasons, the creators of the ETS system did not anticipate such a rapid price increase. Its effect is a drastic increase in the cost of power and heating in the conditions of the Polish economy. A broader discussion of the situation in the EUA market is given in two papers by the author in April[6] and September[7] 2021.

Unfortunately, the public debate avoids questions of the negative impact that climate policy can have on Polish people's lives. It is common to present only the benefits. For example, in the case of the EU ETS, the profit that "Poland" makes from the sale of emission allowances is often emphasized. Such a claim is a kind of misinformation, as it ignores fundamental issues:

- the Polish economy, as a whole, has a shortage of emission allowances, estimated at 65 million tons per year for 2021-2023[8]. These allowances must be purchased from foreign bidders with a current surplus;
- public finance revenue from the sale of allowances from the free pool allocated to the Polish government comes at the expense of Polish companies. Public finance revenue from the sale of allowances from the free pool allocated to the Polish government comes at the expense of Polish companies.

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4 According to the National Center for Balancing and Emissions Management. The report is not a statement in the discussion of the optimal energy mix for Poland. In its development, in addition to economic viability and ecology, safety issues should be taken into account. Domestic resources are primarily responsible for these. The COVID-19 pandemic showed that in shortage conditions, exporters prioritize meeting domestic demand before meeting international obligations. The same applies to cross-border connections. Regardless of the path chosen, the reform of the energy mix, the so-called transformation, is time-consuming and requires minimum 20-year.

5 https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/emissions-cap-and-allowances_pl.

6 April 2021 https://suwerennoscenergetyczna.pl/wp-content/uploads/2021/04/M.Lachowicz.Raport.23.04.2021.pdf.

7 September 2021, https://zpp.net.pl/wp-content/uploads/2021/09/16.09.2021-Raport-ZPP-Banki-cenowe-a-konkurencyjnosc-Polski-oraz-Unii-Europejskiej.pdf.

8 https://suwerennoscenergetyczna.pl/2021/09/06/raport-specjalny-luka-eu-ets.

Those that need allowances to run their businesses (such as coal power plants) buy them from the government. A similar transfer takes place when paying taxes. Therefore, there can be no profit, as the budget's profit is at the expense of the payers.

However, critics of climate policy do not always seize the opportunity and often use emotional slogans instead of pointing out real problems. This causes the debate to be conducted not in the spirit of **Athenian democracy, but Spartan. In the latter, the votes were won not by those who were right, nor even by those who were in the majority, but by those who shouted louder.**

This study aims to fill a factual gap and provide an estimation of the cost of the planned extension of the EU ETS to residential buildings and transport, the so-called ETS 2, to be borne by Polish households. The costs of operating the EU ETS, including industrial EUA and aviation EUAA allowances, are ignored.

The poorest will bear the highest costs

- Tightening climate policy in the current geopolitical situation (COVID-19, congestion in supply chains, war in Ukraine) is extremely irresponsible and pointless.
- Higher EUA prices will result in more expensive electricity, heating and hot water from the grid. Consumers do not bear the direct cost of the price increases, as they are "hidden" in tariffs and bills. Indirectly, more expensive energy and heating will increase inflation. All of this factors will contribute to lower living standards for Polish households and a decrease in disposable income.
- ETS 2 will charge every citizen with taxes on CO_2 emissions. The smallest costs will be borne by... the richest, who will be able to insulate their houses according to EU standards, as well as purchase expensive electric cars, which are normally useful in urban environments. Moreover, it is the wealthiest who will be able to take advantage of the subsidies provided for the purchase of the aforementioned.
- The costs of transformation for the poorest groups of society are to be compensated by the Climate Social Fund. Poland can count on 17.6 percent of the value of this fund in 2025-2032. Its extent is not clear, the latest figures put it at 87 billion euros, most of which will come from the central budget. Poland may receive about 15.3 billion euros, or about 70 billion zlotys, from it. However, the CSF spending plan must be approved by the European Commission. This means that in the case of the CSF, the case of the NRRP may be repeated.
- Regardless of the approval of the plan and the timeliness of CSF disbursements, Poland will be a net loser on this system. The bulk of its costs will be borne by the middle class that is too poor to invest in the EC's preferred solutions, yet too wealthy to benefit from the CSF.
- The negative impact of the EC's pro-climate policy is suffered not only by households.

- Industry is escaping from the EU to countries with less restrictive regulations and cheaper electricity (carbon leakage). The solution to prevent this flight is the carbon duty (CBAM), however, the EC in its analysis does not at all foresee a situation where foreign countries decide to retaliate.
- A small opportunity for Poland can be seen in ETS 2, should be that the Warsaw Stock Exchange becomes one of the leading trading floors for ETS trading.

Already in its current form, the EU ETS system influences the current and future structure of electricity supply in Poland, very strongly rewarding low-carbon sources in the energy mix while penalizing emission sources. The revision of the ETS under FF55 has resulted in an increase in EUA prices, which will result in electricity and heating prices. The cost of extracting and processing energy resources such as oil and coal will also increase. Subsequently, the consequence of higher EUA prices will be more expensive consumer goods and groceries, which will obviously reduce the disposable income of Polish households and lower their standard of living. This is because the EU climate policy will also increase the cost of food production due to the increase in the price of gas (ETS, the Methane Directive and the imposition of the ETS on maritime transport, i.e. also the supply of LNG), used in the production of fertilizers.

The extension of the ETS to buildings and road transport will place a further burden on households, due to the quasi-tax on the consumption of every fossil fuel used for energy purposes by a citizen. The forestry strategy will reduce the supply of alternative fuels to gas and coal - wood, briquette and biomass, resulting in an increase in their price. At the same time, plans to gradually abandon the EU's import dependence on Russian raw materials, while ethically justifiable, will increase the price of gas, coal and oil, which will be another financial burden on society.

Household disposable income will be pared by the rising cost of products necessary for survival and higher charges for electricity and heating, as well as for fuels that power vehicles. The consequence will be a decrease in the mobility of society, as both rail (electric) and road (combustion) transportation will face price increases due to both the global situation and new political burdens. Moreover, it should be stressed that the methane emissions regulations envisioned under FF55 pose a threat of significant costs to the mining sector (mines) and gas infrastructure.

On the other hand, the revision of the RED and IED directives defining the use of RES in heating will result in a successive increase in the dependence of heating sources on electricity at the expense of their own resource - coal. Plans to incorporate units smaller than 20 MW and local boiler plants, mostly fueled by gas or coal, will also contribute to an increase in heating prices.

THE CONSEQUENCE OF HIGHER EUA PRICES WILL BE MORE EXPENSIVE CONSUMER GOODS AND GROCERIES, WHICH WILL OBVIOUSLY REDUCE THE DISPOSABLE INCOME OF POLISH HOUSEHOLDS AND LOWER THEIR STANDARD OF LIVING.

The EC, in theory, seems to be aware of the negative consequences of climate policy for households and plans to set up a so-called Climate Social Fund, but only if BRT is included in the quasi-ETS system. This would be a mechanism to compensate the lowest-income households for additional energy costs. Paradoxically, this is an anti-climate solution, as the rich will subsidize the combustion of emitting fuels for the poorer. And the fund itself is not large enough to reimburse Poland for the costs of implementing EU climate policy.

In the document cited above, the EC sets the size of the CSF for 2025-2032 at €72 billion from central funds, which should be at least doubled by national funds. This gives a total of 144 billion euros. The document specifies that Poland can

count on about 17 percent of the Fund's resources. This means, in total, 24.5 billion euros to mitigate the effects of climate policy, which amounts to about 110 billion zlotys. Concurrently, the cost of introducing ETS 2 in the variant in which the soft cap proves to be effective is PLN 16.7 billion per year. The annual net loss from the introduction of ETS 2 is therefore PLN 3 billion, and this is on the condition that payments from the CSF will be received without problems. If speculators break through the €45 barrier, the net loss will increase sharply.

In addition to the extremely negative consequences for households, the effects on industry should also be mentioned, although this is not the subject of this analysis. The effect of the EU climate policy will be a significant reduction in the competitiveness of the Polish industry, both through rising energy prices and transport costs, increased fuel prices and the imposition of new climate taxes on transport. EU climate policy must be taken into account, among other things, in the development strategies of the Central Transport Port (EUAA), the ports of Tri-City and Szczecin (CBAM, ETS for maritime transport).

Currently, one can observe an increase in the price of all energy carriers. This is reflected in an increase in the price of all consumer goods (inflation). At the same time, the Russian invasion in Ukraine increases uncertainty and threatens the stability of raw material supplies. The implementation of additional tributes burdening the budgets of citizens in such a situation should be considered unreasonable, and the consequences of pushing through these artificial fees could be a significant slowdown in industrial production, economic growth and the progressive pauperization of the population. Accurate numerical estimates, are impossible to obtain at this point partly due to the remote horizon of the forecast, but mainly because the final proposals for changes in EU regulations have not yet been determined. There is no doubt that Europe and the EU are currently struggling with more pressing challenges than the climate, for example: post-Covid reconstruction and the war on the border. The latter has already resulted in the resettlement of nearly 10 million Ukrainians, of whom more than 3 million have left the country and about 2 million have found refuge in Poland. It seems that these issues should take priority over climate policy, the beneficial effects of which are planned over a horizon of several decades, but the fiscal burden will be imposed immediately. It should be recalled that fiscal policy is counter-cyclical, i.e. during an economic downturn (caused, for example, by a pandemic or war), debt is incurred and society is "subsidized" by the state. Raising taxes during a recession, on the other hand, is not common in civilized economies.

EUROPE AND THE EU ARE CURRENTLY STRUGGLING WITH MORE PRESSING CHALLENGES THAN THE CLIMATE, FOR EXAMPLE: POST-COVID RECONSTRUCTION AND THE WAR ON THE BORDER.

However, ETS 2 could be an opportunity for the Polish capital market. Since the EC assumes that all trading will take place at auctions, it is logical that stock exchanges should organize them. Poland should aim for the Warsaw Stock Exchange to be one of the main trading floors for ETS BRT allowances. Warsaw Stock Exchange is the strongest stock exchange in the "New Union" (translator's note: countries that joined the EU in 2004) and a natural candidate to coordinate the entire system. Of course, it is extremely illogical to expect the Old Union (translator's note: the six countries that founded the EU) to give up its stock exchanges, probably in Leipzig, where EUAs have been traded for years. But the New Union has enough voting power to demand a second trading floor on its territory. Before Brexit even EUA allowances were traded on two stock exchanges, apart from Leipzig trading took place also in London.

EU ETS 2: what do we know, what do we assume?

- The structure of ETS 2 is to be similar to the ETS. The supply of allowances is to decrease annually by a linear reduction factor (LRF) of just over 5%. Surpluses will be eliminated by a market stability reserve (MSR). There are no free allowances, trading is to take place at auctions.
- The new feature in comparison with the original ETS is the introduction of a soft cap. If the allowance price exceeds the level of 45 euros per ton for two months in a row, then additional 20 million allowances will be released to the market.
- Soft cap does not mean that financial institutions cannot "attack" the ETS BRT to artificially raise prices. Such an attack will be possible if adequate funds are involved. Then, the ETS BRT price could come close to the price of industrial EUA allowances. However, it is possible that the EC will be interested in a stronger defense of the €45 level.
- Compensation for the negative financial effects of the proposed reforms is to be handled by the Climate Social Fund, with an amount of 87 billion euros. Just over 15 billion may go to Poland. However, the disbursement plan must be approved by the European Commission, which means that the situation with the NRRP could be repeated

From the very beginning, the so-called ETS 2 was intended to be a system analogous to the ETS, not a part of it. The details are not exactly known, however, its general outline was made public. In the EC[9] proposal one can read that:

- The launch of the system is planned for 2027. In case of exceptionally high energy prices, the EC will postpone it to 2028.
- The emission reduction trajectory and linear reduction factor (LRF) are set at 5.1 percent from 2024 and 5.38 percent from 2028.
- During the first year of the system's opera-

[9] https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698890/EPRS_BRI(2022)698890_EN.pdf.

tion, the auction volume will be increased by 30 percent.

- If the ETS BRT price exceeds 45 euros for two consecutive months, an additional 20 million allowances from the MSR (market stabilization reserve) will be released to the market. The MSR in the old ETS system is primarily used to eliminate excessive allowances from the market.

This prevents installations from buying allowances in stock, during periods when the price is low.

- The EC does not provide for free allowances, trading will take place at auctions[10].
- The EC allows member states to exempt fuel suppliers from the ETS BRT system until 2030. The condition is the introduction of a national tax, the amount of which will be at least equal to the amount of the ETS BRT allowance.

At the same time, it is worth noting that member states made an effort to make the EC aware of the negative social impact of the proposed solution. The result of the efforts was the introduction, along with the new regulations, of the so-called Climate Social Fund. In theory, this is a compensation mechanism designed to reduce the negative consequences of the climate transition, which will be borne by less well-off citizens. The CSF is to receive funds from the sale of ETS 2 allowances, up to €65 billion. The fund is able to be expanded with domestic financing, up to 87 billion euros[11]. Most of it will be allocated towards the increased costs of road transportation and building heating (up to 37.5 percent of the total funds).

The rest will be spent on long-term structural investments, such as building renovation, decarbonization, integration of energy from renewable sources, and purchase and maintenance of zero-emission vehicle infrastructure[12]. IAs recently as June 2022, information indicates that a national plan for spending money from the Fund, will have to be approved by the European Commission[13]. Our experience with the NRRP indicates that approval of such a plan may turn out to be subject to a number of conditions arbitrarily chosen by the EC. If the CSF were to be contributed with the Polish capital as well, this could lead to a situation in which it is not the Polish government that decides what Polish money will be used for.

To conclude, the characteristics of the ETS 2 allowances market are essentially identical to the EU allowances market. More extensively, the characteristics of the latter are presented in the author's two 2021 papers examining the possibility of price bubbles forming[14]. In addition to similarities such as the presence of LRFs and MSRs, it is worth noting that if financial institutions are admitted to ETS BRT trading (which seems natural for auctioning allowances), then demand side will be split between buyers who need ETS BRT and financial institutions. The advantage that the latter have in this situation is described in the author's previously cited studies.

At this point, the main difference between EUA and ETS BRT is the soft cap on price. In the case of ETS BRT, it is 45 euros per ton and will release an additional 20 million allowances to the market. In the short to medium term, this should result in price stabilization. The study goes on to assume that ETS BRT allowances will converge in price to 45 euros, but will not reach this price.

It should be emphasized that the issue of the presence of price bubbles on emission allowances is not settled definitively. The issue of speculation began to be raised by the Polish gover-

10 https://www.europarl.europa.eu/legislative-train/package-fit-for-55/file-revision-of-the-eu-emission-trading-system-(ets).

11 Earlier, in June 2022, the EC indicated that €72 billion in central funding would have to be backed by at least an equivalent amount from member states.

12 https://www.europarl.europa.eu/news/en/press-room/20221212IPR64528/deal-on-establishing-the-social-climate-fund-to-support-the-energy-transition.

13 https://www.europarl.europa.eu/RegData/etudes/ATAG/2022/729460/EPRS_ATA(2022)729460_EN.pdf

14 Lachowicz, op. cit.

nment in official negotiations with the EC from October 2021. The argument gained support from other countries as well[15]. In response, the Commission has asked ESMA (European Securities and Markets Authority) to investigate whether speculation is occurring on EU allowances.

ESMA presented its preliminary results in November 2021 and did not see speculation. The European supervisor said that economic and political factors were behind the price increase, and that the surge in the number of investors was not evidence of speculation[16]. In its final report[17], which was released in March 2022, ESMA reiterated its position and stressed that long positions are mainly held by installations, which thus hedge against price increases[18]. However, the supervisor estimated that the fact that half of the short positions are held by investors, most of whom are based in Germany or the U.S., could cause concern.

A comprehensive thread on speculation on EU allowances is worth commenting on the current market situation. Recent tests of the explosiveness of the time series[19] were performed by the author at the end of 2022[20] for scientific publications[21].

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They indicate that the situation is unstable and bubbles can be still formed. Admittedly, in 2022 EUAs did not reach the ceiling of 100 euros, giving hope for relative stabilization in the range of 80-90 euros, the above-mentioned limit has now (March 2023) been exceeded. This leads us to conclude that, after a temporary reduction in activity, the activity of EUA market players has caused the reappearance of a price bubble. In March we saw another sharp drop in the price of allowances, by about €10, to around €90 per ton. The reason for the sell-off may have been the bankruptcy of the US Silicon Valley Bank. Such sharp price fluctuations, which are not uncommon for EUAs, give additional evidence to support the speculation hypothesis.

In conclusion, for the time being, all the details of ETS 2's structure are not known. However, its developers declare that it is intended to be similar to its predecessor. In view of the above, the possibility of price bubbles forming on the prices of new allowances (BRT ETS2) cannot be excluded, as is the case with EUA allowances in the old ETS. However, this study assumes that the soft cap of 45 euros per ton will prove effective, making the ETS BRT price not exceed this level.

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15 Romania and Spain, among others

16 For individual investors, the barriers to entry are practically non-existent (it is enough to open an account with an institutional intermediary). Institutional investors must obtain the appropriate permits, but the whole procedure is not a problem for a properly managed financial sector company. In market terms, the increase in the number of investors can be explained by the attractiveness of EUA allowances as an investment, i.e. being an opportunity to make a profit.

17 https://www.esma.europa.eu/sites/default/files/library/esma70-445-38_final_report_on_emission_allowances_and_associated_derivatives.pdf.

18 So-called hedging. Along with arbitrage (searching for earnings in price differences of the same product in different markets) and speculation, it is one of the three main types of activity on stock exchanges.

19 One way of studying the presence of price bubbles. It consists in checking whether price growth in a given period is within statistical norms (quite wide). It can be used when it is not possible to use traditional valuation methods that examine the stock price and future expected cash flows. EUA allowances are a commodity instrument, so classical methods cannot be used.

20 Scope of the study: January 2015-November 2022.

21 The article was accepted for publication in the journal Law and Climate for Q1 2023 with no remarks from the reviewers.

Threats arising from the implementation of ETS 2

- The extension of the ETS to buildings and transportation will significantly burden Polish households. A statistical household will incur annual costs of up to PLN 1560.
- If the soft cap of 45 euros does not stop the rise in ETS BRT allowance prices, then they could rise even to the level of EUA allowance prices, estimated on the basis of available sources at around 200 euros in current prices.
- If this is the case, the cost of ETS 2 to the average household will exceed 7,000 per year.
- Realistically, the costs incurred by households heating their own homes and using cars will be higher. This is because some households, included in the average use district heating. Others do not own a car. For an example family using 3.5 tons of coal and 2 tons of diesel fuel annually, the cost of ETS 2 will be about PLN 2,500.
- On a national scale, the cost of covering households under the ETS 2 could be up to 21 billion zlotys a year if the soft cap works. If not, then the cost could rise to as much as PLN 96 billion per year.

From the point of view of the time horizon of the analysis, which extends to 2030, it will be valuable to provide at least an indicative forecast of the price of emission allowances, both EUA ETS and BRT ETS2. In econometric forecasting, a forecast 6-7 years ahead is a relatively long-term forecast, as it requires presenting a trajectory of change for 24-28 periods[22]. In such a horizon, something may happen that no model can predict - such as the development of a breakthrough technology. Finally, even with absolute stability in the environment, predicting in a bubble environment is *de facto* impossible. For this reason, the estimates

[22] Most econometric models use quarterly frequency data. We do encounter also models based on monthly data (e.g., the new macromodels of Professor A. Welfe's team). In the latter case, a 7-year horizon requires a forecast 84 periods ahead.

presented below should be treated as indicative. This report does not attempt to predict the actions of players in the EUA ETS and the as yet unconstructed BRT ETS 2 markets. It works as a signal for potential risks.

Awareness of the existence of these will help prepare the economy for the changes being introduced. As noted above, the EU solution is not necessarily in Poland's best interest. It is downright irrational to expect the other 26 EU countries to put Poland at the top of their priorities. The implementation of any regulatory change resulting from the implementation of the Community's climate policy should be carried out thoughtfully. Such changes are often a far-reaching interference in the lives of its inhabitants. Preparation of an appropriate strategy for proceeding, updated by the current results of the negotiators' work, is essential. In this way, the Polish economy and society will avoid shock change, and the negative aspect of its impact on living standards and economic development, can be mitigated. Of course, where possible, negotiations should be undertaken.

During negotiations Poland should oppose most of the solutions and seek to get as much as possible in exchange for a more lenient position.

The EU allowance price forecast was made in 2021 by the Polish Economic Institute (PEI)[23]. In retrospect, however, it can be considered that the authors were taken by surprise by the rate of allowance price growth. In the scenarios presented, they amounted, in 2015 firm prices[24]:

- baseline, 55 euro;
- current, 80 euro;
- moderate 109 euro;
- high, 170 euro.

The National Center for Balancing and Emissions Management has also attempted to predict the situation in the EUA market. In its October 2021 report, it quotes the Vertis forecast. This one, in both cases, assumes exceeding the 100 euro limit. In the bullish scenario, it assumes an EUA price of 170 euros, while in the bearish scenario, it assumes 120 euros, giving an average of about 145 euros for both scenarios[25].

Since the two forecasts cited above were made in a similar time, it can be assumed that the "current" PEI scenario corresponds to the bearish Vertis scenario, the "high" scenario is close to the bullish scenario, and the "moderate" scenario should be regarded as the so-called baseline, close to the average of the two Vertis scenarios.

THE SITUATION IN THE EUA MARKET IN 2022 AND EARLY 2023 INDICATES THAT INVESTORS HAVE TAKEN A NEW INTEREST IN ALLOWANCES IN THE EUA MARKET.

However, the rate of allowance price increases clearly surprised analysts. EUA allowances cost around €90 at the end of 2022. When discounted by a measure of HICP26 inflation[26], this results in about 59.35 euros at 2015 prices. This means that the level of the baseline scenario projected for 2030, EUA prices have already reached. The situation in the EUA market in 2022 and early 2023 indicates that investors have taken a new interest in allowances in the EUA market. Earlier fluctuations may have been due to uncertainty over the course of the Russian-Ukrainian conflict and ESMA's interest in the matter.

However, an accurate comparison of forecasts is difficult. PEI analysts do not provide a me-

23 Maj, M., Rabiega, W., Szpor, A., Cabras, S., Marcu, A., Fazekas, D. (2021), *Impact on Households of the Inclusion of Transport and Residential Buildings in the EU ETS*, Polish Economic Institute, Warsaw.

24 The authors did not state which measure of inflation they use as a benchmark. There is also no information about at least the class of econometric models they used for their forecasts.

25 Bullish and bearish scenarios - the first assumes that investors will play more strongly for growth, and the second assumes that they will be less determined (from stock market bulls and bears).

26 According to Eurostat, data for the entire EU.

asure of inflation used or assumptions about its growth. The author's forecast of inflation over a seven-year horizon, given the current geopolitical conditions, is subject to considerable risk of error. However, one can be assisted by projections from the European Commission, for instance. The ones for the EU amount to 7 percent in 2023 and 3 percent in 2024[27]. The ECB's trajectory for the eurozone assumes that inflation will begin to come back to its target of 2 percent starting in 2025[28]. Thus, if we assume the EC's forecast for 2023 and 2024, and a firm 2% per year over the 2025-2030 period, then the **scenarios given by PEI correspond to levels of 103, 150, 205 and 320 euros in 2030**. Since EU allowances are already above €100 (March 2023), and prices at the end of 2022 amounted to more than €110 in 2030 prices, it can be noted that the current and moderate scenarios from the PEI forecast and the intermediate scenario from the Vertias forecasts can be considered

In the estimation that is being prepared, it is not only the assumptions regarding the growth trend in the price of emission allowances that are a subject for discussion. The cited PEI report assumes, for example, that replacing a part of the passenger cars with electric cars in 2030 will result in a reduction in emissions of about ¼ compared to 2005. WEI's approximate estimation from 2021, however, indicates that even replacing 75 percent of the passenger cars with BEVs (translator's note: battery electric vehicles) will not result in a reduction in CO_2 emissions[29].

The number of people in a household is most likely to change over the coming years. It currently amounts to 2.61[30], and is influenced by two groups of factors:

- **Demographic issues, such as fertility and mortality rates.** In Poland, the fertility rate is 1.38. To ensure replacement of generations, it would have to reach 2.1. In 2022, about 300,000 children were born, while almost 450,000 Poles died. This means that in just one year population of a city in the size of Opole disappeared from the map of Poland. If the trend were to continue through 2030, Poles will have declined by 1.2 million, which is roughly Kraków and Poznań together. The GSO's latest census also shows that in the last decade, Poland's population has declined by more than a million. The outlook is therefore not optimistic;
- **Net migration rate.** In 2022, after the outbreak of full-scale war in Ukraine, about

27 https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6782.
28 https://www.ecb.europa.eu/pub/projections/html/ecb.projections202212_eurosystemstaff~6c1855c75b.en.html#toc7.
29 Especially when taking into account transmission and charging losses. Transformation track according to the State Energy Policy 2040. Currently, this strategy has become outdated, however, the government has not yet published new proposals.
30 Data from the General Statistics Office's (GSO) Local Data Bank for 2020.

3 million Ukrainians, mostly children and women, came to Poland. Due to the mobilization, many men have returned to their homeland. Some of these migrants will be interested in staying permanently in Poland.

In 2016 the GSO made a forecast of the number of people per household. The prediction for 2020 worked out quite well. However, it was prepared before the pandemic and the war. This study, however, does not attempt to correct it for the aforementioned factors. The main reason is time constraints and the scope of the report[31]. This report therefore assumes an average number of people per household of 2.40 in 2030.

The level of energy consumption in households is reported by the GSO[32]. These data need to be added to the emission factors of individual energy carriers[33] and the emissivity in the power industry[34], reported by the National Center for Balancing and Emissions Management. Finally, for the purpose of conversion, the approximate emissivity of motor fuels per terajoule[35]. is needed. On this basis, the CO_2 emission factors per household presented in Table 1 were obtained. The data assume 13.6 million households in Poland (GSO). The following carriers are not included in ETS 2: electricity, district heat, district hot water, lignite and coke. No attempt is made to estimate the number of households in 2030.

31 Projection of demographic issues requires fairly complex actuarial models. The demographic component is often overlooked even in economy-wide models of medium-to-large size.
32 Domestic energy consumption.
33 https://www.kobize.pl/uploads/materialy/materialy_do_pobrania/monitorowanie_raportowanie_weryfikacja_emisji_w_eu_ets/WO_i_WE_do_monitorowania-ETS-2021.pdf.
34 https://kobize.pl/uploads/materialy/materialy_do_pobrania/wskazniki_emisyjnosci/Wskazniki_emisyjnosci_grudzien_2019.pdf oraz raport dotyczący emisyjności dla małych kotłów wykorzystywanych przez gospodarstwa domowe https://krajowabaza.kobize.pl/docs/MATERIAL_wskazniki_male_kotly_2020.pdf.
35 https://www.ipcc-nggip.iges.or.jp/public/gl/guidelin/ch1wb1.pdf oraz konwersje jednostek ze strony hextobinary.com.

Table 1. CO_2 emissions per household in Poland in 2020.

Energy carrier	TJ	Indicative CO_2 emission factors, kg per GJ	CO_2 emissions, tons, in total	Emissions per household, kg
Natural gas	147 200	57,65	8 486 081	623,98
Liquid gas for domestic purposes	22 026	57,65	1 269 807	93,37
Heating oil	3 407	72,50	246 981	18,16
Hard coal	389 591	113,00	44 023 742	3 237,04
Firewood	222 716	101,00	22 494 271	1 653,99
Other types of biomass	14 955	115,00	1 719 838	126,46
Gasoline	178 723	65,00	11 616 976	854,19
LPG	54 217	57,65	3 125 606	229,82
Diesel fuel	148 297	72,50	10 751 506	790,55
Heat in total	799 894		78 240 721	5 753
Transport in total	381 236		25 494 088	1 875
Total in ETS 2	1 181 130		103 734 809	7 628

Source: own elaboration

The emissions shown in Table 1 focus on households. For example, rates suitable for small central heating boilers are given. The data does not include grid electricity, grid heat and grid hot water. Averaged emissions are presented. Households differ in their consumption of energy carriers. An urban household connected to central heating and mains water will not directly consume fuel for heating purposes. These households bear the cost of the EU ETS in the tariffs at which they buy heat from the supplier. Finally, consumption per household is not the same as per capita consumption. The study assumes 2.61 persons per household for now and 2.40 in 2030.

The above estimate shows that currently, the extension of the EU ETS to residential buildings and transportation would result in the purchase of additional emission allowances for about 7.6 tons of CO_2 per household. In total, more than 100 million tons of CO_2 would be covered by ETS 2 nationwide. At the same time, the carbon intensity of our power and heating industry results in a statistical Polish household incurring emission costs of about 5.1 tons of CO_2, which results in roughly 70 million tons nationwide. However, the costs of the emission allowances needed to generate electricity and heat from the grid are hidden into the tariffs at which households buy electricity, heat and hot water from the grid.

To estimate the cost of ETS 2, the report assumes that ETS BRT allowance prices will be €45, as the EC intends. However, it is possible that these allowances will also become the target of speculators. Then the price of the ETS BRT allowance could reach a level comparable to that of the EUA allowance. Calculations for such an event, are also shown in Table 2. In addition, the euro exchange rate is assumed to be PLN 4.5. An attempt to model the exchange rate in the horizon to 2030 has not been made.

Tabela 2. Cost of EU ETS reform presented in FF55 on Polish households, moderate scenario

A variable in the scenario	2030
ETS BRT price in ETS 2, euros	45
EUA price in ETS	205
Emissions per farm, tons	12,90
Emissions per farm in ETS 2	7,70
ETS 2 cost per farm, euros	346,48
ETS 2 cost per farm, euros, no soft cap	1 578,41
ETS 2 cost per farm PLN	**1 559,17**
ETS 2 cost per farm, no soft cap, PLN	**7 102,86**
Total cost of ETS 2 in the economy, billion euros, soft cap	4,71
Total cost of ETS 2 in the economy, billion euros, no soft cap	21,47
Total cost of ETS 2 in the economy, billion zl, soft cap	**21,20**
Total cost of ETS 2 in the economy, zloty billion, no soft cap	**96,60**

Source: own elaboration

Uncertain return of funds. Will the CSF end up like the NRRP?

- Increased spending on heat and transportation means less money that can be spent on other goods, whether basic (food) or higher-level, such as culture and leisure activities.
- The Climate Social Fund will not compensate entirely for these expenses, as the cost of ETS 2 to Polish households will exceed the funds we can get from it.
- Obtaining the funds is uncertain. The spending plan must be approved by the European Commission. The NRRP case shows that this can prove to be difficult.
- To prepare Poland for ETS 2 implementation, it is worth taking the following steps:
  - Be more assertive in the negotiations conducted by the Polish government with Brussels.
  - Lobby the Warsaw Stock Exchange to become one of the leading trading floors for new ETS BRT allowances.
  - Implement a pilot program efficiently, with the inclusion of commercial buildings and commercial transportation in ETS 2.
  - Fight for money from the Climate Social Fund.
  - (Optionally, conditionally) introduce a national tax so as to exempt itself from ETS 2 by 2030.

The calculation shows that Polish households will bear further costs of EU climate policy in 2030. If we assume the optimistic variant, in which the price of 45 euros per allowance will actually restrain further increases in their price, then the average Polish household will pay about PLN 1,500 per year for them. However, let's remember that the level of 45 euros is only a soft cap. Reaching it for two months in a row will only release an additional pool of allowances to the market. Its immediate consequence will, of course, be

a price drop. However, if investors prove enough determined and have the means, then they are able to continue the pressure and drive the price up further, above the €45 level. In that case, the report assumes that the price of ETS 2 allowances will follow a similar pattern to the price of EUA allowances in the ETS. Then, the cost that a statistical Polish household will be forced to bear will exceed PLN 7,000.

It should be remembered that the calculations in Tables 1 and 2 are for a "statistical" household, i.e. they are values averaged over the whole of Poland. In practice, some households pay less, others more. A household located in the center of a large city uses district heating. Those living in such a household also do not need to have a car, as they can travel by public transportation. New buildings are also better insulated and more energy efficient. A less affluent household in a rural area, for example, **using 3.5 tons of coal and 2 tons of diesel fuel per year, will have to spend not 1,500 zlotys, but about 2,500 zlotys on ETS BRT**.

THE COST THAT A STATISTICAL POLISH HOUSEHOLD WILL BE FORCED TO BEAR WILL EXCEED PLN 7,000.

For poorer households, such expenses are unacceptable. In 2020, the subsistence minimum[36] was, depending on the type of household, between PLN 530 and PLN 640 per month, or PLN 6,360- 7,680 per year. Under this threshold in 2020 were 5.2 percent of all households[37]. Even if one assumes that disposable income in this group will increase by 100 percent in the decade 2020-2030, i.e. faster than the estimated average growth, it will be at the level of PLN 13,000-15,000 per year in 2030. **For such a household, the cost of ETS 2 will be about 18 percent of disposable income**, in an optimistic scenario in which ETS BRT stops at 45 euros. Such households typically do not have the savings to incur the one-time expense of insulating the house or purchasing the heating methods recommended by the EC. For example, the cost of a heat pump for a medium-sized house of 120-150 sqm exceeds 40 thousand zlotys. Even if part of this amount is reimbursed in the form of subsidies, the entire investment is well beyond the capabilities of less affluent households living in single-family buildings. Due to traffic exclusion, i.e. the limited number of available public transport connections, giving up the car is usually impossible. In turn, electromobility is not, at least for the time being, the optimal solution for residents of smaller towns due to technical limitations and the price of electric cars. **If the 45-euro limit is exceeded, such a household may have to spend half of its income on ETS BRT allowances alone.**

To compensate for the negative social impact of climate policies, the European Commission is proposing to introduce a shield mechanism in the form of a Social Climate Fund. **However, it is made so that any spending financed from it must be approved by the EC. The experience with the NRRP shows that Poland may have a hard time getting such approvals, and even reasonable projects may be deliberately delayed.** Moreover, it is likely that with the Fund's current structure, funds will be transferred from the middle class to the poorest households. The positive effects of such flows will be limited, as this will erode the middle class.

Climate policy and emissions trading schemes, both ETS and ETS 2, affect key economic sectors such as power generation and transportation. Increases in the cost of heating, electricity or fuel are most often directly passed on by companies to customers (otherwise they would have to deplete their margins). This causes the cost of components and final goods to rise, resulting in a price spiral. For this reason, it can be expected

[36] Estimated annually by the Institute of Labor and Social Affairs, defined as "a low alarming level of satisfaction of needs, below which there is a biological threat to life and psychophysical development of a person." The minimum is the extreme poverty line as defined by the GSO.

[37] https://stat.gov.pl/files/gfx/portalinformacyjny/pl/defaultaktualnosci/5487/14/8/1/zasieg_ubostwa_ekonomicznego_w_polsce_w_2020_roku.pdf.

that the final impact on households, which these households will experience, for example, in rising food or drug prices, will be much higher than the direct costs of the EU ETS. This will make the disposable income left for households to spend on, for example, education or culture, almost imperceptible.

Even if the EU's climate policy did not affect the economy through a series of backloops, the continuing pauperization of Polish households could still be expected. For example, food expenditures, for example, have been growing in a basically linear manner[38], while the pace of household income growth has been declining over time. Therefore, it can be considered that in 2030-2040 households will spend proportionally more on necessities such as food or medicine than in 2020. Combined with climate policy prices, this means a much smaller pool of disposable income for expenses such as education, culture and entertainment, or even clothing. Already now (2020), Polish households spend proportionally much less on food, for example, than the Netherlands or Germany (17.9 percent vs. 12.8 percent and 12 percent, respectively)[39]. Spending on culture and recreation is also lower by about 5 percentage points. Although spending on education is similar in percentage terms, due to much lower disposable income, it is not quantitatively comparable. At the same time, it should be emphasized that in Germany, for example, the minimum subsistence amount is more than 9 thousand euros, i.e. at the current exchange rate, more than 45 thousand zlotys (about 3,750 zlotys per month). This amount is six times higher than in Poland and about PLN 1,000 less than the Polish median earnings. **This means that already, according to the German definition, several dozen percent of Polish households are below the poverty threshold.**

38 R2 at 93 percent.

39 According to Eurostat: https://ec.europa.eu/eurostat/databrowser/view/NAMA_10_CO3_P3 custom_2231339/default/table?lang=en.

Some economists defend climate policy, noting that the price of electricity is no longer as important in location decisions as its degree of pollution. Supporters of this theory need to be reminded of a few facts. The role of a stable supply of quality electricity is fairly well described in the research literature. Harvard Business School uses Intel's plant in Costa Rica as an example, precisely describing the various elements of the decision-making process that led to locating production there. The impact that electricity prices have on the economy is recognized by the European Commission itself. The escape of energy-intensive industries from the Community to places where energy is cheaper is called "carbon leakage." It is this that the Carbon Border Adjustment Mechanism (CBAM) is designed to counteract. If the price of electricity were less important than its " cleanliness," then CBAM would be completely unnecessary, and "carbon leakage" would not exist. After all, every company would locate production where the energy is the cleanest, without looking at the price. Nor would anyone risk restricting the flow of goods by introducing CBAM and risk retaliatory tariffs from the economies of the Americas or Asia. Of course, the ESG standards being introduced within the EU mention "carbon passports" and the carbon performance of products, but it's hard to say at this point whether these rules actually reflect the real expectations of the Community's societies, or are just another idea of the pro-climate faction of politicians. It should be remembered that the EU, while wealthy and populous, is neither the world's largest nor most prosperous market.

"Clean" energy itself is a rather illusory concept. The power installed in RES should be balanced almost one-to-one with conventional sources. RES power production itself is particular. In the case of wind, there are periods of the calm (translator's note: no wind) across the continent. Photovoltaics, on the other hand, generate the most RES during the day, less in the mornings and evenings, and zero at night. The system can and must be balanced with energy storage, which in current technological realities means building pumped storage power plants. Small nuclear reactor technology is only being tested. And industry, especially highly developed one, needs a stable energy supply. A fifteen-minute power outage for a household is inconvenient, but manageable. In a factory, on the other hand, it can mean having to throw away an entire batch of goods. Industry, on the other hand, clearly gives strength to the economy, providing jobs and being the engine for the development of numerous related industries.

With the above issues in mind, the following measures can be proposed, so as to prepare Poland for the changes:

- **More assertive attitude in negotiations**

One should stop being afraid of negative opinions or angry comments in the press. Polish negotiators should first and foremost defend Poland's interests. Partners from Brussels, Berlin, Paris, Madrid or Prague do not always have to like us, or even not like us at all. However, an assertive, patriotic stance will be respected by patriots from other countries. Moreover, because we like similar people, an assertive negotiator from Brussels may privately like an assertive negotiator from Warsaw very much, even though clashes may be fierce at the tables. In a spirit of mutual respect, agreement is even easier to reach.

- **Lobbying the Warsaw Stock Exchange**

ETS BRT allowances will have to be traded somewhere. Since there is no free allocation, it is logical that transactions will be made on platforms dedicated to trading financial instruments. Before Brexit, industrial EU allowances were traded in Leipzig and in London. ETS BRT allowances should also be traded on two trading floors. Given the past, a natural candidate for one of the venues is Leipzig. The other venue should be Warsaw. All the forces of Polish diplomacy should be used for this, and the area of the Trimarium should be convinced about this idea as well. This should not be particularly difficult, as the WSE is one of the largest stock exchanges in the region.

- **Wise implementation of pilot program covering buildings and commercial transport**

By the time ETS 2 covers residential buildings and private transportation, it will have already been introduced in the commercial sector in 2024. This time should be used to prepare Poland for the changes. Numerous examples (e.g., the Deposit Law) show that Poland does not always handle the implementation of EU requirements smoothly. In the case of ETS 2, we still have a few years before it directly affects the ordinary citizen.

- **Fighting for money from the Climate Social Fund**

The Climate Social Fund is needed to ease the costs of climate policy for poorer households. Its scale is not enough to cover the entire cost of the EU ETS. Transfers from it are likely to come at the expense of the middle class (the richest can afford EU solutions, the poorest will receive most from the CSF). Regardless of its flaws, the CSF should be fought for. Acceptance of the national spending plan may prove to be a problem. The European Commission must approve it, before the money flows. Here, every possible argument and means should be used in negotiations with Brussels, including the veto of initiatives important to the EC. Even if it turned out that we would lose the NRRP, we cannot afford to lose money from this fund.

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