GO$_2$50

CLIMATE | SOCIETY | ECONOMY

NO.05/2024
ISSN 2720-5320

CAKE

KOBiZE

GO$_2$50

CLIMATE | SOCIETY | ECONOMY

Copyright ©2024 Institute of Environmental Protection – National Research Institute (IOŚ-PIB).
All rights reserved.

The present document may be used, copied or distributed, in whole or in part, exclusively for noncommercial purposes and subject to copyright, in particular, with an indication of the source of its origin.

Prosimy o przesyłanie uwag, pytań lub komentarzy do dokumentu na adres: **cake@kobize.pl**

Disclaimer: The findings, interpretations, and conclusions expressed in this document are those of the authors, and not necessarily of the organization with which the authors are affiliated. This document is distributed in the hope that it will be useful, but the IOŚ-PIB shall not be held liable for any damage caused as a consequence of the use of its content.

In order to directly receive issues of the **"GO2'50"** publication and the **"Report on the Carbon Market"** we encourage you to sign up for our **NEWSLETTER**.

National Centre for Emissions Management
Institute of Environmental Protection
National Research Institute

Centre for Clim
and Energy An

Publisher:

Institute of Environmental Protection – National Research Institute (IOŚ-PIB)

National Centre for Emissions Management

Editorial:

Editor in Chief:
Robert Jeszke

Editorial Secretary:
Aneta Tylka

Address:

ul. Słowicza 32
02-170 Warszawa, Polska

www.kobize.pl
e-mail: cake@kobize.pl

Financed from the resources of the National Fund for Environmental Protection and Water Management

Funded by
NATIONAL FUND
FOR ENVIRONMENTAL PROTECTION
AND WATER MANAGEMENT

Team of Authors edited by Robert Jeszke:

Robert Jeszke
Deputy Director of IOŚ-PIB, Head of the National Centre for Emissions Management, KOBiZE and Centre for Climate and Energy Analyses, CAKE

Maciej Pyrka
Head of the Strategy, Analysis and Auction Unit and the Centre for Climate and Energy Analyses (CAKE) / KOBIZE

Igor Tatarewicz
Deputy Head of the Strategy, Analysis and Auction Unit, Centre for Climate and Energy Analyses (CAKE) / KOBiZE

Sebastian Lizak
Strategy, Analysis and Auction Unit, Centre for Climate and Energy Analyses (CAKE) / KOBiZE

Michał Lewarski
Strategy, Analysis and Auction Unit, Centre for Climate and Energy Analyses (CAKE) / KOBiZE

Jan Witajewski-Baltvilks
Strategy, Analysis and Auction Unit, Centre for Climate and Energy Analyses (CAKE) / KOBiZE

Marta Rosłaniec
Strategy, Analysis and Auction Unit, Centre for Climate and Energy Analyses (CAKE) / KOBiZE

Wojciech Rabiega
Centre for Climate and Energy Analyses (CAKE) / KOBiZE

Szymon Wójcik
Centre for Climate and Energy Analyses (CAKE) / KOBiZE

Sławomir Skwierz
Vice President of the Management Board, Energy Market Agency S.A., Centre for Climate and Energy Analyses (CAKE) / KOBiZE

Piotr Lipka
Emissions Allowances Allocation Unit, KOBiZE

Izabela Zborowska
Deputy Head of Climate Policy Instruments Unit, KOBiZE

Anna Serzysko
Climate Policy Instruments Unit, KOBiZE

Piotr Świat
Legal Unit, KOBIZE

Sylwia Kryłowicz
Deputy Head of the Emissions Allowances Allocation Unit, KOBiZE

Przemysław Chrzan
Emissions Allowances Allocation Unit, KOBiZE

Tomasz Majchrzak
Head of the Emissions Allowances Allocation Unit, KOBiZEPiotr Lipka, Zespół Rozdziału Uprawnień, KOBIZE

Małgorzata Nowakowska
Emissions Allowances Allocation Unit, KOBiZE

Katarzyna Mazanek
Strategy, Analysis and Auction Unit, Centre for Climate and Energy Analyses (CAKE) / KOBiZE

Grzegorz Gmyrek
Strategy, Analysis and Auction Unit, Centre for Climate and Energy Analyses (CAKE) / KOBiZE

Adam Wąs
Warsaw University of Life Sciences (SGGW), CAKE

Piotr Sulewski
Warsaw University of Life Sciences (SGGW)

Izabela Lewarska
Strategy, Analysis and Auction Unit, Centre for Climate and Energy Analyses (CAKE) / KOBiZE

List of Contents

Foreword 6

1. CO_2 market in the EU ETS: outlook and EUA price projection for 2025 7

2. What do we know about the Carbon Border Adjustment Mechanism (CBAM) after one year of its operation? 17

3. Challenges of transformation in district heating sector 27

4. Free allocation rules for installations in the Emissions Trading System 39

5. Rules for participation of shipping companies in the EU ETS system 56

6. Everything you'd like to know about ETS2 but don't know how to ask. 68

7. ETS2: Opportunities and Challenges for Poland in the Context of Energy Transition and EU Climate Goals. 83

8. CO_2 Emission Costs in Transport and Buildings Under ETS2 in Poland Until 2050 93

9. Economic impact of the European Commission's proposed 2040 GHG emission reduction target 109

10. Organic farming – a solution to the Planet's problems or a dead end in development? 119

11. Challanges of the Ukraine's integration into EU ETS. 129

12. The role of transparency in the implementation of the Paris Agreement 141

Foreword

While we sometimes forget it, there is no doubt that the impacts of global warming, and therefore climate policy, touch all sectors of the economy and many areas of our lives. A similarly multidimensional tone characterises the latest, fifth edition of our publication, which we are delighted to share with you.

Looking ahead, we recommend an article that outlines the prospects and projections for the EU ETS market in 2025, and introduce you to the meanderings of the Carbon Border Adjustment Mechanism (CBAM) in an article that evaluates it after one year of operation.

A significant area where the energy transition is proving to be anything but straightforward is district heating. This is particularly relevant in countries such as Poland. The authors of the next article look at this issue and outline the possible paths of change in this sector and the eventual consequences.

Much of this issue is devoted to the European Union's rapidly evolving climate and energy policy, demonstrating how it is becoming increasingly complex. Amendments are being made to mechanisms that have been in place for some time, as well as to those currently being implemented or planned. We recommend an article authored by KOBiZE experts explaining the new rules for free allocation in the EU ETS, as well as the one describing the monitoring, reporting and verification obligations for maritime transport, which has been included in this system.

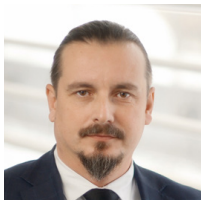
In the context of the new EU climate policy solutions that are currently being implemented or will be implemented in the near future, we recommend articles on the new Emissions Trading Scheme for Buildings and Road Transport (ETS2) – both an article explaining the principles of its operation and an analysis of the opportunities and challenges it creates for Poland in the context of the energy transition.

The challenges that climate policy poses are also faced by the agricultural sector, which has to meet the growing demand for food while at the same time reducing its negative impact on the climate and the environment. This makes it all the more important to analyse and evaluate, often critically, the solutions proposed and implemented, as the authors of the following article discuss and ask whether organic farming is the right direction to take.

As we follow the development of the EU's climate policy, we need to look at its wider implications, as discussed in the article on the economic consequences of the European Commission's proposed 2040 GHG emission reduction target. The current political debate – also in time for the Poland-led Presidency in the first half of 2025 – focuses on the impact of future decisions on the competitiveness of European markets and costs for consumers.

Since climate change is a global issue and international negotiations have their own dynamics, we recommend a article on the role of transparency in the implementation of the Paris Agreement, as well as the one on the extension of the scope and impact of the Community's climate policy illustrated by the integration of measures implemented in Ukraine into those operating in the European Union.

Enjoy reading!



Robert Jeszke
Deputy Director of IOŚ-PIB, Head of the National Centre for Emissions Management, KOBiZE and Centre for Climate and Energy Analyses, CAKE

CO_2 market in the EU ETS: outlook and EUA price projection for 2025

Authors:

Sebastian Lizak, Strategy, Analysis and Auction Unit, KOBIZE/CAKE

Michał Lewarski, Strategy, Analysis and Auction Unit, KOBIZE/CAKE

CO_2 market in the EU ETS: outlook and EUA price projection for 2025

Key words: EUA price, "Fit for 55" package, EU ETS, MSR, supply, demand, emission, CO_2 market

Author:
Sebastian Lizak

Author:
Michał Lewarski

Abstract

The aim of this article is to identify the technical (chart and indicator analysis) and fundamental (supply and demand in the European CO_2 market) factors that will potentially influence EUA prices in 2025. The first part of the article uses technical chart analysis to identify the current trend in the EUA market and the key technical factors that have driven it. In addition, a potential scenario for EUA prices in the 2025 outlook[1] is presented. An upside scenario is based on a potential reversal of the current downward correction, while a downside scenario is based on a retest of the price lows at the levels identified by the technical analysis. The article also outlines the technical conditions that need to be met for either scenario to materialise. The second part of the article identifies potential supply and demand factors in the EU ETS that may influence the behaviour of EUA prices in 2025. Supply factors may include those that determine the volume of allowances offered on the EU ETS primary and secondary markets. The demand for allowances, on the other hand, will be determined by the volume of emissions and the future behaviour of EU ETS participants (compliance operators and financial institutions) depending on their current emissions and hedging needs. The third section presents three projections of EUA prices for 2025 by three analysts (CAKE/KOBiZE, BNEF and Veyt, which take into account both supply and demand factors).

1 This article contains price projections which are solely the opinion of the authors and are provided for information purposes only. These forecasts are based on available data and current market trends, but it should be remembered that the market is volatile and future events may affect the results in unpredictable ways. In accordance with Article 69 of the Law of 29 July 2005 on trading in financial instruments, the information published does not constitute investment advice or a recommendation within the meaning of the law. The authors are not liable for any investment decisions taken on the basis of the forecasts presented.

Analysis of EUA prices using graphs and indicators

Is the EUA's market currently in an uptrend (bullish) or a downtrend (bearish)? It is difficult to answer this question unequivocally because, as can be seen in Figure 1, two uptrend lines can be drawn. The first, labelled "*bullish uptrend line 1*", was drawn after the lows of March and October 2020 and February 2024, while the faster second line ("*bullish uptrend line 2*") is steeper and was drawn after the lows of October 2020, September 2022 and May 2023. If we were to assume that the EUA's were still in an uptrend, then the "*bullish uptrend line 1*" would apply and the "*bearish downtrend line*" shown in red would only be a correction in the uptrend. On the other hand, if we were to consider that "bullish uptrend line 2" is in effect, then the red "*bearish downtrend line*" would mean that the EUA's are currently in a downtrend.

> EUA prices from February 2020 to February 2023 rose dynamically from around €18 to €95 (more than 430%), which is the historically "all time high" EUA price on a monthly basis on the secondary spot market".

It can be seen that EUA prices from February 2020 to February 2023 rose dynamically from around €18 to €95 (more than 430%), which is the historically highest EUA price on a monthly basis[2] on the secondary spot market (the so-called "All Time High" – or "ATH" for short). However, since reaching the ATH, EUA prices have undergone a downward correction of more than 40%, with prices trading at lower and highs and lower lows. For example, in February 2024, this correction brought prices down to a local low of around €56 (on a monthly basis). In recent months, however, EUA prices have been consolidating around €65-75 in the front end, signalling a possible attempt to reverse the downward correction/trend. This is evidenced by a series of increasingly higher price bottoms and the breakout of the red *"bearish downtrend line"* on the monthly chart in mid-October (marked in yellow in Figure 1).

FIGURE 1. EUA FUTURES PRICE QUOTATIONS ON A MONTHLY INTERVAL WITH UPWARD/DOWNWARD AND SUPORT/RESISTANCE TREND LINES PLOTTED

Source: KOBiZE own compilation based on investing.com (accessed 20 January 2025).

The triangle technical pattern that has formed (Figure 1) suggests that there is a potential upside to the €95 area (ATH). The key, however, will be whether the EUA prices first breaks through the resistance line at €80, which the EUA's has now reached. A break of this zone would open the way for a rally to the historical ATH. Conversely, if this resistance (€80) is not broken, there is a risk of a downward correction to at least the first bullish line and the first major support at around €65.

2 Closing prices in the monthly interval are shown. Note that the closing prices in the monthly, weekly and daily intervals differ.

FIGURE 2. RANGE OF THE BREAKOUT FROM THE TRIANGLE FORMATION TO €95 IN THE WEEKLY INTERVAL

Source: KOBiZE own compilation based on investing.com (access 20 January 2025).

The RSI oscillator[3], which measures the relative strength of EUA prices, had been in a very long downtrend, as shown by the sharp downward resistance line on the weekly chart. It was not until the end of December 2024 that the downward resistance line was broken. This means that there may be an attempt to change the prevailing trend (down to up). The RSI currently stands at 65 points, very close to the market's overbought zone of 70 points. A significant break out of this level increases the risk of a downward correction. The second most important technical indicator, the MACD oscillator[4], which analyses the convergence/divergence of moving averages, is a strong indicator of a possible change in trend. On the weekly chart, we can see a breakout of the downward channel line, led by the tops of the intersecting moving averages. Significantly, the line of averages (shown in yellow) was crossed from below in November 2024, which is sometimes interpreted as a buy signal. A similar situation has occurred in the past, followed by a significant rebound in EUA prices. In

3 The RSI (Relative Strength Index) is measured on a scale of 0 to 100. The most common periods for which this indicator is calculated are 9, 14 and 21 days. The RSI measures the strength of upward movements in relation to downward movements. The signal is given when the indicator value enters or leaves an "oversold" or "overbought" level. It is assumed that a RSI value below 30 indicates an "oversold" market level and an RSI value above 70 indicates an "overbought" market level.

4 MACD (Moving Average Convergence Divergence) is one of the most commonly used indicators. This indicator is formed by calculating the difference between two exponential moving averages – usually the result of subtracting the 26-day exponential moving average from the 12-day exponential moving average. A buy signal is generated when the MACD crosses above the non-increasing signal line, and a sell signal is generated when the MACD crosses above the non-increasing signal line.

addition, the MACD histogram (vertical lines) was above the zero line, which is a very strong buy signal. The probability of a continuation of the recent price gains is therefore increasing.

FIGURE 3. TECHNICAL INDICATORS (RSI ON THE LEFT, MACD ON THE RIGHT) RELATING TO THE WEEKLY EUA PRICES.

Source: KOBiZE own compilation based on investing.com (accessed 17 January 2025).

Potential EUA price drivers in 2025

Demand

According to the latest European Commission data, EU ETS emissions were at the 1,096 Mt CO_2 eq level – 16,5% lower than in 2022. This is by far the largest annual emissions reduction in the EU ETS history. The largest emission reductions were achieved in the electricity sector – 24%, mainly due to a significant increase in wind and solar renewable electricity generation[5] and fuel switching from coal to less carbon-intensive gas. Energy-intensive industries, on the other hand, reduce emissions by 7,5% compared to 2022, due to production cuts and CO_2 efficiency increases. Such a sharp drop in emissions in 2023 means that only 14.3 p.p. of emission reductions are needed to meet the 62% EU ETS reduction target (a 47,6% reduction is achieved in 2023 vs. 2005). However, it is difficult to see how a reduction rate as high as 2023 can be maintained in the following years, i.e. 2024. Although no official emissions data has yet been published by the EC, some analysts are already publishing preliminary results. Veyt predicts that emissions from the energy sector will fall by as much as 15%, but this will be partly offset by an increase in industrial emissions of around 8,5%[6]. This means that EU ETS emissions are not expected to fall as dramatically in 2024 as it was in 2023 (if Veyt's forecasts are correct, EU ETS emissions could fall "only" by around 3-4%).

It should be remembered that 2023 was a specific year due to the economic stagnation in the EU

5 In 2023, RES energy was the main source of electricity in the EU, accounting for 44,7% of total electricity generation. At the same time, electricity generated from fossil fuels fell by 19,7% compared to 2022, accounting for 32,5% of total electricity generation.

6 Figures provided by Veyt at a webinar held on 16 January 2025 entitled *"Europe's carbon market in 2024. 'Europe's carbon market in 2024: prices down, volumes up".*

and the impact of the energy crisis. The weakness of the EU economy is to some extent reflected in the PMI (Purchasing Managers Index[7]), which has been falling steadily since the end of 2021 and was below the critical level of 50 points in August 2022. Since mid-2023, however, we have already seen an improvement in this indicator, which stabilises around 45-47 points. Is there a chance that it will recover and that European industry will improve? It seems that the current weakness in industry could be an argument for the European Central Bank to cut interest rates further (and perhaps stronger). Especially as they are still quite high at the moment. Lower interest rates should stimulate the European economy to increase production and emissions in the EU ETS. Higher emissions mean higher demand and higher EUA prices.

Lower interest rates should stimulate the European economy to increase production and emissions in the EU ETS. Higher emissions mean higher demand and higher prices for allowances.

The second argument for price increases is the unwavering correlation between EUA and TTF gas prices. Rising gas prices cause EUA prices to rise. Why does this happen? It is because more expensive gas (e.g. a reduction in RES generation due to windy winter weather) provides more incentive to buy cheaper and more carbon-intensive coal. The rise in TTF gas prices has been blamed, among other things, on the suspension of Russian gas transit through Ukraine to several EU member states. The cold winter and gas supply problems have led to a reduction in the level of EU gas storage (from 90% to around 70%). However, it is difficult to say whether the trend towards more expensive gas will continue in the wake of the US election. President-elect Donald Trump has announced that he will increase the production of energy resources (including gas) and their export to other countries. This could mean lower prices for this commodity in the EU and increased profitability for its use as fuel in the EU ETS. On the other hand, if global coal prices fall, the opposite is possible, i.e. a partial displacement of gas by coal (we saw such a phenomenon in the EU in 2024, especially in Germany[8]). Trump could influence the EUA price demand for another reason[9]. His policy of restricting imports by imposing tariffs on goods imported into the US could aggravate an already difficult situation for the European industry.

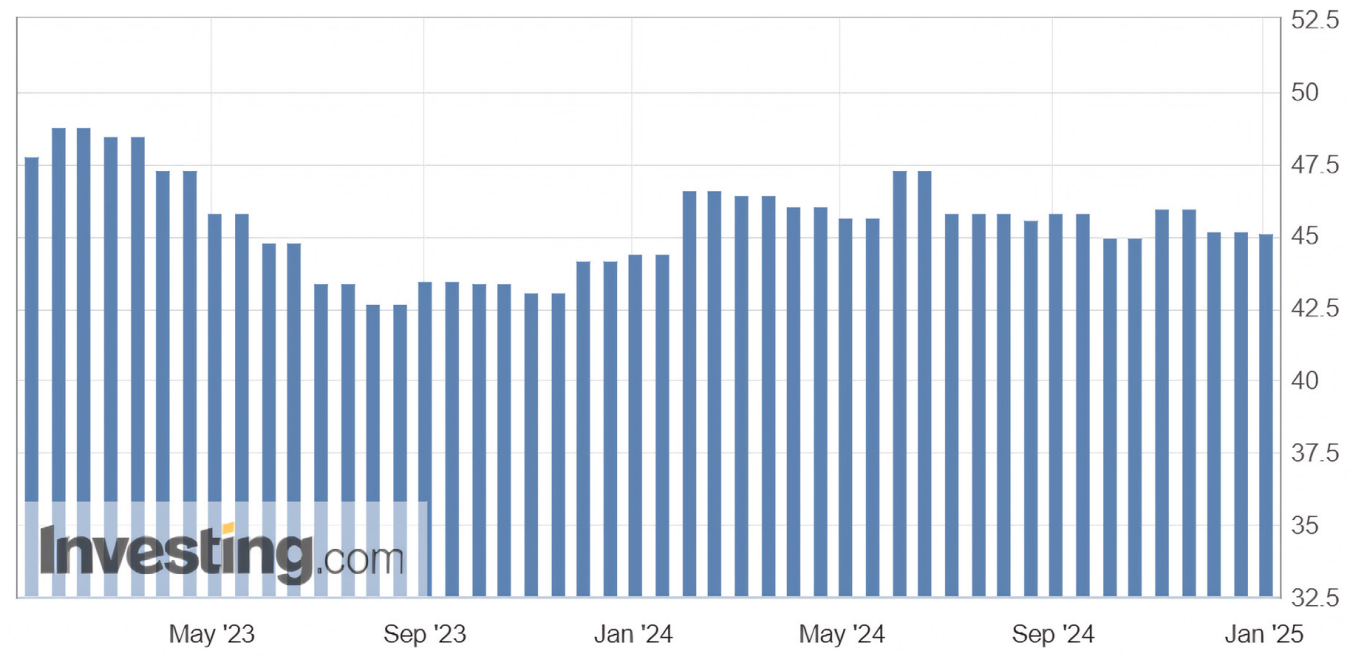
Supply

In 2024, the total number of auctioned EUA allowances was c.a. 600 million, some 90 million more than in 2023. This increase in supply is due, among other things, to:

- the addition to the pool of EUA's to be auctioned of volumes from 2027-2029 (87 million) to partially finance the REPowerEU plan as the RRF found (the so-called "froantloading"),
- the inclusion of the maritime sector in the EU ETS (around 74 million), which will only have to fully account for its emissions in the following years,
- lower EUA transfers to the MSR in 2024 (around 50 million compared to 2023).It should be noted that this high supply of allowances in 2024 occurred despite the start of the implementation of the 'Fit for 55' package from 2024 onwards, which increases the annual linear reduction factor (the so-called "LRF") from 2.2% to 4.3% (corresponding to a reduction in available EUA's

7 It is a key indicator used to assess economic activity in the industrial sector
8 https://biznesalert.pl/niemcy-wegiel-energetyka-oze-miks-energetyczny/ (access: 13.12.2024 r.)
9 https://www.euractiv.pl/section/demokracja/news/trump-do-unii-europejskiej-bedziecie-musieli-zaplacic/ (access: 13.12.2024 r.)

FIGURE 4. EUROZONE MANUFACTURING PMI



Source: investing.com (publication: 02.01.2025)

of 45 million[10]) and the introduction of the first rebasing[11] (90 million).

> **Over the years, however, the number of allowances available for auctioning is likely to decrease. The exception to this will be 2026, which will see the culmination of factors that will severely constrain the supply of allowances.**

Over the years, however, there should be an increasing reduction in the number of allowances available for auctioning. The year 2026 will be exceptional in this respect, as it will see the culmination of a number of factors that will severely constrain the supply of allowances. The main ones are listed below.

- Complete the "monetisation" (auctioning) of allowances under the RRF to partially fund the REPowerEU plan in 2026[12].
- Start phasing out the free allocation of EUA's[13],
- higher benchmark levels for free allowancesApply full auctioning to aviation,
- Achieve full inclusion of maritime emissions.
- Launch a main CBAM phase based on the purchase of CBAM certificates linked to the EU ETS allowance price.

10 The LRF for 2.2% was approximately 43 million allowances, while for 4.3% it was approximately 88 million allowances. The difference was therefore approximately 45 million allowances.

11 a one-off reduction of EUA's within the cap (cap) by a specific number. In this case by 90 million.

12 According to EC estimates, there will be around 58 million EUA's to be auctioned in 2026 from the RRF (to partially fund the REPowerEU plan). However, this figure may change depending on the level of EUA allowance prices.

13 Free allowances in CBAM sectors are to be gradually reduced between 2026 and 2034, with a 48,5% reduction by 2030. CBAM sectors, according to EC data, account for approximately 53% of the pool of free allowances.

At the same time, the impact of the MSR on the auction pool is expected to decrease significantly – according to CAKE/KOBiZE estimates, the surplus of allowances on the market (the so-called TNAC[14]) will fluctuate around the upper limit of the MSR (833 million) from 2027 onwards. This means that fewer and fewer allowances should be transferred to the reserve. At the same time, it should be noted that the MSR will be modified in connection with the planned 2026 revision of the EU ETS Directive which is expected to start as early as 2025. It is more likely that the MSR parameters will be further "souped up" (e.g. flexible reduction of MSR thresholds). The future reform of the MSR should therefore be seen as an upward price driver.

MSR will be modified in connection with the planned 2026 revision of the EU ETS Directive which is expected to start as early as 2025. It is more likely that the MSR parameters will be further "souped up" (e.g. flexible reduction of MSR thresholds).

The key question from the perspective of potential EUA price increases is: when will market participants start to price in these future allowance shortages? SparkChange experts, a consulting firm, tried to answer this question. They found that the (allowance) market starts to factor future allowance shortages into prices about 1, 5-2 years in advance. This was the case in 2017/2018, when prices increased significantly before the introduction of the MSR in 2019, and in 2020/2021. The same may be true in 2025-2026, when the market will start discounting significant deficits from 2026-2027. Increased EUA's purchases are not only expected from the industrial sector, which may take over the current role of the power industry (which uses so-called "hedging") and buy allowances several years in advance (to hedge against future allowance shortages). New participants in the system from the maritime sector are also likely to join the group of buyers. It remains to be seen how EU importers will approach hedging the price of CBAM certificates. Will they use hedging, i.e. buying earlier, cheaper EUA's in the EU ETS to hedge the price of CBAM certificates in the future (they would profit from the price difference[15])? Most importantly, importers would not need to open accounts in the EU ETS registry as they could buy the ETFs products offered on the exchanges to which everyone has access.

EUA price forecasts for 2025

This section presents three projections of EUA prices for 2025 from three analyst firms (in addition to CAKE/KOBiZE, these are projections from BNEF and Veyt). All projections take into account both supply and demand factors, as well as projections for the development of the EU economy and climate policy.

The CAKE/KOBiZE model projection forecasts[16] an average EUA price of around €102 in 2025[17], mainly due to improving fundamentals, including a significant reduction in the supply of EUA's and higher demand for EUA's in future years (end of RRF froantloading, phasing out free EUA's, maritime sector full inclusion and aviation sectors in the EU ETS).

BNEF, on the other hand, expects an average price of €70 in 2025 as a result of the balance between the large supply of EUA's and low emissions in the EU.

14 Total Number of Allowances in Circulation

15 For example: they would buy EUA's in the EU ETS at €70 and later sell them for €100 when prices in the EU ETS start to rise. They would gain €30 on such a transaction. If the price of CBAM certificates linked to the EUA prices was €100, they would actually buy the certificates at €70 (taking into account the earlier profit of €30 on the sale of EUA's in the EU ETS).

16 Projection based on CREAM & CarbonPIE models within CAKE/KOBiZE – Carbon Regulation Emission Assessment Model (CGE model) & Carbon Policy Implementation Evaluation Tool (EU ETS simulation model).

17 https://ariadneprojekt.de/media/2025/01/Ariadne-Documentation_IndustryWorkshop@Brussels_January2025.pdf

Key changes, such as the full inclusion of the maritime and aviation sectors in 2026 (100% auctioning), will have a greater impact in the longer term. BNEF highlights the role of increased renewable energy and reduced demand from energy-intensive industries.

Veyt[18] points to the possibility of a price increase to €95, driven by the projected EUA deficit caused by the lower emissions cap and higher transfers to the MSR. Additional EUA's RRF sales and the increasing share of RES remain a risk, which could reduce demand.

> The CAKE/KOBiZE modelling projection predicts an average allowance price of around €102 in 2025, mainly due to improving fundamentals, including a significant reduction in the supply of allowances and higher demand for allowances in future years (end of froantloading from REPowerEU, reduction in free allowances, full inclusion of the maritime and full auctioning in aviation sector in the EU ETS).

TABLE 1. EUA PRICE FORECAST IN 2025

INSTITUTION	AVERAGE EUA PRICE FORECAST
CAKE/KOBiZE	€102
BNEF	€70
Veyt	€95

Sources: BNEF, Veyt

Summary

Based on a technical analysis of the European CO_2 market, it is difficult to identify the dominant trend. It can take the form of a sustained upward trend (bull market) with a 40% correction or a definite transition into a downward trend (bear market). The most dynamic increases in EUA prices of 430% occurred between 2020 and 2023 (from €18 to a record €95). In contrast, since reaching the ATH in 2023, the market has experienced a more than 40% correction, bringing prices below €60 in early 2024. Currently, prices are reaching an important resistance level of €80, which may suggest an attempt to reverse the downtrend (or negate the 40% correction). Breaking out of the triangle formation and the €80 resistance could open the way to €95, i.e. provide an opportunity to retest the historical maximum. The upside scenario is supported by the technical analysis indicators (MACD and RSI), which broke through key levels in November and December 2024. Failure to break out of the €80 level increases the risk of a downward correction to at least the €65 level.

Emissions reductions in 2023 reached a record 16,5% thanks to increased renewable energy and improved industrial efficiency. However, the expected economic recovery in the EU, supported by possible interest rate cuts by the European Central Bank, could increase industrial production and emissions, driving up demand for EUA's. The potential recovery in industry is indicated by estimates from consultancy Veyt, which expects emissions

18 Veyt webinar: "EUA market dynamics and outlook: navigating the path forward", 24.10.2024 r.

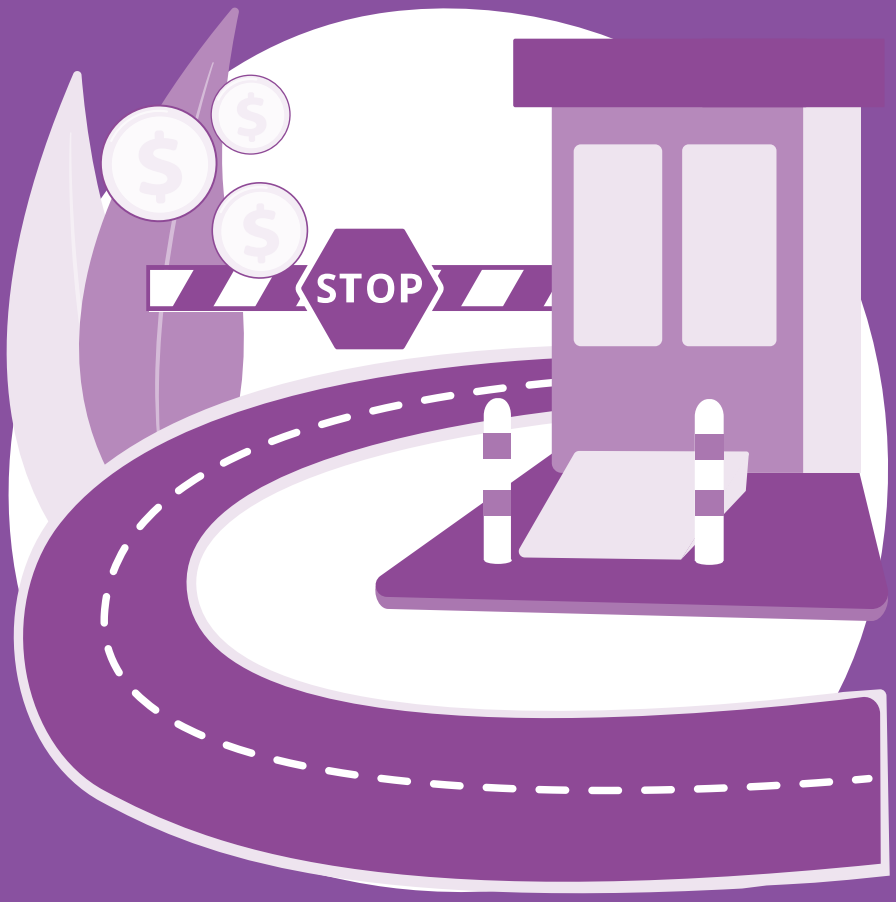
from the sector to increase in 2024. The second important price driver is the correlation between EUA prices and TTF gas prices. Higher gas prices can induce the use of more carbon-intensive coal, increasing the demand for EUA's. However, there is uncertainty about the future of gas prices, including in the context of US energy policy.

A record c.a. 600 EUA's was available for sale in 2024 due to measures such as the RRF frontloading of allowances and the inclusion of the maritime sector in the EU ETS. However, a significant reduction in supply is expected in subsequent years, particularly from 2026 onwards. Key factors are the end of RRF allowance sales in 2026 and the full implementation of auctioning for the aviation and maritime sectors. A reduction in the supply of allowances could push up allowance prices, especially if market participants start discounting future shortfalls in advance, as has been the case in the past.

The technical and fundamental potential for allowance prices to rise above €95 in 2025 appears to be confirmed by the CAKE/KOBiZE and Veyt model projections. In this case, both institutions project the greater importance of a reduction in the supply of allowances compared to the demand for EUA's (emissions volumes). BNEF, on the other hand, takes a different view, assuming that future demand and supply of allowances will be in equilibrium, so that the price of EUA in 2025 should remain at about the similar level as today (around EUR 70).

Bibliography

1. Decision (EU) 2015/1814 of the European Parliament and of the Council of 6 October 2015 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending
2. Directive 2003/87/EC (Text with EEA relevance)Text with EEA relevance (OJ L 264 9.10.2015, p. 1).
3. Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC (OJ L 275 25.10.2003, p. 32).
4. KOBiZE, Raport z rynku CO_2, April 2024 r. (no. 145)CO_2 Market Brief (September 2024 r.)
5. Report from the Commission to the European Parliament and the Council on the functioning of the European carbon market in 2023, November 2024
6. Murphy John J., Technical analysis of financial markets, 1999.



What do we know about the Carbon Border Adjustment Mechanism (CBAM) after one year of its operation?

Authors:

Piotr Lipka, Emissions Allowances Allocation Unit, KOBIZE

Sylwia Kryłowicz Deputy Manager, Emissions Allowances Allocation Unit, KOBIZE,

Małgorzata Nowakowska, Emissions Allowances Allocation Unit, KOBIZE

What do we know about the Carbon Border Adjustment Mechanism (CBAM) after one year of its operation?

Key words: CBAM, border adjustment mechanism, imports, carbon leakage; CBAM goods, allowance trading scheme


Author:
Piotr Lipka


Author:
Sylwia Kryłowicz


Author:
Małgorzata Nowakowska

Summary

This article aims to provide a first summary of the implementation of the Carbon Border Adjustment Mechanism (CBAM) from the perspective of the authority responsible for its implementation in the Member State, as well as from the point of view of importers. The first part of the article is devoted to the discussion of the origins of the CBAM mechanism in the context of the operation of the European Union Emissions Trading System (EU ETS) and issues of carbon leakage. In the next part of the article the problems encountered by importers in fulfilling their obligations under the adopted regulations are discussed in a synthetic way. This is a summary of the first experience with the functioning transitional phase of this mechanism introduced in the EU to reduce CO_2 emissions in imports as well as to protect EU industry. Key problems include importers' lack of awareness of their obligations, the resistance of third country operators to report emissions data, the significant fragmentation of reporting due to the large number of small and medium-sized importers and technical difficulties. The CBAM mechanism needs further improvements, including better education of system participants, simplification of reporting processes and increased international cooperation. The last part of the article focuses on the principles of accounting for embedded emissions from CBAM goods during the target period. Furthermore, it highlights the need for importers to request actual data on embedded emissions of CBAM goods from operators of third-country installations during the transitional phase.

Poland is one of the Member States with the largest number of CBAM reports submitted, which provides an opportunity to look at the functioning of the mechanism from a broader perspective.

Purpose and relevance of the CBAM mechanism for EU climate policy

One year has passed since the start of the Carbon Border Adjustment Mechanism (CBAM) on 1 October 2024, which was introduced by Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 *establishing a carbon border adjustment mechanism*.[1] Therefore, it is now possible to attempt the first summaries and analyses.

EU Emission Trading System (EU ETS) has been in place in the European Union since 2005. This mechanism covers sources of greenhouse gas emissions, i.e. installations (mainly industrial installations). Like the EU ETS, CBAM also targets emission sources, i.e. installations and entities (installation operators), but located in third countries. In addition, this mechanism concerns importers exporting goods to the customs territory of the Union. Therefore, it is the EU's response to enhancing its impact in the area of climate policy and encouraging efforts not only within the Union but also by other countries. It also aims to protect the Union's industry.

Before the introduction of the CBAM, the Union's industry was subject to climate policy, the implementation of which still requires investments in emission reductions. The previous internal actions of the community aimed at protecting industry and its competitiveness on the international stage have proven to be insufficient. The most important problem faced by the European Union in this area is the relocation of goods production outside its territory due to lower operating costs, which is caused in particular by the lack of adequate regulations to combat climate change in third countries, such as, for example, fees for CO_2 emissions into the atmosphere. As a result, installations operating in the EU are becoming less competitive compared to installations located in third countries, which leads to a decrease in exports of EU goods and a loss in the internal market to goods imported from third countries. This problem concerns in particular countries neighbouring third countries and installations which spend a significant part of their production on exports. Under the current EU ETS mechanism, sectors or subsectors deemed at risk of carbon leakage have been designated to protect industry, for which a 100% free allocation rule for CO_2 emission allowances has been adopted, calculated on the basis of a specific product benchmark. Carbon leakage is discussed in situations where, due to costs associated with climate policy, companies relocate production to other countries with more lenient emission restrictions or environmental laws. Such relocation leads to an increase in total emissions globally, while limiting the effectiveness of the EU's emissions reduction policy, and also leads to a reduction in the economic output of energy-intensive businesses in the EU due to loss of market share. The list of sectors and subsectors deemed at risk of carbon leakage in the existing EU ETS has already been updated three times and adopted by a legal act. For the preparation of the first two lists, the following assumptions were made:

- the direct and indirect costs resulting from the implementation of Directive 2003/87[2] would increase production costs, calculated in relation to gross value added, by at least 5%, and
- Intensity of trade between the sector and non-EU countries (imports and exports) is more than 10%.

An additional factor determining whether a sector or subsector is also considered to be exposed to carbon leakage is:

1 OJ EU L 130, 16.5.2023, p. 52.

2 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32).

- the sum of direct and indirect additional costs is at least 30%, or
- the intensity of trade from outside the EU exceeds 30%.

The estimated costs take into account the fact that certain sectors that are not included in the carbon leakage list are eligible for a partial allocation of free allowances. However, in the third Decision 2019/708[3], which determines the list of sectors or subsectors deemed at risk of carbon leakage, (currently in force in the period 2021-2030), the criteria defining membership in this group have changed. That Decision assessed the carbon leakage exposure of sectors on the basis of an indicator reflecting trade with third countries and the intensity of emissions. The intensity of trade with third countries was calculated as the ratio of the total value of exports to third countries plus the value of imports from third countries to the total market size in the European Economic Area. The trade intensity assessment for each sector and subsector was compiled on the basis of the data reported by Eurostat in the COMEXT database. The data contained in this database are the most complete and reliable for the Union's external trade in goods with third countries. The emission intensity, measured in kg CO_2 per euro, was calculated as the sum of direct and indirect emissions in a given sector divided by the added value of the goods. Emission monitoring data of installations covered by the EU ETS, contained in the Union Registry, are the most accurate and transparent source of CO_2 emissions data and are therefore used to calculate direct emissions for sectors. However, data from Eurostat structural business statistics were used to estimate gross value added at sectoral level. Another element needed to identify sectors and sub-sectors at risk of carbon leakage was the determination of indirect emissions. Indirect emissions are considered to be data on electricity consumption obtained directly from Member States. An emission factor for electricity shall be used to convert electricity consumption into indirect emissions. As a benchmark, the European Commission used the EU average electricity production in the energy mix. This figure is based on the total annual emissions in the Union from the electricity sector for all electricity generation sources in Europe divided by the corresponding amount of electricity generated. The emission factor for electricity shall be updated to take into account the decarbonisation of the electricity system and the increasing share of renewable energy. The new value refers to 2015 and is therefore based on data available for the full three calendar years (2013-2015) and amounts to 376 grams of carbon dioxide per kWh. In addition, under Directive 2003/87, Member States may grant compensation to the most energy-intensive sectors where the increase in electricity costs resulting from the introduction of the EU ETS is significant. Compensations are granted through national State aid schemes. Funds from the revenues generated by the auction of emission allowances, up to a maximum of 25% of these revenues, can be used for compensations. However, despite the adoption of these measures, the competitiveness of the Union's industry has not improved, and exports continue to decline.

Difficulties in implementing the CBAM and the role of importers and non-EU producers

The CBAM mechanism is the European Union's response to criticism of the industry sector indicating the difficult situation of EU installations and the loss of export markets to inefficient and highly emission-intensive installations from third countries.

3 Commission Delegated Decision (EU) 2019/708 of 15 February 2019 supplementing Directive 2003/87/EC of the European Parliament and of the Council as regards the identification of sectors and subsectors deemed at risk of carbon leakage for the period 2021-2030 Urz. EU L 120, 8.5.2019, p. 20).

> However, it should be noted that, despite expectations on the part of the industry to implement the CBAM mechanism, it turned out that the biggest challenge faced by importers, customs services and authorities designated by EU countries to perform this task, as well as the industry itself in third countries, was the very short time to prepare this mechanism.

Only 4.5 months passed between the adoption and entry into force of Regulation 2023/956 and the start of the CBAM mechanism. During that period, an implementing Regulation (EU) 2023/1773 of 17 August 2023 *laying down rules for the application of Regulation (EU) 2023/956 of the European Parliament and of the Council as regards reporting obligations for the purposes of the carbon border adjustment mechanism during the transitional period*[4] by the Commission had to be adopted and a tool for fulfilling the obligations arising from these regulations had to be developed. In the current first phase of the CBAM, the goods covered by this mechanism are those classified under the EU ETS as being at risk of emission leakage, and their production pathway is sufficiently simple and transparent to easily determine their embedded direct and indirect emissions, as is the case in the EU ETS system. Designated CBAM goods are among the sectors producing: cement, fertilisers, hydrogen, steel and iron, aluminium and electricity.

The Carbon Border Adjustment Mechanism is addressed directly to operators of installations in third countries where CBAM goods are produced and subsequently imported into the European Union. The reporting obligation, on the other hand, rests with the declarant subject to that obligation (hereinafter: the declarant), i.e. the importer or the indirect customs representative.

In view of the above, **for the proper implementation of the tasks resulting from the CBAM mechanism, close cooperation is required between the installation operator where the CBAM goods were manufactured and the importer of the goods who releases those goods for free circulation in the customs territory of the Union.** The CBAM mechanism is aimed at protecting EU industry and increasing the involvement of third countries in the fight against climate change.

The adopted approach has imposed additional obligations on importers, as it is the importer who is responsible for reporting embedded emissions. It follows from past practice that importers are concerned that they will not receive correct actual data on embedded emissions from manufacturers of CBAM goods in a timely manner. Additionally, there is some misunderstanding related to the fact that emission monitoring rules are not directly aimed at importers. It should be pointed out that this task rests with the operators of installations where imported goods are produced. On the basis of discussions with importers, it can be pointed out that in their opinion there is a belief that an easier way to combat climate change would be to introduce an additional fee without the need to report embedded emissions from CBAM goods.

> However, it should be noted that the philosophy of introducing CBAM is in line with World Trade Organisation rules and does not introduce new duties or taxes, but introduces a similar burdening of production costs related to greenhouse gas emissions, as is the case in EU installations covered by the EU ETS. This allows to protect the market without introducing mechanisms to promote the Union industry.

4 OJ Urz. EU L 228, 15.9.2023, p. 94.

The implementation of the CBAM mechanism has been divided into two phases. The first one started in October 2023 and is called the transition phase. This phase will last until the end of 2025 and has been limited only to the reporting obligation through the CBAM Transitional Registry. The report shall be submitted for each quarter within one month of its completion. The second phase is the so-called definitive period, which will start on 1 January 2026. The reporting period will henceforth be a calendar year and the report (declaration) will have to be submitted by 31 May of the following year. The first CBAM declaration for 2026 will be made in 2027. During the definitive period, the embedded emissions imported in CBAM goods by importers will also start to be accounted for through purchased certificates on a purchasing platform set up specifically for this purpose.

In the implementation of the CBAM, the most relevant element for the declarant is the CBAM registry where the reports are submitted. During the transitional phase there is a so-called CBAM Transitional Registry, whereas in the definitive period, importers will be dealing with the so-called CBAM Registry. The operation of the CBAM Transitional Registry and the form of the report itself is not complicated, however, the implementation of any new tools presents difficulties, as was the case here.

In the first phase of the functioning CBAM Transitional Registry, the most important aspect was the verification of the entities that can submit a CBAM report. For this purpose, the Commission used the Uniform User Management and Digital Signature system (UUM&DS), which is set out in the provisions of Commission Implementing Regulation (EU) 2023/1070 of 1 June 2023 *on technical arrangements for developing, maintaining and employing electronic systems for the exchange and storage of information under Regulation (EU) No 952/2013 of the European Parliament and the Council*[5] and the Economic Operator Registration and Identification (EORI). In accordance with the above-mentioned Regulation, these systems were used for the purpose of validation and retrieval of information on the identity of economic operators in relation to imports from third countries. In Poland the system of verification and authorisation of importers was based on the Tax and Customs Electronic Services Platform (hereinafter: PUESC). Access to the CBAM Transitional Registry was granted to natural persons who are business owners and who, as part of the PUESC activity, have rights extended to access the CBAM Transitional Registry and have a link to the CBAM declarant registered in the PUESC in the 'Customs' area. For business owners and persons entitled to self-representation, access to log in to the CBAM Transitional Registry has been granted ex officio since 1 January 2024. In the case of employees or agents of the company, access to the CBAM registry was carried out upon request. The adopted rules for verification and logging in to the CBAM Transitional Registry allowed most interested declarants to log in to the system in a fairly short time (one month). However, the reporting tool itself in the first phase of operation generated numerous systemic errors that required intervention and several dozen amendments, which resulted in the European Commission extending the deadline for submitting the CBAM report by an additional 30 days in the first reporting period (Q4 report 2023). The extension of the reporting deadline and the elimination of registry errors significantly helped declarants to fulfil their obligations despite the short time they had to familiarise themselves with the new obligations. Nevertheless, a key convenience for declarants and operators of installations was the possibility to use default values for individual CBAM goods set by the European Commission in the first three reporting quarters. As a result, more than 90% of the reports submitted in these quarters contain data prepared by the European Commission and not actual data obtained from the operator of the installation where the CBAM goods were produced.

5 OJ Urz. EU L 143, 2.6.2023, p. 65

The first quarter in which default values could not be used in CBAM reports was the third quarter of 2024. In that quarter, embedded emissions had to be based on actual data obtained from third-country installation operators. Due to the fact that during the third quarter importers reported numerous problems in obtaining data for determining embedded emissions from operators of installations from third countries, the European Commission prepared a derogation in this respect. In the CBAM Transitional Registry, where no actual data were obtained, the CBAM reporter had to demonstrate the efforts made and due diligence in obtaining them. In this case, after the selection of the relevant fields in the CBAM Transitional Registry indicating the absence of actual data, the specific embedded direct emissions and the specific embedded indirect emissions were automatically set to "zero". Thus, these reports did not contain data on the volume of emissions imported into the European Union. Thanks to this solution, CBAM reports submitted this quarter will show how cooperation between declarants and operators of installations from third countries is developing and how important the lack of actual data on embedded emissions is. Despite the derogation introduced, the declarant should in subsequent quarters recover actual data from the operator of the third country installation, as this is in the interest of both the importer and the producer of the CBAM good. For this purpose, to facilitate communication, the European Commission prepared and provided support materials on its website, including guidelines and a so-called information exchange form between installation operators and importers. Workshops were also conducted for installation operators from third countries to explain how to develop data on embedded emissions and how the lack of data would impact the determination of default indicators in the target period.

Rules for accounting embedded emissions in the definitive phase

In the definitive phase, the problem of the lack of actual data for determining embedded direct emissions is regulated in Art. 2 of Regulation 2022/956, which states that, in the absence of actual data, embedded emissions are determined using default values determined in accordance with the regulations in point 4.1 of Annex IV to that regulation. The criteria for determining the default values set out in the above-mentioned provisions are set out in two options. The former sets default values as the average emission intensity level for each country from which a CBAM good is imported, increased proportionally by a specific markup, while the latter option sets default values due to the lack of reliable data for the country from which the good is imported, based on the average emission intensity of the worst performing EU ETS installation for the type of CBAM good in question. To determine the default values in Option 1, it is very important to obtain reliable data on actual emissions during the transition phase.

> However, it should be pointed out that both proposed solutions for determining default values will be unfavourable for those installations whose benchmark is similar to or better than the least carbon intensive installations in the EU ETS, since the use of default values will increase the attributed embedded emissions for CBAM goods produced in those installations. This approach is intended to ensure that, during the definitive phase, operators of installations from third countries for which the Union market is important for export will register themselves in the CBAM registry to report independently the embedded emissions of CBAM goods produced in their installations.

Another important element of the definitive phase is that importers account for embedded emissions through certificates that the declarant will be required to purchase. By 31 May of each year, starting in 2027, the declarant shall surrender a number of CBAM certificates in the CBAM registry corresponding to the embedded emissions declared in the CBAM report. However, it should be noted that the number of certificates required to be surrendered by 2033 will be adjusted in accordance with the harmonised rules for the free allocation of emission allowances under the EU ETS. In order to understand this adjustment, it is necessary to look at the principle of calculating the number of free allowances to be allocated to an installation covered by the EU ETS. For this purpose, a formula for calculating the free allocation of emission allowances for the production of a CBAM good of an EU installation shall be used:

$$F_{i,k} = BM_i \times HAL_i \times CBAM_i \times CSCF_i,$$

Where:

$F_{i,k}$ – Annual preliminary allocation to sub-installations in year k (number of allowances per year);

HAL_i- historical activity level of the sub-installation (activity unit per year);

BM_i – applicable in the years 2026-2030 value of the benchmark for product or heat or fuel or 97% - 91% of process emissions

$CBAM_i$- applicable CBAM factor;

$CSCF_i$ – cross-sectoral uniform correction factor.

The adjustment in the number of certificates to be cancelled will be calculated in a similarly manner, regardless of the declared embedded emissions imported in the CBAM goods.

To calculate the number of certificates that will need to be surrendered for the CBAM goods released for free circulation, the amount of imported CBAM goods should be substituted in the 'historical activity level of the sub-installation' and this amount should be multiplied by:

- applicable in the period 2026-2030 value of the relevant benchmark for product, heat, fuel or 97%-91% of process emissions (BMi), and by:
- the CBAM indicator, which shall be as follows: 97,5 % in 2026, 95 % in 2027, 90 % in 2028, 77,5 % in 2029, 51,5 % in 2030, 39 % in 2031, 26,5 % in 2032, 14 % in 2033 (CBAMi), and:
- the European Commission's Cross-sectoral Uniform Correction Factor (CSCFi).

The value calculated in the aforementioned manner will not require settlement by means of a certificate. This value is equal to the number of free allowances allocated to the installation producing the CBAM good in the European Union. Therefore, every ton of CO_2 that is not covered by a free allocation will have to be purchased as a certificate and surrender.

What does this mean for the importer? If the declarant uses default values to determine embedded emissions in the declaration, the need to surrender the amount of embedded emissions of the imported good will be based (when choosing the second option to determine default values) on the most emission-intensive EU ETS installations, when the BM_i EU ETS values are determined on the basis of the 10% least emission-intensive installations in the European Union. The best example to illustrate this approach is to demonstrate the value of the benchmark specified for measurable heat (BM_i). After reviewing the EU ETS benchmarks for measurable heat, this benchmark will most likely be set at level 31.15 te CO_2/TJ, and for the most carbon-intensive installations that

use lignite as a fuel, the benchmark will be approx. 119.89 teCO_2/TJ. This indicates that the difference between the best and the worst indicator will be 88.74 tonnes of CO_2 equivalent. Using the CBAM indicator of 97.5% in 2026 and assuming a CSCF value of 1 (for the simplification of the calculations), this will leave 86 tonnes of CO_2 for the settlement of embedded emissions, i.e. 86 certificates will have to be purchased (119.89 – 31.15 = 88.74 × 97.5% = 86.52 = 86). It should be pointed out that one certificate will correspond to one tonne of CO_2 equivalent of the embedded emissions of a good. Thus, assuming that the average price of emission allowances in the week 21 to 25 October 2024 was EUR 63.64[6], the cost of purchasing certificates would be EUR 5 473.25 (EUR 86 × 63.64 = EUR 5 473.25 = approx. 23 767.22 PLN).

Of course, this example is the most extreme, very simple and theoretical demonstration of the principle of correction using default values, since it is assumed that one TJ of measurable heat is used to produce one tonne of CBAM commodity, for which the benchmark is based on the most emission-intensive installations in the Union. This therefore illustrates the principle of using default values and the principle of adjustment resulting from the harmonised rules for free allocation of EU ETS allowances and the estimation of costs related to the purchase and surrender of certificates.

Challenges and need for improvement

Looking at the origins of the CBAM mechanism's operation, the biggest challenge faced by participants in this system was the short time for its implementation, as well as the ad hoc solutions introduced by the European Commission in the Transitional Registry, which led to many mistakes and irregularities in the first submitted CBAM reports.

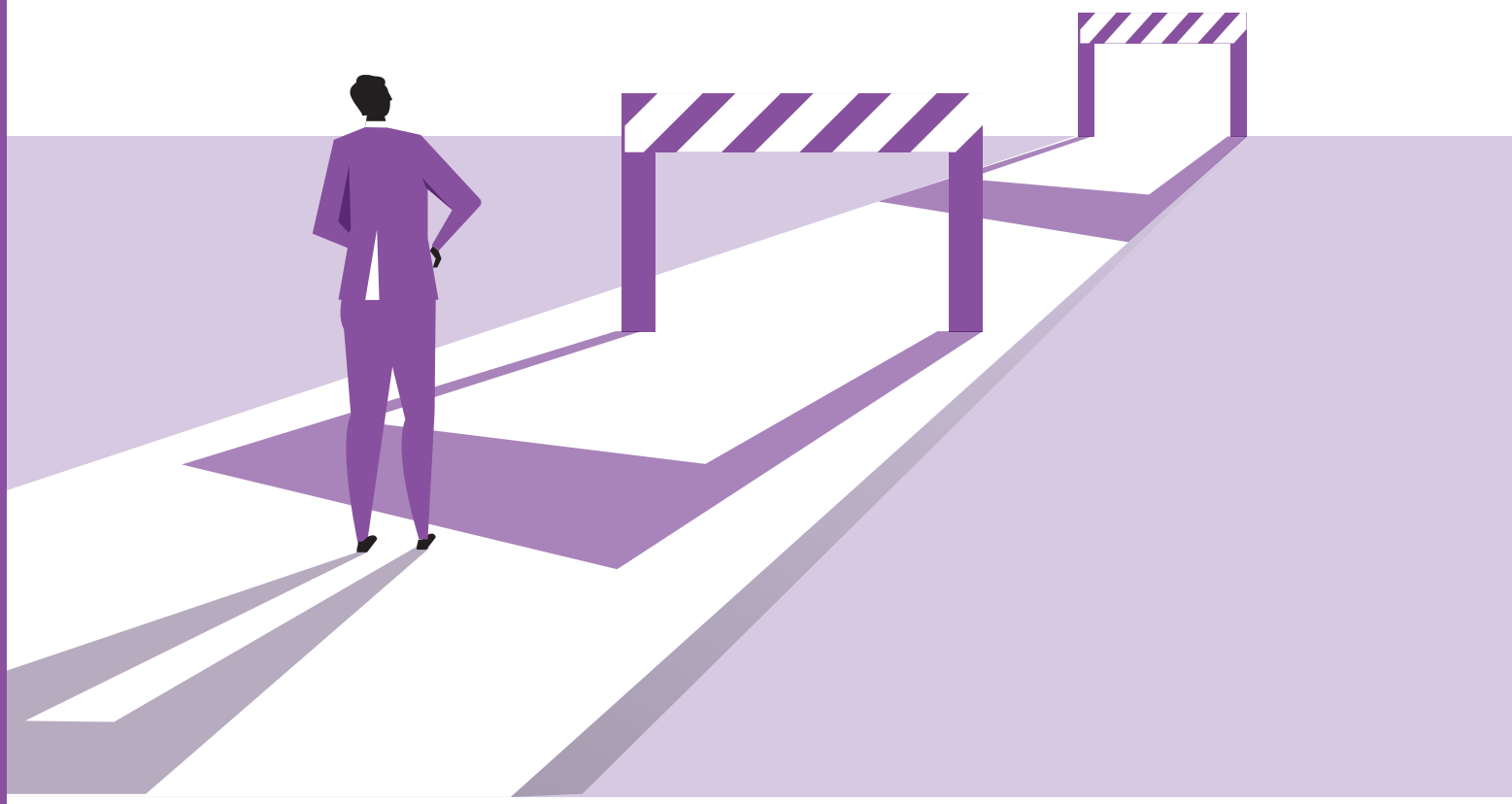
> **This example also shows how unfavourable default values can be for determining embedded emissions for a CBAM commodity and how important it is to obtain actual data from the operator of a third country installation. It should be noted that the cost of purchasing and accounting for embedded emissions will be borne by the declarant, which is why cooperation between the importer and the operator of the installation is crucial also during the transitional phase in order to obtain reliable data.**

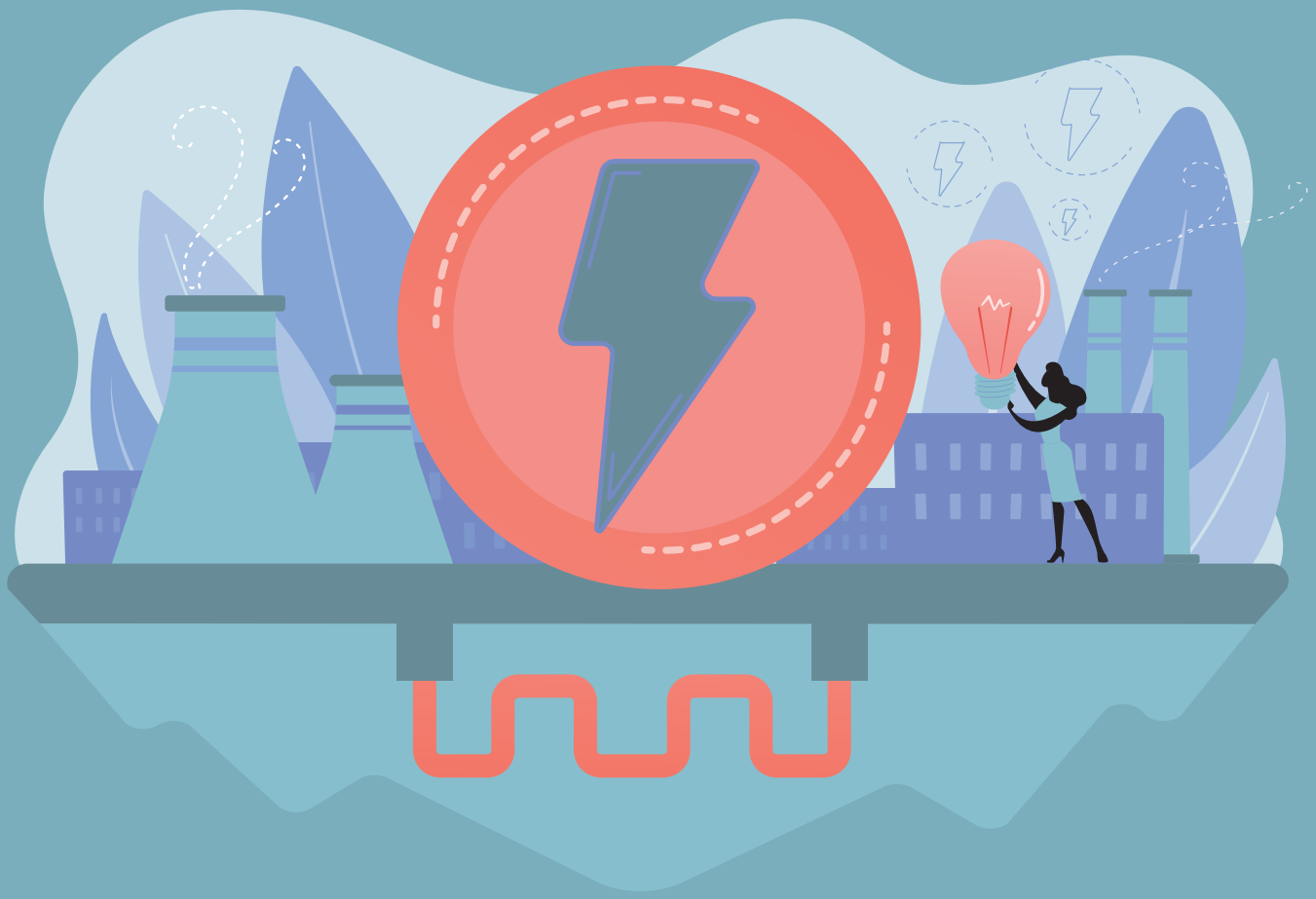
An example here is the change in the tonnage of imported goods – initially, the weight of goods could be reported in tonnes and kilograms, while from the second report this value must be reported only in tonnes. The second sensitive aspect of this mechanism is certainly the delayed legislative processes and the adoption of "last minute" legislation. The result is certainly problems for Member States in preparing a team of qualified staff to be able to explain to stakeholders how the mechanism works and the implementation of the obligations arising from these regulations. As a result, importers are still not aware of the consequences of not reporting or incorrectly reporting embedded emissions. Last but not least, the reluctance of third country installation operators to cooperate in determining the emissions of the goods being built and to provide importers with the actual necessary data to submit a CBAM report seems to be the most relevant element that has a direct impact on the functioning of the CBAM mechanism. The scale of this problem will be verifiable at the earliest after the expiry of the reporting time for the third quarter of 2024, i.e. by the end of October 2024.

6 https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fpublic.eex-group.com%2Feex%2Feua-auction-report%2Femission-spot-primary-market-auction-report-2024-data.xlsx&wdOrigin=BROWSELINK

It should therefore be pointed out that certain issues related to the introduction and functioning of the CBAM mechanism need to be streamlined and improved. It is important that Member States and the European Commission continue to make importers and installation operators aware of their obligations in this regard and explain the intricacies of the mechanism. Cooperation between the participants in the CBAM mechanism is key to its proper functioning and to meeting the assumptions that were made when it was created.

Bibliography:
1. Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism (OJ L 130, 16.5.2023, p. 52).
2. Commission Implementing Regulation (EU) 2023/1773 of 17 August 2023 laying down the rules for the application of Regulation (EU) 2023/956 of the European Parliament and of the Council as regards reporting obligations for the purposes of the carbon border adjustment mechanism during the transitional period (OJ L 347, 20.12.2023,pp. Urz. EU L 228, 15.9.2023, p. 94).
3. Commission Implementing Regulation (EU) 2023/1070 of 1 June 2023 on technical modalities for the development, maintenance and use of electronic systems for the exchange and storage of information pursuant to Regulation (EU) No 952/2013 of the European Parliament and of the Council Urz. EU L 143, 2.6.2023, p. 65).
4. Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32).
5. Commission Delegated Decision (EU) 2019/708 of 15 February 2019 supplementing Directive 2003/87/EC of the European Parliament and of the Council as regards the identification of sectors and subsectors deemed at risk of carbon leakage for the period 2021-2030 Urz. EU L 120, 8.5.2019, p. 20).
6. Guidance Document nº2 on the harmonised free allocation methodology for the EU ETS – 2024 revision
7. Guidance on determining the allocation at installation level Final version issued on 26 February 2024.
8. https://www.kobize.pl/pl/article/cbam/id/2415/informacje-ogolne





Challenges of transformation in district heating sector

Authors:
Igor Tatarewicz, Strategy, Analysis and Auction Unit, KOBIZE/CAKE
Michał Lewarski, Strategy, Analysis and Auction Unit, KOBIZE/CAKE
Sławomir Skwierz, Vice-President of the Board Energy, Market Agency S.A.

Challenges of transformation in district heating sector

Key words: *District heating, energy transformation, Fit for 55, EU energy and climate policy, national power system, district heating production, zero-emission technologies, RES.*


Author:
Igor Tatarewicz


Author:
Michał Lewarski


Author:
Sławomir Skwierz

Abstract

The Polish district heating sector is a sector where energy transformation and decarbonization pose a huge challenge. The need to adapt to European regulations, rising prices of fuels and CO_2 emission allowances, as well as the high costs of the transformation itself, combined with the poor financial condition of most district heating companies, are factors that put the sector in a very difficult position from the very beginning. Choosing the transformation path is a difficult and not obvious choice at the very stage of development planning. The article presents the most current scenarios of development of the district heating sector in Poland in the long term, developed by research centers dealing with this topic. The aim of the work is to present various paths and alternatives to support decision-makers in this difficult and not obvious choice. The analyzes conducted show that there is no one-size-fits-all solution for the district heating industry, but electrification is to play a key role in the transformation.

The analyzed scenarios were dominated by heat pumps and electrode boilers in a cooperation with heat storage, biomass boilers and gas systems. In all scenarios considered, a characteristic feature was the gradual abandonment of coal fuels in heat production, as a natural consequence of the functioning of the EU ETS system and the increase in costs related to the purchase of CO_2 emission allowances. The experience of Western European countries such as Germany, France and Denmark shows that the important role of biomass in the sector's decarbonization process should not be ignored when choosing a technology. Its use will maintain the stability of the system and the supply of heat to end users at an acceptable cost.

List of abbreviations:

EU ETS – European CO_2 emission allowance trading system
Fit for 55 – a package of EU legal acts implementing the assumptions of the European Green Deal, for this purpose the EU is to reduce greenhouse gas emissions by 55% in 2030 compared to the 1990 level
RES – renewable energy sources
SCB – sustainability criteria for biomass fuels
P2H – *power to heat* – technologies using electricity for heating purposes
PTEZ – Polish Association of Utility Heat and Power Plants (pol. Polskie Towarzystwo Elektrociepłowni Zawodowych)
EU – European Union
URE – Energy Regulatory Office (pol. Urząd Regulacji Energetyki)

Introduction

District heating is a very important link in the heat supply chain to end users and plays a special role in the national energy system. It is responsible for the production of district heat at the level of approximately 300 PJ[1], which covers the total national heat demand by 25-30%[2]. Importantly, this form of heat production significantly contributes to the reduction of the so-called low emissions, which is a very serious problem in Poland and the main source of pollution in small towns. Unfortunately, approximately 80% of all district heating systems in Poland do not have the status of effective systems within the meaning of the Energy Efficiency Directive, and coal fuels still dominate in the production of system heat. This sector requires urgent action to set directions and determine methods and sources of financing. The key issue is to provide financial resources to implement the necessary investments. The investment needs of the heating sector are very large, as indicated by studies of many industry organizations[3,4]. This is directly related to the need to properly program the development of this sector to, on the one hand, meet the transformation requirements and, on the other hand, optimize costs in such a way that they are acceptable to customers. The cost of heat is one of the most significant items in the budget of an average household. The industry has long been pointing out the lack of a strategy for district heating, which has not been developed yet. The article presents and compares the most current scenarios for the development of the district heating sector. The purpose of these analyzes was to identify various alternatives and their associated costs, as well as to identify risks and potential implementation problems.

The current situation in district heating sector

> Coal has dominated the structure of system heat generation in Poland for years. The statistical data in this regard for 2022 indicate a still high share of coal in the structure of district heating production in Poland at the level of approximately 66%. Since 2002, the share of coal fuels has decreased by 15.5 percentage points, with a simultaneous increase in the share of renewable energy sources (mainly biomass, which accounted for approximately 12% of the share in the system heat generation structure) and gas fuels (9%), which is confirmed by the successive and gradual direction of changes in Poland's energy economy model.

Coal has dominated the structure of system heat generation in Poland for years (Figure 1). The statistical data in this regard for 2022 indicate a still high share of coal in the structure of district heating production in Poland at the level of approximately 66%. Since 2002, the share of coal fuels has decreased by 15.5 percentage points, with a simultaneous increase in the share of renewable energy sources (mainly biomass, which accounted for approximately 12% of the share in the system heat generation structure) and gas fuels (9%), which is confirmed by the successive and gradual direction

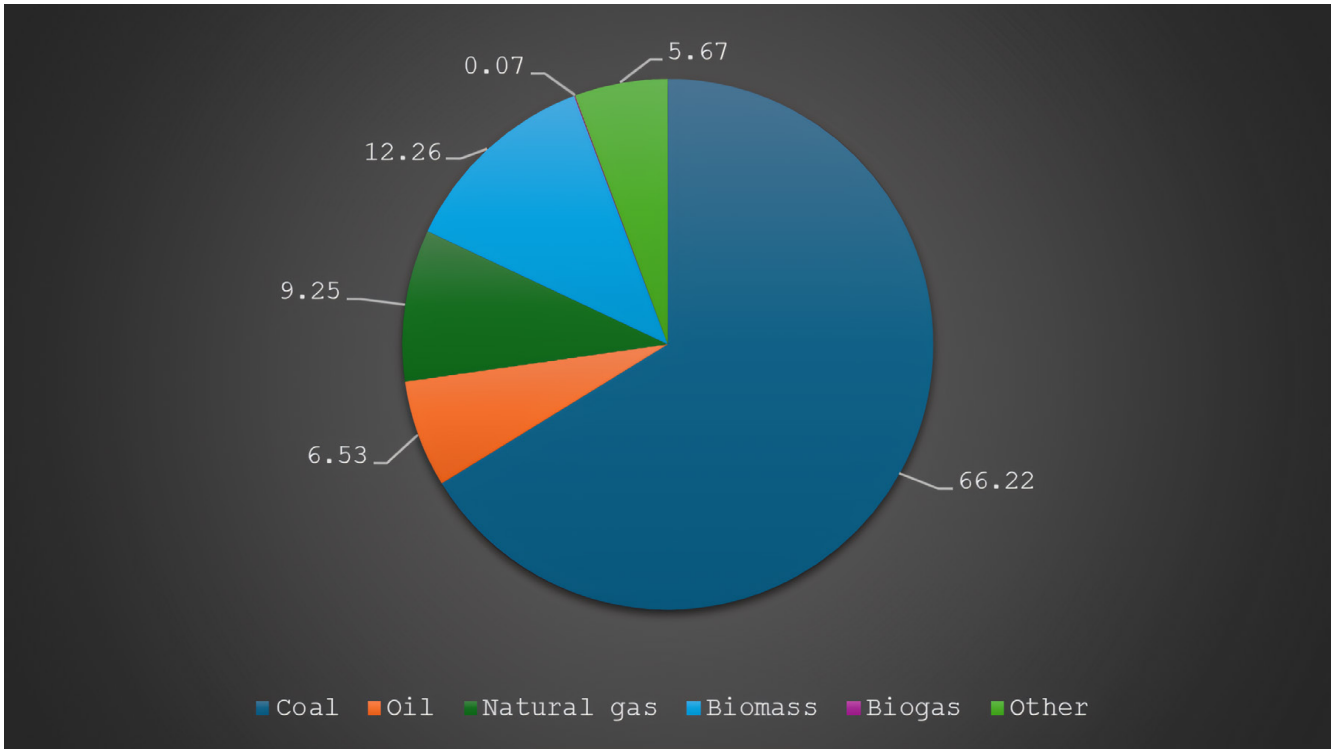
1 Eurostat, https://ec.europa.eu/eurostat/databrowser/view/nrg_bal_s__custom_13361329/default/table?lang=en (access: 18/10/2024)

2 as above

3 According to the report "The impact of the Fit for 55 package on the Polish economy" (pol. "Wpływ pakietu Fit for 55 na polską gospodarkę") by Bank Pekao S.A. of December 2021, the cost of the "Fit for 55" package for Poland in the coming years is nearly EUR 200 billion additionally, and a significant part of these expenditures will concern district heating.

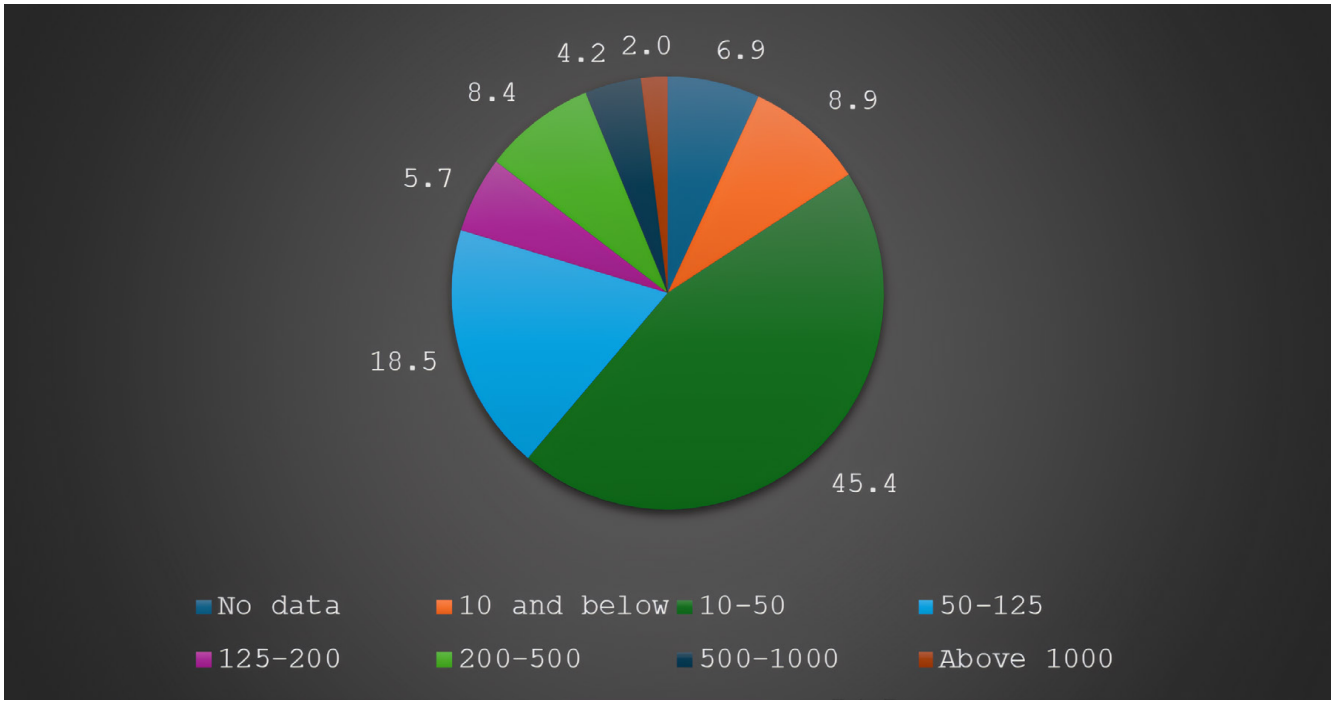
4 However, from the Report of the Polish Association of Utility Heat and Power Plants (pol. Polskie Towarzystwo Elektrociepłowni Zawodowych) from May 2023 entitled "Assessment of the impact of the decisions of the EU "Fit for 55" package on the transformation of the district heating sector in Poland" (pol. "Ocena wpływu rozstrzygnięć unijnego pakietu "Fit for 55" na transformację sektora ciepłownictwa systemowego w Polsce") shows that meeting the requirements of this package in the area of decarbonization of the district heating sector will require expenditure ranging from PLN 276 billion to PLN 418 billion, depending on the adopted investment scenario.

FIGURE 1. STRUCTURE OF DISTRICT HEATING PRODUCTION IN POLAND IN 2022 [%]



Source: Own study based on URE (Energy Regulatory Office) data

FIGURE 2. STRUCTURE OF DISTRICT HEATING COMPANIES ACCORDING TO THE CAPACITY INSTALLED IN HEAT SOURCES IN 2022 [MW]



Source: Own study based on URE data

of changes in Poland's energy economy model. A slightly greater diversity of fuels used to produce district heat occurs in cogeneration units. However, in the context of the Fit for 55 package commitments, the pace of coal consumption reduction must be significantly increased.

The total amount of thermal power installed in units generating system heat in Poland was 53,188 MW in 2022. This means a reduction compared to 2002 by 17,764 MW. Enterprises produced district heat in sources of various sizes, with a predominance of small sources up to 50 MW (220 entities out of 355 producing district heat throughout the country). Only eight licensed companies had the achievable power of their sources exceeding 1,000 MW each, and their total achievable power was approximately 1/3 of the achievable power of all licensed sources. These entities also operated in the area of electricity generation.

An important issue for the heating industry is to provide financial resources for the implementation of necessary investments, meanwhile the financial situation of district heating enterprises is difficult and deteriorating every year. The increase in fuel costs and the need to incur increasing costs related to the purchase of CO_2 emission allowances, under regulated heat prices, causes a gradual deterioration of financial results, profitability and liquidity indicators.

According to the Energy Regulatory Office (URE)[5], the gross financial result in 2022 amounted to minus PLN 6.24 billion (in 2021 – minus PLN 1.5 billion, in 2020 – minus PLN 473.8 million, in 2019 – minus PLN 543 million). The financial result on sales amounted to minus PLN 5.9 billion, and the sales profitability amounted to minus 21.48%.The conclusion is that without external financing, the industry will not be able to bear the burden of investments that must be carried out in order to adapt to EU requirements.

> According to the Energy Regulatory Office (URE), the gross financial result in 2022 amounted to minus PLN 6.24 billion (in 2021 – minus PLN 1.5 billion, in 2020 – minus PLN 473.8 million, in 2019 – minus PLN 543 million). The financial result on sales amounted to minus PLN 5.9 billion, and the sales profitability amounted to minus 21.48%.The conclusion is that without external financing, the industry will not be able to bear the burden of investments that must be carried out in order to adapt to EU requirements.

Outlook of development scenarios for the system district heat generation sector

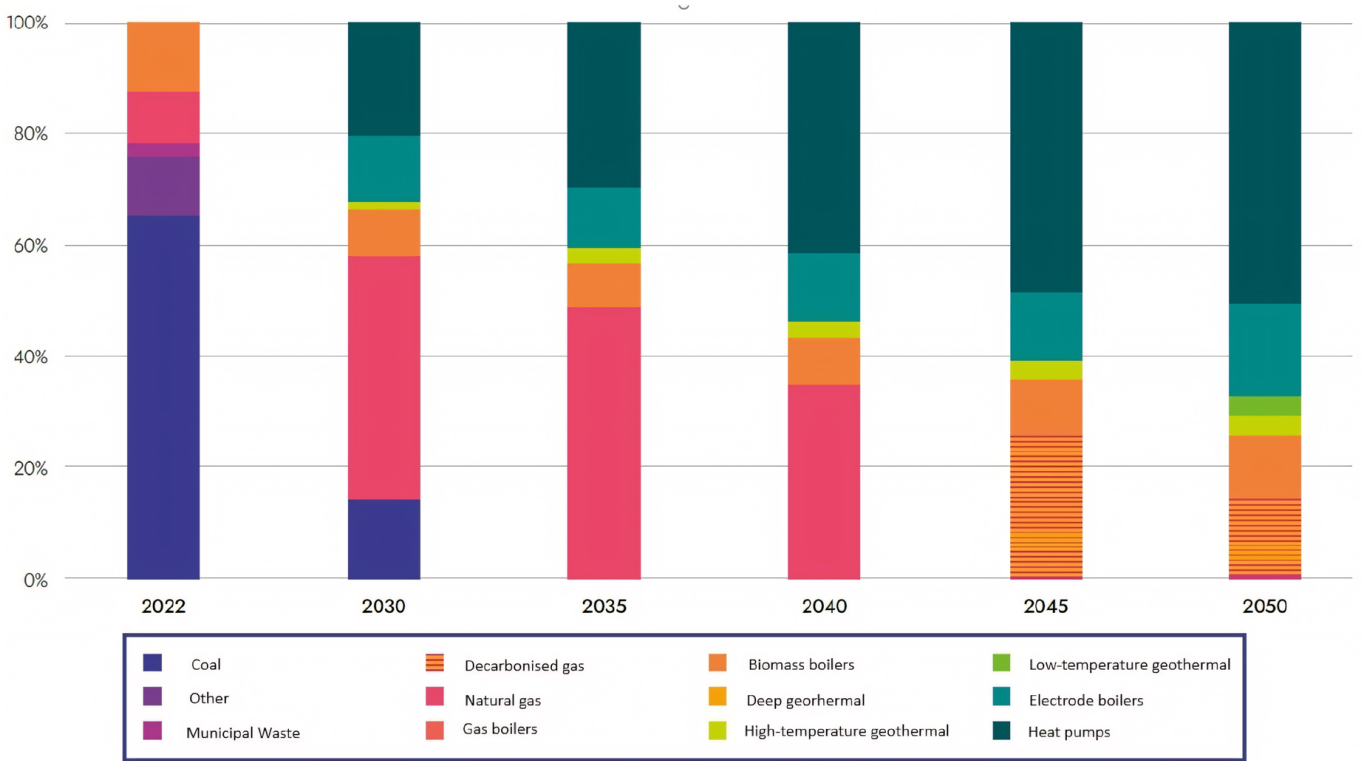
Recently, at least several scenarios for the development of the district heating sector in Poland in the long term have been published. It is worth analyzing them in order to recognize general development trends in this sector.

The latest available analysis in this area is the study of the Polish Association of Utility Heat and Power Plants (PTEZ) entitled "The potential of using Power to Heat technology in the transformation of the district heating sector in Poland"[6]. This study contains three different variants – A (Power to Heat), B (Gas cogeneration) and C (Coal), the results of which in terms of power and production of district heat are presented below. Option A assumes the fastest development of the Power to Heat technology, which will achieve 1 GW of installed capacity of heat pumps and 2 GW of electrode boilers already

5 URE– Energy Regulatory Office, Thermal energy in numbers – 2022 (pol. Energetyka cieplna w liczbach – 2022 r.), Warsaw, October 2023

6 PTEZ – Polish Association of Utility Heat and Power Plants (pol. Polskie Towarzystwo Elektrociepłowni Zawodowych), The potential of using Power to Heat technology in the transformation of the district heating sector in Poland (pol. Potencjał wykorzystania technologii Power to Heat w transformacji sektora ciepłownictwa systemowego w Polsce.). Warsaw, June 2024

FIGURE 3. HEAT PRODUCTION STRUCTURE IN VARIANT A PTEZ [%]



Source: PTEZ

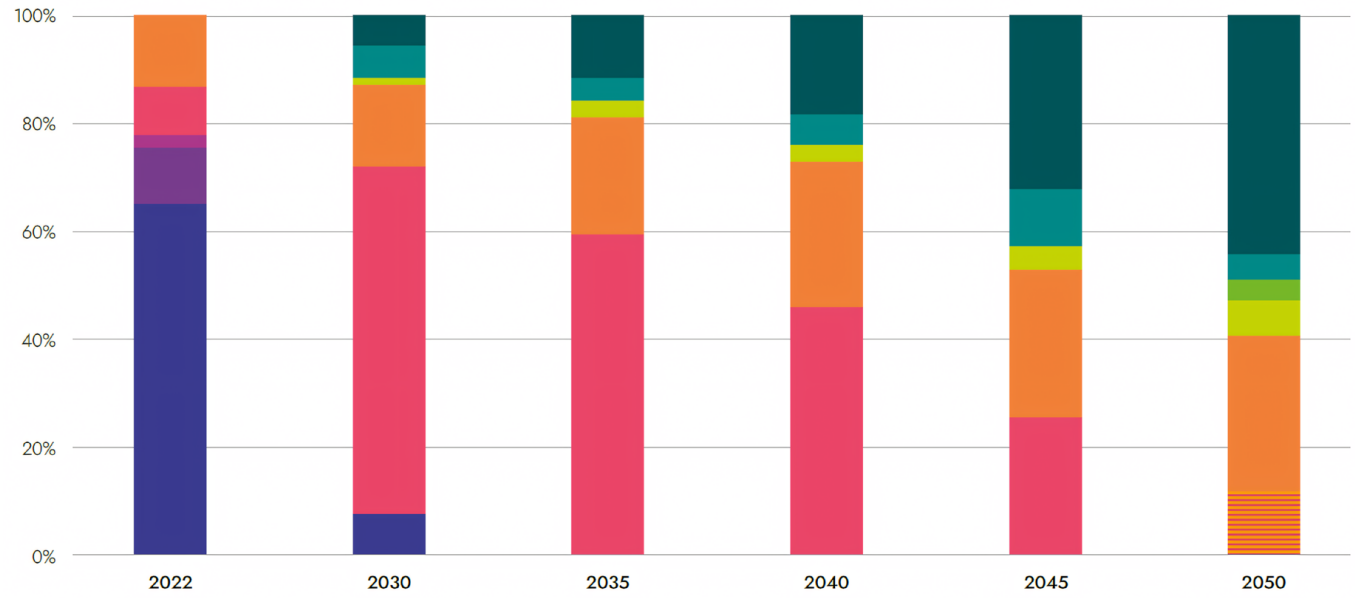
in 2030. Ultimately, in 2050, the capacity of heat pumps is 5 GW and electrode boilers – 10 GW. The scenario also assumes a transition from natural gas to the so-called green gases, i.e. biogas, biomethane or hydrogen.

In variant B, coal was assumed to be replaced by natural gas. Gas cogeneration units are maintained in the system as long as regulatory conditions allow, with the option of switching to zero-emission gases after 2045. Power to Heat technology has been available since 2030, but it constitutes a much smaller share in both the power and production structure compared to Variant A.

Variant C was treated as a reference point in this analysis and presents the structure of system heat production based for a relatively long time on fossil fuels – both coal and natural gas. However, variant C does not meet the regulatory conditions resulting from EU directives. This is a scenario that assumes a conservative approach to the transformation of heat sources and limited access to financing sources, which consequently translates into ineffective heating systems. The scenario assumes greater emphasis on the development of technologies based on biomass and biogas.

Another interesting analysis that was published recently is "The concept of decarbonization of district heating in Poland according to NCBR"(pol.

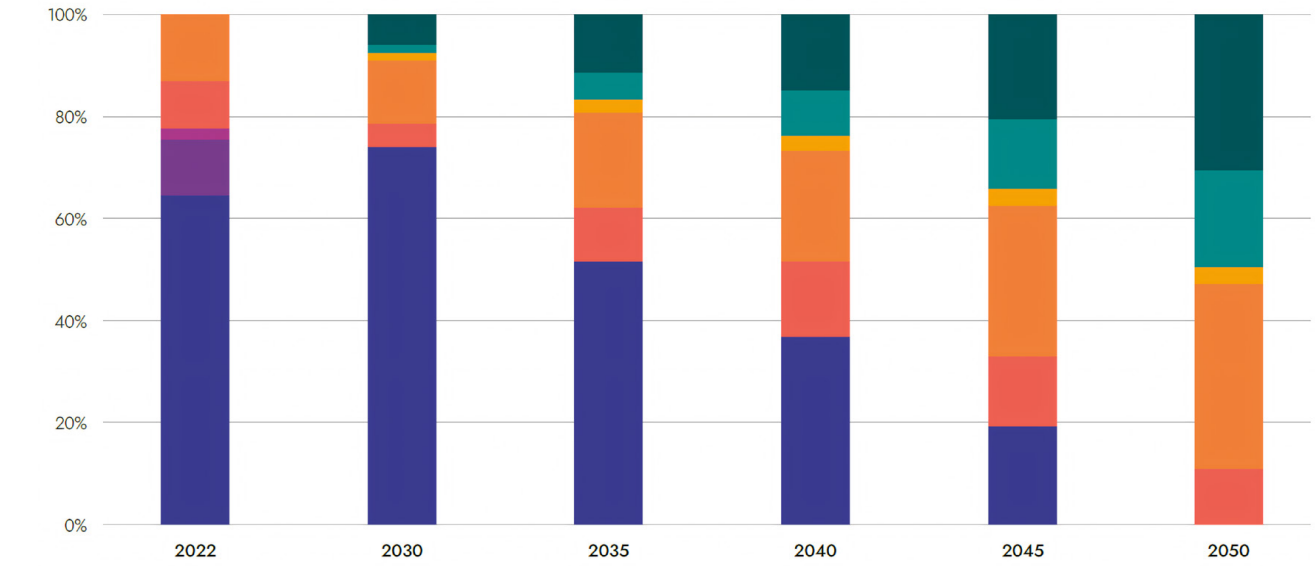
FIGURE 4. HEAT PRODUCTION STRUCTURE IN VARIANT B PTEZ [%]



Source: PTEZ

"Koncepcja dekarbonizacji ciepłownictwa systemowego w Polsce wg NCBR"). It was prepared as a contribution to the update of the "National Energy and Climate Plan for 2021-2030" currently being developed by the Ministry of Climate and Environment. Electrification was adopted as the most appropriate way to decarbonize district heating, which in turn translates into the need for integration and sharing of resources by the electricity and heating sectors. Analyzes carried out by NCBR show that in order to balance the power system based on sources characterized by unstable operation, it

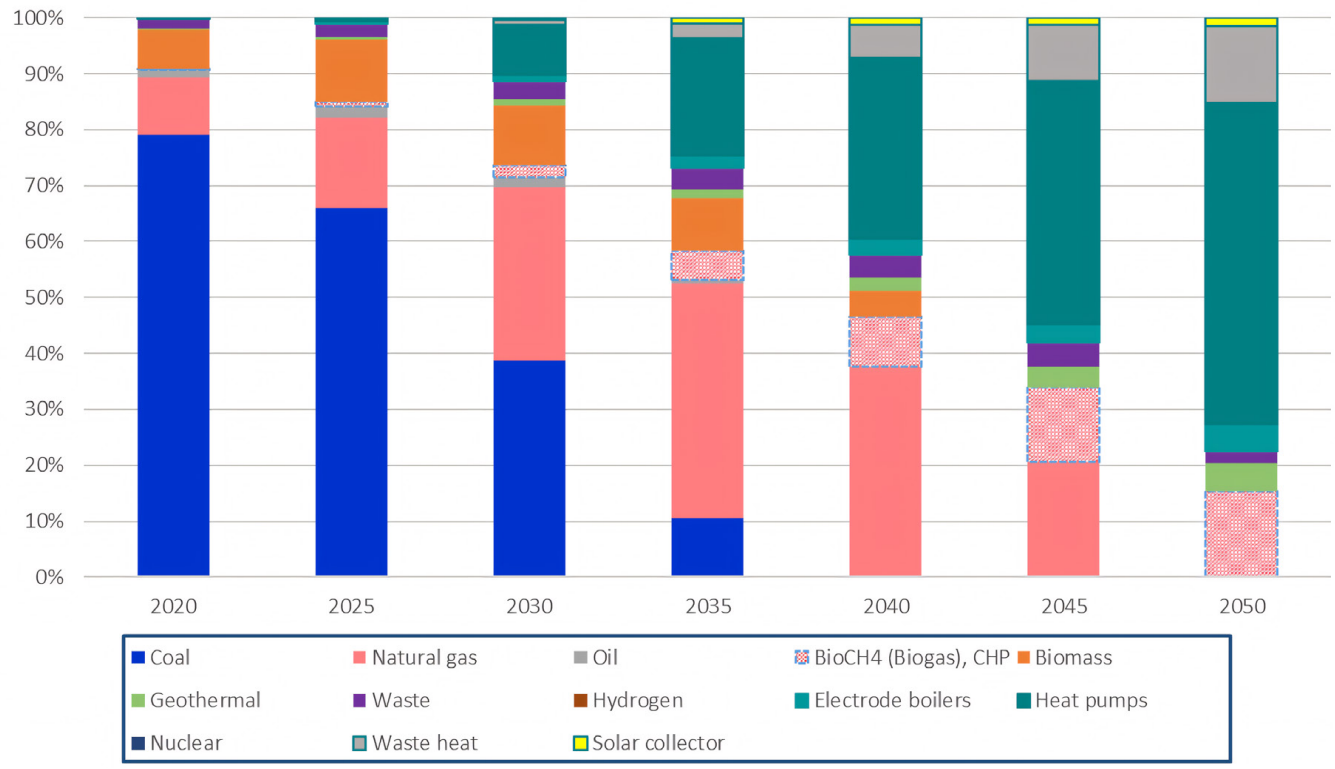
FIGURE 5. HEAT PRODUCTION STRUCTURE IN VARIANT C PTEZ [%]



Source: PTEZ

will be necessary to use heat storage facilities on a large scale. According to NCBR estimates, the total capacity of heat storage facilities should be at least 800 GWh. Heat accumulators will be powered by heat pumps and electrode boilers, which consume electricity during periods of overproduction, during which periods low prices on the wholesale market are expected. When the energy supply in the power system is insufficient, available gas power plants powered by biomethane or hydrogen are to be launched.

FIGURE 6. STRUCTURE OF HEAT PRODUCTION IN THE NCBIR SCENARIO [%]

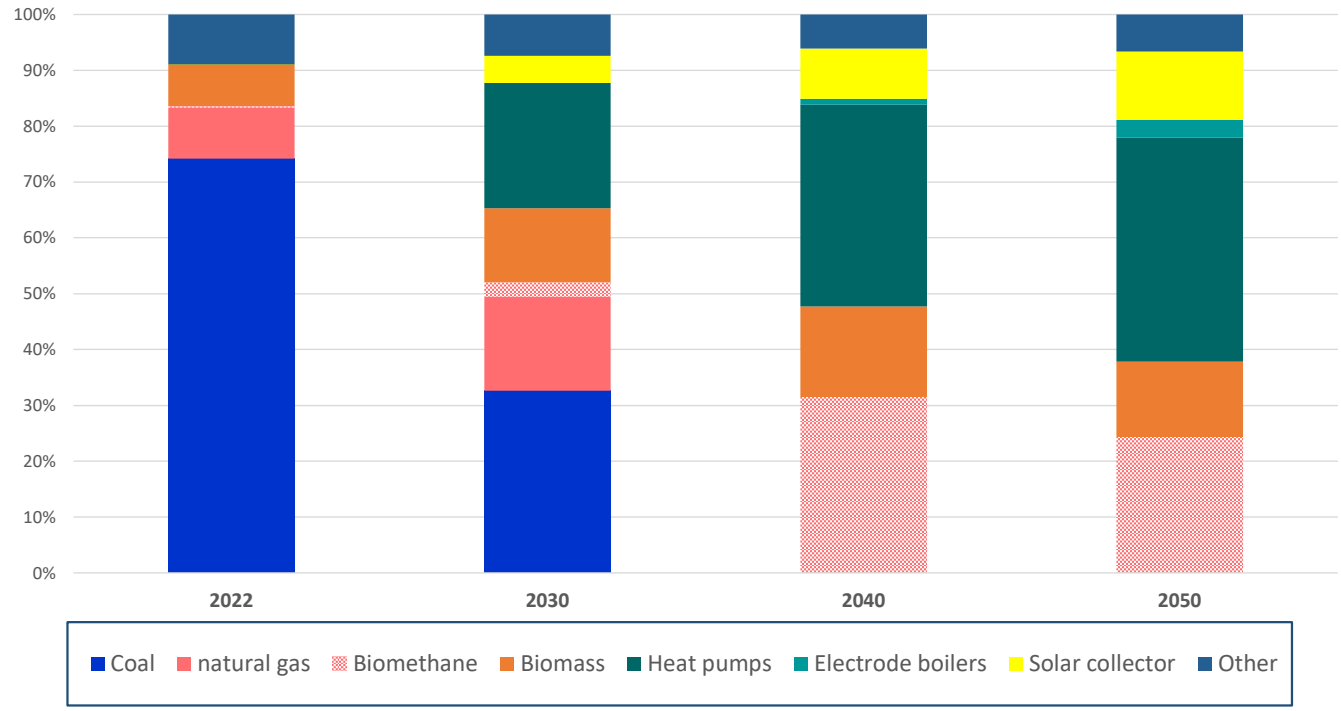


Source: NCBiR

A slightly older study is the report of the Energy Forum published in November 2023 entitled "A future without gas and coal. Strategy for the heat sector." (pol. "Przyszłość bez gazu i węgla. Strategia dla sektora ciepła"). In the scenario presented in the above-mentioned report, the main direction of transformation of district heating is, similarly to the NCBiR study, electrification. Already in 2030, large-scale heat pumps are expected to account for 22% of system heat production. In the following decades, this share increases. Ultimately, in 2050, heat production from heat pumps and electrode boilers is expected to account for 43%. The work assumes that the main "lower" energy sources for heat pumps will be sewage treatment plants (23% of heat for pumps in 2030 and 59% in 2050) and geothermal energy, which will increase its share to 20% in 2030., and then drop to 15% in 2050. The transitional fuel for the transformation of district heating is natural gas, which is planned to be completely phased out by 2040. Natural gas in this scenario is replaced by biomethane, although the potential for using biomethane on such a scale may be questionable. In the study by Forum Energii, biomass was treated as a supplementary fuel due to the fact that it must meet the SCB sustainable development criteria, which means that its availability is subject to certain limitations. In the initial

period of the forecast, it is gaining importance, i.e. its share in the production of system heat increases from 7% to 13% in 2030 and then 19% in 2036. After reaching the peak in 2036, its share gradually decreases – to 14 % in 2050, as a result of its decreasing competitiveness compared to P2H technology.

FIGURE 7. HEAT PRODUCTION STRUCTURE IN THE FORUM ENERGII SCENARIO [%]

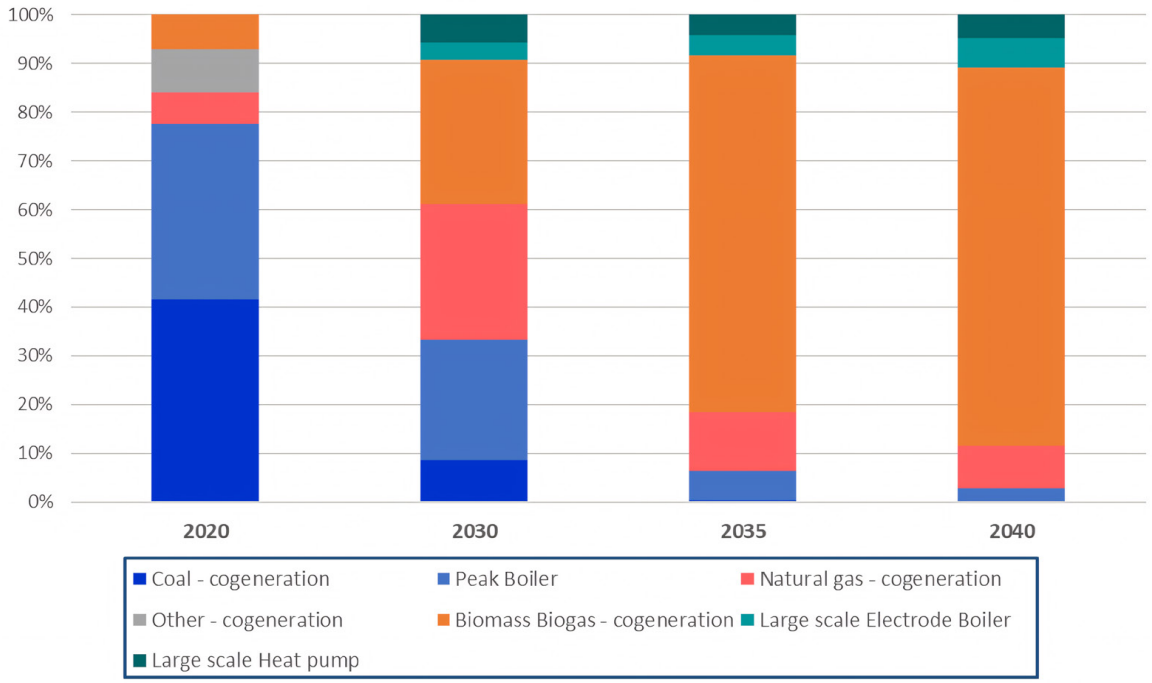


Source: Forum Energii

Another relatively up-to-date vision of the development of the district heating sector in Poland is presented by the Instrat Foundation in a study entitled "Almost emission-free Poland. Four energy transformation scenarios by 2040."[7]. The leading trend in all scenarios presented is the move towards effective cogeneration, based on gas in the initial phase of the transformation, and after 2030 on environmentally sustainable agricultural biomass and biogas. Taking into account the potential for the development of biogas plants in Poland, thermal power plants and agricultural biomass heating plants play a key role here (it remains an open question to what extent the development of sources based on biomass may be additionally limited by the potential further tightening of SCB criteria, difficulties related to the logistics of fuel supplies and the availability of biomass on the market). Large heat storage facilities play an important role as they are one of the key energy storage technologies. Due to the relatively small differences between the scenarios, the article presents only the S1 scenario for the ambitious development of renewable energy and nuclear energy.

7 Kubiczek P., Smoleń M., Żelisko W., Poland almost emission-free. Four energy transformation scenarios by 2040. (pol. Polska prawie bezemisyjna. Cztery scenariusze transformacji energetycznej do 2040 r.). Warsaw, 2023.

FIGURE 8. STRUCTURE OF HEAT PRODUCTION IN THE SCENARIO OF AMBITIOUS DEVELOPMENT OF RENEWABLE ENERGY AND NUCLEAR ENERGY ACCORDING TO THE INSTRAT FOUNDATION [%]



Source: Instrat Fundation

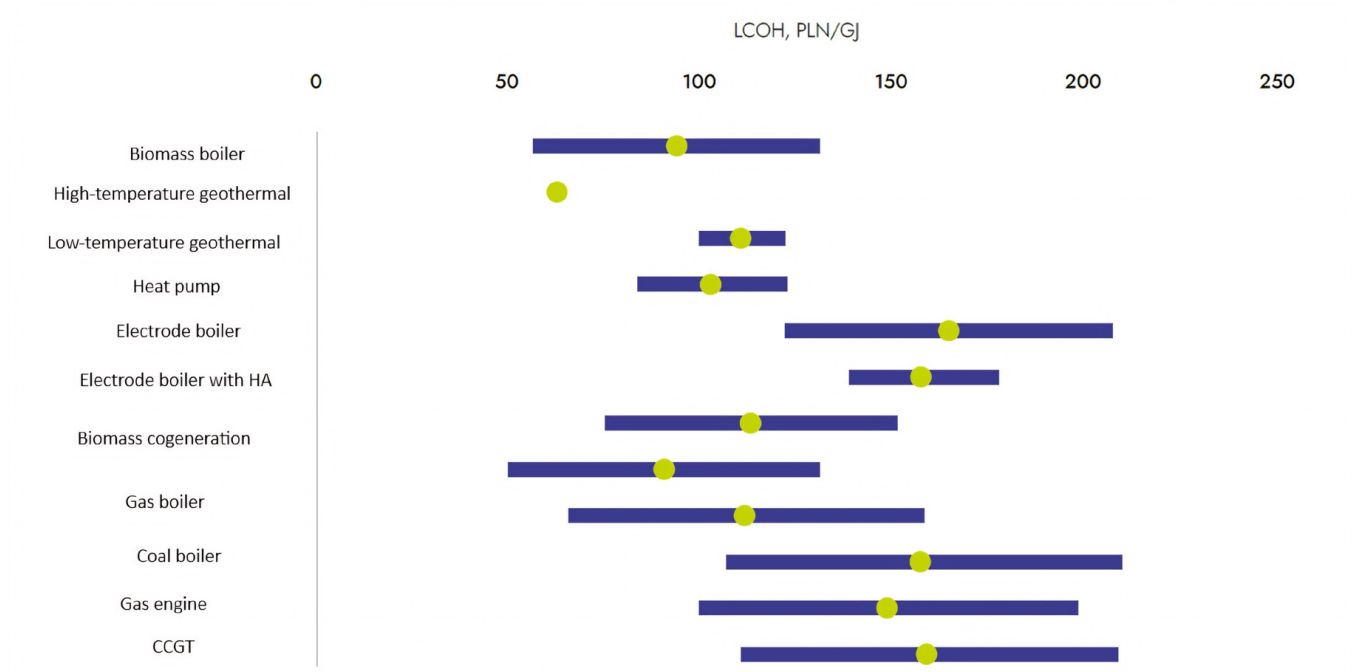
LCOH costs of heat generation technologies

An important criterion for selecting an appropriate scenario are the costs of heat production, which are then reflected in the prices for heat delivered to end users. The analysis carried out by PTEZ shows that the cheapest solutions are biomass technologies (Fig. 9), but it can be expected that in the conditions of a significant increase in demand for biomass, the costs of obtaining biomass in the future would be higher. At the other extreme there are electrode boilers, but it must be remembered that, to a large extent, electrode boilers will serve as peak load sources, so relatively high variable costs do not necessarily exclude this technology.

In general, the costs of heating technologies based on electricity will largely depend on electricity prices, which in turn will result not only from the adopted directions of development of the energy sector itself and the pace of its modernization, but also from the pace of electrification of other branches of the economy. A significant increase in demand for electricity in other sectors may mean that the availability of relatively cheap energy from surplus renewable energy production will be limited, increasing the costs of electricity-based heating.

In general, the costs of heating technologies based on electricity will largely depend on electricity prices, which in turn will result not only from the adopted directions of development of the energy sector itself and the pace of its modernization, but also from the pace of electrification of other branches of the economy. A significant increase in demand for electricity in other sectors may mean that the availability of relatively cheap energy from surplus renewable energy production will be limited, increasing the costs of electricity-based heating.

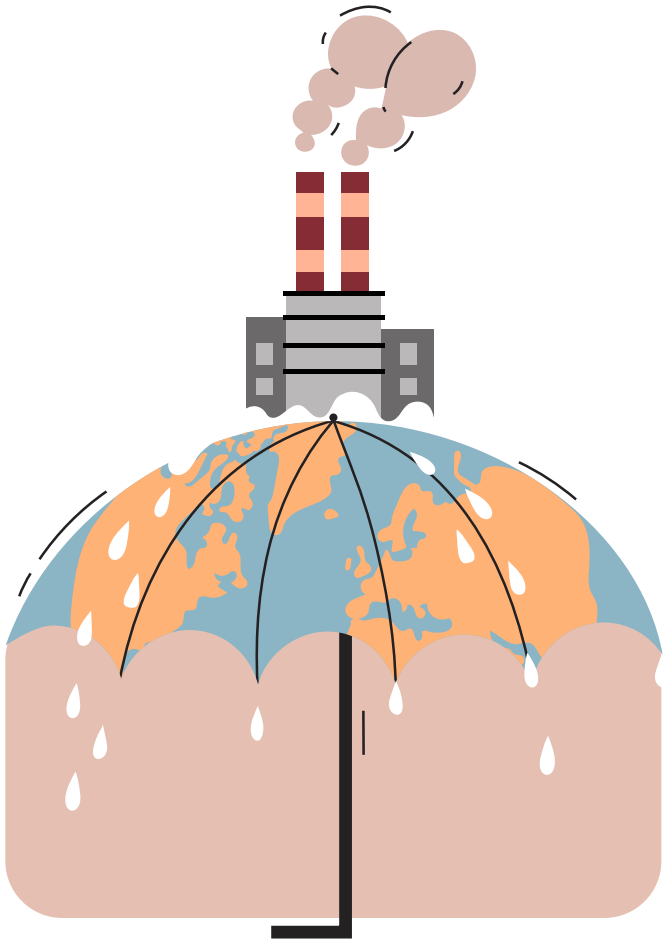
FIGURE 9. LCOH FOR SYSTEM HEAT GENERATION TECHNOLOGY [PLN/GJ]



Source: PTEZ

Conclusions:

Despite the theoretically wide availability of low- and zero-emission technologies, the choice of the optimal variant of investment, taking into account the security of heat supply and acceptable prices is not obvious. However, apart from significant differences in the vision of the development of the district heating sector presented by individual research centers, there are also clear common elements. First of all, most analyzes show the significant role of electrification of district heating, which is seen as an opportunity to meet the goals related to Poland and the EU's pursuit of climate neutrality.



The complete or partial use of renewable electricity by P2H installations contributes to increasing the share of green energy in the heating sector. At the same time, the development of this technology may have a positive impact on the use of surplus electricity from renewable energy

The complete or partial use of renewable electricity by P2H installations contributes to increasing the share of green energy in the heating sector. At the same time, the development of this technology may have a positive impact on the use of surplus electricity from renewable energy sources in the national power system. Integration of the energy system with heating systems in the technical and regulatory area is a very important element of the broadly understood energy transformation.

sources in the national power system. Integration of the energy system with heating systems in the technical and regulatory area is a very important element of the broadly understood energy transformation. However, as mentioned above, this direction of development of district heating is strongly dependent on changes in the electricity generation and distribution sector. A significant increase in power demand related to the electrification of heating will require huge investments in the modernization of transmission and distribution networks. Moreover, it is necessary to take into account the fact that the electrification of other sectors of the economy will also take place in parallel, which means that the available amounts of relatively cheap energy from surplus renewable energy production may be much smaller than it is assumed today.

A significant increase in power demand related to the electrification of heating will require huge investments in the modernization of transmission and distribution networks. Moreover, it is necessary to take into account the fact that the electrification of other sectors of the economy will also take place in parallel, which means that the available amounts of relatively cheap energy from surplus renewable energy production may be much smaller than it is assumed today.

It seems that we should not focus on one direction of development of system heating, but take into account wider range of available technologies. With regard to the role and share of other technologies for the production of system heat, the scenarios presented above from various research centers present divergent visions. In particular, this concerns the issue of the development of biomass sources, which, in our opinion, should also find a place in the future structure of system heat production, but today it is difficult to clearly predict the scale of this development. To conclude, it seems that the main direction of development of district heating should be primarily electrification, but also supported by other technologies, with natural gas as a bridge technology between today's and the target heating mix.

Bibliography:

1. Eurostat, https://ec.europa.eu/eurostat/databrowser/view/nrg_bal_s__custom_13361329/default/table?lang=en (access: 18/10/2024)
2. Kubiczek P., Smoleń M., Żelisko W., Poland almost emission-free. Four energy transformation scenarios by 2040. (pol. Polska prawie bezemisyjna. Cztery scenariusze transformacji energetycznej do 2040 r.). Warsaw, 2023.
3. Pekao SA (Polish bank), "The impact of the Fit for 55 package on the Polish economy" (pol. "Wpływ pakietu Fit for 55 na polską gospodarkę"). Warsaw, December 2021
4. PTEZ – Polish Association of Utility Heat and Power Plants (pol. Polskie Towarzystwo Elektrociepłowni Zawodowych), Assessment of the impact of the decisions of the EU "Fit for 55" package on the transformation of the district heating sector in Poland (pol. Ocena wpływu rozstrzygnięć unijnego pakietu "Fit for 55" na transformację sektora ciepłownictwa systemowego w Polsce). Warsaw, May 2023
5. PTEZ – Polish Association of Utility Heat and Power Plants (pol. Polskie Towarzystwo Elektrociepłowni Zawodowych), The potential of using Power to Heat technology in the transformation of the district heating sector in Poland (pol. Potencjał wykorzystania technologii Power to Heat w transformacji sektora ciepłownictwa systemowego w Polsce.). Warsaw, June 2024
6. URE– Energy Regulatory Office, Thermal energy in numbers – 2022 (pol. Energetyka cieplna w liczbach – 2022 r.), Warsaw, October 2023

Free allocation rules for installations in the Emissions Trading System

Authors:

Sylwia Kryłowicz, Deputy Manager, Emissions Allowances Allocation Unit, KOBIZE

Przemysław Chrzan, Chief Specialist, Emissions Allowances Allocation Unit, KOBIZE

Tomasz Majchrzak, Head of the Emissions Allowances Allocation Unit, KOBIZE

Free allocation rules for installations in the Emissions Trading System

Key words: Emissions Trading System, Free Allocation of Emission Allowances, Emission Allowances, Pool of Allowances, Benchmark.


Author:
Sylwia Kryłowicz


Author:
Przemysław Chrzan


Author:
Tomasz Majchrzak

Summary:

A further amendment to Directive 2003/87, which entered into force in June 2023, amended the rules for the free allocation of emission allowances for installations covered by the emissions trading scheme. The increased reduction target for 2030 to 62% for installations covered by the EU ETS will reduce the available free allocation pool. The article focuses on the relationship between the pool of available emission allowances for free allocation between installations covered by the EU ETS and the allocation rules and variables affecting the final number of allowances allocated. The first part of the article focuses on demonstrating the rules affecting the limitation of the availability of emission allowances that can be allocated free of charge. The next part of the article is devoted to harmonised allocation rules and their amendments. The article presents the method of calculating the individual allocation of emission allowances for installations, as well as the elements having the greatest impact on the number of emission allowances allocated to installations, i.e., product, heat or fuel benchmarks. The last part of the article is devoted to the rules for adjusting benchmarks based on the 10% most efficient installations in a given sector or subsector in the Union in terms of relevant benchmarks in the year to which the adjustment relates.

Amendments to the allocation rules for installations for the subperiod 2026-2030

Discussion of the changes to the rules for free allocation of emission allowances to installations in the 2026-2030 subperiod introduced by Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 *concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme*[1] *(hereafter:* "Directive 2023/959") requires going back to 2009 and discussing the provisions for establishing transitional Union-wide rules for harmonised free allocation of emission allowances, starting with the third phase of the ETS, i.e., in the trading period 2013-2020.

In 2009, the rules for the functioning of the Emissions Trading System (EU ETS) were profoundly reformed by Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009, amending Directive 2003/87/EC *so as to improve and extend the greenhouse gas emission allowance*

1 OJ Urz. EU L 130, 16.5.2023, p. 134.

trading scheme of the Community. [2] (hereinafter: 'Directive 2009/29'). The most important element of the changes was the establishment of an EU-wide pool (Trade and *Cap*) of emission allowances, which is designed to support the achievement of the reduction targets adopted in a given trading period.

The creation of an EU-wide pool was possible after the end of the period set out in the Kyoto Protocol,[3]i.e. the years 2008-2012, and the achievement of the reduction targets adopted individually for the countries that joined the European Union in 2004, including Poland, and the common reduction target for the so-called Kyoto Protocol. the "old 15" European Community countries that have negotiated a common reduction target in Kyoto.

The Union-wide allowance **pool has been established as the sum of the contributions of each EU Member State. The determination of the contribution was based on the average of the total annual quantity of allowances issued by Member States in accordance with the Commission Decisions on their National Allocation Plans for the period 2008-2012 of 2010.** The pool thus determined shall decrease annually by a linear factor of 1,74 %. In addition, the extension of the EU ETS to new activities, in particular to the chemical industry, resulted in an increase of the designated pool by verified emissions from these new activities. The pool thus determined for 2013 was 2 084 301 856 emission allowances, following Decision 2013/448.[4] The level of reduction was also set in the third phase of the EU ETS covering the period 2013-2020, and from 2014, the pool is reduced by a linear factor of 1.74%, which gives the amount of 38 264 246 allowances. Total emission reductions in the Union in 2020 were set at 21% in relation to 2005 emissions.

The second element of the changes introduced in 2009 was a change in the distribution of allowances. During the third trading period of the EU ETS (with a few exceptions), no emission allowances are allocated free of charge for emissions related to electricity production, and the emission allowances generated by this sector will be auctioned. And this auction has become the basic tool for distributing allowances for installations.

The rules on free allocation of allowances to installations are intended to be a transitional tool and apply only to industrial installations. Due to the introduction of the two distribution tools, it was necessary to divide the main pool of allowances into two 'baskets', so 57% of the available pool of allowances is intended for auctioning, and 43% is intended for free allocation to installations where industrial activities are carried out. In addition, 5% of the EU-wide allowance pool is set aside for the new entrants reserve. A reserve of up to 300 million allowances has also been created to support the construction and launch of demonstration projects aimed at the environmentally safe capture and geological storage of $CO2_{(so\text{-}called\ CO2}$ capture and geological storage). CCS) and demonstration projects of innovative renewable energy technologies in the territory of the Union.

The number of allowances available in a given year from the EU-wide pool is also affected by the Market Stability Reserve[5], which aims to balance supply and demand in the short term and to minimise price volatility during auctioning, for example, the introduction of auction backloading, which aimed to change the distribution of auction volumes between 2013 and 2020.

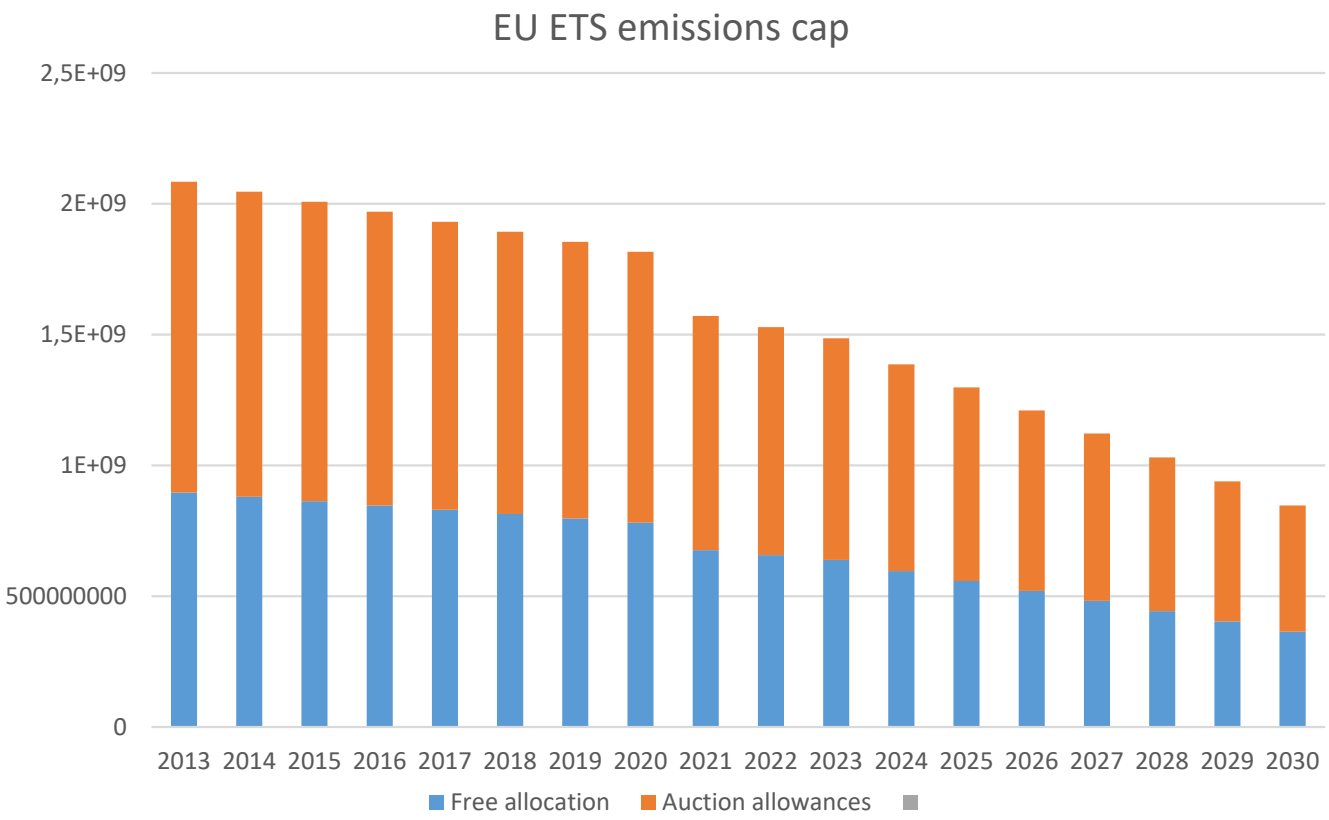
2 OJ Urz. EU L 059, 27.2.2019, p. 8.

3 Kyoto Protocol to the United Nations Framework Convention on Climate Change, done at Kyoto on 11 December 1997 (OJ U. 05.203.1684).

4 Commission Decision 2013/448/EU of 5 September 2013 concerning national implementing measures for the transitional free allocation of greenhouse gas emission allowances pursuant to Article 11(1) Directive 2003/87/EC of the European Parliament and of the Council Urz. EU L 240, 7.9.2013, p. 27).

5 Decision (EU) 2015/1814 of the European Parliament and of the Council of 6 October 2015 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC Urz. EU L 264, 9.10.2015, p. 1)

FIGURE 1. CHANGES TO THE EU-WIDE ALLOWANCE POOL BETWEEN 2013 AND 2030.



Source: KOBIZE's own study based on Decision 2013/448, Decision 2020/1722 and Decision 2023/1575.

Rules for free allocation of emission allowances

1) Phase 3 of the EU ETS, trading period 2013-2020

The rules introduced for the free distribution of allowances have made it necessary to set out a harmonised way of allocating allowances to installations throughout the Union. As indicated above, 43 % of the allowances available in the Union were to be allocated. The rules for free allocation of emission allowances have been set so as to give an impulse to operators of installations covered by the EU ETS to further reduce emissions, e.g. the transition from the use of hard coal as a fuel to natural gas was a sufficient action to reduce emissions in phase 3 of the EU ETS when the benchmark was based on the benchmark for natural gas in subsequent phases when the benchmark was reduced such action is no longer sufficient. Therefore, the rules on free allocation of emission allowances are intended to stimulate further reduction efforts by introducing competition between installations operating in the sector concerned. Defining a list of sectors or subsectors of industry at risk of carbon leakage has become an essential element of free allocation.

What do sectors at risk of carbon leakage mean?

In order to protect the competitiveness of the EU industry, the European Commission, in phase 3 of the EU ETS, examined the direct and indirect costs arising from the implementation of Directive 2003/87 for installations. If the production cost in relation to the gross value increases and certain criteria are met, there is a risk of carbon leakage. The first criterion is defined on the basis of a cost of at least 5% and an intensity of trade with third countries

of more than 10%; the second criterion refers to the sum of direct and indirect additional costs of at least 30% or the intensity of trade with third countries exceeded 30% defined by product by NACE or PRODCOM codes. The fulfilment of one or both conditions by the sector or sub-sector concerned led to its inclusion in the carbon leakage list, which meant that it was cost-effective to bring the good in question from third countries, which could lead to installations/productions being moved out of the Union. The first list of sectors or subsectors at risk of carbon leakage was established in 2010 by Decision 2010/2[6], and the second by Decision 2014/746[7] covered the period 2015-2019. The third decision was adopted in 2019, which amended the criteria for determining whether a sector or subsector is deemed to be at risk of carbon leakage. In Decision 2019/708,[8] the exposure of sectors to carbon leakage was assessed based on an indicator reflecting trade with third countries and the intensity of emissions, the list of sectors refers to the period 2021-2030.

To calculate the number of emission allowances for an installation, the determined values of product benchmarks (benchmarks), defined as the emissions related to the production of one unit of a given product, were used. Such an assumption makes it possible to compare installations producing a given product in different EU Member States. In order to achieve this objective, a comparative analysis was carried out for identified products produced in installations covered by the EU ETS. The identification of products was based on NACE or PRODCOM codes, and then, for each of the goods, it was necessary to define system boundaries identifying the processes that occur during their production and cause

The carbon leakage list has a direct impact on the number of allowances allocated free of charge to installations. Since 2013, free allocation has allocated 80% of the total quantity of allowances to the installation calculated in accordance with Commission Decision (EU) 2011/278 of 27 April 2011 determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council[9] (hereinafter: 'Decision 2011/278'). This level has been decreasing each year to reach 30% by 2020, with the exception of this rule for 100% allocation to sectors and subsectors identified as exposed to carbon leakage.

or may cause emissions. In this way, the system gradient of the benchmark, i.e. the indicator, was determined. There are 52 product benchmarks and two so-called fall-back approaches for heat and fuel. However, it should be noted that some activities carried out in installations have been covered by the EU ETS due to installed combustion units exceeding the rated thermal input above 20 MW. Therefore, comparative analysis for such diverse and heterogeneous products was difficult to perform. As not all production processes are covered by the EU ETS, a fall-back approach has been developed. As indicated above, electricity generation is not allocated free allowances and therefore, only two fall-back benchmarks have been set, i.e. a heat benchmark for the use of measurable heat in processes and a fuel benchmark for non-measurable

6 Commission Decision 2010/2 of 24 December 2009 determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage *Urz. EU L 1 of 05. 01.2010, p. 10).*

7 Commission Decision 2014/746 of 27 October 2014 determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage for the period 2015 to 2019 *Urz. (OJ* L 308, 29.10.2014, p. 114).

8 Commission Delegated Decision (EU) 2019/708 of 15 February 2019 supplementing Directive 2003/87/EC of the European Parliament and of the Council as regards the identification of sectors and subsectors determined to be at risk of carbon leakage for the period 2021-2030 (OJ*L 347, 20.12.2019, pp. Urz. EU L 120, 8.5.2019, p. 20).*

9 OJ Urz. EU L 130, 17.5.2011, p. 1.

heat. Measurable heat is considered to be heat transferred via pipelines using a carrier such as, inter alia: steam, hot water, oil, etc., which allows it to measure the use of heat in production processes. Where heat or mechanical energy is directly used in the production process without the indirect production of measurable heat, there is non-measurable heat when energy is generated in the combustion of fuels in furnaces or dryers. The last type of emission for which free allowances are allocated has not been defined as a benchmark but has been determined on the basis of historical emissions from process emissions. Process emissions are essential in some manufacturing processes where coal is part of the raw material. The allocation to process emissions was based on grandfathering combined with a correction factor to adjust the methodology – that is, in relation to the effort required by the installation to contribute to the overall reduction of greenhouse gas emissions. To that end, the grandfathering provisions identify the processes for which free allocation is based on a certain percentage of total emissions from those processes.

In order to set benchmarks, Directive 2009/29 lays down rules which provide that the starting point for setting benchmarks should be the average performance of the 10% most efficient installations in the European Union (understood in this context as the European Economic Area) over the period 2007-2008. The indicator takes into account all emissions (including those related to heat generation) except those related to electricity consumption. In addition, it was assumed that for *the product benchmarks 'one product one benchmark',* which means that the benchmarks are not differentiated according to the technology, fuel mix, size, age of the installation, climatic conditions, or quality of the raw materials used in the installations producing the product. In this way, all GHG emission reduction options remain an integral part of the benchmarking methodology. The Directive has established an allocation system based on the *ex-ante* principle. In the case of product benchmarking, all three factors of fuel mix, heat production efficiency and heat end-use efficiency shall be considered for the determination of the benchmark expressed as t CO_2 /t unit of production. However, the benchmark for heat and fuel production expressed as t CO_2/ TJ energy of heat produced or fuel consumed. In the case of process emissions and grandfathering, individual CO2 emissions from the following processes shall be taken into account for allocation:

- the chemifcal, electrolytic or pyrometallurgical reduction of metal compounds contained in ores, concentrates or secondary materials whose primary purpose is not the production of heat,
- removal of impurities from metals and their compounds whose primary purpose is not the production of heat,
- pyrolysis of carbonates, except for the treatment of waste gases, the primary purpose of which is not the production of heat,
- chemical synthesis of products and intermediate products in which the carbon-containing material participates in reactions, the primary purpose of which is not the production of heat,
- the use of carbon-containing additives or raw materials whose primary purpose is not the production of heat,
- the chemical or electrolytic reduction of metal or non-metal oxides, such as silicon oxides and phosphates, the primary purpose of which is not the production of heat.

The first benchmarks were included in Commission Decision 2011/278/EU. The act also included rules for calculating the allocation of installation emission allowances.

To determine the allocation correctly, installations had to be divided into so-called sub-installations, which denote factors of production, products and corresponding emissions. Due to the types of benchmarks, we can distinguish 4 types of sub-installations:

1. product benchmark sub-installation,
2. heat benchmark sub-installation,
3. fuel benchmark sub-installation,
4. process emissions sub-installation.

To designate a sub-installation in an installation, each operator of the installation identified the products produced in the installation based on NACE or PRODCOM codes and, on this basis, in accordance with the established hierarchy, first checked whether a product benchmark had been defined for a given product. If the answer was yes, the operator designated a product benchmark sub-installation, if the answer was no, it verified whether measurable heat is produced, in which case it designated a heat benchmark sub-installation and, if not, a fuel benchmark sub-installation or a process emissions sub-installation where one of the above processes is carried out in the installation. The next element is to provide data on the production volume during the reference period, either the average production of the product concerned for the years 2005-2008 or the average for the years 2009-2010, which was higher, for each sub-installation, and to attribute the emissions associated with the production of that product. Since the carbon leakage list was also determined based on NACE or PRODCOM codes, the designated sub-installation was either carbon-leakage CL or non-carbon-leakage CL. The calculation of the preliminary allocation of emission allowances at sub-installation level was based on the formula:

$$F_{i,k} = BM_i \times HAL_i \times CLEF_i,$$

Where:

- *Fi,k – Annual preliminary allocation to sub-installations in year k (number of allowances per year),*
- *HALi- historical activity level of the sub-installation (activity unit per year),*
- *BMi – the applicable benchmark value for product or heat or fuel or 97% of process emissions,*
- *CLEFi- Applicable Carbon Exposure Factor (without unit).*

For an installation, the preliminary quantity of emission allowances to be allocated shall be the sum of the quantity of allowances to be allocated for each separate sub-installation in the installation. As indicated above, the calculations relate to the determination of the preliminary number of emission allowances to be allocated, while the final number of emission allowances to be allocated is adjusted using either a cross-sectoral correction factor (CSCF)or a linear factor. As has already been said, the pool of allowances available for allocation to installations in the Union is limited to 43% of the Union-wide pool, and where the applications for Union-wide allocation submitted by operators exceed the available pool of allowances, it is necessary to determine a cross-sectoral uniform correction factor. In the third phase, it was necessary to determine this coefficient, which is why the specific CSCF reduced the allocation of allowances by about 11% in 2013 and because the amount of available allowances decreases from year to year, the coefficient increased every year until 2020, reaching a value of about 22%.

Specific procedures have been prepared for electricity generators. As already indicated, no emission

allowances have been allocated free of charge for the production of electricity since 2013, but the generation of measurable heat in high-efficiency cogeneration units as defined in Directive 2004/8/EC[10]or the generation of heat for district heating by power plants/CHPs has resulted in the possibility to apply for free allocation of allowances for the production of measurable heat. However, in each year following 2013, the total allocation of allowances to that type of installation with respect to the production of heat shall be adjusted by a linear factor. A similar rule also applies to new entrants for which the quantity of allowances allocated is adjusted by a linear factor of 1.74% over that period, starting from the second year in which the installation was included in the EU ETS.

2) Phase 4, billing period 2021-2030

2.1) 2021-2025 sub-period

During phase 4 of the EU ETS, further changes were introduced, including, inter alia, the free allocation of emission allowances.

> **Directive 2018/410[11] amended the setting of a new value for the linear factor of 2.2% for that period (until 2024) and introduced the principle of adjusting the values of benchmarks, an important element of the formula for calculating the allocation of allowances.**

In addition, phase 4 of the trading period is divided into two 5-year allocation sub-periods for which benchmarks will be adjusted, resulting in a two-fold reduction of the benchmark value. Rules have been introduced to adjust the benchmark values set out in Commission Decision 2011/278/EU for 54 benchmarks. In addition, for process emissions representing around 1% of industrial emissions covered by the EU ETS, emission allowances are allocated on the basis of historical emissions, with installations receiving 97% free allocation based on historical process emissions. The rules for determining the historical activity level, which was based on the average of the five-year period preceding the application for allocation, were also amended

10 Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC Urz. EU L 52, 21.2.2004, p. 50).

11 Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments and Decision (EU) 2015/1814.

for the first subperiod, 2014-2018 and for the second subperiod, 2019-2023. The changes made to benchmark values did not concern any changes to the definitions of benchmarks, including within the system boundary for the period of 2021-2025. The revised benchmark values were determined on the basis of verified information on the greenhouse gas intensity provided by operators and reported in the national implementing measures pursuant to Article 11 of Directive 2003/87/EC[12] of 2016 and 2017. The average efficiency of the 10% most efficient installations in those years was calculated for each indicator. On the basis of a comparison of those values with the benchmark values laid down in Decision 2011/278/EU, which was based on data for the years 2007 and 2008, annual reduction rates were established for the benchmarks for the nine-year period from 2007/2008 to 2016/2017. Those annual reduction rates were then used to calculate, by extrapolation, the corresponding reductions in the benchmark values for the 15-year period from 2007/2008 and until 2022/2023. The reduction applied over a period of 15 years should not be lower than 3% (annual reduction rate 0.2%) or higher than 24% (annual reduction rate 1.6%). This approach means that we are dealing with 5 cases of reduction in the annual rate. An annual reduction rate below the 0.2% threshold, in which case the maximum reduction of the reference ratio will be 3% with the same reduction if the annual reduction rate is equal to 0.2%. In the third case, the annual reduction rate will be above the 0.2% threshold and below the 1.6% threshold in such circumstances, the individual annual reduction rate is calculated, which will be applied for 15 years. Two further cases concern examples where the annual reduction rate is equal to or above the 1.6% threshold. In both cases, an annual reduction rate of 1.6% is applied, leading to a reduction of the benchmark value by 24%. In addition, in accordance with Article 10a para. Specific provisions apply to the update of benchmark values for aromatics, hydrogen, synthesis gas and liquid metals in Directive 2003/87/EC, where benchmark values for those products are adjusted by the same percentage as those for refineries, and the benchmark for hot metal is updated by an annual reduction rate of 0.2%. The Commission has assessed the national implementing measures, i.e. the list of installations containing information relevant for free allocation, which were submitted by each EU Member State by 30 September 2019. In its assessment, the European Commission has drawn attention, in particular, to the completeness and consistency of the data and, in some cases, has requested additional clarifications or corrections from the competent authorities concerned. A key element in determining the reference curves is the flow between installations or sub-installations of heat or intermediate products, which allows the emission to be correctly attributed to the product. Regulation 2019/331,[13]which replaced Decision 2011/278, introduced rules that allow emissions linked to the import, export and internal production of measurable heat, waste gases, or transferred CO_2 to be treated consistently. Thus, in order to determine the emissions associated with those processes, the relevant emission factors were adopted, which were determined using the values of the heat and fuel benchmarks and were subsequently updated by applying the fixed annual reduction rates. For heat imports with unknown or unclearly defined emission factors and for heat exports, a value of 53.3 teCO_2/TJ was used. This value was obtained by applying an annual reduction rate of 1.6% to the value of the heat benchmark in the 9-year period from 2007/2008 to 2016/2017. For the export of waste gases, 37.4 teCO_2/TJ was subtracted from the actual emission factor of the waste gases. This value corresponds to the emission factor for natural gas (56.1 teCO2/TJ)multiplied by a factor of 0.667,

12 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC Urz. EU L 275, 25.10.2003, p. 32, as amended).

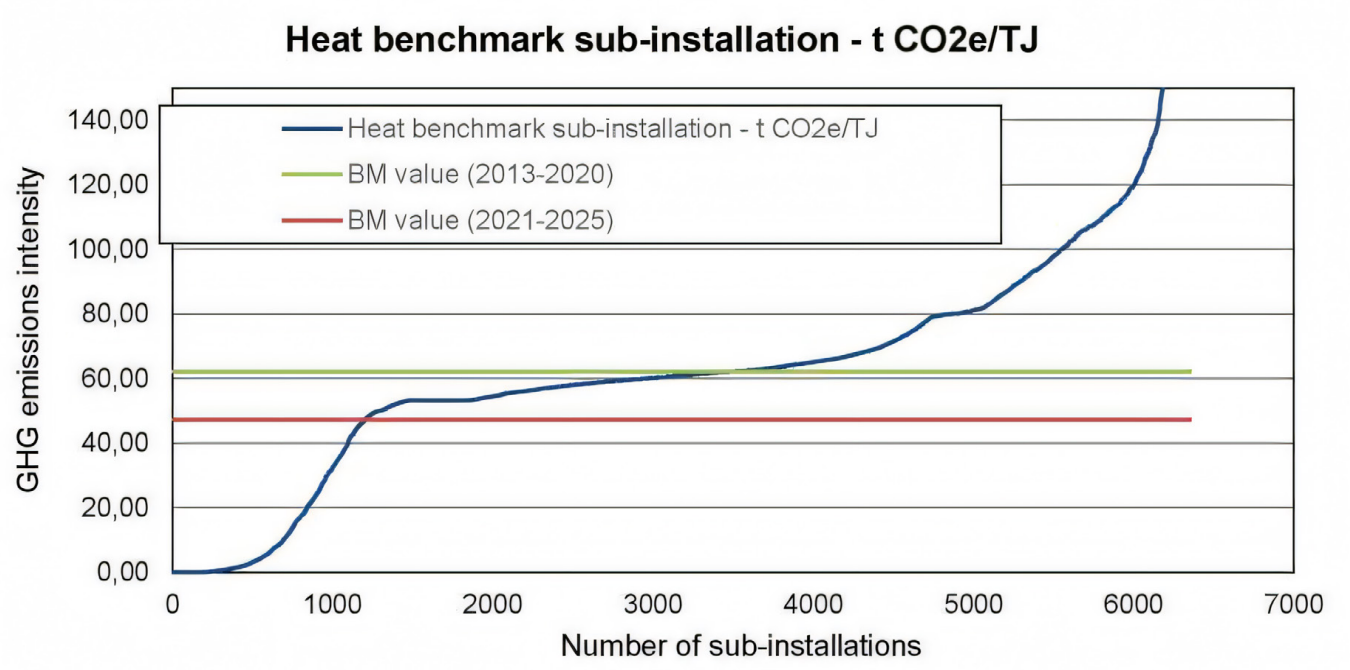
13 Commission Delegated Regulation (EU) 2019/331 of 19 December 2018 determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council *Urz. EU L 59, 27.2.2019, p. 8.*

which corresponds to the difference in efficiency between the use of the waste gas and the use of the reference fuel natural gas. For imports of waste gases, a value of 48.0 teCO$_2$/TJ was used. This value was obtained by applying an annual reduction rate of 1.6% to the fuel benchmark value for the 9-year period 2007/2008 to 2016/2017.

The method for attributing emissions to different sub-installations laid down in the above-mentioned act may lead to a negative greenhouse gas intensity in cases where heat is produced using a fuel with a low emission factor and is exported to other sub-installations or installations. In such cases, the greenhouse gas intensity of the sub-installation concerned is set at zero for the purpose of determining the revised benchmark values.

The European Commission presented its assessment and principles for setting benchmark updates in a document entitled: Update *of benchmark values for the years 2021 – 2025 of phase 4 of the EU ETS Benchmark curves and key parameters (Updated final version issued on 12 October 2021).* This article discusses all 54 benchmarks. The analysis for selected benchmarks representing each of the 5 cases of application of the annual reduction rate is presented below. First, for measurable heat, where the upper threshold of the annual reduction rate of 1.6% has been exceeded

FIGURE 2. EXAMPLE OF A BENCHMARK WHERE THE ANNUAL REDUCTION RATE IS 1.6%.



Source: Update of benchmark values for the years 2021 – 2025 of phase 4 of the EU ETS Benchmark curves and key parameters.

6 350 heat benchmark sub-installations from a pool of 6 619 heat benchmark sub-installations were taken into account to determine the benchmark. The calculated update rate expressed as %/year for the period 2007/2008 to 2016/2017 was -10.83%, which results in a 24% reduction in the reference level compared to phase 3, i.e. the benchmark value for calculating the allocation for this type of sub-installation in the period 2021-2025 is 47.3 t CO2e/TJ.

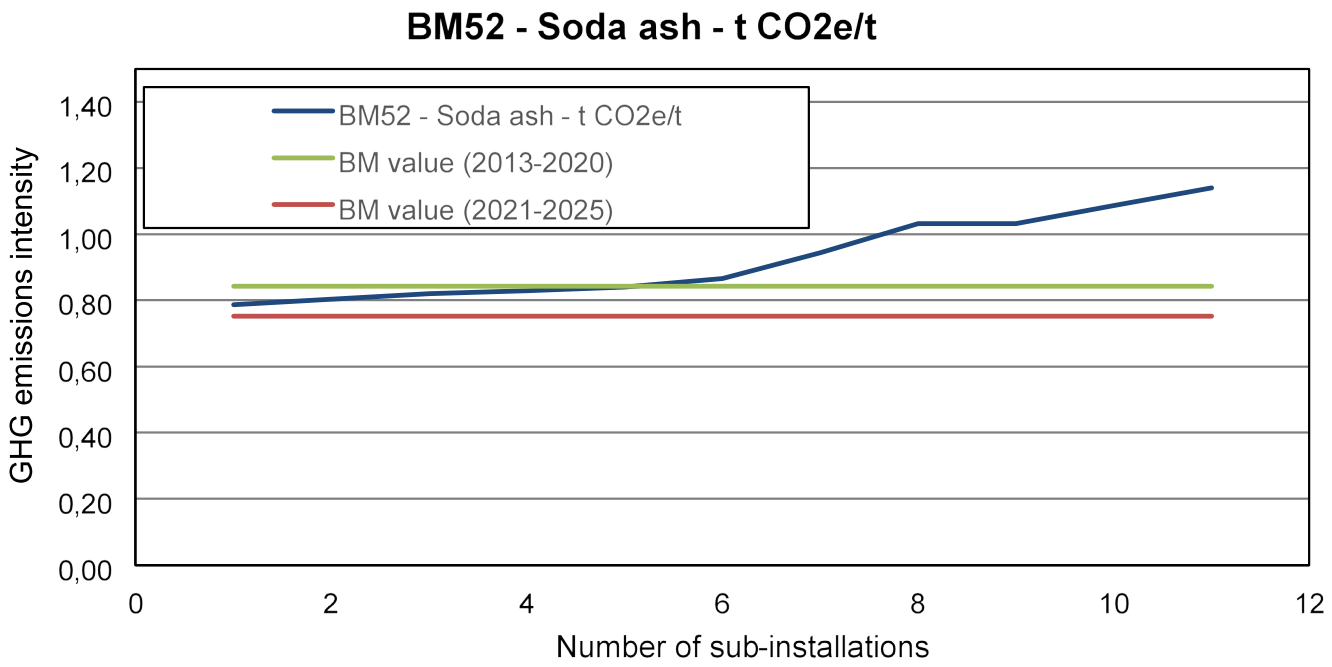
In the case of the sub-installation covered by the soda product benchmark, the calculated update rate in %/year for the period 2007/2008 to

KEY PARAMETERS OF THE HEAT BENCHMARK SUB-INSTALLATION	VALUE	UNIT
Average greenhouse gas intensity of the 10% most efficient installations in 2016/2017	**1,6**	**t CO2e/TJ**
Reference value 2021-2025	**47,3**	**t CO2e/TJ**
Benchmark for phase 3, 2013-2020 (as benchmark)	62,3	t CO2e/TJ
Calculated update rate in %/year for the period 2007/2008 to 2016/2017	-10.83%	
Update rate in %/year applied to step 3 benchmark	-1,60 %	
Update rate in % applied to the Stage 3 benchmark	-24,0 %	
Median greenhouse gas intensity of all installations in 2016/2017	60,9	t CO2e/TJ
Average greenhouse gas intensity of all installations in 2016/2017	83,7	t CO2e/TJ
Weighted average greenhouse gas intensity of all installations in 2016/2017	76,8	t CO2e/TJ
Number of (sub)installations using the benchmark for free allocation	6 619	
Number of (sub)installations included in the benchmark value update	6 350	
(Assigned) benchmark GHG emissions (average 2016/2017) CL sub-installation non-CL sub-installation District heating sub-installation	**212 553 983** 74 186 492 60 818 938 77 548 553	t CO2e
Preliminary free allocation of benchmarked allowances in 2021 CL sub-installation non-CL sub-installation District heating sub-installation	**79 883 758** 59 340 064 4 319 936 16 223 758	**EUA**

Source: Update of benchmark values for the years 2021 – 2025 of phase 4 of the EU ETS Benchmark curves and key parameters.

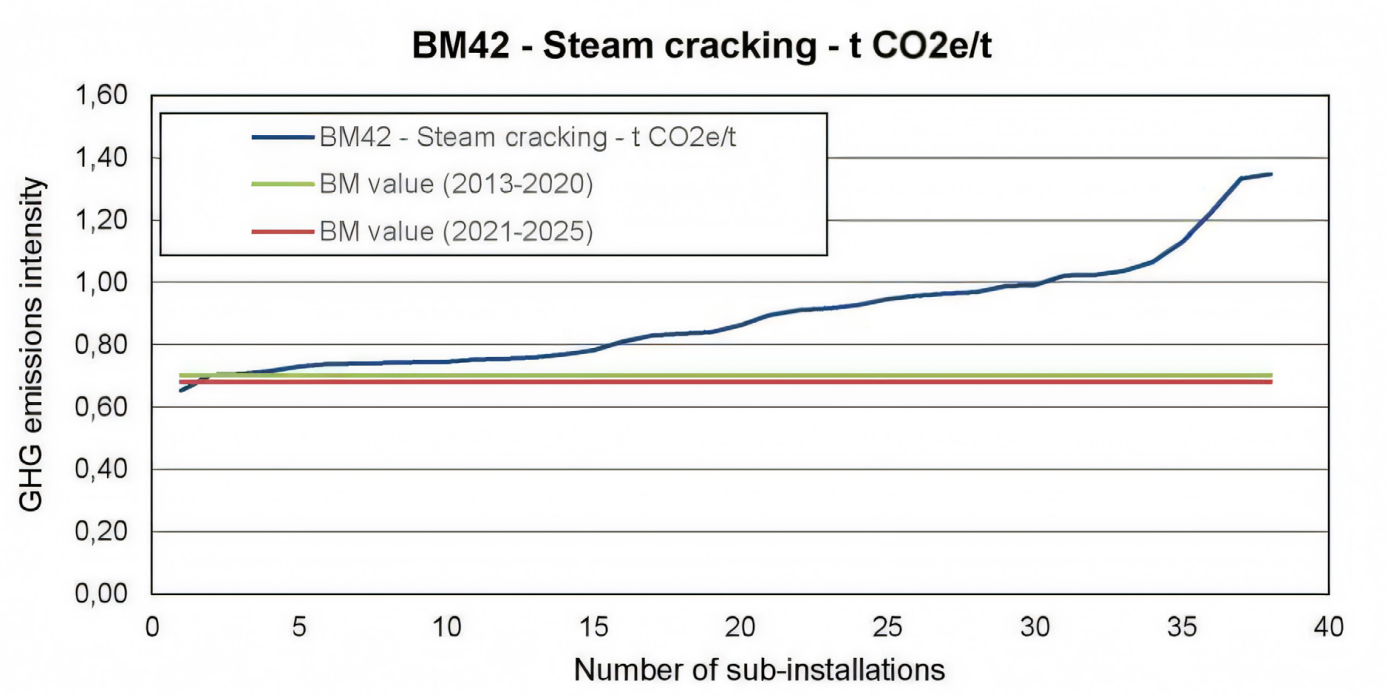
2016/2017 was -0.71%, i.e. it exceeded the lower threshold of 0.2% but did not exceed the upper threshold of 1.6%. Therefore, the update rate in % applied to the phase 3 benchmark was -10.7% and the adjustment of the indicator value amounted to 0.753 t CO2e/t after rounding.

FIGURE 3. EXAMPLE OF A BENCHMARK WHERE THE ANNUAL REDUCTION RATE IS MORE THAN 0.2% AND LESS THAN 1.6%.



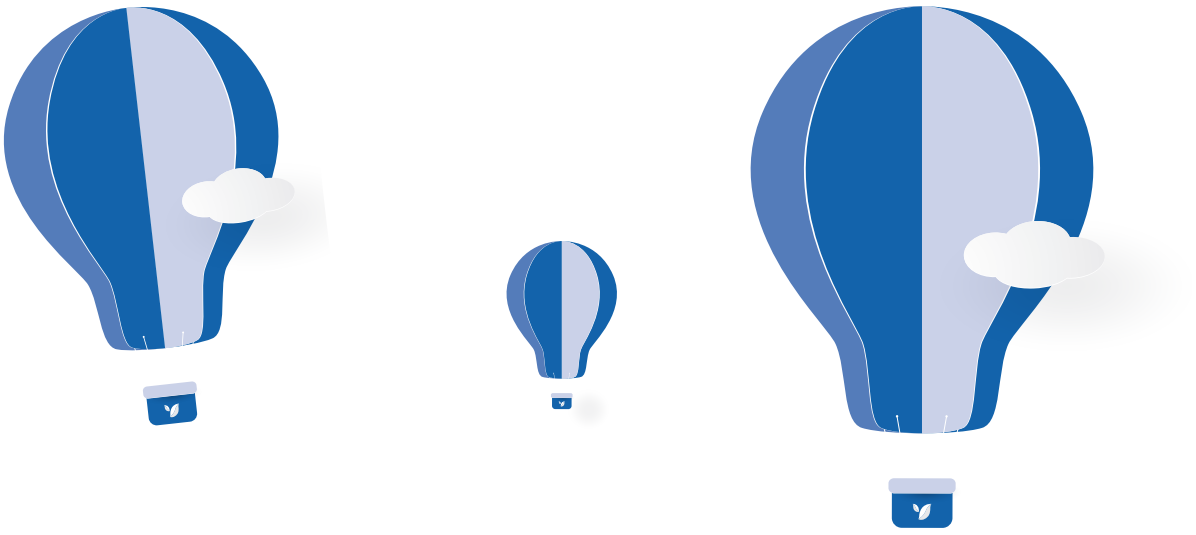
The last possible case for updating the benchmark, as indicated above, concerns those benchmarks where the adjustment does not exceed the lower threshold of 0.2%. This update value occurs in steam cracking, where the update rate between 2006/2007 and 2016/2017 is 0.15%/year, and thus the reference value for 2021-2025 was formed on the basis of 3% updates as indicated in the graph below.

FIGURE 4. EXAMPLE OF A BENCHMARK WITH AN ANNUAL REDUCTION RATE OF 0.2%



KEY PARAMETERS FOR BM52 SODA	VALUE	UNIT
Average greenhouse gas intensity of the 10% most efficient installations in 2016/2017	**0,789**	**t CO2e/t**
Reference value 2021-2025	**0,753**	**t CO2e/t**
Benchmark for phase 3, 2013-2020 (as benchmark)	0,843	t CO2e/t
Calculated update rate in %/year for the period 2007/2008 to 2016/2017	-0.71%	
Update rate in %/year applied to step 3 benchmark	-0.71%	
Update rate in % applied to the Stage 3 benchmark	-10.7%	
Median greenhouse gas intensity of all installations in 2016/2017	0,866	t CO2e/t
Average greenhouse gas intensity of all installations in 2016/2017	0,926	t CO2e/t
Weighted average greenhouse gas intensity of all installations in 2016/2017	0,945	t CO2e/t
Number of (sub)installations using the benchmark for free allocation	12	
Number of (sub)installations included in the benchmark value update	11	
(Assigned) benchmark GHG emissions (average 2016/2017)	7 218 816	t CO2e
Preliminary free allocation of benchmarked allowances in 2021	**5 497 992**	**EUA**

Source: Update of benchmark values for the years 2021 – 2025 of phase 4 of the EU ETS Benchmark curves and key parameters.



KEY PARAMETERS OF STEAM CRACKING BM42	VALUE	UNIT
Average greenhouse gas intensity of the 10% most efficient installations in 2016/2017	**0,693**	**t CO2e/t**
Reference value 2021-2025	**0,681**	**t CO2e/t**
Benchmark for phase 3, 2013-2020 (as benchmark)	0,702	t CO2e/t
Calculated update rate in %/year for the period 2007/2008 to 2016/2017	-0.15%	
Update rate in %/year applied to step 3 benchmark	-0,20 %	
Update rate in % applied to the Stage 3 benchmark	-3.0%	
Median greenhouse gas intensity of all installations in 2016/2017	0,851	t CO2e/t
Average greenhouse gas intensity of all installations in 2016/2017	0,891	t CO2e/t
Weighted average greenhouse gas intensity of all installations in 2016/2017	0,849	t CO2e/t
Number of (sub)installations using the benchmark for free allocation	39	
Number of (sub)installations included in the benchmark value update	38	
(Assigned) benchmark GHG emissions (average 2016/2017)	31 393 609	t CO2e
Preliminary free allocation of benchmarked allowances in 2021	**22 816 634**	**EUA**

Source: Update of benchmark values for the years 2021 – 2025 of phase 4 of the EU ETS Benchmark curves and key parameters.

In 2021, the updated values of the benchmarks applicable in the first sub-period (2021-2025) were reduced by a maximum of 24% for 31 out of 54 benchmarks, bringing the annual reduction rate to 1.6% for the period 2008-2023. The remaining benchmarks were lowered in the range of 3-24%. This reflects the progress made in recent years by most industrial sectors in reducing the emission intensity per unit of product. The percentage of process emissions for process emissions sub-installations remained unchanged at 97%. The update of all 54 benchmarks was adopted by Commission Implementing Regulation (EU) 2021/447 of 12 March 2021, determining revised benchmark values for free allocation of emission allowances for the period from 2021 to 2025 pursuant to Article 10a(1). 2 Directive 2003/87/EC of the European Parliament and of[14]the Council. For the 2021-2025 subperiod, the cross-sectoral uniform correction factor was 100%[15].

2.2) Allocation subperiod 2026-2030

In 2024, applications for free allocation of emission allowances for the next subperiod, 2026-2030, were resubmitted by operators. However, the rules for free allocation of emission allowances have been tightened compared to the 2021-2025 subperiod. Those amendments were introduced by Directive 2023/959 of 10 May 2023, which aims to implement the *Fit for 55* package, which will contribute to reducing the Union's economy-wide net greenhouse gas emissions by at least 55 % compared

14 OJ Urz. EU L 87, 15.3.2021, p. 29.

15 Commission Implementing Decision (EU) 2021/927 of 31 May 2021 on the establishment of a uniform cross-sectoral correction factor for the adjustment of free emission allowances for the period from 2021 to 2025 *(OJL 347, 31.5.2021,pp. Urz. EU L 203, 9.6.2021, p. 14).*

to 1990 levels by 2030. To achieve that objective, *'the EU ETS should incentivise production in installations that have partially reduced or completely eliminated greenhouse gas emissions. The description of certain categories of activities in Annex I to Directive 2003/87/EC needs to be amended to include in the scope of the EU ETS installations that carry out activities listed in that Annex and meet the capacity threshold related to those activities but do not emit any greenhouse gases, thereby ensuring equal treatment of installations in sectors. In addition, free allocation should take into account, as a guiding principle, the potential for circular use of materials and the independence of the benchmark from the raw material or type of technology used, where production processes have the same objective. Notwithstanding these guiding principles, the revised benchmarks for the period 2026-2030 should continue to distinguish between primary and secondary production for steel and aluminium. It is also necessary to decouple the update of benchmark values for refineries and for hydrogen to reflect the increasing importance of hydrogen production, including green hydrogen, outside the refinery sector.*[16]

As a result of these changes, the annual reduction rate for benchmark updates has been increased from an annual reduction rate of 1.6% to 2.5%, and the lower threshold has been increased from 0.2% to 0.3%. As was the case in the first sub-period, the benchmark values for the period 2026-2030 are based on the benchmark values set for the period 2013-2020 and reduced by the percentage of those two values to be applied for each of the years 2008-2028. In this sub-period, the reduction applied over a period of 20 years should not be lower than 6% (annual reduction rate 0.3%) or higher than 50% (annual reduction rate 2.5%). In addition, for the period from 2026 to 2030, the annual reduction rate of the hot metal benchmark shall not be modified as a result of a change in the definition of the benchmark or system boundaries, as well as by way of derogation concerning benchmark values for aromatics and syngas, those values shall be adjusted by the same percentage as the refinery benchmark in order to maintain a level playing field for producers of those products. In addition, the percentage of process emissions for process emissions sub-installations has changed and corresponds to the historical activity level related to these emissions multiplied by 97% until 2027 and by 91% from 2028 onwards.

Another element reducing the possibility of free allocation relates to the introduction of a new Carbon Border Adjustment Mechanism$_{(CBAM).}$ Carbon Border Adjustment Mechanism ('CBAM') established by Regulation 2023/956[17]. The CBAM introduced the principle of phasing out free allocation for goods covered by that Regulation. This is the case in the current subperiod for the cement, fertiliser, iron and steel, aluminium and hydrogen sectors.

In addition, an exception to the use of CSCF has been introduced, which aims to promote installations using low- or zero-carbon technologies. The derogation concerns an installation where more than 60 % of the preliminary annual number of emission allowances allocated free of charge to that installation are sub-installations with greenhouse gas emissions below the average of the 10 % most efficient sub-installations for the relevant benchmarks. Where this condition is met, the final annual amount of emission allowances free of charge shall not be reduced and shall be equal to the preliminary annual amount of allowances free of charge. That provision, on the one hand, promotes zero-emission technologies used in the installation and, on the other hand, makes it necessary for installations that do not comply with that principle to reduce further the final annual

16 Recital 10 in the preamble to Directive 2023/959

17 Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism Urz. EU L 130, 16.5.2023, p. 52)

Those sectors have been included in the carbon leakage list and have so far received a 100% allocation, and as of 2026 it will be reduced by a CBAM factor of 97,5 % in 2026, 95 % in 2027, 90 % in 2028, 77,5 % in 2029, 51,5 % in 2030, 39 % in 2031, 26,5 % in 2032 and 14 % in 2033 respectively, and no CBAM factor shall apply as of 2034. The second element limiting free allocation is the revised values of the linear factor, which is 4.3% from 2024 to 2027 and 4.4% from 2028, resulting in a reduction of the available pool of allowances and, thus, the need to introduce a cross-sectoral uniform correction factor (CSCF), which will need to be adjusted for the final allocation of emission allowances to installations.

amount of emission allowances free of charge by applying the CSCF in order to fit into the pool of allowances available for allocation to installations. In addition, a 20% reduction in free allocation has been introduced in installations that are required to carry out an energy audit or to implement a certified energy management system, in accordance with Article 8 of Directive 2012/27/EU[18]of the European Parliament and of the Council, and that have not implemented the recommendations resulting from the audit or the energy management system in the subperiod 2026-2030. The allocation reduction may be waived where the operator demonstrates that it has implemented recommendations or other measures that have ensured greenhouse gas emission reductions equivalent to those resulting from the recommendations of the installation concerned. The same 20% reduction of free allowances shall apply to installations that have sub-installations where the level of greenhouse gas emissions is higher than the 80th percentile in relation to the level of emissions for the relevant product benchmark. For these installations, to not reduce the number of allowances allocated, the operator must develop a climate neutrality plan that will set out the directions for achieving climate neutrality by the installation in 2050, and every five years set milestones and targets to be achieved and verified.

All the changes introduced are aimed at reducing the pool of free emission allowances, which should accelerate reduction efforts in installations covered by the EU ETS. Based on the adopted amendments, the benchmarks will be updated at the turn of 2025 and 2026, after the Commission has assessed and checked the national implementing measures submitted by EU Member States by 30 September 2024. However, it can be concluded that increasing the thresholds for updating benchmarks to 2.5% and 0.3% and promoting installations that use low- or zero-carbon technologies in the EU ETS will result in a lower benchmark value based on a higher threshold. An analysis of Regulation 2021/447 reveals a trend and potential to reduce benchmarks by 50%. One of the most visible examples is lowering the benchmark for heat and fuel. Both indicators have the widest applications, which will result in installations using fossil fuels with the highest benchmark, such as hard coal, for which the benchmark is above 100 $teCO_2$/TJ, being in a very difficult situation when applying a benchmark of 31.15 $teCO_2$/TJ to the allocation of emission allowances.

In summary, the introduced changes to the rules for free allocation of emission allowances for the sub-period 2026-2030 increase the pressure on industry's decarbonisation, particularly in the energy

18 Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Urz. EU L 315, 14.11.2012, p. 1.

sectors. Increasing the threshold for updating the benchmark to 2.5% every year and changing the rules for adjusting the allocation through the CSCF will result in low free allocation and, thus, the need for a rapid transition to low-carbon technologies. Therefore, it is necessary to support the activities of industry through the introduction of legal regulations supporting transformational actions and the deployment of innovative technologies, and to prepare financial support to achieve this goal. The grounds laid down in Directive 2023/959 for the introduction of an emission trading system for buildings, road transport and other activities not yet covered by that system with regard to the use of fuels for energy purposes will not make it possible to avoid reduction measures by leaving the system to installations. This shows the determination to achieve the goal of climate neutrality by 2050 and may be an opportunity for Poland to make a "jump" of civilization in the 21st century or plunge our country by losing the competitiveness of industry not only in the EU but also in the world for many years to come.

bibliography

1. Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC Urz. EU L 275, 25.10.2003, p. 32, as amended).
2. Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community Urz. EU L 140, 5.6.2009, p. 63).
3. Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments and Decision (EU) 2015/1814 Urz. EU L 76, 19.3.2018, p. 3).
4. Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme Urz. EU L 130, 16.5.2023, p. 134).
5. Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC Urz. EU L 52, 21.2.2004, p. 50).
6. 2013/448/EU: Commission Decision of 5 September 2013 concerning national implementing measures for the transitional free allocation of greenhouse gas emission allowances pursuant to Article 11(1) Directive 2003/87/EC of the European Parliament and of the Council Urz. (OJ L 240, 7.09.2013, p. 27).
7. Commission Decision (EU) 2020/1722 of 16 November 2020 on the Union-wide quantity of allowances to be issued under the EU Emissions Trading System for 2021 Urz. EU L 386, 18.11.2020, p. 26).
8. Commission Decision (EU) 2023/1575 of 27 July 2023 on the Union-wide quantity of allowances to be issued under the EU Emissions Trading System for 2024 Urz. EU L 192, 31.7.2023, p. 30).
9. 2010/2/: Commission Decision of 24 December 2009 determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage Urz. EU L 1, 5.01.2010, p. 10).
10. 2014/746/EU: Commission Decision of 27 October 2014 determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage for the period 2015 to 2019 Urz. EU L 308, 29.10.2014, p. 114).
11. Kyoto Protocol to the United Nations Framework Convention on Climate Change, done at Kyoto on 11 December 1997 (OJ U. 05.203.1684).
12. Decision (EU) 2015/1814 of the European Parliament and of the Council of 6 October 2015 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC Urz. EU L 264, 9.10.2015, p. 1).
13. 2011/278/EU: Commission Decision of 27 April 2011 determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council Urz. EU L 130, 17.5.2011, p. 1.
14. Commission Delegated Regulation (EU) 2019/331 of 19 December 2018 determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council Urz. EU L 59, 27.2.2019, p. 8).
15. Commission Implementing Regulation (EU) 2021/447 of 12 March 2021 determining revised benchmark values for free allocation of emission allowances for the period from 2021 to 2025 pursuant to Article 10a(1) Directive 2003/87/EC of the European Parliament and of the Council Urz. EU L 87, 15.3.2021, p. 29).
16. Update of benchmark values for the years 2021 – 2025 of phase 4 of the EU ETS Benchmark curves and key parameters (Updated final version issued on 12 October 2021);
17. Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism Urz. EU L 130, 16.5.2023, p. 52).
18. Methodology for the free allocation of emission allowances in the EU ETS post 2012 Report on the project approach and general issues.

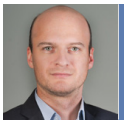
Rules for participation of shipping companies in the EU ETS system

Author:

Piotr Świat, Legal Unit, KOBIZE

Rules for participation of shipping companies in the EU ETS system

Keywords: Emissions Trading System, EU ETS, maritime transport, maritime transport activities, shipping company, emissions monitoring, emissions reporting, verification, MRV, emissions accounting, port of call, ships with a gross tonnage (GT) of 5 000 or more



Author:
Piotr Świat

Abstract:

Before 1 January 2024, carbon dioxide emissions from the maritime transport sector were outside the scope of the EU ETS. Starting from 1 July 2015, they were subject only to obligations related to monitoring, reporting, and verification (hereinafter referred to as the "MRV mechanism"). With the entry into force of the relevant provisions of Directive 2023/959, which amended Directive 2003/87/EC (the ETS Directive), carbon dioxide emissions from maritime transport—and subsequently methane and nitrous oxide emissions—were included in the EU ETS.

The article discusses the rules for shipping companies' participation in the EU ETS system, the maritime transport activities that trigger participation in the system, and the fundamental obligations arising from this participation. It addresses not only the issues related to the inclusion of maritime transport in the EU ETS system but also certain aspects stemming from previous regulations applicable to shipping companies.

The idea of including maritime transport among the sectors that would contribute to reducing emissions within the European Union was expressed in the preamble to Directive 2009/29/EC[1]. According to the intention expressed therein, given that global greenhouse gas emissions must be reduced by at least 50% below their 1990 levels by 2050, all sectors of the economy, including international maritime transport and aviation, should contribute to this goal. In 2013 the European Commission adopted a strategy for the gradual inclusion of emissions from maritime transport in the EU's greenhouse gas reduction policies.

The first regulatory step toward achieving this objective was Regulation 2015/757[2]. The adoption of this regulation was justified by the fact that maritime transport impacts the global climate and air quality due to emissions of carbon dioxide (CO_2) and other pollutants. Additionally, international maritime shipping remained the only means of transport not included in the EU's greenhouse gas reduction commitments, even though Union-related CO_2

1 Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community (OJ L 140, 5.6.2009, p. 63).

2 Regulation (EU) 2015/757 of the European Parliament and of the Council of 29 April 2015 on the monitoring, reporting and verification of carbon dioxide emissions from maritime transport, and amending Directive 2009/16/EC (OJ EU L 123, 19.5.2015, p. 55). It entered into force on 1 July 2015. The current title is "on the monitoring, reporting and verification of greenhouse gas emissions from maritime transport, and amending Directive 2009/16/EC" (since 1 June 2023).

emissions from maritime shipping increased by 48% between 1990 and 2007. Regulation 2015/757 aimed to reduce maritime emissions at the EU level, initially focusing solely on CO_2. To this end, a monitoring, reporting, and verification obligations (MRV mechanism[3]) based on ships' fuel consumption was established. This was intended as the first step toward incorporating maritime emissions into the EU's greenhouse gas reduction commitments.

The MRV obligations targeted companies (later called "shipping companies"), defined as the shipowner or any other organisation or person, such as the manager or the bareboat charterer, which has assumed the responsibility for the operation of the ship from the shipowner[4]. The MRV mechanism required aforementioned companies to monitor and report CO_2 emissions from specific voyages conducted by designated ships[5]. It did not envisage a role for Member State competent authorities in approving monitoring plans and emissions reports for ships, and, more importantly, it lacked any mechanism for accounting for these emissions. Monitoring plans and reports were verified by independent verifiers, and a positive verification of the report was required for the issuance of a compliance document[6]. Apart from measures provided under national laws to ensure compliance with Regulation 2015/757, the regulation itself granted Member State port authorities the power to issue an expulsion order against a ship as to which MRV obligations were not fulfilled for at least two consecutive reporting periods (i.e., two calendar years).

This framework remained until 1 January 2024, when maritime transport was integrated into the EU ETS (European Union Emissions Trading System) by linking the provisions of Regulation 2015/757 with those of the ETS Directive[7], as substantially amended by Directive 2023/959[8]. This integration forms only a part of the extensive reform of the EU ETS that was introduced in "Fit for 55" package.

The EU legislator did not initially assume that the achievement of reduction targets in the maritime transport sector would be achieved by including it in the EU ETS system. Regulation 2015/757 envisaged that if an international agreement on a global MRV system or global measures to reduce greenhouse gas emissions from maritime transport were reached, the Commission would review the regulation and potentially propose amendments to align it with that agreement. However, as no such system materialized and the measures undertaken by the International Maritime Organization (IMO) were deemed insufficient to meet the goals of the Paris Agreement[9], the decision was made to include maritime transport in the EU ETS.

3 Obligations to monitor, report and verify emissions.

4 This concept is similar to the term "shipowner" in the Polish Maritime Code, referring to a party who operates a maritime vessel, either owned or chartered, in their own name.

5 The regulation applied to ships with a gross tonnage (GT) of over 5 000 units, concerning CO_2 emissions released by these ships during their voyages between ports of call within a Member State and their activities within such ports of call.

6 The Compliance Document must remain on board the vessel as confirmation of compliance with MRV obligations. Inspection authorities in Member States are entitled to verify the presence of a valid compliance document on board.

7 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003, establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32, as amended).

8 Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023, amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading system (OJ EU L 130, 16.5.2023, p. 134).

9 According to reason (19) of the preamble to Directive 2023/959 "the Commission should report to the European Parliament and to the Council on the progress achieved in the IMO towards an ambitious emission reduction objective, and on accompanying measures to ensure that maritime transport duly contributes to the efforts needed to achieve the objectives agreed under the Paris Agreement. Efforts to limit global maritime emissions through the IMO are under way and should be encouraged, including the rapid implementation of the Initial IMO Strategy on Reduction of Greenhouse Gas Emissions from Ships, adopted in 2018, which also refers to possible market-based measures to incentivise greenhouse gas emission reductions from international shipping. However, while recently there has been progress in the IMO, this has so far not been sufficient to achieve the objectives of the Paris Agreement. Given the international character of shipping, it is important that the Member States and the Union within their respective competences work with third countries to step up diplomatic efforts to strengthen global measures and make progress on the development of a global market-based measure at IMO level."

Incorporating maritime transport into the EU ETS required the adoption of regulations to ensure monitoring, reporting, and verification of emissions by new system participants (which was partially facilitated by the existing MRV mechanism) and to ensure that these verified emissions were accounted for through the surrender of allowances, as per the EU ETS rules. To this end, in addition to Directive 2023/959 introducing new provisions to the ETS Directive, Regulation 2015/757 was significantly revised[10].

Shipping Companies Participating in the EU ETS

> **A shipping company may be subject to the obligations of both the MRV mechanism and the EU ETS or only the MRV mechanism.**

To qualify as a shipping company an entity must own a ship or assume operational responsibility for it from the owner[11]. The next step is to determine whether it carries out activities covered by Regulation 2015/757 that are also included in the EU ETS under the ETS Directive (as so-called "maritime transport activities," discussed further below). Such companies are assigned to "administering authorities" (sometimes called "administering authorities responsible") from relevant Member States[12].

In principle, the administering authority (responsible) for a shipping company is the Member State where the company is registered[13]. However, this does not mean that participation in the EU ETS is limited to companies registered in EU Member States. If a company is not registered in an EU Member State, the Member State in which the shipping company had the greatest estimated number of port calls from voyages falling within the scope of ETS Directive in the preceding four monitoring years will serve as the administering authority. If no such voyages occurred during that period, the administering authority will be the Member State where a ship of the shipping company started or ended its first voyage falling within the scope of ETS Directive[14].

This means that the place of registration of a shipping company is only a starting criterion. Other companies, particularly those from non-EU countries, are assigned to administering authorities based on voyages made by their ships to or from ports of call in Member States. As a result, a shipping company from any country worldwide can become a participant in the EU ETS if its ship conducts a voyage to or from a port in an EU Member State.

10 By regulation (EU) 2023/957 of the European Parliament and of the Council of 10 May 2023, amending Regulation (EU) 2015/757 in order to provide for the inclusion of maritime transport activities in the EU Emissions Trading System and for the monitoring, reporting and verification of emissions of additional greenhouse gases and emissions from additional ship types (OJ EU L 130, 16.5.2023, p. 105).

11 The full definition of a shipping company: "the shipowner or any other organisation or person, such as the manager or the bareboat charterer, that has assumed the responsibility for the operation of the ship from the shipowner and that, on assuming such responsibility, has agreed to take over all the duties and responsibilities imposed by the International Management Code for the Safe Operation of Ships and for Pollution Prevention, set out in Annex I to Regulation (EC) No 336/2006 of the European Parliament and of the Council".

12 Assignment is based on the rules set out in the amended ETS Directive and in the implementing regulation adopted pursuant to it, specifically Commission Implementing Regulation (EU) 2023/2599 of 22 November 2023 laying down rules for the application of Directive 2003/87/EC of the European Parliament and of the Council as regards the administration of shipping companies by administering authorities in respect of a shipping company (OJ EU L 2023/2599, 23.11.2023).

13 In this article, European Union Member States and their authorities, as well as European Union ports, are also understood to include the states, authorities, and ports of the European Economic Area (EEA)..

14 This differs for shipping companies subject only to the MRV mechanism but not included in the EU ETS, as derived from Article 3 point (p) of Regulation 2015/757 in connection with Article 3gf(1)(a-c) of the ETS Directive, from which it can be concluded that a company not included in the EU ETS will be assigned to a Member State only if it is registered there.

The European Commission has published a list of shipping companies conducting maritime transport activities, along with their corresponding administering authorities (Member States)[15], and this list is to be regularly updated[16].

Maritime Transport Activities in the EU ETS System

> Not every ship performing specific voyages or other activities covered by Regulation 2015/757 will automatically qualify the shipping company responsible for that ship as a participant in the EU ETS. A key determinant is whether the ships under its responsibility and the activities they perform qualify as "maritime transport activities" under the ETS Directive.

As already mentioned maritime transport activities (covered by EU ETS system) are a significant part of the activities covered by the scope of Regulation 2015/757[17], because ultimately, while every maritime transport activity (covered by the EU ETS system) will be covered by the MRV mechanism, not every activity covered by the MRV mechanism will be covered by the EU ETS system[18].

The following emissions from ships are (or will be) included in the EU ETS:

1. **Ships with a gross tonnage (GT) of 5 000 or more**[19], in relation to emissions of specified greenhouse gases released, starting from 1 January 2024, during two types of activities performed by these ships:

   a. **Voyages** for the commercial transport of passengers or cargo, from the last port of call to a port of call in an EU Member State and from a port of call in an EU Member State to the next port of call, and

   b. **Activities within the port** of call in an EU Member State;

2. **Offshore vessels**[20] **with a gross tonnage (GT) of 5 000 or more**, concerning emissions of specified greenhouse gases released during the voyages and activities within the port of call in an EU Member State, starting from 31 December 2026[21].

A voyage is defined as any movement of a ship that originates from or terminates in a port of call. More challenging, however, is describing activities within the port of call. These activities are not explicitly defined but can be inferred from certain provisions

15 By Commission Implementing Decision (EU) 2024/411 of 30 January 2024 on the list of shipping companies specifying the administering authority in respect of a shipping company in accordance with Directive 2003/87/EC of the European Parliament and of the Council (OJ EU L. 2024/411, 31.01.2024).

16 The administering authority responsible for the shipping company, according to this list, retains responsibility regardless of subsequent changes in the operations or registration of the shipping company—until such changes are reflected in an updated list.

17 This will apply starting 1 January 2025, when the scope of the regulation is extended to include activities of new ship types (so-called general cargo ships and offshore vessels). Regardless of this, the regulation (and therefore the EU ETS) did not and does not apply to warships, naval auxiliaries, fish-catching or fish-processing ships, wooden ships of a primitive build, ships not propelled by mechanical means, or government ships used for non-commercial purposes.

18 Activities covered solely by the MRV mechanism but not included in the EU ETS will ultimately include only emissions from general cargo ships and smaller offshore vessels – with a gross tonnage (GT) of below 5 000 units but not less than 400 units. Provisions covering these activities within the scope of Regulation 2015/757 will take effect from 1 January 2025. However, it should be noted that the Commission was to review Regulation 2015/757 in 2024 to potentially extend these ships under the scope of Directive 2003/87/EC or propose other measures to reduce greenhouse gas emissions from such ships.

19 This refers to the total capacity of the enclosed spaces of a ship within its hull and superstructures, expressed in dimensionless units (gross tonnage), according to the definitions used in public statistics on the Central Statistical Office's website: https://stat.gov.pl/metainformacje/slownik-pojec/pojecia-stosowane-w-statystyce-publicznej/798,pojecie.html#:~:text=Pojemno%C5%9B%C4%87%20rejestrowa%20brutto%20%2D%20obj%C4%99to%C5%9B%C4%87%20przestrzeni,%3D%202%2C83%20metr%C3%B3w%20sze%C5%9Bciennych.

20 Offshore vessels are understood to mean ships providing offshore support, i.e., delivering equipment, materials, and personnel to platforms, wind farms, or other maritime installations; these ships may install, service, and perform other such tasks on these facilities.

21 Offshore vessels with a gross tonnage (GT) of 5 000 or more will be included in the EU ETS after 31 December 2026, but are already subject to MRV obligations under Regulation 2015/757 beginning from 1 January 2025.

in Regulation 2015/757 and from the practice of preparing emission reports under previous regulations. They primarily concern emissions released during berthing. The preamble further indicates that this category includes emissions from ships moving within the port, such as between voyages. Also according to the European Commission's draft guidelines, this would cover emissions taking place between arrival at first berth and departure from last berth not taking place when the ship is at berth[22]. Activities within the port appear to include, among others, the movement of the vessel around the port in order to: change the berth, refuel, clean tanks, positioning, but also some service activities if they cause emissions. The types of port activities beyond berthing that will qualify under Regulation 2015/757 will become clearer as the new regulations are applied.

Final criterion for classification as "maritime transport activities" is the release of specific greenhouse gases. Currently, only carbon dioxide (CO_2) is included. However, starting 1 January 2026, methane (CH_4) and nitrous oxide (N_2O) will also be subject to regulation[23].

The table below outlines the distinction between activities subject only to the MRV mechanism and those covered by both the MRV mechanism and the EU ETS:

Activities covered by both; MRV mechanism and EU ETS	Ship of 5 000 gross tonnage (GT) and above	performes voyages to/ from EU port of call or performs activities within EU port of call	during activities releases CO_2, CH_4 or N_2O*
Activities covered solely by MRV mechanism	General cargo ship below 5 000 gross tonnage (GT) but not below 400 gross tonnage (GT)**	performes voyages to/ from EU port of call or performs activities within EU port of call	during activities releases CO_2, CH_4 ora N_2O

*** Until 1 January, 2026**, *only CO_2 emissions will be included in the EU ETS,* **starting from 1 January 2026**, *methane (CH_4) and nitrous oxide (N_2O) will also be included.*

*** Such a group has been covered by Regulation 2015/757 from 1 January 2025, furthermore, in the period from 1 January 2025 to 31 December 2026, solely the MRV mechanism will cover emissions from activities of large offshore vessels (with a gross tonnage (GT) of 5,000 or more), however after 31 December 2026 emissions from large offshore vessels will be covered by EU ETS.*

Obligations of Shipping Companies Participating in the EU ETS

Shipping companies participating in the EU ETS will fulfill obligations arising from the revised MRV mechanism, the ETS Directive, and the related delegated and implementing regulations.

According to the rules in the EU ETS, every participant is required, among other things, to hold an account in the Union Registry. This account is necessary for surrender of allowances, which constitutes the accounting of emissions. Shipping companies participating in the EU ETS are obligated to submit an application for opening an account

22 The European Commission, The EU ETS and MRV Maritime General Guidance for Shipping Companies, Guidance Document No. 1, 3rd draft, June 25, 2024. It is worth noting that this document is in the draft stage.

23 With regard to obligations arising solely from the MRV mechanism, methane and nitrous oxide have been included within the scope of Regulation 2015/757 since 1 January 2024 (previously only carbon dioxide was covered).

in the Registry to the national administrator[24] of the Union Registry, along with the required documents and information. This must be done within 40 business days from the publication of the list by the European Commission indicating the administering authorities responsible for shipping companies. However, this does not mean that a company not included in this list is exempt from this obligation. Company not included in the list must submit an application within 65 business days from the first voyage of its ship that meets the EU ETS criteria[25].

Regardless of the above deadline, Regulation 2015/757 specifies the timeframe in which a shipping company must submit a monitoring plan for each ship covered by this regulation. This creates a significant difference compared to the EU ETS solutions for installations (where obtaining a greenhouse gas emissions permit, which includes the approval of the monitoring plan, is required before opening an account in the Union Registry) and for the aviation sector (where obtaining a decision approving the monitoring plan for aviation emissions precedes the opening of a Union Registry account). For maritime transport, the deadlines for opening a Union Registry account and submitting monitoring plans for ships are independent of each other.

As regulated under the existing MRV mechanism for maritime transport, the shipping company submits the monitoring plan first to the verifier – no later than two months after the first arrival of a given ship at a port of call in a Member State. The monitoring plan itself is submitted separately for each ship for which the shipping company is responsible[26]. However, for ships covered by the EU ETS, the shipping company, after verification by the verifier, must also obtain a positive decision from the appropriate administering authority[27]. The administering authority is required to approve the monitoring plan within four months of the first arrival of the given ship at a port of call in a Member State. This creates a potential problem if, for any reason, the verification stage of the monitoring plan is delayed in such a way that the administering authority receives the monitoring plan for approval when compliance with the aforementioned deadline is no longer possible. The regulations do not provide for legal consequences for missing the deadline by the authority, so it does not seem that in practice this would prevent the authority from conducting a thorough analysis of the monitoring plan. Emissions monitoring plans for ships whose emissions fall under Regulation 2015/757 but are not covered by the EU ETS should not be subject to approval by the responsible administering authority[28].

Monitoring applies to each reporting period during which the company is obligated to monitor and report greenhouse gas emissions. Detailed monitoring rules are set out in Annexes I and II to Regulation 2015/757.

Shipping companies are also required to submit, by 31 March of each year[29], a verified emissions report for the given reporting period for each ship for which

24 In the Polish legal system this refers to The National Centre for Emissions Management.

25 There may be questions about the applicable deadline for a shipping company not included in the list, where all of its ships of sufficient gross tonnage (GT) currently operate exclusively within the port activities of a Member State and therefore do not conduct voyages. Such a scenario is rather merely theoretical.

26 This differs from the case of aircraft operators, where the monitoring plan concerns the operator as a whole and not to each individual aircraft.

27 When approving monitoring plans and their modifications, the administering authorities should duly consider the verifier's conclusions regarding the evaluation of monitoring plans.

28 It is problematic that this rule does not explicitly derive from the provisions of Regulation 2015/757. The regulation stipulates that shipping companies should in all cases submit a monitoring plan for a ship to the administering authority; however, the deadline for the authority to approve the plan is only specified in the provisions regarding ships included in the EU ETS. An interpretative hint can be found in reason (9) of the preamble to the Commission Delegated Regulation (EU) 2023/2917 of October 20, 2023, on verification activities, accreditation of verifiers, and approval of monitoring plans by administering authorities pursuant to Regulation (EU) 2015/757 of the European Parliament and of the Council on the monitoring, reporting, and verification of carbon dioxide emissions from maritime transport and repealing Commission Delegated Regulation (EU) 2016/2072 (OJ EU L 2917, 29.12.2023).

29 A Member State may decide on an earlier deadline, but not earlier than 28 February. According to the previous provisions, the report had to be submitted by 30 April.

the company is responsible. The ship-level report must specify the type and amount of fuel used by the ship, along with the emission factor for that fuel and greenhouse gas emissions in metric tons (for voyages and port activities[30]), as well as the distance traveled (divided into segments such as time spent at sea, time at anchorage, and total transport work performed).

In addition to the monitoring plans and reports discussed above, which have been carried over with some changes from the existing MRV mechanism, the revised Regulation 2015/757 introduces a new type of report of particular importance to shipping companies participating in the EU ETS: aggregated emissions report at the company level[31]. The key information reported in this document includes a list of ships whose emissions fall within the scope of the ETS Directive and aggregated greenhouse gas emissions from all ships subject to that directive. The aggregated report will form the basis for surrender of allowances in the Union Registry by shipping companies participating in the EU ETS. However, the regulations do not exclude the obligation to submit the aforementioned report for shipping companies not responsible for ships whose emissions are covered by the EU ETS and, as a result, are not participants in this system. Therefore, although this may seem unjustified, the regulations imply that a shipping company subject only to the MRV mechanism will also be required to submit an aggregated report[32]. In such a situation, the company would seem to be able to only enter zero values in the sections relating to ships and emissions covered by the EU ETS. At the time of writing this article, there is no practice in this regard, as no aggregated report has yet been submitted[33].

The aggregated report at the company level is subject to verification and subsequent submission, including to the responsible administering authority of the Member State, by 31 March[34]. In most cases it would be hard to imagine assessing its accuracy and completeness without using the previously verified ship-level emissions reports from the given reporting period that contribute to this report. This sequence of actions is confirmed by the ETS Directive in the preamble, which states that during company-level verification, the verifier should not verify ship-level emissions reports "as those reports at ship level will have been already verified".

Although this may seem unjustified, the regulations imply that a shipping company subject only to the MRV mechanism will also be required to submit an aggregated report. In such a situation, the company would seem to be able to only enter zero values in the sections relating to ships and emissions covered by the EU ETS

The documents discussed above – the ship-level monitoring plan, the ship-level emissions report, and the aggregated company-level report – are submitted via the THETIS-MRV IT system. This system will also enable communication between shipping companies, verifiers, and Member State authorities.

The adopted solution should significantly simplify reporting obligations for shipping companies. Monitoring plans and ship-level emissions reports must be submitted to multiple entities simultaneously[35]. The architecture of the THETIS system is designed to allow monitoring plans and reports uploaded to the system to be visible to all relevant entities simultaneously. However, to meet deadlines,

30 Under the prior practice, emissions reports were typically limited to activities categorized as being at berth within Member State ports.

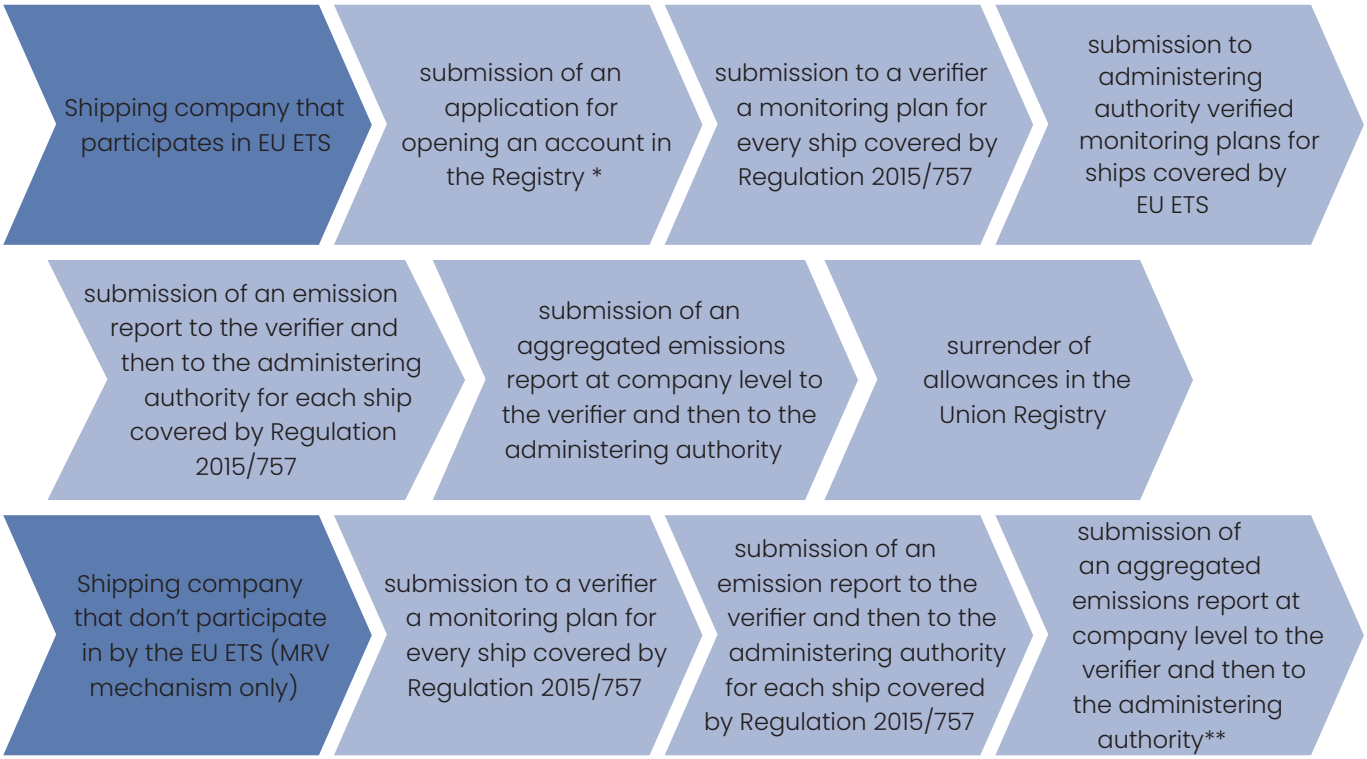
31 Awkwardly termed in Regulation 2015/757 as "aggregated emissions data at the company level."

32 This situation will most frequently apply to shipping companies that exclusively own general cargo ships. Similarly, it will also concern offshore vessels with a gross tonnage of 5 000 units or more before they are included in the EU ETS, which will occur after 31 December 2026.

33 The current draft guidelines from the European Commission (The EU ETS and MRV Maritime General Guidance for Shipping Companies, Guidance Document No. 1, 3rd draft, June 25, 2024) do not directly address such a situation.

34 A Member State may decide on an earlier deadline, but not earlier than 28 February. The first aggregated reports will be submitted in 2025 for the year 2024.

35 For example, ship-level emissions reports must be submitted simultaneously to the responsible Member State authority, the flag state authority, and the European Commission, and before that they must be submitted to a verifier.



** Depending on the circumstances, the deadline for submitting the application to open an Union Registry account may expire later than the deadline for submitting some monitoring plans for ships covered by the EU ETS. Of course, the obligation to submit an application to open a Union Registry account is, in principle, a one-time obligation for a shipping company.*

*** In such aggregated report ships whose emissions fall within the scope of the ETS Directive won't be listed, while aggregated greenhouse gas emissions from all ships subject to the directive would amount to 0.*

it must be noted that completing a given stage (e.g. document verification) will require the shipping company to issue a command in the system to forward the document to the authority so that the authority can exercise its competencies – regardless of the fact that the authority will be able to view the document from the outset.

Above are the obligations of the MRV mechanism and the EU ETS system concerning shipping companies – covered and not covered by the EU ETS.

Accounting for Emissions from Maritime Transport Activities

For voyages to and from ports of call in Member States or activities within such ports, shipping companies will be required to surrender allowances in respect of 100% released emissions. For voyages from a Member State port to a third-country port (or vice versa), shipping companies will be required to surrender allowances in respect of 50% released emissions. Ultimately, this is the only lasting mitigating factor regarding the accounting for emissions obligation for shipping companies participating in the EU ETS.

> **To deter potential circumvention by ships calling at ports outside the Union and transferring transshipment operations to non-EU ports, the EU legislator has excluded certain ports not belonging to Member States from the definition of "port of call" concerning container ships ("neighbouring container transshipment ports").**

It should be also noted that to deter potential circumvention by ships calling at ports outside the Union and transferring transshipment operations to non-EU ports, the EU legislator has excluded certain ports not belonging to Member States from the definition of "port of call" concerning container

ships[36] ("neighbouring container transshipment ports"). Currently, this exclusion applies only to East Port Said and Tanger Med, but this list is subject to change[37]. The consequence of this exclusion is that even though a ship calls at a neighboring container transshipment port, its voyage will typically conclude only upon returning to the port of origin or arriving to another port of call. If this is a Member State port, the shipping company will be obligated to surrender allowances in respect of 100% of the emissions released during that voyage.

While the inclusion of maritime transport in the EU ETS anticipates additional emission allowances, a significant increase in demand for these allowances is expected. Maritime transport activities will be settled using the same emission allowances (general allowances) used by other EU ETS participants. Moreover, no free allocation of emission allowances is provided for shipping companies.

While the inclusion of maritime transport in the EU ETS anticipates additional emission allowances, a significant increase in demand for these allowances is expected. Maritime transport activities will be settled using the same emission allowances (general allowances) used by other EU ETS participants. Moreover, no free allocation of emission allowances is provided for shipping companies.

Interest in allowances auctioned off by shipping companies will likely be significantly lower only in 2025 since for emissions released during 2024, shipping companies will only need to surrender allowances in respect of 40% of their verified emissions reported for that year. For 2025 the obligation will increase to 70%, and in subsequent years, it will reach 100%.

The ETS Directive also provides derogations from the obligation to surrender allowances in respect of emissions - that derogations will expire after 31 December 2030. Exemptions during this period may include for example voyages[38] to islands without road or rail link with the mainland with a population of fewer than 200 000[39] inhabitants; voyages[40] between ports of Member States, where one lacks a land border with another Member State and the other is the geographically closest Member State to the first[41]; voyages between a port in an outermost region of a Member State and a port in the same Member State[42].

Provisions also allow for emissions to be classified as "zero" when using fuels that meet sustainability and greenhouse gas emission-saving criteria for the use of biomass and greenhouse gas emission-saving criteria for renewable transport fuels of non-biological origin and recycled carbon fuels, as outlined in Directive 2018/2001[43]. Similarly, the EU legislator has provided for synthetic low-carbon fuels[44] that meet greenhouse gas reduction criteria under Directive

36 These ports, however, must be located no more than 300 nautical miles from a Member State's port. Moreover, the exemption applies only to container ship stops at ports outside the Union where container transshipment constitutes the majority of container traffic. Neither the ETS Directive nor the acts issued under it define the term "container ship." Such a definition, although in a different context, is provided in Annex II to Regulation (EU) 2015/757 of the European Parliament and the Council ("a ship designed exclusively for the carriage of containers in holds and on deck").

37 The list is included in Commission Implementing Regulation (EU) 2023/2297 of 26 October 2023, identifying neighbouring container transhipment ports pursuant to Directive 2003/87/EC of the European Parliament and of the Council (OJ EU L 2297, 27.10.2023).

38 Carried out by ships other than cruise ships or ro-ro passenger ships.

39 Provided such an island is included in a special list published by the European Commission.

40 Carried out by ships other than cruise ships or ro-ro passenger ships.

41 If such voyages are conducted under a cross-border public service contract or as part of a cross-border public service obligation.

42 In all three cases, the exemption also applies to activities of ships within these ports.

43 Directive (EU) 2018/2001 of the European Parliament and of the Council of December 11, 2018, on the promotion of the use of energy from renewable sources (OJ EU L 328, 21.12.2018, p. 82, as amended).

44 These are gas and liquid fuels meeting the appropriate criteria, whose energy value derives from low-emission hydrogen.

2024/1788[45]. Applying zero-rating for emissions from such fuels in a report creates a legal fiction that these emissions do not exist and, therefore allowances, in this respect, don't have to be surrendered.

Penalties for Non-Compliance with EU ETS Obligations by Shipping Companies

The ETS Directive extends the requirement for Member States to establish penalties for violations of the directive's implementing provisions to the maritime transport sector. This means that national legislator should consider introducing similar sanctions to those provided for in the Act on the greenhouse gas emission allowance trading system in relation to installations and aircraft operators already covered by the EU ETS. This would mean introducing administrative fines against a shipping company whose ship conducts maritime transport activities without an approved monitoring plan, a shipping company that fails to comply with the obligation to submit an aggregated report or surrender proper number of emission allowances. The legislator should also consider whether to maintain some of the fines provided for in the Act on Preventing Pollution of sea from Ships or, for example, limit them to ships not covered by the ETS Directive.

In addition shipping companies must be aware that, in addition to administrative fines or similar measures provided by Member States for failing to account for emissions, the ETS Directive introduces a specific penalty for all ships of such companies. If a shipping company fails to comply with the surrender obligations for at least two consecutive reporting periods[46], the competent authority of the Member State of arrival[47] will be entitled to issue an expulsion order for the company's ships. Consequently, every Member State except the state under whose flag given ship operates will be required to refuse entry to its ports for the company's ships until the company fulfills its surrender obligations. The only ports in EU that such ships will be allowed to access will be those of the flag state. However, even in these cases, the flag state will be required to detain the ship until the company fulfills its surrender obligations[48].

Summary

Shipping companies participating in the EU ETS must simultaneously comply with the MRV mechanism's requirements and the obligations associated with the EU ETS system, which derive from the revised ETS Directive and related legislation.

The approach of integrating maritime transport into the EU ETS through modifications to the existing MRV mechanism provisions, on the one hand, and introducing new provisions specific to EU ETS participation, on the other, is likely to result in practical uncertainties about applying EU law and challenges in implementing these provisions in Member State legislation. Some of these issues have been highlighted in this article.

45 Directive (EU) 2024/1788 of the European Parliament and of the Council of June 13, 2024, on common rules for the internal markets of renewable gases, natural gas, and hydrogen, amending Directive (EU) 2023/1791 and repealing Directive 2009/73/EC (OJ EU L 1788, 15.07.2024).

46 And if other enforcement measures have failed to ensure compliance.

47 Under existing regulations, based on the Act of March 16, 1995, on Preventing Pollution from Ships, the appropriate director of the maritime office is likely to be responsible.

48 A similar sanction is provided for in Regulation 2015/757 in cases of non-compliance with MRV obligations; however, in this case, the expulsion order pertains only to the ship for which MRV obligations are not fulfilled and not to all ships of the given shipping company.

The inclusion of maritime transport in the EU ETS, alongside other changes introduced by Directive 2023/959, represents a significant enhancement of the long-established emissions trading system by incorporating another major emissions sector. Without this measure, achieving the EU's goals of reducing net greenhouse gas emissions of at least 55 % compared to 1990 levels by 2030, achieving climate neutrality by 2050, and achieving negative emissions would be considerably more difficult.

Given the rising costs of emission allowances, the inclusion of maritime transport in the EU ETS can be expected to at least slow the increasing emissions from maritime transport activities. A significant increase in demand for auctioned emission allowances, especially after 2026, is also anticipated.

It is worth noting that the expected reduction in greenhouse gas emissions will not be confined solely to the EU, as the inclusion of maritime transport in the EU ETS will affect shipowners from third countries – if their ships undertake voyages where one of the ports of call is in a Member State. In such cases, shipowners, also from third countries, may be interested in adopting low-emission technologies or fuels, allowing them to significantly reduce their demand for emission allowances.

Expected reduction in greenhouse gas emissions will not be confined solely to the EU, as the inclusion of maritime transport in the EU ETS will affect shipowners from third countries – if their ships undertake voyages where one of the ports of call is in a Member State. In such cases, shipowners, also from third countries, may be interested in adopting low-emission technologies or fuels, allowing them to significantly reduce their demand for emission allowances.

Bibliography

1. The EU ETS and MRV Maritime General guidance for shipping companies, Guidance document No. 1, 3rd draft, 25 June 2024, European Commission.
2. Terms Used in Public Statistics, Central Statistical Office website https://stat.gov.pl/metainformacje/slownik-pojec/pojecia-stosowane-w-statystyce-publicznej/798,pojecie.html#:~:text=Pojemno%C5%9B%C4%87%20rejestrowa%20brutto%20%2D%20obj%C4%99to%C5%9B%C4%87%20przestrzeni,%3D%202%2C83%20metr%C3%B3w%20sze%C5%9Bciennych
3. Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003, Establishing a Scheme for Greenhouse Gas Emission Allowance Trading Within the Community and Amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32, as amended).
4. Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009, Amending Directive 2003/87/EC to Improve and Extend the Community Greenhouse Gas Emission Allowance Trading Scheme (OJ L 140, 5.6.2009, p. 63, as amended).
5. Regulation (EU) 2015/757 of the European Parliament and of the Council of 29 April 2015, on the Monitoring, Reporting, and Verification of Carbon Dioxide Emissions from Maritime Transport and Amending Directive 2009/16/EC (OJ EU L 123, 19.5.2015, p. 55, as amended).
6. Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018, on the Promotion of the Use of Energy from Renewable Sources (OJ EU L 328, 21.12.2018, p. 82, as amended).
7. Regulation (EU) 2023/957 of the European Parliament and of the Council of 10 May 2023, Amending Regulation (EU) 2015/757 to Include Maritime Transport in the EU Emissions Trading System and Monitoring, Reporting, and Verification of Additional Greenhouse Gases and Emissions from Additional Ship Types (OJ EU L 130, 16.5.2023, p. 105).
8. Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023, Amending Directive 2003/87/EC Establishing a Scheme for Greenhouse Gas Emission Allowance Trading Within the Union and Decision (EU) 2015/1814 on the Establishment and Operation of a Market Stability Reserve for the Union Greenhouse Gas Emission Allowance Trading Scheme (OJ EU L 130, 16.5.2023, p. 134).
9. Commission Delegated Regulation (EU) 2023/2917 of 20 October 2023, on Verification Activities, Accreditation of Verifiers, and Approval of Monitoring Plans by Administering Authorities Pursuant to Regulation (EU) 2015/757 of the European Parliament and of the Council on the Monitoring, Reporting, and Verification of Carbon Dioxide Emissions from Maritime Transport and Repealing Commission Delegated Regulation (EU) 2016/2072 (OJ EU L 2917, 29.12.2023).
10. Commission Implementing Regulation (EU) 2023/2297 of October 26, 2023, Specifying Transshipment Container Ports Pursuant to Directive 2003/87/EC of the European Parliament and of the Council (OJ EU L 2297, 27.10.2023).
11. Commission Implementing Regulation (EU) 2023/2599 of 22 November 2023, Establishing Rules for the Application of Directive 2003/87/EC of the European Parliament and of the Council with Regard to the Administration of Shipping Companies by Administering Authorities Responsible for the Shipping Company (OJ EU L 2023/2599, 23.11.2023).
12. Commission Implementing Decision (EU) 2024/411 of 30 January 2024, on the List of Shipping Companies Indicating the Administering Authority Responsible for the Shipping Company Under Directive 2003/87/EC of the European Parliament and of the Council (OJ EU L 2024/411, 31.01.2024).
13. Directive (EU) 2024/1788 of the European Parliament and of the Council of 13 June 2024, on Common Rules for the Internal Markets of Renewable Gases, Natural Gas, and Hydrogen, Amending Directive (EU) 2023/1791 and Repealing Directive 2009/73/EC (OJ EU L 1788, 15.07.2024).
14. Act of 16 March 1995, on Preventing Pollution of sea from Ships (Journal of Laws of 2023, item 1072, and of 2024, item 834).
15. Act of 12 June 2015 on Greenhouse Gases Emissions Trading System (Journal of Laws of 2024, item 1505).

Everything you’d like to know about ETS2 but don’t know how to ask.

Authors:

Przemysław Chrzan, Emissions Allowances Allocation Unit, KOBIZE

Sylwia Kryłowicz, Deputy Manager, Emissions Allowances Allocation Unit, KOBIZE

Everything you'd like to know about ETS2 but don't know how to ask.

Keywords:


Author:
Przemysław Chrzan


Author:
Sylwia Kryłowicz

Summary:

Increasingly, the issue of the ETS2 has been raised in public opinion and the costs to society of introducing this mechanism, many of which are fragmented and worrisome. This article presents the subject matter related to this and sketches the picture of mechanisms operating within the framework of the European Union's climate policy. It describes the emissions trading mechanism itself, the scope of ETS2 and tries to estimate the costs resulting from it for the average consumer, i.e. the user of fossil fuels.

When we think about the Emissions Trading System, we usually focus on the word "trade", but the word "system" is much more important here.

In the article, we try to draw attention to the importance of reasonable and wise spending of funds obtained from the emissions trading system and their allocation to investments aimed at limiting the increase in the costs of climate policy in the future.

EU ETS, introduction to ETS2

ETS2 is part of the EU's carbon trading system. Therefore, in order to fully illustrate the principles of the ETS2, it is necessary to describe in the introduction the environment in which it will operate, i.e. the CO_2 emissions trading system itself.

The CO_2 emissions trading system is the main mechanism of the Fit For 55 package[1] and the EU climate policy aimed at reducing greenhouse gas emissions in the European Union. There are many more areas for action under Fit For 55, but in this article we focus on emissions trading.

EU ETS / EU Emissions Trading System / European Emissions Trading System. The scheme has been in operation since 2005 and is the Union's main mechanism for reducing greenhouse gas emissions. Across Europe, it covers around 10,000 installations[2] emitting CO_2 and other greenhouse gases such as nitrous oxide and perfluorocarbons.[3]In Poland, the EU ETS currently takes part in approx. 560 installations, although in 2005 there

1 For more information, visit the European Commission's website: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en,accessedby: 26.11.2024).

2 European Commission. (04.2024). *List of operators in the EU ETS*.(https://climate.ec.europa.eu/document/download/ab2c1214-decb-40bc-bb0d-d37f080bdebd_en?filename=policy_ets_registry_operators_ets_en.xlsx, accessed: 26.11.2024)

3 Emissions from non-CO2 greenhouse gases shall be converted into CO2 equivalent, which takes into account the greenhouse effect potential of the gas in question in terms of carbon dioxide. For ease of reference, we use the term CO2 emissions, although this means equivalent.

were more than a thousand. Participation in the EU ETS is mandatory for installations meeting the relevant criteria. These are large industrial installations such as: power plants, combined heat and power plants, heating plants with a capacity exceeding 20 MW in fuel, large installations in industry: refining, metallurgy, chemical, glass, ceramic, paper, cement, limestone. In addition, aviation is included in the scope of the EU ETS, and maritime transport since 2026. The thresholds for mandatory participation are set out in the EU ETS Directive[4]. The idea behind the EU ETS is that the owner of a covered installation reports greenhouse gas emissions per CO_2 every year. It is then required, on pain of a financial penalty, to surrender a number of emission allowances covering the emissions of that installation. Emission allowances can be bought from an EU Member State in a special auction, bought from other participants in the EU ETS or saved by reducing emissions. So the less you emit, the less you have to buy emission allowances. Fewer and fewer CO_2 allowances are available on the market every year. They should therefore become more and more expensive and stimulate the desire of plant owners to reduce emissions. Part of the emission allowances is allocated free of charge by an EU Member State. Free emission allowances shall be allocated on an equal basis to each installation in the Union. Initially before 2012, free emission allowances were allocated for most real emissions. Since 2013, a technological criterion for calculating free allowances based on the so-called benchmarks for the least carbon-intensive technologies has been introduced. There has been a sudden decrease in the number of allowances allocated free of charge, which has led to a sudden increase in the price of allowances.

For example, a coal-fired heating plant has an actual specific CO_2 emission of approx. 100 t CO_2 per terajoule (TJ) of heat produced. It gets free allowances in the amount of 15 t CO_2/TJ. How easy it is to count, he has to buy 85 t CO_2/TJ to surrender his emissions. If the owner of the district heating plant does not do so, he will receive a penalty of EUR 100 per tonne of CO_2 and, in addition, he will still have to surrender his outstanding allowances. Actual emissions in the case of heat production, in addition to the generation technology, mainly depend on the fuels burned during production, where coal is one of the most carbon-intensive. Emissions decrease accordingly if gas is used for heat production and are zero if biomass is used. However, in the case of biomass, sustainability criteria must be met to demonstrate zero emissions. In other words, biomass must be certified. On the other hand, free emission allowances are allocated regardless of the fuels used, but as we mentioned earlier, on the basis of technological benchmarks. An installation producing heat based on coal, gas or biomass will receive the same amount of free allowances. Therefore, using a more carbon-intensive fuel, more allowances need to be purchased to cover their actual emissions. The EU ETS is, in principle, intended to be a mechanism to incentivise decarbonisation, so zero-emission installations or, in other words, installations that do not emit CO_2 are not covered by the system. According to the latest changes, installations whose emissions from biomass (correspondingly counted) represent more than 95% of their total emissions will not be covered by the EU ETS from 2026.

Let us illustrate the overall level of costs associated with the purchase of emission allowances. Let's assume that a small heating plant covered by the EU ETS in Poland, supplying the district heating network, produces approx. 200 TJ of heat per year. With the use of coal, it emits approx. 20 000 t CO_2, gets approx. free of charge. 3,000 allowances. To cover its emissions, it has to buy 17,000 allowances. With an allowance price of around EUR 70 per allowance,

4 Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC, consolidated text.

the owner of such a heat plant must spend approx. EUR 1.2 million. This money is included in the heat price for heat consumers. It's a little different with electricity producers. Due to the fact that no free allowances are available for the production of electricity, a classic power plant must buy the necessary allowances to cover virtually all its emissions associated with the production of electricity. The largest Polish power plant, fired with lignite, must purchase approx. 30 million CO_2 allowances at a cost of EUR 70 per allowance of around EUR 2.1 billion per year[5]. This money is included in the price for electricity consumers. The money raised by the Member State from the sale of emission allowances should be spent in a prescribed manner for purposes related to climate policy. However, as shown by the report of the Supreme Audit Office on the management of funds from the sale of greenhouse gas emission allowances,[6] this part of the 'system' still needs to be improved.

What does not fall within the scope of the EU ETS, let us call 'non-ETS'. In simple terms, 'non-ETS' are smaller industrial plants (below the EU ETS thresholds), transport, heating of residential buildings, including single-family buildings (if they are no longer heated by heat produced under the EU ETS), agriculture. The costs of participation in the EU ETS are higher than the costs of emissions in the 'non-ETS', as, at least in the case of Poland, there are no CO_2-related charges commensurate with the EU ETS. For example, a local coal-fired heating plant covered by the EU ETS supplying heat to the district heating network bears the costs of purchasing CO_2 emission allowances, which it transferred to consumers of its heat. A heating plant located in another part of the city that does not meet the EU ETS thresholds does not incur costs related to the purchase of emission allowances (it incurs lower costs related to local environmental charges). As long as it does not increase its capacity above 20 MW, it will not enter the EU ETS, which in the case of the first heating plant should act in a way that encourages investment in less carbon-intensive heat sources. So in addition to the distortion of economic competitiveness on the local market, we are also dealing with the inefficiency of the EU's emission reduction policy. This is one of the reasons why the ETS2 was created to 'seal' the EU ETS.

ETS2, basic principles

In 2023, the EU ETS Directive was amended to extend the ETS to buildings, road transport and other sectors. The working name is ETS2. With the introduction of ETS2, every European citizen using fossil fuels will pay for their CO_2 emissions. This is a kind of revolution in financing the climate transition, because so far the CO_2 emission fee has been charged to large industrial plants and it was the recipient of the electricity, heat or other products and goods produced by these plants who paid for the emission included in the price of the goods, but did not pay this fee directly. With the entry into force of ETS2, the fuel supplier will charge an appropriate emission fee to the purchaser of that fuel. However, fees under the basic ETS and ETS2 cannot overlap,

With the introduction of ETS2, every European citizen using fossil fuels will pay for their CO_2 emissions. This is a kind of revolution in financing the climate transition, because so far the CO_2 emission fee has been charged to large industrial plants and it was the recipient of the electricity, heat or other products and goods produced by these plants who paid for the emission included in the price of the goods, but did not pay this fee directly.

5 According to data from the registry of allowances, the European Commission, (EUROPA - Environment - Kyoto Protocol - European Union Transaction Log. (https://ec.europa.eu/clima/ets/welcome.do?languageCode=en,accessed on 26.11.2024)

6 NIK on the management of funds from the sale of greenhouse gas emission allowances - Supreme Audit Office, (https://www.nik.gov.pl/aktualnosci/entitlements-for-emissions-gas-heating plants.html, accessed 26.11.2024)

so if e.g. a heat consumer is powered by a district heating plant covered by the basic ETS, it will not incur additional ETS2 fees. In practice, when it comes to heating, ETS2 costs will be borne, among others, by heat consumers powered by a heating plant not covered by the basic ETS or purchasing fuel for heating themselves.

> **The ETS2 participants will be fuel suppliers, they will account for 'emissions placed on the market with fuel'.**

The ETS2 participants will be fuel suppliers, they will account for 'emissions placed on the market with fuel'.[7] Such a fuel supplier that is a participant in ETS2 is legally referred to as a 'regulated entity'. Compared to the basic ETS, where emitters account for their emissions, in ETS2, fuel suppliers will account for how many emissions they have placed on the market in fuel. From 2025, regulated entities will report annually how much fuel they have released for consumption and calculate the CO_2 emissions associated with it. From 2027, they will surrender emission allowances in a number covering emissions (unless there is already another CO_2 tax in the country concerned at least equivalent to the allowances). ETS2 participants will buy allowances in auctions organised by the Member State (separate from the auctions under the basic ETS). The auction revenues will feed into well-defined actions related to the climate transition and the Social Climate Fund (SCF-Social Climate Fund). ETS2 does not cover fuels already combusted under the core ETS, zero-emission fuels and municipal waste fuel. It will cover CO_2 emissions from fuels used for heating buildings, road transport (excluding agricultural vehicles) and industry below the entry thresholds of the basic ETS.

Sectors covered by the ETS2

The scope of the ETS2 covers the release for consumption of fuels in the following sectors (if these fuels are no longer used in the basic ETS):

- Construction sector,
- Road transport sector,
- Additional sectors.

Construction and road transport sectors

The scope of the sectors is defined in great detail. Emission sources in the buildings and road transport sectors are:

- CHP plants (source category code 1A1a ii[8]) and district heating plants (source category code 1A1a iii) provided that they produce heat for residential heating and commercial and public services. The scope of commercial and public services includes, among others, shops, wholesalers, hotels, restaurants, schools, health facilities, service premises,[9]
- fuels directly used for heating households (source category code 1A4b),
- fuels directly used in commercial and public services (source category code 1A4a),
- road transport (source category code 1A3b), except for the use of agricultural vehicles on paved roads.

7 In principle, this applies to the supplier of the last fuel in the excise chain, i.e. supplying fuel directly to the consumer.

8 According to Annex III of the EU ETS Directive, which defines the scope of sectors covered by the ETS2, these are emission sources as defined in the2006 IPCC Guidelines for National Greenhouse Gas Inventories, access: 26.11.2024)

9 The IPPC Guidelines, in turn, refer to theISIC (International Standard Industrial Classification of All Economic Activities Revision 3.1, accessed 26.11.2024),which specifies the scope of each category of services.

FIGURE 1. DETAILED SCOPE OF ADDITIONAL SECTORS COVERED BY ETS2.

- Fuel combusted by the fuel extraction or energy-producing industries.
- Electricity and heat generation
- Fuel production: refineries, coking plants, other

Manufacturing Industries and Construction (IPCC source category code 1A2)

- Iron and Steel (ISIC Group 271 and Class 2731)
- Non-Ferrous Metals (ISIC Group 272 and Class 2732)
- Chemicals (ISIC Division 24)
- Pulp, Paper and Print (ISIC Divisions 21 and 22)
- Food Processing, Beverages and Tobacco (ISIC Divisions 15 and 16)
- Non-Metallic Minerals Includes products such as glass, ceramic, cement, etc.; (ISIC Division 26)
- Transport Equipment (ISIC Divisions 34 and 35)
- Machinery Includes fabricated metal products, machinery and equipment other than transport equipment; (ISIC Div
- Mining (excluding fuels) and Quarrying (ISIC Divisions 13 and 14)
- Wood and Wood Products (ISIC Division 20 1 A 2 k Construction ISIC Division 45)

Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories

The buildings and road transport sectors concern space heating and road transport. In the field of heating, ETS2 will include both the supply of fuel to a local heating plant outside the thresholds for participation in the classic ETS, and the supply of fuel directly to heat the house (e.g. coal storage or gas supplier to a residential community with its own boiler room).

Additional sectors

The sources of emissions in the additional sectors are:

- energy industry (source category code 1A1), excluding categories already covered as construction sector,
- manufacturing and construction (source category code 1A2),

Additional sectors in ETS2 therefore include the part of industry that is not covered by the basic ETS. In practice, sectors where combustion of fuels takes place not yet covered by the ETS will be covered by the ETS2. This should be mentioned, as the general opinion believes that ETS2 will only cover heating of households and transport.

ETS2 - how many emissions?

According to data included in the National Inventory Report 2024 – Inventory of greenhouse gas emissions and removals in Poland for the years 1988-2022,[10] total greenhouse gas emissions in 2022 in Poland amounted to 380.51 million tonnes of eq. CO_2 of which 342.97 million t eq. CO_2 is emissions from the combustion of fuels, transport and industrial processes. Emissions in 2022 from installations covered by the EU ETS in Poland amounted to 184.15

10 National Centre for Emissions Balancing and Management, National Inventory Report 2024 (https://kobize.pl/uploads/materials/materials_for_downloads/national_issuance_inventory/NIR_2024_synthetic_report_PL.pdf, accessed at: 26.11.2024).

million tonnes of eq. CO_2.[11] If emissions from installations covered by the EU ETS are deducted from total emissions from combustion of fuels, transport and industrial processes, the potential scope of ETS2 in Poland could be approx. 158.82 million tonnes of eq. CO_2.

TABLE 1 ESTIMATION OF THE POTENTIAL SCOPE OF ETS2 IN THE EU

Total GHG emissions in the EU in 2021	3 468	mln t eq. CO_2
including emissions from fuel combustion for energy, transport, and industrial processes.	2 981	
Emissions from installations covered by the EU ETS in the EU in 2021	1 337	
Potential scope of ETS2 in the EU	1 644	

TABLE 2 ESTIMATION OF THE POTENTIAL SCOPE OF ETS2 IN POLAND

Total GHG emissions in Poland in 2022	381	mln t eq. CO_2
including emissions from fuel combustion for energy, transport, and industrial processes.	343	
Emissions from installations covered by the EU ETS in Poland in 2022	184	
Potential scope of ETS2 in Poland	159	

At EU level, based on available emissions data for 2021,[12] total greenhouse gas emissions in the EU in 2021 amounted to 3 468.4 million tonnes of eq. CO_2, including 2 980.7 million tonnes of eq. CO_2 emissions from the combustion of fuels, transport and industrial processes. Emissions in 2021 from installations covered by the EU ETS in the EU amounted to 1 336,7 million tonnes of eq. CO_2.[13] If emissions from installations covered by the EU ETS are subtracted from total emissions from combustion of fuels, transport and industrial processes, the potential scope of the ETS2 could be approx. 1,644 million tonnes of eq. CO_2.

In view of the European Union's 2040 climate target[14] of reducing emissions by 90% by 2040 compared to 1990, an estimate of the need for ETS2 allowances could be made. Assuming a linear reduction trajectory in line with the climate target (which in practice may not happen and emissions may be higher), the potential scope of ETS2 emissions was estimated and compared with the pool of allowances that will be available for auctioning in ETS2[15].

In the perspective of 2026-2032, it may turn out that emission allowances are more than the level of emissions. For now, this is a very rough estimate,

11 EU Emissions Trading System (ETS) data viewer — European Environment Agency (https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1, accessed: 26.11.2024).

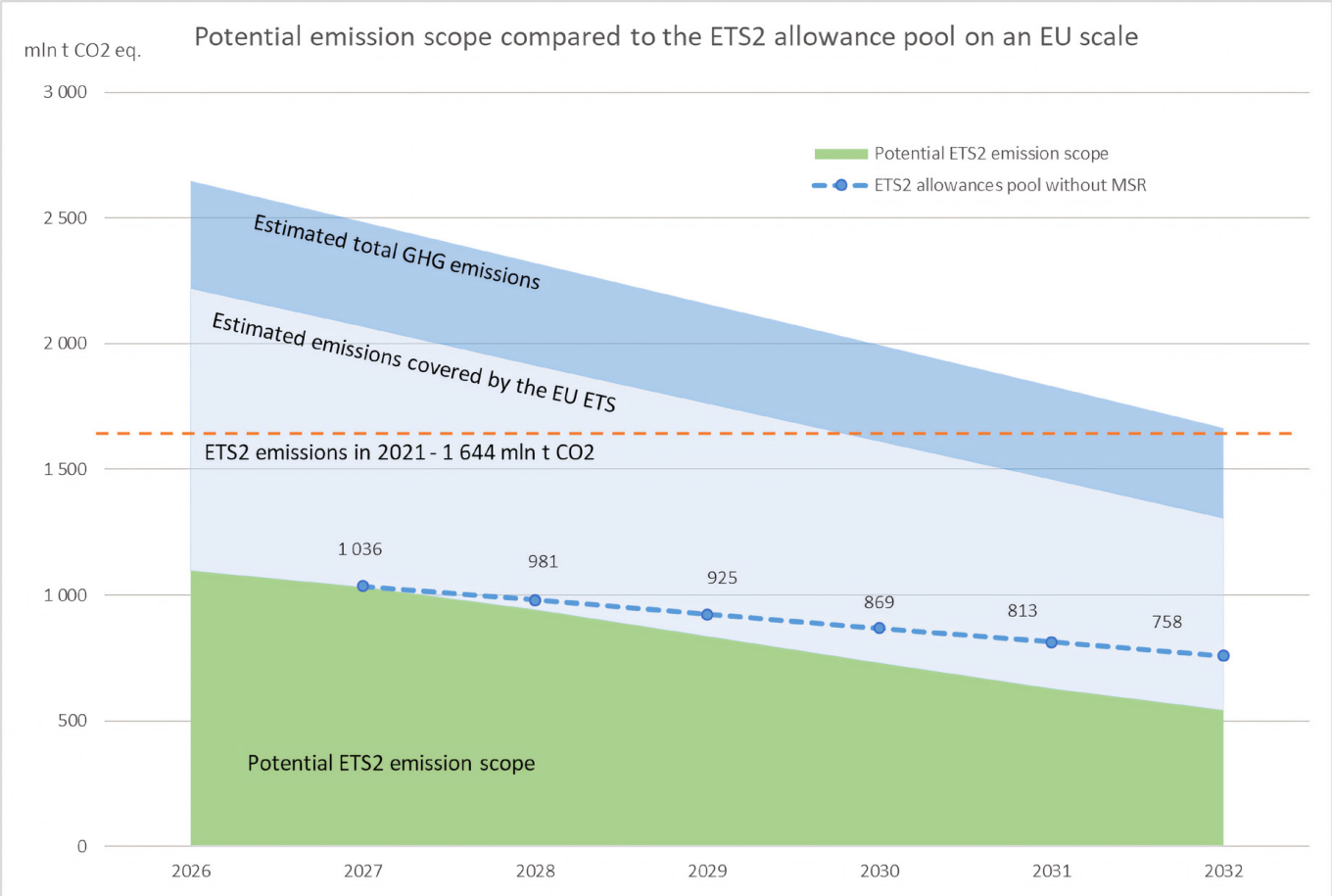
12 Greenhouse Gas Inventory Data - GHG Profiles - Annex I (https://di.unfccc.int/ghg_profile_annex1, accessed: 26.11.2024).

13 EU Emissions Trading System (ETS) data viewer — European Environment Agency.(https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1, accessed: 29.09.2024).

14 More information 2040 climate target - European Commission (access: 26.11.2024).

15 ETS2: Opportunities and Challenges for Poland in the Context of Energy Transition and EU Climate Goals, GO250 Nr 05/2024 Robert Jeszke, Izabela Lewarska, Sebastian Lizak.

FIGURE 2. POTENTIAL SCOPE OF EMISSIONS COMPARED TO THE EU ETS2 ALLOWANCE POOL



Source: KOBiZE own calculations

assuming that emissions trading mechanisms will work and emissions will decrease. If emissions from ETS2 were to remain at 2021 levels, then there would be a shortage of allowances. However, only emissions data for 2024, 2025 and 2026 under ETS2 rules, will show a more precise range of emissions. If emissions in ETS 2 turn out to be higher than estimated, then the increase in the price of allowances should have a stimulating effect on reducing emissions in the long term. It can also be inferred from the graph that if no action is taken to reduce CO_2 emissions in the ETS2, the gap between emissions and the number of allowances available will increase. In turn, a shortage of allowances on the market will lead to an increase in the price of allowances. It is already clear how important it is to spend the obtained funds wisely on investments reducing CO_2 emissions in the future. Any estimate of the price of the allowance over the long term should take this into account.

> **If no action is taken to reduce CO_2 emissions in the ETS2, the gap between emissions and the number of allowances available will increase. In turn, a shortage of allowances on the market will lead to an increase in the price of allowances. It is already clear how important it is to spend the obtained funds wisely on investments reducing CO_2 emissions in the future**

It is also important to bear in mind the MSR reserve, i.e. 600 million allowances, which will be activated

before 2030 in the event of an excessive increase in the price of allowances.

Fuels covered by ETS2

For the purposes of ETS2, the definition of "fuel" has been adopted - any energy product referred to in Article 2 para. 1 of Directive 2003/96/EC, including the fuels listed in Table A and Table C of Annex I, and any other product intended for use, offered for sale or used as motor fuel or heating fuel as defined in Article 2(1) of Directive 2003/96/EC. 3 of that Directive, including for the production of electricity.

The following are excluded from the scope of ETS2:

- release for consumption of fuels already used in the EU ETS,
- release for consumption of fuels with an emission factor of zero,
- release for consumption of hazardous or municipal waste used as fuel.

Due to the broad definition of fuel, it is easier to determine which fuels will not be covered by ETS2, i.e. ETS2 will not be covered by the following fuels:

- peat,
- waste used as fuels (hazardous or municipal waste used as fuels, which is explicitly excluded from the scope of ETS2 in Annex III of the Directive),
- fuels derived from waste (mainly used in EU ETS installations),
- solid biomass (e.g. wood-based fuels),
- charcoal.

Emission allowances and spending from ETS2

In accordance with the provisions of the EU ETS Directive,[16]EU Member States shall ensure that, from 2025 onwards, each regulated entity monitors, in each calendar year, the level of emissions corresponding to the quantities of fuels released for consumption under the ETS2. From 2026 onwards, Member States shall also ensure that each regulated entity reports those emissions to the competent authority in the following year. EU Member States shall ensure that each regulated entity that held a permit on 1 January 2025 reports its historical emissions for 2024 by 30 April 2025. From 1 January 2028, EU Member States shall ensure that, by 31 May each year, the regulated entity surrenders a number of allowances covered by this Chapter equivalent to the total emissions of that regulated entity corresponding to the amount of fuels released for consumption under the ETS2 in the preceding calendar year.

From 2027 or 2028, ETS2 allowances will be auctioned separately from ETS allowances (there will be no free allocation as is the case for the basic ETS). The auctioning of ETS2 allowances will start from 2027 or from 2028 if the specific conditions set out below are met. In 2027, 600 million ETS2 allowances will be placed in the Market Stability Reserve (MSR Market Stability Reserve)[17], 150 million allowances will be auctioned and all revenues from these auctions will be transferred to the Social Climate Fund by 2032[18]. From the remaining quantity of allowances, to generate a maximum amount of EUR 65 billion, the European Commission will ensure

16 The EU ETS Directive requires the ETS2 provisions to be transposed into national law by 30 June 2024. At the time of publication of this text, work is ongoing to introduce the relevant provisions in Polish law.

17 A special reserve from which allowances are released to prevent excessive increases in auction prices.

18 More information on the Social Climate Fund: Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund and amending Regulation (EU) 2021/1060

the auctioning of an additional quantity of ETS2 allowances and the revenues from these auctions will be made available to the Social Climate Fund until 2032.

A specific mechanism is also foreseen to address excessive increases in the price of allowances. If, for more than three consecutive months, the average price of allowances in ETS2 auctions is more than twice the average price of allowances in ETS2 auctions over the previous six consecutive months, the European Commission shall release 50 million allowances from the Market Stability Reserve (MSR). In 2027 and 2028, the first years of operation of the auctions, the European Commission will release allowances from the Market Stability Reserve if, for more than three consecutive months, the average price of allowances is higher than 1.5 times the average price of allowances over the reference period covering the preceding six consecutive months. If the average price of ETS2 allowances in the following two months exceeds EUR 45, 20 million allowances will be released from the MSR. If the average price of ETS2 allowances is more than three times the average price of allowances over the previous six consecutive months, 150 million ETS2 allowances will be released from the Market Stability Reserve.

As a general rule, this mechanism is intended to counter an increase in the price of ETS 2 allowances of more than EUR 45. 600 million allowances will be available in the MSR for use in such cases by the end of 2030. If these funds are fully used to regulate the allowance price, the allowance price may significantly exceed the security thresholds.

In addition to the Social Climate Fund, EU Member States shall determine how revenues generated from the auctioning of allowances are to be used for the following activities:

- measures to contribute to the decarbonisation of heating and cooling systems in buildings or to reduce the energy demand of buildings,
- measures to financially support low-income households in worst-performing buildings;
- measures to accelerate the uptake of zero-emission vehicles,
- financial support for the establishment of a fully interoperable refuelling and recharging infrastructure for zero-emission vehicles,
- measures to incentivise the shift to public transport,
- financial support measures to address social problems faced by low- and middle-income transport users,
- financing of the Social Climate Plan[19],
- providing financial compensation to final consumers of fuels where double counting of emissions could not be avoided.

The total pool of allowances in the Union available for auctioning under the ETS2 from 2026 to 2032 without taking into account the Market Stability Reserve amounts to 5,232 billion allowances[20]. The market value of these allowances, calculated at a weighted average price of EUR 45 per allowance, is EUR 237.2 billion. Of this amount, the Social Climate Fund will be endowed with EUR 65 billion. In addition, 0.6 billion allowances worth EUR 27 billion will be available in the Market Stability Reserve before the end of 2030 to fund the pool in the event of a sudden increase in the price of allowances. The amounts given are estimates, they will vary depending on the actual price of emission allowances.

This money should go to investments aimed at reducing emissions and increasing the efficiency of energy use, in order to ultimately reduce the burden on society of the costs of climate policy. Despite the fact that the ETS2 participants will be fuel suppliers, the amounts referred to above will be generated by charging costs to their customers, i.e. fossil fuel users.

Despite the fact that the ETS2 participants will be fuel suppliers, the amounts referred to above will be generated by charging costs to their customers, i.e. fossil fuel users.

Costs related to ETS2

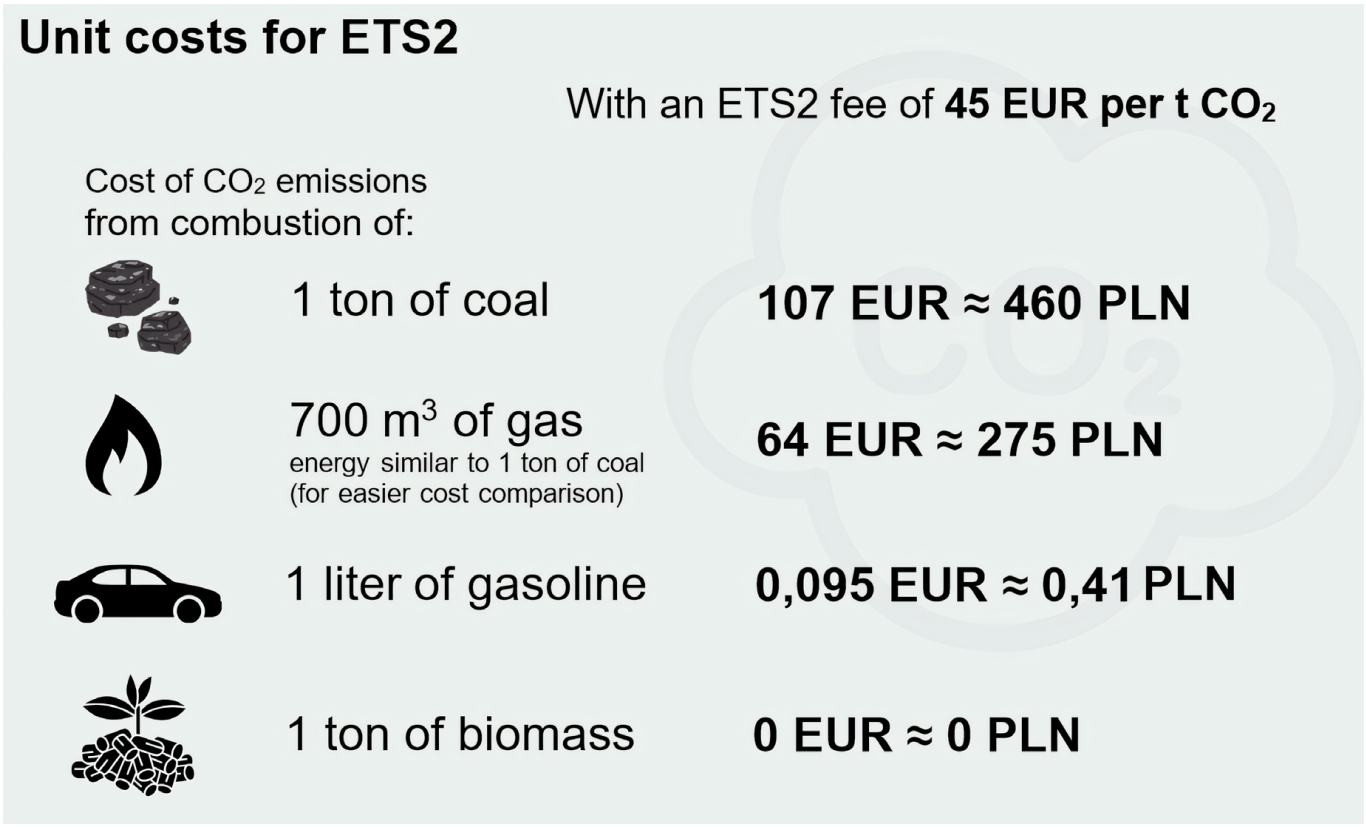
For the basic unit cost analysis, EUR 45 per emission allowance was used. It is difficult to accurately estimate the future prices of ETS2 allowances, all the more so as EU Member States have the possibility to derogate from the introduction of ETS2 before 2030 if they have introduced a national carbon tax. Such derogations shall only be possible where the national tax rate is higher than the average auction price of allowances in a given year and only in relation to the obligation for the payers of such tax to surrender allowances. This, combined with the possibility for the European Commission to control the supply of allowances in the early years of the ETS2, makes it difficult to accurately predict the price of allowances. According to some analyses[21], the allowance price may stabilise around EUR 100 after 2030.

19 Social Climate Fund spending plan to be drawn up by each Member State under Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund

20 ETS2: Opportunities and Challenges for Poland in the Context of Energy Transition and EU Climate Goals, GO250 Nr 05/2024 Robert Jeszke, Izabela Lewarska, Sebastian Lizak

21 CO2 Market Report No 147, June 2024. (https://www.kobize.pl/uploads/materials/materials_for_downloads/report_co2/2024/KOBiZE_Analysis_of the market_CO2_June_2024.pdf, accessed at: 26.11.2024).

FIGURE 3. ETS2 COSTS PER UNIT OF ENERGY WITH AN ALLOWANCE PRICE OF EUR 45.



Source: Own elaboration based on Calorific values (NCV) and CO2 emission factors (EF) in 2021 for reporting under the Emissions Trading System for 2024.

Any calculations made below are estimates. The idea of introducing the ETS2 system is ultimately to reduce the consumption of fossil fuels and decarbonize the economy and increase the efficiency of energy use. Therefore, estimates of costs per unit of energy used are more meaningful, as an analysis of the estimated cost for an example household does not take into account the reduction in energy consumption that ETS2 should ultimately achieve. It only has to show what an estimated level of costs we can deal with after the introduction of ETS2.

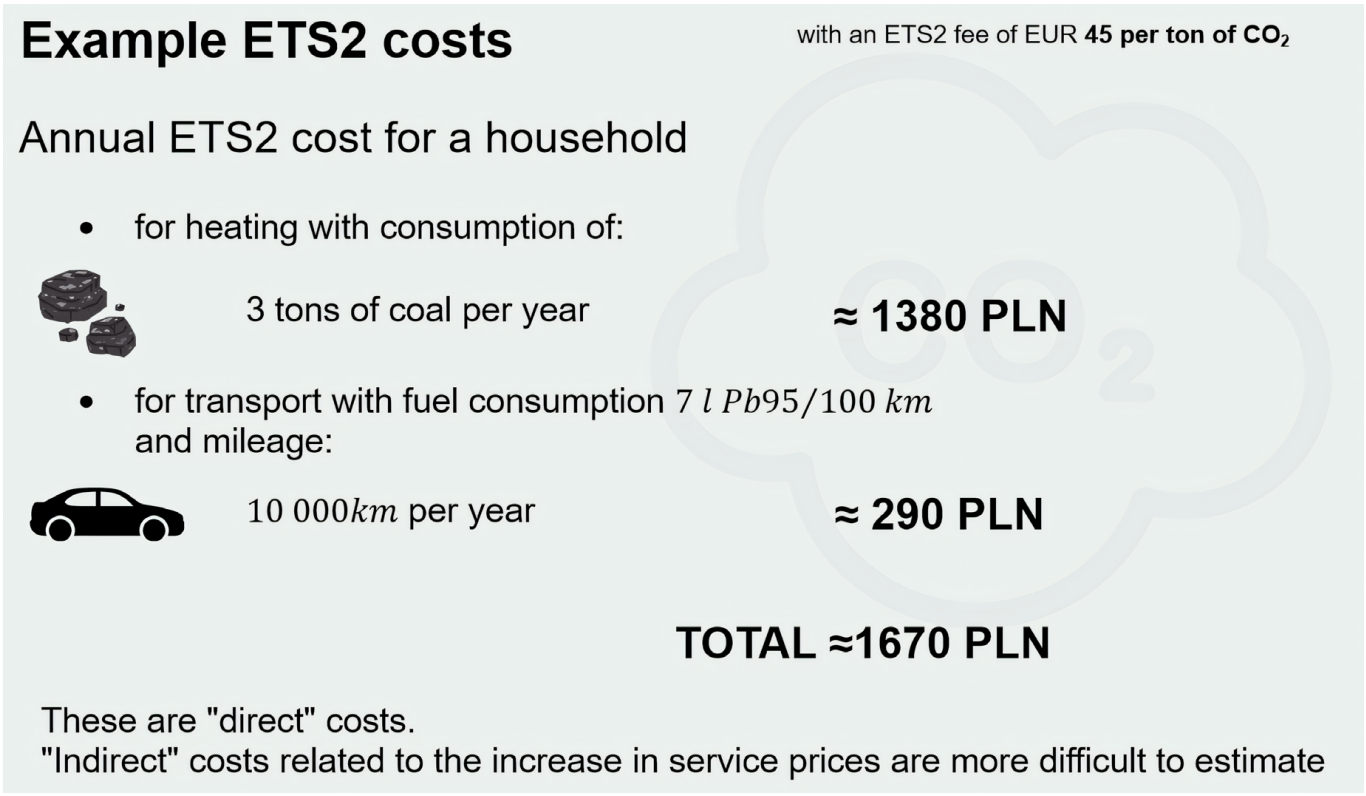
Costs per unit of energy used

In order to compare the costs associated with the use of different fuels, an analysis of costs per unit of energy was made, which is easy to convert for the final consumer of fuel for basic fuels used in residential households. The standard parameters for the net calorific value and emission factors[22] were used.

Assuming that an example farm consisting of a family living in a single-family household uses 3 tons of coal per year for heating and has a petrol-fired passenger car with a mileage of 10 000 km per year, the direct costs of ETS2 will amount to approx. PLN 1 670 per year (assuming a price of EUR 45 per allowance). These are the direct costs of heating and transportation that the family will incur when buying coal and gasoline. Indirect costs are difficult to estimate as they relate to a possible increase in ETS2 induced prices for services falling within the scope of commercial and public services and an increase in product prices in additional sectors.

22 Calorific values (NCV) and CO2 emission factors (EF) in 2021 for reporting under the Emissions Trading Scheme for 2024. (https://www.kobize.pl/uploads/materials/materials_for_downloads/emissions_indicators/WO_and_WE_for_monitoring-ETS-2024.pdf, accessed: 26.11.2024). For carbon NCV = 25,2 MJ/kg, EF = 94,19 kg CO2/GJ. For gas NCV = 36,56 MJ/m3, EF = 55,37 kg CO2/GJ. For petrol NCV = 40,95 MJ/kg (30,61 MJ/l), EF = 0,03 kg CO2/GJ.

FIGURE 4. ANNUAL ETS2 COSTS FOR THE SAMPLE HOUSEHOLD WITH AN ALLOWANCE PRICE OF EUR 45.



Source: Own elaboration based on calorific values (NCV) and CO2 emission factors (EF) in 2021 for reporting under the Emissions Trading System for 2024.

Another example of the impact of ETS2 is the housing community, which uses its own natural gas-fired boiler room for heating. Medium-sized community consuming approx. 130 000 m^3 of gas will incur a ETS2 cost of around PLN 50 000 per year (assuming a price of EUR 45 per allowance). You can also try to determine the costs per m^2 of dwellings with a specific EP of non-renewable primary energy demand for heating, ventilation and hot water. However, such calculations can be a big mistake and should only be considered as indicative. For example, an apartment in a multi-family building in the previously described housing community heated by burning gas in a local boiler room has an EP index of 105 kWh/m^2/year. The gas demand for heating 1 m^2 of such an apartment is 10.339 m^3/year and the emission from heating this 1 m^2 is 20.92 kg CO_2/year. The unit cost of ETS2 (assuming EUR 45 per allowance) will be PLN 4.05/m^2/year. For an apartment with an area of 57 m^2, the annual cost of gas heating would therefore increase by approx. 230 PLN/year.

Possibility of postponing the introduction of ETS2 allowances auctions

The legislation introduces the possibility to postpone ETS2 emissions trading until 2028 in case of exceptionally high energy prices. By 15 July 2026, the European Commission shall publish a notice as to whether one or both of the following conditions are fulfilled:

a. the average price of TTF gas for the six calendar months ending 30 June 2026 was higher than the average price of TTF gas in February and March 2022;

b. the average price of Brent crude oil for the six calendar months ending 30 June 2026 was more than twice the average price of Brent crude oil for

the preceding five years; the five-year reference period shall be the five-year period ending before the first month of the six-calendar-month period.

If one or both conditions are met, the start of the auctioning of ETS2 allowances shall be postponed to 2028 and the initial surrender of allowances in respect of total emissions from 2028 shall be postponed to 31 May 2029.

An analysis of the data in this area suggests that it may be difficult to meet the conditions for postponing ETS2 by one year. The average price of TTF gas in February and March 2022 was EUR 112.25/MWh[23]. Currently, TTF gas prices oscillate around 45 EUR/MWh. Therefore, in order to meet this condition, the average price of TTF gas in the first half of 2026 should be almost two and a half times higher than today.

FIGURE 5. WEEKLY PRICE OF TTF GAS FUTURES IN EUR/MWH.

Source: TTF Natural Gas FuturesChart, Investing.com (Dutch TTF Natural Gas Futures Chart - Investing.com, accessed at: 28.11.2024)

According to the second criterion, the average price of Brent crude oil in the first half of 2026 should be more than twice as high as the average price of Brent crude oil in 2021-2025. The fulfilment of this condition will therefore only be determinable after the end of 2025. The average price from January 2021 to November 2024 is USD 82,63/barrel[24]. However, if prices in 2025 were similar to current prices, for the condition to be met, the average price of Brent crude oil in the first half of 2026 should reach more than USD 160/barrel.

Summary

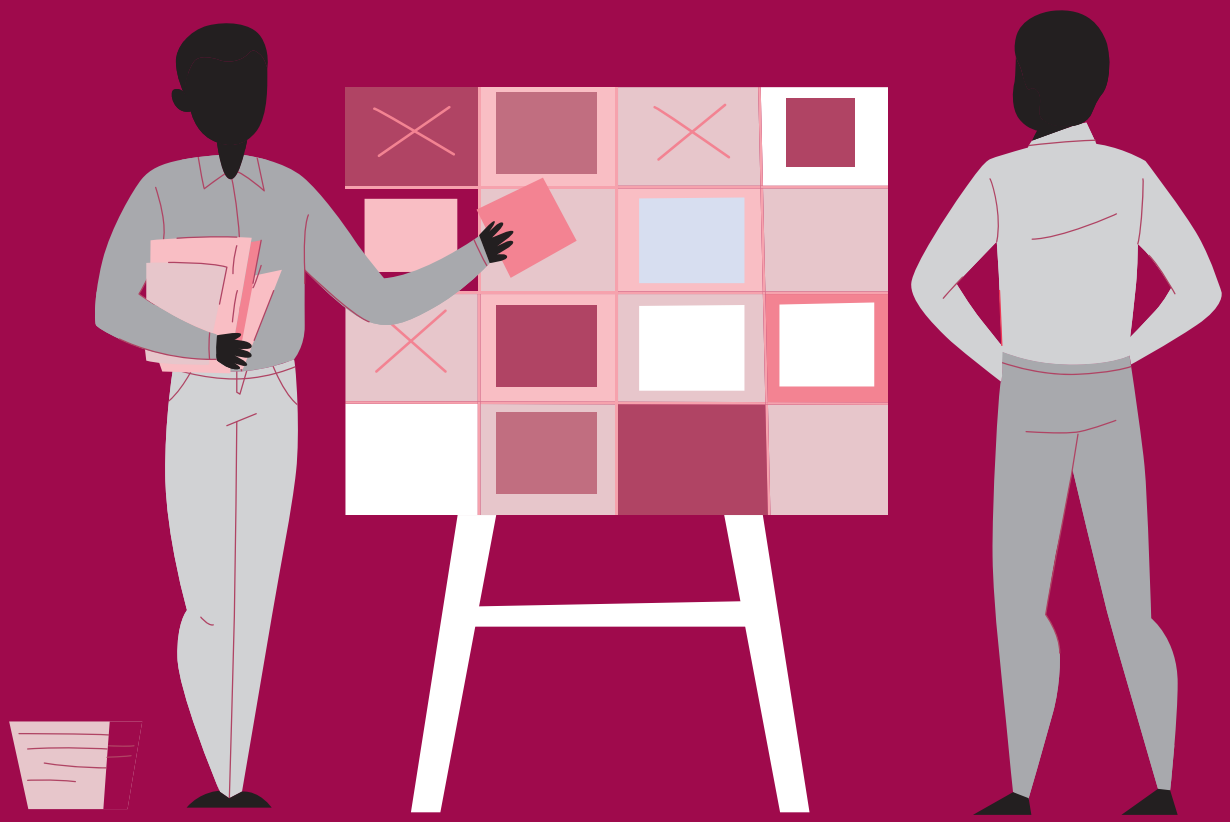
The introduction of ETS2 is a significant step in the development of EU climate policy. It extends the burden of financing climate policy from large industrial installations to end-users of fossil fuels. However, the expected increase in costs associated with this gives rise to legitimate public concern. When considering the social impact of the introduction of new ETS2 levies, it is impossible not to take into account the expected change in the structure of the use of fossil fuels that ETS2 may lead to. ETS2 is inextricably linked to a specific

23 Dutch TTF Natural Gas Futures Historical Data, https://www.investing.com/commodities/dutch-ttf-gas-c1-futures-historical-data, accessed 28.11.2024.
24 Brent Oil Futures Historical Data, https://www.investing.com/commodities/brent-oil-historical-data, accessed 28.11.2024.

use of auction revenues and to the Social Climate Fund. The primary objective of ETS2 is to achieve the decarbonisation of district heating and cooling systems in buildings or to reduce the energy demand of buildings. Therefore, it is very important to design transparent rules on the spending of funds obtained from the ETS2 in order to achieve this goal as much as possible. Failure to take any action to reduce emissions in the ETS2 sectors could lead to an increase in the price of allowances.

Bibliography:

1. Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC.
2. Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing a Social Climate Fund and amending Regulation (EU) 2021/1060
3. Delivering on the European Green Deal, European Commission, https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en (access: 26.11.2024).
4. List of EU ETS operators, European Commission, https://climate.ec.europa.eu/document/download/ab2c1214-decb-40bc-bb0d-d37f080bdebd_en?filename=policy_ets_registry_operators_ets_en.xlsx (accessed: 26.11.2024).
5. EUTLRegistry, European Commission, EUROPA - Environment - Kyoto Protocol - European Union Transaction Log. (https://ec.europa.eu/clima/ets/welcome.do?languageCode=en, (accessed on 26.11.2024).
6. NIK on the management of funds from the sale of greenhouse gas emission allowances - Supreme Audit Office, https://www.nik.gov.pl/aktualnosci/entitlements-for-emissions-gas-heating plants.html, (accessed on 26.11.2024).
7. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, IPCC, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, (accessed 26.11.2024)
8. International Standard Industrial Classification of All Economic Activities, Rev 3.1, International Standard Industrial Classification of All Economic Activities Revision 3.1, (accessed 26.11.2024).
9. National Inventory Report 2024, National Centre for Emissions Balancing and Management, https://kobize.pl/uploads/materials/materials_for_downloads/national_emissions_inventory/NIR_2024_synthetic_report_PL.pdf, (accessed: 26.11.2024).
10. EU Emissions Trading System (ETS) data viewer — European Environment Agency https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1, (accessed: 26.11.2024).
11. Greenhouse Gas Inventory Data - GHG Profiles - Annex I (https://di.unfccc.int/ghg_profile_annex1, (accessed: 26.11.2024).
12. Climate strategies & targets, European Commission 2040 climate target - European Commission, (access: 26.11.2024).
13. CO_2 Market Report No. 147, June 2024, National Centre for Emissions Balancing and Management, https://www.kobize.pl/uploads/materials/materials_for_downloads/report_co2/2024/KOBiZE_Analysis_of the market_CO2_June_2024.pdf, (accessed: 26.11.2024).
14. Calorific values (CV) and CO2 emission factors (EC) in 2021 for reporting under the Emissions Trading Scheme for 2024, National Centre for Emissions Balancing and Management. https://www.kobize.pl/uploads/materials/materials_for_collection/emission_indicators/WO_i_WE_for_monitoring-ETS-2024.pdf, (accessed: 26.11.2024).
15. Dutch TTF Natural Gas Futures Historical Data, https://www.investing.com/commodities/dutch-ttf-gas-c1-futures-historical-data, (accessed 28.11.2024.)
16. Brent Oil Futures Historical Data, https://www.investing.com/commodities/brent-oil-historical-data, (accessed 28.11.2024).



ETS2: Opportunities and Challenges for Poland in the Context of Energy Transition and EU Climate Goals

Authors:

Robert Jeszke, Deputy Director of IOŚ-PIB, Head of KOBIZE and CAKE

Izabela Lewarska, Strategy, Analysis, and Auction Unit, KOBIZE/CAKE

Sebastian Lizak, Strategy, Analysis, and Auction Unit, KOBIZE/CAKE

ETS2: Opportunities and Challenges for Poland in the Context of Energy Transition and EU Climate Goals

Keywords: ETS2, "Fit for 55" package, EU ETS, MSR, TNAC, SCF

Author:
Robert Jeszke

Author:
Izabela Lewarska

Author:
Sebastian Lizak

Abstract

This article discusses the structures of the new emission trading system for buildings and road transport (so-called ETS2), planned to start operating in 2027, and analyses its potential impact on the number of Polish allowances, as well as the revenues generated from their sale, identifying possible challenges.

The ETS2 system aims to reduce CO_2 emissions by 43% by 2030 compared to 2005 levels. Its implementation is intended to encourage participants to invest in energy modernisation of buildings and low-emission transport solutions. Key components of ETS2 include the Market Stability Reserve (MSR) and the Social Climate Fund (SCF), which will support households and micro-enterprises adapt to potentially higher costs resulting from the new system.

Under ETS2, Poland will have significant funds available from the auctioning of allowances and resources allocated through the SCF. Between 2027 and 2032, ETS2 could generate up to €32.1 billion in revenues for Poland. This financial perspevctive should ensure substantial support for Poland's energy transition and help mitigate the negative impact of ETS2 on households and vulnerable economic sectors. These funds can be used to modernise infrastructure and develop renewable energy sources[1].

The ETS2 is an important step towards achieving the EU's ambitious climate goals, but it will require significant investments, especially in high emitting countries such as Poland. Despite the challenges, an appropriate and effective use of the resources available to Poland, such as auction revenues and SCF funds, combined with intensified emission reduction measures, should help achieve these goals.

1 Provided that the funds from ETS2 do not go to so-called "own resources," meaning they will not finance the EU budget.

Introduction

The ‚Fit for 55' package includes a wide range of policy measures aimed at different sectors of the economy, including transport, energy, buildings, industry and agriculture. A central element of this strategy is the strengthening of the European Emissions Trading System (EU ETS), which has been the main mechanism for reducing emissions in energy-intensive sectors of the European economy since 2005. As part of the "Fit for 55" package, the introduction of a new system for road transport and buildings—ETS2—has been proposed to start in 2027. This system would operate in parallel with the EU ETS and cover the so-called non-ETS sectors.

Architecture of the ETS2 System

The new system will cover CO_2 emissions from fuel combustion in buildings and road transport, as well as additional sectors not covered by the EU ETS, such as small industrial installations. It is important to emphasise that ETS2 will not include buildings or vehicles used in agriculture[2]. The aim of ETS2 is to reduce emissions by 43% from 2005 levels by 2030. The new system will complement other policies of the European Green Deal in the sectors it covers, helping Member States to achieve their emission reduction targets in line with the ESR regulation[3]. The price of allowances in ETS2 is designed to encourage participants to invest in modernising buildings and developing low-emission transport solutions.

According to the European Commission, existing emission reductions in the ETS2 sectors are not sufficient to ensure climate neutrality by 2050[4]. This is particularly true for the transport sector, where greenhouse gas (GHG) emissions have been increasing since 1990 and are projected by the EEA to be 4% higher in 2023-2030 than in 1990[5]. In contrast, emissions in the buildings sector decreased from 735 Mt CO_2eq in 1990 to 489 Mt CO_2eq in 2022, and are projected to be 42% below 1990 levels by 2030[6].

The new ETS2 system will be phased in. From 2026, compliance entities will have to report verified emissions, and from 2027, the ETS2 system will be fully operational. However, its implementation may be delayed by one year depending on energy prices. Entities that place fuels on the market, rather than end users, will be subject to the new system, which includes an obligation to purchase allowances at auctions (there will be no free allowances as in the EU ETS). Part of the auction revenues will be used to suport vulnerable users, households, and micro-enterprises through the Social Climate Fund.

Number of Allowances in the ETS2 System

The total number of allowances (known as the cap) in the ETS2 system will be based on 2005 emission levels and data from 2016–2018, which will be used to determine the proportion of allocated allowances. The linear reduction factor (LRF) has been set at 5.10% for the years 2024–2027, which means a gradual reduction in the number allowances available in the ETS2 system. From 2028, the total number of emission allowances will be estimated on the basis of average emissions in 2024-2026 and then gradually reduced by a fixed annual reduction of 5.38 %[7]. The initial cap was published by the European Commission in early December 2024 and amounts to 1.036 billion emission allowances[8]. Verified emissions for 2024 are to be published by 30 April 2025.

2 Article 30j of the EU ETS Directive provides for the possibility of including additional sectors or their parts that were previously not covered by either the EU ETS or ETS2. The expansion of ETS2 beyond its current scope can be carried out unilaterally by Member States, provided it is approved by the European Commission. According to Article 30i, the Commission is required to present an assessment of the feasibility of merging the sectors covered by the EU ETS and ETS2 by the end of October 2031.

3 Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013

4 https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/ets2-buildings-road-transport-and-additional-sectors_en, accessed on December 12, 2024.

5 https://www.eea.europa.eu/data-and-maps/data/data-viewers/eea-greenhouse-gas-projections-data-viewer

6 Seibert, Dennis, Peter Kasten, Jakob Graichen, Nora Wissner (2024): EU 2040 Climate Target: Potential contributions of the transport sector. Oeko-Institut, Berlin.

7 If emissions significantly exceed the designated reduction pathway, meaning they surpass the 2025 emission cap by more than 2%, there is a possibility of tightening the LRF to support the achievement of long-term climate goals.

8 https://climate.ec.europa.eu/news-your-voice/news/emissions-trading-system-buildings-road-transport-and-small-industry-ets2-cap-adopted-2027-2024-12-03_en, accessed on December 12, 2024.

TABLE 1. COMPARISON OF MSR MECHANISMS IN EU ETS AND ETS2

CATEGORY	MSR IN EU ETS	MSR IN ETS2
MSR thresholds	400–833 million	210–440 million
Number of allowances released from MSR	200 million	100 million
Number of allowances placed in MSR	24% x TNAC	100 million
Invalidation mechanism	YES, up to 400 million	NO, remaining 600 million invalidated after 2030

Source: Own elaboration

From 2027, all allowances in the ETS2 system will be auctioned, meaning there will be no free allowances, as is currently the case in the EU ETS.

From 2027, all allowances in the ETS2 system will be auctioned, meaning there will be no free allowances, as is currently the case in the EU ETS. In addition, 30% more allowances will be placed in the market in 2027 (so-called frontloading) to ensure a smooth start to the system. These additional allowances will be deducted from the total number of allowances for the years 2029-2031.

Market Stability Reserve (MSR) in ETS2

Similar to the EU ETS system, the Market Stability Reserve (MSR) in ETS2 will be operational from 2028. Prior to this, 600 million allowances will be placed in MSR in 2027, forming an additional pool independent of the total number of allowances (cap). It is important to note the allowances in this special MSR pool will only be valid until 2030. This means that in 2031, any unused allowances (not released to the market) will be invalidated, and only allowances that were previously transferred to the reserve will be eligible for release back to the market.

600 million allowances will be placed in MSR in 2027, forming an additional pool independent of the total number of allowances (cap). It is important to note the allowances in this special MSR pool will only be valid until 2030.

The MSR in ETS2 differs from the EU ETS reserve in several respects, including the size of the thresholds for transferring allowances and the number of allowances transferred. In the EU ETS, thresholds are set at 833-400 million allowances in circulation (referred to as TNAC - Total Number of Allowances in Circulation), while in ETS2, these thresholds are 440-210 million. The mechanism is similar: if the surplus of allowances (TNAC) in ETS2 exceeds 440 million, 100 million allowances will be removed from the auction pool. Conversely, if the surplus falls below 210 million, 100 million allowances are released from the reserve.

Unlike the EU ETS, where allowances are released asymmetrically (24% of the surplus above 833 million is transferred to the reserve, and 200 million

are released when TNAC falls below 400 million), ETS2 follows a symmetric approach[9].

In addition, similar to the EU ETS system (Article 29a of the EU ETS Directive), ETS2 will include mechanisms to "protect the market from sudden allowance price increases" (Article 30h of the EU ETS Directive). If the rate of allowance price growth in ETS2 is too rapid and exceeds the specified price threshold, a certain number of allowances will be released from the MSR reserve in ETS2[10].

Social Climate Fund

To support the most vulnerable groups (including households, micro-enterprises, and transport users), the European Commission has proposed the establishment of the Social Climate Fund (SCF) alongside the implementation of the ETS2 system. The fund aims to mitigate the impact of the ETS2 on these groups by redistributing revenues from the sale of emission allowances. The fund will support the implementation and financing of social support programs while accelerating the transition in both sectors.

The fund will operate between 2026 and 2032 with a budget of €65 billion (or €54.6 billion if the start of the system is delayed). Poland's share of the SCF is the highest of all EU Member States, acounting for 17.6% of the total funds, equivalent to €11.4 billion over the period 2026-2032 (or €9.6 billion if the system is delayed). By comparison, France, the second largest beneficiary of the SCF, will receive €7.3 billion (€6.1 billion with a delay). At the other end of the spectrum, countries such as Luxembourg, Malta, Cyprus, and Estonia will receive the lowest financial support—less than €1 billion each.

Poland's share of the SCF is the highest of all EU Member States, acounting for 17.6% of the total funds, equivalent to €11.4 billion over the period 2026-2032 (or €9.6 billion if the system is delayed).

Thanks to this substantial share, Poland is guaranteed significant financial support, which can contribute to large-scale investments in sector transformation and adaptation to new regulations. According to the European Commission's report on energy prices and costs in Europe (March 2024), Poland belongs to the group of countries with medium electricity and gas costs in 2020. This data is before significant fuel and energy price increases. The introduction of the ETS2 and the increase in fuel costs for end users will exacerbate the problem of energy poverty. Therefore, a development of a comprehensive support system for households is crucial to limit the scale of this problem.

According to Article 30d of the EU ETS Directive, the sources of funding for the SCF include allowances to be sold at auctions:

- 50 million allowances from the EU ETS (Article 10a(8b)),
- 150 million allowances from ETS2 (Article 30d(3)),
- additional ETS2 allowances to reach a total SCF funding of €65 billion or €54.6 billion if the start of the ETS2 is delayed (Article 30d(4)).

9 After 2030, the operation of the MSR in the EU ETS will be based on slightly modified rules. According to these rules, if the number of allowances in circulation (TNAC) exceeds 833 million, 12% of that surplus will be transferred to the reserve. Conversely, if TNAC falls below 400 million, 100 million allowances will be moved from the reserve to the auction pool.

10 Article 30h of the EU ETS Directive allows for the release of 50 million (or 150 million) allowances from the MSR if the price doubles (or triples) over the past two years. Additionally, if the auction price exceeds €45 over a consecutive two-month period, 20 million allowances are released from the MSR (provided that allowances can only be released through this mechanism until December 31, 2029). The allowances are released from the MSR evenly over a three-month period, starting no later than two months from the date the conditions outlined in Article 30h are met.

Analytical Section

This analysis is based on emissions projections from the transformation scenario included in the Impact Assessment (IA) of the "Fit for 55" package, which was developed using the PRIMES model and published alongside the package in 2021. However, these projections are static, which means that market mechanisms such as the supply of allowances within the ETS2 system do not affect the projected emission reductions. As a result, the market is vulnerable to a shortfall in the number of allowances available projected demand[11].

ETS 2 auction volumes

As shown in the Table 2, the ETS2 emission cap will decline steadily with a decreasing linear reduction factor (LRF) of around 55-56 million allowances per year. According to the European Commission data, the emissions cap will be around 1.036 million in 2027 and will fall to around 750 million in 2032. However, this does not mean that all allowances will be available to EU member states. From this cap, the European Commission will allocate 150 million allowances to the SCF, which will be auctioned in equal tranches of 25 million each year until 2032. In addition, to increase market liquidity in the system's first year of operation, the Commission will froantload around 310 million allowances. As a result, the pool of allowances to be auctioned by EU Member States will increase significantly to around 1.323 million in 2027. However, these additional allowances will be deducted from the pool for 2029-2031 (equally 104 million each year).

MSR Operations

According to CAKE/KOBiZE estimates, the surplus of allowances in the ETS2 (under TNAC[12]) will be at a very low level, below 100 million allowances, from the start of the system in 2027. By 2029, the market situation may change rapidly, and the number of allowances in circulation may become insufficient relative to demand. This shortfall is expected to increase significantly after 2030, reaching around 500 million allowances in 2032.

The MSR partially mitigates this problem until 2030 by releasing a total of 300 million allowances over three years as a result of the TNAC falling below the lower threshold of 210 million. After 2030, however, this mechanism will no longer be effective for a number of reasons. First, the special MSR pool of 600 million allowances will be invalidated after 2030.

TABLE 2. THE EMISSION CAP AND THE NUMBER OF ALLOWANCES AVAILABLE IN THE ETS2 SYSTEM OVER THE PERIOD 2027-2032 [MILLION].

CATEGORY/YEARS	2027	2028	2029	2030	2031	2032
ETS2 cap	1 036	981	925	869	813	758
Frontloading	+312	0	-104	-104	-104	0
SCF auction volumes (150 million)	25	25	25	25	25	25
EU MS auction volumes (excluding SCF)	1 323	956	796	740	684	733

Source: Own elaboration.

11 https://energy.ec.europa.eu/data-and-analysis/energy-modelling/policy-scenarios-delivering-european-green-deal_en (accessed on December 16, 2024).
12 TNAC - Total Number of Allowances in Circulation.

TABLE 3. MSR OPERATIONS AND AUCTION POOL FOR THE YEARS 2027–2032 [MILION EUA].

CATEGORY/YEARS	2027	2028	2029	2030	2031	2032
Surplus of allowances - TNAC	66	51	-64	-173	-379	-475
Transfers to MSR	0	0	0	0	0	0
Transfers from MSR	0	100	100	100	0	0
Auction volumes of EU MS including MSR	1 323	1 056	896	840	685	733

Source: Own elaboration.

Second, the reserve will not contain any allowances transferred from auctions (because TNAC will not exceed the upper threshold of 440 million). As a result, the MSR will be empty and unable to play its role in stabilising the system. To deal with the potential shortage of allowances, ETS2 participants will need to step up their reduction efforts. Alternatively, participants may choose to buy allowances early in the early years of the system (similar to the hedging strategy used by the power sector in the EU ETS) before allowance prices rise significantly.

By 2029, the market situation may change rapidly, and the number of allowances in circulation may become insufficient relative to demand. This shortfall is expected to increase significantly after 2030, reaching around 500 million allowances in 2032.

The European Commission does not seem to take this risk seriously when projecting allowance prices in the ETS2. According to the EC's 2022 projection, the price of allowances in ETS2 will be only €25 in 2027, rising to €69 in 2032. When compared with the projections of financial institutions, these estimates appear to be significantly underestimated (for example, Veyt estimates that ETS2 allowance prices could exceed €200 by 2031[13]). The EC's very cautious estimates regarding the ETS2 allowance prices suggest that the institution relies heavily on increased allowance supply through 130% front-loading in 2027 and the minimum price mechanism (€45[14]). However, these safeguards may prove insufficient to minimise the risk of price increases in practice.Doubts have been raised in particular about the minimum price mechanism, which can only be applied twice a year – the 20 million allowances released through this mechanism may not be enough to meet increased

TABLE 4. PROJECTION OF ALLOWANCE PRICES IN ETS2 (2027–2032) [€ PER TON].

SPECIFICATION	2027	2028	2029	2030	2031	2032	WEIGHTED AVERAGE
Allowance price*	25	40	45	51	61	69	45

*Source: European Commission (*for 2031–2032 based on linear extrapolation), 2022.*

13 Based on the webinar organized in June 2024 by the analytical firm Veyt titled "ETS 2 Could See Allowance Price Above EUR 200/t."

14 Under this mechanism, if the auction price exceeds €45 over a consecutive two-month period, 20 million allowances are released from the MSR (taking into account that allowances can only be released through this mechanism until December 31, 2029).

TABLE 5. ESTIMATED BALANCE OF ETS2 ALLOWANCES FOR POLAND OVER THE PERIOD OF 2027–2032 [MILION].

SCENARIO 1 - WITHOUT MSR	AUCTION VOLUMES	SCF ALLOWANCES	EMISSION VOLUME	ALLOWANCE BALANCE
	436	250	495	191
SCENARIO 2 – WITH MSR	AUCTION VOLUMES	SCF ALLOWANCES	EMISSION VOLUME	ALLOWANCE BALANCE
	461	250	495	216

Source: Own elaboration

demand. In addition, there is a risk of increased demand for allowances as a result of increased hedging not only by ETS2 participants but also by investment funds activities. It is also worth noting that other "stabilisation" mechanisms mentioned in Article 30h of the EU ETS Directive, analogous to those used in the EU ETS (Article 29a), will only be available after two years.

Poland's allowance balance in ETS2

Table 5 shows the balance of Polish allowances in the ETS2 for the years 2027–2032 under scenarios with and without the MSR mechanism. KOBiZE estimates that Poland will have access to between 436 and 461 million emission allowances in both scenarios. The "injection" of funds that Poland will receive from the Social Climate Fund amounts to €11.4 billion. This value translates into around 250 million allowances when divided by the average allowance price of €45, as projected by the European Commission for 2022. In total, Poland will have access to 686 to 711 million allowances over the period of 2027-2032, which after accounting for emissions of 495 million allowances, should result in a positive allowance balance of 191 million to 216 million allowances.

Poland's estimated revenues from ETS2

The analysis of revenues from the ETS2 system for Poland in the years 2027–2032 shows that Poland could generate significant funds from the sale of emission allowances. As shown in Table 6, depending on the scenario, Poland's revenues from the sale of ETS2 emission allowances are estimated to be

TABLE 6. PROJECTED POLAND'S REVENUES FROM THE ETS2 SYSTEM IN 2027-2032.

SCENARIO 1 - WITHOUT MSR	AUCTION VOLUMES [MILLION]	AVERAGE ALLOWANCE PRICE* [EUR/TON]	REVENUE [EUR]	REVENUE [PLN] **
	436	45	19 620	84 366
SCENARIO 2 – WITH MSR	AUCTION VOLUMES [MILLION]	AVERAGE ALLOWANCE PRICE* [EUR/TON]	REVENUE [EUR]	REVENUE [PLN] **
	461	45	20 745	89 203

*(*) – *projection by the EC weighted average for the years 2027-2032 (for 2031-2032, the price was estimated based on linear extrapolation).*

(**) - exchange rate of 4.30 PLN/EUR assumed (according to Ministry of Finance guidelines from October 2024).

Source: Own elaboration

between €19.6 billion and €20.7 billion (PLN 84 billion to PLN 89 billion). Adding €11.4 billion from the Social Climate Fund (SCF) to this amount increases Poland's total ETS2 revenues for 2027-2032 to between €31 billion and €32.1 billion (PLN 133.3 billion to PLN 138 billion).

> **Depending on the scenario, Poland's revenues from the sale of ETS2 emission allowances are estimated to be between €19.6 billion and €20.7 billion (PLN 84 billion to PLN 89 billion). Adding €11.4 billion from the Social Climate Fund (SCF) to this amount increases Poland's total ETS2 revenues for 2027-2032 to between €31 billion and €32.1 billion (PLN 133.3 billion to PLN 138 billion).**

Revenues from the auction sales could be even higher if expert projections of a significant increases in ETS2 allowance prices materialise (Poland's revenue estimates are based on relatively low European Commission price projections). If this scenario materialises, these additional funds could provide substantial support for financing the energy transition and modernising key sectors of the Polish economy. The revenues could be used to support the development of renewable energy sources, modernise transport infrastructure, implement programmes to reduce household energy costs, which is particularly important given the challenges associated with energy poverty.

It should be noted that high allowance prices in ETS2 could place a significant burden, especially on the poorest households, in particular, who often do not have the resources to undertake costly building modernisation projects - these costs often exceed their total annual income. It is therefore crucial to make full use of all available funds, such as the Social Climate Fund and revenues from ETS2 auctions.

Summary

The introduction of the ETS2 is a key element of Europe's strategy to reduce emissions and combat climate change, particularly in sectors that have been difficult to decarbonise, such as road transport and the residential and municipal sectors.

From 2027 onwards, the ETS2 will face a significant shortage of allowances in the market, which will become much more pronounced after 2030, reaching around 500 million in 2032. The MSR stabilisation mechanism initially mitigates this problem by releasing 300 million allowances into the market, but this will cease to be effective after 2030 as the additional MSR pool of 600 million allowances expires and the lack of transfers from

auctions prevents the system from stabilising. To address this shortfall, participants in the system will need to step up their reduction efforts. Alternatively, they will be forced to buy allowances earlier, with the risk of increased demand, rising prices and speculative market activity. The European Commission's forecast of allowance prices between €25 and €69 for 2027-2032 appears to be underestimated given these risks.

Between 2027 and 2032, Poland could have access to up to 711 million allowances, including auctioned allowances and SCF funds, which could generate revenues of around €32.1 billion. These revenues could be even greater if allowance prices are higher than projected by the European Commission. Poland's revenues from the ETS2 could be used to finance the energy transition, support the development of renewable energy sources, modernise transport infrastructure and reduce energy poverty, which is a critical issue for Polish households.

Poland, as the largest beneficiary of the SCF, has a unique opportunity to implement energy transition and infrastructure modernisation. With this financial support, it will be possible to improve the energy efficiency of buildings, develop renewable energy sources and reduce energy costs for households and micro-enterprises.

Bibliography

1. Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 amending Directive 2003/87/EC establishing the scope of the existing Annex I of the ETS Directive been changed in such a way, that through changes to the threshold criteria of the EU ETS, it will cover further groups of installations, but also new types of activities3, such as maritime transport, have been included in this system. a system for greenhouse gas emission allowance trading within the Union and Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading system, OJ L 130, 16.5.2023, p. 134.
2. European Commission (2024): Report on Energy Prices and Costs in Europe, COM(2024) 136 final, March 2024.
3. European Environment Agency (EEA) (2023): EEA Greenhouse Gas Projections – Data Viewer, data viewer on projections of greenhouse gas (GHG) emissions reported to the EU/EEA by European countries. Available online at https://www.eea.europa.eu/data-and-maps/data/data-viewers/eea-greenhouse-gas-projections-data-viewer, last accessed: 2 December 2024.
4. Hesse, Tilman, Sibylle Braungardt (2024): EU 2040 Climate Target: The Role of the Buildings Sector. Oeko-Institut, Freiburg.
5. Oeko-Institut (2024): Supply and Demand in ETS 2, Assessment of the New EU ETS for Road Transport, Buildings, and Other Sectors.
6. Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 on the establishment of the Social Climate Fund and amending Regulation (EU) 2021/1060.
7. Seibert, Dennis, Peter Kasten, Jakob Graichen, Nora Wissner (2024): EU 2040 Climate Target: Potential Contributions of the Transport Sector. Oeko-Institut, Berlin.

CO_2 Emission Costs in Transport and Buildings Under ETS2 in Poland Until 2050

Authors:

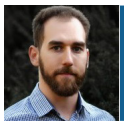
Wojciech Rabiega, Centre for Climate and Energy Analyses, CAKE

Szymon Wójcik, Centre for Climate and Energy Analyses, CAKE

CO_2 Emission Costs in Transport and Buildings Under ETS2 in Poland Until 2050

Key words: ETS2, electromobility, ene rgy poverty, transformation costs, Social Climate Fund.

Author:
Wojciech Rabiega



Author:
Szymon Wójcik

Abstract

The European Union has set ambitious goals for transforming its economy toward complete decarbonization by the mid-21st century. Until now, its primary tool for achieving these objectives has been the Emissions Trading System (EU ETS). However, the potential for further emission reductions within the current framework is limited, as it does not encompass the entire economy[1]. The introduction of ETS2 aims to extend the emissions trading system to the road transport and building sectors.

The EU is an economically and politically diverse union, characterized by varying geographic conditions, natural resources, and levels of societal wealth. Moreover, each member state has a unique social structure, leading to differing levels of vulnerability to energy poverty and transport exclusion. To ensure social acceptance of the significant challenge of economic decarbonization, it is essential to analyze the costs of planned actions, particularly for the most vulnerable social groups.

This article examines the projected costs of implementing the ETS2 system in Poland. Simulation results indicate that the highest burden from emission fees can be expected around 2035. In subsequent years, due to changes in the energy mix, these costs are projected to decrease.

This article examines the projected costs of implementing the ETS2 system in Poland. Simulation results indicate that the highest burden from emission fees can be expected around 2035. In subsequent years, due to changes in the energy mix, these costs are projected to decrease. The analysis conducted by the CAKE team highlights the necessity of accelerating the transformation process and underscores the importance of implementing protective measures for the most vulnerable social groups. These measures should leverage newly proposed funds, such as the Social Climate Fund.

1 The pool of new allowances will be exhausted by 2040.

Introduction

The European Emissions Trading System (ETS), introduced in 2005, has significantly contributed to reducing greenhouse gas (GHG) emissions within the European Union. According to data published in the report on the functioning of the European carbon emissions trading market[2], emissions from electircity and heat generation and industrial production had decreased by 47% by 2023 compared to 2005. While this reduction is substantial, its pace remains insufficient to meet the ambitious goals set by the EU under the ‚Fit for 55' package. To address this issue, the ETS framework is being expanded to include buildings and road transport, referred to as ETS2.

The implementation of ETS2 poses challenges for EU member states, both in maintaining the competitiveness of their economies and in ensuring an equitable distribution of the costs associated with these new regulations among EU citizens. This is particularly significant for low-income households, where energy and heating costs constitute a large proportion of total expenditures[3]. These households, facing limited means to improve the energy efficiency of their homes or replace vehicles with zero-emission alternatives, risk experiencing economic and/or transport exclusion[4].

According to Statistics Poland's data (cited from Eurostat)[5], in 2021, the total energy consumption per capita in Polish households amounted to 24.6 GJ, of which 6 GJ (24%) was derived from renewable sources[6]. This level is comparable to the EU average of 24.5 GJ, with 5.2 GJ (21%) sourced from renewables.

Although the share of renewable energy in Polish household consumption exceeds the EU average, the overall structure of energy consumption in Poland cannot be considered environmentally friendly. This is primarily due to the fact that 22% of energy consumption originates from coal combustion[7]. This figure stands in stark contrast to the EU average of 2%, with only six out of 27 EU countries reporting coal energy consumption levels above 1%[8].

Given that coal combustion is one of the most carbon-intensive energy sources, Poland's example is particularly relevant when assessing the real CO_2 emission costs for households under ETS2. This is especially pertinent as household spending on energy sources (excluding electricity), based on 2021 data from the Statistics Poland, averaged nearly 3,500 PLN per year (see Figure 1), accounting for approximately 5% of the average annual household income in Poland[9]. It is worth noting that this figure represents an average; for the most economically disadvantaged households, this share is significantly higher.

ETS2 also encompasses emissions related to individual transport. Currently, the share of zero- and low-emission vehicles in Poland is below 1% of the total passenger car fleet. According to data published

2 European Comission (2024) Report from the Commission to the European Parliament and the Council on the functioning of the European carbon market in 2023, Publications Office of the European Union, Brussels.

3 European Comission (2020) Possible extension of the EU Emissions Trading System (ETS) to cover emissions from the use of fossil fuels in particular in the road transport and the buildings sector – final report, Publications Office of the European Union, Brussels.

4 Cambridge Econometrics (2020) Decarbonising European transport and heating fuels – Is the EU ETS the right tool? – final report, Cambridge.

5 Statistics Poland (2023) Energy consumption in households in 2021, Warsaw, Rzeszow.

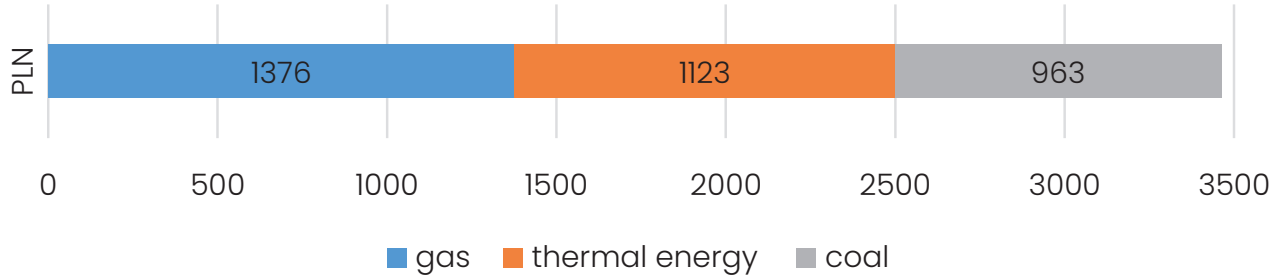
6 Understood here as: biomass, solar energy, geothermal energy, and ambient heat.

7 It should be noted that this refers to energy sources directly consumed by households. This means that the indicated percentage does not include, for instance, the consumption of coal by combined heat and power plants to produce electricity later used by households.

8 Poland was followed by Ireland (5%), Bulgaria (4%), the Czech Republic (2%), Lithuania (2%), and Slovakia (1%).

9 This estimate is based on data from the 2021 National Population and Housing Census regarding the average number of people per household (Statistics Poland, 2023, 2021 National Population and Housing Census: Families in Poland in the light of the 2021 Census results, Warsaw) and on the announcement by the President of Statistics Poland concerning the average monthly disposable income per capita in 2021 (https://stat.gov.pl/en/latest-statistical-news/communications--and-announcements/list-of-communiques-and-announcements/average-monthly-available-income-for-a-total-of-1-person-in-2021,305,8.html, accessed on: 18.11.2024).

FIGURE 1. STRUCTURE OF ENERGY CARRIER EXPENDITURES IN POLAND IN 2021 [PLN].



Source: Own calculations based on Statistics Poland data.

by the European Environment Agency[10], the average CO_2 emissions from new cars in Poland were 134.8 g/km in 2023, compared to the EU average of 107.8 g/km. As shown in Figure 2, Poland ranks among the countries with the highest CO_2 emissions from new vehicles, far exceeding the target of 95 g/km set for 2020–2024. This indicates that Polish households may be particularly affected by rising costs associated with vehicle usage under ETS2, though this will depend significantly on the pace of replacing combustion-engine vehicles with low- and zero-emission alternatives. The situation is further exacerbated by the fact that 96.4% of buses in Poland were diesel-powered in 2021, a figure 3.9 percentage points higher than the EU average[11]. A notable positive development is the significant growth in new electric bus registrations in Poland, which rose by approximately 125% between 2022 and 2023[12].

Objective and Methodology

This study aims to estimate the costs of carbon dioxide emissions produced by households through passenger car use and residential heating. The results presented are based on analyses conducted by the Center for Climate and Energy Analyses (CAKE)[13].

The base scenario for the analysis is the FIT55 scenario, which targets a reduction of emissions in the ETS2 system by 87% by 2050 and 43% by 2030, relative to 2005 levels. This scenario is enhanced with a transportation sector transformation component (FIT55_trans) that incorporates the advancement of zero-emission technologies, making them economically competitive with internal combustion engine (ICE) vehicles. Key measures in this scenario include:

- a ban on the sale of new ICE passenger cars from 2035 onward,
- subsidies for public transportation,
- emission standards for new trucks, as proposed by the European Commission's 2023 regulations[14],

10 European Environment Agency Datahub (2024) [EU SDG 13_31] Average CO_2 emissions per km from new passenger cars, (https://sdi.eea.europa.eu/data/f788b75b-1803-47ec-968e-abe59075f8f5, accessed on: 06.11.2024).

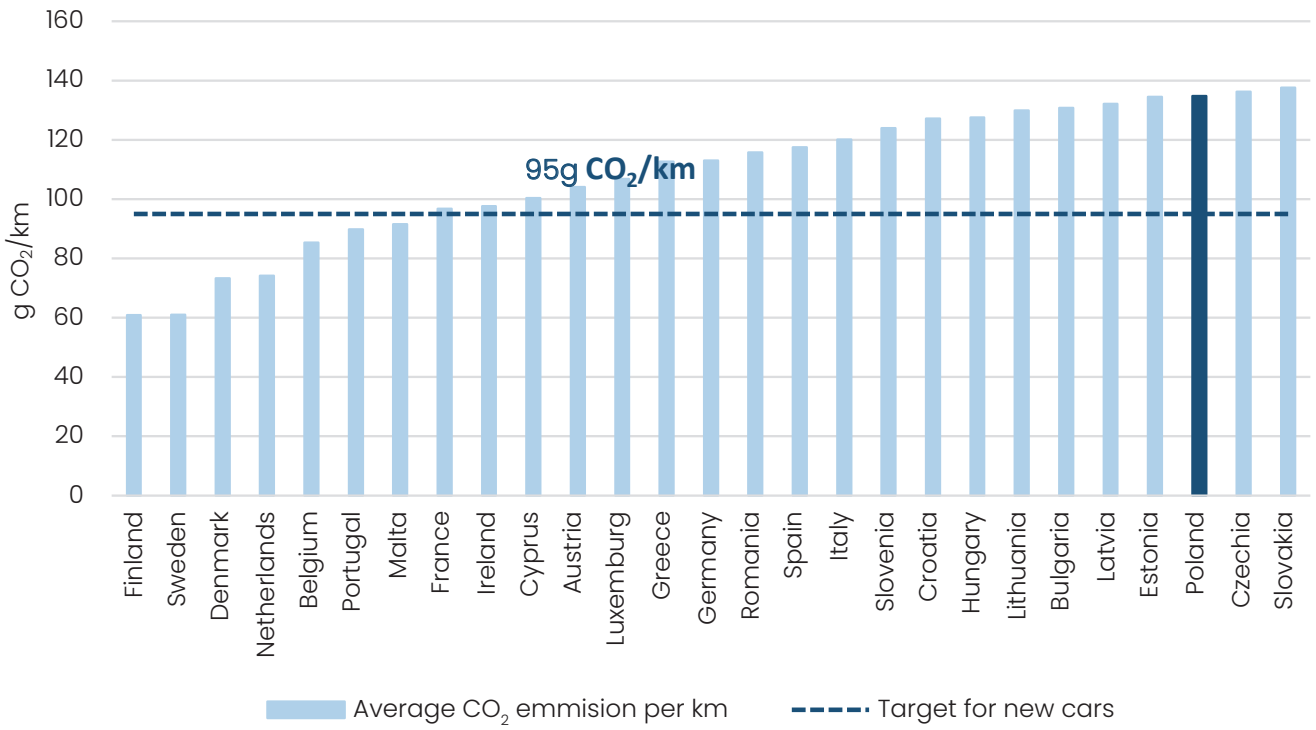
11 https://www.acea.auto/files/ACEA-report-vehicles-in-use-europe-2023.pdf (accessed on: 13.11.2024).

12 https://www.sustainable-bus.com/news/uk-germany-norway-leader-electric-bus-market-2023-europe/ (accessed on: 13.11.2024).

13 Pyrka M., Jeszke R., Boratyński J., Witajewski-Baltvilks J., Antosiewicz M., Tatarewicz I., Rabiega W., Wąs A., Lewarski M., Skwierz S., Rosłaniec M., Lizak S., Zborowska I., Chodor M., Kobus P., Cygler M., Gorzałczyński A., Tylka A., Lewarska I., Mzyk P., Sekuła M. (2024). VIIEW on EU ETS 2050: Exploring synergies between the EU ETS and other EU climate policy measures – carbon removal, hydrogen, and sectoral transport policy, Institute of Environmental Protection – National Research Institute / National Centre for Emissions Management (KOBiZE), Warsaw (https://climatecake.ios.edu.pl/wp-content/uploads/2024/04/LIFE_VIIEW_EUETS_Exploring-synergies.pdf, accessed on: 18.11.2024).

14 European Comission (2023) Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2019/1242 as regards strengthening the CO⊠ emission performance standards for new heavy-duty vehicles and integrating reporting obligations, and repealing Regulation (EU) 2018/956, Publications Office of the European Union, Strasbourg.

FIGURE 2. AVERAGE CO_2 EMISSIONS FROM NEW CARS IN UE27 COUNTRIES IN 2023 PER KILOMETER [g CO_2/KM].



Source: Own eleboration based on European Environment Agency data.

- an increased scrappage rate for gasoline-, diesel-, and LPG-powered passenger cars compared to historical levels,
- subsidy programs for zero-emission vehicles.

For buildings, the FIT55 scenario assumes an almost complete phase-out of coal use in households by 2030. It also foresees a gradual improvement in household energy efficiency, with an annual 1% increase considered autonomous and cost-free.

The scenario simulations were carried out using the following modeling tools:

- the transport sector model – TR3E[15],
- the general equilibrium model – d-Place[16],
- the energy sector model – MEESA[17],
- the agricultural sector model – EPICA[18].

These models are interconnected through an iterative procedure, exchanging information such

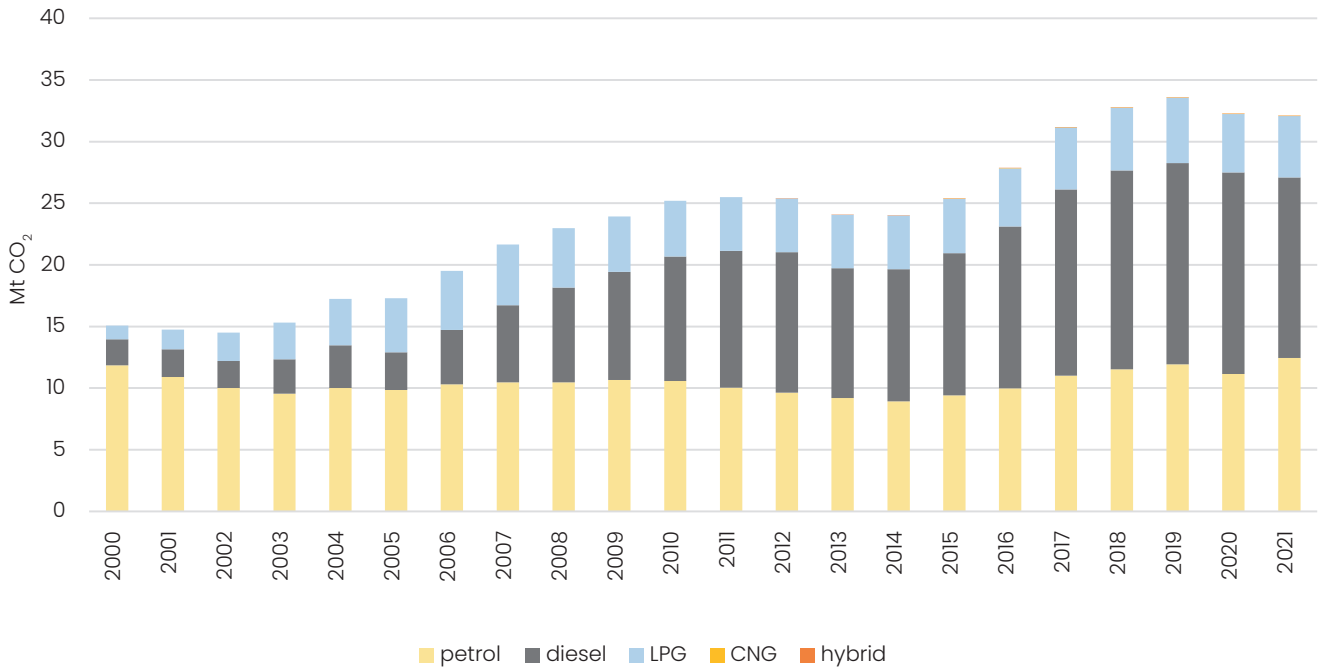
15 Rabiega, W., Sikora, P., Gąska, J., Gorzałczyński A. (2022). The TR3E Model, ver. 2.0, The Institute of Environmental Protection – National Research Institute/ National Centre for Emissions Management, Warsaw 2022. (https://climatecake.ios.edu.pl/wp-content/uploads/2022/03/CAKE_TR3E_v.2_transport-model--documentation.pdf, accessed on: 18.11.2024).

16 Boratyński, J., Pyrka, M., Tobiasz, I., Witajewski-Baltvilks, J., Jeszke, R., Gąska, J., Rabiega, W. (2022). The CGE model d-PLACE, ver. 2.0, The Institute of Environmental Protection – National Research Institute/ National Centre for Emissions Management, Warsaw 2022. (https://climatecake.ios.edu.pl/wp-content/uploads/2022/03/CAKE_d-PLACE_v.2_d-place-model_documentation.pdf, accessed on: 18.11.2024).

17 Tatarewicz, I., Lewarski, M., Skwierz, S. (2022). The MEESA Model, ver. 2.0, The Institute of Environmental Protection – National Research Institute/ National Centre for Emissions Management, Warsaw 2022. (https://climatecake.ios.edu.pl/wp-content/uploads/2022/03/CAKE_MEESA_v.2_energy-model_documentation.pdf, accessed on: 18.11.2024).

18 Wąs, A., Witajewski-Baltvilks, J., Krupin, V., Kobus, P. (2022). The EPICA Model, ver. 2.0, The Institute of Environmental Protection – National Research Institute/ National Centre for Emissions Management, Warsaw 2022. (https://climatecake.ios.edu.pl/wp-content/uploads/2022/03/CAKE_EPICA_v.2_agriculture--model_documentation.pdf, accessed on: 18.11.2024).

FIGURE 3. HISTORICAL CO_2 EMISSIONS IN POLAND FROM PASSENGER CAR USE BY FUEL TYPE [Mt CO_2].



Source: Own eleboration based on the IDEES-JRC 2021 database.

as GDP growth, electricity prices, and investment levels[19]. This approach ensures that actions in key sectors are modeled in detail, taking into account sector-specific technological and economic assumptions. At the same time, linking sectoral models with the general equilibrium model ensures cross-sectoral consistency in greenhouse gas emission reductions (aligned with the goals of the 'Fit for 55' package) and calculates the marginal costs of emission reductions within the EU ETS (ETS1[20]) and ETS2 systems.

Historical Background – Emissions and Trends

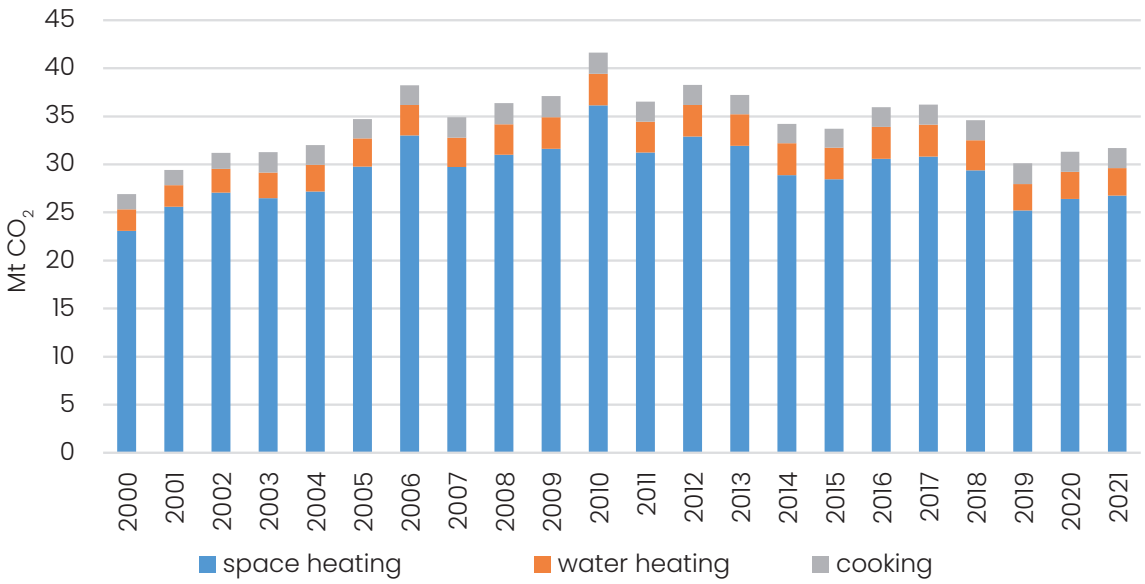
The discussion of the analysis results should begin with an outline of the context in which the ETS2 system is being implemented in Poland. It is worth noting that emissions from passenger car use in the country more than doubled between 2000 and 2021 (see Figure 3). This increase is attributed to growing transport activity, a declining share of public transport—which is less emission-intensive than individual transport—and the minimal development of the zero-emission vehicle fleet. In 2022, passenger cars emitted approximately 34.6 Mt of CO_2, with diesel-powered vehicles accounting for half of these emissions. Given that the introduction of the ETS2 system will impose costs on vehicle users based on emissions from burning fossil fuels, the significant share of high-emission vehicles on Polish roads could result in substantial increases in transportation-related emission costs.

For households, emissions related to building usage primarily stem from heating/cooling, water

19 Boratyński, J., Witajewski-Baltvilks, J., Tatarewicz, I., Pyrka, I., Rabiega, W., Wąs, A., Kobus, P., Lewarski, M., Gorzałczyński, A., Tobiasz, I., Vitaliy, K., Jeszke, R., (2021) Procedure for linking sectoral models with the CGE model, Technical documentation version 1.0, Institute of Environmental Protection – National Research Institute / National Centre for Emissions Management (KOBiZE), Warsaw (https://climatecake.ios.edu.pl/wp-content/uploads/2021/12/CAKE_Models_Linking_21.12.2021_final.pdf, accessed on: 18.11.2024).

20 The European Emissions Trading System, covering the energy sector, high-emission and energy-intensive industries, as well as the aviation and maritime transport sectors.

FIGURE 4. HISTORICAL CO_2 EMISSIONS FROM RESIDENTIAL ENERGY USE IN POLAND [Mt CO_2].



Source: Own eleboration based on the IDEES-JRC 2021 database.

heating, and cooking. Historical emissions from heating, cooling, and cooking in households, as reported in the JRC-IDEES 2021 database for the years 2000–2021, are shown in Figure 4. Household emissions have remained around 34 Mt CO_2 annually, which translates to an average of 2,500 kg of carbon dioxide per household per year. It is noteworthy that in 2021, 85% of these emissions originated from residential heating, with solid fuels accounting for 65% and natural gas 34%.

The introduction of the ETS2 emissions trading system in 2027 will shift the burden of emissions from residential energy use onto households. The historical emission levels shown in Figure 4 form the baseline for potential costs if a transition to zero-emission fuels for heating, water heating, and cooking does not occur.

Emission Reduction Cost Pathway

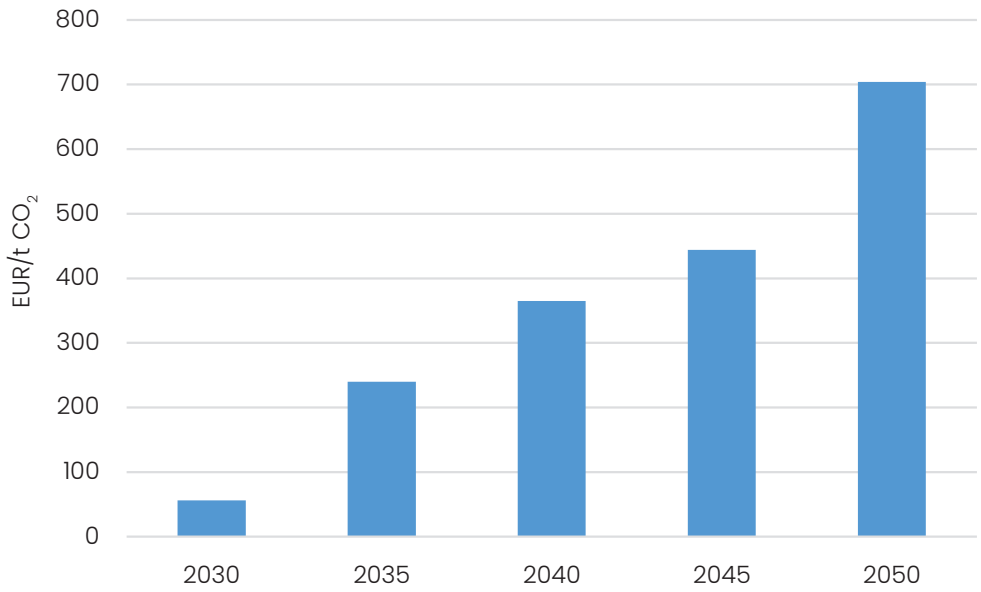
The historical reliance on fossil fuels by Polish households, as described above, highlights the necessity of reducing their consumption. For households, it is crucial to understand both the scale of costs they will incur during the emission reduction process and how these costs will be distributed over time. The projected marginal costs of emission reduction, based on the previously described FIT55_trans scenario[21], are shown in Figure 5. It is estimated that following the introduction of ETS2 in 2027, the cost of emission reduction will amount to 56 EUR per ton of CO_2 in 2030, over 360 EUR in 2040, and approximately 700 EUR in 2050.

Passenger Transport Activity up to 2050

The costs of ETS2 associated with passenger car usage depend, among other factors, on changes

21 Pyrka M., Jeszke R., Boratyński J., Witajewski-Baltvilks J., Antosiewicz M., Tatarewicz I., Rabiega W., Wąs A., Lewarski M., Skwierz S., Rosłaniec M., Lizak S., Zborowska I., Chodor M., Kobus P., Cygler M., Gorzałczyński A., Tylka A., Lewarska I., Mzyk P., Sekuła M. (2024). VIIEW on EU ETS 2050: Exploring synergies between the EU ETS and other EU climate policy measures – carbon removal, hydrogen, and sectoral transport policy, Institute of Environmental Protection – National Research Institute / National Centre for Emissions Management (KOBiZE), Warsaw (https://climatecake.ios.edu.pl/wp-content/uploads/2024/04/LIFE_VIIEW_EUETS_Exploring-synergies.pdf, accessed on: 18.11.2024).

FIGURE 5. PATHWAY OF MARGINAL EMISSION REDUCTION COSTS IN THE UE27 COUNTRIES IN FIT55_TRANS TRANSPORT POLICY SCENARIO [EUR/t CO$_2$].

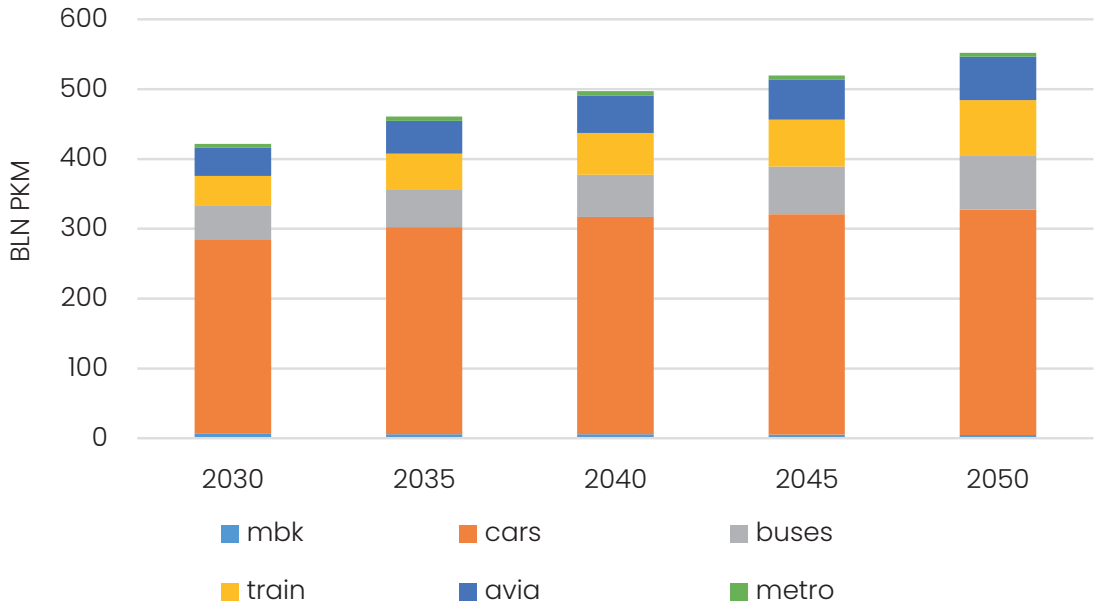


Source: Own calculations based on results from the TR3E and d-Place models.

in transport activity. The passenger transport sector development scenario (see Figure 6) assumes an increase in total passenger activity from 360 billion passenger-kilometers (pkm) in 2025 to approximately 550 billion pkm in 2050. This represents an annual growth rate of 1.8%, with passenger car activity growing at a slower rate of 1.1% annually (a total increase of 32% over the 2025–2050 period).

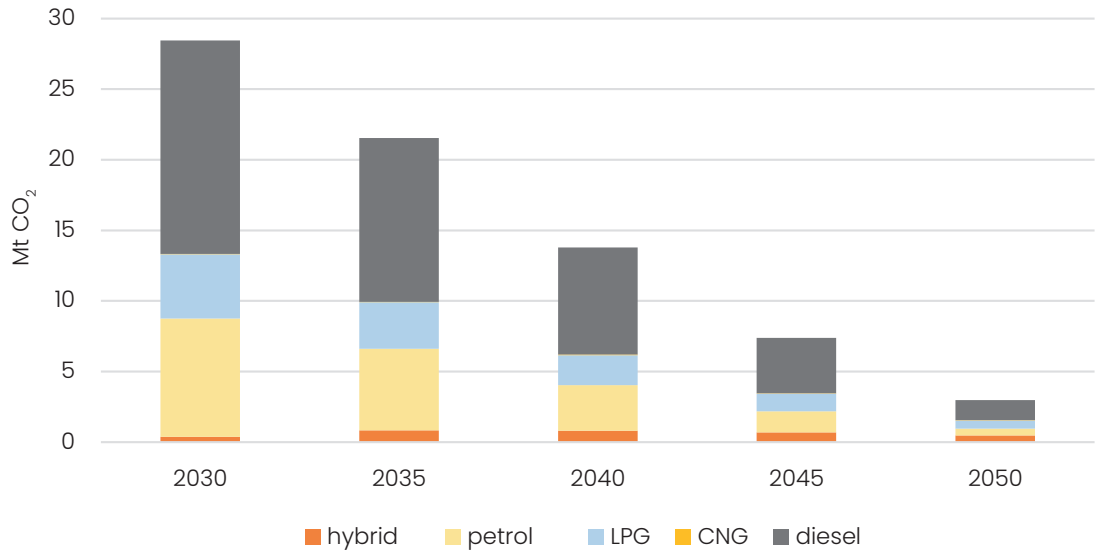
This indicates that part of the individual transport activity (assuming consistent growth across all modes) will shift to collective transport—rail, buses,

FIGURE 6. DEVELOPMENT OF THE PASSENGER TRANSPORT SECTOR IN POLAND IN THE TRANSPORT SCENARIO [BLN PKM].



Source: Own calculations based on results from the TR3E model.

FIGURE 7. PASSENGER CAR EMISSIONS IN POLAND BY FUEL TYPE IN THE TRANSPORT SCENARIO [Mt CO_2].



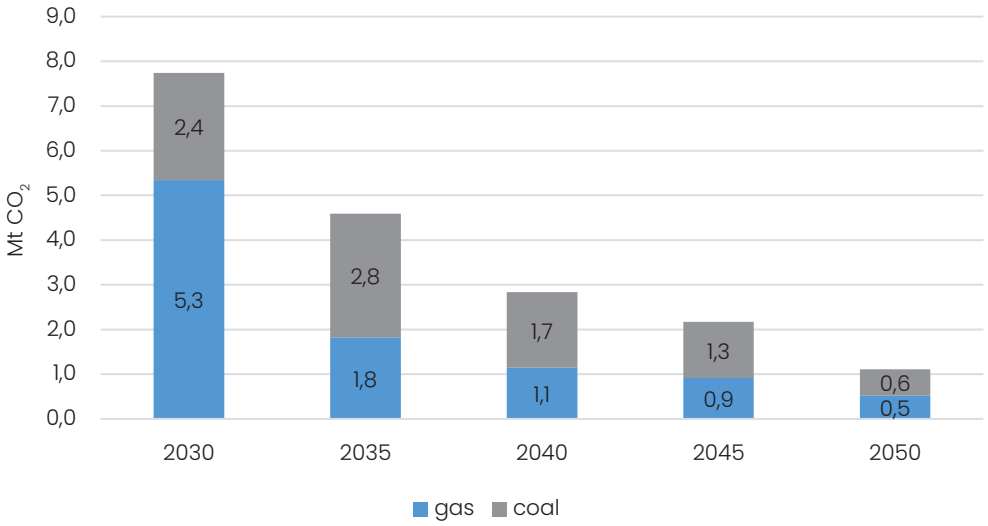
Source: Own calculations based on results from the TR3E model.

and airplanes. As a result, households will avoid some of the direct costs of ETS2 in fuel prices by opting for alternative transportation modes (a substitution effect).

However, passenger cars will remain the dominant mode of transport, although their share in total passenger activity is expected to decrease from 69% in 2025 to 58% by 2050.

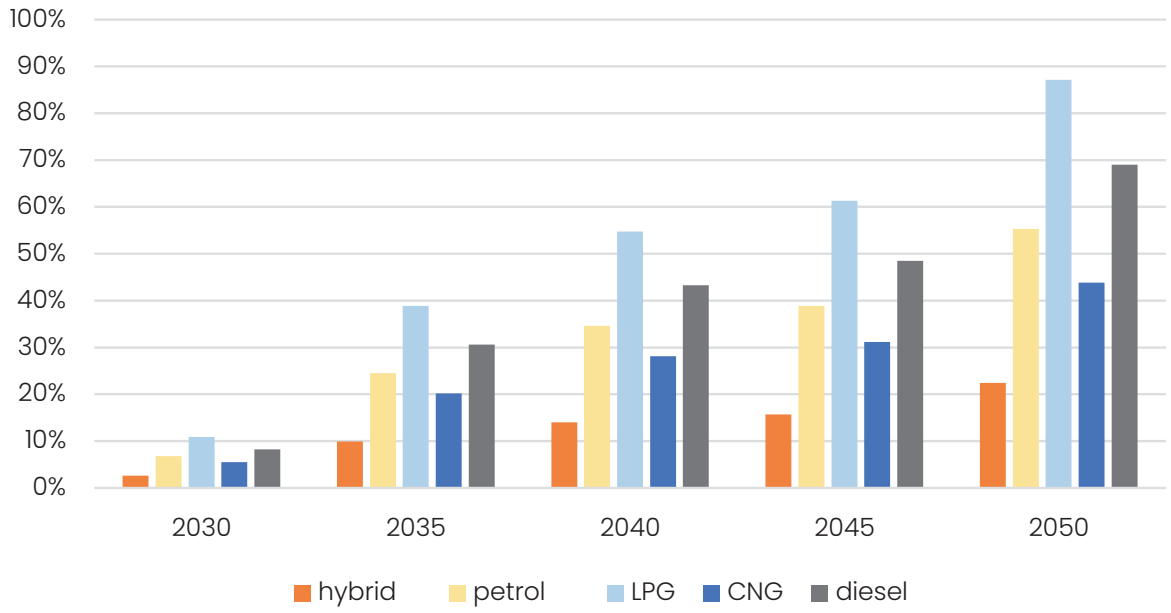
As a result of implemented policies in the transport scenario, emissions from passenger cars are projected to decrease tenfold by 2050 compared to the levels observed in the 2025–2030 period (see Figure 7). This implies that households and firms will not be directly burdened by emission costs from burning fossil fuels, as the increasing emission costs under ETS2 will be offset by the reduced use of combustion engine vehicles.

FIGURE 8. HOUSEHOLD EMISSIONS IN POLAND BY EMISSION SOURCE (FUELS) [Mt CO_2].



Source: Own calculations based on results from the d-Place model.

FIGURE 9. CHANGE IN FUEL COSTS FOR PASSENGER CARS IN POLAND DUE TO THE INTRODUCTION OF ETS2 [%].



Source: Own calculations based on results from the TR3E and d-Place models.

Emissions from Buildings Usage up to 2050

In the FIT55 scenario, households significantly alter the structure of energy carriers used for space heating, water heating, and cooking (see Figure 8). Between 2020 and 2030, there is a substantial shift away from coal use for residential heating, followed by a phase-out of gas usage between 2030 and 2040. By 2030, total emissions from coal and gas combustion are projected to decline fivefold compared to the average levels observed during 2020–2025. By 2040, these emissions are expected to decrease tenfold. Electricity, partially sourced from renewable energy, will replace the energy previously obtained from coal and gas combustion[22].

Costs for Households Resulting from the Introduction of ETS2

To illustrate the costs of the ETS2 system in transport, the increase in fuel costs per kilometer for passenger cars due to the introduction of emission charges was calculated (see Figure 9). The cost changes take into account improvements in vehicle fuel efficiency, the emission intensity of the fuels used, and the emission charge rates.

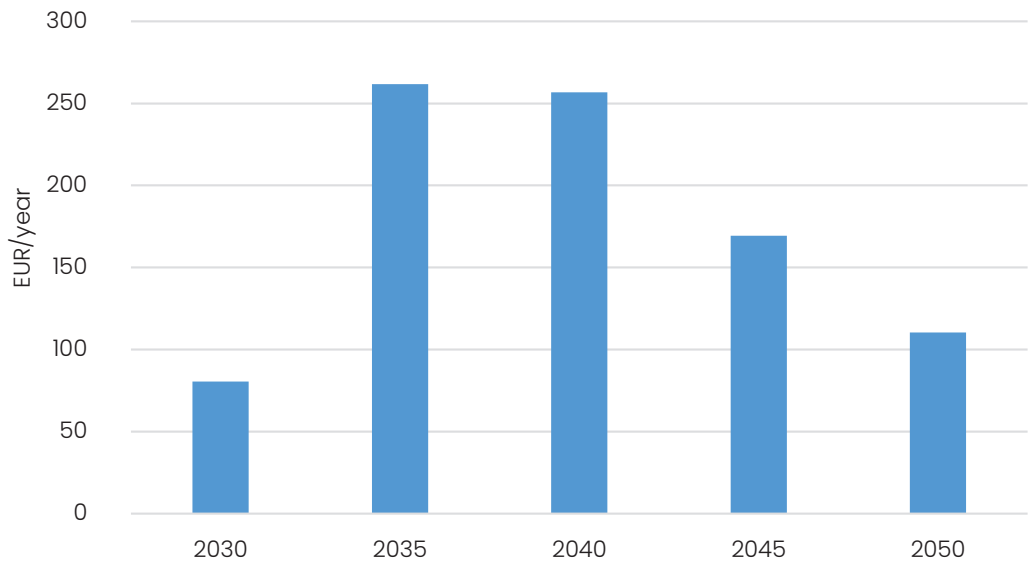
By 2050, gasoline costs for powering cars could increase by more than 50%, while diesel costs could rise by as much as 70%. The largest cost increase is expected for LPG-powered vehicles due to their high fuel consumption, which results in higher emissions per kilometer. The lowest cost increase is observed for hybrid vehicles, thanks to their partial reliance on electricity (especially during acceleration, when fuel demand is highest) and their relatively low road emissions.

The average costs per household[23] in the ETS2 system were calculated based on the product of passenger car emissions and the marginal cost of emission reduction in the transport scenario (see Figure 10). For the calculations, it was assumed that 70% of passenger cars are used by

22 Emissions from electricity generation are covered by the ETS system.

23 The calculations accounted for all households without differentiating between those using combustion-engine vehicles, electric (or hydrogen) vehicles, or a combination of combustion-engine and electric vehicles.

FIGURE 10. AVERAGE EMISSION COSTS PER HOUSEHOLD IN POLAND IN THE ETS2 SYSTEM RESULTING FROM PASSENGER CAR USAGE [EUR/year].



Source: Own calculations based on results from the TR3E and d-Place models.

households, with the remaining 30% used commercially[24].

Between 2035 and 2040, the average annual emission cost per household is estimated at approximately 250 EUR. In 2045, when annual emissions from passenger car use are projected to be around 380 kg CO_2, the emission charge would amount to 170 EUR per household annually. By 2050, the cost of emission reduction is expected to peak at approximately 700 EUR per ton of CO_2, translating to an average emission charge of 110 EUR annually for emissions of about 160 kg CO_2 per household.

It is important to emphasize that these simulation results are based on a set of assumptions regarding fuel costs, technology costs, availability, and the lifespan of combustion-engine vehicles purchased in the future. The results are sensitive to changes in any of these assumptions and should not be considered definitive. Additionally, the outcome could vary due to a possible delay in the implementation of the ETS2 system or the introduction of alternative mechanisms to mitigate costs[25].

Therefore, the simulation results presented in Figure 10 should be regarded as highlighting the need to accelerate the transformation process and implement protective measures for vulnerable social groups. One potential source of funding for such measures is the Social Climate Fund, which is set to be introduced before ETS2 (in 2026). Poland is expected to be its largest beneficiary, entitled to 17.6% of the 65 billion EUR fund[26].

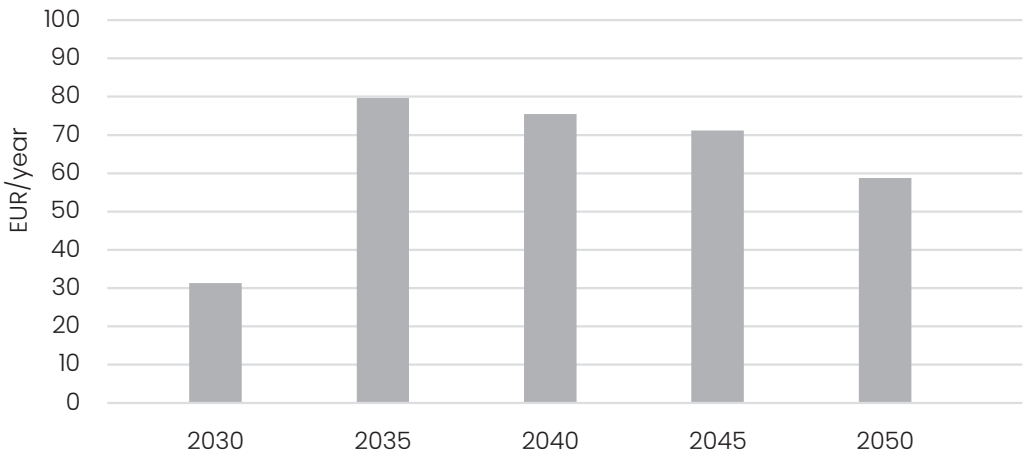
Including buildings in the ETS2 system will force households to abandon coal as a heating fuel due to its high emissions intensity. In the FIT55 scenario, coal use for residential heating—and consequently emissions from its combustion—is expected to

24 https://www.transportenvironment.org/uploads/files/Unveiling-Europes-corporate-car-problem_TE.pdf (accessed on: 13.11.2024).

25 According to the amendment of the EU ETS directive, if the price of emission allowances in the ETS2 system exceeds 45 euros per ton during its initial years of operation, intervention mechanisms will be activated to stabilize the market.

26 European Parliament and Council (2023) Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing the Social Climate Fund and amending Regulation (EU) 2021/1060. (https://eur-lex.europa.eu/legal-content/PL/TXT/PDF/?uri=CELEX:02023R0955-20240630, accessed on: 18.11.2024)

FIGURE 11. AVERAGE EMISSION COSTS PER HOUSEHOLD IN POLAND IN THE ETS2 SYSTEM RESULTING FROM BUILDINGS USAGE [EUR/year].



Source: Own calculations based on results from the d-Place model.

decrease eightfold between 2025 and 2030. Gas use for heating is projected to decline most significantly, by approximately threefold, between 2030 and 2035.

The average household[27] costs associated with CO_2 emissions from coal and gas combustion are presented in Figure 11. In 2035, these costs will peak at approximately 80 EUR per year per household. In the subsequent period, from 2040 to 2050, the costs are projected to decrease to around 60 EUR per year in the simulated scenario[28].

Including buildings in the ETS2 system will compel households to phase out coal first, followed by gas. Average emission charges per household are expected to peak at approximately 80 EUR per year in 2035 and decline to around 60 EUR annually during 2040–2050 (considering all households in Poland). Continuing to use coal and gas for heating, cooking, and water heating could result in emission charges reaching 1,000 EUR in 2040 and 2,500 EUR in 2050, assuming emissions of 3.5 tons of CO_2 per year.

Impact of ETS2 on the Structure of the Passenger Car Fleet

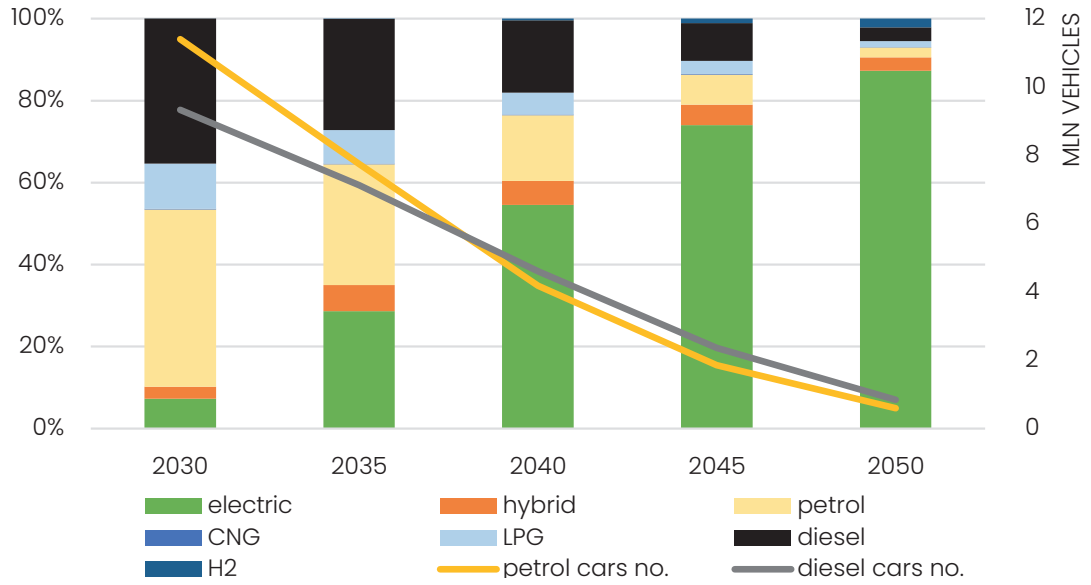
The simulated structure of the passenger car fleet in the transport scenario is presented in Figure 12. The development of electromobility is driven by a combination of factors, including:

- technological advancements in zero-emission technologies, leading to relatively lower vehicle prices and reduced total ownership costs for passenger cars,
- the ban on the sale of internal combustion engine vehicles starting in 2035,

27 The emission costs resulting from residential energy use were calculated for all households without differentiating between ‚emission-producing' and ‚emission-free' households.

28 It should be noted that in the methodology adopted for this study, emission costs are averaged across all households in Poland, including those that do not directly use coal or gas for heating purposes, such as apartment dwellings. As a result, the obtained outcomes may differ from similar studies that have applied different assumptions in this regard (see, for example, Buk, Izdebski (2024); Maj et al. (2021)).

FIGURE 12. STRUCTURE OF THE PASSENGER CAR FLEET IN THE TRANSPORT SCENARIO IN POLAND [%] AND PREDICTED NUMBER OF GASOLINE- AND DIESEL-POWERED VEHICLES IN USE [MLN VEHICLES].



Source: Own calculations based on results from the TR3E model.

- the introduction of emission charges under the ETS2 system in 2027.

By 2040, 55% of the passenger car fleet will consist of electric and hydrogen vehicles, increasing to nearly 90% by 2050. The number of gasoline- and diesel-powered vehicles is projected to decline by more than half between 2030 and 2040. By 2050, the total number of such vehicles remaining in use is expected to be approximately 1.5 million.

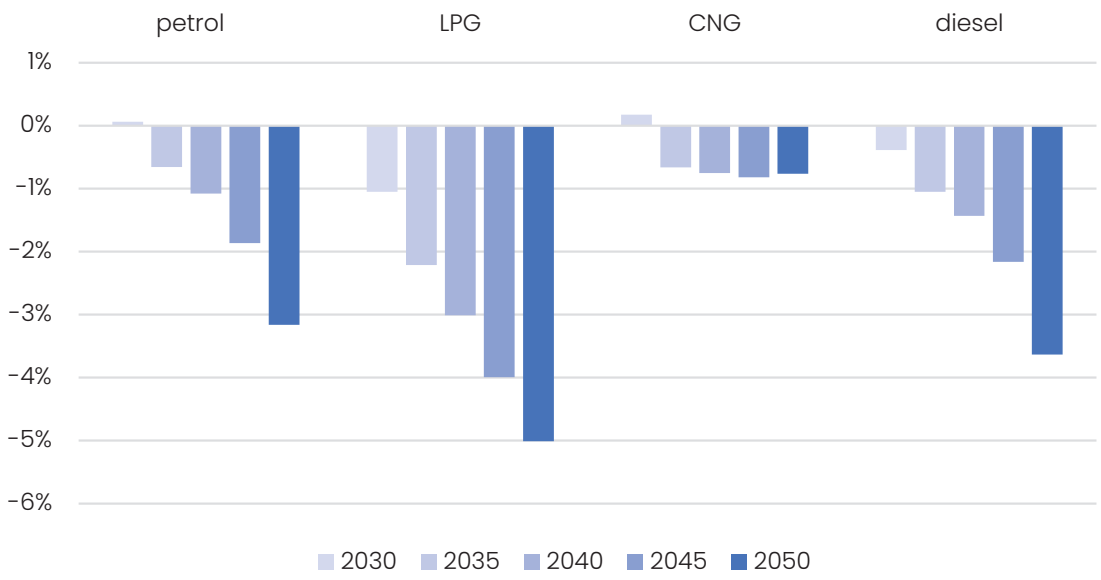
The number of gasoline- and diesel-powered cars will decrease by more than half between 2030 and 2040. By 2050, their total number in use is expected to be approximately 1.5 million. This will translate into an average emission cost per household of 250 EUR annually during 2035–2040, 170 EUR in 2045 (with annual emissions of 380 kg CO_2), and 110 EUR in 2050. Exclusively operating a combustion-engine vehicle, however, would result in emission costs of approximately 500 EUR in 2040 and 1,000 EUR in 2050.

Changes in the passenger car fleet result from a series of policies implemented in the FIT55_trans scenario. One component of these measures is the emission charge. Figure 13 illustrates the percentage changes in the number of passenger cars caused by increased fuel costs due to CO_2 emission charges (alongside other implemented policies/shocks, such as technological advancements or a scrappage rate higher than historical levels).

The extent of the impact on the number of vehicles depends on the trajectory of emission allowance prices and vehicle emissions. For gasoline- and diesel-powered cars, these changes could reach 3–4% of the fleet, while for LPG-powered vehicles, the decrease could reach 5%.

It is important to note that the percentage reduction applies to different baseline levels of vehicle numbers

FIGURE 13. CHANGES IN THE NUMBER OF PASSENGER CARS IN POLAND BY FUEL TYPE DUE TO EMISSION CHARGES IN THE ETS2 SYSTEM [%].



Source: Own calculations based on results from the TR3E model.

in the fleet. Consequently, lower percentage values in 2035–2040 correspond to larger absolute reductions than in 2045–2050 due to higher reference levels. In absolute terms, the number of combustion-engine cars could decrease by approximately 50,000 gasoline- and LPG-powered cars and over 70,000 diesel-powered cars between 2035 and 2040.

This reduction in the fleet results solely from increased fossil fuel prices, even when accounting for other policies such as the ban on the sale of combustion-engine cars starting in 2035.

Summary

The introduction of the ETS2 system as a mechanism for reducing emissions will lower CO_2 levels in Poland. However, this reduction will come at the cost of additional expenses borne by households that do not transition to zero-emission energy sources. The highest emission-related costs for households will occur in 2035, when the decarbonization process reaches its peak pace. These costs are expected to amount to approximately 250 EUR annually for using combustion-engine vehicles and 80 EUR annually for burning coal and gas.

Decarbonization in the transport sector will progress more slowly than in residential energy use, as used combustion-engine vehicles often find new owners on the secondary market. In contrast, coal and gas heating systems are typically not resold or reused. It is important to note that the costs provided are average costs per household, regardless of how the household heats its home. However, only „emission-producing" households using fossil fuels will actually bear these costs. Similarly, in the case of transport, no distinction is made between households owning electric vehicles versus those owning combustion-engine vehicles.

After 2040, transport emission costs will decline linearly, dropping to just over 100 EUR per household annually by 2050, which is more than a twofold decrease. The trajectory of household costs reflects the total ETS2-related expenses, influenced by transport activity, the structure of the vehicle fleet, and emission charges, adjusted for the number of households.

In contrast, emission charges related to building use will not decline as significantly after 2040. By this time, the transition to electric heating systems will have reached an advanced stage, with average annual emissions per household falling below 200 kg CO_2 (totaling 1.1 Mt CO_2 across all households).

The analysis conducted by the CAKE team concludes that it is necessary to accelerate the transformation process and implement protective measures, particularly for the most vulnerable social groups. These measures should be based on newly proposed funds, such as the Social Climate Fund.

The emission charge in ETS2 will be added to the price of fuels (gasoline, diesel, coal, and gas) and will be borne by 'emission-producing' households—those using internal combustion engine (ICE) vehicles and burning coal or gas for heating, cooking, and water heating. Based on the proportion of ICE vehicles in Poland, the share of vehicles for which users will bear CO_2 emission costs in the fleet is projected to decline from 100% in 2025 to 45% in 2040 and 13% in 2050.

By dividing the total transport emission costs borne by households by the number of emission-producing households, it is possible to estimate ETS2 costs per emission-producing household. Using this methodology, the annual burden from operating ICE vehicles could exceed 500 EUR in 2040 and reach 1,000 EUR annually per emission-producing household by 2050.

In a similar manner, it is possible to estimate the share of households using fossil fuels for heating, cooking, and water heating based on fuel consumption data. According to Eurostat[29], in 2020, approximately 54% of the energy consumed by households came from fossil fuels (in 2015, this share was 62%, and by 2022, it had decreased to 52%).

Using the FIT55 scenario, it can be estimated that the number of households relying on coal and gas will decrease from approximately 7 million in 2025 to around 300,000 in 2050. Based on these figures, the costs incurred by households continuing to burn these fuels can be projected. With emissions of around 3.5 tons of CO_2 annually per household using coal and gas, emission costs could exceed 1,000 EUR in 2040 and reach approximately 2,500 EUR in 2050.

It is important to note that these charges could disproportionately affect low-income individuals. According to Eurostat statistics[30], in 2020, the income of households in the lowest quintile did not exceed 15,000 EUR, and this threshold increased to 18,000 EUR annually by 2023. During the same period, household expenditures[31] on electricity, gas, and other fossil fuels amounted to approximately 1,800 EUR annually. This indicates that an emission cost of over 3 tons of CO_2 would exceed the current cost of purchasing these fuels.

When analyzing the results of model simulations, it is important to consider the sensitivity of the results to assumptions regarding technology costs, fuel prices, and the availability of technologies in the future. The outcomes of the presented simulations should lead to the conclusion that accelerating the transformation process is essential. In order to protect the most vulnerable social groups, we should also focus on protective measures— for this purpose, we can utilize available resources, such as those from the Social Climate Fund, of which Poland is the largest beneficiary.

29 Eurostat: nrg_d_hhq statistics.
30 Eurostat: ilc_di01 statistics.
31 Eurostat: nama_10_co3_p3 statistics.

Literature:

1. Boratyński, J., Pyrka, M., Tobiasz, I., Witajewski-Baltvilks, J., Jeszke, R., Gąska, J., Rabiega, W. (2022). The CGE model d-PLACE, ver. 2.0, The Institute of Environmental Protection – National Research Institute/ National Centre for Emissions Management, Warsaw 2022. (https://climatecake.ios.edu.pl/wp-content/uploads/2022/03/CAKE_d-PLACE_v.2_d-place-model_documentation.pdf).
2. Buk, Izdebski (2024) Analiza wpływu ETS2 na koszty życia Polaków, Warszawa. (https://ets2koszty.pl/wp-content/uploads/2024/07/ets2_raport_final.pdf, accessed on: 18.11.2024)
3. Cambridge Econometrics (2020) Decarbonising European transport and heating fuels – Is the EU ETS the right tool? – final report, Cambridge.
4. European Comission (2020) Possible extension of the EU Emissions Trading System (ETS) to cover emissions from the use of fossil fuels in particular in the road transport and the buildings sector – final report, Publications Office of the European Union, Brussels.
5. European Comission (2024) Report from the Commission to the European Parliament and the Council on the functioning of the European carbon market in 2023, Publications Office of the European Union, Brussels.
6. European Environment Agency Datahub (2024) [EU SDG 13_31] Average CO_2 emissions per km from new passenger cars, (https://sdi.eea.europa.eu/data/f788b75b-1803-47ec-968e-abe59075f8f5, accessed on: 06.11.2024).
7. Statistics Poland (2023) Energy consumption in households in 2021, Warsaw, Rzeszow.
8. European Comission (2023) Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2019/1242 as regards strengthening the CO⌧ emission performance standards for new heavy-duty vehicles and integrating reporting obligations, and repealing Regulation (EU) 2018/956, Publications Office of the European Union, Strasbourg.
9. Boratyński, J., Witajewski-Baltvilks, J., Tatarewicz, I., Pyrka, I., Rabiega, W., Wąs, A., Kobus, P., Lewarski, M., Gorzałczyński, A., Tobiasz, I., Vitaliy, K., Jeszke, R., (2021) Procedure for linking sectoral models with the CGE model, Technical documentation version 1.0, Institute of Environmental Protection – National Research Institute / National Centre for Emissions Management (KOBiZE), Warsaw (https://climatecake.ios.edu.pl/wp-content/uploads/2021/12/CAKE_Models_Linking_21.12.2021_final.pdf, accessed on: 18.11.2024).
10. Pyrka M., Jeszke R., Boratyński J., Witajewski-Baltvilks J., Antosiewicz M., Tatarewicz I., Rabiega W., Wąs A., Lewarski M., Skwierz S., Rosłaniec M., Lizak S., Zborowska I., Chodor M., Kobus P., Cygler M., Gorzałczyński A., Tylka A., Lewarska I., Mzyk P., Sekuła M. (2024). VIIEW on EU ETS 2050: Exploring synergies between the EU ETS and other EU climate policy measures – carbon removal, hydrogen, and sectoral transport policy, Institute of Environmental Protection – National Research Institute / National Centre for Emissions Management (KOBiZE), Warsaw (accessed on: 18.11.2024).
11. European Parliament and Council (2023) Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 establishing the Social Climate Fund and amending Regulation (EU) 2021/1060. (https://eur-lex.europa.eu/legal-content/PL/TXT/PDF/?uri=CELEX:02023R0955-20240630, accessed on: 18.11.2024).
12. Statistics Poland (2023) 2021 National Population and Housing Census: Families in Poland in the light of the 2021 Census results, Warsaw.
13. https://stat.gov.pl/en/latest-statistical-news/communications-and-announcements/list-of-communiques-and-announcements/average-monthly-available-income-for-a-total-of-1-person-in-2021,305,8.html (accessed on: 18.11.2024).
14. https://www.acea.auto/files/ACEA-report-vehicles-in-use-europe-2023.pdf (accessed on: 13.11.2024)
15. https://www.sustainable-bus.com/news/uk-germany-norway-leader-electric-bus-market-2023-europe/ (accessed on: 13.11.2024).
16. https://www.transportenvironment.org/uploads/files/Unveiling-Europes-corporate-car-problem_TE.pdf (accessed on: 13.11.2024).
17. 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.
18. Rabiega, W., Sikora, P., Gąska, J., Gorzałczyński A. (2022). The TR3E Model, ver. 2.0, The Institute of Environmental Protection – National Research Institute/ National Centre for Emissions Management, Warsaw 2022. (https://climatecake.ios.edu.pl/wp-content/uploads/2022/03/CAKE_TR3E_v.2_transport-model-documentation.pdf, accessed on: 18.11.2024).
19. Tatarewicz, I., Lewarski, M., Skwierz, S. (2022). The MEESA Model, ver. 2.0, The Institute of Environmental Protection – National Research Institute/ National Centre for Emissions Management, Warsaw 2022. (https://climatecake.ios.edu.pl/wp-content/uploads/2022/03/CAKE_MEESA_v.2_energy-model_documentation.pdf, accessed on: 18.11.2024).
20. Wąs, A., Witajewski-Baltvilks, J., Krupin, V., Kobus, P. (2022). The EPICA Model, ver. 2.0, The Institute of Environmental Protection – National Research Institute/ National Centre for Emissions Management, Warsaw 2022. https://climatecake.ios.edu.pl/wp-content/uploads/2022/03/CAKE_EPICA_v.2_agriculture-model_documentation.pdf, accessed on: 18.11.2024).

Economic impact of the European Commission's proposed 2040 GHG emission reduction target

Authors:
Maciej Pyrka, Head of Strategy, Analysis and Auction Unit, KOBIZE/CAKE
Robert Jeszke, Deputy Director of IOŚ-PIB, Head of KOBIZE and CAKE
Jan Witajewski-Baltvilks, Strategy, Analysis and Auction Unit, KOBIZE/CAKE
Marta Rosłaniec Strategy, Analysis and Auction Unit, KOBIZE/CAKE

Economic impact of the European Commission's proposed 2040 GHG emission reduction target

Key words: 2040 reduction target, EU energy and climate policy, climate neutrality, economic impacts of climate policy, costs of decarbonisation, costs of the European Green Deal


Author:
Maciej Pyrka


Author:
Robert Jeszke


Author:
Jan Witajewski-Baltvilks


Author:
Marta Rosłaniec

Abstract

Achieving climate neutrality by 2050 will have a significant impact not only on emissions reductions but also on individual sectors and regions. An analysis of the European Commission's proposed 90% emissions reduction target for 2040 (relative to 1990 levels) provides insights into its impact on the EU economy and the measures needed for a cost-effective and sustainable transition to the 2050 target. According to the EC, the option of 90% target represents the smallest greenhouse gas budget, ensures competitive advantage, reduces environmental damage and is in line with the recommendations of the European Scientific Advisory Board on Climate Change (ESABCC). However, an analysis by the Centre for Climate and Energy Analyses (CAKE) examines alternative scenarios and their economic impact on the EU and its Member States. Excluding experimental technologies and slowing down the development of existing technologies reduces the number of low-cost abatement options by 2040. In the CAKE scenarios (Fit55_S2+ and Fit55_S3+), this led to a sharp increase in the price of emission allowances in 2040, although this fell to €380/tCO_2 by 2050 due to the availability of cheaper solutions. The rapid decarbonisation led to moderate GDP losses at EU level, with significant regional differences. Countries such as Poland faced higher burdens due to the investment costs of low-emission technologies, which reduced consumption.

Comparing the EC's results with CAKE's independent analyses aims to support constructive dialogue on the proposed 2040 climate target, enabling a better understanding of its potential challenges, costs, and benefits.

This article is based on Chapter 9 of the report, "*Exploring report. Synergies between the EU ETS and Other EU Climate Policy Measures – Carbon Removal, Hydrogen, and Sectoral Transport Policy*"[1], prepared by CAKE at KOBiZE/IOŚ-PIB. The report responds to the impact assessment (IA) of selected reduction scenarios presented by the European Commission and analyses their implications for the EU economy and society.

1 Pyrka M., Jeszke R., Boratyński J., Witajewski-Baltvilks J., Antosiewicz M., Tatarewicz I., Rabiega W., Wąs A., Lewarski M., Skwierz S., Rosłaniec M., Lizak S., Zborowska I., Chodor M., Kobus P., Cygler M., Gorzałczyński A., Tylka A., Lewarska I., Mzyk P., Sekuła M. (2024). VIIEW on EU ETS 2050: Exploring synergies between the EU ETS and other EU climate policy measures – carbon removal, hydrogen, and sectoral transport policy, Institute of Environmental Protection – National Research Institute / National Center for Emission Management (KOBiZE), Warsaw, April 2024 (link: https://www.kobize.pl/pl/article/aktualnosci-2024/id/2629/nowa-analiza-cake-kobize-ios-pib-dotyczaca-synergii-systemu-eu-ets-z-innymi-politykami; accessed: 22/10/2024).

List of abbreviations:

CAKE – Centre for Climate and Energy Analysis
CCS – Carbon Capture and Storage
DACCS – Direct Air Carbon Capture and Storage
EC – European Commission
ESABCC – European Scientific Advisory Board on Climate Change
ETS2 – Emissions Trading System for the Building and Transport Sectors
EU – European Union
EU ETS – European Union Emissions Trading System
GDP – Gross Domestic Product
GHG – Greenhouse gases
IA – Impact assessment
IOŚ-PIB – Institute of Environmental Protection – National Research Institute
KOBiZE – National Centre for Emission Management
LULUCF – Land Use, Land Use Change and Forestry
Non-ETS – Sectors outside the European Emissions Trading System
RES – Renewable energy sources

The European Union's new climate targets: ambitious challenges on the path to climate neutrality

The European Union has long been at the forefront of global climate action, setting ambitious climate targets that steadily increase commitments to reduce greenhouse gas (GHG) emissions. The current strategy, the European Green Deal[2], aims to reduce emissions by 55% by 2030 compared to 1990 levels, with the ultimate goal of achieving net climate neutrality by 2050 (after accounting for the negative emissions). A cornerstone of EU climate policy is the ‚Fit for 55' legislative package[3], which formalises emissions reduction targets for the coming decade to 2030. The pursuit of climate neutrality requires the European Union to strike a delicate balance between sustainable development and economic viability.

> **In February 2024, the European Commission presented its proposals for the 2040 target[4], fulfilling its obligation under the European Climate Law[5].**

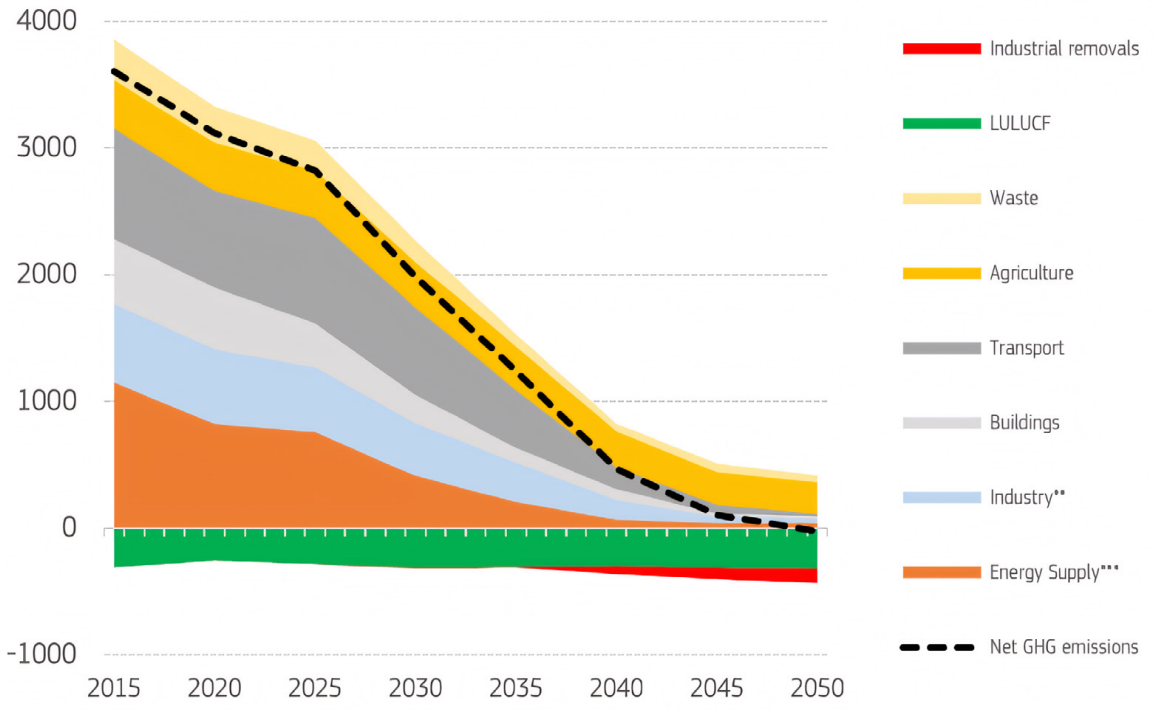
The Commission's proposal opens a political debate that will certainly dominate the European stage in the coming months. The Commission initially proposed a net reduction of 90% in greenhouse gas emissions compared to 1990 levels, arguing that Member States were ready for the challenge. This proposal is based, among others, on three main pillars: the proposal of the European Scientific Advisory Board on Climate Change, the public consultation and the Impact Assessment (IA) carried out by the European Commission.

The European Scientific Advisory Board on Climate Change (ESABCC) has indicated that the EU is ready for a 90-95% reduction target. The public consultation, which closed on 23 June, 2023, showed broad support for strong climate action, with respondents proposing an average reduction target of 77%, reflecting a more conservative approach than the ESABCC recommendation.

> **The European Commission's impact assessment highlighted the ambition of the 90% target and presented it as a new pathway for emissions reductions by 2040.**

2 Communication from the Commission to the European Parliament, the European Council, the Council, the Economic and Social Committee and the Committee of the Regions, The European Green Deal, European Commission, Brussels, 11.12.2019 COM(2019) 640 final.
3 The ‚Fit for 55' package is a set of legislative acts aimed at amending and updating EU legislation and introducing new initiatives to ensure that EU policies are in line with the climate targets set by the Council and the European Parliament in the European Green Deal.
4 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Securing our Future, The 2040 climate target and the path towards climate neutrality by 2050: foundations for a sustainable, fair and prosperous society, European Commission, Strasbourg, 6.2.2024 COM(2024) 63 final.
5 Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 on establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 (European Climate Law).

FIGURE 1. EMISSION REDUCTION PATH IN THE S3 SCENARIO, EU27 [MT CO $_{2EQ}$]



Source: European Commission

However, alternative scenarios from the IA need to be analysed to assess the validity of the decision.

In response to these challenges, the Centre for Climate and Energy Analysis (CAKE) has taken the initiative to recalculate the scenarios presented in the impact assessment using its own modelling tools. The aim is to compare the European Commission's results with CAKE's independent assessment, thereby supporting a constructive dialogue on the proposed 2040 climate target. Such a dialogue is essential to ensure a fair sharing of the mitigation burden and to secure broader support in the EU for the transition path chosen.

Analysis of the 2040 climate targets considered by the EC in the impact assessment

The EC IA entitled "Securing our future Europe's 2040 climate target and path to climate neutrality by 2050 building a sustainable, just and prosperous society" presents three emission reduction scenarios for 2040: S1 (-78.5%), S2 (-88%) and S3 (-92%). In addition, the EC presented the "LIFE" scenario, which is intended to show how selected parameters, including those related to lifestyles, will affect emission reductions. Although scenarios S1 to S3 differ in the expected level of emission reductions by 2040, they all aim to achieve climate neutrality by 2050.

When analysing the modelling results presented by the EC in the impact assessment, in particular scenarios S2 and S3, it should be noted that they may be subject to a high degree of uncertainty due to the assumption of the implementation of technologies that are not currently available on the market, including synthetic fuels and hydrogen. In addition, the EC's assumption of a high potential for renewable energy sources (RES) may be overly optimistic.

In addition, the EC has not presented in the impact assessment the differentiation of changes in macroeconomic indicators between countries and regions as a result of the implementation of the scenarios examined. Presentation of average changes in macroeconomic indicators at EU level In the most ambitious scenario S3, the lowest level of projected GDP is 0.8% lower than in scenario S2. In the least ambitious scenario S1, GDP is at most 0.6% higher than in scenario S2. The magnitude of the changes is therefore relatively small for the EU as a whole. However, this does not mean that the impact will be small for all countries and regions of the European Union.

An alternative to EC's analysis

This article compares the results obtained by the EC in the impact assessment with the results obtained using the CAKE modelling tools. Contrary to the EC's IA scenarios, it was assumed that synthetic fuels (e-fuels) will not develop, that there will be no large-scale deployment of direct atmospheric CO_2 capture and storage (DACCS) technology, and that hydrogen (without taking into account subsidies) will have to compete with natural gas on the open market.

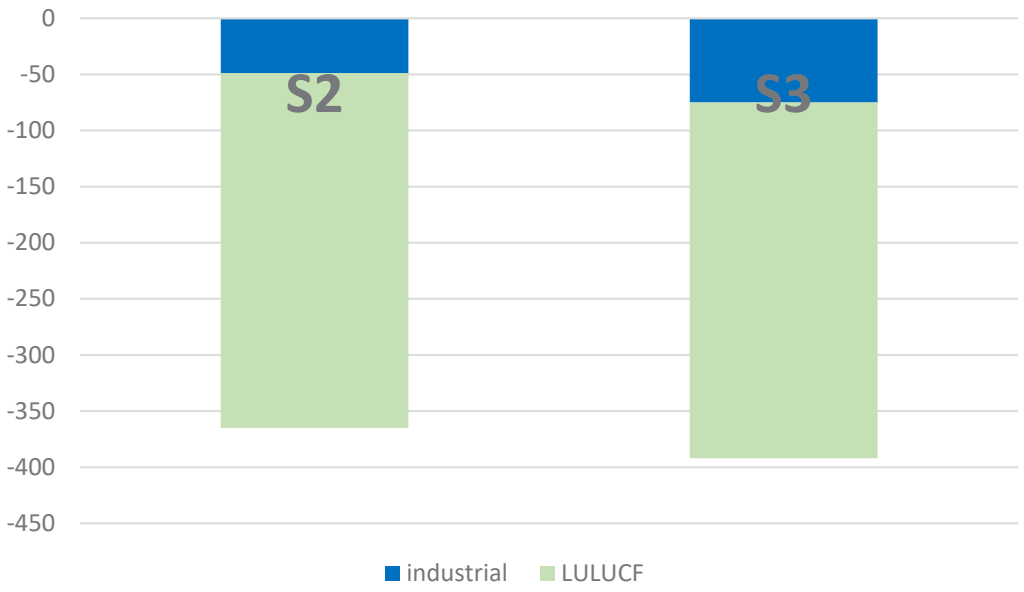
The implementation of very ambitious reduction targets for the EU without the above-mentioned technologies, and assuming that the use of hydrogen is conditioned by the price of the natural gas, required the introduction of a mechanism that would allow exceeding emission limits (exceeding reduction targets). For this purpose, the CAKE analysis assumed an unlimited supply of emission allowances at a cost of EUR 1,000/tCO_2. This allows emission limits to be exceeded, and excess emissions occur when the allowance price reaches EUR 1,000.15 per tonne of CO_2 eq. This can be compared to a situation where installations covered by the limit pay penalties for excess emissions, but there is no real reduction in emissions.

TABLE 1. REDUCTION TARGETS IN THE FIT55+, FIT55_S2+ AND FIT55_S3+ SCENARIOS FOR THE EU.

SCENARIO	GHG EMISSION REDUCTION TARGET FOR EU27				LULUCF **[MLN TCO_2 EQ.]**	EXCEEDING THE EMISSION LIMIT **[MLN TCO_2 EQ.]**
	TOTAL NET GHG EMISSION REDUCTION- INCLUDING LULUCF (COMPARED TO 1990)	EU ETS (COMPARED TO 2005)	NON-ETS (COMPARED TO 2005)	ETS2 (COMPARED TO 2005)		
2040						
Fit55+	83%	82%	66%	68%	-396	1
Fit55_S2+	88%	89%	71%	84%	-316	161
Fit55_S3+	92%	91%	77%	87%	-317	302
2050						
Fit55+	100%	95%	85%	87%	-481	112
Fit55_S2+	101%	96%	87%	98%	-332	363
Fit55_S3+	101%	96%	87%	98%	-333	360

Source: KOBiZE, Exploring Synergies between the EU ETS and Other EU Climate Policy Measures – Carbon Removal, Hydrogen, and Sectoral Transport Policy, April 2024.

FIGURE 2. LEVEL OF DIFFERENT CO_2 REMOVALS IN 2040 FROM THE EC IA TO THE 2040 REDUCTION TARGET IN SCENARIOS S2 AND S3 [MT CO_2 EQ.]



Source: CAKE based on data from the European Commission

The table 1 shows the CAKE scenarios analysed and the corresponding GHG emission reduction targets.

The Fit55+ scenario is a reference scenario and includes emission reduction pathways such as the Fit55 scenario from the CAKE report entitled: *Exploring Synergies between the EU ETS and Other EU Climate Policy Measures – Carbon Removal, Hydrogen, and Sectoral Transport Policy.*[6]

As an alternative to the reference scenario Fit55+, two additional analytical scenarios Fit55_S2+ and Fit55_S3+ have been proposed, reflecting the targets contained in the EC IA S2 and S3 scenarios respectively. The reduction paths in these scenarios differ from those in Fit55+ in that they show a faster net reduction in the period 2030-2040 (88% and 92% by 2040 for S2 and S3, respectively) and aim at a more ambitious overall reduction by 2050, in line with the updated EC assumptions. The scenarios differ in the level of negative emissions from the LULUCF sector after 2030. These differences are shown in Figure 2.

Macroeconomic results

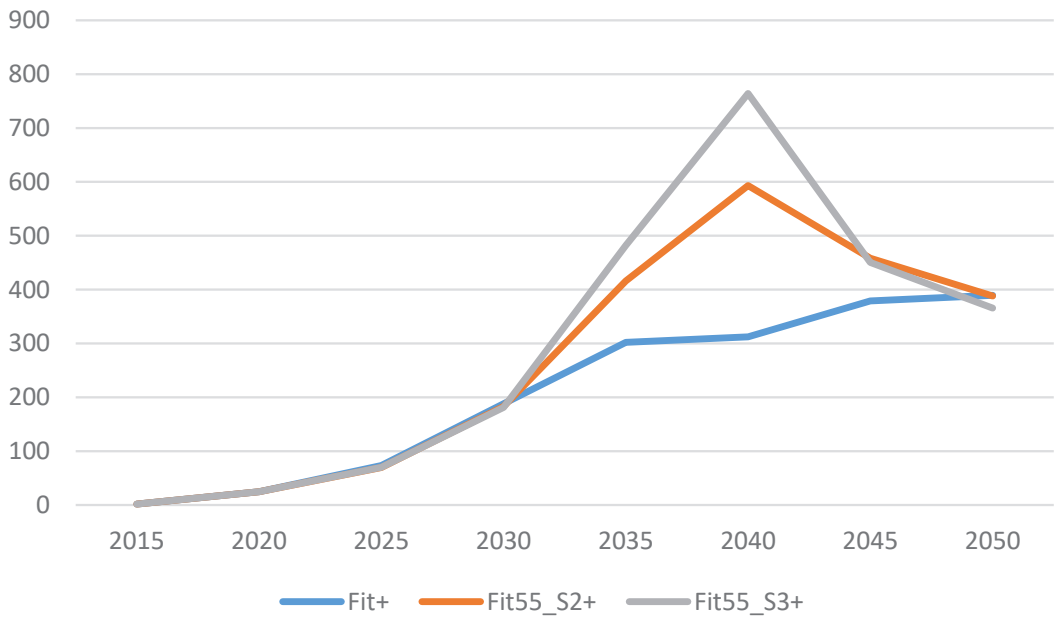
As mentioned above, technologies that are at an experimental stage and whose commercialisation costs are subject to high uncertainty (e.g. e-fuels, DACCS technology) were excluded from the model scenarios, resulting in a narrowing of the available emission reduction options in 2040.

In simulations with very ambitious abatement targets, EU ETS allowance prices increased rapidly in 2040 (EUR 590/tCO_2 and EUR 740/tCO_2 for the Fit55_S2+ and Fit55_S3+ scenarios, respectively – see Figure 3), reflecting the high abatement costs.

However, EU ETS prices fall to EUR 380/tCO_2 in 2050 for all scenarios, reflecting the increasing availability and development of abatement technologies and improved energy efficiency by that year.

6 Exploring Synergies between the EU ETS and Other EU Climate Policy Measures – Carbon Removal, Hydrogen, and Sectoral Transport Policy (https://climatecake.ios.edu.pl/wp-content/uploads/2024/04/LIFE_VIIEW_EUETS_Exploring-synergies.pdf); available: 22.10.2024 r.).

FIGURE 3. PRICES OF EMISSION ALLOWANCES IN THE EU ETS SYSTEM IN THE FIT55+, FIT55_S2+ AND FIT55_S3+ SCENARIOS [EUR/T CO_2 EQ.]



As shown in Figure 4, scenarios with a higher rate of decarbonisation (Fit55_S2+ and Fit55_S3+) suggest a moderate GDP decline at EU level in 2040 compared to the Fit55+ scenario. However, the results vary between regions. The largest negative impact of tightening reduction targets is observed in the Southern Europe region, where the decline reaches -3.1% in the Fit55_S2+ scenario and -3.5% in the Fit55_S3+ scenario. Poland also experiences significant GDP declines of -1.9% (Fit55_S2+) and -2.2% (Fit55_S3+). In the Central Europe region, the impact is slightly lower at -1.2% and -1.5% respectively. On the other hand, France, Germany, the Iberian region and Italy show relatively small declines, ranging between

FIGURE 4. CHANGES IN GDP BETWEEN THE FIT55_S2+ AND FIT55_S3+ SCENARIOS AND THE FIT55+ SCENARIO IN SELECTED EU REGIONS.

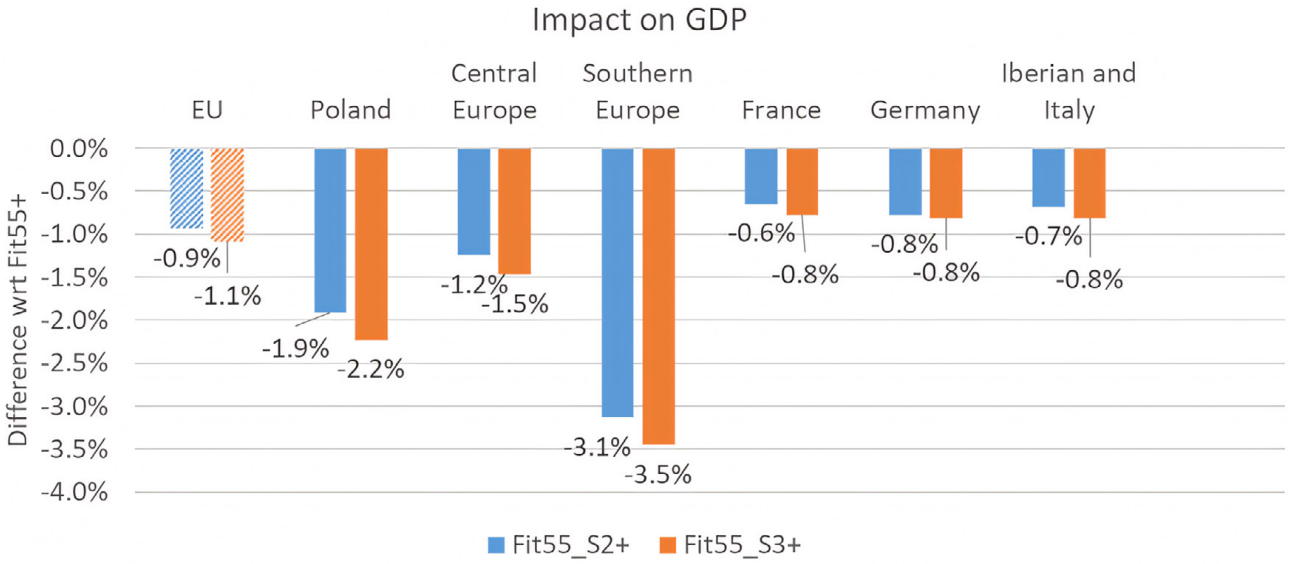
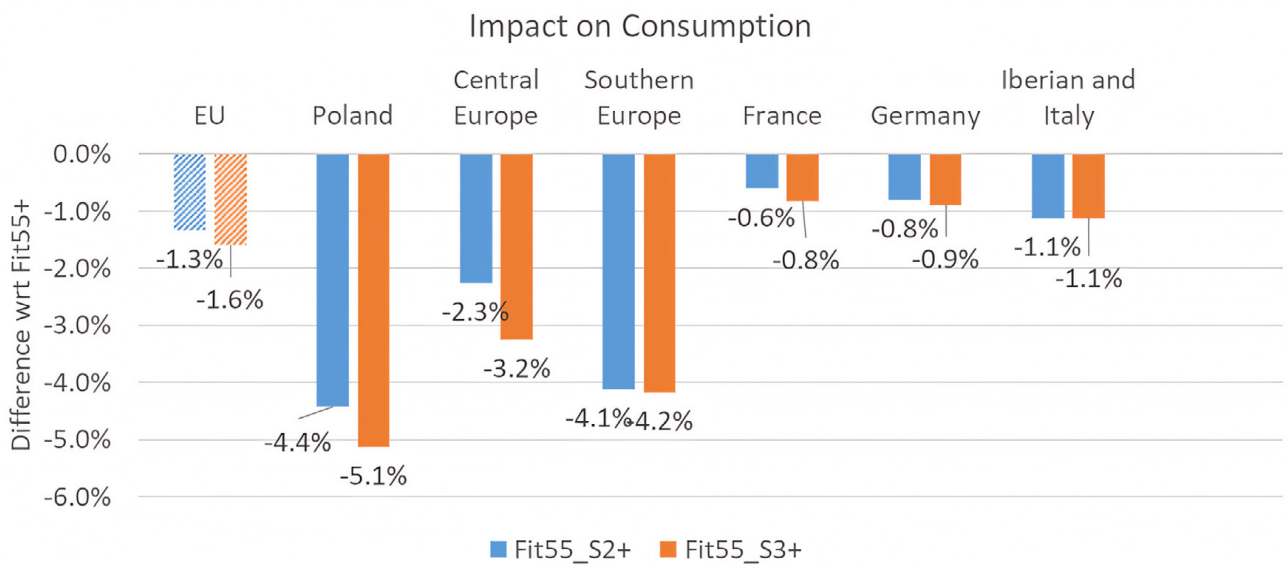


FIGURE 5. CHANGES IN HOUSEHOLD CONSUMPTION BETWEEN THE FIT55_S2+ AND FIT55_S3+ SCENARIOS AND THE FIT55+ SCENARIO IN SELECTED EU REGIONS.



-0.6% and -0.8%. Overall, the Fit55_S3+ scenario has a greater negative impact on GDP than Fit55_S2+, which is visible in all the regions analysed.

The estimated difference in consumption levels (Figure 5) in 2040 is significantly higher than the difference in GDP, especially for several regions and EU Member States, including Poland. The rapid introduction of low-emission technologies will require a significant increase in investment, the cost of which will be borne by citizens in the form of reduced consumption.

The largest reductions in consumption in 2040 are observed in Poland, where the change reaches -4.4% in the Fit55_S2+ scenario and -5.1% in the Fit55_S3+ scenario compared to the Fit55+ scenario. There is also a significant reduction in consumption in the Southern Europe region (-4.1% and -4.2% in the Fit55_S2+ and Fit55_S3+ scenarios, respectively), and in Central Europe (-2.3% and -3.2%, respectively).

For the remaining regions and countries, the impact of increased climate ambition is less severe, but still noticeable. In the case of France and Germany, the decline in consumption in 2040 is moderate, at about -0.6% and about -0.9% in the Fit55_S2+ and Fit55_S3+ scenarios, respectively, compared to the Fit55+ scenario. The Iberian region and Italy experience a decrease in consumption of -1.1% in both scenarios as a result of the tightening of the targets.

In summary, the Fit55_S3+ scenario brings larger reductions in consumption than Fit55_S2+, and these differences are particularly pronounced in countries such as Poland and the regions of Central and Southern Europe. Accelerating reductions comes at an additional cost, as technological change takes time and the potential of each key technology (including PV, wind and nuclear) is limited. In the case of Poland, the impact of tightening the 2040 climate ambition is much higher than the EU average.

The changes examined, comparing the Fit55_S2+ and Fit55_S3+ scenarios with the Fit55+ scenario, show that the differences are significant both in terms of consumption (a decrease of about -4.4%

in Fit55_S2+ and -5.1% in Fit55_S3+ for Poland compared to -1.3% and -1.6% for the EU) and GDP (-1.9% and -2.2% respectively for Poland compared to -0.9% and -1.1% for the EU). This phenomenon is the result of greater structural challenges and the need for much higher investment spending in Poland, which places a significant burden on the economy.

Emissions that are difficult to reduce in the economy

The European Commission estimates that agriculture will remain the largest emitter in 2050, with emissions of 250 Mt CO_2. Importantly, the EC points to the possibility of significant emission reductions in this sector and increased removals of around 125 Mt CO_2 in 2040 and 175 Mt CO_2 in 2050. Achieving these reductions is linked to lifestyle changes described in the LIFE additional scenario. Potential emission reductions in agriculture would reduce the pressure on other sectors of the economy, while reducing the overall costs of the transformation.

In the CAKE analysis, large emissions remain in the industrial sectors, but are largely captured through the use of carbon capture and storage (CCS) technology.

The land transport sector remains a particular challenge in regions with relatively high emission intensity of that sector, such as Poland and Southern and Central Europe. In these areas, the costs of switching to low-emission technologies are much higher. By 2040, land transport will be the largest source of emissions in these regions, underlining the need to accelerate the transformation.

In addition, the slow transformation of water transport in Southern Europe is a major obstacle to reducing emissions. This sector is the second largest source of greenhouse gas emissions in the region after land transport, which has a significant impact on the costs associated with intensifying the transformation.

Discussion

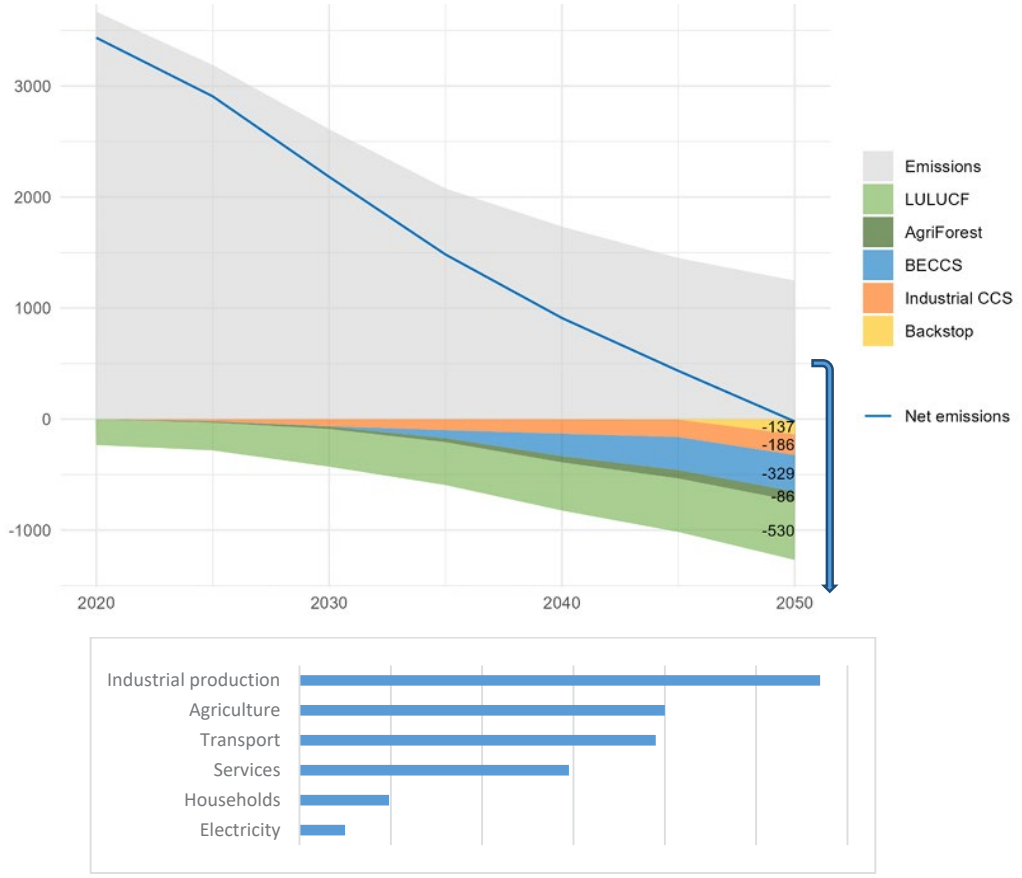
The impact assessment proposed by the EC does not take into account the potential negative effects related to the risk of delaying the development of new technologies and access to alternative fuels. Raising the ambition of climate policy could therefore prevent the EU from increasing its competitiveness in global markets and encourage the relocation of production and investment outside the EU, known as carbon leakage.

The high costs of accelerating the transformation could lead to a significant deterioration in living standards for the lowest income households (energy poverty). Investments in the energy transition could be associated with lower social transfers in coal-dependent Member States, such as Poland. The high pace of structural change could lead to a decline in the value of assets in some sectors, especially in energy-intensive and still high-emission sectors.

Another issue is the fossil fuel sector. Workers with training and experience in this sector may find it difficult to use their skills in other sectors, resulting in lower incomes. Labour market policies are therefore needed to address this issue. However, they may require increased public sector spending, which is limited due to other needs (investments related to the energy transition).

Despite the fact that the EC suggests small changes in employment, the lack of reflection on the need to reallocate capital and labour across EU countries may lead to an underestimation of the increase in unemployment in some EU regions and the social consequences of the transition. The EC document does not provide detailed information on the social and economic impact of meeting the 2040 target from the perspective of individual Member States or sectors, including the impact on the national energy mix, national budgets or investment burdens. This is one of the important aspects, which is why it has been included in the presentation of the CAKE results.

FIGURE 6. GREENHOUSE GAS EMISSIONS AND REMOVALS, EU27 [MT CO_2 EQ.]



Source: CAKE/ KOBiZE, Exploring Synergies between the EU ETS and Other EU Climate Policy Measures – Carbon Removal, Hydrogen, and Sectoral Transport Policy, April 2024.

The authors of the impact assessment argue that early investment in low-carbon technologies creates a "competitive advantage" over the rest of the world, allowing increased production. However, this assumption is weakly supported by theory and evidence, and the "building a competitive advantage" argument ignores the fact that the rest of the world can copy and improve on EU innovations at lower cost. Historically, investment in low-carbon technologies has failed to create a competitive advantage, as illustrated by the market for photovoltaic panels.

Bibliography

1. Commission Staff Working Document Impact Assessment Report, Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Securing our future: Europe's 2040 climate target and path to climate neutrality by 2050 building a sustainable, just and prosperous society, EC, SWD(2024) 63 final, Strasbourg 2024.

2. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Europe's 2040 climate target and path to climate neutrality by 2050 building a sustainable, just and prosperous society, Brussels, 07.02.2024, COM(2024) 63 final.

3. Pyrka M., Jeszke R., Boratyński J., Witamewski-Baltvilks J., Antosiewicz M., Tatarewicz I., Rabiega W., Wąs A., Lewarski M., Skwierz S., Rosłaniec M., Lizak S., Zborowska I., Chodor M., Kobus P., Cygler M., Gorzałczyński A., Tylka A., Lewarska I., Mzyk P., Sekuła M. (2024). VIIEW on EU ETS 2050: Exploring Synergies between the EU ETS and other EU climate policy measures – carbon removal, hydrogen, and sectoral transport policy, Institute of Environmental Protection – National Research Institute / National Center for Emission Balancing and Management (KOBiZE), Warsaw, April 2024 (link: https://www.kobize.pl/pl/article/aktualnosci-2024/id/2629/nowa-analiza-cake-kobize-ios-pib-dotyczaca-synergii-systemu-eu-ets-z-innymi-politykami; accessed: 22/10/2024).

4. Communication from the Commission to the European Parliament, the European Council, the Council, the Economic and Social Committee and the Committee of the Regions, The European Green Deal, European Commission, Brussels, 11.12.2019 COM(2019) 640 final.

5. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Securing our Future, The 2040 climate target and the path towards climate neutrality by 2050: the foundations for a sustainable, fair and prosperous society, European Commission, Strasbourg, 06.02.2024 COM(2024) 63 final.

6. Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 on establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 (European Climate Law).

7. Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050, European Climate Change Scientific Advisory Board, 15/06/2023, DOI: 10.2800/609405, ISBN: 978-92-9480-584-3.

Organic farming – a solution to the Planet's problems or a dead end in development?

Authors:
Adam Wąs, Warsaw University of Life Sciences (SGGW), CAKE
Piotr Sulewski, Warsaw University of Life Sciences (SGGW)

Organic farming – a solution to the Planet's problems or a dead end in development?

Key words: Organic farming, greenhouse gas emissions, eco-efficiency of agriculture, European Green Deal, sustainable intensification of agriculture

Author:
Adam Wąs[1]

Author:
Piotr Sulewski[2]

Summary:

The development of modern agriculture has a long history, spanning over 23,000 years. However, significant changes in agricultural landscapes and ecosystems began in the 18th century, when the Industrial Revolution greatly increased human impact on the environment, including through the intensification of agricultural production. These transformations were associated with innovations that enhanced crop yields, such as ammonia synthesis in 1913 and the Green Revolution in the 20th century, which significantly boosted agricultural productivity, particularly in developing countries. While agriculture has enabled the production of greater quantities of food, it has also led to environmental harm, including water and soil pollution from synthetic fertilizers. This has contributed to water eutrophication and the degradation of natural ecosystems. Today, agriculture faces the challenge of meeting the growing demand for food while protecting the environment.

In response to these challenges, the European Union developed the European Green Deal (EGD), one of which key goals is increasing the share of organic farming. According to the plan, 25% of EU agricultural land will be managed organically by 2030. Modern organic farming emphasizes reducing the use of synthetic fertilizers and pesticides to protect biodiversity and improve soil and water quality. However, organic farming is not without controversy. While it supports environmental protection, it may not always produce enough food, as its yields are typically lower than those of conventional methods. It may require an expansion of agricultural land to maintain adequate production levels, which carries the risk of deforestation and biodiversity loss.

Therefore, pursuing organic farming unconditionally must balance environmental conservation with food security. Increasing the share of organic

1 Katerda Ekonomiki i Organizacji Przedsiębiorstw, Instytut Ekonomii i Finansów, SGGW w Warszawie
2 Katerda Ekonomiki i Organizacji Przedsiębiorstw, Instytut Ekonomii i Finansów, SGGW w Warszawie

farming in the EU to the 25% target set by the EGD could lead to a production decrease, which might be offset by expanding farmland in the EU or importing food. Simulations suggest that transitioning to organic farming could increase the area under cultivation by 8.2%. Additionally, the need for more livestock in organic systems could further alter the structure of agricultural production.

> **Unlike organic farming, which strictly limits production intensity, sustainable intensification focuses on efficiently using resources without excessively expanding agricultural areas at the expense of nature.**

Development of Modern Agriculture

As a conscious human activity, agriculture has roots in the past 23,000 years. The first major changes in the landscape resulting from agricultural activity on a larger scale date back to around 8.5 thousand years BCE. The transition from hunting and gathering to agriculture marked the moment when humans increasingly influenced the natural environment. In the initial stages, this activity had a limited scope. Still, even then it was able to affect ecosystems significantly (there are known examples of ancient tribes that wreaked havoc on local flora and fauna).

A breakthrough event that significantly accelerated the scale of human impact on nature was the Industrial Revolution, which began in the 18th century. From the beginning of civilization until 1800, the number of people worldwide increased from around 4 million to almost a billion. By 1928, the population had doubled to 2 billion, and in 2022, it had already reached 8 billion. Experts predict that by 2080, the number of people will exceed 10 billion, although the growth will be slower than in previous years. Such population growth has not remained indifferent to the natural environment, to which agriculture has undoubtedly contributed.

Despite the concerns expressed by Thomas Malthus[3] in the 18th century, agriculture has managed to increase food production without a proportional increase in cultivated areas. One of the discoveries that contributed to the increase in agricultural production in the world was the method of direct synthesis of ammonia from hydrogen and nitrogen invented by Fritz Haber and Carl Bosch in 1913. To this day, it is the basis for the production of nitrogen fertilizers worldwide. It is estimated that currently, half of humanity owes its access to food to artificial fertilizers. Another event of fundamental importance for increasing food production was the Green Revolution introduced by the FAO (Food and Agriculture Organization of the United Nations), which aimed to increase agricultural productivity, especially in developing countries. As a result, between 1961 and 2020, the area of agricultural fields increased by only 6%, but grain production increased by as much as 343%. Such a high increase in production was possible thanks to the intensive use of artificial fertilizers - the use of nitrogen fertilizers increased tenfold, and phosphorus and potassium fertilizers more than fourfold. Despite the rapid population growth, one of the most important positive results of the intensification of agricultural production was the reduction of hunger in the World. However, this did not remain without impact on the natural environment. The intensification of agricultural production has numerous negative effects on the environment. Excessive use of nitrogen and phosphorus fertilizers leads to water and soil pollution, contributing to eutrophication, i.e. excessive enrichment of water bodies with nutrients, which results in the degradation of aquatic ecosystems. It is estimated that in Europe,

3 Thomas Malthus (1766-1834) argued that since the population grows geometrically while food production increases arithmetically, an inevitable state of overpopulation would lead to a global famine.

the amount of nitrogen in fields exceeds the needs of plants by 37% and phosphorus by 8%. Excessive fertilization results in losses of nitrogen introduced into the soil in the form of fertilizers at a level of between 50% and 75%, which additionally burdens the environment. Agriculture is estimated to be responsible for 80% of the eutrophication processes of the world's seas.

In the face of challenges related to environmental protection and the continued growth of the world's population, agriculture is facing the need for change. The debate on the best model for agricultural development is still ongoing, and the key question is: how to provide enough food for the growing population while protecting our planet? Among the most frequently mentioned solutions are organic and sustainable agriculture.

> **In the context of climate change and growing demand for food, we face the challenge of reconciling increased food production with environmental protection.**

In the context of climate change and the growing demand for food (expected to increase by about 50% by 2050), we face the challenge of reconciling increased food production with environmental protection. Scientists and politicians are debating how to provide enough food for the constantly growing population while reducing the risk to ecosystems.

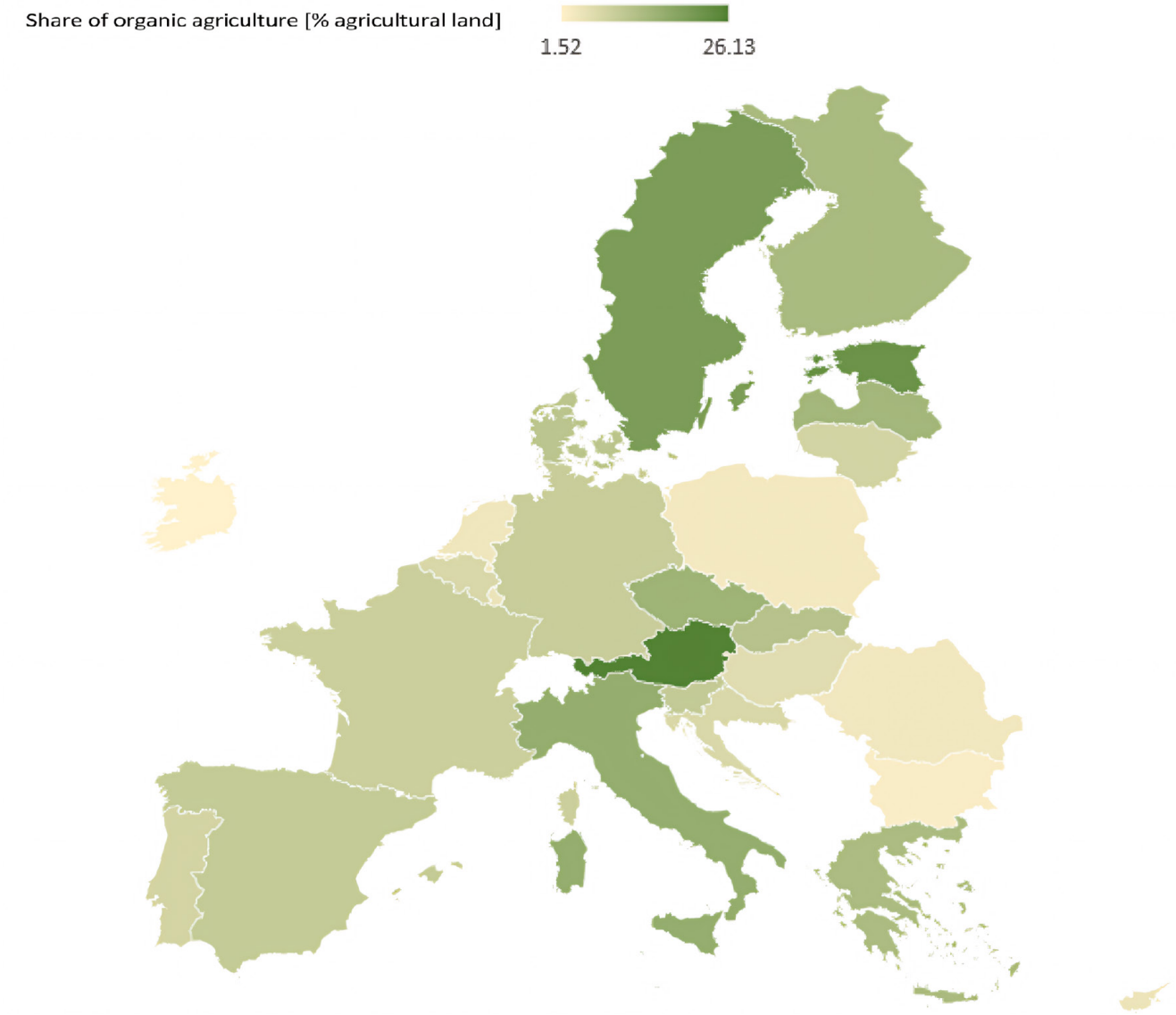
This debate raises, among other things, the issue of the disproportion between the share of agriculture in the creation of the European Union's gross domestic product (only about 1.4%) and the significant contribution of this sector to greenhouse gas emissions (it is one of the most emission-producing sectors of the economy and is responsible for about 11% of total emissions in the EU). However, considering that food supply to people is entirely dependent on agricultural production, it cannot be abandoned. Moreover, agriculture is still a source of raw materials that cannot be produced synthetically (based on biomass).

European Green Deal and organic farming

The EU's response to the challenges resulting from increasing climate change and the ongoing degradation of the natural environment has become the concept of economic and social policy called the "European Green Deal" (EGD). One of the elements included in this plan is the "Farm to Fork Strategy", according to which the Sustainable European Food System should have a neutral impact on the environment, support climate change mitigation, strengthen biodiversity, ensure food security, food safety, and the competitiveness of EU agriculture while respecting the principles of Fair Trade. Some of these postulates also correspond to the assumptions of the EU's biodiversity strategy, "Bringing nature back into our lives".

One of the main proposals to reduce the impact of agriculture on the environment under the Green Deal is to set a goal for at least 25% of agricultural land in the EU to be cultivated using organic methods by 2030. For comparison, in 2020, the total area of agricultural land under organic crops was 9.1%. It is worth noting that the importance of organic production, measured by the share of organic crops, varies across EU countries – the leader in this respect is Austria (over 25% of the area of agricultural land with organic crops). At the other end of the scale, there are Malta, Ireland, Bulgaria, Romania and Poland (with a share of organic crops below 5%). The map below shows the differences in the share of organic crops in the area of agricultural land across EU countries.

Organic farming is often associated in society with the best solution for the environment and health. Organic crops are believed to be grown in harmony with nature, without using genetically modified organisms, chemical plant protection products,



Source: own study based on Eurostat data

pesticides, or artificial fertilizers, which is supposed to minimize their negative impact on soil, water, and biodiversity and ensure food safety. For many people, "organic" means sustainable, safe for the Planet and future generations, and at the same time, better for health because organic products are perceived as free from harmful chemicals.

> **Paradoxically, organic farming, which by definition is meant to be more environmentally friendly, can in some cases contribute to increasing negative environmental impacts.**

The impact of organic farming on the environment

Although organic farming and its products have a clearly positive image in the public consciousness, their actual impact on the environment and health depends on many factors. In the case of organic food, attention is drawn to, among others, potential threats related to greater contamination of crops with fungal pathogens, leading to the presence of harmful mycotoxins in products.

However, the main doubt is related to the question: "Is organic farming able to provide a sufficient amount of food?". Some authors suggest that this

is possible, although it would require adjustments in the structure of agricultural production (e.g., increasing the importance of legumes) and in the entire food supply chain (e.g., reducing food losses and waste and reducing meat consumption).

However, many researchers question the production potential of organic farming to ensure food security and the resulting environmental benefits. Because organic farming usually produces lower yields than conventional methods, larger land areas are needed to produce the same amount of food. The results of various analyses suggest a decrease in organic crop yields compared to conventional crops by 20-25% in the case of experimental studies and even 50% in field conditions. There is a fear that making up for this loss would involve acquiring additional areas for agricultural production, which would probably occur through deforestation.

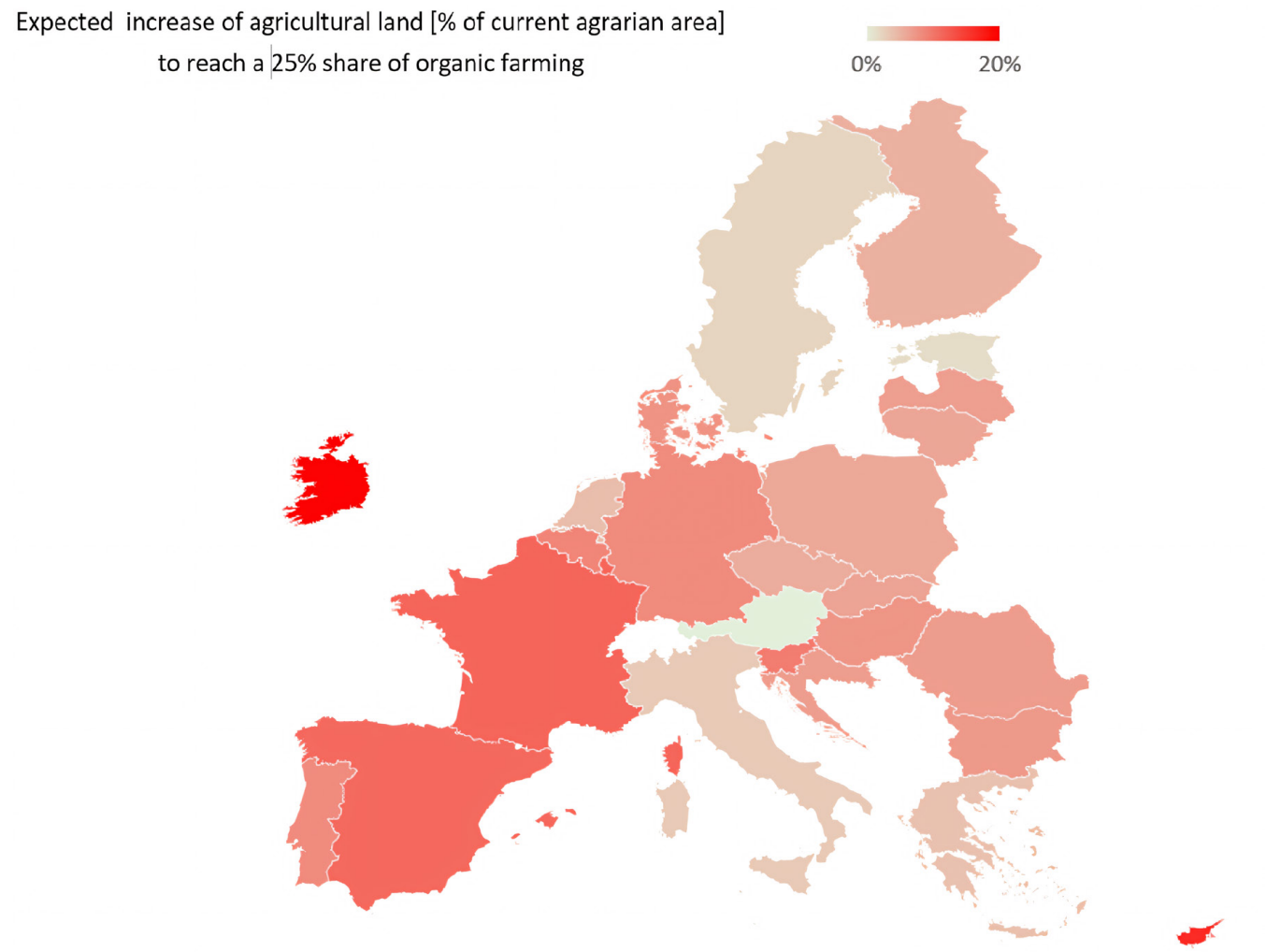
In the context of these doubts, mainly related to the risk of expanding agricultural land, the question is increasingly being asked: "Should we cultivate intensively on a smaller area (with awareness of the serious impact on biodiversity), or should we cultivate organic crops, also affecting the environment (perhaps to a lesser extent) but on a much larger area?".

Moreover, in some studies, researchers suggest that lower yields obtained in organic production may lead to an increase in the intensity of production in other regions (also valuable in terms of nature). The threat of territorial expansion of agriculture also carries the risk of further loss of biodiversity, despite the fact that due to the significant reduction in the use of pesticides, organic farming is considered more environmentally friendly.

However, the potential deforestation associated with agricultural expansion is an equally serious problem, as forests play a key role in absorbing carbon dioxide and stabilizing the climate. Their mass deforestation contributes to greenhouse gas emissions, which exacerbates climate change. It should also be noted that deforestation disrupts the water cycle in nature by affecting rainfall patterns, which is also one of the most important precursors to climate change. But there are others. For example, healthy forests release a number of volatile organic compounds, which have a general "cooling effect" by blocking incoming solar energy. Deforestation eliminates this effect and contributes to global warming. In addition, lost forests are usually replaced by agriculture, which produces its own greenhouse gas (GHG) emissions. Adding up these impacts, we can say that the actual contribution of deforestation to global warming since 1850 is as much as 40 percent. Maintaining the current rate of tropical deforestation could add 1.5 degrees Celsius to global temperatures by 2100 – even if we immediately stop emitting greenhouse gases from fossil fuels[4].

Another threat in the context of popularizing an organic production system is the risk of a negative nutrient balance (soil depletion), resulting from the abandonment of artificial fertilizers. This is particularly important in the case of organic farms without animal production, which is a source of organic fertilizers. Another problematic issue is the plant nutrition system – in organic farming, the maximum mobilization of nutrients from soil resources is assumed, which can lead to the impoverishment of the production potential of soils. Moreover, the very process of releasing nutrients from the soil requires their mineralization. This is associated with the decomposition of soil organic matter, which is accompanied by the release of carbon dioxide. In this context, it is worth noting that previous assessments of the share of agriculture in total greenhouse gas emissions underestimate the impact of converting natural land into agricultural land and the related

4 Pearce F., 2018.



Source: own study

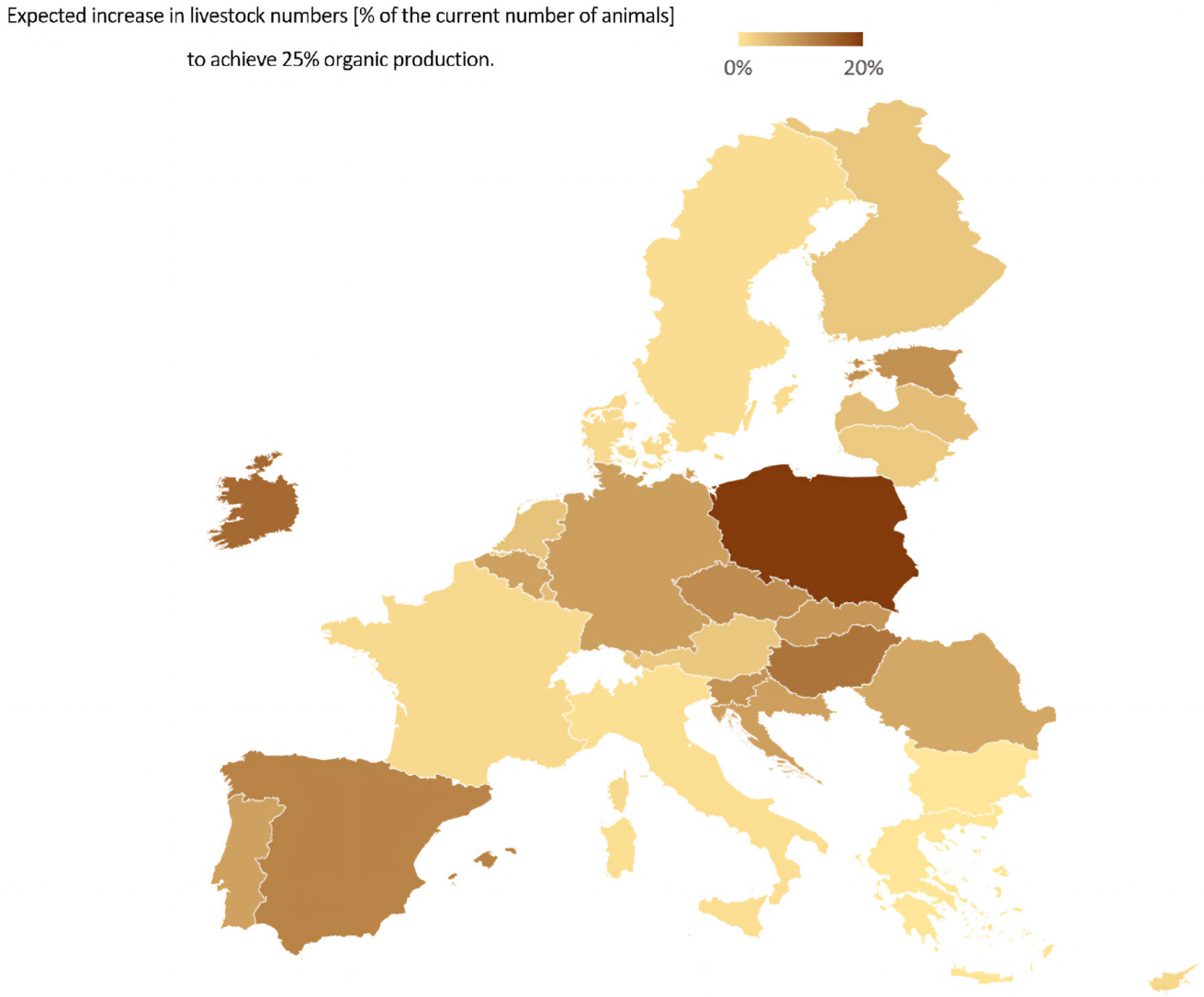
loss of soil potential to store carbon. It is estimated that due to changes in land characteristics, the real share of agriculture in GHG emissions may be as high as 20-25%, which is about twice as high as indicated by official statistics.

In the context of the environmental impact of agriculture, natural environment, the question can therefore be asked whether ecological production system, requiring the involvement of more land, is able to ensure sufficient food without increasing the pressure on the environment, in particular increase in GHG emissions.

Can organic farming feed Europe?

To assess the impact on the demand for agricultural land of increasing the share of organic farming in EU countries to the level proposed in the European Green Deal (an average of 25%), a simulation was carried out illustrating how much the area of crops and the number of animals should be increased to maintain the total amount of agricultural production at an unchanged level. These analyses considered the current share of organic farming in individual EU countries and the differences in productivity between organic and traditional production methods. The differences in productivity for plant cultivation were estimated based on wheat yields and for animal husbandry – based on the average milk yield of cows in both farming systems.

The simulation results indicate that for most EU countries, to maintain agricultural production at an unchanged level and at the same time increase



Source: own study

the share of organic farming to 25%, the area of crops would have to increase significantly. On an EU scale, the area of crops would have to increase by 8.2%[5]. The only exception is the Austria mentioned above, which already meets the EU requirements regarding the share of organic production.

Maintaining the volume of animal production at the current level in the case of implementing the share of animals kept in the organic system assumed by the EU would mean the need to increase the animal population by several to a dozen or so percent. The effects of implementing these changes depend on the current share of animals in the organic production system and differences in productivity in individual countries. Currently, only Greece meets the requirement of 25% of animals kept in the organic system. In other countries, it would be necessary to increase the animal population. The exception is Bulgaria, where, due to the lack of differences in productivity, any changes in the share of animals in organic farms do not require an increase in the number of herds. In Poland, due to the small percentage of animals in organic farms, compensating for the lower productivity would require an increase in the population by almost 20%. In the entire EU, an average increase in the population by 7.4% would be

5 Wąs, A., Sulewski, P., Rawa, G., & Jurek, K., 2024;

required. The estimated increase in the population necessary to maintain production while increasing the share of organic farming to 25% is presented on the map below.

Analyses by other authors[6] show that an increase in the area of organic crops by 1% may result in a decrease in production by 0.278%. Assuming an increase in this area to 25%, this could mean a decrease in production of about 7%. It can, therefore, be seen that the results of the simulation presented above are consistent with the estimates of other authors. In reality, increasing the area of agricultural crops in European countries is highly controversial (the area of UR has been decreasing in recent years), and the implementation of such a plan could only take place through the territorial expansion of agriculture at the expense of forests.

Other authors point to a possible increase in food imports to supplement the reduced food production using organic methods. Research conducted in Great Britain[7] indicates that the conversion of agriculture in England and Wales to organic farming would significantly increase food imports. Conventionally expressing the size of agricultural production using the area of crops, the authors showed that the analyzed regions would be forced to "import" an additional 6 million hectares of agricultural land after switching to organic farming. These estimates do not include agricultural products imported due to their origin (including rice, tea, coffee, etc.). At the same time, it has been shown that introducing organic farming in England and Wales would increase GHG emissions from agriculture by 25% to even 70%.

In the context of these results, it can be stated that if the implementation of the EU plans for a 25% share of organic farming took place throughout the Community, food imports would have to be carried out from other countries, leading to the so-called "carbon leakage" of greenhouse gases. In such a case, the global increase in emissions would

6 Cristache S-E, Vuță M, Marin E, Cioacă S-I, Vuță M., 2018;
7 Smith, L.G., Kirk, G.J.D., Jones, P.J. et al. 2019;

be difficult to determine due to the uncertainty regarding the size of GHG emissions in the country of origin. The risk of "carbon leakage" from European agriculture, resulting from the reduction of agricultural production in Europe under the influence of the implementation of climate policy, is also indicated by analyses conducted at KOBiZE in the LIFE VIIEW project[8].

If the implementation of the EU plans for a 25% share of organic farming were to take place throughout the Community, food imports would have to be carried out from other countries, leading to the so-called "carbon leakage" of greenhouse gases.

Sustainable Intensification vs. Organic Farming - Summary

There are many doubts in the debate about the future of organic farming and its role in creating a more sustainable food system. Some researchers suggest that sustainable intensification may be a more sensible path. This approach fits well with the concept of integrated farming[9]. This is a lesser-known approach than organic farming, but it is based on scientific knowledge and may be more beneficial to the environment. The idea is to maximize agricultural efficiency by combining different production techniques while protecting the environment. As technology advances, the potential for sustainable intensification grows, especially thanks to "smart farming" and precision farming innovations. In contrast to organic farming, sustainable intensification is an approach that focuses on improving the efficiency of agricultural production while maintaining balance with the ecosystem.

Compared to organic farming, which generally places great emphasis on reducing the intensity of production and minimizing the use of chemical fertilizers and pesticides, sustainable intensification focuses on increasing yields on existing farmland, using advanced technologies, better management practices, and innovations in plant and animal genetics. This approach seeks to achieve higher yields not at the expense of natural resources such as soil, water, and biodiversity but by using them more efficiently. The aim is to reduce pressure on the environment, avoiding the development of new farmland at the expense of forests, grasslands, and other valuable ecosystems. By using technologies such as precision farming, which allows for precise fertilization and irrigation, it is possible to reduce resource losses and improve efficiency at every stage of production. In this way, it offers opportunities to maintain or even increase the area of forests, which play a significant role in absorbing greenhouse gases from agricultural production[10] and contribute to maintaining biodiversity.

References

1. Pearce F. Rivers in the sky: how deforestation is affecting global water cycles. Yale Environment 360, 2018. (https://e360.yale.edu/features/how-deforestation-affecting-global-water-cycles-climate-change; accessed 20.09.2024).
2. Wąs, A., Sulewski, P., Rawa, G., & Jurek, K. The Dilemmas Of Sustainable Agriculture – Extensification Of Production Or Sustainable Intensification. Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu, 26, 2024. (https://doi.org/10.5604/01.3001.0054.5165).
3. Cristache S-E, Vuță M, Marin E, Cioacă S-I, Vuță M. Organic versus Conventional Farming—A Paradigm for the Sustainable Development of the European Countries. Sustainability. 2018, 10(11):4279. (https://doi.org/10.3390/su10114279).
4. Smith, L.G., Kirk, G.J.D., Jones, P.J. et al. The greenhouse gas impacts of converting food production in England and Wales to organic methods. Nat Commun 10, 4641, 2019.(https://doi.org/10.1038/s41467-019-12622-7).
5. VIIEW on EU ETS 2050: Changing the scope of the EU ETS. Institute of Environmental Protection - National Research Institute / National Centre for Emissions Management (KOBiZE), 2023, Warsaw.
6. (https://climatecake.ios.edu.pl/download/116/; accessed 22.09.2024).
7. Majewski, E. Koncepcja systemu integrowanej produkcji rolniczej (ang. The concept of an integrated agricultural production system), 1995.
8. VIIEW on EU ETS 2050: Exploring synergies between the EU ETS and other EU climate policy measures - carbon removal, hydrogen, and sectoral transport policy, Institute of Environmental Protection - National Research Institute / National Centre for Emissions Management (KOBiZE), 2024, Warsaw
9. (https://climatecake.ios.edu.pl/download/128/; accessed 24.09.2024).

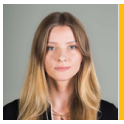
8 VIIEW on EU ETS 2050, 2023;
9 Majewski, E.,1995;
10 VIIEW on EU ETS 2050, 2024;

Challanges of the Ukraine’s integration into EU ETS

Authors:
Katarzyna Mazanek, Strategy, Analysis and Auction Unit, KOBIZE/CAKE
Grzegorz Gmyrek, Strategy, Analysis and Auction Unit, KOBIZE/CAKE
Michał Lewarski, Strategy, Analysis and Auction Unit, KOBIZE/CAKE

Challanges of the Ukraine's integration into EU ETS

Key words: Ukraine's integration into EU ETS, ETS1, ETS2, NECP, MRV, Energy deficit


Author:
Katarzyna Mazanek


Author:
Grzegorz Gmyrek


Author:
Michał Lewarski

Abstract

Ukraine's integration into the European Union Emissions Trading System (EU ETS/ETS1) is a key milestone towards country's membership in the European Union (EU), stated in the Association Agreement (AA). With respect to these obligations, Ukraine plans to set off ETS, which aims at limiting the emissions of greenhouse gases (GHGs), supporting energy transformation and sustainable revival of the economy.

There are three phases of implementing Ukrainian ETS. The first phase, ending 2025, includes preparation of legislative matters, development of Monitoring, Reporting and Verification (MRV) and creation of legislative framework for the ETS. In the second phase, in 2026-2028 period, implementation of the pilot scheme which will test the functioning of the system is planned. In the last phase in 2029-2033 period, the system is anticipated to achieve full operationalization and integration into EU ETS. The key challenges in the process is to define applicable emissions limit, set the principles of free allowances allocation, and provide coherence with EU's regulations.

There are many challenges of implementing ETS Ukraine may face, of which a few were presented by the Federation of Employers of Ukraine (FEU). Beside the challenges, it will also bring new opportunities such as integration into EU clean-tech sectors.

Estimation of the emissions market size and the emissions sectoral structure in Ukraine will be an important part of integrating Ukraine's ETS into EU ETS1. One of the benefits concerning ETS will be a robust increase in the revenues to the state's budget and a huge reduction of GHGs in comparison to the currently levied carbon tax of 0.72 EUR/tCO_{2eq}[1], a part of environmental tax established in the Article 14.1.57 in the Tax Code of Ukraine[2].

Beginning in 2027, EU will introduce ETS2 covering emissions from buildings, road transport and several other sectors, which are currently not subject to ETS1. Due to low credibility of the data, the estimation of the number of emissions in Ukrainian sectors that meet the ETS2 criteria is difficult. However, the available data show that the majority of the emissions will be generated by buildings. Some households were not fully introduced to individual energy use metering and this problem should be addressed until ETS2 is implemented.

From October 1, 2023, importers will be obliged to report on CO_2 emissions from goods covered by Carbon Border Adjustment Mechanism (CBAM). Many importers including Ukrainian companies are, however, unaware of the mechanism. The integration into EU ETS would enable Ukraine to avoid the obligation of purchasing CBAM certificates. The power sector could be exempted from this

1 1st April 2024 status.

2 Tax Code of Ukraine (https://cis-legislation.com/document.fwx?rgn=32564, access: 21.11.2024).

obligation even sooner if certain requirements are met.

Despite its ambitious plans, Ukraine also faces a bunch of ETS-related challenges. The full-scale war with Russia and the destruction of critical energy infrastructure resulting from it have severely weakened country's production capabilities, decreasing the electrical capacity from 55 GW before the war to less than 20 GW (*July 2024 status*). The devastations affected main power plants including the biggest power plant in Ukraine, Zaporozhye nuclear power plant, and many solar and wind plants.

The Government of Ukraine take actions aiming to rebuild the energy infrastructure and strengthen energy security. The recovery plans involve building new gas power plants, development of wind power and other renewable energy sources. This should reduce reliance on fossil fuels and improve the resilience of the Ukrainian energy system.

List of abbreviations:

AA – The Association Agreement
CBAM – Carbon Border Adjustment Mechanism
DRI – Direct Reduction Iron
EAF – Electric Arc Furnace
EBA – European Business Association
ECSEE – Energy Community for South East Europe
ENTSO-E – the European Network of Transmission System Operators
EU – European Union
EU ETS – European Union Emissions Trading System
FEU – The Federation of Employers of Ukraine
MRV – Measurement, Reporting, and Verification
NECP – National Energy and Climate Plan
toe – the ton of oil equivalent—the quantity of energy contained in a ton of crude oil (1 toe = 11,630 kWh = 11.63 MWh = 41.868 GJ)

Introduction

On December 14, 2023, the European Council decided to start accession negotiations with Ukraine, which means that over the next few years Ukraine will have to implement EU laws and regulations. As part of these preparations, on June 25, 2024, the Ukrainian government published the National Energy and Climate Plan (NECP) for 2025-2030. The document represents Ukraine's main energy and climate policy strategy with the aim of supporting economic recovery, promoting sustainable reconstruction, and transforming the structure of energy production towards greener sources.[3]

Among the key goals of Ukraine's NECP are:

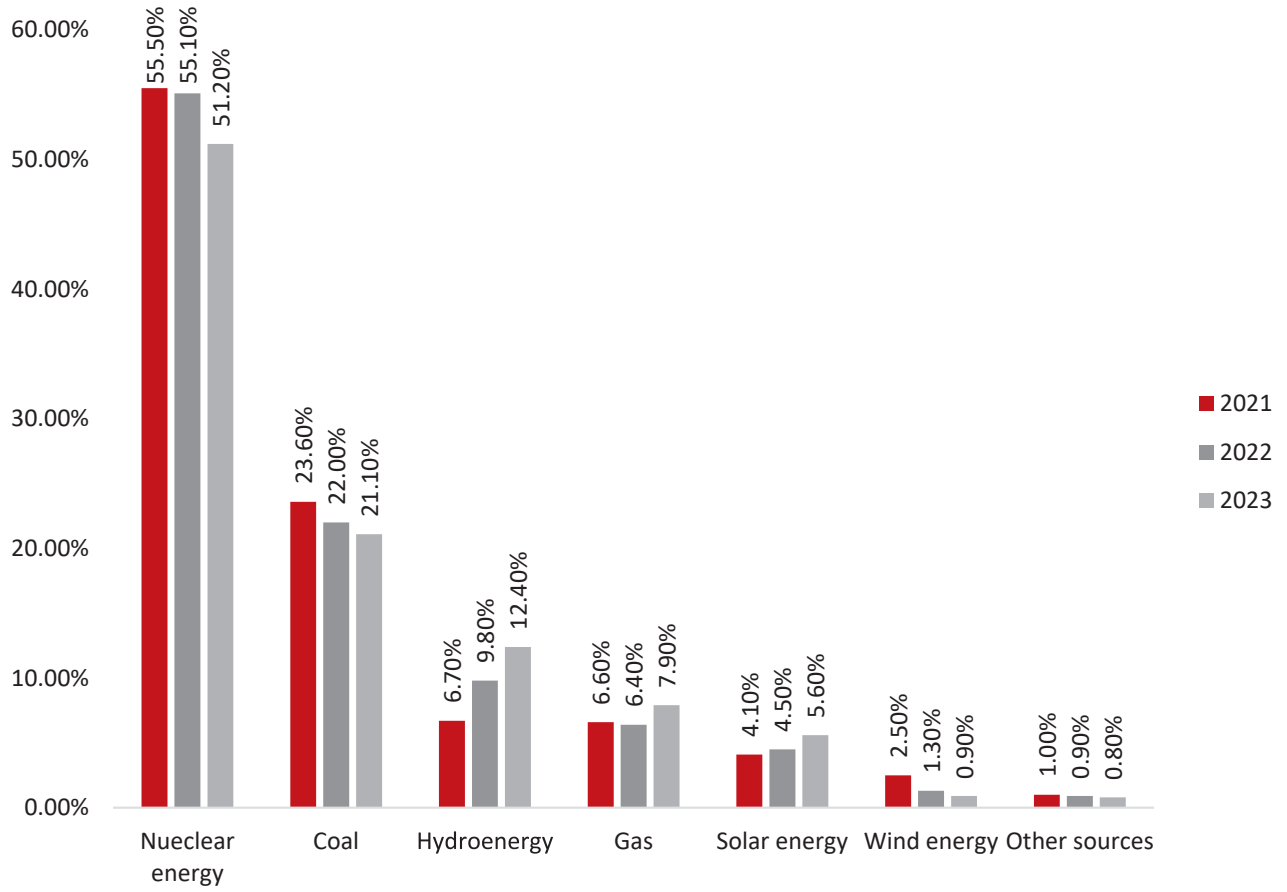
1. reducing greenhouse gas emissions by 65% from 1990 levels by 2030,
2. achieving a 27% share of RES in total final energy consumption by 2030,
3. deepening diversification of energy sources and supply routes so that no more than 30% comes from a single supplier,
4. primary energy consumption of no more than 72.2 million tons of oil equivalent (toe), and final energy consumption of no more than 42.2 million toe by 2030.[4]

Integration into EU ETS

The planned accession to the EU will require either full implementation of EU ETS or implementation of national ETS of Ukraine, close to the EU standards with respect to its ambitions[5]. The Association Agreement's (AA) assumes that Ukraine will deploy

3 Bank Gospodarstwa Krajowego, Monitor Spraw Ukraińskich nr 3 (https://www.bgk.pl/files/public/Raporty/Monitor_spraw_ukrainskich/Monitor_spraw_ukrainskich_nr._3_BGK_lipiec_2024.pdf, access: 03.09.2024).
4 ibid.
5 GMF, Rebuild, Decarbonize, and Integrate: Ukraine, the EU, and the Road to a Net-Zero Energy Sector, (https://www.gmfus.org/news/rebuild-decarbonize-and-integrate-ukraine-eu-and-road-net-zero-energy-sector, access: 20.11.2024).

FIGURE 1. ENERGY PRODUCTION IN UKRAINE BY SOURCE [%], 2021-2023.



Source: Bank Gospodarstwa Krajowego, Monitor Spraw Ukraińskich, July 2024.

its ETS, which would cover the power generation sector and industry, no later than 2025. In April 2023, the Minister of Environmental Protection and Natural Resources expressed his willingness to introduce ETS-related legislation in 2024. According to the concept note prepared in October 2023 by the European Business Association (EBA), Ukrainian companies are interested in implementing internal ETS market on clearly defined conditions and its further integration into EU ETS. That would enable the companies to prepare for the EU accession.[6]

On May 31, 2024 the Government of Ukraine has filed a bill in the Parliament on climate policy law and the implementation of national ETS. Ukraine plans to implement the emissions trading system in three phases. The first phase in 2024-2025 period will focus on preparations of ETS implementation including necessary legislation, improvement of Monitoring, Reporting and Verification framework (MRV). The second phase in 2026-2028 period is set to adopt the pilot system to test the readiness of the system and to point and address any potential problems. In the third phase in 2029-2033 period, the system should already be operational and ready for the integration into EU ETS. The key element of the integration process will be the cap, i.e. the total number of allowances, and how much of it will be available in the free allocation.

6 IMF, Policies to Address Climate Change Ukraine, (https://www.elibrary.imf.org/view/journals/018/2024/001/article-A001-en.xml, access: 04.09.2024).

Ukrainian greenhouse gas (GHG) emission targets:

1. By 2030: Economy-wide net domestic reduction of 65% in GHG emissions compared to 1990 (updated NDC)

2. By 2050: GHG emissions from energy and industrial processes will not exceed 31-34% of 1990 GHG levels (Low Emission Development Strategy 2050)

3. By 2060: Climate neutrality (National Economic Strategy until 2030)[7]

Ukrainian installations subject to the regulations applied MRV framework in 2021 and initially were to publish monitoring reports annually. The outbreak of the full-scale war with Russia resulted in the MRV framework becoming voluntary.[8]

Ruslan Stirlets, the Minister of Environmental Protection and Natural Resources, informed that 2024 is the year of Ukraine's preparations for EU's Carbon Border Adjustment Mechanism (CBAM). He outlined the capability of deploying all the necessary legislative acts and tests for ETS framework in the industry sector needed to understand the rules of the system functioning.[9]

The Federation of Employers of Ukraine (FEU) on behalf of representatives of government and business discussed the Strategy for the Implementation of the Greenhouse Gas Emissions Trading System in Ukraine until 2033 and prepared propositions for the effective functioning of the national ETS. The needs and challenges Ukraine will have to face were summed up in six points:

1. The activities that will facilitate the creation of the database with the quantities of emissions per 1 kW of capacity used and the ETS framework for import of goods to Ukraine, until the end of 2025.

2. Extension of the timeframe for Ukrainian ETS implementation process: the preparations phase in 2024-2025 period, the pilot phase in 2026-2031 period, beginning of the operational phase in 2032-2038 phase with full integration into EU ETS in 2038.

3. Training on ETS functioning for members of the authorities, supervisors and operators of plants covered by the system. FEU pre-estimated that six of all subsectors subjected to the ETS is represented by as many as 2700 Ukrainian companies. Due to a large number of entities potentially covered by the ETS, a supplement for the operation plan was proposed. The purpose of the supplement is to create conditions for increasing the number of entities participating in the verification process.

4. Preventing so called double payment for CO_2 emissions.

5. Approach for defining the number of temporary free allocation for power plants in order to modernize, diversify and transform the energy system.

6. Introduction of new credible MRV framework, taking into account training process and financing options (sponsors, grants).

The discussion were also focused on nuclear and partially gas-fired power generation which should

7 ICAP, Ukraine,(Ukraine | International Carbon Action Partnership (icapcarbonaction.com), access: 03.09.2024).
8 ICAP, Ukraine, (Ukraine | International Carbon Action Partnership (icapcarbonaction.com), access: 03.09.2024).
9 National emissions trading system will be launched in a pilot mode in 2025: Ruslan Strilets, (https://www.kmu.gov.ua/en/news/natsionalna-systema-torhivli-vykydamy-v-pilotnomu-rezhymi-zapratsiuie-u-2025-rotsi-ruslan-strilets, access: 02.09.2024).

be treated the same way as they are in EU, where they received a green label. FEU proposed to address this issue during the negotiations on Ukraine's membership in EU.[10]

> **Despite many challenges, Ukraine may benefit from implementing ETS, which could make it possible for Ukrainian companies to prevent their products from being covered by CBAM tax. Implementation of the ETS will also enable the integration into EU clean-tech sectors.[11]**

Emissions to be covered by ETS1 in Ukraine

Introduction of the ETS system in Ukraine aims to gradually reduce GHGs emissions and decentralize the accumulation of the resources used for decarbonisation and improvement of the energy efficiency management. The comparison between the individual sectors of the EU and Ukraine and also between the trends of carbon prices is crucial if we want to understand the size of the future ETS in Ukraine.[12]

The differences between EU ETS revenues and recent estimates of revenues from the (extremely low) Ukrainian carbon tax of EUR 0.70 per ton of CO_2 and between significant budget revenues in EU member states with budget revenues in Ukraine suggest, that similar effects cannot be expected in the fiscal area. The role of the carbon tax is rather symbolic and it does not stimulate neither the emission reductions of the companies nor any significant budget revenues.[13]

Statistics of the verified GHGs emissions in the EU show that most of the emissions are generated by the energy sector followed by large industry sectors (metals, refinery, cement production). The possibility to collect the information from all the individual holders of the allowances in a single EU registry provides the disposal of the precise information on verified EU emissions. There are similar tendencies to the estimation of the GHG emissions in Ukraine, yet the more precise focus on each sector allows the EU to better understand the ETS market size and dynamics in comparison to Ukraine.[14]

If we compare verified emissions from different industry sectors in the EU and Ukraine, we can observe that before 2022, the metallurgic industry in Ukraine had relatively high emissions share of one third of the EU emissions in this sector. The post-war dynamics, including the loss of many steel sector assets and the perspective of potential modernization of the sector based on zero carbon technologies (Direct Reduction Iron–DRI and Electric Arc Furnace–EAF) can nevertheless contribute to change the situation in Ukraine.[15]

Emissions to be covered by ETS2 in Ukraine

ETS2 is planned to be implemented in EU in 2027 and will cover fuel combustion buildings and transport sector (and other sectors not subject to the current ETS—mainly small industry, not covered by ETS1[16]).

10 FEU put forward proposals for effective implementation of the ETS in Ukraine, (https://gmk.center/en/news/feu-put-forward-proposals-for-effective-implementation-of-the-ets-in-ukraine/, access: 02.09.2024).

11 Ukraine's path to European Union membership and its long-term implications, (https://www.bruegel.org/policy-brief/ukraines-path-european-union-membership-and-its-long-term-implications, access: 02.09.2024).

12 GHG emissions assessment in Ukraine on the way to climate neutrality and ETS introduction, (https://greendealukraina.org/products/analytical-reports/ghg-emissions-assessment-in-ukraine-on-the-way-to-climate-neutrality-and-ets-introduction, access: 21.11.2024).

13 Ibid.

14 Ibid.

15 Ibid.

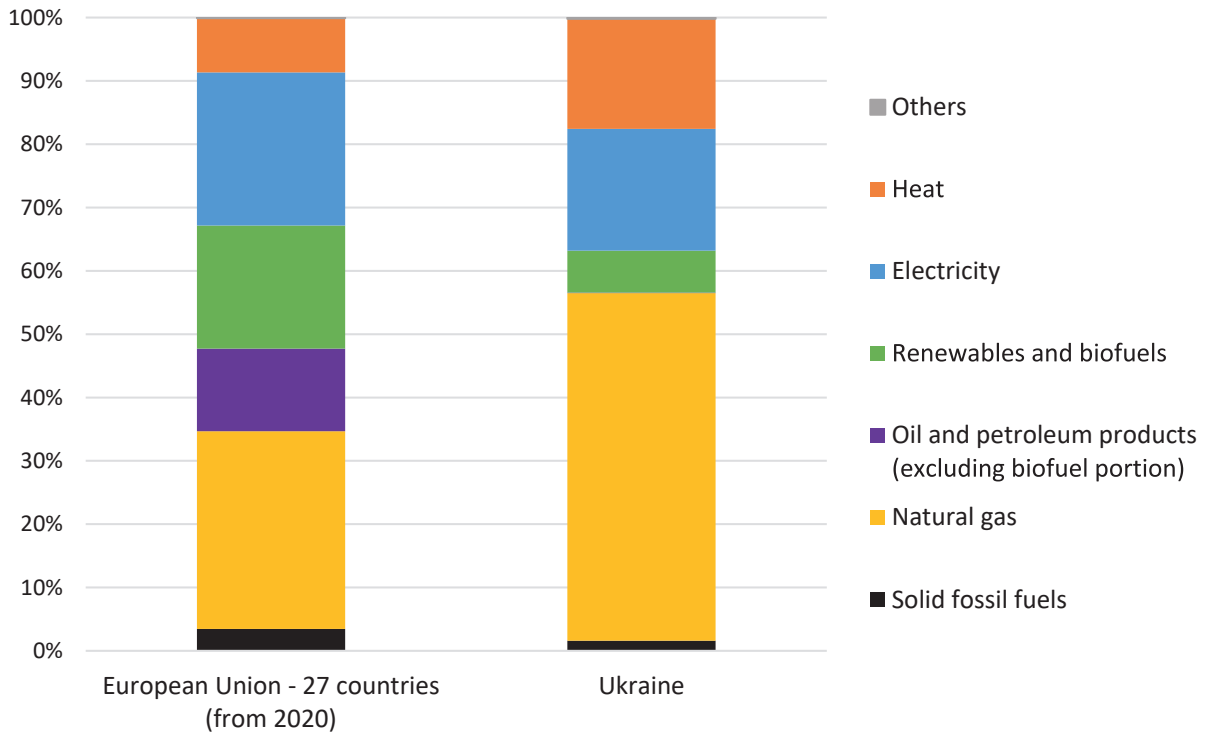
16 Climate Action, ETS2: buildings, road transport and additional sectors, (https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/ets2-buildings-road-transport-and-additional-sectors_en, access: 04.09.2024).

This will be important for households which need to take into consideration individual heating and cooling activities, as well as private transport utilization. The implementation of ETS2 could be challenging especially for Ukraine, where the individual energy use metering is still not fully introduced for many households.[17]

The comparison between emissions per capita from buildings and transport in the EU and Ukraine shows, that Ukraine has almost 3 times lower per capita emissions. Partially, this estimate can be explained by Ukraine's smaller fleet of vehicles than the EU's average for individual member state. The lack of credible data on individual consumption might also contribute to the difference between the EU and Ukraine, suggesting a need for improvement of data collection and verification methods in Ukraine, particularly in the buildings sector.[18]

Natural gas has the largest share of emissions among other energy sources used in the Ukrainian households which accounts for almost half of the households emissions. Before the war caused by Russian Federation, the energy consumption in Ukraine from renewable energy sources (RES) and biofuels was growing systematically with the highest annual growth rate of 37% (from 45,871.5 TJ to 63,018 TJ) in 2016. In 2020, the consumption from RES and biofuels in Ukraine was 79,198 TJ. The comparison between the EU's and Ukraine's energy consumption is presented below.[19]

FIGURE 2. SHARE OF ENERGY CARRIERS IN HOUSEHOLD ENERGY CONSUMPTION IN THE EU AND UKRAINE [%], 2015.



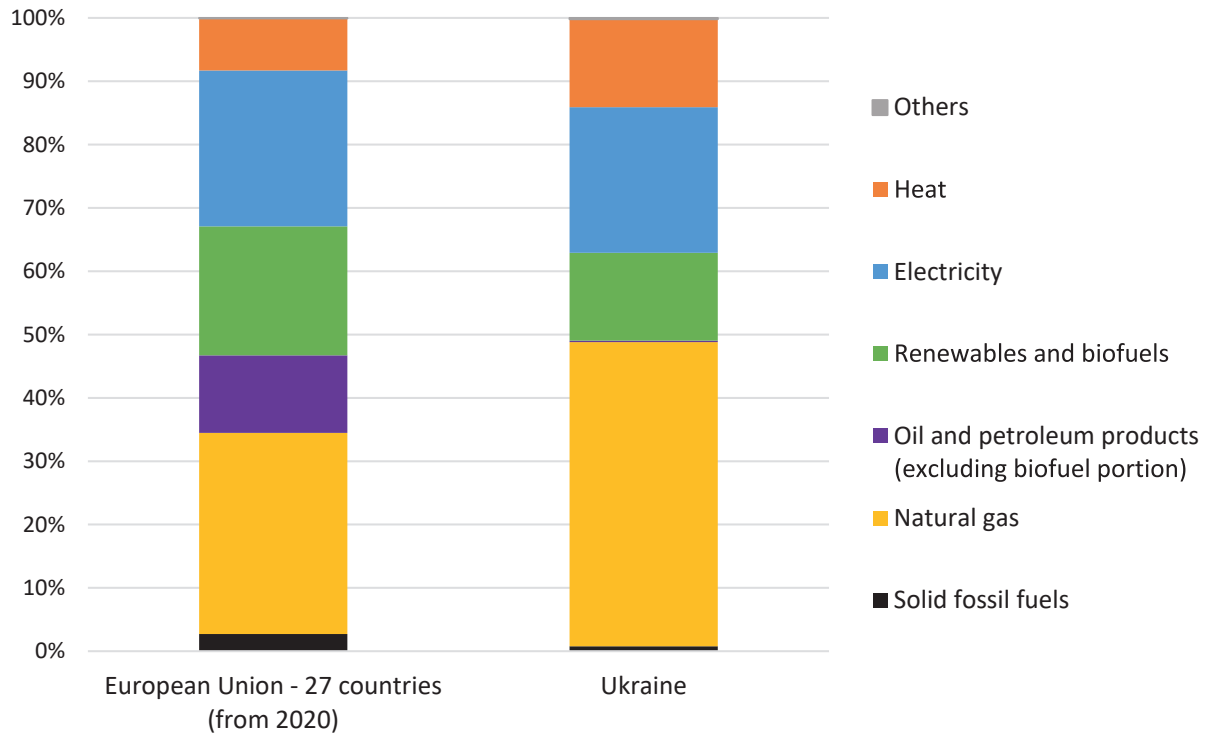
Source: Eurostat, Simplified energy balances (2024)

17 GHG emissions assessment in Ukraine on the way to climate neutrality and ETS introduction, (https://greendealukraina.org/products/analytical-reports/ghg-emissions-assessment-in-ukraine-on-the-way-to-climate-neutrality-and-ets-introduction, access: 21.11.2024).

18 Ibid.

19 Eurostat, Simplified energy balances, (https://ec.europa.eu/eurostat/databrowser/view/nrg_bal_s__custom_12907817/default/table?lang=en, access: 17.09.2024).

FIGURE 3. SHARE OF ENERGY CARRIERS IN HOUSEHOLD ENERGY CONSUMPTION IN THE EU AND UKRAINE [%], 2020.



Source: Eurostat, Simplified energy balances (2024)

The overall picture of emissions in Ukraine under ETS2 based on the *National Center for GHG Emission Inventory*[20] shows, that the buildings sector will remain the main contributor and emit nearly the same amount of GHGs as the total emissions from road transport and the rest of the sectors subject to ETS2. The data require thorough verification with respect to the individual energy consumption, though.[21]

CBAM and Ukraine

The value of imported goods from Ukraine that might be covered by CBAM is estimated to be around EUR 2.9 billion. In 2019, the share of the imports from Ukraine that, in the future, might potentially be subject to CBAM was 6% of the total imports from abroad in the EU potentially subject to the mechanism.[22]

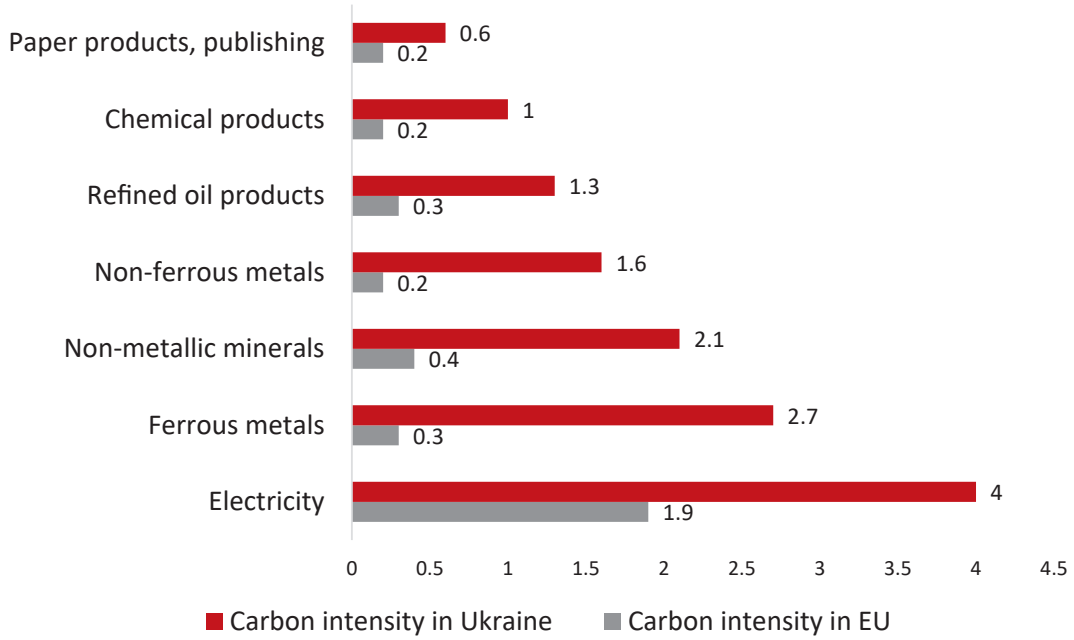
One of the goods that can be covered by the mechanism is electricity of which the total value of imports from Ukraine to the EU in 2020 qualified to be covered was EUR 281 million. It should be noted that in the future this value might be much higher due to the full synchronisation of the Ukrainian energy system with the European Network of Transmission System Operators, ENTSO-E, which took place on March 16, 2022.[23]

The level of the CBAM tax is calculated based on the amount of the GHGs emission generated in

20 National Center for GHG Emission Inventory (https://en.nci.org.ua/, access: 20.11.2024).
21 GHG emissions assessment in Ukraine on the way to climate neutrality and ETS introduction, (https://greendealukraina.org/products/analytical-reports/ghg-emissions-assessment-in-ukraine-on-the-way-to-climate-neutrality-and-ets-introduction, access: 21.11.2024).
22 Possible impact of CBAM on the Ukrainian electricity market, (https://getmarket.com.ua/en/news/possible-impact-of-cbam-on-the-ukrainian-electricity-market, access: 02.09.2024).
23 Ibid.

the production of goods. This is why the mechanism will have a robust impact on the EU's electricity import from Ukraine, where the production of the electricity is characterised by twice the EU's carbon intensity, i.e. the amount of CO_2 emitted in the production of 1 MWh.

FIGURE 4. CARBON INTENSITY IN THE EU AND UKRAINE [KG OF CO_2 PER 1 USD].



Source: Own elaboration based on Chepeliev, M. (2021). 'Possible Implications of the European Carbon Border Adjustment Mechanism for Ukraine and Other EU Trading Partners.' Energy RESEARCH LETTERS, 2(1). https://doi.org/10.46557/001c.21527.

Ukraine can be exempted from CBAM on a universal basis if the conditions provided by AA and Energy Community for South East Europe (ECSEE) are met. Another question is Ukraine's exemption from CBAM on electricity import, which could be possible after Ukraine satisfies certain requirements. One of the requirements states that the electricity market in Ukraine be integrated with the EU internal market by merging both markets into one and there not be possible to apply CBAM on energy import to the EU. The exemption could be revoked if: there is no progress in implementing the requirements, Ukraine takes action contrary to the objectives set by EU climate and environmental law or contrary to decarbonisation targets.[24]

The problems concerning CBAM were already revealed in the first reporting period, scheduled to end on January 31, 2023. On the platform through which the importers' reports were collected, overloads preventing reports from being sent were encountered and the Commission had to extend the reporting deadline for another month. Moreover, many importers facing bureaucratic problems were not ready to send their reports. According to the German Emissions Trading Authority less than 10% of 20,000 companies in Germany fulfilled their reporting obligations on time. The Swedish Environmental Protection Agency informed that the share of such entities in Sweden was 11%. Most of the importers is not aware of the existence of CBAM, including the entities from Ukraine from

24 Ibid.

which contractors have already begun to demand the submission of CBAM certificates.[25]

The situation of Ukraine during the war

> **The full-scale war with Russia has severely weakened Ukraine's economy and presented it with many new challenges. Before the invasion began, Ukraine's energy sector was one of the largest in Europe, with a generation capacity of 55 GW. However, as a result of the war's devastation, capacity fell below 20 GW, making energy security one of the key concerns for the country's economy. Losses in Ukraine's energy sector (excluding district heating) as of December 2023 were estimated at $7.5 billion by the World Bank, the Ukrainian government, the European Union and the United Nations.[26]**

Since the beginning of the war (*as of July 2024*), Russia has taken control of the Zaporizhzhia nuclear power plant, several thermal power plants, nearly half of Ukraine's solar power plants and approximately 75% of its wind power plants, which together provided about 18 GW of generation capacity. In addition, Russia has completely destroyed almost all oil refineries and a significant portion of storage infrastructure, two thermal power plants (in Tryppillia and Slobozhanske) and two hydroelectric power plants (in Kakhovka and Zaporizhzhia). Russian military actions have damaged half of the high-voltage transmission substations and the infrastructure of underground natural gas storage facilities. Some thermal power plants have been critically damaged, with 80% of their structures destroyed.[27]

Repairing energy infrastructure is extremely challenging and costly, placing Ukraine at significant risk of failing to ensure energy security, especially with the upcoming winter. According to Minister H. Haluschenko, the 2024/25 heating season faces the highest risk of blackouts since the start of Russia's invasion. Additionally, Head of Energy Supervision R. Slobodyan reported that due to war-related destruction, there is a daily deficit in generation capacity. It is currently impossible to precisely estimate the risks for the upcoming heating season, as they depend on the number of damaged installations, the progress of repairs, and the number of facilities restored to operation. Strengthening air defense for energy facilities and increasing Ukraine's capacity to import energy are crucial measures.[28]

The government is seeking financial support from other countries (including Poland) and has announced an increase in electricity tariffs from 2.64 hryvnias (UAH) in June to 4.32 UAH (*as of July 2024*). The additional funds are intended for the reconstruction of energy facilities and the construction of protective measures. According to the government, the tariffs remain artificially low to support the population and the country's economy. The government also plans to provide material assistance (e.g., firewood) and financial aid to the poorest individuals in the most affected regions, including Kharkiv, Kherson, Sumy, Dnipropetrovsk, Zaporizhzhia, Mykolaiv, Chernihiv, and Luhansk.[29]

Reconstruction Plan

Ukrainian Railways (Ukrzaliznytsia – UZ) has established a subsidiary, UZ Enerho, which announced on June 28, 2024, a plan to construct gas power

25 Overcoming CBAM challenges for Ukraine and the EU, (https://gmk.center/en/opinion/what-challenges-does-cbam-pose-for-the-eu-and-ukraine/, access: 05.09.2024).

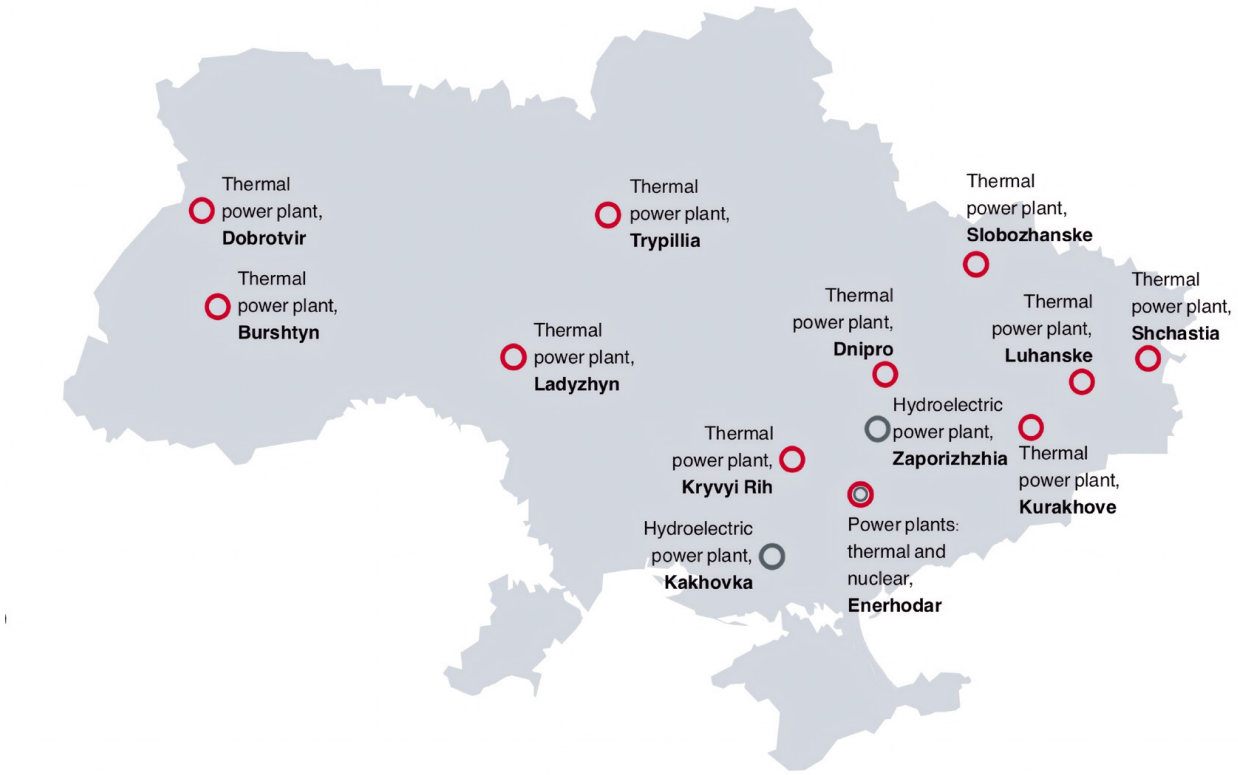
26 Bank Gospodarstwa Krajowego, Monitor spraw ukraińskich nr 3 (https://www.bgk.pl/files/public/Raporty/Monitor_spraw_ukrainskich/Monitor_spraw_ukrainskich_nr._3_BGK_lipiec_2024.pdf, access: 03.09.2024).

27 Ibid.

28 Bank Gospodarstwa Krajowego, Monitor spraw ukraińskich nr 3 (https://www.bgk.pl/files/public/Raporty/Monitor_spraw_ukrainskich/Monitor_spraw_ukrainskich_nr._3_BGK_lipiec_2024.pdf, access: 03.09.2024).

29 Ibid.

MAP 1. POWER PLANTS IN UKRAINE ATTACKED BY RUSSIA.



Source: Bank Gospodarstwa Krajowego, Monitor Spraw Ukraińskich, July 2024 (translated into English by the author).

plants with a capacity of up to 250 MW in regional capital cities across Ukraine. These power plants will be connected to UZ's infrastructure, public utility facilities and key elements of critical infrastructure. Ukrainian Railways is currently facing electricity deficits and there are concerns that disruptions to the network's operation could occur during the autumn and winter seasons. Such disruptions would further negatively impact power distribution, as UZ is one of the largest electricity suppliers in the country.[30]

At the same time, DTEK plans to develop several wind power projects, including the 650 MW Poltava wind power plant, which is scheduled to begin construction in 2025. The cost of the project is estimated at $976 million, and DTEK is seeking financial support for the investment.[31]

At the Ukraine Recovery Conference, held on June 11-12, 2024 in Berlin, President Volodymyr Zelenski outlined an ambitious plan to build gas facilities of up to 1 GW this year, and to increase capacity by another 4 GW over the next few years. Experts, however, are skeptical of these announcements, stressing that so far no country has implemented such large-scale projects in such a short period of time, although it is possible to start work on the announced date.[32]

In addition, the Ukraine Facility, a financial assistance program for 2024-27, was launched. Funds

30 Bank Gospodarstwa Krajowego, Monitor spraw ukraińskich nr 3 (Monitor_spraw_ukrainskich_nr._3_BGK_lipiec_2024.pdf, access: 03.09.2024).
31 Ibid.
32 Ibid.

from this program are intended to be used for urgent energy infrastructure repairs, as well as investment in Renewable Energy Sources.[33]

Summary

Ukraine's integration into the EU ETS is a key step on its path to EU membership, aiming to reduce emissions, modernize the energy sector and enhance cooperation with EU clean technology markets. In December 2023, the European Council decided to start accession negotiations with Ukraine, which requires Ukraine to implement EU regulations, including the ETS. As part of these preparations, Ukraine has developed a National Energy and Climate Plan for 2025-2030.

Ukraine plans to implement the national ETS in three phases: preparation (2024-2025), pilot phase (2026-2028), and full operation (2029-2033) with the goal of integration into the EU ETS by 2038. ETS implementation is crucial so that Ukraine can avoid CBAM fees that could affect Ukrainian exports to the EU, including CO_2-intensive electricity exports. In addition, the ETS is intended to help Ukraine adapt to EU climate standards and integrate into Europe's clean technology sectors.

The implementation of these plans has been hampered by the war with Russia, which has led to significant damage to Ukraine's energy infrastructure, reducing its generation capacity and posing a serious threat to the country's energy security. Rebuilding the energy sector, including power plants and transmission infrastructure, is one of the main challenges facing Ukraine.

In response to these challenges, Ukraine is taking steps to rebuild and modernize its energy sector, including building new gas-fired power plants and developing renewable energy projects. Ukraine is working with international partners, including the European Union and other organizations, to obtain financial and technical support.

Bibliography:
1. Bank Gospodarstwa Krajowego, Monitor Spraw Ukraińskich nr 3, July 2024., pp. 39-48. (Monitor_spraw_ukrainskich_nr._3_BGK_lipiec_2024.pdf, access: 03.09.2024).
2. Climate Action, ETS2: buildings, road transport and additional sectors (https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/ets2-buildings-road-transport-and-additional-sectors_en, access: 04.09.2024).
3. Eurostat, Simplified energy balances (https://ec.europa.eu/eurostat/databrowser/view/nrg_bal_s__custom_12907817/default/table?lang=en, access: 17.09.2024).
4. GMK Center, FEU put forward proposals for effective implementation of the ETS in Ukraine (https://gmk.center/en/news/feu-put-forward-proposals-for-effective-implementation-of-the-ets-in-ukraine/, access: 02.09.2024).
5. GMK Center, Overcoming CBAM challenges for Ukraine and the EU (https://gmk.center/en/opinion/what-challenges-does-cbam-pose-for-the-eu-and-ukraine/, access: 05.09.2024).
6. Green Deal Ukra□na, GHG emissions assessment in Ukraine on the way to climate neutrality and ETS introduction (https://greendealukraina.org/products/analytical-reports/ghg-emissions-assessment-in-ukraine-on-the-way-to-climate-neutrality-and-ets-introduction, access: 21.11.2024).
7. ICAP, Ukraine (Ukraine | International Carbon Action Partnership (icapcarbonaction.com), access: 03.09.2024).
8. ICAP, Ukraine adopts law towards ETS adoption, November 2024 (https://icapcarbonaction.com/en/news/ukraine-adopts-law-towards-ets-adoption, access: 20.11.2024).
9. IMF, Policies to Address Climate Change Ukraine (https://www.elibrary.imf.org/view/journals/018/2024/001/article-A001-en.xml, access: 04.09.2024).
10. Tax code of Ukraine (https://cis-legislation.com/document.fwx?rgn=32564, access: 21.11.2024).
11. Narodowy Bank Polski, Avarage exchange rates (https://nbp.pl/en/statistic-and-financial-reporting/rates/archive-table-a-csv-xls/, access: 17.10.2024).
12. National Center for GHG Emission Inventory (https://en.nci.org.ua/, access: 20.11.2024).
13. National emissions trading system will be launched in a pilot mode in 2025: Ruslan Strilets (https://www.kmu.gov.ua/en/news/natsionalna-systema-torhivli-vykydamy-v-pilotnomu-rezhymi-zapratsiuie-u-2025-rotsi-ruslan-strilets, access: 02.09.2024).
14. Possible impact of CBAM on the Ukrainian electricity market (https://getmarket.com.ua/en/news/possible-impact-of-cbam-on-the-ukrainian-electricity-market, access: 02.09.2024).
15. Ukraine's path to European Union membership and its long-term implications (https://www.bruegel.org/policy-brief/ukraines-path-european-union-membership-and-its-long-term-implications, access: 02.09.2024).

33 Ibid.

The role of transparency in the implementation of the Paris Agreement

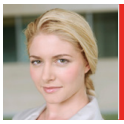
Authors:

Anna Serzysko, Climate Policy Instruments Unit, KOBiZE

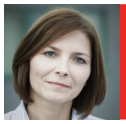
Izabela Zborowska, Deputy Head of the Climate Policy Instruments Unit, KOBiZE

The role of transparency in the implementation of the Paris Agreement

Key words: Climate Convention, UNFCCC, Paris Agreement, transparency, biennial reports, enhanced transparency framework, ETF, Nationally Determined Contributions to the Paris Agreement defined at national level, NDCs



Author:
Anna Serzysko



Author:
Izabela Zborowska

Abstract:

The current climate regime, which is based on the UN Climate Convention, is the primary vehicle for international efforts and action to address and adapt to climate change. Its key element is now the Paris Agreement adopted in 2015 and whose provisions are still being implemented. One of the core elements created within the new climate agreement is unified reporting guidelines for all countries, called the new Enhanced Transparency Framework (ETF). All Parties to the Paris Agreement were obliged to develop and submit by the end of 2024, their Biennial Transparency Reports (BTRs), established under the ETF system.

These reports will provide reliable, transparent and comprehensive data on greenhouse gases (GHG) emissions and removals, mitigation and adaptation actions and support. Ultimately, they will contribute to enhancing the transparency of countries' actions in fulfilling their commitment under the Paris Agreement. The new ETF system will also allow for the analysis and comparison of actions taken by countries, particularly in terms of meeting their commitments and targets set out in their Nationally Determined Contributions to the Agreement (NDCs). The 'ambition mechanism' created by the Paris Agreement, of which the new ETF framework is an important element, is intended to inform countries in the process of updating and strengthening their NDCs, as well as to simultaneously identify gaps and challenges in these efforts. And while the benefits of implementing the UNFCCC's new climate reporting standards appear to be self-evident, the commitment to the new transparency regime may be challenging for some countries. This is particularly the case for developing countries and those with no experience in reporting their actions in terms of, inter alia, reducing emissions or conducting their own GHG emission inventories. Hence, an important element of the work of the UN Climate Convention in the coming years is to focus on the development of a new, enhanced transparency framework while ensuring the effective and global involvement of countries in the process, including by providing support to some of them.

The Paris Agreement[1] (hereafter: the Agreement, PA) is currently the most important instrument for international climate policy. It is a cross-cutting framework for global action to limit global warming. Through it`s universal participation the agreement, creates a global platform for action to intensify the efforts of all countries in reducing

1 Paris Agreement to the United Nations Framework Convention on Climate Change, adopted in Paris on 12 December 2015, (https://unfccc.int/sites/default/files/english_paris_ agreement.pdf, access: 29.11.2024).

GHG emissions and the green transformation of the world's economies. One of the primary goals set out in the Paris Agreement is the so-called temperature target, which is to keep the increase in global average temperatures well below 2°C above pre-industrial levels and provides for an aim to limit the temperature increase to 1.5°C (as per Article 2 of the PA). Additionally, the Agreement establishes that countries will aim to peak global greenhouse gas emissions 'as soon as possible', acknowledging that developing countries will require more time to achieve this. It was also clarified that countries should aim for rapid emission reductions to achieve climate neutrality by 2050.[2]

2 Neutrality is understood within the framework of the Agreement as maintaining a balance between anthropogenic emissions and sinks.

As one of the major innovations in the multilateral climate change regime, the Paris Agreement introduced the obligation to prepare and regularly renew Nationally Determined Contributions (NDCs) to the agreement. These contributions represent declarations by individual countries, as Parties to the Paris Agreement of their undertaken and planned national actions and their results in addressing climate change. Countries are required to submit their NDCs on a cyclical basis every five years, with the second round of NDCs due in 2025. In addition, the decisions adopted in Paris encourage countries to formulate and communicate their long-term low-carbon development strategies.[3]

One of the key elements of the Paris Agreement is unified reporting guidelines for all countries, called the new Enhanced Transparency Framework (ETF), which ensures transparency in countries' actions.

However, without a top-down system to systematically collect information on countries' actions and progress towards their NDCs, it would not be possible to verify whether countries' efforts align with their declared actions (including emission reductions) and whether the collective effort of all Parties to the Agreement is sufficient to achieve its goals, including the temperature target. Therefore, one of the key elements of the Paris Agreement is unified reporting guidelines for all countries, called the new Enhanced Transparency Framework (ETF), which ensures transparency in countries' actions.

TRANSPARENCY IN UNFCCC BEFORE THE PARIS AGREEMENT

Since the founding of the UN Climate Convention[4], its Parties have made efforts to contribute to its overarching objective of stabilising greenhouse gas concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system. In pursuing this goal, countries faced many challenges, including obtaining reliable, transparent and comprehensive data on GHG emissions and removals, mitigation and adaptation actions and support. Under the Convention itself, and later also under the Kyoto Protocol, dedicated arrangements were created for the regular collection, reporting and review of relevant country-specific information.

The core elements of the reporting system under the Climate Convention, which were established first under the UNFCCC, are National Communications (NC) government reports and National Inventory Report (NIR) of greenhouse gas emissions. National Communications are prepared on

3 Para. 36. of Decision 1/CP.21.

4 United Nations Framework Convention on Climate Change, adopted on 9 May 1992 in New York (https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU19960530238/O/D19960238.pdf, access: 21.11.2024).

FIGURE 1: COMPARISON OF REPORTING REQUIREMENTS UNDER THE UNFCCC TRANSPARENCY SYSTEM BEFORE AND AFTER THE PARIS AGREEMENT.

	PAST REQUIREMENTS OF UNFCCC REPORTING			ENHANCED TRANSPARENCY FRAMEWORK (ETF) UNDER THE PARIS AGREEMENT		
	DEVELOPED COUNTRIES	DEVELOPING COUNRIES	LDCs & SIDS	DEVELOPED COUNTRIES	DEVELOPING COUNTRIES	LDCs & SIDS
GHG INVENTORY	Every year	When submitting NC or BUR	Flexibility towards submission deadlines	Every year	Every two year	Flexibility towards submission deadlines
NATIONAL COMMUNICATIONS	Obligatory every 4 years Mandatory information on support provided	Optional every 4 years Less restrictive guidelines	Optional every 4 years Less restrictive guidelines	No change		
BIENNIAL REPORTS	Obligatory BR every 2 years Mandatory information on support provided	Optional BUR every 2 years Less restrictive guidelines	Flexibility towards submission deadlines Less restrictive guidelines	Obligatory at least every two years	Obligatory at least every two years	Flexibility towards submission deadlines

Source: Międzynarodowe negocjacje w ramach Konwencji klimatycznej, IOŚ-PIB 2024.

a regular basis by all countries for the purpose of presenting their current policies and actions on climate change mitigation and adaptation and informing on actions taken to meet their obligations under the UN Climate Convention and the Kyoto Protocol. National Inventory Reports, on the other hand, are sets of data informing about the annual emissions of individual substances in the respective country. Both documents are prepared by all Parties to the UNFCCC, but the character of the commitments varies among them.[5] Developed countries (Annex I) had detailed and clearly defined timeframes for the submission of both documents, while other countries had far-reaching flexibility as to their scope as well as the timing of their submission. Over time and as the work of the UN Climate Convention evolved, a comprehensive Measurement, Reporting and Verification (MRV) system was established, which was also differentiated based on the division of countries introduced by the Convention. Developed countries were required to prepare Biennial Reports (BRs) containing, inter alia, GHG emission inventories, emissions and removals projections, emission reduction strategies and actions, information on technology transfer and financial assistance to developing countries. Developing countries prepared biennial reports (Biennial Update Reports, BURs) to update the information contained in their National Communications. While both types of biennial reports under the MRV were to be submitted by countries every two years, developing countries had more flexibility in this requirement, mainly because they have less capacity to report regularly.

Despite the long-standing development of the transparency system under the UN Climate Convention, until 2015 it was based on a fixed division of countries under the Convention into developed and developing countries, which resulted in

5 In the creation of the UN Climate Convention, a fixed division of countries into two categories was adopted, on which further definition of their actions and obligations was based. The most developed countries were assigned the greatest historical responsibility for the high level of greenhouse gases in the atmosphere and were listed in an annex to the Convention (these are the so-called Annex I countries). All other states not listed in this annex (i.e. non-Annex I countries) are commonly referred to as developing countries.

differentiated commitments to the frequency and accuracy of information reported. Prior to the adoption of the Paris Agreement, under the MRV system, Annex I countries of the Convention had to report more frequently and in greater detail than those of other countries, which had far-reaching flexibility as to the scope and frequency of their reports.

Following the adoption of the Paris Agreement, transparency measures have been replaced by the new Enhanced Transparency Framework (ETF). [6]

This system was built on the experience gained under the UNFCCC, in particular the MRV system. However, unlike previous rules and practices under the UN Climate Convention, the Paris Agreement introduced new reporting rules for actions taken by all countries. The flexibilities introduced apply to the poorest countries (LDCs[7] and SIDS[8]), and to those developing countries that will themselves indicate their limited capacity and decide to apply it regarding the scope, frequency and level of detail of reporting. Developing countries that choose to apply such flexibility must indicate in their reports what constraints on their part are the reason for this and over what period of time they assume these constraints will be improved and eliminated. [9] Nevertheless, the Paris Agreement assumes that, ultimately, all reporting under ETF will be unified. All Parties to the Paris Agreement were required to prepare and submit, by the end of 2024, their Biennial Transparency Reports (BTRs), which replaced the Biennial Reports (BRs and BURs) previously submitted by States.[10] The new transparency system assumes that countries will continue to produce the reports that have been operating under the Convention, i.e. the national communications (NC) and the national inventories (NIR) (Figure 1). At the same time, it is worth emphasising that countries that are not or will leave the Paris Agreement, will have to continue to fulfil their reporting obligations directly under the Climate Convention (Art. 4 and 12 UNFCCC), i.e. submit annual GHG inventories for developed countries, national communications and biennial reports (BR or BUR)[11] using the relevant reporting guidelines.

The Paris Agreement outlined the general framework for the ETF system (as set out in Article 13 of the PA), so further work was required to create Modalities, Procedures And Guidelines (MPGs).[12] The MPGs set out the technical requirements for the operation of the new transparency regime, defining, among

6 In accordance with Article 13 of the Paris Agreement.

7 The Least Developed Countries (LDCs) are a group of lowest-income countries whose composition is regularly reviewed by the Development Committee of the UN Economic and Social Council.

8 Small Island Developing States.

9 In accordance with Decision 18/CMA.1 par.6.

10 The last BR reports were submitted by developed countries by the end of 2022, while BUR reports were submitted by developing countries by the end of 2024.

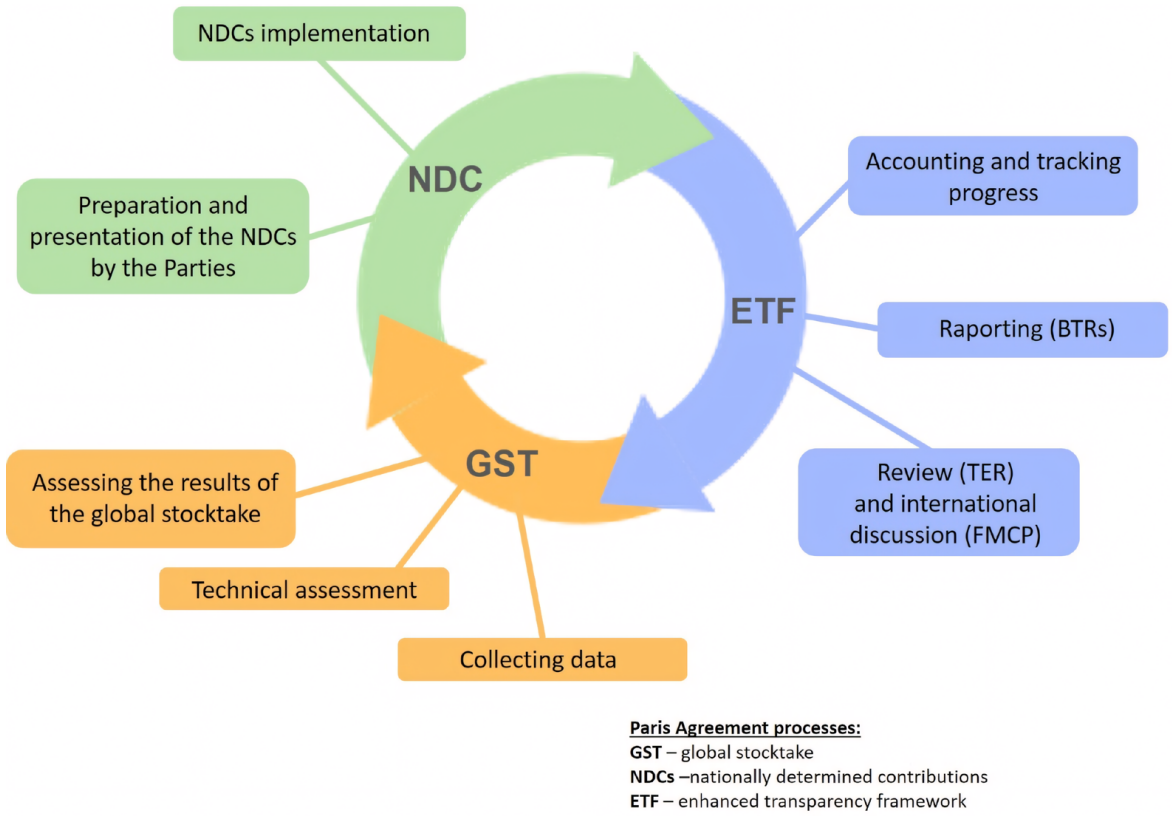
11 In accordance with Decision 1/CP.24 par. 44.

12 The principles of MPGs were set out at COP24 as part of the 2018 Katowice Package (Decision 3/CMA1, https://unfccc.int/sites/default/files/resource/cma2018_3_add1_advance.pdf#page=3, access: 29.11.2024) and decisions adopted at COP26 in 2021 in Glasgow (Decision 1/CMA.3, https://unfccc.int/sites/default/files/resource/cma2021_10_add1_adv.pdf, access: 29.11.2024).

other things, the scope of information to be reported by countries.[13] Over time, other key elements of the new ETF system have also been refined, such as, inter alia, reporting periods, a common reporting format and scope for all countries (common tabular format, CTF) and other processes necessary for the effective implementation of the ETF (e.g. expert technical review, training of experts).

Reporting under the Paris Agreement enables comparison of actions taken by countries against their commitments and targets set out in NDCs, while identifying gaps and challenges in these actions. The 'ambition mechanism' created by the Paris Agreement (Figure 2) is intended to inform countries in the process of updating and strengthening their NDCs. This mechanism arises from the interaction between the cycles of preparing and submitting Nationally Determined Contributions (NDCs), Enhanced Transparency Framework (ETF) and the Global Stocktake (GST) review of collective progress towards the Paris Agreement and its long-term goals. The above interactions of the key processes set out in the Paris Agreement demonstrate the important role of the Enhanced Transparency Framework in building international trust between states, which is essential for the full implementation of the Paris Agreement. At the same time, the ETF provides the basis and arguments for increasing the ambition of actions needed to achieve the temperature targets and stabilise global GHG emissions.

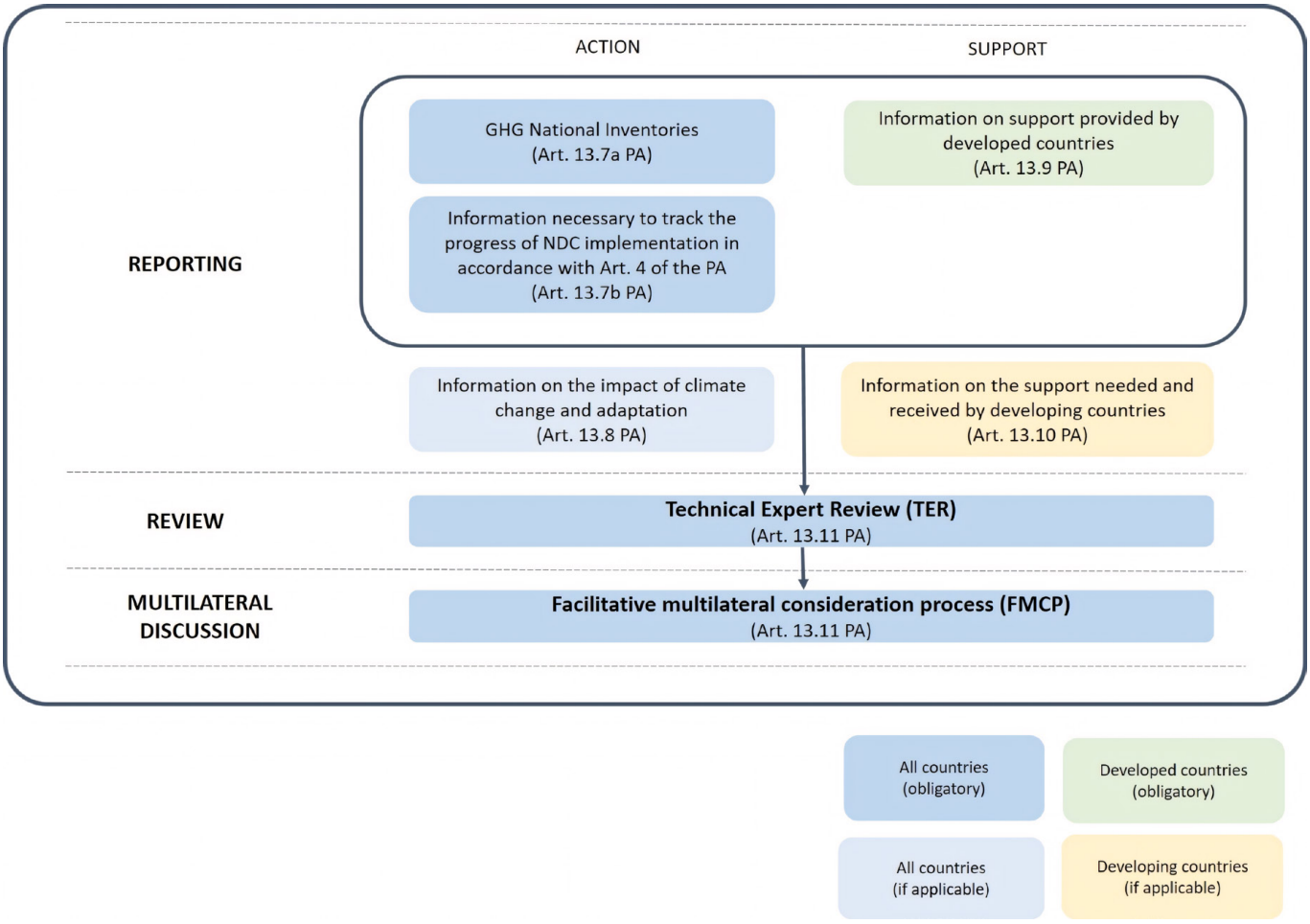
FIGURE 2: LINKING THE CYCLE PROCESSES ESTABLISHED UNDER THE PARIS ARRANGEMENT (ETF, GST AND NDC).



Source: Międzynarodowe negocjacje w ramach Konwencji klimatycznej, IOŚ-PIB 2024

13 States that are not Parties to the Paris Agreement in implementing their reporting obligations under the Climate Convention remain free to apply the MPG Guidelines (Decision 18/CMA.1).

FIGURE 3: CORE ELEMENTS OF THE ENHANCED TRANSPARENCY FRAMEWORK (ETF) CREATED UNDER THE PARIS AGREEMENT



Source: Own compilation based on UNFCCC

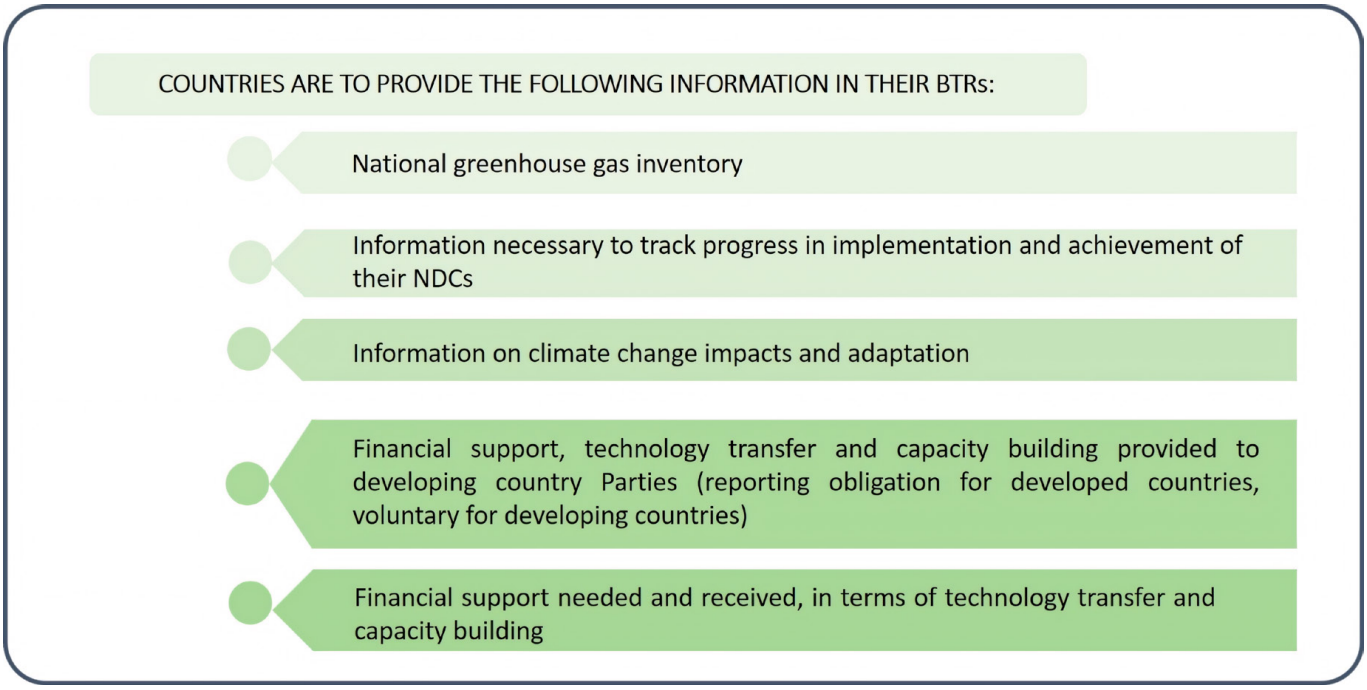
CORE ELEMENTS OF THE ETF

The Enhanced Transparency Framework established under the Paris Agreement is based on three core elements (Figure 3):

- Biennial Transparency Reports (BTRs),Technical Expert Review (TER),
- Facilitative multilateral consideration process (FMCP).

Biennial Transparency Reports (BTRs), are to be submitted by countries every 2 years and provide information on their implementation of the Paris Agreement, including their national GHG inventories[14] and information necessary to track progress in implementing and achieving their reported NDCs. In addition, developed countries and other donor Parties should provide information in their reports on financing, technology transfer and development and capacity-building support provided and mobilised to developing country Parties. Developing States Parties are encouraged to report on any support they need and have received. All Parties should also provide information on climate change impacts and adaptation. At the same time, BTRs

14 Annex I countries to the Convention continue to be required to submit national greenhouse gas inventories annually in accordance with decisions 3/CP.5, para. 2, and 1/CP.24, para. 42.



Source: own study

are the vehicle through which States report on the implementation of their NDCs (including accounting for the achievement of their declared emission reduction target).

While countries were required to submit their first BTR reports by the end of 2024, some flexibility was allowed for the implementation of this obligation.

This is especially true for countries that do not have experience in reporting on this scale, such as small island developing states and least developed countries, which were exempted from having to meet this deadline. Nevertheless, the majority of countries met the deadline set for the submission of their first reports.[15] Poland's first BTR report was also submitted to the UNFCCC in accordance with the deadline set under the Paris Agreement arrangements, i.e. at the end of 2024.[16]The next step, once the reports have been received by the UNFCCC Secretariat, is to review the information reported therein by Parties, which is essential for understanding joint implementation efforts and is carried out in two stages. First, the information reported will be assessed by independent experts through a Technical Expert Review (TER) process to determine whether it is consistent with the guidelines. The experts then produce a report with findings on the Party's compliance with the reporting requirements and areas for improvement. Secondly, the review report, together with other information provided by the Party, is included in the Party's public discussion on the status of implementation of the Paris Agreement in its country (Facilitative multilateral consideration process, FMCP). Reporting and review of the BTR, together with the FMCP, takes place on a biennial cycle for each Party.

15 UNFCCC BTRs Registry, (https://unfccc.int/first-biennial-transparency-reports, access: 3.01.2025).

16 The first Polish biennial transparency report for the Conference of the Parties to the United Nations Framework Convention on Climate Change was submitted by KOBiZE on behalf of Poland to the Secretariat of the United Nations Framework Convention on Climate Change UNFCCC on 31 December 2024 and is available on the official website of the Convention: https://unfccc.int/first-biennial-transparency-reports, access: 3.01.2025).

One of the recent developments of the ETF, has been the launch of an electronic tool[17], which provides a means for countries to report information on their climate action as required by the Paris Agreement. This tool allows countries to compile data and generate reporting tables (known as CTF tables) with a standardised, agreed format for all countries, thereby streamlining and making the ETF reporting process more consistent.

ADVANTAGES AND BARRIERS IN IMPLEMENTATION OF THE ETF AT INTERNATIONAL AND NATIONAL LEVELS

As the ETF system is a new one under the UN Climate Convention and has many temporary flexibilities for implementation by developing countries, it will only become fully functional over time, which will come with the harmonisation of the information that will be processed under this system. Preparing reports under the ETF can be challenging for some countries, especially those without experience in conducting GHG inventories, reporting this information and verifying it. This is primarily due to their limited or non-existent obligations under the former transparency regime (MRV). Many countries inform that they have problems with data collection, management and analysis and reporting, hence the new requirements imposed on them by the new ETF transparency framework are undeniably challenging for them. Therefore, the further development of the ETF requires supporting developing countries in building their capacity to fully engage in its implementation. Some of the biggest barriers and constraints faced by some countries include: scarcity of resources and their limited institutional capacity, lack of or underdeveloped monitoring technologies, or limited development and access to technology.

One solution to this problem may be the New Collective Quantified Goal (NCQG) for climate finance adopted at COP29 in Baku. However, it may also pose additional challenges to the current structure of transparency system. Existing guidance under the ETF already includes detailed reporting of support given and received, and ETF principles (i.e. methods, procedures and guidelines, MPGs) indicate that information on South-South climate finance flows 'should' be provided in BTR reports. Considering, however, the arrangements adopted at COP29, establishing a new quantifiable financial target is based on its two basic components.[18] During COP in Baku it was agreed that the new climate finance target would be at least USD 300 billion per year by 2035. Developed countries are to have a leading role in meeting this target, and other countries were encouraged to participate voluntarily in providing and mobilising finance for this target. Additionally, all countries were urged to scale up all sources of climate finance - public and private - to at least USD 1.3 trillion per year by 2035. A target formulated in this way may require adaptation and updating of the transparency regime in the future - particularly in terms of reporting under the ETF of financing provided by developing countries, or the reporting of financial flows from private sources (which are currently not covered by ETF reporting). This includes the possible need to clarify the rules for reporting by developing countries of support received. The refinement of these rules will be possible, inter alia, as part of the review of the ETF Guidelines, which will take place in 2028.[19]The ETF's regular reporting, review and multilateral considerations provide a platform for countries to learn from each other and create opportunities for new cooperations to address climate challenges. By aligning with its requirements, they will gain better insights into their own emissions and adaptation

17 The online tool for country reporting under the ETF was launched in June 2024, (https://unfccc.int/news/launch-of-new-climate-reporting-tools-for-enhanced-transparency, access: 29.11.2024).

18 Outcomes of the Baku Climate Change Conference - Advance Unedited Versions, UNFCCC, 2024 (https://unfccc.int/cop29/auvs, access: 29.11.2024).

19 In accordance with par. 2 of Decision 18/CMA.1 "Modalities, procedures and guidelines for the transparency framework for action and support referred to in Article 13 of the Paris Agreement", UNFCCC, 2018, https://unfccc.int/resource/tet/0/00mpg.pdf.

data and be able to improve their national capacity to monitor and report GHG emissions. Strengthening these efforts at the national level can ultimately contribute to the development of more effective climate policies.

The data collected through BTRs will help governments assess their progress in implementing climate policies and identify areas where resources and support are most needed. A better understanding of these needs, as supported by data, will put countries in a better position to attract more funding and accelerate implementation of their Paris Agreement commitments.

Not least, much of the information, including those collected for BTRs, is also important for formulating new national commitments on emissions reductions, which can be used by countries to create their new and updated NDCs (in line with the cycle of raising ambition for action outlined above). Under the ETF's guidelines for reporting information on financial support received, developing countries will include in their BTRs, also information on the status of the activity supported by the funding received, as well as its impact and estimated results. Enhanced reporting of information regarding the deployment, impact and results of climate finance interventions is not only important for accountability, but also helps identify developing countries' priorities and the challenges they face, which in turn can make international support more targeted and tailored to developing countries' needs and priorities.

Transparent reporting and ongoing improvement of institutional capacity in this regard, at the same time gives credibility to a country's commitment to combat climate change, thereby providing an opportunity for the development of the country's economy, the influx of new investors, as well as strengthening the country's position in international cooperation and debate on climate change and the transformation of economies.

In order to promote the ETF system, the pursuit of transparency in countries' actions and the importance of these actions in achieving the goals of the Paris Agreement, international initiatives, including political ones, focusing on developing the transparency system under the UNFCCC are becoming increasingly popular. Their formula

varies (dialogues, platforms, workshops), nevertheless they are all aimed at strengthening and building mutual trust between countries, supporting their work on BTRs and encouraging widespread participation in the system. A specific area of their work will also focus on supporting capacity-building efforts for developing countries in their involvement in the ETF system. Examples of international initiatives dedicated to transparency issues under the UNFCCC include the Baku Global Climate Transparency Platform (BTP)[20], or the Global Transparency Dialogue at the 79th UN General Assembly in New York.[21]

Summary:

BTRs will provide the basis for assessing the effectiveness of the Paris Agreement and the UNFCCC process, as well as the effectiveness of climate action and mitigation efforts by countries around the world.

The introduction of a unified reporting system and the creation of an Enhanced Transparency Framework (ETF) is critical to the implementation, credibility and enforcement of the Paris Agreement.

Through regular reporting, countries will demonstrate their accountability to the international community, while contributing to increased trust between Parties to the Agreement and the activities implemented under the UN Climate Convention.

The ETF's provision of high-quality information will enable the tracking of progress toward climate goals, identifying progress as well as gaps in needed action.

The ETF process will also be key in raising policy awareness among decision-makers, resulting directly in strengthening national policymaking processes regarding the creation and updating of climate policies.

A key challenge of the coming years in building a credible and stable ETF system will be to ensure adequate support, whether financial, technology transfer or capacity building, to meet the demands placed on countries by this system.

Only through a well-functioning, unified transparency under the Paris Agreement it will be possible to assess and analyze progress on global climate policy goals, including the Paris Agreement itself.

Bibliography:
1. United Nations Framework Convention on Climate Change, adopted on 9 May 1992 in New York (https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU19960530238/O/D19960238.pdf, access: 3.01.2025).
2. Paris Agreement to the United Nations Framework Convention on Climate Change, adopted in Paris on 12 December 2015, (https://unfccc.int/sites/default/files/english_paris_ agreement.pdf, access: 3.01.2025).
3. Decisions adopted by the UN Climate Convention are available on its website: http://unfccc.int"Międzynarodowe negocjacje w ramach Konwencji klimatycznej", IOŚ-PIB, 2024 (https://ios.edu.pl/wp-content/uploads/2024/06/miedzynarodowe-negocjacje-w-ramach-konwencji-klimatycznej.pdf, access: 3.01.2025).
4. "Reference Manual for the Enhanced Transparency Framework under the Paris Agreement Understanding the enhanced transparency framework and its linkages", UNFCCC, 2022 (https://unfccc.int/sites/default/files/resource/v2_ETFreferencemanual.pdf).

20 COP29 Presidency Launches Baku Global Climate Transparency Platform to Support Developing Nations Addressing Climate Change,(https://cop29.az/en/media-hub/news/cop29-presidency-launches-baku-global-climate-transparency-platform-to-support-developing-nations-addressing-climate-change, access: 21.11.2024).

21 High-level Dialogue on Global Climate Transparency, (https://sdg.iisd.org/events/high-level-dialogue-on-global-climate-transparency/, access:21.11.2024)..

Address:
Słowicza 32
02-170 Warsaw, Poland
www.kobize.pl
e-mail: cake@kobize.pl

Funded by
NATIONAL FUND
FOR ENVIRONMENTAL PROTECTION
AND WATER MANAGEMENT