LIFE Climate CAKE PL

System of providing and disseminating information to support the strategic implementation of climate policy

Centre for Climate and Energy Analyses

KOBiZE

What is CAKE?

OBJECTIVES

The main objective of the LIFE Climate CAKE PL project is to build a comprehensive and sustainable system for creating and delivery of information on the climate and energy policy impacts in order to improve the effectiveness and efficiency of its implementation.

Project activities are focused predominantly on supporting the decision-making process and increasing the potential of the knowledge and competence of the national administration involved in climate and energy policy development and implementation.

CAKE – the Centre for Climate and Energy Analysis established as the project outcome is above all a team of experts developing and applying analytical tools, networks and communication channels, then in sustainable manner produce and deliver knowledge to support decision-making process.

LIFE Climate CAKE PL 2017 – 2022

In the first three years of the LIFE Climate CAKE PL project, due to the commitment of the entire Team, we managed not only to achieve our objectives, but also have proved to our stakeholders, both domestically and internationally, the quality and suitability of our work.

The activities we focus on include delivery of necessary knowledge and assistance to public administration in the development and implementation of climate and energy policy.

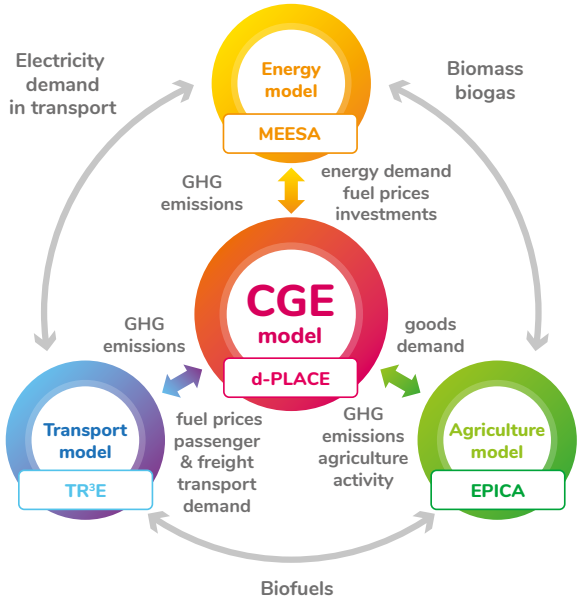
Initially, the LIFE Climate CAKE PL project was supposed to be finished in November 2020. However, due to new ambitious goals and measures proposed by the European Commission in the European Green Deal, it has become necessary to extend the analytical efforts employing the CAKE capacity. The high value of our works has been recognized by the European Commission, therefore the LIFE Climate CAKE PL project was extended for another two years until 2022.

The Team

The CAKE team consists of 19 people, including 13 modelling experts and staff responsible for the administration, promotion and settlement. Our team includes professionals permanently employed at IOŚ-PIB and KOBiZE, as well as experts and scholars from universities and research centres collaborating with us. The project implementation would not have been successful without the great engagement of all these people.

Analytical Toolkit

Construction and the continuous improvement of analytical toolkit, that is crucial to generate knowledge about the climate and energy policy impacts, remains an essential component of the project. The CGE general equilibrium model is at the heart of the toolbox and works with three sectoral models covering energy, transport and agriculture. This comprehensive and coherent set of models allows for the accurate impact assessment of planned measures, in particular targets of both climate and energy policy as well as sector policies.



d-PLACE – Model CGE

- the global macro-economic model allows for a comprehensive assessment of the climate and energy policy economic impacts.

MEESA – Model for European Energy System Analysis

- the model allows for a thorough simulation of various transformation options of the energy sector in the EU.

TR³E – Transport European Economic Model

- the model allows for the analysis of various options to reduce CO_2 emissions in the transport sector, including the implementation of new technologies.

EPICA – Model for Evaluation of Policy Impacts – Climate and Agriculture

- the model enables the analysis of the impact of various climate policy measures on agriculture, including emissions production volume and structure, and farmers income in Poland.

All documentation for models developed under LIFE Climate CAKE PL are available at:
www.climatecake.pl

LIFE Climate CAKE PL studies and reports

During the three years of the project implementation CAKE team has made a several number of analyzes, the most important we present below. All CAKE reports are available in English and Polish on the: www.climatecake.pl

1. "The Risk of carbon leakage in the context of increasing the EU greenhouse gas emission reduction target" (June 2019)

The main purpose of the analysis is to assess the possible magnitude of the carbon leakage applying various assumptions and policy scenarios, including the impact on emission levels, GDP and the economic sectors' condition.

Key findings:

- Differences in the production structure and emission intensity in sectors contribute to a similar extent to the carbon leakage scale, therefore the EU should reduce emissions mainly by energy mix transformation (e.g. promoting fuel and emission efficient technologies), and by changing the sectoral structure (e.g. by free allocation or by adjusting border taxes).

- External technology development also affect the results – it is assumed that the fossil fuels use will be gradually decreasing, regardless of the adopted reduction targets. Such an assumption allows for a better simulation of the changes in real life.

2. "CO_2 emissions reduction potential in Transport sector in Poland and the EU until 2050" (October 2019)

Paper presents examination of different emission reduction pathways in transport sector in Poland and in the EU up to 2050. In 2015, transport was responsible for almost a quarter of GHG emission in non-ETS in Poland – thus significant emission reduction without efforts in this sector is practically unachievable.

Key findings:

- The total emission reduction in the transport sector in Poland ranges from 36% in the „Low" scenario to 66% in the „Forced electromobility" scenario, while in the EU the total emission reductions in 2050 vary between the scenarios from 45% in the „Low" to 67% in the „Forced electromobility" scenario.

- Total results for Poland show that, depending on the scenario, the net financial effect in the transport sector may range from EUR 18.1 billion in benefits in the „Low" scenario to over EUR 167 billion in loss in the „Forced electromobility" scenario.

3. “Scenarios of low-emission energy sector for Poland and the EU until 2050” (October 2019)

Assuming the policy focused on systematic reduction of CO_2 emissions and an increase in renewable energy share (up to a minimum of 50% of electricity demand in each of the analysed countries by 2050), four scenarios for the low-emission EU electricity and district heating sector have been examined.

Key findings:

- The total reduction of CO_2 emission in the energy sector in Poland in 2015-2050 ranges from approx. 35% in the scenario without forced reductions to approx. 95% in scenarios with deep emission reduction.
- Reducing CO_2 emissions from electricity generation is more feasible than in district heating, what can result in replacing district heat production by individual sources - electric heat and heat pumps. Then the emission is “shifted” to the electricity generation.
- In all forced reduction scenarios, Poland’s electricity imports exceed its exports.
- In all scenarios for Poland, lignite use is rapidly decreasing in 2025-2030 and wind farms are subject to dynamic development.
- Nuclear units play an important role in reducing costs in the EU in all forced reduction scenarios.
- All deep reduction scenarios involve extremely high unit costs of CO_2 emission reduction.

4. “The European Green Deal impact on the GHG’s emission reduction target and the EUA prices” (March 2020)

Report examines the question how the increase in reduction target from 40% to 50% and 55% in 2030 may change the real change in emissions. This concerns sectors covered by the EU emissions trading system (EU ETS) as well as sectors outside this system, i.e. non-ETS. Impact of new reduction targets on the EUA prices has been also examined.

Key findings:

- Adopting a 50% reduction target in the EU will rise the price of emission allowances in the EU ETS up to 34 euro/EUA and 52 euro/EUA in 2025 and 2030 respectively. The 55% reduction target will rise the price of allowances to 41 euro/EUA in 2025 and 76 euro/EUA in 2030.
- New reduction targets will also reduce the number of allowances to zero around 2042-2045 (for a 50% and 55% reduction target respectively). This is the effect of increase of the linear reduction factor (LRF) from 2,2% to 3,2% or to 3,7%.
- Average decrease in non-ETS limits in Member States’s would account for 9% and 14% over the 2021-2030 period (for a 50% and 55% reduction target respectively). In case of Poland, the average decrease in the non-ETS emission limit in this period will be 2% and 5%, respectively.

5. “Assessing climate policy impacts in Poland’s agriculture” (July 2020)

Different attitudes to greenhouse gasses emission reductions in the agricultural sector have been examined, including: (1) induced general reduction targets for agricultural GHG emissions, (2) introducing taxes on nitrogen-based fertilisers in crop production, and (3) introducing price on emissions from agriculture.

Key findings:

- Forcing the GHG reduction by 20% leads to decline in value of produced market commodities by ca. 9.5% and farm income by ca. 14%. Decline in production following the forced GHG emission reduction to the greatest extent affects the production of cattle for beef (by 35%), milk (by 16%), maize for grain (by 21%), and sugar beets (by 21%).
- Assuming implementation of the EUR 20 emission tax, the potential emission costs would rise to PLN 2,78 bn at country scale, which would mean an expense of PLN 1 960 per average farm and PLN 195 per ha of Utilised Agricultural Area (UAA). These are close to nearly 10% of average farm income.
- Introducing the N-tax and accordingly rising the N-fertiliser prices by 20% leads to increase of fertiliser costs by 3,95% and at the same time resulted in 10,3% decline in their use, while the farm income decreases by 5,5% and emission reduction is as low as 1,6%.

6. "The effects of the implementation of the Border Tax Adjustment in the context of more stringent EU climate policy until 2030" (September 2020)

Report examines the impact of CBAM introduction (Carbon Border Adjustment Mechanism) on the EU Member States' economies, including price levels, changes in the production value, exports and imports, and macroeconomic indicators such as GDP and household consumption. The GHG55 scenario has been examined assuming an increase in the reduction target of greenhouse gas emissions to 55% in 2030, compared to the level from 1990, and the BTA scenario assuming the implementation of the GHG emission tax on products imported to the EU (Border Tax Adjustment). The emission border tax covers imports to the EU in sectors covered by the EU ETS.

Key findings:

- An increase in the prices of imports into the EU – according to the projection, the prices of imported goods in the sectors subject to border tax adjustment would be higher by about 1,6% on average in 2030.

- A change in the value of imports – an increase in the prices of imported goods to the EU would cause a change in the value of imports by about -3.4% in the sectors subject to border tax adjustment. The largest changes occur in the sector of ferrous metals, by -11.6%.

- An increase in prices of products exported from the EU and a decline in the value of exports – as the result of an increase in prices of goods manufactured in the EU, the prices of goods exported from the EU to the other regions of the world will grow. The prices of export goods in the sectors covered by the border tax adjustment would grow by about 0,2%. The increase would be the largest in the sector of ferrous metals, by 0,4%. The value of exports from the EU in the sectors subject to border tax adjustment would be -1.1%.

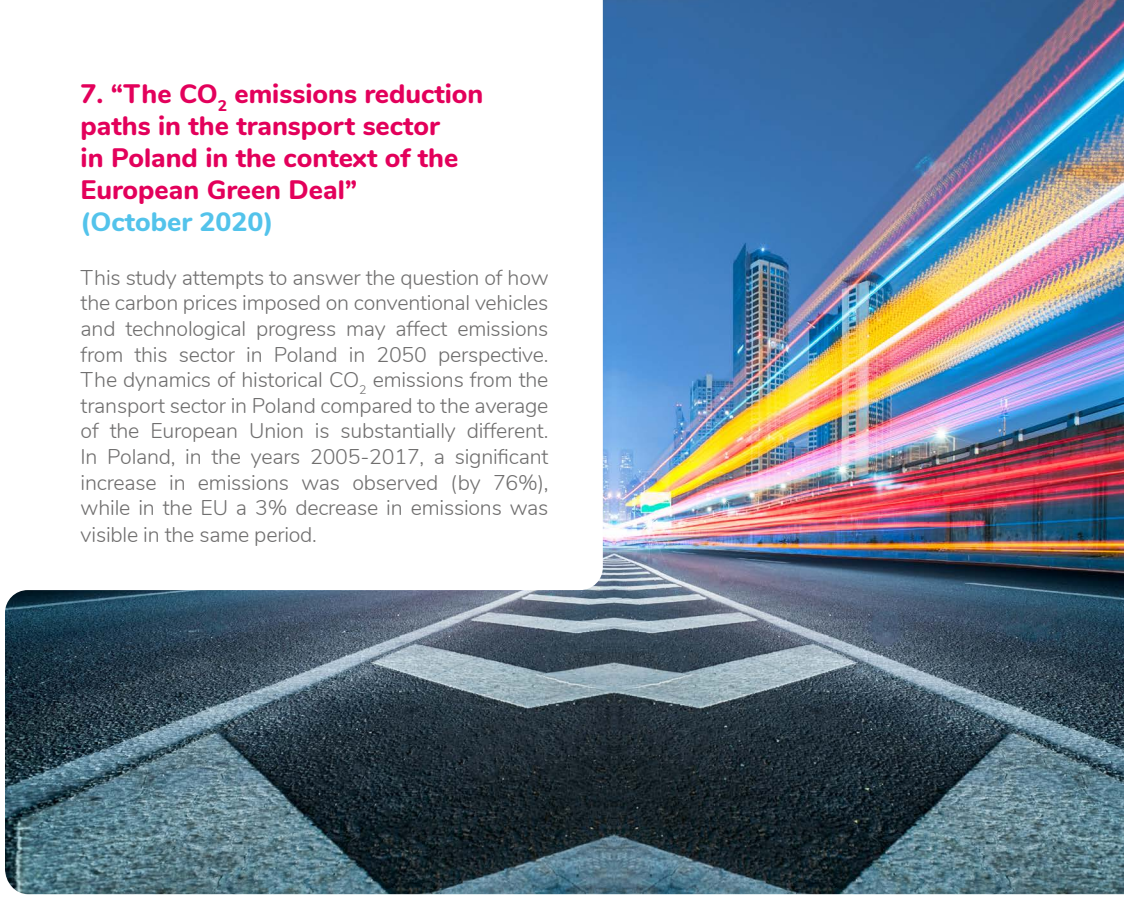
- The average change in exports to the regions outside the EU would be about -0,7%, considering all sectors, while the largest are expected in Bulgaria, -1,3%, and the Baltic States, -1,2% (about -1% for Poland).

- The introduction of the border tax adjustment in the EU would cause a reduction in the global GHG emissions by about 24 Mt CO_2 eq.

- The implementation of the border tax adjustment within the EU would bring in 2030 additional revenues estimated at about EUR 7,61 billion (USD 10,6 billion) in constant 2011 prices.

7. "The CO_2 emissions reduction paths in the transport sector in Poland in the context of the European Green Deal" (October 2020)

This study attempts to answer the question of how the carbon prices imposed on conventional vehicles and technological progress may affect emissions from this sector in Poland in 2050 perspective. The dynamics of historical CO_2 emissions from the transport sector in Poland compared to the average of the European Union is substantially different. In Poland, in the years 2005-2017, a significant increase in emissions was observed (by 76%), while in the EU a 3% decrease in emissions was visible in the same period.



Key findings:

- The increase in the operating costs of ICE-powered cars (levy on CO_2 emissions) and the decrease in prices of low-emission vehicles (electric and hybrid) will result in a dynamic increase in the number of electric vehicles in Poland – around 350 000 vehicles per year.

- The structure of the passenger car fleet in Poland would change: 7% share of electric cars and 5% hybrid cars in 2030 and 54% electric cars and 10% hybrid cars in 2050.

- Changing consumer preferences regarding the vehicle purchase, as well as an increase in rail transport use would lead to a decrease in emissions up to 52 Mt CO_2 in 2030 and 31 Mt CO_2 in 2050.

- The development of electromobility would increase the total demand for electricity in road transport in 2050 by approximately 35 TWh, which would account for approximately 15% of the national electricity demand in that year (additional CO_2 emissions from electricity production would represent 1,3% of emissions from the road transport sector).

Events and project promotion

Dissemination of the project outputs, sharing the knowledge, also the verification of our work with stakeholders, are recognised as an important part of the project. Therefore, we present and share the results of CAKE analyses at national and international conferences.

CAKE / IOŚ-PIB / KOBiZE have organised two international conferences: „ Challenges of the economic transformation in the perspective of achieving climate neutrality by 2050" (November 2019), in Warsaw and an on-line conference „European Green Deal 2050 - Challenges of transformation" (May 2020) organised jointly with the Permanent Representation of the Republic of Poland to the European Union.

The CAKE team participated in two Conferences of Parties to the United Nations Framework Convention on Climate Change (UNFCCC): COP24 in Katowice in 2018 and COP25 in Madrid in 2019, in GTAP 22nd Annual Conference on Global Economic Analysis at the Warsaw University in 2019, in 25th conference of environmental economists EAERE2020.

We have participated in many international meetings and workshops organised by the EC Joint Research Centre (JRC), The European Roundtable on Climate Change and Sustainable Transition (ERCST), Zurich University of Applied Science (ZHAW), Grantham Research Institute at the London School of Economics, CAN Europe, World Bank, EURACTIV, other LIFE programmes (LIFESide), WWF, WISE Europa and many more.

The LIFE Climate CAKE PL project outputs have been presented and quoted in the national and foreign press, including Euractiv.com, Carbon Pulse, Shekulli, African Daily, Efeverde.com, WNP, Wysokie Napięcie, Teraz Środowisko, CIRE, gramwzielone.pl.

Opinions about CAKE

"Each individual country must develop its own way to climate neutrality. Low-income Member States face even more difficult challenges. The works and outputs of the LIFE Climate CAKE PL project are of great importance for the substantive discussion on the challenges we face and the ways to achieve this goal"

Michał Kurtyka,
Minister of Climate and Environment

"The LIFE Climate CAKE PL project is a positive example of the EU funds' use under the LIFE Program, that we would like to see among the increasing number of its Polish beneficiaries. CAKE activities are widely identified and recognized as an important contribution to the debate on climate and energy questions, both in the national and international dimension"

Artur Lorkowski,
Vice-President of the Management Board of National Fund for Environmental Protection and Water Management

"The results of the analyses carried out under the LIFE Climate CAKE PL project are very useful and desirable in the current discussions on such important issues related to the future of the energy transformation and the implementation of the European Green Deal."

Piotr Szymański,
Director Energy, Transport and Climate,
Joint Research Centre, European Commission

"The LIFE Climate CAKE PL project proves that Polish research centres are increasingly recognized in the international arena, and the expertise and experience presented by its experts and the whole team allowed IOŚ-PIB / KOBiZE to join the ranks of recognized scientific institutions in Europe, what translates into continual grants awarded for research projects."

Krystian Szczepański,
Director of the Institute of Environmental Protection – National Research Institute

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