



SUSTAINABLE ENERGY DEVELOPMENT AGENCY

ODYSSEE-MURE

Energy Efficiency in Industry - Bulgaria

Tsvetomira Kulevska

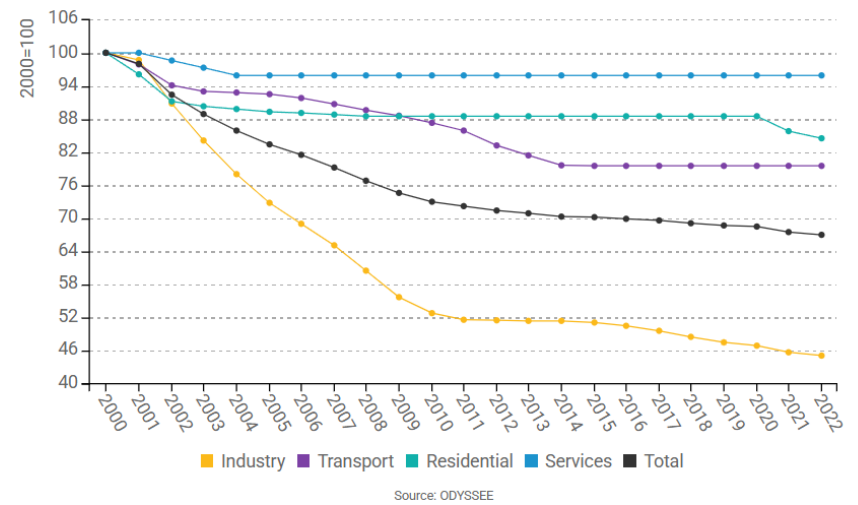
*Director at "Coordination and Management of EE
and RES" DG*

First Meeting of the Project "ODYSSEE-MURE EED"

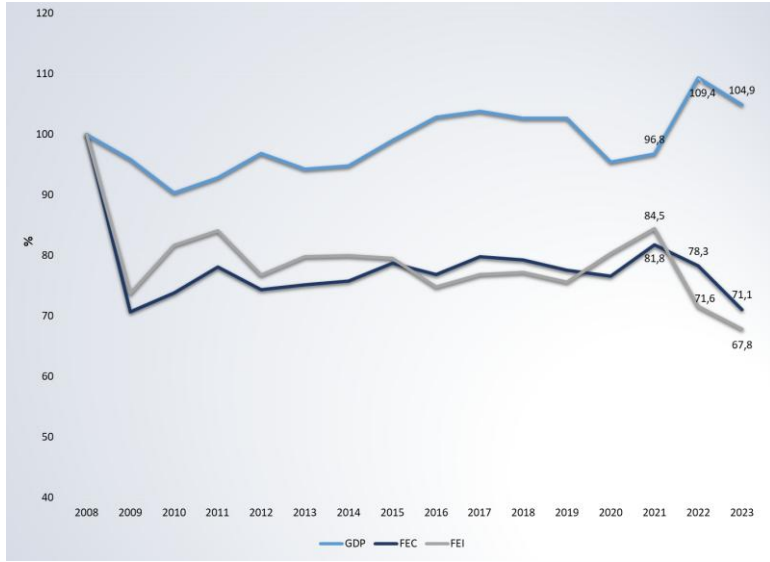
Monitoring the EED-Recast"

5-6 November 2025, Chişinău, Moldova

Technical Energy Efficiency Index Energy consumption in Industry



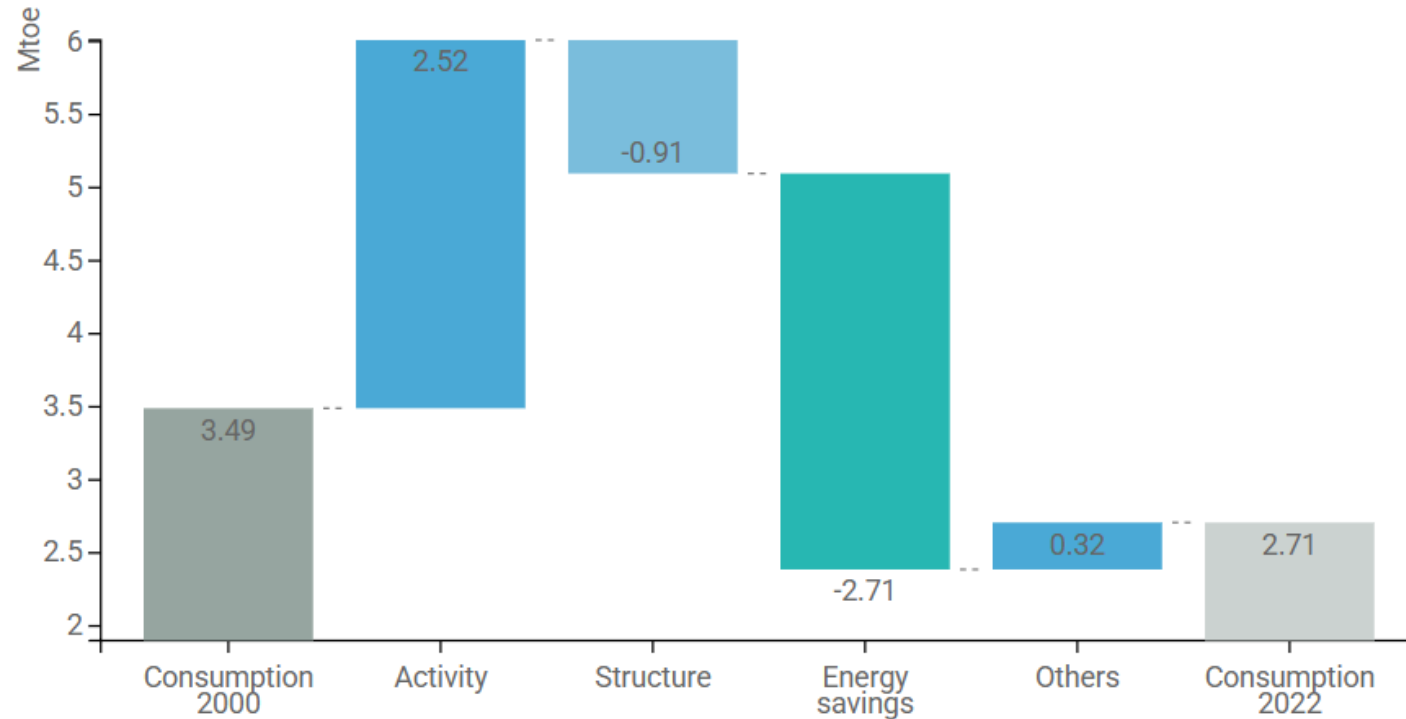
Technical energy efficiency as measured by technical index ODEX improved by 33% from 2000 to 2022 or 1.8%/year on average. **The highest progress was registered in Industry** (2.7%/year or 55% in total), followed by the transport (1%/year, 20%), residential (0.7%/year, 15%) and in services (4%).



Source: SEDA, Annual Analysis 2024, NSI data

In 2023, compared to the previous year 2022, the sector's GDP decreased by 4.15%. Final energy consumption decreased by 9.2%. Energy intensity decreased by 5.3%.

Main drivers of the energy consumption variation in industry



Source: ODYSSEE

Energy consumption of industry decreased by 0.78 Mtoe, from 3.49 Mtoe in 2000 to 2.71 Mtoe in 2022. Energy savings (-2.71 Mtoe) and structural effects (-0.91 Mtoe), towards less energy intensive branches, contributed to this largest decrease of sector energy consumption. On the opposite the growth in activity (expressed with production indexes) partially offset these effects (+2.52 Mtoe).

Policies and measures implemented in the Industry sector

0.59 TJ

Program "Competitiveness
and innovation in enterprises"
2021-2027
([Read in MURE](#))



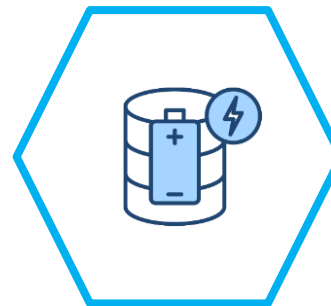
0.12 TJ

Scheme to support green
hydrogen and biogas production
projects
([Read in MURE](#))



0.58 TJ

Construction of new RES for own
consumption in combination with local
facilities for energy storage in
enterprises
([Read in MURE](#))



Thank you!



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MOTIVA

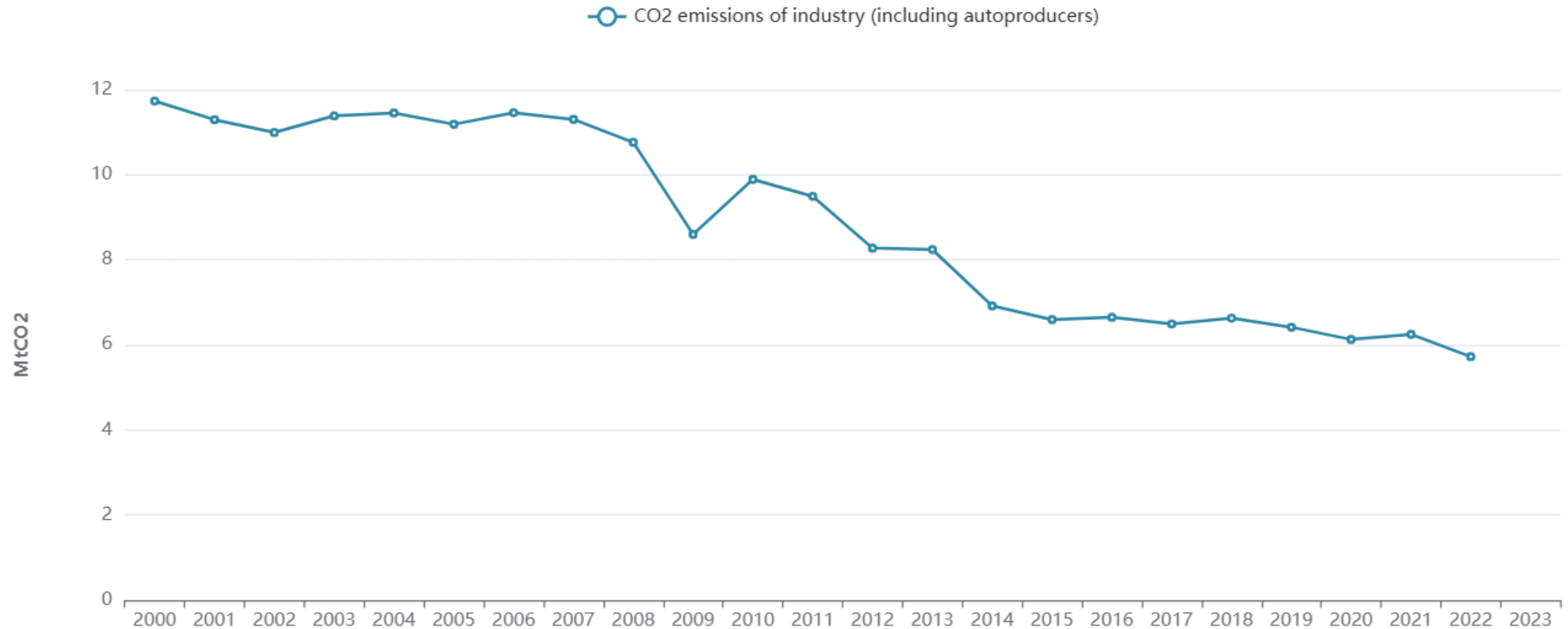
Energy Efficiency in Industry – Finland

Lea Gynther, Motiva Oy
Odyssee-Mure, 5 November 2025



CO2 emissions of industry 2000-2023

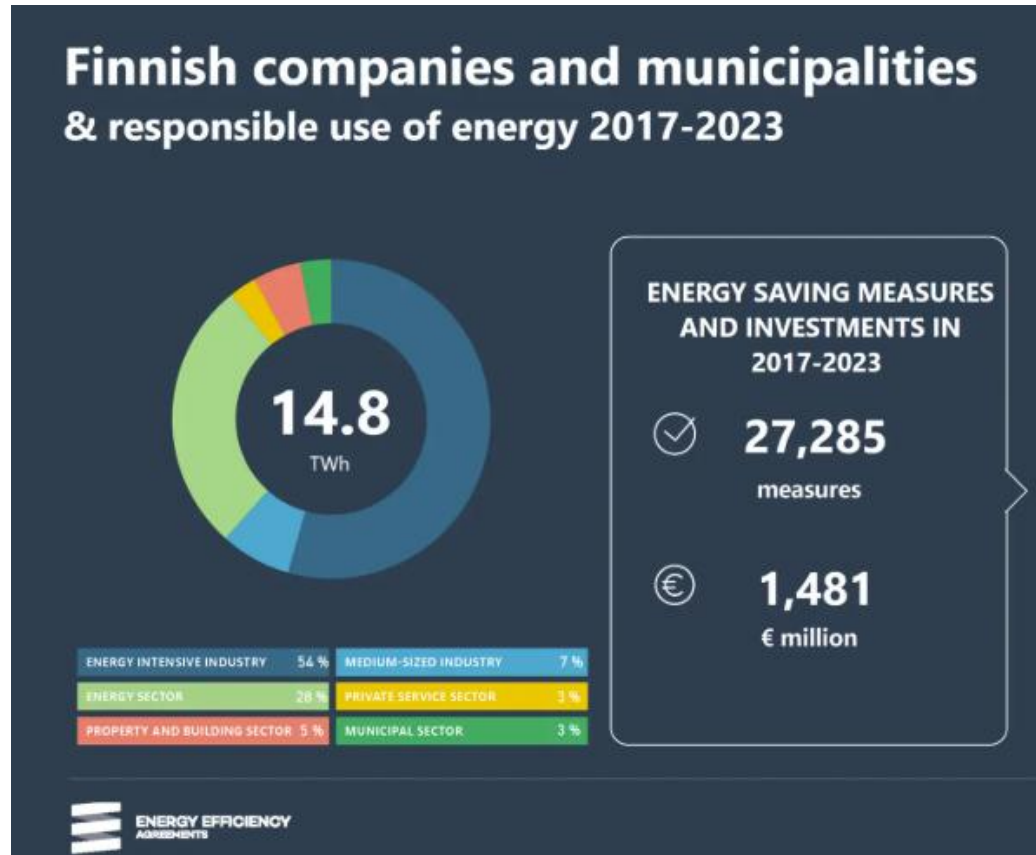
Finland (FI)



Energy Efficiency Agreements for Industries

Agreements 2017-2025

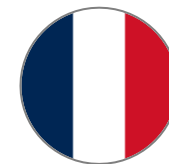
Coverage over 60% of all energy use



New agreements 2026-2035

- Energy-Intensive Industries – Confederation of Finnish Industries (EK)
- Energy-Intensive Industries – Finnish Forest Industries Federation
- Food Industry Action Plan
- Chemical Industry Action Plan
- Technology Industry Action Plan
- Wood Product Industry Action Plan
- Industry – General Action Plan
- Energy Sector Action Plan
- Motor Trades and Repairs Action Plan
- Commerce Sector Action Plan
- Hotel and Restaurant Sector Action Plan
- Service Sector – General Action Plan

Evolution of Key Industry Indicators



Energy Consumption

279 TWh in
2023

2% decrease
per year
over the last
decade

- The main energy sources are:
 - Natural gas, widely used for heat generation and in some industrial processes.
 - Electricity, powering machinery, motors, and electrochemical processes.
 - Petroleum products, primarily in chemical and petrochemical industries.
- **Energy consumption has decreased thanks to ongoing energy efficiency improvements.**

Energy Efficiency

1% decrease per year over the
last decade

- **Energy efficiency** has improved by **6%** between 2013 and 2023, as measured by the technical ODEX.
- **Efficiency gains differ by industrial sector** with the automotive sector achieving the largest savings since 2000 (48%).
- The most energy intensive industries are not necessarily the ones achieving the largest gains **with steel efficiency improving by 5%, cement by 12% between 2000 and 2023.**

Industrial Output

In 2023, back to 2015 level after
COVID low

- Industrial output has experienced moderate growth after 2020.
- This includes both recovery from the COVID-19 downturn and ongoing modernisation in manufacturing.
- **IPI shows stable performance, with some resilience** despite energy price shocks.
- **Growth is uneven** : the automotive and especially the primary metals sector have struggled, while others like the chemical industry, have grown.

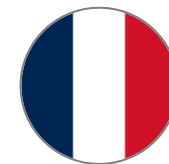
CO2 Emissions

65 MtCO₂eq
in 2023

8,7 %
decrease
between
2022 and
2023

- French industrial GHG Emissions represents 20% of total emissions, one of the largest share mainly through the combustion of fossil fuels (natural gas, coal, oil) and industrial processes (steelmaking, chemicals);
- This reduction is mainly due to the **improvements in energy efficiency** in industrial plants and the reduction of energy use per unit of output (gradual **shift in the energy mix** toward lower-carbon sources such as electricity and biomass, **optimization and modernization** of industrial processes and equipment).

Energy Efficiency Impact on the Industrial Sector



2006

Energy Savings Certificates

Mechanism: Energy suppliers are required to fund or carry out energy efficiency measures. Industries can generate CEEs through standardised actions (e.g., high-efficiency motors, heat recovery, insulation) and sell them on a market.

Key figures: Estimated market value: ~€5 billion/year (2024)

Impact: Massive uptake among SMEs for common efficiency measures
Contributed to steady decrease in industrial energy intensity (-30% since 1990)

2009

ADEME Support – Fond Chaleur

Public subsidies and technical support for all sizes of industrial actors (feasibility studies/Demonstrator and pilot projects/renewable heat (e.g., biomass, solar thermal)/Industrial heat recovery)

Key figures: Budget of ~€350M/year (varies by year)

Impact: Enabled low-carbon heating and efficiency upgrades (food industry, paper, wood, and chemicals)/
Deployed in over 4,000 industrial projects.

2015

Mandatory Energy Audits

Regulatory requirement (EU directive transposed in French law) for large companies (>250 employees or >€50M turnover)

Rules: Energy audits every 4 years or certified energy management system (ISO 50001)

Impact:

- Raised awareness of inefficiencies
- Helped identify ROI-positive projects
- Often a gateway to further use of CEE or ADEME grants

2021

EU ETS Phase IV

Carbon pricing (EU-level) for energy-intensive industries under the EU ETS (cement, metallurgy, chemicals, refining...)

Key figures:

- CO₂ price: ~€80–100/tCO₂ (2024)
- ~1,000 industrial sites covered in France

Impact:

- Strong incentive to reduce fossil fuel use
- Complemented by French national schemes like DECARB IND
- Pushed large emitters to electrify or modernise

2023

DECARB IND & DECARB FLASH (France 2030)

Grant-based public support for mid-sized and large emitters (focusing on process electrification, deep energy efficiency upgrades, fuel switching, CCUS)

Key figures:

- Projects must reduce ≥ 1,000 tCO₂/year
- Minimum investment: €3 million
- Grants up to €30 million/project
- DECARB IND has already supported projects avoiding > 3 MtCO₂/year (as of 2024)

Impact:

- Major enabler for deep decarbonisation in hard-to-abate sectors (cement, steel, refining)
- Supports the national goal of reducing industrial emissions from ~78 MtCO₂eq (2021) to ~45 MtCO₂eq (2030).

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Energy Efficiency in Industry - Germany

Input for roundtable

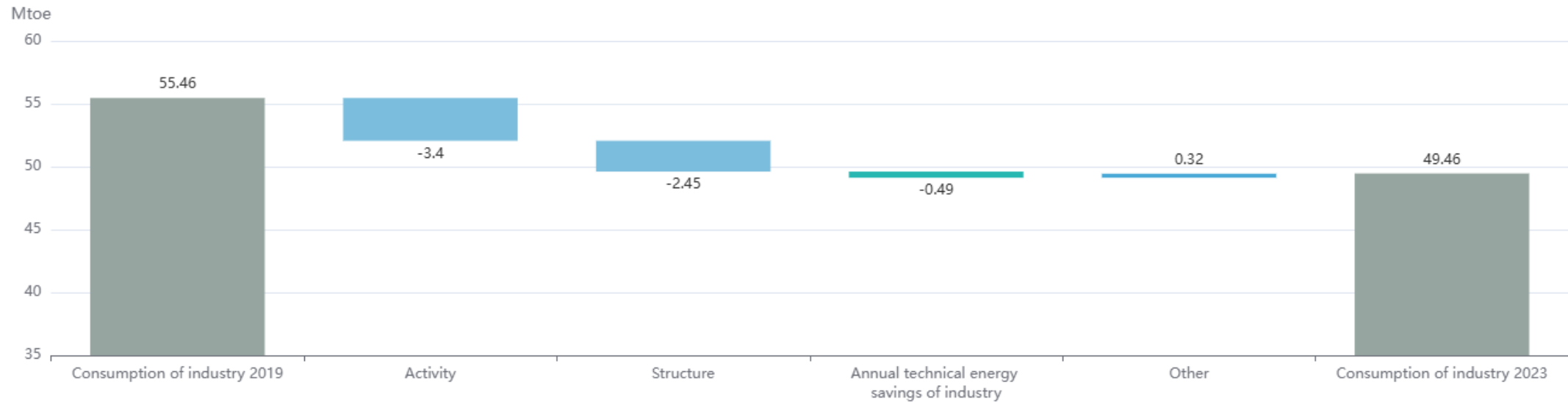
Niklas Reinfandt, Fraunhofer ISI

5-6 November 2025, Chişinău, Moldova



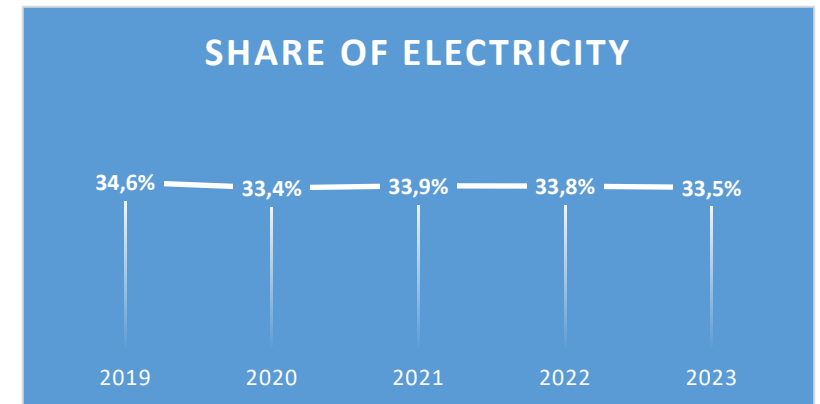
Indicators and decomposition

- Decomposition: Germany – industry 2019-2023



- Energy intensity and technical energy efficiency index of industry

Title	Unit	2019	2020	2021	2022	2023
Energy intensity of industry	MJ/EUR2015	2,76	2,88	2,78	2,70	2,54
Energy intensity of industry at constant structure	MJ/EUR2015	3,02	3,10	3,12	3,02	2,95
Technical energy efficiency index of industry		88,87	88,76	88,68	88,40	88,29



Measures

- Main measures with regard to energy efficiency and decarbonisation:

Decarbonisation

Two central measures:

- Klimaschutzverträge (Carbon Contracts for Difference)
- Support for energy-intensive industrial companies to build and operate sustainable, low-carbon production facilities that would otherwise not yet be profitable.
- second round just started (now including CCS)
- ex-ante GHG –savings in 2030*: 4,8 Mt CO₂-eq.
- **Bundesförderung Industrie und Klimaschutz (Federal funding for industry and climate protection)**
- Industrial projects that contribute to greenhouse gas neutrality (including SMEs)
- ax-ante GHG –savings in 2030: 1,3 Mt CO₂-eq.

Energy efficiency

- **Energy- and Resource Efficiency in the Economy**
- The EEE is the central public funding programme for German Industry
- It is a multi-measure programme consisting of several different modules
- ex-ante GHG –savings in 2030*: 4,6 Mt CO₂-eq.
- Detailed evaluation available (see next slides)

Further important measures:

- BEHG (Fuel Emissions Trading Act)
- Energy Efficiency and Climate Protection Networks Initiative

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Thank you!

Partners:





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Energy Efficiency of the Industry Sector in Georgia

November 5, 2025

Tengiz Ivanidze
Energy Efficiency Centre Georgia



This project has received funding from the European Union's LIFE programme under grant agreement No. 101075902

EE Indicators for Industry: Georgia's Progress and Challenges

- Georgia's industrial energy efficiency remains 2–2.5× lower than Western Europe.
- Energy intensity improving slowly - decreased by 13% (2013–2022).
- 2022 intensity: ≈ 0.76 MJ per 2020 USD PPP.
- Industrial energy intensity: 0.72 toe/000 USD vs. Germany 0.18.
- Key industrial sub-sectors by energy use:
 - Iron & Steel: 30%
 - Non-metallic minerals: 28%
 - Chemical & Petrochemical: 14%
 - Construction: 13%
- Progress due to UNIDO, EBRD GEFF, EU support programs.

Georgia's industry shows gradual improvement but remains among the least energy-efficient in Europe.

Energy Efficiency Policy Framework and Mechanisms

Policy Framework:

- Law on Energy Efficiency (2020)
- National Energy Efficiency Action Plan (NEEAP) – 14% energy savings target by 2025.
- GHG target: –35% vs. 1990; Industrial sector: –5%.
- Institutional development: MoESD with international partners creating an EE body.

Mechanisms:

1. Regulation & Standards – ISO 50001, energy audits.
2. Financial Instruments – EBRD GEFF, EU grants.
3. Capacity Building – UNIDO, EECG training.
4. Voluntary Agreements – industry–government partnerships.

Outcomes:

- Gradual decline in energy intensity.
- Increased awareness and pilot programs.

Barriers:

- Limited access to finance.
- Low energy prices reduce incentives.
- Lack of qualified energy auditors and data gaps.

Energy efficiency policies act through regulation, finance, and capacity building.

Unlocking Georgia's industrial potential requires enforcement, reliable data, and better financial access.

Thank you!

Energy Efficiency Centre Georgia

www.eecgeo.org



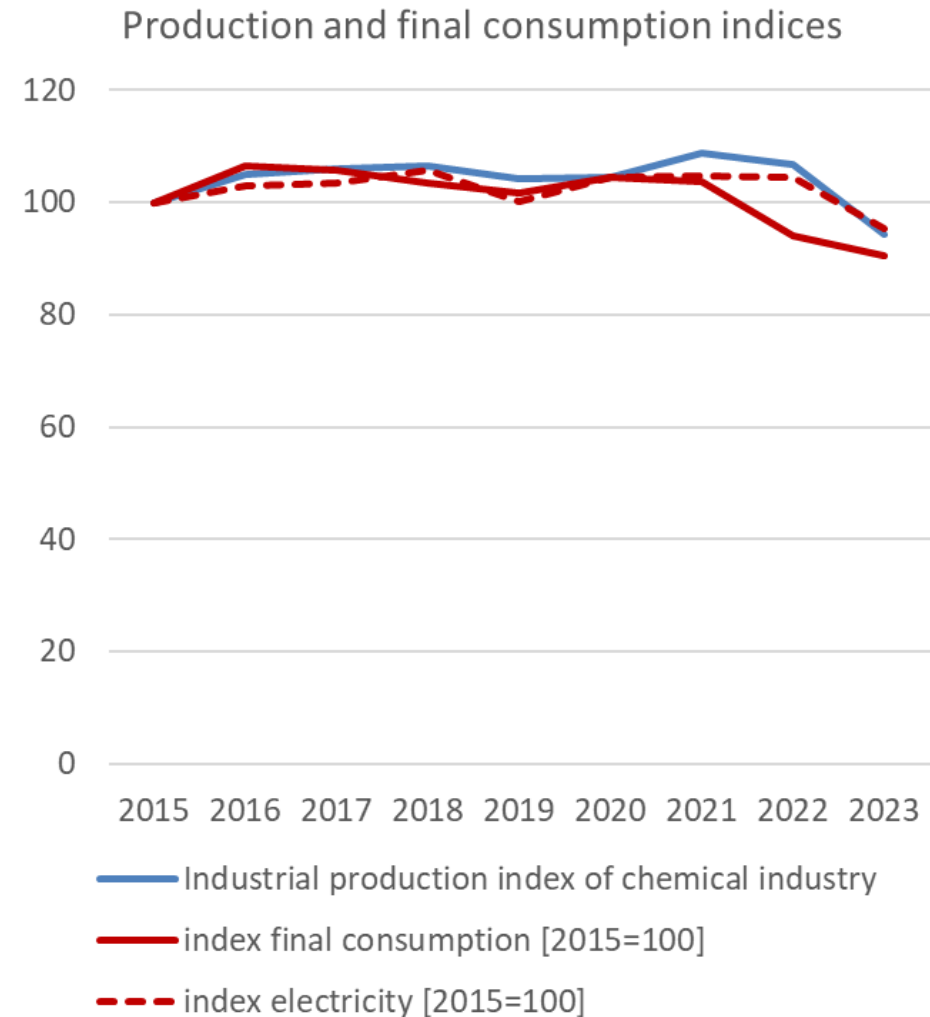
Production and final consumption of the Dutch chemical industry

The Dutch chemical industry uses 58% of final energy in the manufacturing industry (2023)

Total final energy consumption decreased in 2022 due to high energy prices

Electricity consumption remained stable in 2022

Lower production volume in 2023; fears of some de-industrialisation



Source data: Odyssee

Shares of gas and electricity in the Dutch chemical industry

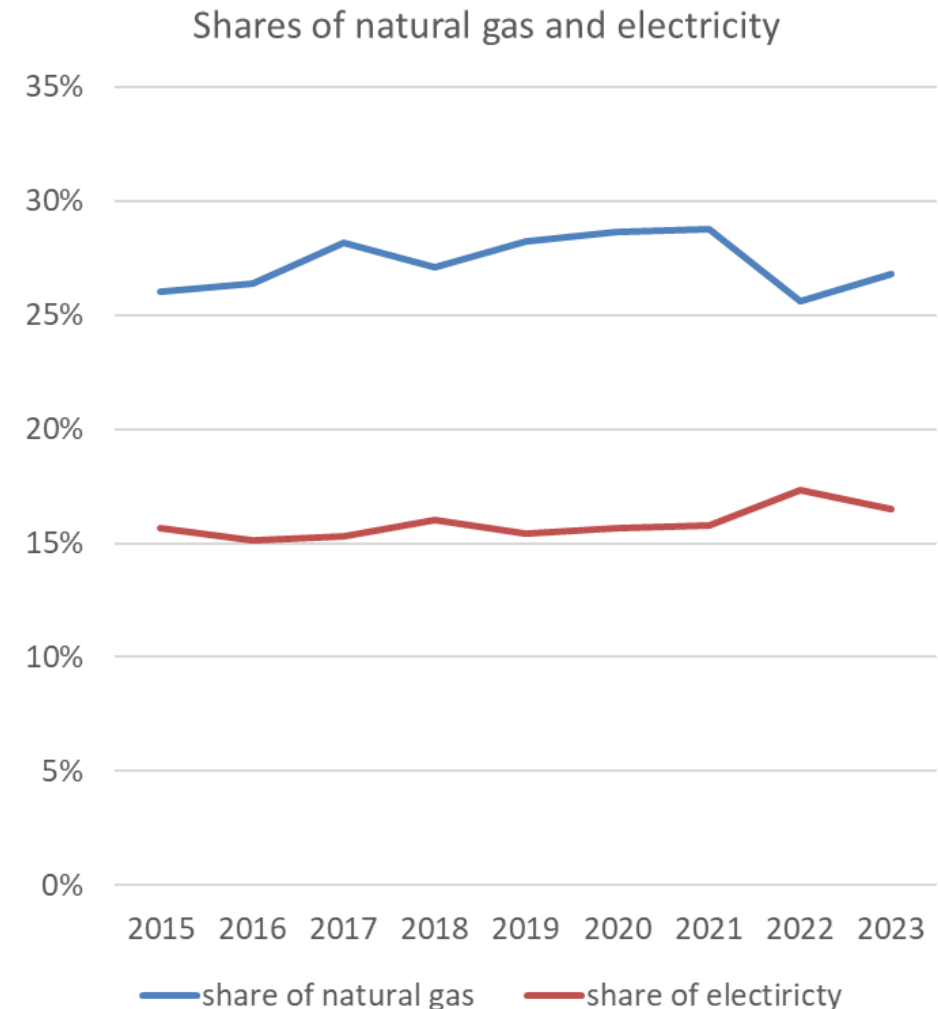
One of the goals of Dutch climate policy is electrification of industry

Policy measures: national carbon tax and subsidy for de-carbonisation measures

Network congestion is in the way

Nitrogen emission restrictions limit electricity grid extension

Limited increase in share of electricity shows the slow electrification



Source data: Odyssee

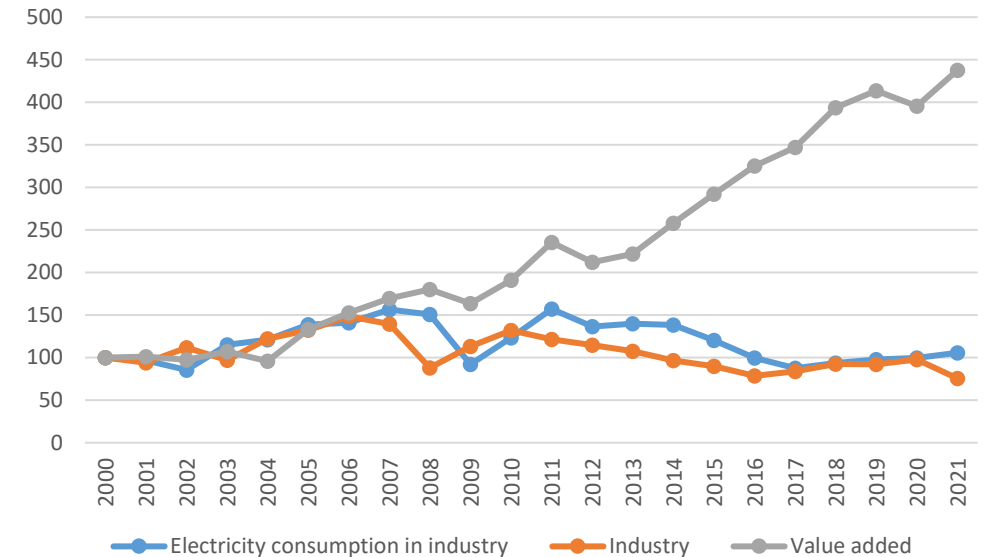
Energy Efficiency Indicators and Savings Trends in Industry – North Macedonia (2010–2023)

Key Developments

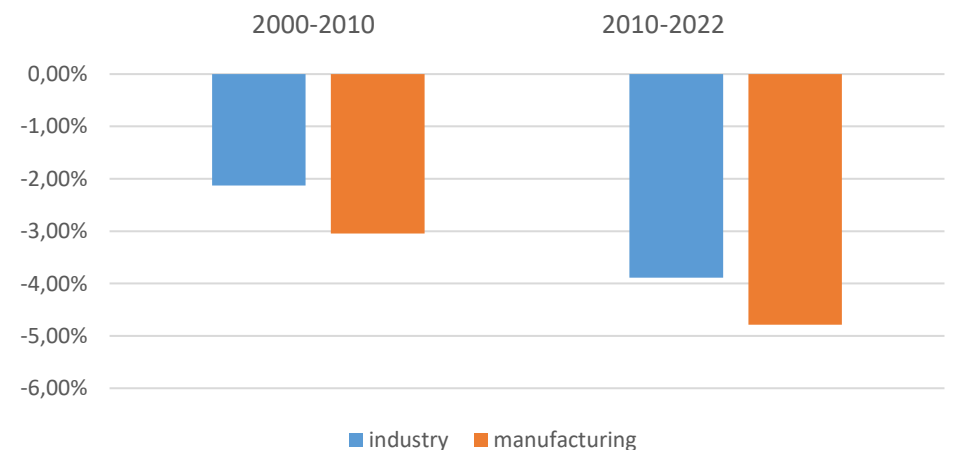
- Industrial energy intensity declined by approximately 25%, reflecting improved efficiency and technological upgrades.
- The share of electricity in total industrial energy consumption increased from 35% in 2010 to 46% in 2023, reflecting a trend toward electrification of industrial processes.
- Gradual substitution of oil-based fuels with natural gas and electricity, particularly after 2022, as part of efforts to strengthen energy security and reduce import dependency.

Sectoral Insights

- Most significant efficiency improvements observed in metallurgy, cement, and food industries, where modernisation and process control yielded major reductions in energy use per unit of output.
- The industrial sector is progressively decoupling energy consumption from production growth, aligning with EU energy-transition targets.



Divergence between the metrics - reflect structural changes in the economy, efficiency improvements, shifts toward other sectors



Trends in energy intensities in industry and manufacturing

Key Policy Measures (Implemented / Ongoing)

Efficient Electric Motors

- Gradual phase-out of outdated motors in manufacturing;
- Incentives for adoption of IE3/IE4 models;
- ~10–15% reduction in electricity demand per production unit.

Advanced Technologies & Energy Management

- Support for energy audits, process optimisation, and automation;
- Introduction of energy management systems in industrial facilities;
- Training and awareness campaigns for energy managers.

Strategic Focus:

- Promote electrification of industrial processes (heat pumps, electric furnaces);
- Improve energy security through diversification away from natural gas;
- Strengthen cooperation with the private sector to invest in efficient and low-carbon technologies.

Impact:

- Increased industrial competitiveness;
- Contribution to national targets under Energy development strategy and NECP
- Reduced CO₂ emissions and improved resilience to energy crises.

Energy Efficiency Policies in Polish Industry (MURE database)

High-efficient cogeneration support system – Improves air quality in cities through development of district heating based on low-emission sources.

Support for energy-intensive industries – Aims to reduce the carbon footprint of energy-intensive industries in Poland.

Industry for transformation – Supports the development of zero- and low-carbon solutions, with a focus on clean mobility and energy sectors.

County heating system – Reduces the environmental impact of district heating companies and improves air quality by supporting investment projects.

Polish Geothermal Plus – Promotes increased use of geothermal resources in Poland.

Roundtable on Energy Efficiency in Industry: Summary and Recommendations

*ODYSSEE-MURE – First physical meeting, Session 3
Chişinău, Moldova, 5 November 2025*

Barbara Schlomann

Fraunhofer ISI, Karlsruhe, Germany

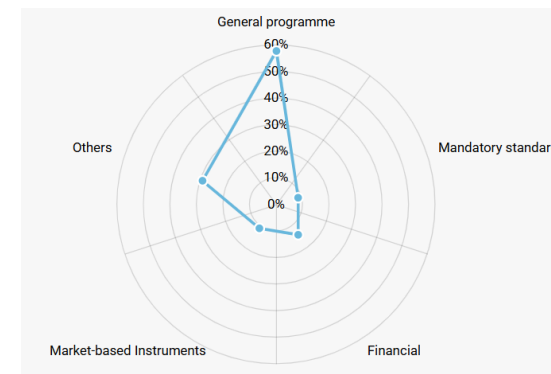
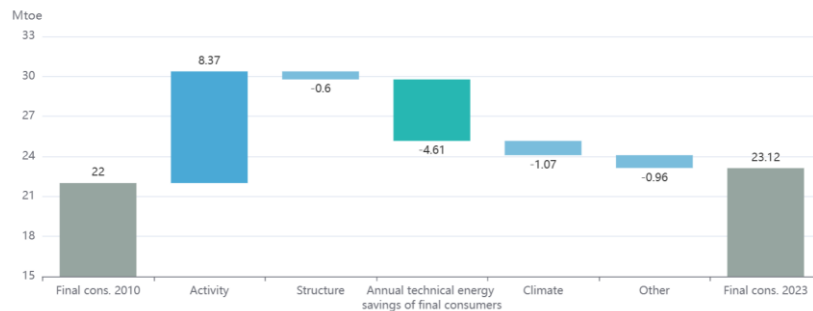


Introduction

From the interview for brochure „30 Years ODYSSEE-MURE“:

Didier: They are many results that can be drawn from the MURE database. Could you promote 2 of them?

Barbara: From MURE database itself, I think that the Radar graphs are a very nice visualization of policy mixes which could be promoted a little more. **The wealth of data in the ODYSSEE-MURE project is fully exploited, especially when results from both databases are combined.** By this, I do not just mean the Combined Tools, i.e. the Energy Efficiency First Tool, the Multiple Benefits Tool and the European Energy Efficiency Scoreboard, but also **the use of different results from both databases to tell a nice story on energy efficiency.**



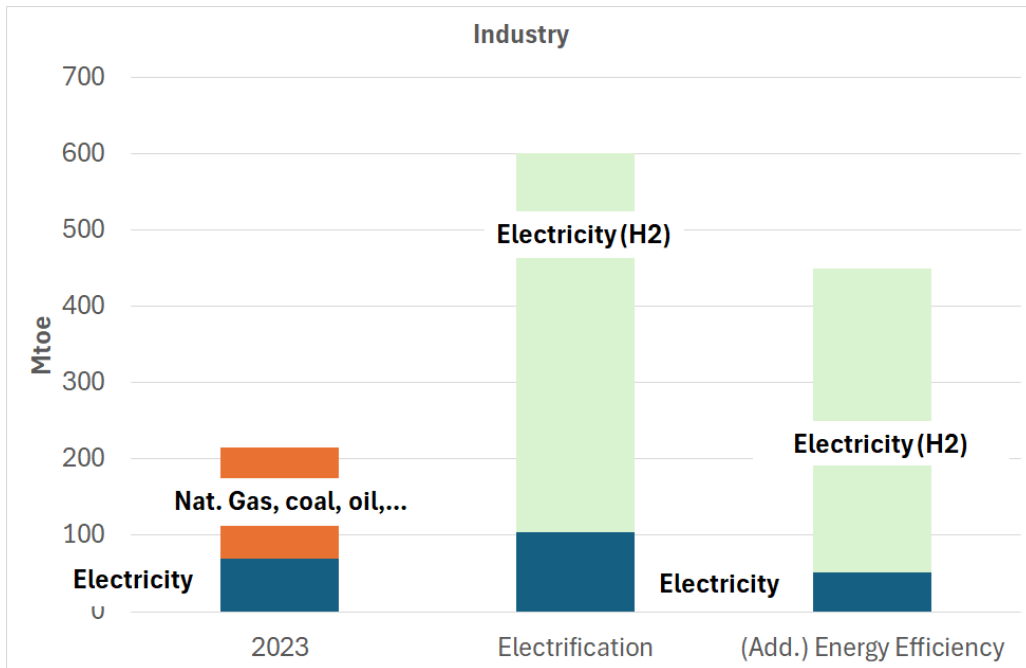
Summary of the roundtable presentations: Nice stories on energy efficiency in industry

- **Bulgaria:** The ODEX and the decomposition of industrial energy consumption is linked to the quantitative impact of 3 key policy measures for industry.
- **Finland:** The development of CO₂ emissions of industry since 2000 is linked to the main policy measure, the Energy Efficiency Agreements for Industries.
- **France:** Development of key energy efficiency, economic and ecologic (CO₂) indicators for industry is linked to the key policy measures for industry in the last 20 years.
- **Germany:** The development of ODEX and the decomposition of energy consumption in the last 5 years is linked to the main policy measures addressing energy efficiency and decarbonisation in industry.
- **Georgia:** Key energy efficiency indicators for industry and energy-intensive sub-sectors are compared with other countries (Western Europe, Germany) and linked to the policy framework and main barriers.
- **Netherlands:** Key indicators for one energy-intensive industry and role of electrification in industry.
- **North Macedonia:** Development of key energy efficiency and economic indicators and structural changes are linked to key policy measures and their multiple impacts (competitiveness, energy efficiency targets, CO₂ emissions, energy security).
- **Poland:** Energy efficiency trends in 4 energy-intensive industries in the last 10 years are linked to the main policies addressing especially the energy-intensive industries and their multiple impacts (air quality, reduction of carbon footprint).

Conclusions and Recommendations

- **Indicators** and **Policies** complement each other → ODEX and Decomposition are frequently used on the indicator side, the quantitative impact is an important figure on the measure side.
- **Decarbonisation** of energy-intensive industries becomes increasingly important → CO₂ indicators and CO₂ decomposition are useful tools for mapping this.
- **Competitiveness** and **Energy Efficiency** are not a conflict, but an opportunity → energy efficiency measures strengthen competitiveness of industry both at the level of companies and the whole economy by lowering energy costs and increasing productivity.
- **Multiple benefits** of **Energy Efficiency** beyond pure energy and energy cost savings are an important justification for the “Energy Efficiency First” principle and for ambitious energy efficiency policies → the Multiple Benefits Tool of ODYSSEE-MURE and SEED MICAT help to make these impacts visible and quantifiable.
- **Electrification** of industry is a key strategy → **Energy Efficiency** is an important addition.

Conclusions and Recommendations



Electrification

- Industrial heat pumps
- Further electrification gas-based processes (steam generators)
- Hydrogen-based energy intensive processes (iron/steel...)
- Question of importing hydrogen, of moving some of the new H2-based processes abroad

(additional) Energy Efficiency

- Electricity motors and applications (70% of present electricity uses)
- Steam generators (30% of present thermal uses)
- Eco-design policies
- Circular economy strategies (including material substitution)
- R&D for improving energy-efficiency of energy intensive processes (cement, ammonia, steel...)

Source: Wolfgang Eichhammer: Presentation at the Inter-Parliamentary Meeting on Renewable Energy and Energy Efficiency (IPM25 Copenhagen)

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Thank you!

Barbara Schlomann

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Partners:

