Press release

EU's CO2 emissions from fossil fuels drop 8%, reaching the lowest levels in 60 years

HELSINKI, 24 January, 2024 - The EU's progress in reducing emissions has accelerated significantly in 2023. A new research paper produced by the Center for Research on Energy and Clean Air (CREA) found that the bloc's annual CO2 emissions from fossil fuels dropped 8% in 2023, reaching levels unseen since the early 1960s. More than half of this reduction comes from a cleaner electricity mix.

Cleaner electricity production contributed to 56% of the reduction in emissions — due in part to continuous growth of solar & wind as well as a rebound in hydropower and nuclear availability. A decrease in electricity demand contributed 8%, while reductions in other sectors, primarily industry and transport, accounted for the remaining 36%. Weather conditions were favourable again this year and were responsible for 19% of the electricity demand reduction.

Coal consumption — which had risen in 2021 and 2022 — has now dipped below pre-pandemic levels. CO2 emissions from coal have seen a year-on-year decline of 25% and have nearly halved since 2015 (-48%). Fossil gas also saw a significant decline with estimated emissions falling by approximately 11%.

"*Though these are initial estimates, they bring a wave of hope*," Hubert Thieriot, Data Lead at CREA said. "*The EU has seen a significant reduction in CO2 emissions, primarily fueled by the advancement in low-carbon electricity sources. However, this decline also reflects a unique convergence of factors that may not recur in 2024, including a surge in hydropower availability, a warm winter and an economic slowdown. To meet its 2030 and 2050 targets, the EU must redouble its efforts and commitment towards electrification and development of low-carbon sources of energy*."

"In 2023, EU CO2 emissions have finally fallen back to levels apparent in my parents generation in the 60s. Yet, over this time period, the economy has tripled, showing that climate change can be combated without foregoing economic growth," said Isaac Levi, Europe-Russia Policy & Energy Analysis Team Lead at CREA. *"The 8% reduction in emissions*

should be celebrated but more must be done to wean the EU off fossil fuels, reduce reliance on petrostates such as Russia, whilst also leaving the world a better place for the next generation."

The EU's gains in reducing emissions are due in part to a shift away from fossil fuels. CREA believes that for sustained growth, this shift must extend beyond the immediate concern of dependency on Russia. It is crucial to diversify energy sources and smoothen the transition to clean energy. A commitment such as this will not only enhance energy security but also aligns with the EU's climate objectives, ultimately mitigating greenhouse gas emissions.

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Note to editors

The CREA report related to this press release can be found here.

CREA has investigated and previously reported on the effectiveness of the EU's sanctions on Russia, the country's ability to still earn revenue from its oil via third countries, and the increased use of a 'shadow' fleet to transport its oil.

We have also produced analysis on the effect of renewables on reducing the EU's dependence on fossil fuels.

All CREA publications can be found here:
energyandcleanair.org/publications

About CREA

The Centre for Research on Energy and Clean Air (CREA) is an independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions, to air pollution. CREA was founded in December 2019 in Helsinki and has staff in several Asian and

European countries. The organisation's work is funded through philanthropic grants and revenue from commissioned research.

www.energyandcleanair.org

About the data

Throughout this briefing, CO2 emissions refer to CO2 emissions from fossil fuels only and from the power generation, industry and transport sectors. Agriculture and LULUCF are not included, nor are methane emissions.

We use "fossil gas" throughout this briefing to refer to fossil methane, i.e. natural gas of fossil origin.

CO2 emissions

The data used for power generation by fuel type and CO2 emission is from CREA's platform that can be accessed here. The charts can be viewed on our live EU CO2 emission tracker.

Emissions are estimated from power output based on average emissions from coal and gas-fired generation by country. These are derived by aligning the daily power generation data with earlier Eurostat monthly data on hard coal, lignite and gas use for power generation.

Gas consumption is obtained from daily data on gas flows from ENTSOG, the European gas network operator. We calculate "apparent consumption", which is the residual of imports from outside the EU, domestic production and flows into and out of storage.

For total oil consumption and for coal consumption outside the power sector, we extend the latest monthly data from EUROSTAT for each country, based on the average deviation from the 2019–2021 average in the past three months. For oil, consumption is based on observed gross inland deliveries, a measure of implied oil consumption based on refinery output, imports, exports and stock changes, as well as deliveries of crude oil and natural gas liquids to non-refinery users, along with several smaller flows (see full definition). For coal, usage is based on final consumption reported by (industrial) users and sales to residential and commercial consumers reported by sellers. Currently, data is available for most countries until the end of August 2022.

CO_2 emissions are estimated from data on fuel consumption, using the Intergovernmental Panel on Climate Change (IPCC) default emissions factors.

Power generation

We collect daily power generation data from the transparency platform of ENTSO-E, the European power grid operator. Note that this dataset may not fully cover the EU-27 region due to missing data points. While trends have shown to be well aligned with other sources (e.g. EMBER), the absolute amounts of electricity demand are likely to be underestimated.

Decomposition of power sector CO2 emission decline

We use a logarithmic-based decomposition, starting with:

$$E = G.I$$

where E represents CO2 emissions, G is the total electricity generation, and I is the average emission intensity.

The change in emissions between 2023 and 2022 can be expressed as:

$$\frac{E_{2023}}{E_{2022}} = \frac{G_{2023}}{G_{2022}} \cdot \frac{I_{2023}}{I_{2022}}$$

Applying logarithm on both side, we obtain:

$$ln\left(\frac{E_{2023}}{E_{2022}}\right) = ln\left(\frac{G_{2023}}{G_{2022}}\right) + ln\left(\frac{I_{2023}}{I_{2022}}\right)$$

Or in other terms,

$$1 = \frac{ln\left(\frac{G_{2023}}{G_{2022}}\right)}{ln\left(\frac{E_{2023}}{E_{2022}}\right)} + \frac{ln\left(\frac{I_{2023}}{I_{2022}}\right)}{ln\left(\frac{E_{2023}}{E_{2022}}\right)}$$

Where the first term of the right-hand side can be understood as the contribution of the power generation change and the second one as the contribution of the change in emission intensity (i.e. change in electricity mix).