

We can expect more emissions from oil refineries in the near-term future, analysis finds

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A global inventory has revealed that CO₂ emissions from oil refineries were 1.3 Gigatonnes (Gt) in 2018 and could be as large as 16.5 Gt from

2020 to 2030. Based on the results, the researchers recommend distinct mitigation strategies for refineries in different regions and age groups. The findings appear August 20 in the journal *One Earth*.

"This study provides a detailed picture of oil refining capacity and CO₂ emissions worldwide," says Dabo Guan of Tsinghua University.

"Understanding the past and future development trends of the oil refining industry is crucial for guiding regional and global emissions reduction."

Climate change is one of the most fundamental challenges facing humanity today, and continuous expansion of fossil-fuel-based energy infrastructure may be one of the key obstacles in achieving the Paris Agreement goals. The oil refining industry plays a crucial role in both the energy supply chain and climate change. The petroleum oil refining industry is the third-largest stationary emitter of greenhouse gases in the world, contributing 6% of all industrial greenhouse gas emissions. In particular, CO₂ accounts for approximately 98% of greenhouse gases emitted by petroleum refineries.

In the new study, Guan and his collaborators developed a [publicly available](#) global inventory of CO₂ emissions from 1,056 [oil refineries](#) from 2000 to 2018. CO₂ emissions of the refinery industry were about 1.3 Gt in 2018. If all existing and proposed refineries operate as usual, without the adoption of any low-carbon measures, they could emit up to 16.5Gt of CO₂ from 2020 to 2030. Based on the findings, the authors recommend mitigation strategies, such as improving refinery efficiency and upgrading heavy oil-processing technologies, which could potentially reduce global cumulative emissions by 10% from 2020 to 2030. The inventory will be updated and improved in the future as more and better data become available.

The study also showed that the average output of global oil refineries

gradually increased from 2000 to 2018, in terms of barrels per day. But the results varied by [refinery](#) age group. Specifically, the average capacity of young refineries, which are mainly distributed in Asia-Pacific and the Middle East, increased significantly from 2000 to 2018, while the average capacity of refineries older than 19 years remained stable. "Given the greater committed emissions brought about by the long remaining operating time of young refineries, there is an urgent need for these refineries to adopt low-carbon technologies to reduce their CO₂ emissions," Guan says. "As for middle-aged and old refineries, improving operational efficiency, eliminating the backward capacity, and speeding up the upgrading of refining configuration are the key means to balance growing demand and reducing CO₂ emissions."

More information: *One Earth*, Lei et al.: "Adaptive CO₂-emission mitigation strategies of global oil refineries in all age groups"

[www.cell.com/one-earth/fulltext ... 2590-3322\(21\)00410-3](http://www.cell.com/one-earth/fulltext...2590-3322(21)00410-3) , DOI: [10.1016/j.oneear.2021.07.009](https://doi.org/10.1016/j.oneear.2021.07.009)

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