



Al-Mustaqbal University
Scientific Affairs Department

Case Study: Oil Industry Emissions in Iraq According to the World Bank

BY

Dr. Tariq Jwad

&

Dr. Mohammed Al-bahrani

Introduction & Background

Environmental emissions from Iraq's oil industry pose significant challenges to achieving sustainable development goals. This study examines the emission data provided by the World Bank and explores measures for effective management and reduction.

The oil industry in Iraq is a critical sector for national economic growth but also contributes significantly to environmental pollution. The World Bank publishes reliable data on emissions, including CO_2 and CH_4, to support environmental policy and transparency, facilitate accountability, and encourage investments in sustainable solutions.

Objectives

- To assess current emission levels from Iraq's oil sector.
- To evaluate the effectiveness of gas investment initiatives aimed at reducing emissions.
- To recommend strategies towards achieving zero emissions by 2040.

Methodology

- Data collection from World Bank reports and COP conferences.
- Quantitative analysis of CO_2 and CH_4 emission data.
- Evaluation of gas flaring and utilization strategies.

Case Presentation:

Recent data indicate a decrease in associated gas flaring emissions, dropping significantly by 2023 due to increased investments in gas capture and utilization. Emissions are measured in kg CO_2 equivalent, which consolidates the greenhouse effects of various gases into a single metric.

Key oil fields with high emission levels include six major fields, each with specific challenges hindering efficient gas utilization and emission reduction.

Relation to SDG 13 (Climate Action)

This case study directly relates to Sustainable Development Goal (SDG) 13, "Climate Action," which calls for urgent measures to combat climate change and its impacts. By assessing and reducing emissions from the oil industry, Iraq aligns itself with global climate agreements and demonstrates its commitment to lowering greenhouse gas emissions, enhancing resilience to climate-related hazards, and integrating climate change measures into national policies and strategies.



COP 29 Commitments to Methane and Carbon Emission Reduction:

COP 29 has reinforced international commitments to significantly reduce methane and carbon emissions. These commitments aim to reduce methane emissions by at least 30% from current levels by 2030 and accelerate carbon neutrality targets globally. Iraq's adherence to these international standards is crucial in achieving substantial emission reductions, supported by strategic gas capture and utilization projects.



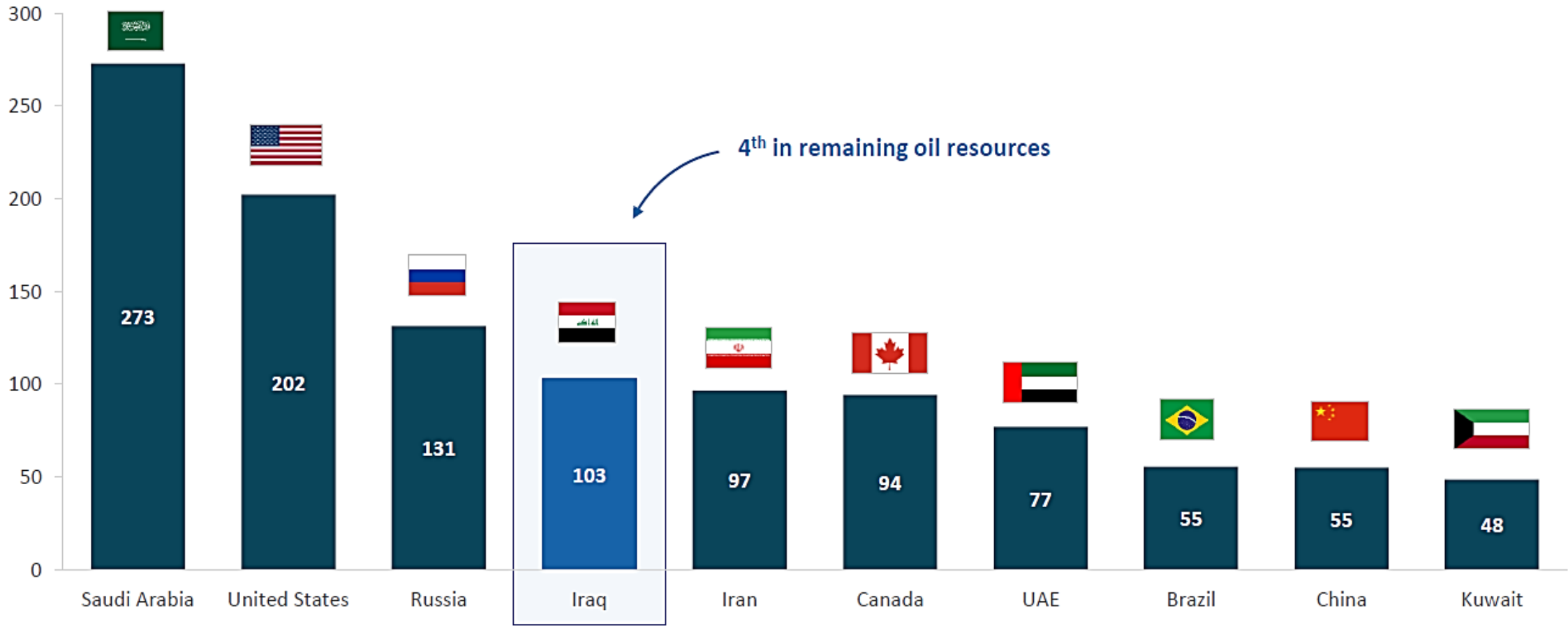
Why is the World Bank Authorized to Publish Environmental Pollution and Emission Data?

The World Bank has been authorized to publish environmental pollution and emission data because:

- It supports environmental and developmental policies.
- It enhances transparency and accountability.
- It assists countries in developing effective sustainable solutions.
- It facilitates evaluating progress toward global environmental objectives.
- It encourages investments in green solutions.
- It is recognized internationally as a reliable source of emission data, as agreed in various Conferences of the Parties (COP) since 1996.
- The World Bank has authorized specific companies to disseminate this data, ensuring consistent and credible reporting.

Iraq is well positioned to meet future oil demand with the 4th most oil resources in the world...

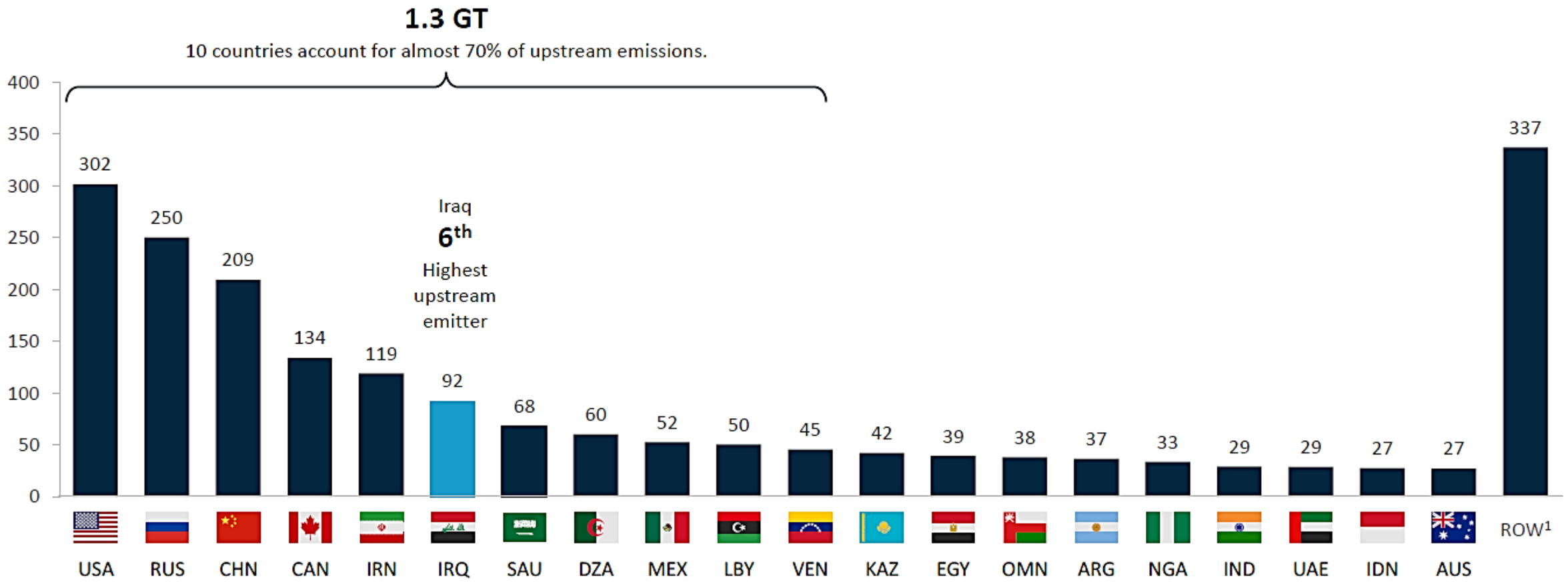
Top ten countries by remaining oil resources[1]
Billion barrels of oil



1) Resources is defined as the sum of all future expected production
Source: Rystad Energy research and analysis; Rystad Energy UCube

The Iraqi upstream sector is among the highest emitting in the world

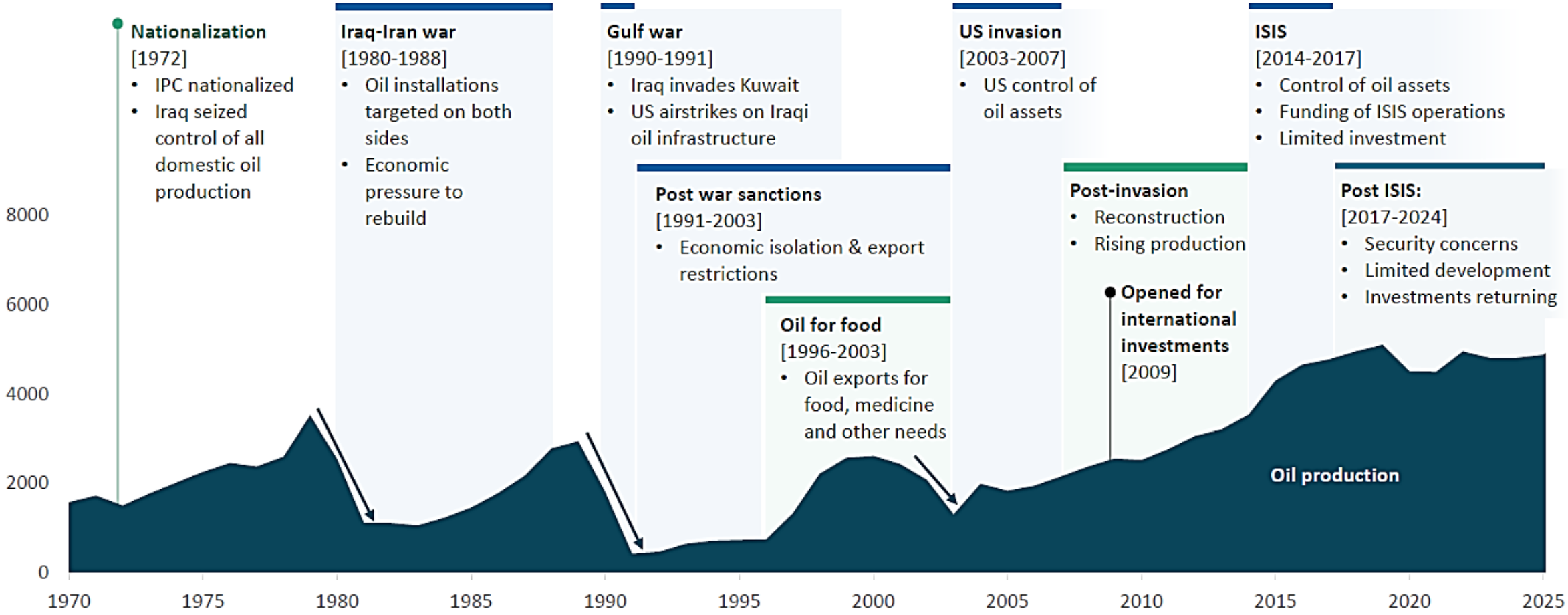
World upstream oil and gas emissions by country (CO2 and CH4 as CO2eq), 2023
Million tonnes CO2eq



1) Rest of the World
Source: Rystad Energy research and analysis; Rystad Energy UCube

However, war, terrorism and unease have limited the development of the Iraqi O&G sector…

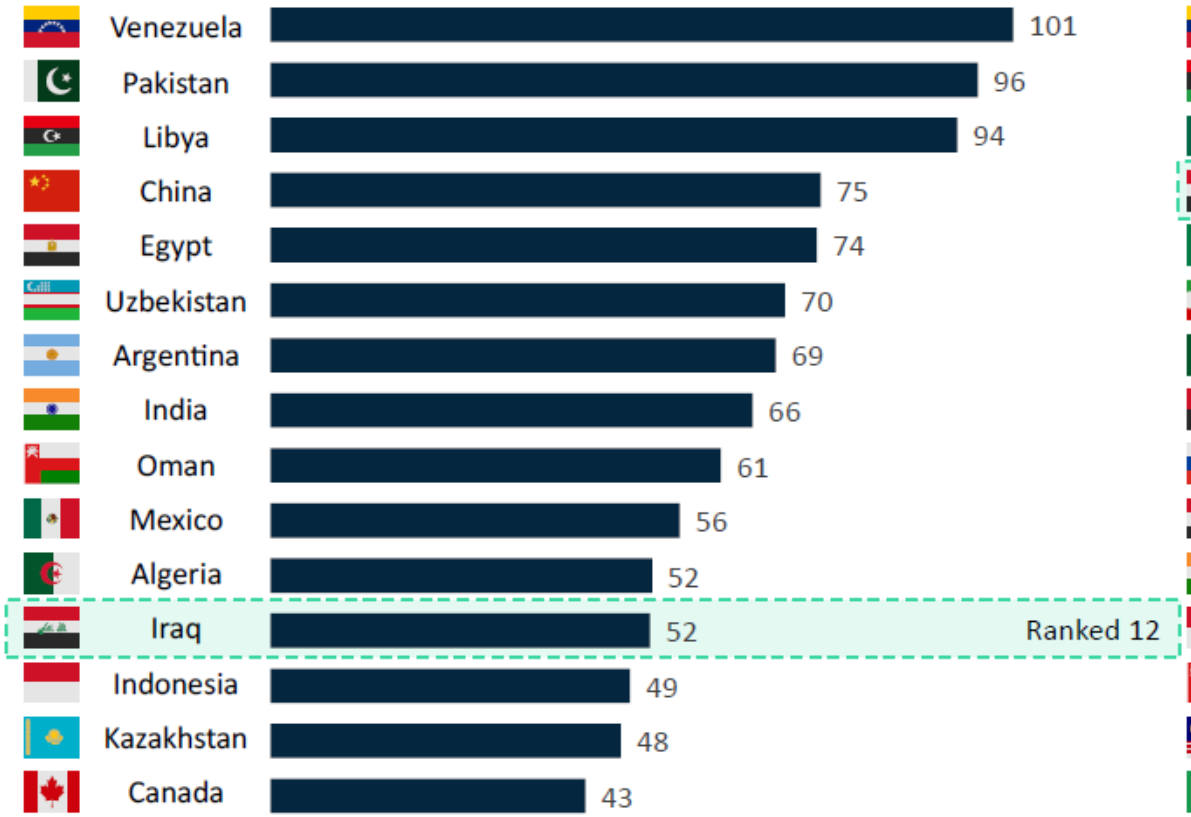
History of oil production, wars and intervention in Iraq
Oil production in Kbbl/d



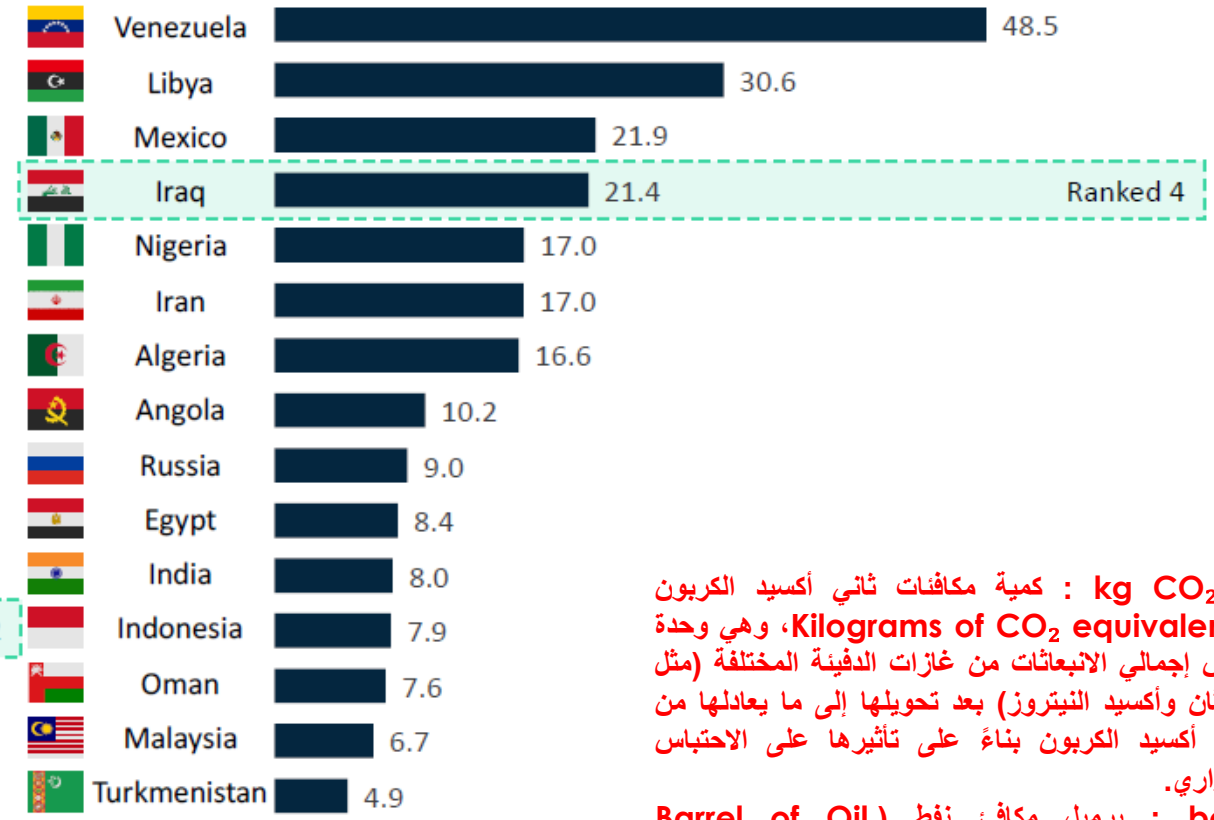
Source: Rystad Energy research and analysis; Rystad Energy UCube

Iraq's upstream sector is among the world's most emission-intensive with significant flaring

Upstream total emission intensities by country (top 15), 2023
kg CO2eq/boe



Flaring emission intensities by country (top 15), 2023
kg CO2eq/boe



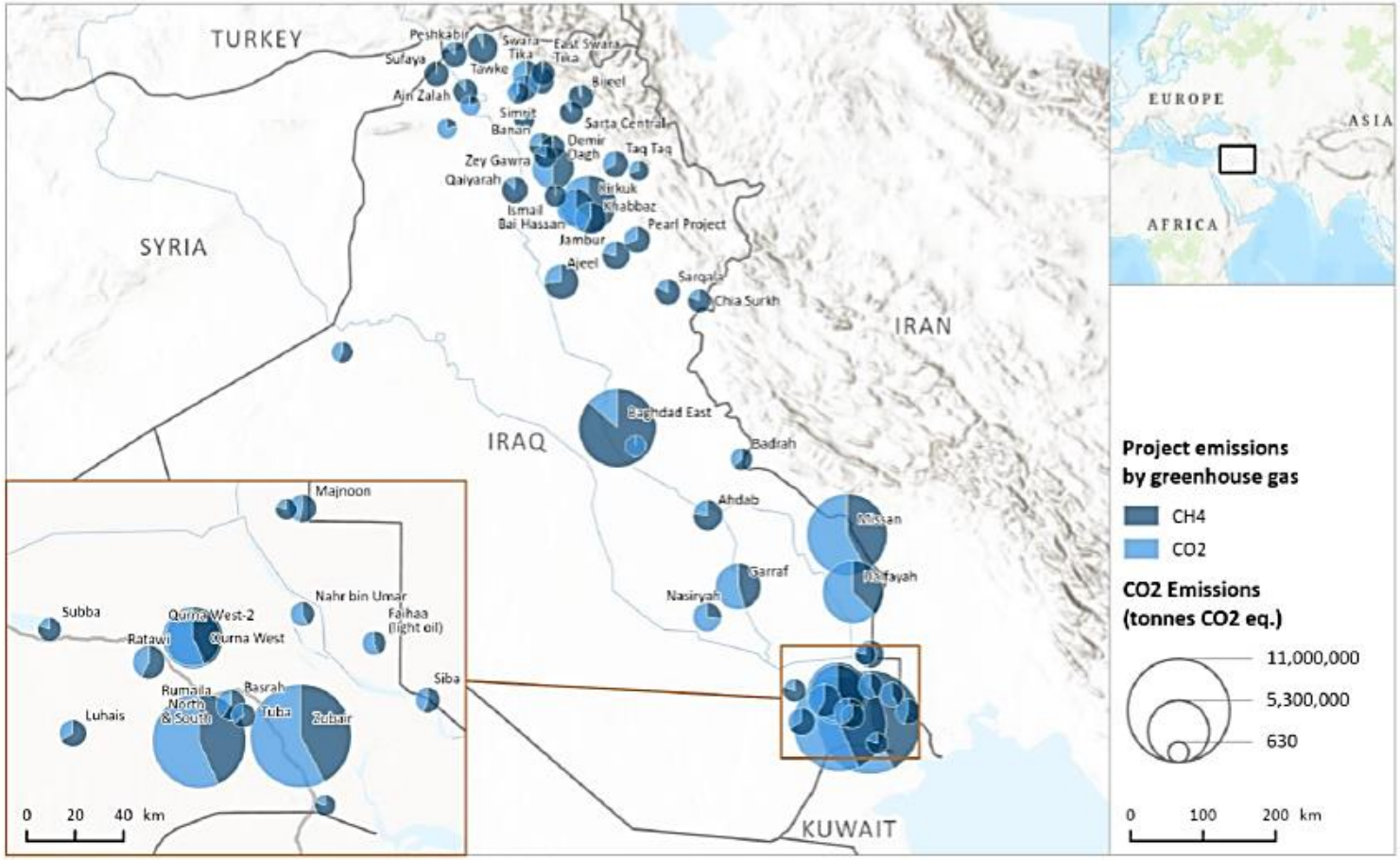
Source: Rystad Energy research and analysis; Rystad Energy UCube

kg CO_2eq : كمية مكافئات ثاني أكسيد الكربون (**Kilograms of CO_2 equivalent**)، وهي وحدة تقيس إجمالي الانبعاثات من غازات الدفيئة المختلفة (مثل الميثان وأكسيد النيتروز) بعد تحويلها إلى ما يعادلها من ثاني أكسيد الكربون بناءً على تأثيرها على الاحتباس الحراري.

boe : برميل مكافئ نفط (**Barrel of Oil Equivalent**)، وهي وحدة قياس تستخدم لتوحيد كميات الطاقة المختلفة بحيث تعادل الطاقة الموجودة في برميل واحد من النفط الخام.

Iraqi O&G emissions are mainly clustered in the Basra and the Al Jazira - Kurdistan region

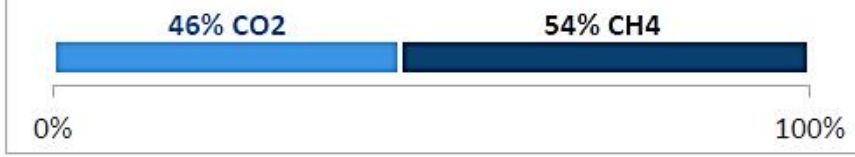
Iraq's oil and gas upstream emissions by project, 2023
Tonnes CO2eq



92 Mt CO2eq upstream O&G emissions in 2023

61% in Basra region due to concentrated major projects
30% in Kurdistan and Al Jazira with more scattered projects

Upstream Emission by CO2 and CH4
% of total emissions



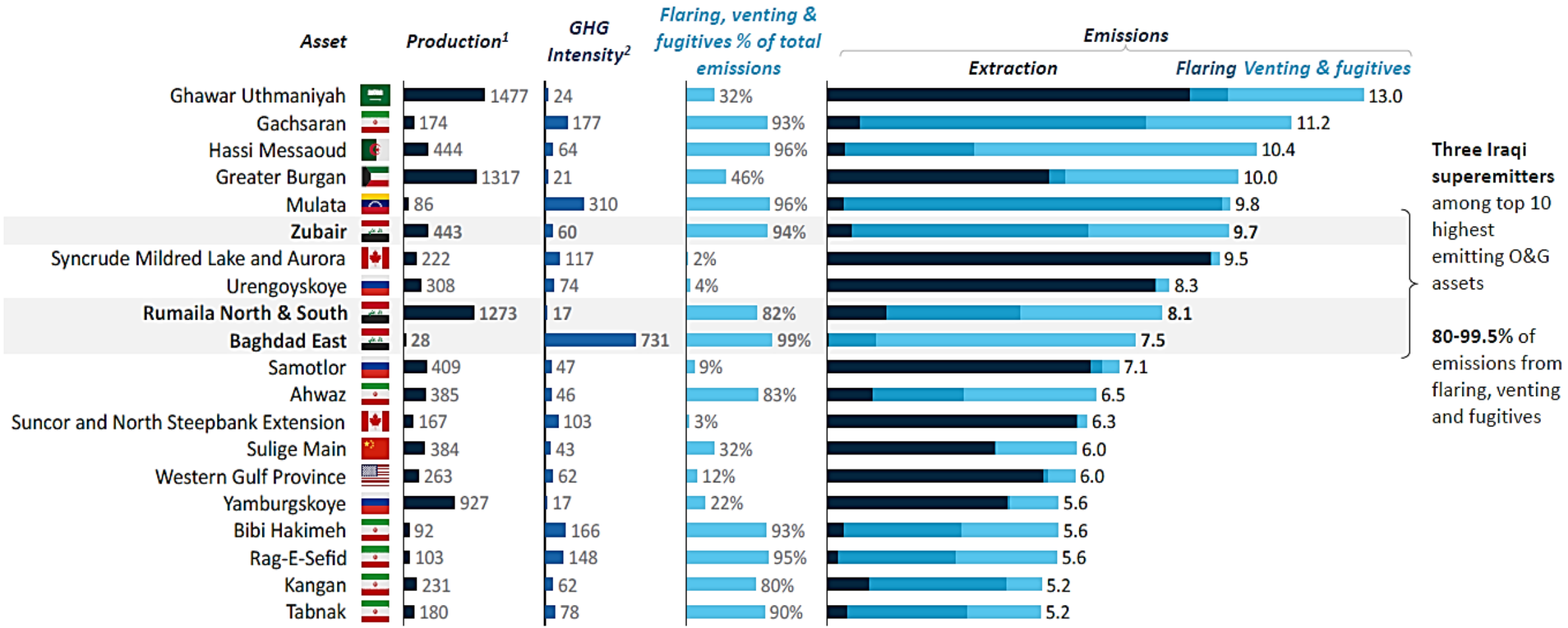
Upstream Emission Intensity
kg CO2eq/boe



Source: Rystad Energy research and analysis; Rystad Energy UCube

Superemitters in Iraq, are on the list of top 10 emitters, driven by flaring, fugitives and venting

Top 20 Oil and gas assets by emissions, split by extraction, flaring and venting/fugitive emissions
Million tonnes CO2eq



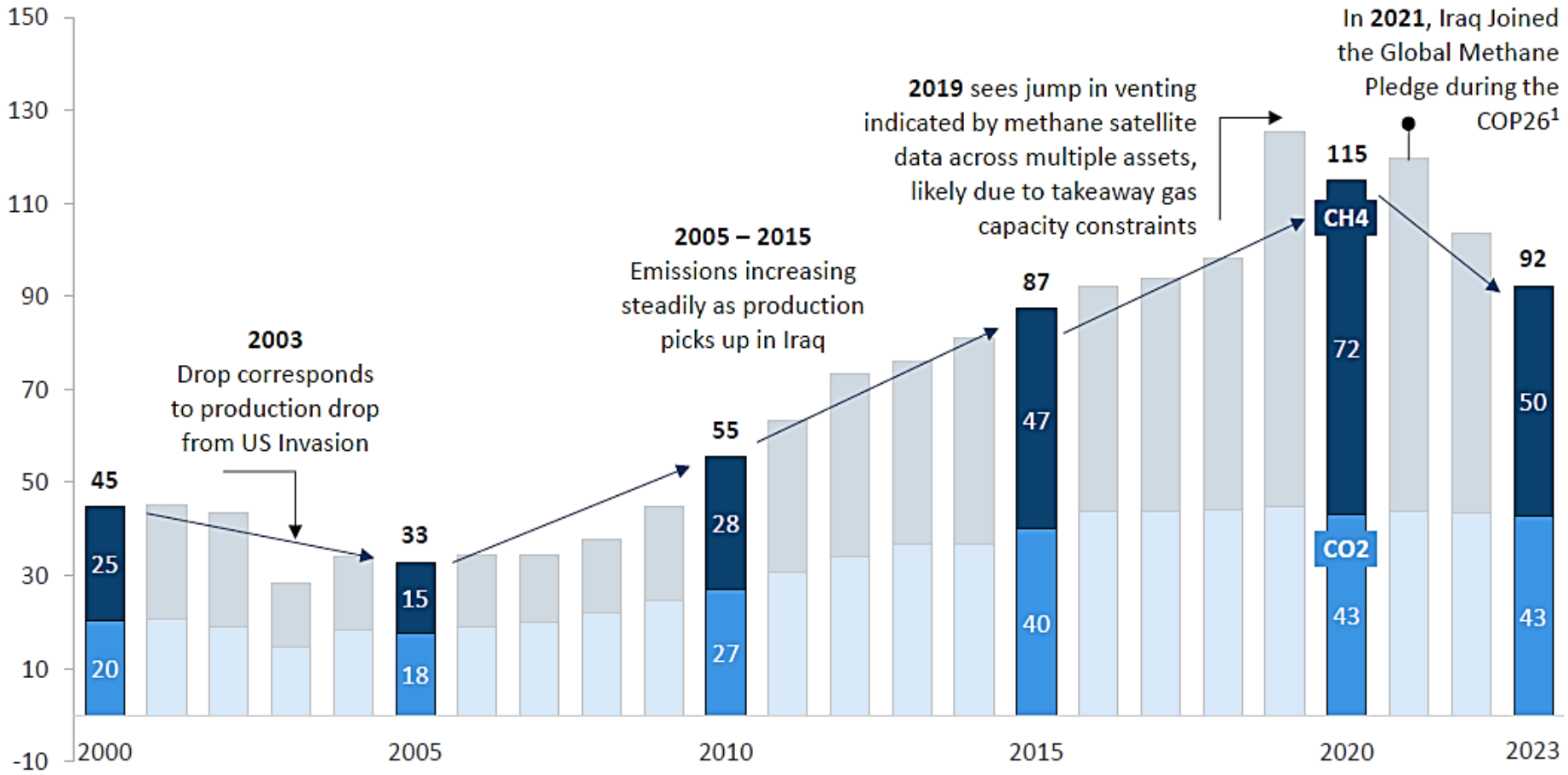
Three Iraqi superemitters among top 10 highest emitting O&G assets

80-99.5% of emissions from flaring, venting and fugitives

1) Production in kbbl/d; 2) GHG intensity including CH4 and CO2 in kg CO2 eq. (100 year potential) / boe
Source: Rystad Energy research and analysis

Upstream emissions steadily increased towards 2021 with recent initiatives driving reductions

Upstream emissions in Iraq, split by CO2 and CH4 emissions, 2010 - 2023
Million tonnes CO2eq



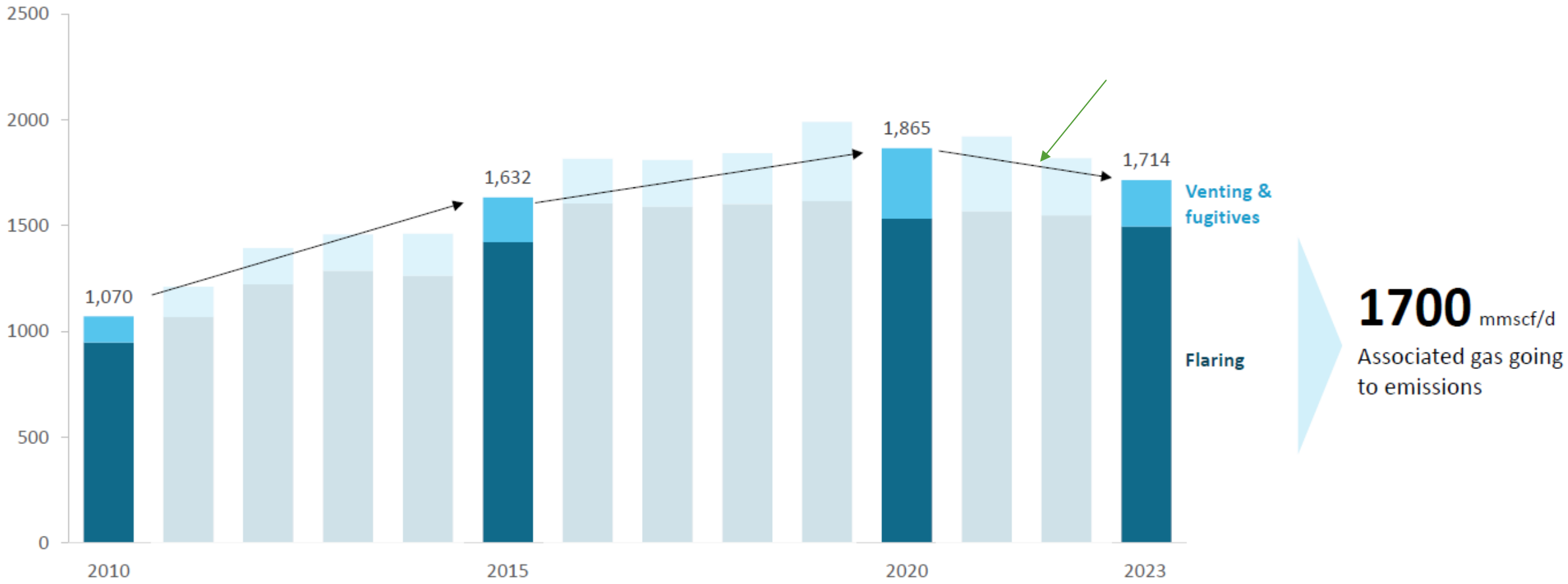
Iraq's commitment

- **Eliminate routine flaring**
  The O&G industry in Iraq has pledged to eliminate routine flaring by 2030
- **Reduce methane emissions by 30%**
  Nationally, Iraq joined the methane pledge in 2021 to reduce methane emissions by 30% by 2030 compared with 2020 levels

1) United Nations Climate Change Conference in Glasgow
Source: Rystad Energy research and analysis; Rystad Energy UCube

Over 1700 million square feet of natural gas is emitted per day through flaring, venting or fugitives

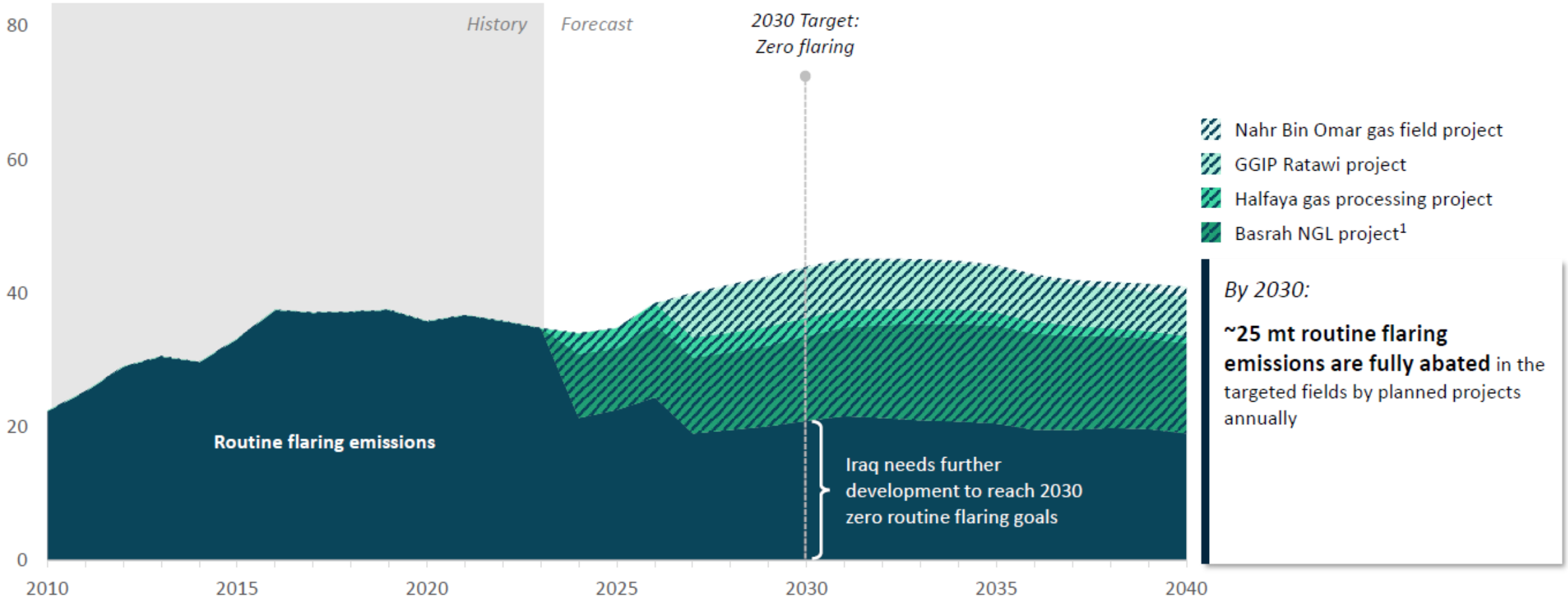
Associated gas volume by treatment
mmscf/day



Source: Rystad Energy research and analytics; Rystad Energy UCube

Current gas utilisation projects are not sufficient to get Iraq to zero routine flaring by 2030

Routine flaring emissions after gas capture and utilisation projects, forecasted to 2040
Million tonnes CO2eq

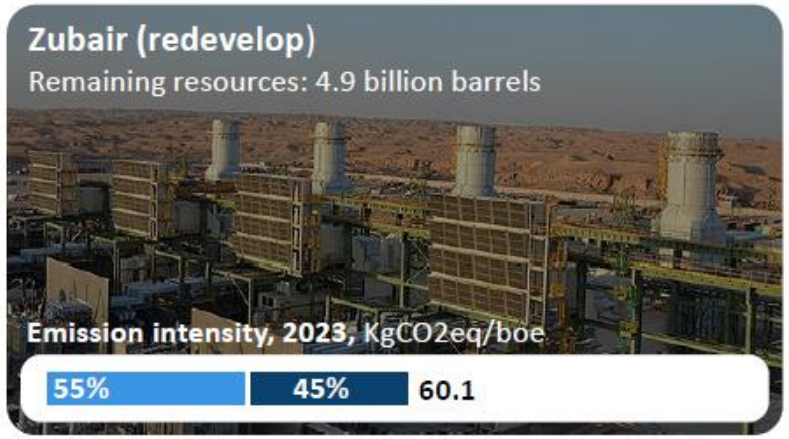


1) Basrah NGL project phase 1 started in 2023, but is only expected to achieve full capacity in 2024 together with phase 2, so 250 mmcfd capacity is estimated to come online from this project in 2024.
Source: Rystad Energy research and analytics; Rystad Energy UCube; Iraq Business News; Middle East Business Intelligence; The Arab Gulf States Institute in Washington

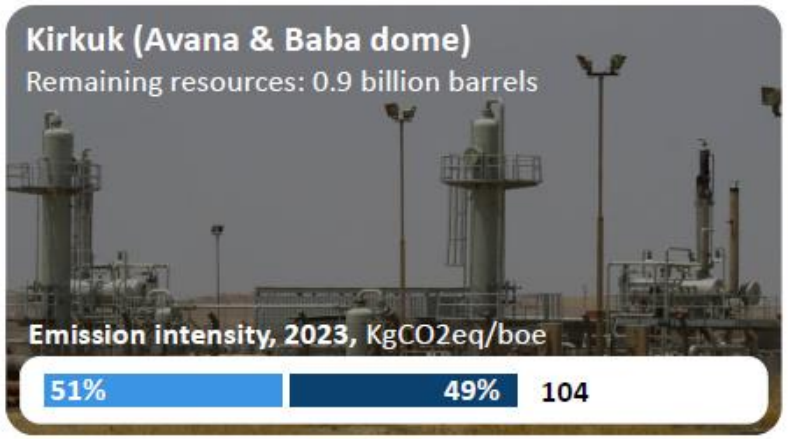
Altogether, these top assets contributed 40% of upstream emissions in 2023

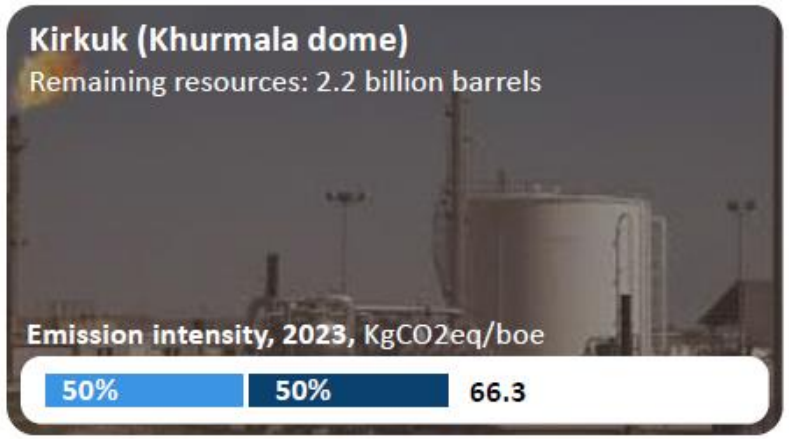
Overview of the six largest upstream emitters in Iraq

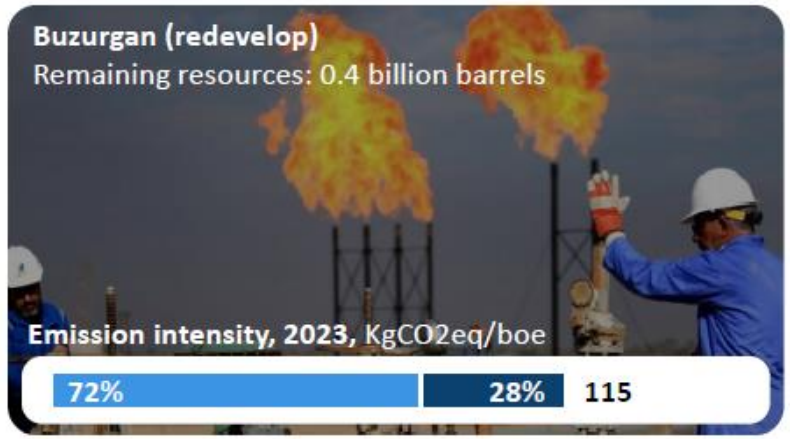












Source: Rystad Energy research and analytics, Rystad Energy Ucube

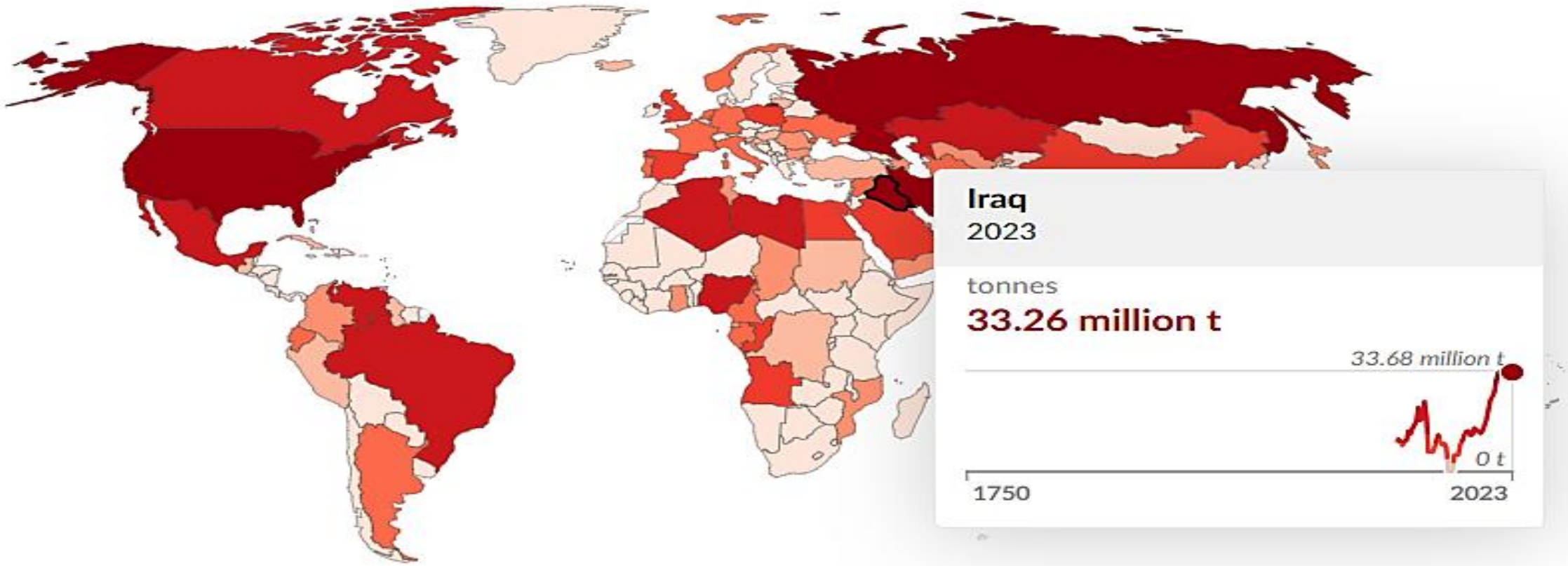
Annual CO_2 emissions from flaring, 2023

Annual emissions of carbon dioxide (CO_2) from flaring, measured in tonnes.

Our World in Data

Table | Map | Chart

World



No data | 0 t | 100,000 t | 300,000 t | 1 million t | 3 million t | 10 million t | 30 million t

1750 — 2023

Data source: Global Carbon Budget (2024) – Learn more about this data

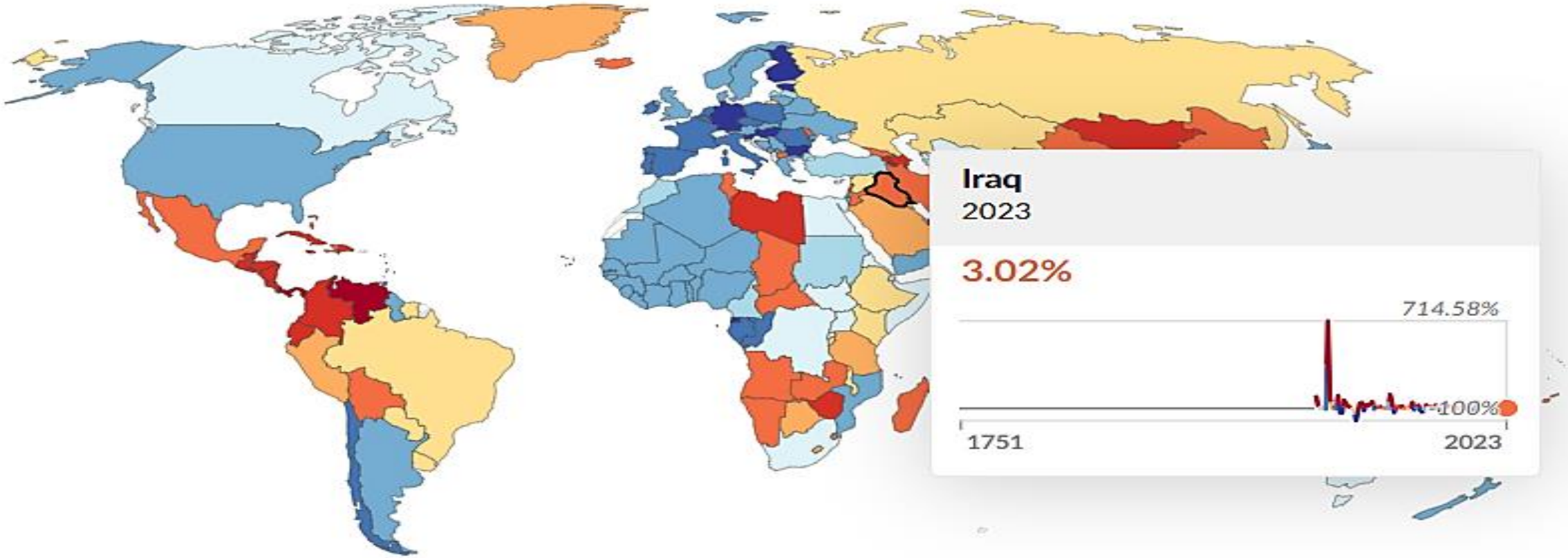
Annual percentage change in CO_2 emissions, 2023

Carbon dioxide (CO_2) emissions from fossil fuels and industry. Land-use change is not included.

Our World in Data

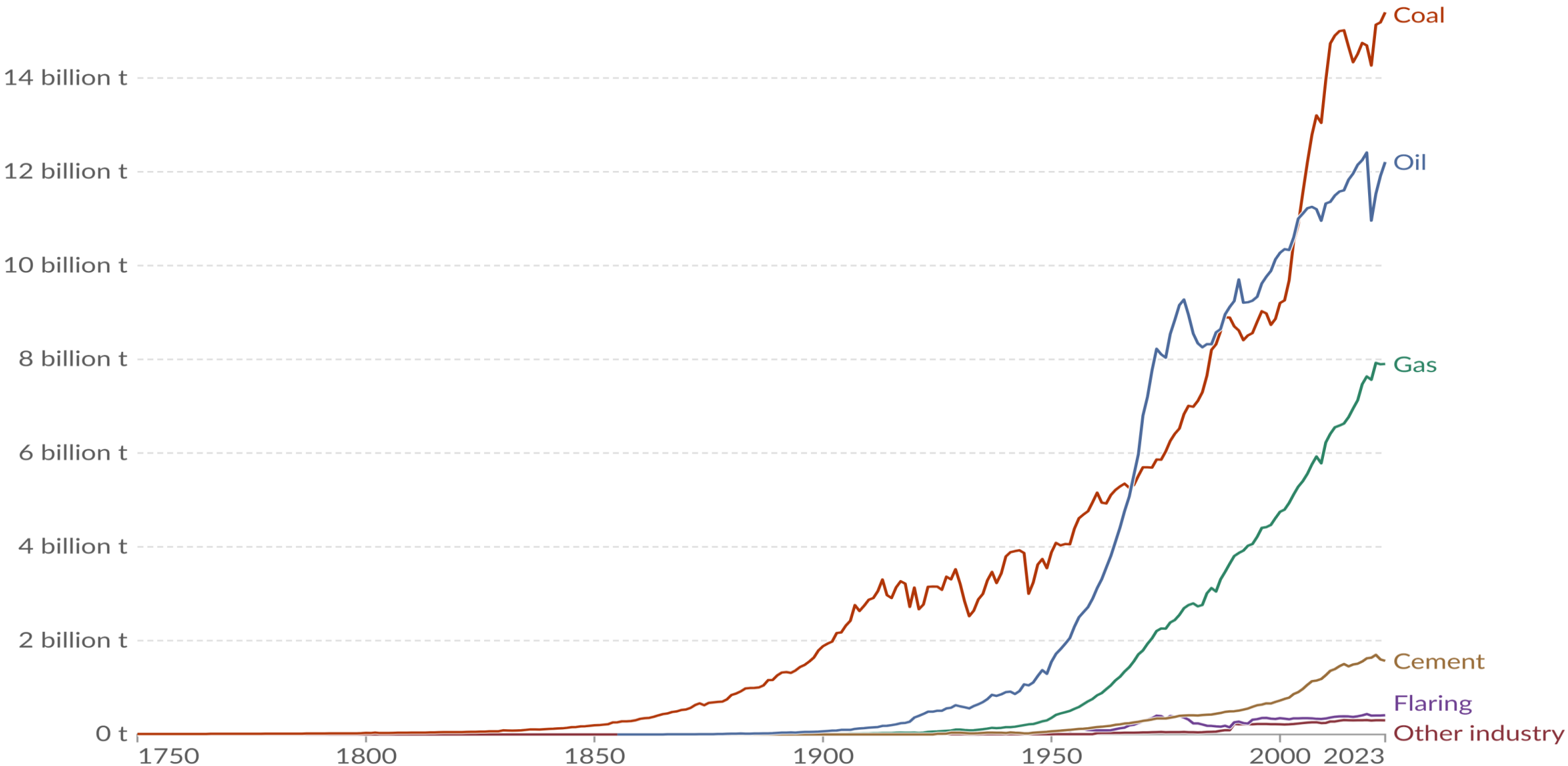
Table | Map | Chart

World



Data source: Global Carbon Budget (2024) – Learn more about this data

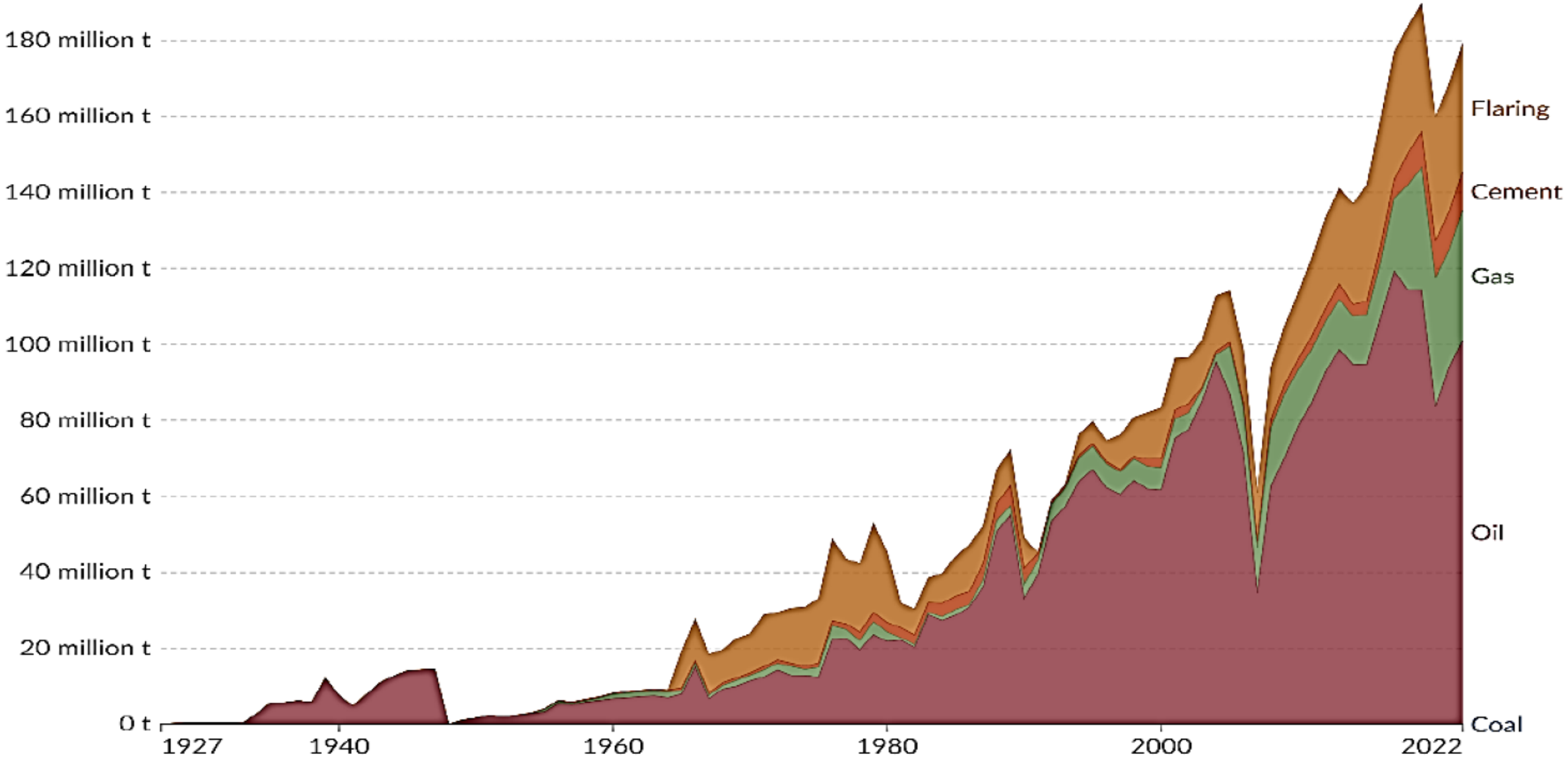
CO_2 emissions by fuel or industry, World



Data source: Global Carbon Budget (2024)

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

CO_2 emissions by fuel or industry type, Iraq



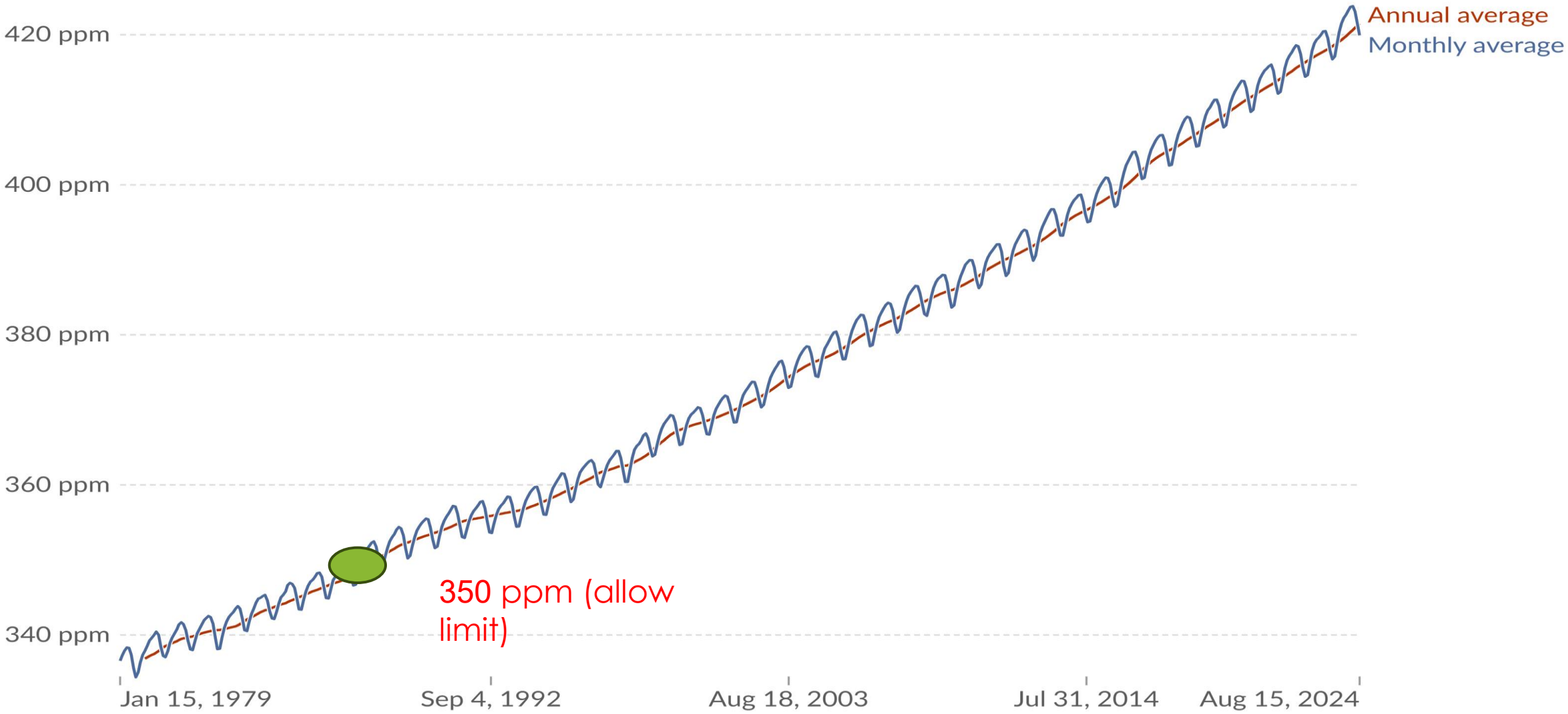
Data source: Global Carbon Budget (2023)

OurWorldInData.org/co2-and-greenhouse-gas-emissions | CC BY

Global atmospheric CO_2 concentration

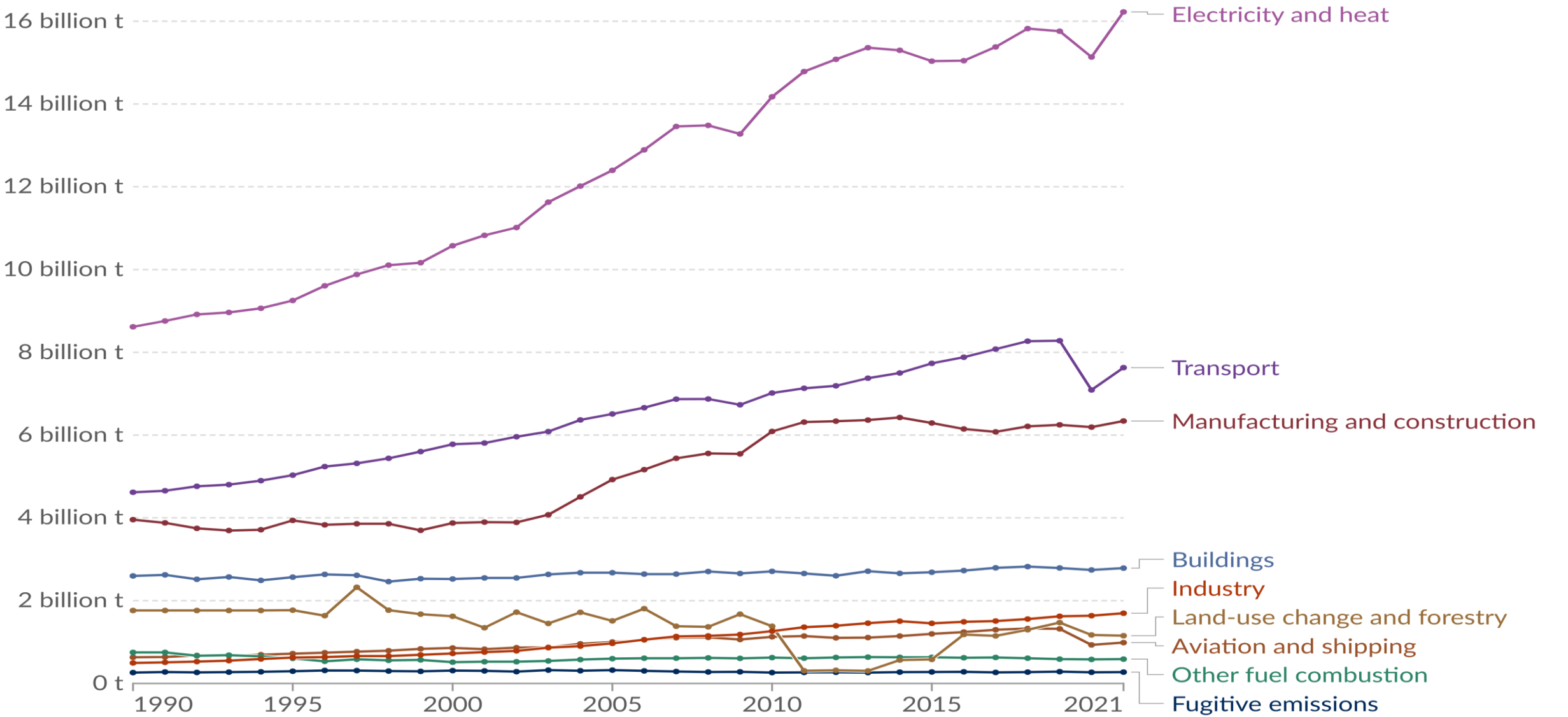
Our World in Data

Atmospheric carbon dioxide (CO_2) concentration is measured in parts per million (ppm).



Data source: NOAA Global Monitoring Laboratory - Trends in Atmospheric Carbon Dioxide (2024)
OurWorldinData.org/climate-change | CC BY

CO_2 emissions by sector, World

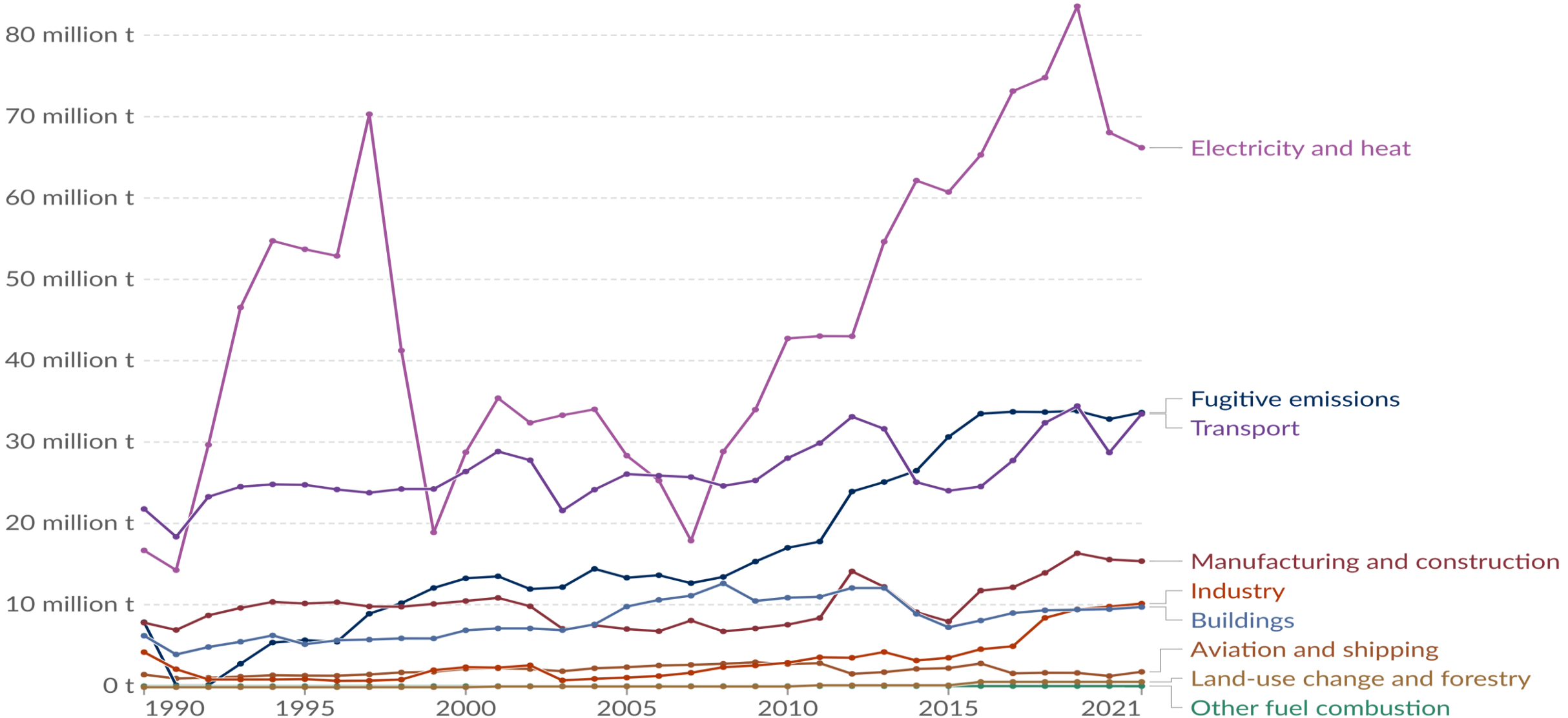


Data source: Climate Watch (2024)
Note: Land-use change emissions can be negative.

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

CO_2 emissions by sector, Iraq

Our World in Data



Data source: Climate Watch (2024)
Note: Land-use change emissions can be negative.

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

Greenhouse gas emissions

Our World in Data

Greenhouse gas emissions[1] include carbon dioxide, methane and nitrous oxide from all sources, including land-use change. They are measured in tonnes of carbon dioxide-equivalents[2] over a 100-year timescale.



Data source: Jones et al. (2024)
Note: Land-use change emissions can be negative.

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

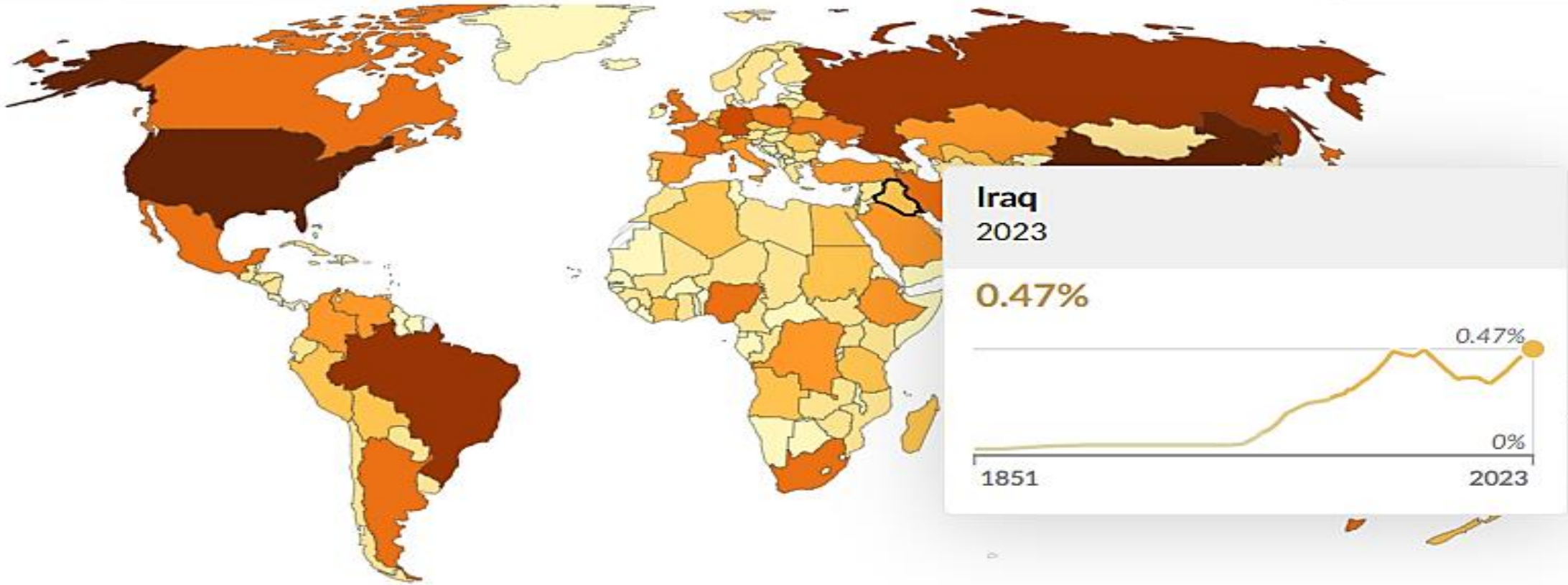
Global warming: Contributions to the change in global mean surface temperature, 2023

Our World in Data

This is shown as a country or region's share of the global mean surface temperature change as a result of its cumulative emissions of three gases – carbon dioxide, methane, and nitrous oxide.

Table | Map | Chart

World



No data | -1% | 0% | 0.1% | 0.25% | 0.5% | 1% | 2.5% | 5% | 10%

1851 — 2023

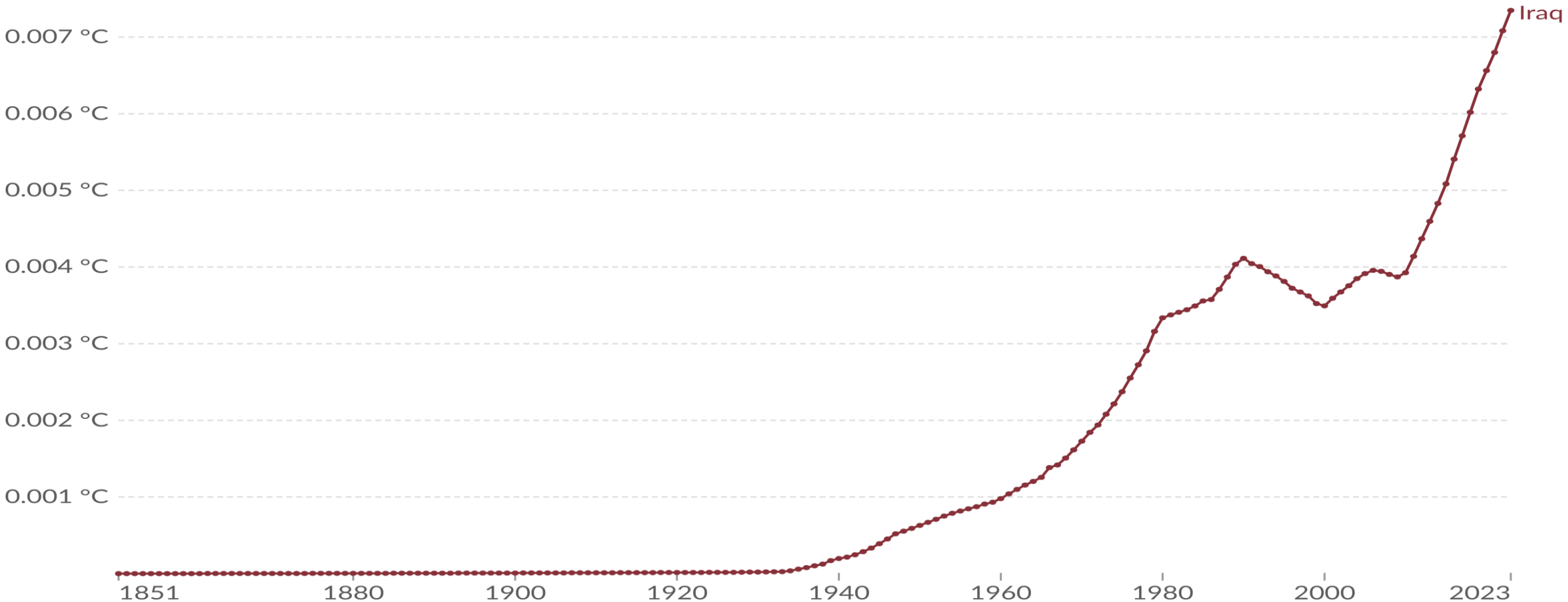
Data source: Jones et al. (2024) – Learn more about this data

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

Contribution to global mean surface temperature rise from fossil sources, 1851 to 2023

Our World in Data

The global mean surface temperature change as a result of a country or region's cumulative emissions of carbon dioxide, methane, and nitrous oxide. This is for fossil fuel and industry[1] emissions only – it does not include land use or agriculture.



Data source: Jones et al. (2024)

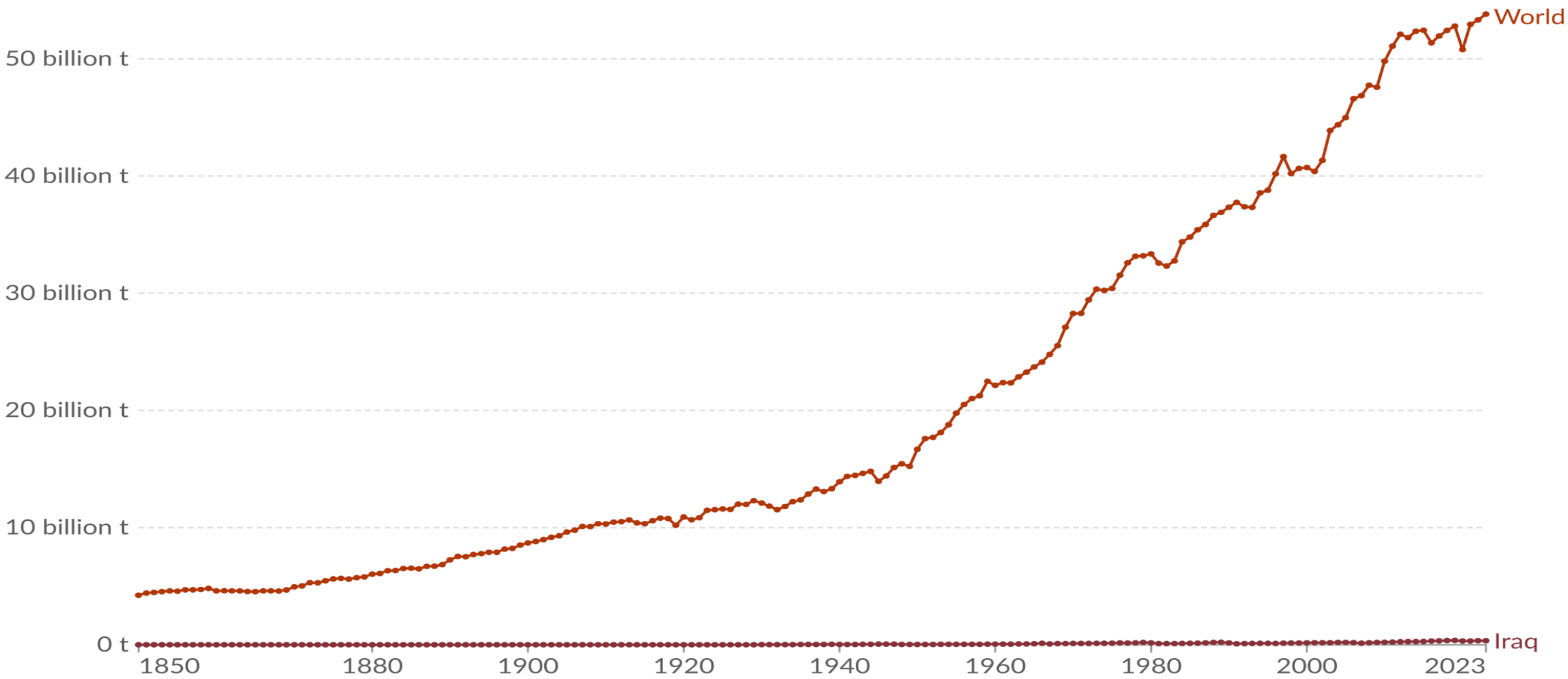
OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO_2) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO_2 includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

Greenhouse gas emissions

Our World in Data

Greenhouse gas emissions[1] include carbon dioxide, methane and nitrous oxide from all sources, including land-use change. They are measured in tonnes of carbon dioxide-equivalents[2] over a 100-year timescale.



Data source: Jones et al. (2024)

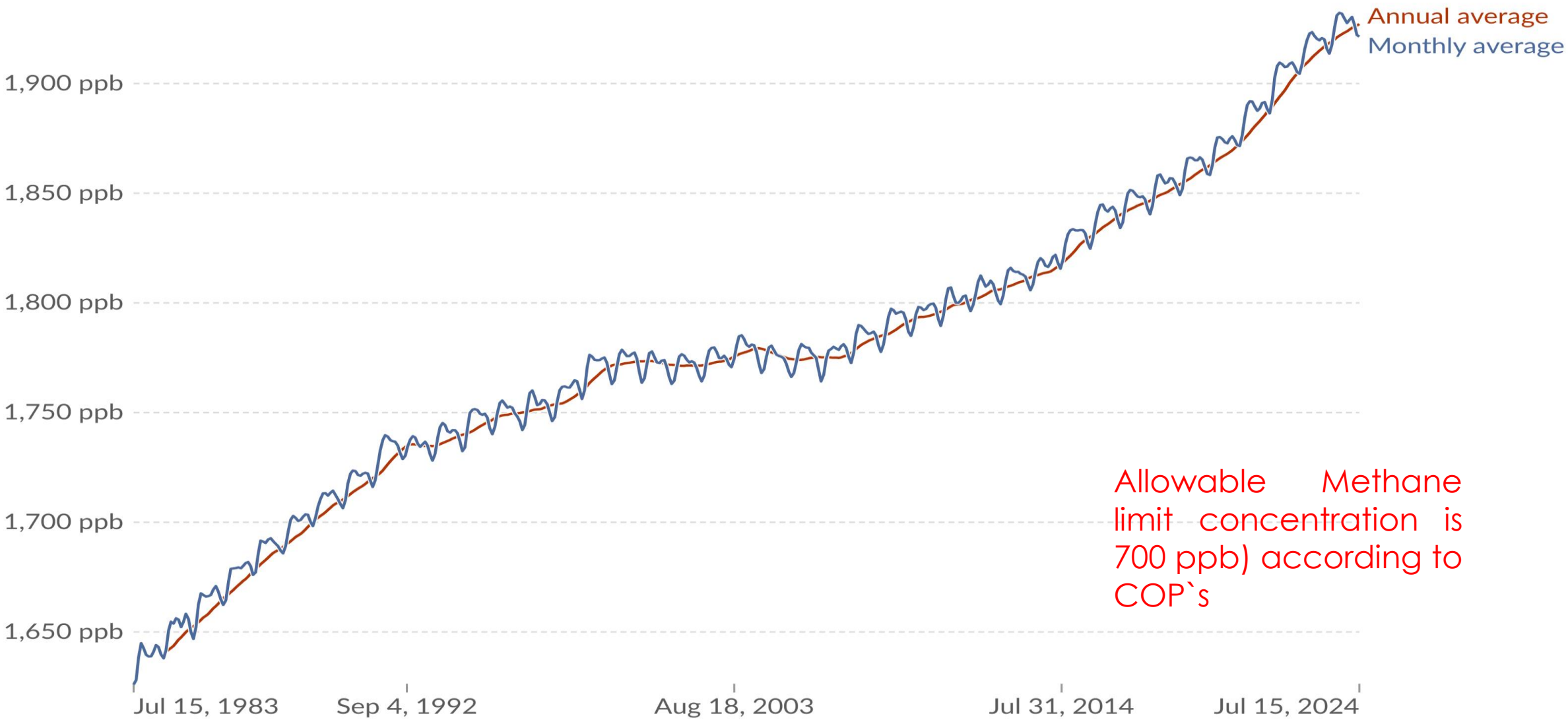
OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

Note: Land-use change emissions can be negative.

Global atmospheric methane concentrations

Our World in Data

Atmospheric methane (CH_4) concentration is measured in parts per billion (ppb).



Allowable Methane limit concentration is 700 ppb) according to COP`s

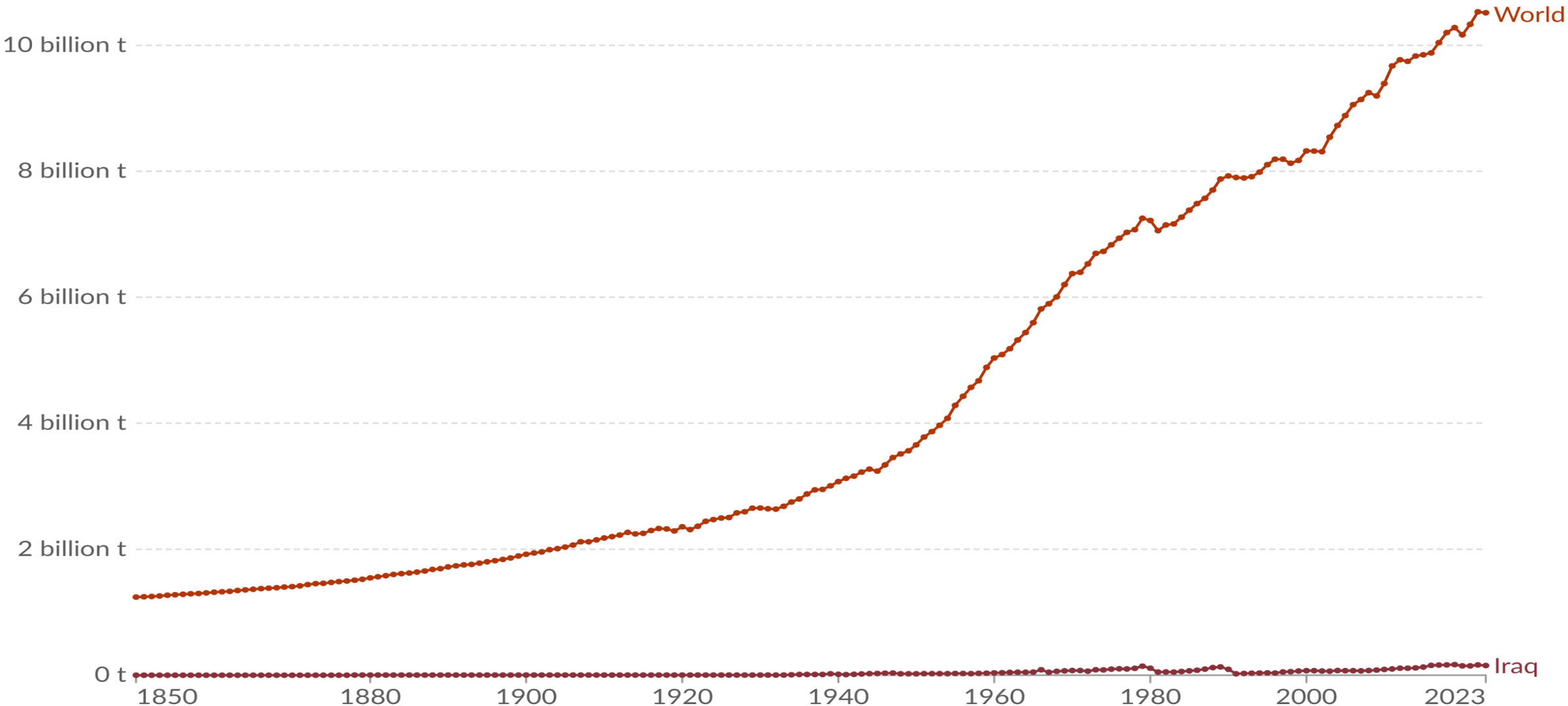
Data source: NOAA Global Monitoring Laboratory - Trends in Atmospheric Methane (2024)

OurWorldinData.org/climate-change | CC BY

Methane emissions

Our World in Data

Methane (CH_4) emissions are measured in tonnes of carbon dioxide-equivalents[1]. Emissions from fossil fuels, industry[2] and agricultural sources are included.

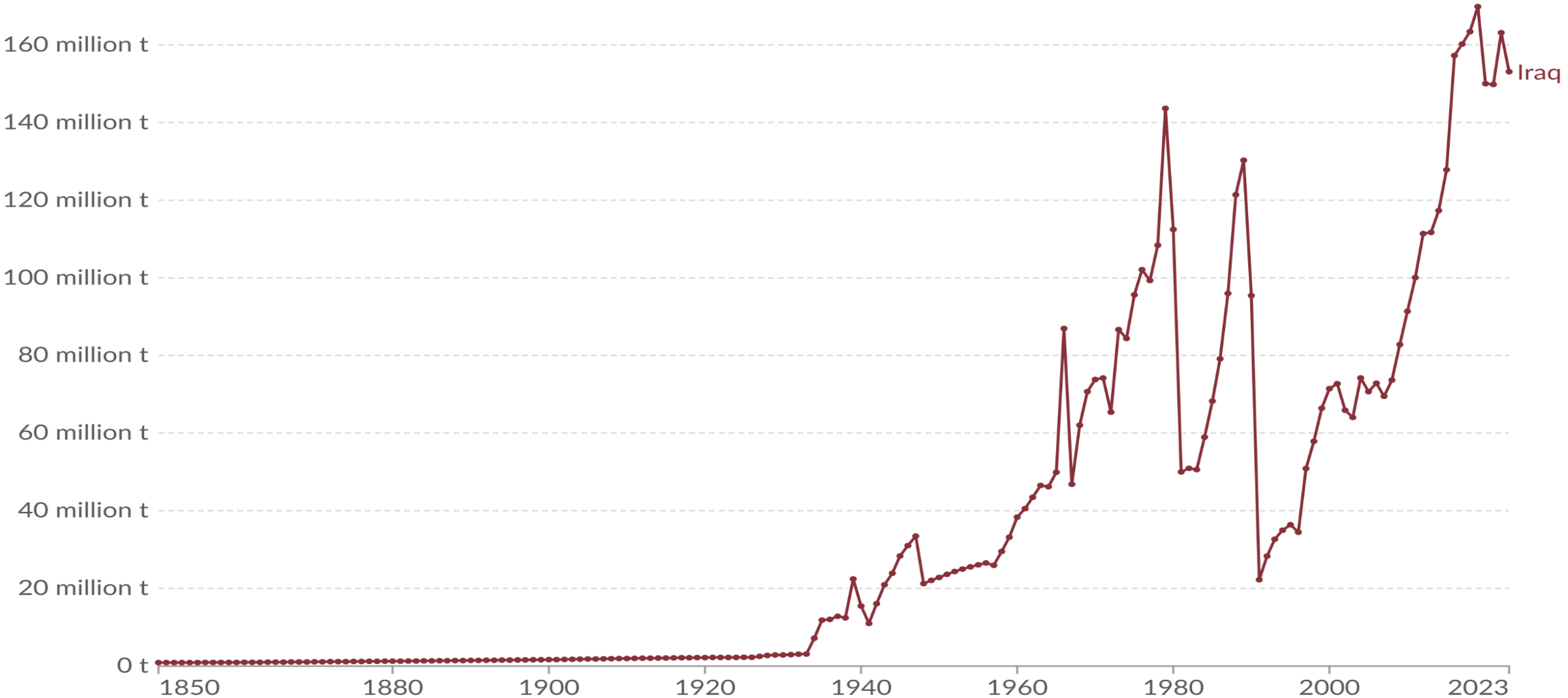


Data source: Jones et al. (2024)

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

Methane emissions

Methane (CH_4) emissions are measured in tonnes of carbon dioxide-equivalents[1]. Emissions from fossil fuels, industry[2] and agricultural sources are included.



Data source: Jones et al. (2024)

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

Conclusions and Recommendations

To achieve the goal of zero emissions by 2040, Iraq needs enhanced investment in infrastructure, better technological integration, and strengthened regulatory frameworks. Further research should focus on evaluating the effectiveness of current initiatives and exploring innovative technological solutions.

References

- World Bank Emission Reports
- COP Conference Proceedings
- Data on gas flaring and investment in associated gas projects