

# Stuck in the Past: Lessons on Emissions for Developing Oil Producers

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## Key messages

- Most economies are slowly decarbonizing, but the economies of high-income, fossil fuel-rich countries are not. This is the case whether examining production- or consumption-based emissions.
- Low-income, fossil fuel-rich countries can learn from the experience of wealthier fossil fuel-rich countries. Remaining on their current path could mean that low-income, fossil fuel-rich countries could face high energy costs, exclusion from export markets, and failure to meet future climate commitments.

There is a viable path to meet the Paris Agreement, the International Energy Agency (IEA) has proclaimed in a recent report.<sup>1</sup> Humanity is still a long way from this path, but data from the Global Carbon Project (an organization providing data and research to track emissions of greenhouse gases) provides some hope. It shows that, over the last fifteen years, carbon dioxide emissions in many high-income countries have declined.<sup>2</sup> While this trend is encouraging, the current flow of carbon dioxide is still dangerous, as it further adds to the stock of greenhouse gases in the atmosphere, taking humanity perilously close to breaking its “carbon budget.”<sup>3</sup>

One group of countries is contributing to these emissions at a particularly alarming rate: high-income countries that are economically dependent on producing fossil fuels. Stuck in the past, emission from these states are not falling but growing. With six percent of human-released carbon coming from twelve fossil fuel-rich, high-income countries, their failure to cut emissions is devastating both for the planet and

1 International Energy Agency. *Net Zero by 2050* (International Energy Agency, 2021), [iea.org/reports/net-zero-by-2050](https://www.iea.org/reports/net-zero-by-2050)

2 “Global Carbon Project”, Future Earth, accessed 19 May, 2021, [globalcarbonproject.org](https://globalcarbonproject.org). Also Zeke Hausfather. *Absolute Decoupling of Economic Growth and Emissions in 32 Countries* (The Breakthrough, 2021), [thebreakthrough.org/issues/energy/absolute-decoupling-of-economic-growth-and-emissions-in-32-countries](https://thebreakthrough.org/issues/energy/absolute-decoupling-of-economic-growth-and-emissions-in-32-countries). The Global Carbon Project database covers most but not all carbon dioxide emissions. It excludes bunker fuel (used mainly for shipping), emissions from international aviation or land use change emissions. Carbon dioxide contributes about 75 percent anthropogenic greenhouse gases. The other notable GHG left out of this database is methane. A significant emission from the oil and gas industry from associated gas that companies fail to flare (turning into carbon dioxide), or that leaks from infrastructure. While generally a smaller impact in the long-term, methane has a significant effect in the short-term (20 years). Because of venting and flaring associated with extraction, some oil and gas producing countries appear to emit far higher amounts of methane than others, e.g. U.S., Russia, Algeria, Nigeria. So our data might underplay total emissions from these countries.

3 See Zeke Hausfather, *Analysis: How much ‘carbon budget’ is left to limit global warming to 1.5C?* (Carbon Brief, 2018). And Alex Dalman, *Carbon budgets: where are we now?* (Carbon Tracker, 2020), [carbontracker.org/carbon-budgets-where-are-we-now](https://carbontracker.org/carbon-budgets-where-are-we-now).

their own citizens. Failing to decarbonize means being locked into using expensive energy and living in more polluted cities. These countries also risk being outcompeted by “greener” countries when exporting to economies with carbon taxes such as the one proposed by the European Union.<sup>4</sup>

## LEARNING FROM LAGGARDS

These fossil-fuel focused laggards tell a cautionary tale for poorer countries who are also dependent on producing oil, gas or coal. For now, they have much lower greenhouse gas emissions; being less industrialized means they consume less energy than richer countries, and therefore emit less. However, as their economies develop, they would do well to avoid repeating the mistakes their wealthier counterparts have made – building carbon-intensive economies is likely to lead them into trouble.

Because of their low emissions, we did not study these poor countries. But we did examine the emissions of high-income countries (as defined by the World Bank).<sup>5</sup> They were responsible for half of all global carbon dioxide released from human processes in 2005, the beginning of our study period. For most of them, emissions fell in the period from 2005 to 2019 (in absolute terms). However, a third of these countries increased their emissions, most of them rich in oil, gas, or coal.<sup>6</sup>

Figure 1 below shows the change in carbon dioxide released by the 40 high-income countries for which data was available. The emissions measured are territory-based — they come from activities within a country, irrespective of where the goods produced are finally consumed. The blue bars denote the top 12 countries by fossil fuel wealth; the orange bars denote the rest.

### Territorial- and consumption-based emissions

Territorial-based emissions (also called production emissions) are those that take place within a country’s territorial boundaries. Therefore, they include emissions from producing goods that are consumed within the country and that are exported but omit emissions embedded in imported goods. If a country exports fossil fuel products, the emissions from extraction are included in these statistics but not those from the final use of the product. This is the approach used by the Intergovernmental Panel for Climate Change (IPCC) guidelines.

Consumption-based emissions reflect the consumption and lifestyle choices of a country’s citizens. They include all CO<sub>2</sub> emissions that were emitted in the production of any good that people in the country consume, included imported goods but not on the goods that the country exports. If a country exports fossil fuel products, none of the emissions related to extraction or product use are included.

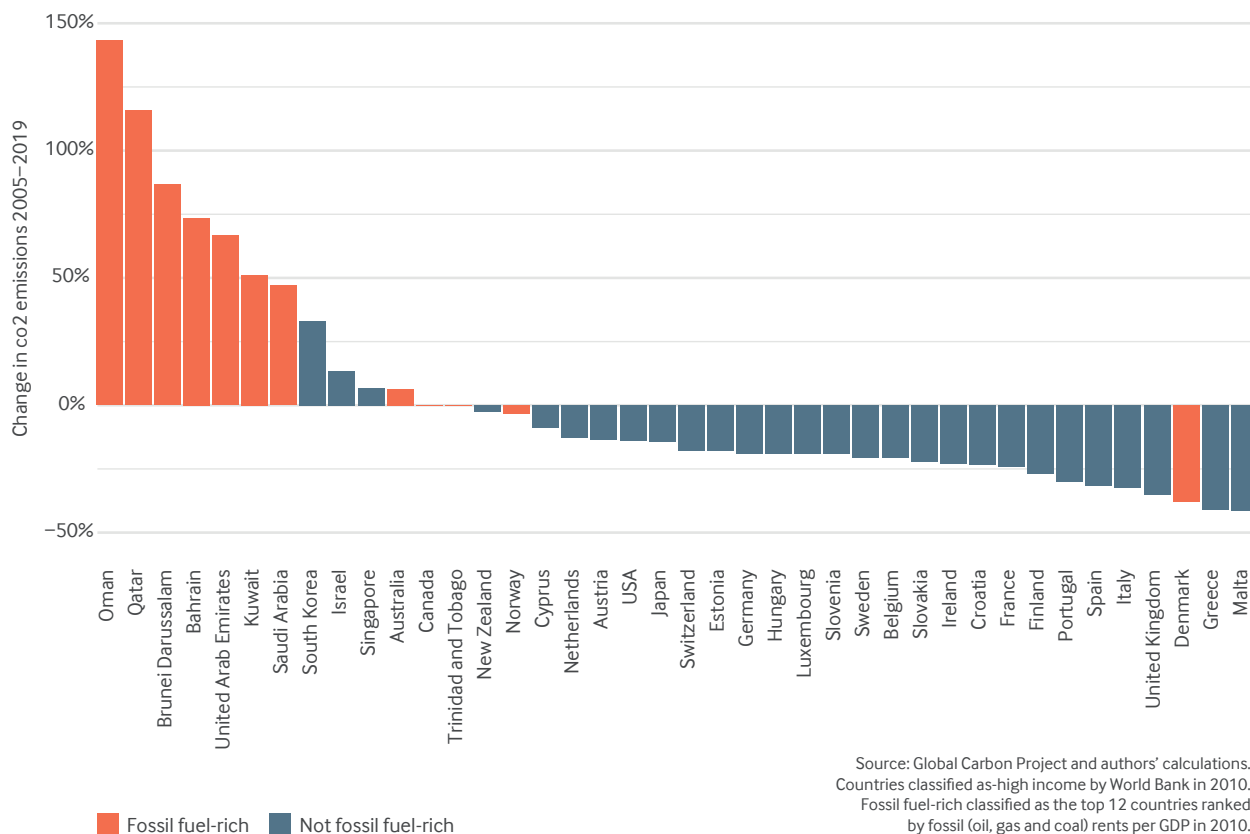
Neither metric captures the emissions from the end-use of a fossil fuel product when it is being exported. Both metrics also exclude emissions resulting from land use change, including deforestation.

4 “Legislative train schedule, A European Green Deal”, European Parliament, last modified 21 April 2021, [europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-carbon-border-adjustment-mechanism](http://europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-carbon-border-adjustment-mechanism).

5 World Bank, “World Bank Country and Lending Groups,” accessed 9 July 2021, [datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups](http://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups).

6 This categorization is based on the “rent” created by oil, gas, or coal industry in 2010 as a percent of GDP using World Bank data. We defined the 12 countries with the highest fossil fuel rents as a percentage of GDP as “fossil fuel rich.”

Figure 1. Change in territorial-based emissions, 2005 - 2019



Among the 12 countries whose emissions rose in the period studied, nine are among the most fossil fuel rich, including long-industrialized nations such as Australia, and low-population petrostates like Qatar. In fact, emissions rose in seven out of the ten fossil fuel rich countries. Canada, the only fossil fuel-rich country of the G7, is also the only member of the group causing rising emissions, despite a carbon tax, clean fuel standards, and methane leak controls. The culprits are principally Canada’s large oil sand reserves, and the high-intensity extractive industry around them.<sup>7</sup>

By contrast, of the 24 countries whose carbon emissions dropped at least 10 percent (with some cutting as much as 40 percent) over the 15-year period, only one was fossil fuel rich: Denmark. Denmark is not typically considered a petrostate, and renewable energy development enjoys broad popular support there.

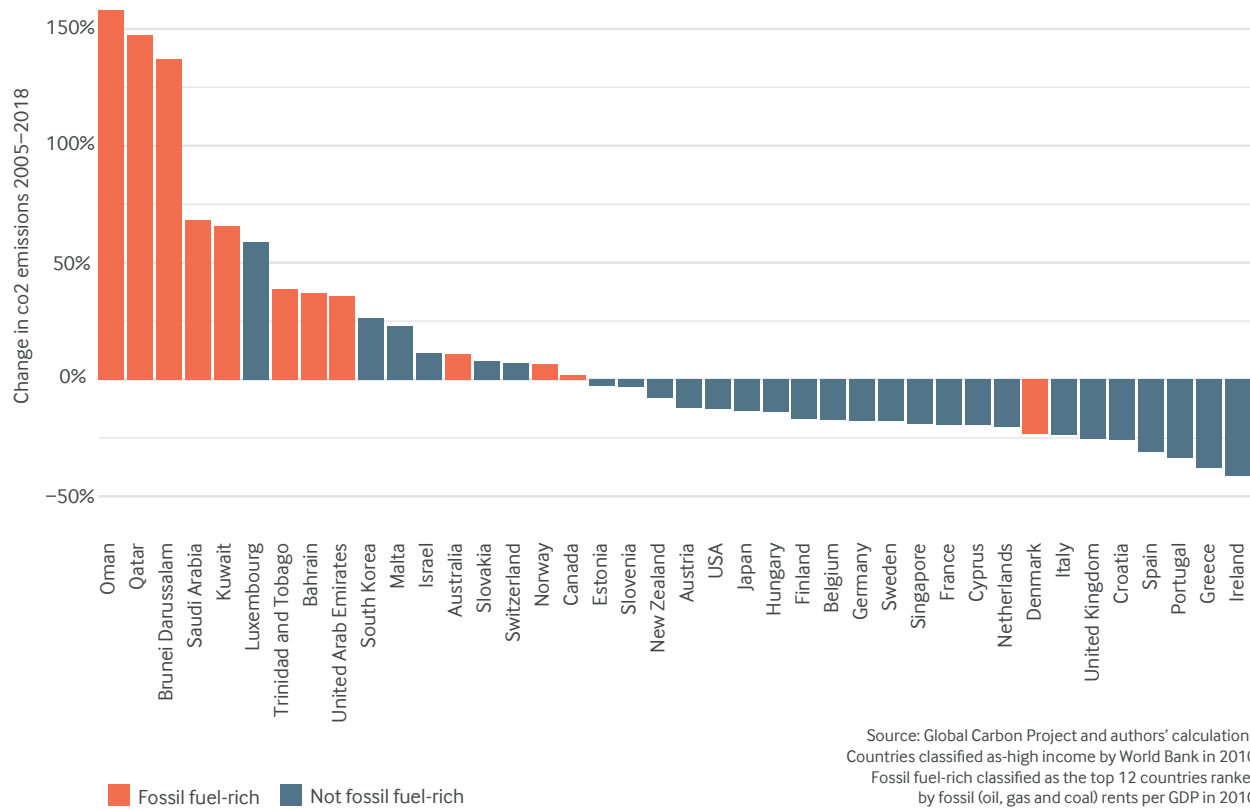
### IMPORT GOODS, EXPORT EMISSIONS?

One explanation for this fall in rich countries’ emissions could be the result of de-industrializing and importing goods from high emissions countries like China, rather than producing them themselves. However, in Figure 2, we show that this is not the entire explanation. Figure 2 shows consumption-based emissions—the carbon footprint of the goods people in each country consume. Measuring emissions this

7 Ian Austen, Christopher Flavelle. "Trudeau Was a Global Climate Hero. Now Canada Risks Falling Behind" (The New York Times, 21 April 2021), nytimes.com/2021/04/21/world/canada/trudeau-climate-oil-sands.html

way leaves out the carbon dioxide that fossil fuel industries emit through oil, gas and coal that they extract and export. But even when ignoring these exported emissions, fossil fuel rich countries are still among the worst offenders—they don't just pollute through what they produce, but also through what they consume.

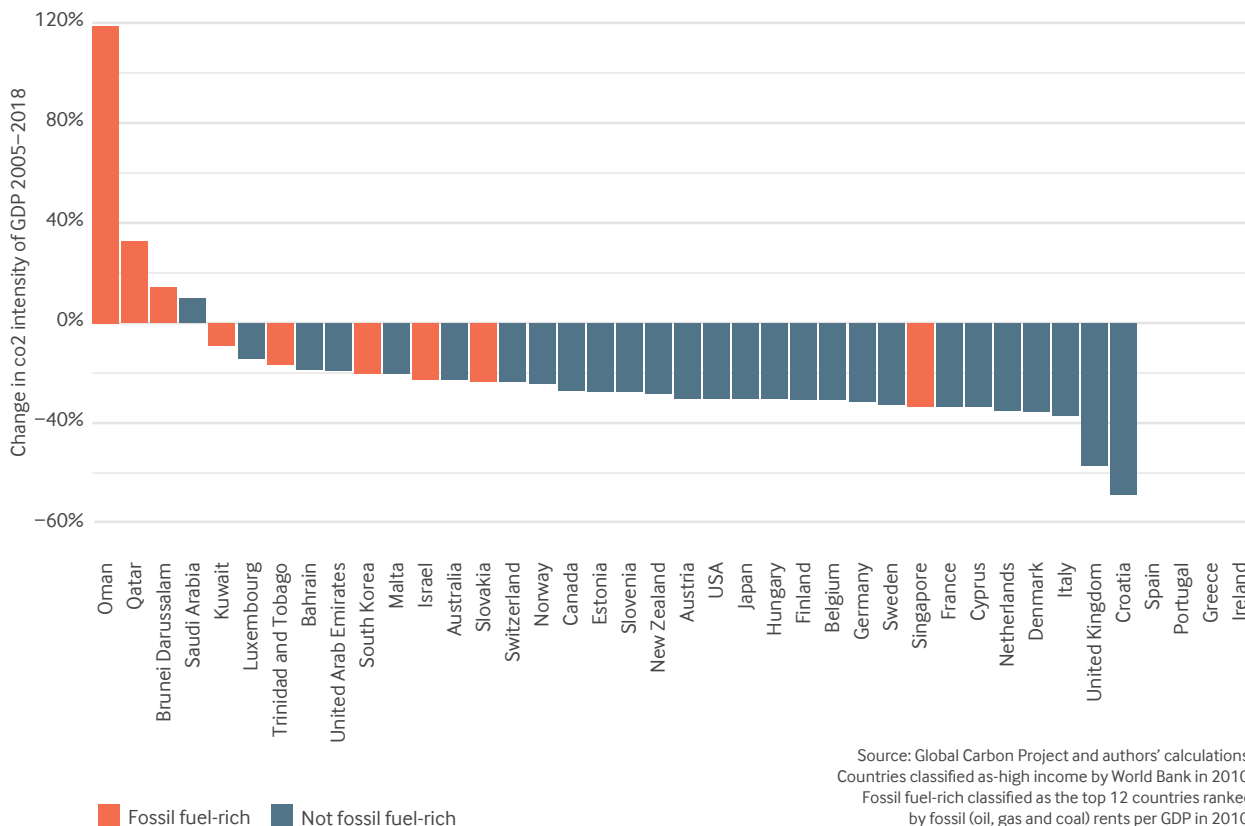
Figure 2. Change in consumption-based emissions, 2005 - 2018



In general, more populous and richer countries tend to emit more carbon. Several fossil fuel rich countries have high rates of both population and economic growth, which may partly explain the differences in emissions compared to countries with little fossil fuels. However, irrespective of population or economic growth, economic activity in fossil fuel rich countries is more carbon intensive.

Figure 3 below shows the carbon intensity of countries' gross domestic product (GDP)—the tons of carbon produced for every unit of domestic income. While a few fossil fuel rich countries do much better on this metric than on those shown above (notably Qatar whose economy has been diversifying recently), this group remains vastly overrepresented among the worst performers.

Figure 3. Change in consumption-based emissions intensity of gross domestic product, 2005 - 2018



### EXPLAINING THE 'CARBON CURSE'

Earlier studies also demonstrated that fossil fuel rich countries tend to have higher emission intensities – a phenomenon that Friedrichs and Inderwildi (2013) have labeled the “carbon curse” in their study looking at the emissions of these countries until 2008.<sup>8</sup> Chiroleu-Assouline and others (2020) found similar results using a more advanced method over a period of 15 years ending in 2009.<sup>9</sup>

Our simple comparison described above suggests that whatever curse these two studies found might have worsened since they were conducted. But how can this phenomenon be explained?

These studies suggest four reasons.

First, a great deal of carbon dioxide and methane is released in the extraction, refining and transport of fossil fuels. Methane is particularly significant: it is 25 times more potent a greenhouse gas than carbon dioxide. In 2020, global oil and gas operations alone emitted 70 million tons of methane<sup>10</sup> – that’s more than all carbon and methane emissions from Japan, one of the biggest emitters in the world.<sup>11</sup>

8 Jörg Friedrichs and Oliver R. Inderwildi, “The carbon curse: Are fuel rich countries doomed to high CO2 intensities?” *Energy Policy* 62 (2013): 1356 – 1365, 10.1016/j.enpol.2013.07.076.

9 Mireille Chiroleu-Assouline & Mouez Fodha & Yassine Kirat, “Carbon curse in developed countries,” *Energy Economics* 90 (2020), 10.1016/j.eneco.2020.104829.

10 IEA. *Methane Tracker 2021* (2021), [iea.org/reports/methane-tracker-2021](https://www.iea.org/reports/methane-tracker-2021)

11 70 million tons of methane is equivalent to 1,750 million tons of carbon dioxide. Japan emitted 1,170 million tons of carbon dioxide equivalent. [worlddata.info/greenhouse-gas-by-country.php](https://worlddata.info/greenhouse-gas-by-country.php)

Second, many governments in fossil fuel producing countries heavily subsidize electricity, or fuels for transport.<sup>12</sup> While some countries have recently been rolling back these subsidies, most have found it politically difficult to do so as their citizens had gotten used to cheap fuel.

Third, an abundance of fossil fuels, particularly if subsidized, leads to inefficient energy use. Consumers of seemingly cheap and abundant energy have little incentive to reduce energy-intensive processes. This is especially true for natural gas, where the alternative to using gas within the country requires high transport cost which may be less economical.

Fourth, having developed energy systems based on fossil fuels, countries can suffer from “carbon lock-in,” a type of path dependency.<sup>13</sup> Rapid progress in solar, wind and battery technologies means that renewable energy is becoming the cheapest option for an energy system starting fresh for any country in the world – but this is a purely hypothetical scenario. Every country has its own established energy systems, and the incumbent power industry, especially in major fossil fuel producing countries, is usually built around coal, diesel or gas. Existing infrastructure, but also firms, know-how and jobs are orientated towards continuing the use of the incumbent fossil fuel, making a transition to renewables a challenge. Consequently, despite the recent dramatic fall in renewable energy costs, and despite the relatively high solar potential that fossil fuel rich countries have on average, they have not taken part in the renewable energy revolution.

## WHY BEING 'CARBON-CURSED' MATTERS FOR DEVELOPING COUNTRIES WITH FOSSIL FUELS

There are at least three reasons why the carbon curse on high income and fossil fuel rich countries matters for their developing country peers like Nigeria, Ghana and Mexico.

- 1 *The carbon curse means higher energy costs.* Carbon-cursed countries are expending more energy to get an extra unit of GDP. Less efficient energy use and expensive energy lock-ins, combined with ignoring the opportunity costs of consuming versus exporting energy, and subsidizing energy consumption might dramatically increase energy costs in the future.
- 2 *The carbon curse could cut countries out of markets with carbon taxes.* The EU’s carbon border adjustment mechanism will tax imported goods based on the greenhouse gases emitted in their manufacture. To be competitive within the world’s largest single market, countries will have to clean up their supply chains. Other jurisdictions may also emulate the EU. This will make all countries relying on more fossil intensive production for their exports less competitive.
- 3 *The carbon curse jeopardizes countries’ climate commitments.* Developing countries’ climate commitments are not a strong bind on current behaviors. This is fair given they have contributed so little to the climate problem. But as they grow richer and industrialize, if developing countries become carbon curse, these commitments will eventually mean countries should limit their emissions.

12 Paasha Mahdavi, Cesar B. Martinez-Alvarez and Michael Ross. *Why Do Governments Tax or Subsidize Fossil Fuels?*(Center for Global Development, 2020), [cgdev.org/publication/why-do-governments-tax-or-subsidize-fossil-fuels](https://cgdev.org/publication/why-do-governments-tax-or-subsidize-fossil-fuels)

13 Daniel Rosenbloom. *Breaking Carbon Lock-In through Innovation and Decline* (2019). 1. [wri.org/climate/expert-perspective/breaking-carbon-lock-through-innovation-and-decline](https://wri.org/climate/expert-perspective/breaking-carbon-lock-through-innovation-and-decline)

## ABOUT THE AUTHORS

David Mihalyi and David Manley are both senior economic analysts at the Natural Resource Governance Institute (NRGI).

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