



Attributing emissions to major carbon producers & holding FF companies accountable for remediation

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 Judiciary Committee
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1

Attribute a share of responsibility to FF producers?

Historical emissions are the chief drivers of climate change;

Companies have:

- produced the lion's share of the carbon fuels that cause climate change
- aware of the threat of CC to their business since mid-1960s
- misled consumers, investors, and legislators on climate risk
- the technical skills, capital, and moral responsibility to *reduce net carbon production* in line with science-based target of 1.5°C



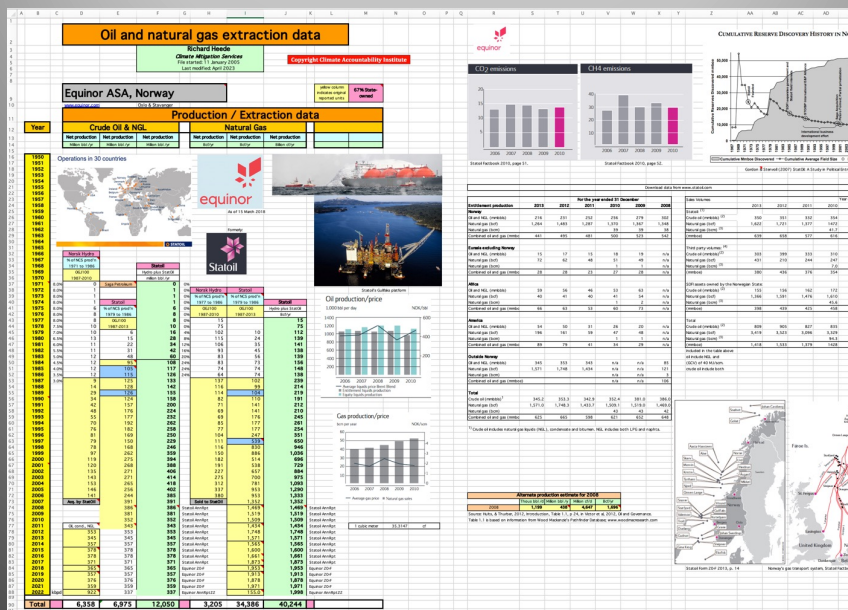
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Carbon Majors: the process

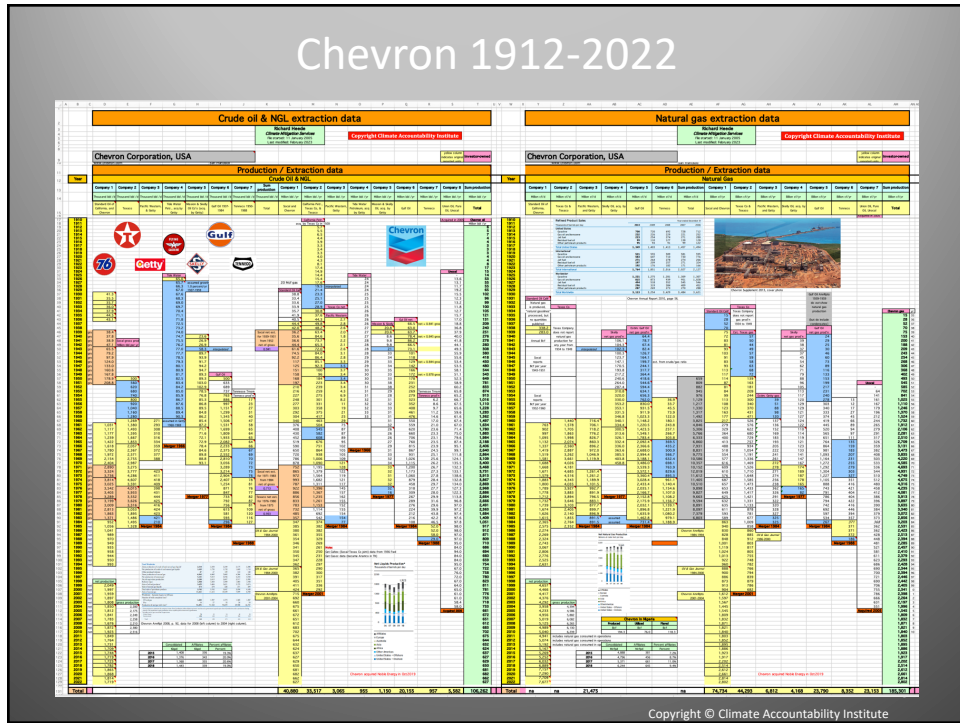
- Entity threshold of ≥ 8 MtC in recent year: 105 Carbon Major entities:
 - 64 investor-owned companies (IOCs)
 - 35 state-owned entities (SOEs)
 - 9 govt-run coal ministries, in FSU, China, Kazakhstan, Ukraine, Poland, North Korea ...
 - 42 coal producers, 73 petroleum, 75 natural gas, 5 cement.
- Earliest production records available, from ~ 1900 for major investor-owned companies, 1970s for most state-owned entities
- Gather entity data on oil, natural gas, coal, and cement production
 - Annual reports, company histories, SEC filings, entity websites
 - *Oil Gas Journal*, EIA data, National Mining Association, *World Oil*, etc.
- Enter production data in million bbl oil, Bcf natural gas, tonnes coal
- Account for mergers and acquisitions (attributed to extant entity)
- Deduct non-energy uses of carbon products ($\sim 8\%$ for oil, eg petrochems)
- Apply robust and peer-reviewed emission factors
- Quantify both direct Scope 1 and indirect Scope 3 (product) emissions

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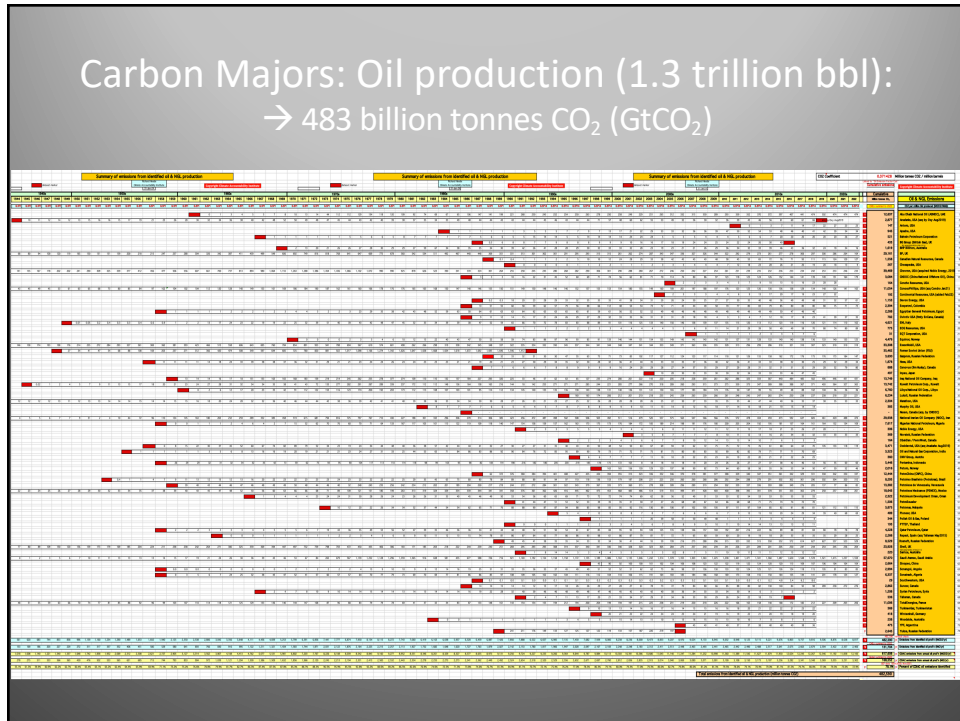
Equinor 1971 – 2022: oil & gas production



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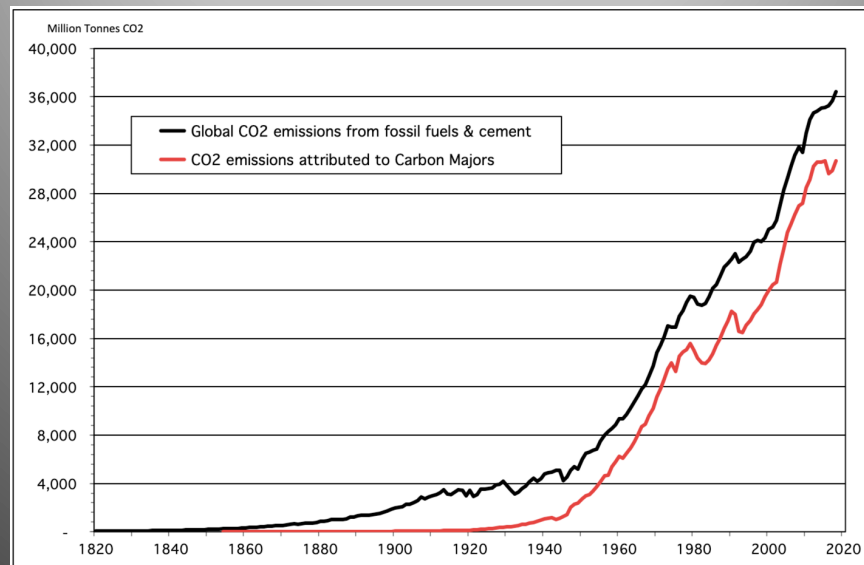
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Quantifying scope 1 & 3 emissions

- Estimates scope 3 emissions from production and use of petroleum products & natural gas as intended
- Accounts for net non-energy uses of petroleum
- Accounts for natural gas liquids (lower EF)
- Accounts for natural gas and coal production
- Scope 1 operational emissions (average ~12% of total):
 - CO₂ from flaring
 - CO₂ from gas processing
 - CO₂ from own fuel use in refineries, equipment, field ops
 - Methane from natural gas & oil production & pipelines etc.

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70% of CO₂ and CH₄ emissions since 1751 traced to 108 fossil fuel and cement producers



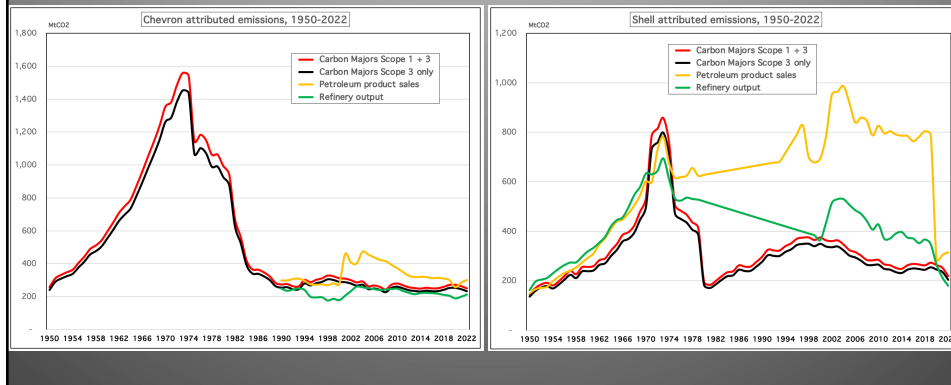
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Production-based vs refining & product sales

- Carbon Majors is based on *net equity production* (red & black)
- Based on *refinery output* (green)
- Based on petroleum *product sales*: typically >prodn (ochre)

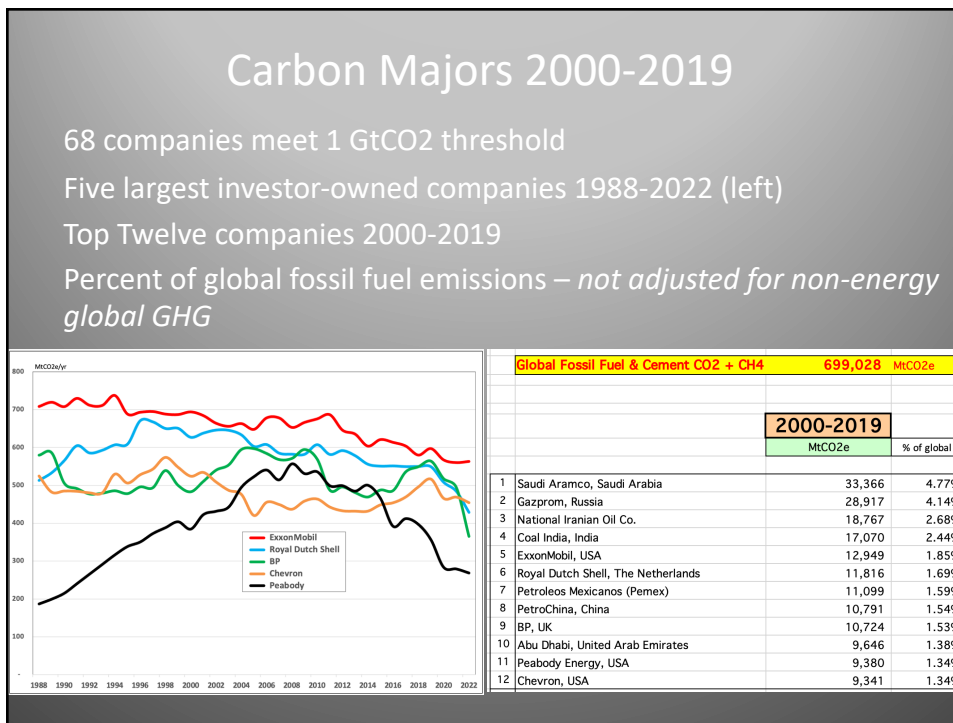


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Remedial payments, time period, etc.

- S-0259 based on petroleum product sales *times* EPA EFs
- Equity suggests accounting for non-fossil fuel emissions in apportioning payments from responsible parties
- Period of time:
 - First UN Conference of the Parties (COP) in 1995
 - UN Framework Convention on Climate Change in 1992
 - Formation of the IPCC in 1988
 - Hansen Senate testimony in June 1988
 - Incontrovertible evidence of human-caused climate change
 - Fossil fuel companies knew of, or willfully ignored, evidence of dangerous interference with global climate since 1950s and 1960s
- Data on FF company historical contributions are publicly available from 1950s to 2022; 2023 data will be public 2024

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Schlussner, Carl-Friedrich, Marina Andrijevic, Jarmo Kikstra, Richard Heede, Joeri Rogelj, Holly Simpkin, and Sylvia Schmidt (2023) *Carbon majors' trillion dollar damages: The case for contributions from fossil wealth to loss and damage finance*, Climate Analytics, Berlin, 36 pp.

Rekker, Saphira, Guangwu Chen, Richard Heede, Matthew Ives, Belinda Wade, & Chris Greig (2023) Evaluating fossil fuel companies' alignment with 1.5°C climate pathways, *Nature Climate Change*, vol. 13:927-934, online 14 August.

Grasso, Marco, & Richard Heede (2023) Time to pay the piper: fossil fuel companies' reparations for climate damages, *One Earth*, vol. 6: online 19 May.

Kenner, Dario, & Richard Heede (2021) White Knights, or Horsemen of the Apocalypse? Prospects for Big Oil to align emissions with a 1.5°C pathway, *Energy Research & Social Science*, vol. 79: art. no. 102049.

Licker, Rachel, Brenda Ekwurzel, Scott C. Doney, Sarah R. Cooley, Ivan D. Lima, Richard Heede, & Peter C. Frumhoff (2019) Attributing ocean acidification to major carbon producers, *Environmental Research Letters*, vol. 14(12); 11 Dec.

Heede, Richard (2019) It's time to rein in the fossil fuel giants before their greed chokes the planet, *The Guardian*, 9 October.

Ekwurzel, B., J. Boneham, M. W. Dalton, R. Heede, R. J. Mera, M. R. Allen, & P. C. Frumhoff (2017) The rise in global atmospheric CO₂, surface temperature, and sea level from emissions traced to major carbon producers, *Climatic Change*, vol. 144:579-590

Heede, Richard, & Naomi Oreskes (2016): Potential emissions of CO₂ and methane from proven reserves of fossil fuels, *Global Environmental Change*, vol. 36:12-20.

Starr, Douglas (2016) The carbon accountant: Richard Heede pins much of the responsibility for climate change on just 90 companies, others think that's a copout, *Science*, vol. 353:858-861.

Frumhoff, P., R. Heede, & N. Oreskes (2015) The climate responsibilities of industrial carbon producers, *Climatic Change*, vol. 132:157-171.

Heede, Richard (2014) Tracing anthropogenic CO₂ and methane emissions to fossil fuel and cement producers 1854-2010, *Climatic Change*, vol. 122(1): 229-241.

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The rise in global atmospheric CO₂, surface temperature, and sea level from emissions traced to major carbon producers.

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