



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

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 Judiciary Committee, Energy & Environment Committee
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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
- been aware of the threat of CC to their business since the mid-1960s
- the technical skills, capital, and moral responsibility to *reduce net carbon production* in line with science-based target of 1.5°C



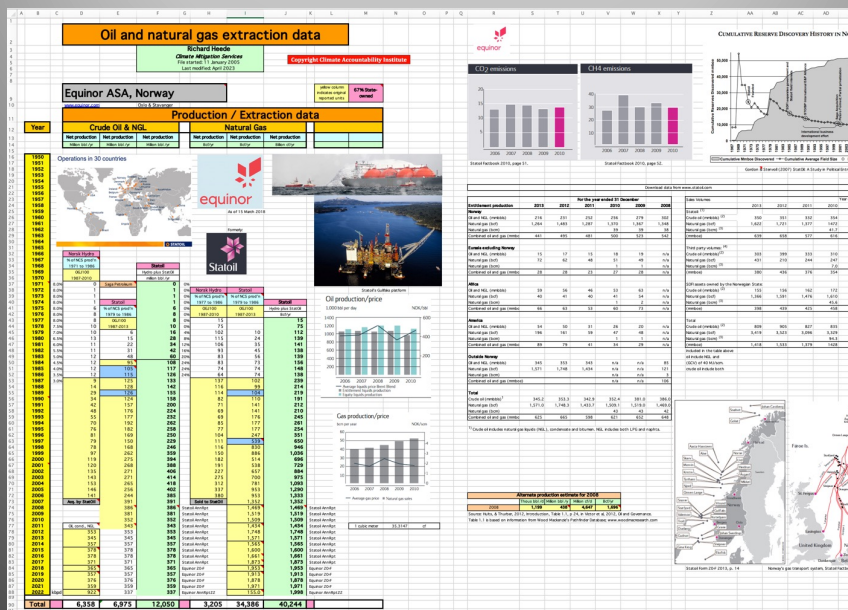
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Carbon Majors: the process

- 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

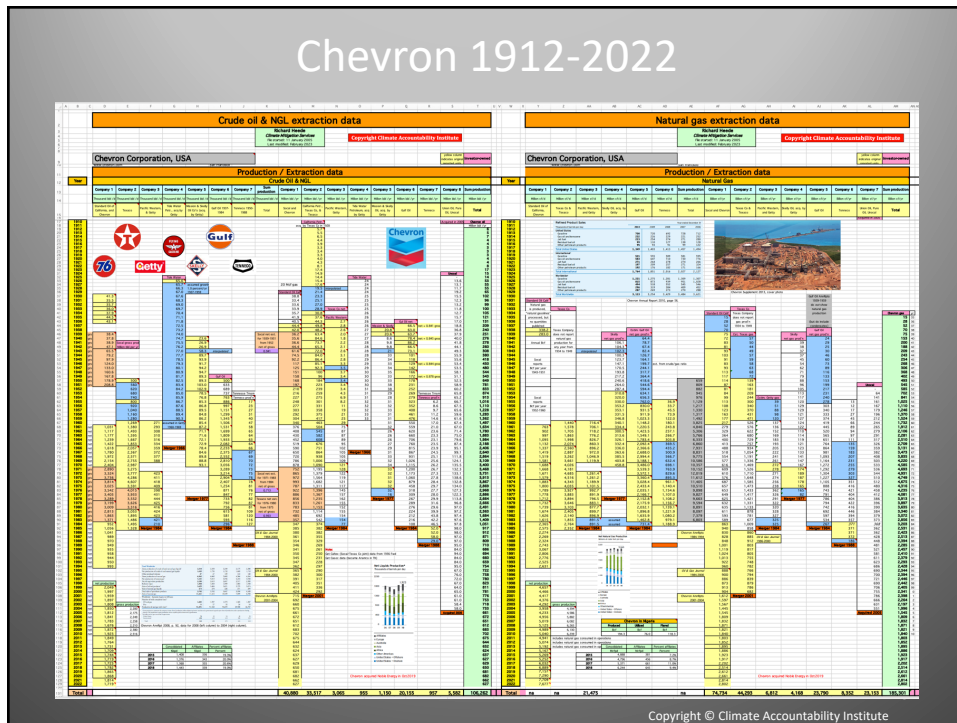
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Equinor 1971 – 2022: oil & gas production



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Chevron 1912-2022



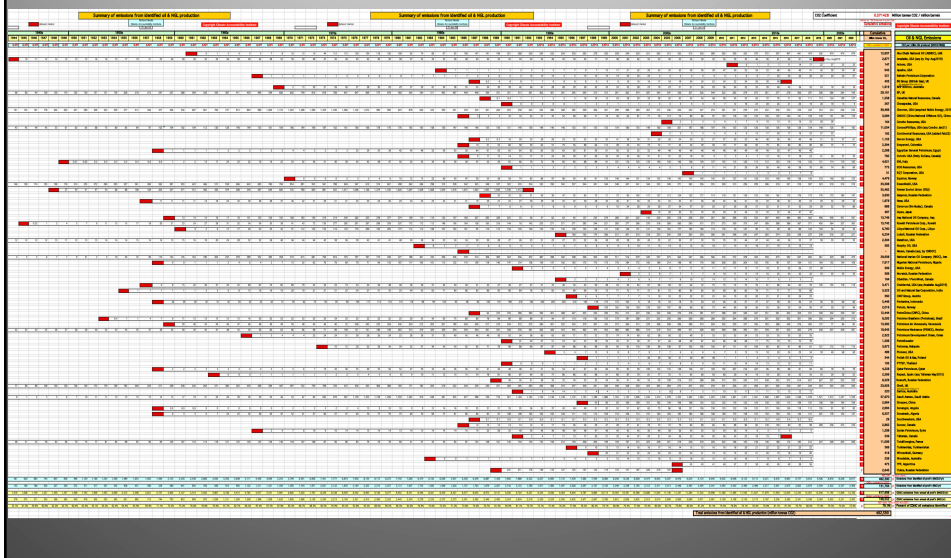
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Quantifying scope 1 & 3 emissions

- Estimates scope 3 emissions from production and use of petroleum products & natural gas as intended
- Deducts 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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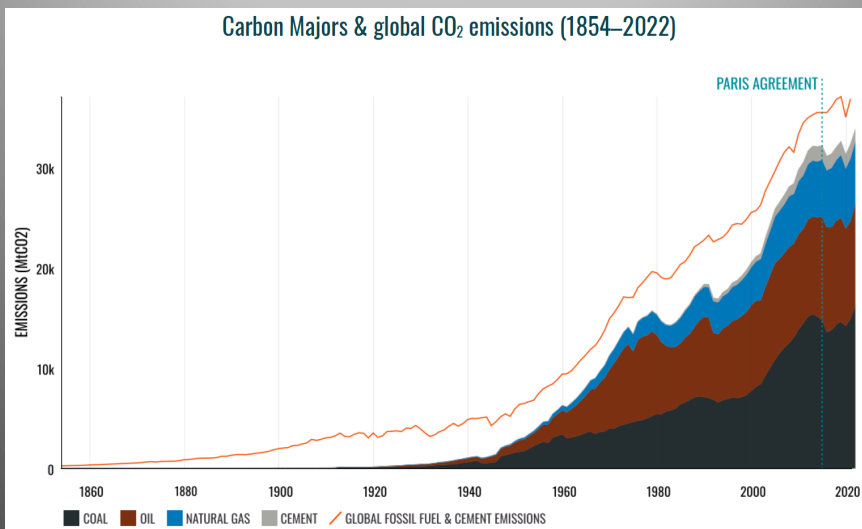
Carbon Majors: Oil production (1.3 trillion bbl):
→ 483 billion tonnes CO₂ (GtCO₂)



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72% of CO₂ and CH₄ emissions since 1751 traced to
122 fossil fuel & cement producers (InfluenceMap Apr24)

Carbon Majors & global CO₂ emissions (1854–2022)



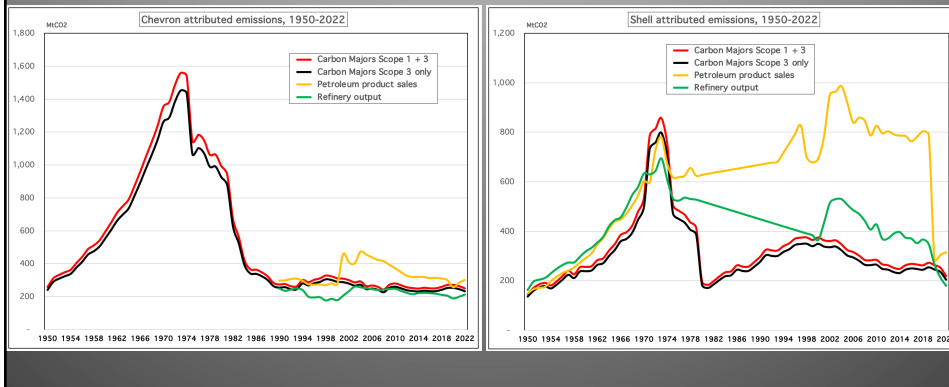
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Production-based vs refining & product sales

- 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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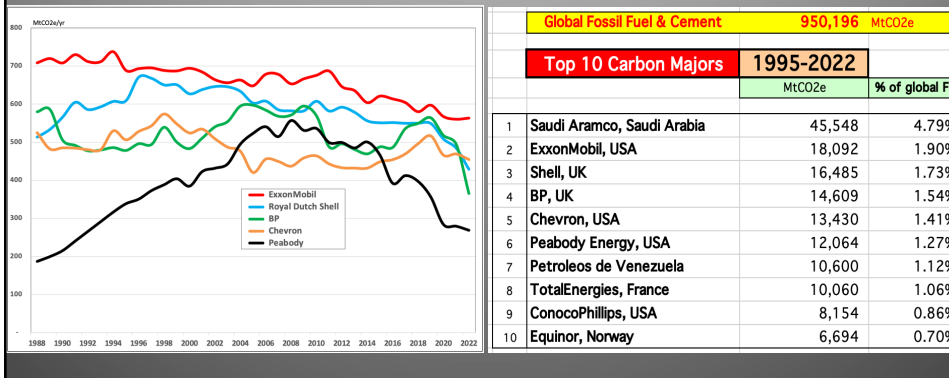
Carbon Majors 1995-2022

73 companies meet 1 GtCO₂ threshold

Five largest investor-owned companies 1988-2022 (left)

Ten leading companies 1995-2022

Percent of global fossil fuel emissions – *not adjusted for non-energy global GHG*



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Climate knowledge

- Evolution of climate knowledge:
 - Fossil fuel companies knew of, or willfully ignored, evidence of dangerous interference with global climate since 1950s & 1960s (Franta, 2018; Pres Johnson Sci Adv Cmte, 1965; Moynihan, 1969)
 - Hansen Senate testimony in June 1988
 - Incontrovertible evidence of human-caused climate change
 - Formation of the IPCC in 1988
 - UN Framework Convention on Climate Change in 1992
 - First UN Conference of the Parties (COP) in 1995
- Data on FF company historical contributions are publicly available from <1950s to 2022; 2023 data will be public 2024; 2024 data in 2Q 2025.

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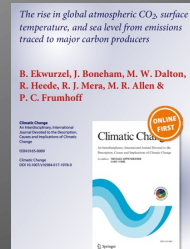
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