# Oil and gas industry's marginal share of global renewable energy

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**Abstract**

Oil and gas companies have claimed to be part of the transition to renewable energy. Our analysis of the energy assets of 250 of the largest oil and gas companies finds a marginal contribution to global renewable energy deployment and that renewable generation represents a tiny proportion of these companies' total energy production. This study empirically legitimizes doubts about the industry's commitment to transition to low-carbon energy production.

**Main Text**

The oil and gas industry faces significant adaptation challenges in a historical juncture marked by complex sustainability dilemmas and the progressive institutionalization of anti-fossil fuels norms[1,2]. Within sustainability transition literature, scholars have helped make sense of the survival strategies adopted by fossil fuel companies. For instance, Halttunen et al. interviewed professionals from the oil industry to unveil their logic in confronting sustainability transition paradoxes[3]. Lamb *et al.* mapped the discourses to justify climate inaction[4]. Megura and Gunderson conceptualised the various framings of solutions to climate change through the study of fossil fuel companies' sustainability reports[5]. Supran & Oreskes and Bonneuil *et al.* studied the peculiarities of specific companies' discursive strategies of climate denial and delay[6,7]. Others focused on the material contribution of the industry to climate mitigation, including renewable energy deployment and carbon removal technologies of major fossil fuel companies[8,9,10,11,12,13]. Meanwhile, the oil and gas industry is promoting the narrative that it is "part of the solution" to the climate crisis through its investments in renewable energy and low-carbon projects[14,15].

However, to the best of our knowledge, no study provides a comprehensive quantification of the renewable energy capacity deployed by the oil and gas industry. Our study addresses this research gap by identifying all major solar, wind, hydropower, and geothermal projects owned by the largest 250 oil and gas companies. We subsequently ask: What is the percentage of global renewable energy capacity owned by oil and gas companies? How much of the primary energy production of oil and gas companies comes from renewable electricity sources? By answering these questions, we aim to provide empirical clarity on the oil and gas industry's role in the energy transition, adding a critical foundation for evaluating corporate claims and related policy discussions.

We take the largest 250 oil and gas companies by hydrocarbon production listed in Urgewald's Global Oil and Gas Exit List, responsible for 88% of the global production in 2022[16]. Next, we identify all their subsidiaries, acquisitions, and sister companies in the power generation sector using the Refinitiv Eikon database. We manually select and create search terms for a total of 959 corporate entities, including parents (250), subsidiaries (344), acquisitions (193), and sister companies (172). Then, we search each of these entities against the ownership field of the 53,054 projects listed in the Global Energy Monitor Trackers[17] to identify a total of 1,964 unique wind, solar, hydroelectric, and geothermal projects where oil and gas companies own a share directly, or through a subsidiary or acquisition (bioenergy power plants are excluded due to their low EROIs and dependence on intermediate biological energy vectors). We compare the aggregated ownership-adjusted capacities of all projects to global renewable energy data from Global Energy Monitor and IRENA[18].

We find that the largest 250 oil and gas companies only own about 1.42% of the global renewable energy capacity in operation (Figure 1a). Around half (54%) of the operating capacity is owned by the oil and gas firms through companies they acquired (Extended Data Figure 1), and 68% of the operating capacity is located in Europe, the USA, India and Brazil (Extended Data Figure 2). The contribution is highest for geothermal (6.96%) and offshore wind (5.24%), technologies for which there is a relative transfer of know-how from well drilling and offshore operations, albeit their global operating capacity is dwarfed by that of hydro, solar, and onshore wind. We observe that oil and gas companies preferentially invest in larger renewable energy projects (Extended Data Figure 3). Finally, we can see that the oil and gas industry ownership share is larger for projects under construction, pre-construction or simply announced (Figure 1b). Still, their capacity in the pipeline only represents 4% of the COP28 decision to triple renewable energy by 2030 (305 of 7,718 GW; UNFCCC, 2023).

Figure 1 does not report data for sister companies, that is, renewable energy companies directly owned by the controlling ‘parents’ of oil and gas companies, most often government entities. We find that sister companies contribute to at least 10% of global operating renewable energy (425 GW, Extended Data Figure 4). This figure is largely attributable (94%) to the sister companies’ of Chinese state-owned firms (Table S1).

The collected data also allows us to estimate how much of the oil and gas industry's primary energy generation comes from renewable sources. To that end, we calculated technology-specific capacity factors based on the capacity and generation figures reported in the annual reports of 13 oil and gas companies. We used these capacity factors to estimate how much energy was generated annually by each of the 250 oil and gas companies based on their operating capacity. This approximation suggests that the aggregated renewable energy generation of the largest 250 oil and gas companies may only represent about 0.13% of their total primary energy extraction (hydrocarbons + renewables) (Figure 2a).

We could only identify operating renewable energy projects for 49 of the 250 companies analysed (Table S2). TotalEnergies is the company with the most installed capacity, at nearly 14.6 GW, far more than runner-ups Eni, BP, TAQA, and Shell with around 4 GW each (Extended Data Figure 5). Even so, TotalEnergies' renewable generation only accounts for 1.59% of its total primary energy extraction (Figure 2b). The companies with the largest share of renewable energy in their total production are TAQA (9.02%) and Pampa Energia (6.68%), whose core business is in the power sector and have relatively little oil and gas production. In the second tier, we find the Japanese Mitsubishi, which produces about 4.89% of their energy from renewable sources, albeit it is also a highly diversified company with modest oil and gas production. Remarkably, none of the North American companies have any significant renewable assets.

Our results show that renewable energy remains a tiny part of the oil and gas industry portfolio. Indeed, they only contribute about 1.42% to the deployment of renewable power globally, while only 49 of the largest 250 oil and gas companies are found to own renewable energy projects in operation. Moreover, about half of their contribution to renewable energy deployment is related to the acquisition of other renewable energy companies - which may be considered as a financial contribution without operational additionality.

We have estimated the contribution of the oil and gas industry to global renewable energy deployment in quantitative terms. However, their ultimate contribution to climate change mitigation is not measurable in Watts or Joules. Instead, it should be judged by considering a whole set of measures, including how much fossil fuel reserves (in barrels) they leave unexploited and how much oil and gas infrastructure they decommission, avoiding the addition of renewables to hydrocarbon extraction and use[19]. Indeed, transition pathways that rely on a reduction of energy demand significantly decrease the need for renewable energy deployment required to attain the Paris Agreement’s targets[20].

Further research may study the socio-ecological impacts and justice implications of the deployment of renewable energies by oil and gas companies in qualitative terms. Critical scholars have already shown how industrial-scale renewable development can be controversial, and conflictive, leading to serious negative social and ecological impacts or encompassing environmental justice matters[21]. In these terms, the question becomes: what social and environmental implications do renewable energy developments by the oil and gas industry encompass?

The oil and gas industry's discourse to be "part of the solution" is one element of a strategy to salvage their social and political licenses to operate in the face of pressure to decarbonise the energy system[5,22]. On the premise that the fossil fuel industry is a force for good and an ally to reckon with, oil and gas companies seal agreements and gain influence in key institutions, be it the UNFCCC, national governments, financial markets, or higher education. The industry depends on such a narrative to accommodate decarbonisation pressures and avoid a transformation of the energy system that would put them out of business. Our study questions the oil and gas industry's claim to be "part of the solution" to the climate crisis with empirical evidence. We show how the industry's contribution to global renewable energy deployment is insignificant and its diversification towards renewable energies is generally anecdotal. These results raise questions for those institutions and organisations continuing to engage with the fossil fuel industry on the basis that the industry is a key player in an energy transition.

## Methods

The largest 250 oil and gas companies by hydrocarbon production (hereafter "companies") collectively responsible for 88.3% of global hydrocarbon production were selected from the Global Oil & Gas Exit List 2023[16]. The tree structure for each of the 250 companies was downloaded from Refinitiv Eikon (see Table S3 for methodological definitions and Extended Data Figure 6 for a schematic methodology). Next, 25 entities controlling more than 50% of shares were identified for 34 companies. All subsidiaries and acquisitions of these controlling entities were downloaded and labelled as sister companies to the respective oil and gas company. Subsidiary and sister companies were subsequently filtered selecting the entities classed in sectors containing the words "Power", "Renewable", "Electricity", or "Utility". Additionally, the Refinitiv Eikon Screener app was used to identify all acquisitions by the companies filtered for the target entities belonging to the "Power" or "Alternative Energy Sources" industries, and the shares obtained being larger than 0.01%. After a manual inspection to avoid duplicated entities and mitigate false positive hits, a list of 193 acquisitions, 344 subsidiaries, 172 sisters was assembled, with a manually defined search term for each (Table S3, column D). The ownership share of its respective parent company was annotated when known, and if unknown it was assigned full ownership (see Table S4, column E).

The search term for each of the companies was queried for an exact word match against the “Owner” field of all “Operating”, “Under construction”, “Pre-construction” or “Announced” projects listed in the Global Energy Monitor (GEM) Wind (February 2025 version), Solar (February 2025 version), Hydropower (April 2024 version) and Geothermal Trackers (March 2025 version). When a project did not have a known owner, but had a listed operator, the operator was also assigned as owner (all hits compiled in Table S5). To avoid double-counting, each of the projects' capacity is multiplied by the ownership percentage held by the owning company (Table S5, column P), and by the share that the ultimate parent company held in the subsidiary or acquisition (Table S4, column E). When the project share ownership was unknown, the project was assumed to be equally owned by each of the project owners. Only 49 of the largest 250 oil and gas companies appeared as direct or indirect owners of operating projects in GEM.

For the companies that showed a large deviation between the aggregated operational capacity listed in GEM and the reported capacity in companies’ 2023-24 annual reports (Table S2, columns AH-AI), we searched for missing projects, subsidiaries or acquisitions in their annual reports and press releases using the key search words “acquisition”, ”subsidiary”, ”wind”, ”solar”, ”photovoltaic”, ”MW”, ”GW”, “capacity”. We iteratively updated the GEM database to reflect reported current information on operating projects (see R Script), and added newly-found subsidiaries and acquisitions to our company search list (Table S4), reaching a final 2.35% shortfall between the aggregated GEM-listed operating capacity we report in this study and the aggregated operating capacity self-reported by the companies (Table S2, AH-AI).

The aggregate share of the global renewable energy capacity owned by oil and gas companies was calculated against the respective global aggregates listed in GEM trackers and against the figures from the UN International Renewable Energy Agency[18] (Table S2, columns L-Q). The share of the total primary energy produced from renewable energy sources by the companies was calculated against the GOGEL production figures[16,23] (Table S2, column S; conversion factors

1 kboe/d = 2.189 PJ/y, 1 TWh = 3.6 PJ). Renewable energy generation figures were calculated with technology-specific capacity factors (generation [GWh]/capacity [GW]) derived from the capacity factors of 13 companies that reported both technology-specific generation and operating capacity figures (Table S2, cells U273, U269, U281, U286). Like all studies of this magnitude, our methodology has to take a number of assumptions and commensurate mitigation measures to estimate the figures reported (Table S6). For further methodological details please refer to the supplementary information.

**Supplementary information**

The supplementary figures and tables are enclosed in the submission.

**Data availability**

Data has been sourced from public online databases including Urgewald's Global Oil and Gas Exit List 2024 (https://gogel.org/) and Global Energy Monitor Wind February 2025 version (https://globalenergymonitor.org/projects/global-wind-power-tracker/download-data/), Solar February 2025 version (https://globalenergymonitor.org/projects/global-solar-power-tracker/download-data/), Hydropower April 2024 version (https://globalenergymonitor.org/projects/global-hydropower-tracker/download-data/) and Geothermal Trackers September 2024 version (https://globalenergymonitor.org/projects/global-geothermal-power-tracker/download-data/). Additional data on company ownership has been sourced from Refinitiv Eikon (https://eikon.refinitiv.com/), a subscription-based product. The minimum corporate ownership information to replicate the analysis is provided in Table S4, but the product licence terms do not allow for a full release of the raw data.

**Code availability**

The R code can be found in the following repository: https://github.com/llavero-pasquina/Oil-and-gas-industry-s-marginal-share-of-global-renewable-energy

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**Author Contributions Statement**

MLP conceptualised, designed and performed the analysis. MLP has produced figures, tables and written the manuscript. MLP and AB contributed to data collection. AB has assisted in the analysis and has written the manuscript.

**Competing Interests**

The authors declare no competing interests.

**Figure Legends/Captions (for main text figures)**

Figure 1. Share of global renewable energy capacity owned by the largest 250 oil and gas companies. The percentages indicate the global ownership-adjusted renewable capacity share by the largest 250 oil and gas companies (black) and their acquisitions (grey) compared to IRENA data (a), including distributed power and compared to Global Energy Monitor data (b), including prospective power plant categories. Below each piechart, the total installed capacity is given.

Figure 2. Share of primary energy generated from renewable sources by the largest 250 oil and gas companies. The percentages indicate the share of primary production (hydrocarbons + renewables) generated from renewable sources by (a) the largest 250 oil and gas companies and (b) a selection of relevant companies. The total primary production is given under each piechart in petajoules.

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