OILCHANGE INTERNATIONAL

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INVESTING IN DISASTER

RECENT AND ANTICIPATED FINAL INVESTMENT DECISIONS FOR NEW OIL AND GAS PRODUCTION BEYOND THE 1.5°C LIMIT

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Oil Change International is a research, communications, and advocacy organization focused on exposing the true costs of fossil fuels and facilitating the coming transition towards clean energy.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

The only credible and safe way to hold global heating below 1.5 degrees Celsius (°C), as governments have committed to do under the Paris Agreement,[1] is to keep the vast majority of oil, fossil gas, and coal in the ground.

Peer-reviewed research led by Oil Change International (OCI) shows that the oil and gas fields and coal mines already operating or being constructed globally – where the infrastructure is built and billions of dollars invested – contain more fossil fuels than the world can afford to extract and burn under the Paris Agreement, leaving no room for new expansion.[2] In 2021, the International Energy Agency (IEA) reached a similar conclusion, finding that approving new fields and mines for construction is inconsistent with the 1.5°C limit, given already developed fields hold enough reserves to fulfill demand as oil and gas use is phased out.[3]

Yet, despite this reality, the oil and gas industry and its investors and enablers continue to propose and finance new projects to extract more carbon. These projects will either cause higher degrees of global warming or create more stranded assets. As the world reels from the social, political, and economic consequences of its continued dependence on fossil fuels, the oil and gas industry is seizing on the current energy upheaval to ensure that the world remains hooked on fossil fuels for decades.[4]

This briefing finds that final investment decisions (FIDs)[a] have already been made to proceed with construction of more than 180 new oil and gas fields or field expansions thus far in 2022. **The FIDs made to-date in 2022 and anticipated by the end of the year could lock in enough new oil and gas production to cause an additional 11 Gigatonnes (Gt) of carbon dioxide (CO_2) pollution.[5] That is equivalent to the lifetime emissions of building 75 new coal power plants, and is more than double the United States's total carbon emissions from energy in 2021.[6]**

Analysis of the new projects and shale wells forecast to receive FIDs between 2023 and 2025 reveals a risk of a major surge of new expansion. **If approved and operated for their full expected lifetimes, these new projects could lock in a further 59 Gt of carbon pollution, equivalent to building almost 400 new coal plants.**

Consequently, **the total carbon pollution locked in by new oil and gas production sanctioned from 2022 to 2025 could amount to 70 Gt CO_2.[b] This amounts to almost two years' worth of the world's current global annual energy-related carbon emissions,[7] and would deplete 17% of the world's remaining carbon budget for a 50% chance of holding warming to 1.5°C.**

This briefing identifies the largest of the new oil and gas production projects that have already received FIDs in 2022 or are likely to be approved before the end of 2022, as well as the largest projected FIDs expected from 2023 to 2025. All this new fossil fuel production is inconsistent with the 1.5°C limit under the Paris Agreement and will not solve the energy crunch that people across the world now face (Box 1). This expansion is also being actively resisted at the local, national, and global levels by local communities, Indigenous Peoples, and civil society organizations. Pressure is building on governments to stop this reckless gamble from the oil and gas industry, enact windfall and wealth taxes to ease the fossil- and conflict-driven cost-of-living crisis, and greatly increase funding for a clean and just energy transition.

a A final investment decision is when project developers approve development of a new field or, in the case of shale, a new fracking well, enabling construction to commence. See Figure 3 for additional context on the typical development cycle of a conventional oil and gas field.

b As described in the Methodology Note, these estimates represent the cumulative carbon pollution that burning the oil and gas reserves contained in these projects would cause, if fully extracted. We do not estimate the additional methane pollution that would be caused while extracting, processing, and transporting the oil and gas. Thus, the full global warming impact of this new expansion is likely to be greater.

BOX 1: THE WORLD IS FACING AN OIL AND GAS CRISIS – NEW OIL AND GAS EXPANSION WILL ONLY MAKE THINGS WORSE

Dependence on oil and gas sowed the seeds for the current energy crisis. The root of this crisis is governments' dual failure to manage the decline of the oil and gas industry in line with climate goals, and to give adequate support to the transition to clean energy.

Putin's invasion of Ukraine amplified the existing failures and vulnerabilities of the fossil fuel supply chain. Russia is a major oil and gas producer, and so sanctions, import bans, and boycotts of Russian supply have further driven up oil and gas prices. The scramble by European nations to acquire alternatives to Russian gas further destabilized the global liquefied natural gas (LNG) market, driving up LNG prices. As a result, some countries are facing energy shortages because they are unable to pay for LNG at international market prices.[8]

Moreover, the invasion was fundamentally a fossil-fueled invasion. Revenues from oil and gas projects backed by European and U.S. companies have financed Vladimir Putin's regime to the tune of nearly USD 100 billion since 2014.[c,9]

This has exacerbated existing inequalities, contributing to a wider cost-of-living crisis that has left many unable to access food, energy, and other basic needs.[10] Meanwhile, big oil and gas companies have gained vast windfall profits, which they have largely used to enrich shareholders, rather than invest in solutions to help people and combat the climate crisis.[11] **Five oil and gas majors – ExxonMobil, BP, Shell, Chevron, and Total – recorded a combined USD 55 billion in profit in the second quarter of 2022 alone, whilst announcing USD 30 billion in returns to shareholders.[12]** The IEA projects that fossil fuel producers as a whole will reap USD 2 trillion in windfall profits in 2022.[13]

The new production identified in this briefing will worsen the climate crisis, and will not help to solve the current European and international energy crisis. Reducing demand, particularly unnecessary energy use in wealthy countries, is the main solution in the immediate term, alongside accelerating renewable energy deployment. For example, Climate Analytics estimates that deploying 10 million heat pumps in Europe could cut gas use by 15 billion cubic meters, which is 10 percent of the Russian gas imported by the EU.[14] Increased electricity generation from wind and solar in Europe in 2022 alone avoided EUR 11 billion in fossil gas import costs since the start of the Russian war in Ukraine, and helped mitigate inflation for fossil fuel prices.[15] Alongside these interventions, redistributive fiscal measures are needed to alleviate international debt crises, deepening poverty, and food shortages in the short-term and to ensure clean energy infrastructure is accessible to all in the medium-term.[16] These policies can be paid for with windfall and wealth taxes, which will also help reverse record levels of profiteering from fossil fuel corporations and some other sectors and investors seen in 2022.

Whereas these measures would help to address the energy security and affordability crisis, alleviate the energy supply crunch, and help people now, new oil and gas fields will only increase dependence on the fossil fuel economy. Locking in long-term fossil fuel production is no answer to an immediate and short term crisis. As the IEA notes, large, long-term oil and gas supply projects "are not a good match for immediate energy security needs" because they typically take years to start producing.[17] **We calculate that the average projected actual start-up year for new oil and gas fields approved for extraction in 2022 is 2025 – far too late to help with the current crisis**.[18] The IEA estimated that since 2010, the delay between approval and production for conventional upstream projects has averaged 4 years.[19]

Since the start of the Russian war against Ukraine, Germany, Italy, and many other European governments have been busy not only securing short-term supplies of LNG, but encouraging further oil and gas exploration and extraction around the world, in particular in Africa.[20] This jeopardizes European claims to climate leadership and increases the risk of stranded assets in already economically vulnerable countries. This also contrasts with a number of emergency and long-term measures recently adopted by the European Union (EU) to aggressively slash its dependence on fossil fuels, such as the RePowerEU plan. In response, the IEA's 2022 World Energy Outlook report states: **"No one should imagine that Russia's invasion can justify a wave of new oil and gas infrastructure in a world that wants to reach net zero emissions by 2050."[21]**

Meanwhile, the U.S. just adopted its farthest-reaching piece of climate legislation yet (The Inflation Reduction Act) and China is doubling down on its investments in renewable energy and electric vehicles.[22] These actions increase the prospects that by the time newly-approved oil and gas fields start producing, demand for fossil fuels in the world's major economic centers could be rapidly declining. In a world planning for net zero emissions by 2050, the IEA indicates global gas demand needs to decline by more than 20 percent below 2021 levels by 2030,[23] making current and future investments in increased production capacity an increasingly hazardous bet. This increases mid- to long-term macroeconomic risks in countries with high levels of dependence on oil and gas revenues or that are planning to become significant producers. The dash for fossil fuels might prove a dangerous mirage for many oil and gas producers.

c Eight companies — BP, Shell, Wintershall Dea, ExxonMobil, TotalEnergies, Equinor, OMV, and Trafigura — are responsible for over USD 95 billion to the Russian government via their stakes in Russian oil and gas projects and companies since 2014, with BP responsible for 80 percent of this total.

THE WORLD NEEDS A MANAGED PHASE-OUT

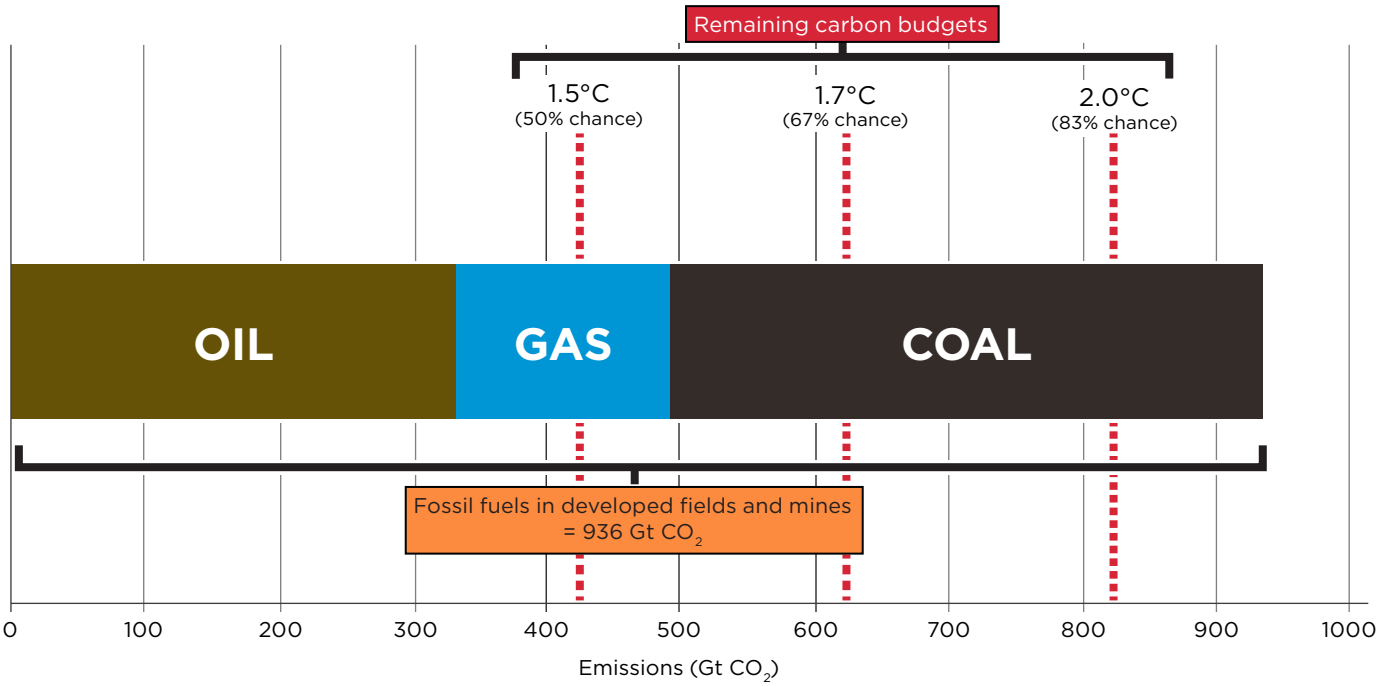
The case for governments to manage a rapid and equitable phase-out of oil and gas production has never been stronger. Fossil fuels are the largest cause of global heating.[24] With just over 1°C of global average temperature rise above pre-industrial levels to date, climate disasters are causing death and devastation across the globe. In large part because the fossil fuel industry has spent the past 30 years blocking solutions and engineering deep lock-in,[25] the world must achieve a rapid wind-down of fossil fuel use and production to hold global temperature rise below 1.5°C and avoid even more dangerous tipping points.

Peer-reviewed research led by Oil Change International (and updated in Figure 1) shows that the fossil fuel industry's investments have already dug the world into a deep hole. **From the beginning of 2022, climate scientists estimate that the world can emit a maximum of 420 Gt of carbon dioxide to preserve a 50-percent chance of limiting warming to 1.5°C**.[26] Yet, the oil and gas fields and the coal mines already in operation or under construction globally contain **enough oil, gas, and coal to cause 936 Gt of carbon dioxide pollution, if fully extracted – well beyond the remaining carbon budget**.[27]

Those numbers are dramatically mismatched. Even if coal were phased out overnight, the oil and gas in already-developed projects could push the world beyond 1.5°C (Figure 1). The implication is that staying within the Paris Agreement limits will require not only ceasing development of new fossil fuel extraction, but also keeping as much as 50 percent of reserves within already-developed projects in the ground by decommissioning them early.[d] These developed projects are sites where companies have already built infrastructure, drilled wells, and invested billions of dollars, creating a strong financial incentive for companies to keep operating them to recoup investment and maximize potential profits.

The conclusion that too much infrastructure already exists ultimately extends to all forms of fossil fuel infrastructure, including coal- and gas-fired power plants. The Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment report (AR6) affirms that

Figure 1: CO_2 emissions committed by developed oil, gas, and coal reserves, compared to remaining carbon budgets to stay within the Paris goals



Sources: Oil Change International analysis based on data from Rystad Energy's UCube, Trout and Muttitt et al., 2022, IPCC, IEA, and Global Carbon Project.[28] Remaining carbon budgets shown are as of the start of 2022.

d Trout and Muttitt et al., "Existing Fossil Fuel Extraction," find that staying within a 1.5°C carbon budget (50 percent probability) implies leaving almost 40 percent of developed reserves of fossil fuels unextracted. This finding is based on developed reserves and carbon budget data from a baseline of 1 January 2018. From 2018 to 2022, carbon budgets have shrunk by around 160 Gt CO_2, but the industry has continued to develop new reserves to replace part or all of those being produced. To stay within a remaining carbon budget of 420 Gt CO_2, as many as 55 percent of developed fossil fuel reserves may need to remain unextracted.

assessment: "Decommissioning and reduced utilization of existing fossil fuel installations in the power sector as well as cancellation of new installations are required" to limit warming to 1.5°C.[29]

The imperative for governments is to lead on a managed transition: to stop allowing the fossil fuel industry to lock in even more heat-trapping pollution and to implement policies that wind down fossil fuel production and scale up clean alternatives at a pace that aligns with climate goals and leaves nobody behind.

While oil and gas companies, their financiers, and some governments have attempted to evade this reality,[30] analysis by the IEA and a variety of other scientific models show that this approach is both necessary and possible.

The IEA's first-ever 1.5°C-aligned energy scenario, the Net Zero Emissions (NZE) scenario, published in 2021 and updated in 2022, confirms that, in a world that is reducing oil and gas demand at a 1.5°C-aligned pace, developing new fields would either lead to levels of production that push the world beyond the 1.5°C, or create a need to accelerate the phase-out of other fields, increasing the risk of stranded assets.[31] A recent meta-analysis by the International Institute for Sustainable Development (IISD) finds broad convergence across a range of 1.5°C -compatible energy pathways, including those assessed by the IPCC, on the **need to immediately end new oil and gas expansion and to reduce global oil and gas production by at least 65 percent by 2050, compared to 2020 levels** (Figure 2).[32] Scenarios that avoid unrealistic and risky reliance on carbon capture and storage (CCS) and/or carbon dioxide removal (CDR) require oil and gas production to decline significantly faster – by nearly 50 percent by 2030, relative to 2020 levels, in the case of the IPCC low-demand illustrative mitigation pathway (IMP-LD) shown in Figure 2.

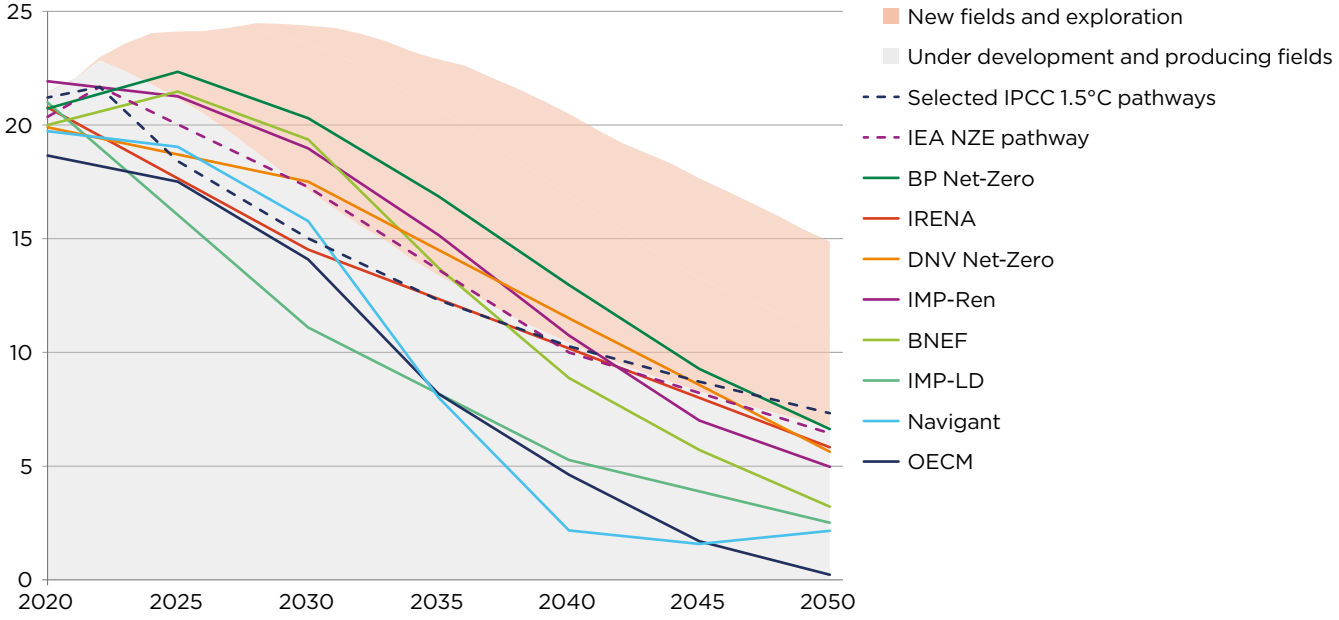
Critically, studies also show the clean technologies necessary to rapidly replace fossil fuels already exist, and these solutions hold the keys not only to tackling the climate crisis, but to ensuring affordable and accessible energy for all.[33]

In this report, we assess the scale at which the oil and gas industry and enabling governments have continued to approve new extraction projects over the past year, projects that lock in more carbon emissions, increase stranded asset risks, siphon investment away from clean energy solutions, and make it even more challenging to achieve the objectives of the Paris Agreement. We also examine the threat of companies and governments continuing on this climate-wrecking trajectory through 2025.

Specifically, we analyze the granting of a final investment decision as the key threshold past which a project's reserves, and the associated carbon pollution, are "locked in." While there are various points of commitment in the process of developing new extraction projects that create "carbon lock-in"[34] (see Figure 3), the FID is when the largest portion of capital is sunk. At this stage, a company has received initial regulatory approval and secured financing, and sets construction into motion.[35] While avoiding the carbon pollution associated with these projects is not impossible, it will require undoing past financial, political, and legal decisions.[36]

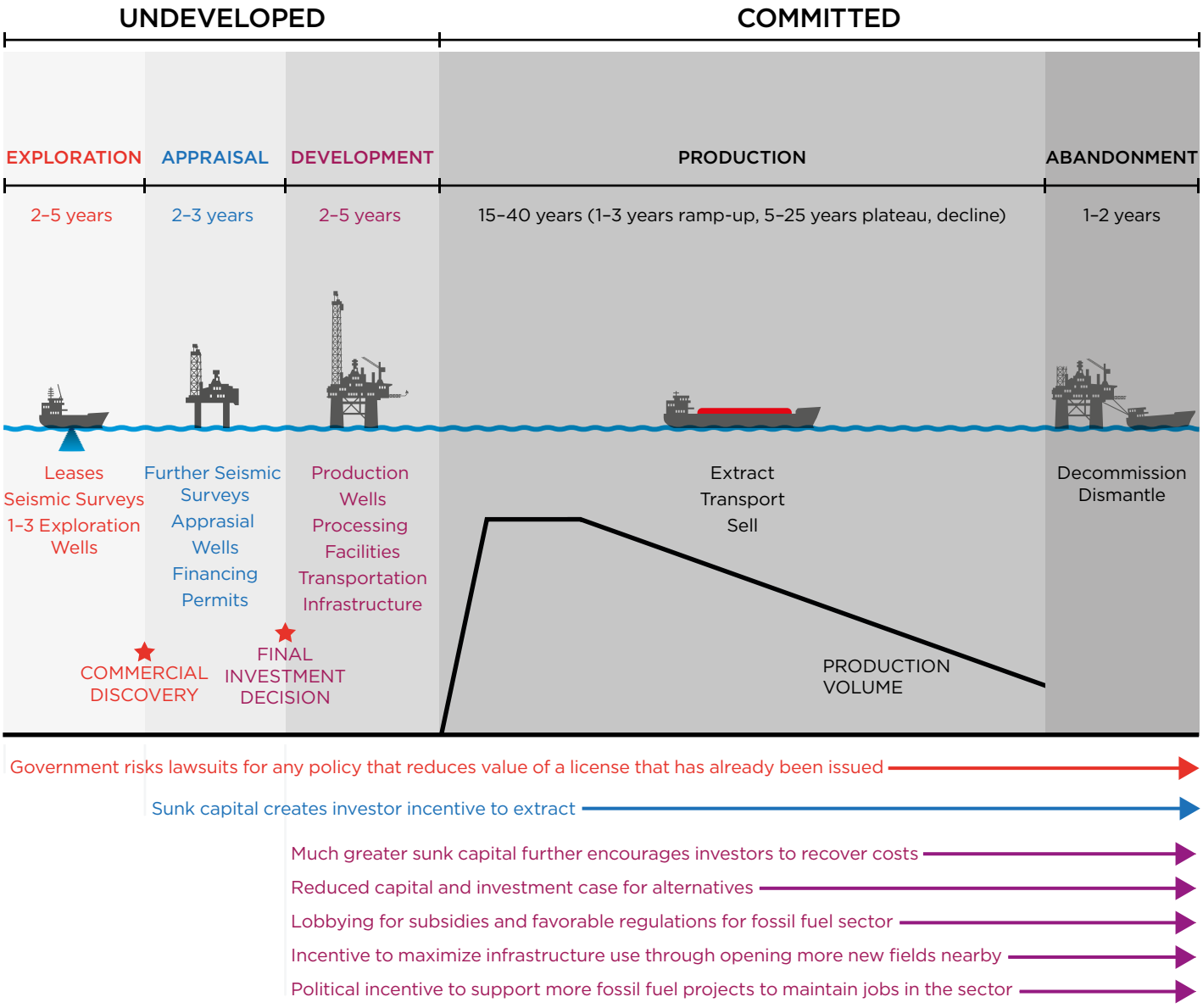
In the midst of global climate and energy crises driven by dependence on fossil fuels, the last thing governments and companies should be doing is deepening it.

Figure 2: Global oil and gas production, based on selected 1.5°C pathways



Source: IISD, 2022

Figure 3: Lifecycle of a typical oil and gas field, showing the kinds of carbon lock-in that typically occur at each stage



Source: Oil Change International

THE INDUSTRY PLANS TO INCREASE CARBON POLLUTION

The oil and gas industry continues to put forward new projects that will result in either the extraction of more fossil fuels than the world can afford to burn while meeting climate goals or more stranded assets. Even as big oil and gas companies publish new, misleading climate pledges and plans, falsely claiming to be confronting the climate crisis, they continue to develop new fields and shale wells and lobby for policies to protect fossil fuel interests.[37]

In this section, we highlight the projects, countries, and companies responsible for the most oil and gas expansion approved in 2022 – measured by projected carbon pollution locked in by new FIDs. We then summarize the projects, countries, and companies that could be the biggest sites and sources of expansion over the next three years.

Globally, the oil and gas industry's production and emissions are growing. Capital expenditure on new oil and gas projects shrank after the oil price crash of 2014, but trended upward steadily until 2020. In 2020, the response to the first waves of the COVID-19 pandemic, combined with geopolitical factors and existing instability in oil and gas markets, rapidly but temporarily drove down oil and gas prices, leading to a sudden drop in total capital expenditures. However, in 2021, the number of new projects approved rebounded (Figure 5).

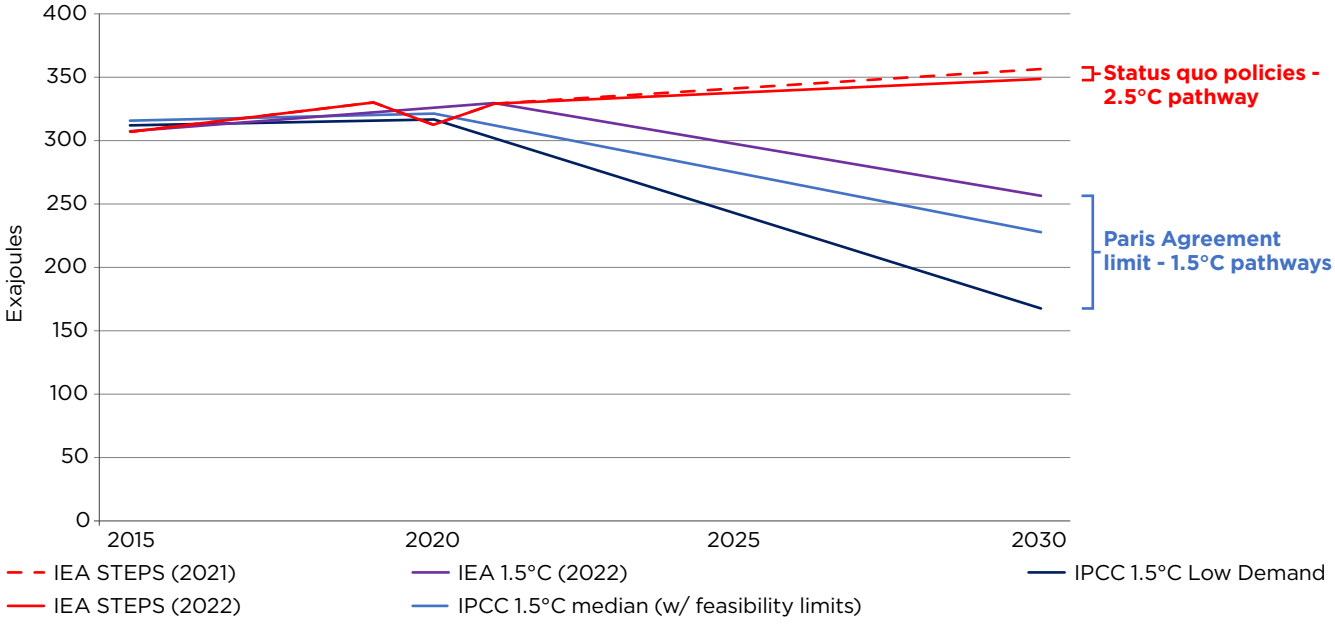
BOX 2: CHANGING FORECASTS DUE TO RUSSIA'S INVASION OF UKRAINE

Western nations have imposed sanctions on the Russian energy sector since Russia invaded Ukraine in February 2022. As a result, the IEA's status quo energy scenario, the Stated Policies Scenario (STEPS), now projects Russian hydrocarbon production to drop by around 20 percent from 2021 levels by 2030, whereas the IEA last year projected Russian oil and gas production would increase by four percent and 13 percent, respectively, over that same time period.[38] For the first time, the IEA's annual World Energy Outlook predicts global fossil fuel use peaking before 2030 across all scenarios, even without additional climate policies, in part due to the energy crisis exposing the economic hazards of fossil gas reliance.[39]

However, the world is nowhere close to phasing out oil and gas production at the rate needed to address the climate crisis (Figure 4). Scenarios from the IEA and Rystad Energy, based on status quo policies and energy demand forecasts, see the rest of the world compensating for most of the Russian production decline by 2030, led by incremental production increases in North America and the Middle East, such that total global production would still increase to 2030.[40] By contrast, 1.5°C pathways published by the IEA and assessed by the IPCC show the need for significant declines in oil and gas production and use by 2030 – by 20 percent below 2020 levels in the IEA's Net Zero Emissions scenario[41] and by almost 50 percent in the IPCC low-demand illustrative mitigation pathway, which avoids risky reliance on CCS or CDR in the energy sector.[42]

Ultimately, to meet their climate commitments, governments must put bold and effective policies in place that explicitly stop the expansion of fossil fuel infrastructure and manage a just and equitable phase-out of production. The world is failing to capitalize on the current energy crisis and the expected decline in Russian fossil fuel production to finally align the global oil and gas production trajectory with the Paris Agreement objective of limiting warming to 1.5°C.

Figure 4: Projections of oil and gas production modeled before and after Russia's invasion of Ukraine, vs. 1.5°C-aligned pathways



Source: IEA,[43] IISD,[44] AR6 Scenarios Database hosted by IIASA[45]

The FIDs made to-date in 2022 and anticipated by the end of the year could lock in enough new oil and gas production to cause an additional 11 Gt of carbon dioxide pollution over the lifetime of the approved fields and wells.[46] **That is equivalent to the lifetime emissions of building 75 new coal power plants, and amounts to more than double the United States's total carbon emissions from energy in 2021.**[47]

Amidst the energy crisis of 2022, the volume of non-shale resources approved has been less than the prior year. However, there is still an upward trend over the Covid-driven low of 2020. Data from Rystad Energy show the risk of a major surge of new resources being sanctioned over the period 2023 to 2025, with the approvals anticipated in 2024 forecast to exceed the existing post-Paris Agreement high of 2019.

Because the projects forecast from 2023 to 2025 have not yet received FIDs, there is time to stop them before construction begins, for example, by convincing governments to reject permits, lodging legal challenges, and pushing public and private financiers to withhold funding.

A driving force behind stopping potential climate bombs has been resistance from frontline activists, Indigenous Peoples, and civil society organizations,[48] and these same strategies may be effective in blocking new proposed projects as well as those recently approved. For instance, through the Stop EACOP campaign, communities in Uganda and Tanzania and their international allies have convinced a growing number of international banks to pull out from funding the East African Crude Oil Pipeline (EACOP), led by French oil and gas company TotalEnergies.[49] Just ahead of this report's publication, Equinor announced it was postponing a final investment decision, originally planned for 2023, on its proposed Wisting oil field in the Norwegian Arctic. This decision came after criticism of Equinor's inadequate environmental assessment and public protests in Norway.[50] Governmental policies aimed at managing the decline in fossil fuel production can – and should – play a part, as demonstrated by the decrease in production growth achieved by the Beyond Oil and Gas Alliance[51] and the shift of public finance from fossil fuels to clean energy promised by signatories of the Glasgow Statement on international public finance.[52]

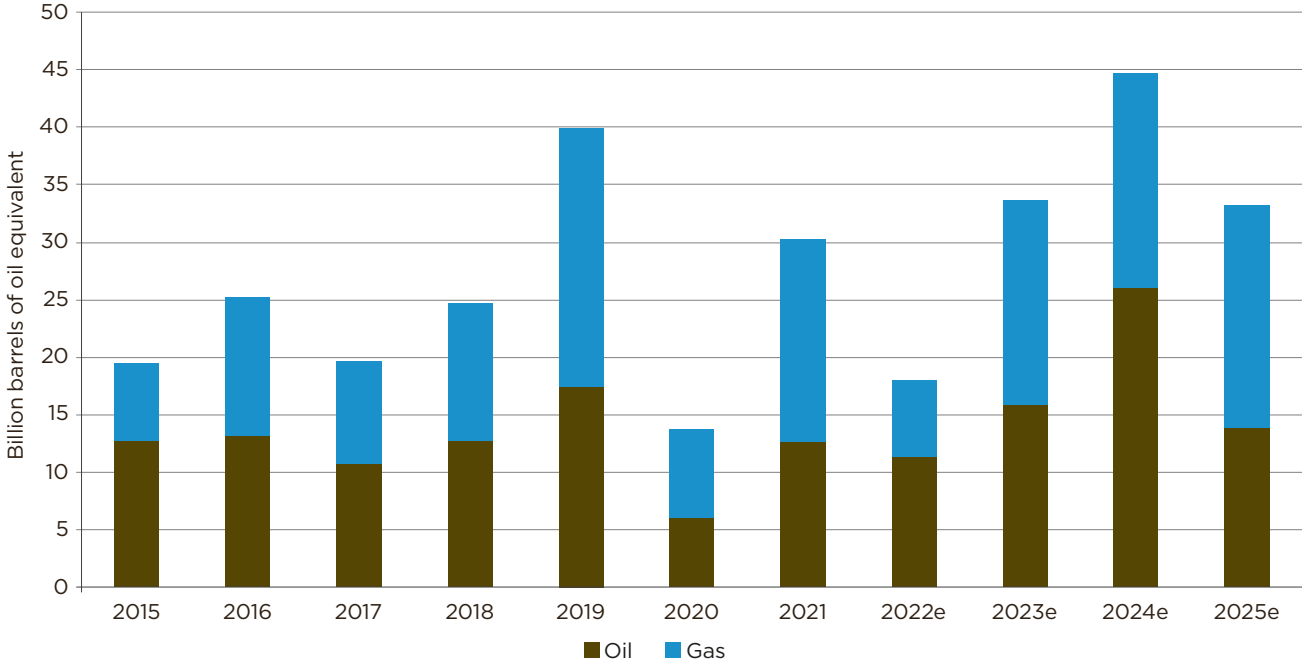
THE BIGGEST NEW EXPANSION IN 2022

Four of the five largest new conventional extraction projects sanctioned in 2022 will primarily increase oil production, not gas production (Figure 7). The reality of increasing oil production contradicts the frequent claims of oil and gas industry actors that they are prioritizing gas development over oil, a priority that rests on the myth that gas is a 'transition' fuel.

Factoring in both conventional assets and new shale wells, the U.S. is definitively the country with the most new expansion approved in 2022, followed by Saudi Arabia (Figure 6). Saudi Arabia was also the largest single recipient of international public finance for fossil fuels from 2018-2020 from the signatories of the Glasgow Statement.[53] The 15 countries with the most new expansion include four of the world's wealthiest oil and gas producers (U.S., Canada, Norway, and Australia). Because all four of these countries have the technical and economic means to rapidly phase out their oil and gas production, a recent study asserts that they should do so by 2034 at the latest to contribute their fair share to the global climate effort.[54]

In the U.S., the biggest culprit is the continued expansion of fracking for shale oil and gas. The industry is pursuing new fracking most aggressively in the Permian Basin, located in the states of Texas and New Mexico (Figure 8), which is the site of almost 40 percent of the new shale expansion we analyze in 2022 in this report.[55] Canada and Argentina are the next two countries where communities face significant new fracking activity.

Figure 5: New oil and gas reserves approved for development worldwide by year (excluding shale)



Source: Rystad Energy's UCube (October 2022)

BOX 3: EQUITY AND CLIMATE JUSTICE IN THE PHASE-OUT OF FOSSIL FUEL PRODUCTION

As governments begin to plan to phase out fossil fuel production to limit global warming to 1.5°C, it is critical that they implement meaningful policies to ensure a just and sustainable energy transition.

A 2020 study in the journal *Climate Policy* by Greg Muttitt and Sivan Kartha presents a framework for equitably curbing fossil fuel extraction, proposing five principles:[56]

1. **Phase down global extraction at a pace consistent with 1.5°C**, using both economic and regulatory approaches, including extraction taxes and licensing moratoria.

2. **Enable a just transition for workers and communities**, including through sound investments in low-emission sectors, social protection for fossil-fuel workers, and local economic diversification.

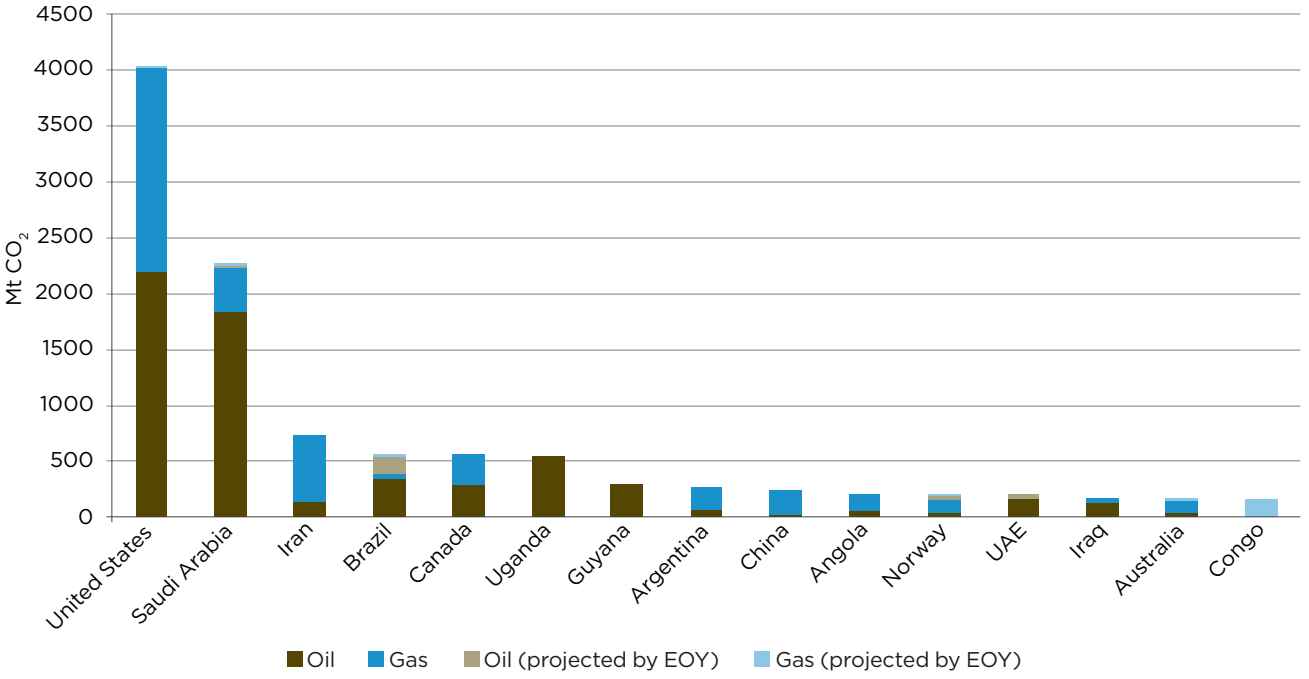
3. **Curb extraction in tandem with environmental justice**, prioritizing ending extraction where communities disproportionately experience the harms of extraction (such as pollution), not the benefits.

4. **Reduce extraction fastest where social costs of transition are least**, meaning that wealthier, diversified economies must phase down production more quickly, as they can better mitigate and absorb the adverse impacts on workers and communities. (A 2022 Tyndall Centre report on phase-out dates for fossil fuel production provides a detailed framework for assessing and applying this principle of equity, arguing that the wealthiest nations with the most diversified economies must phase out all oil and gas production no later than 2034).[57]

5. **Share transition costs fairly**, so that the largest burden is borne by those with the greatest ability to pay, meaning that wealthy countries — which have already benefited the most from past extraction — bear the most cost.

According to this framework, it is clear that an equitable phase-out of fossil fuel production will involve wealthy, economically diversified countries ending their production first. However, finance is also key to historical producers contributing fairly to the effort to limit warming to 1.5°C. Countries in the Global North must meet their climate finance commitments and exceed those commitments by funding a global just transition to clean energy on a massive scale, including in emerging oil and gas producers in the Global South.[58]

Figure 6: Countries with the most oil and gas expansion approved in 2022, by cumulative CO_2 emissions committed by new FIDs



Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

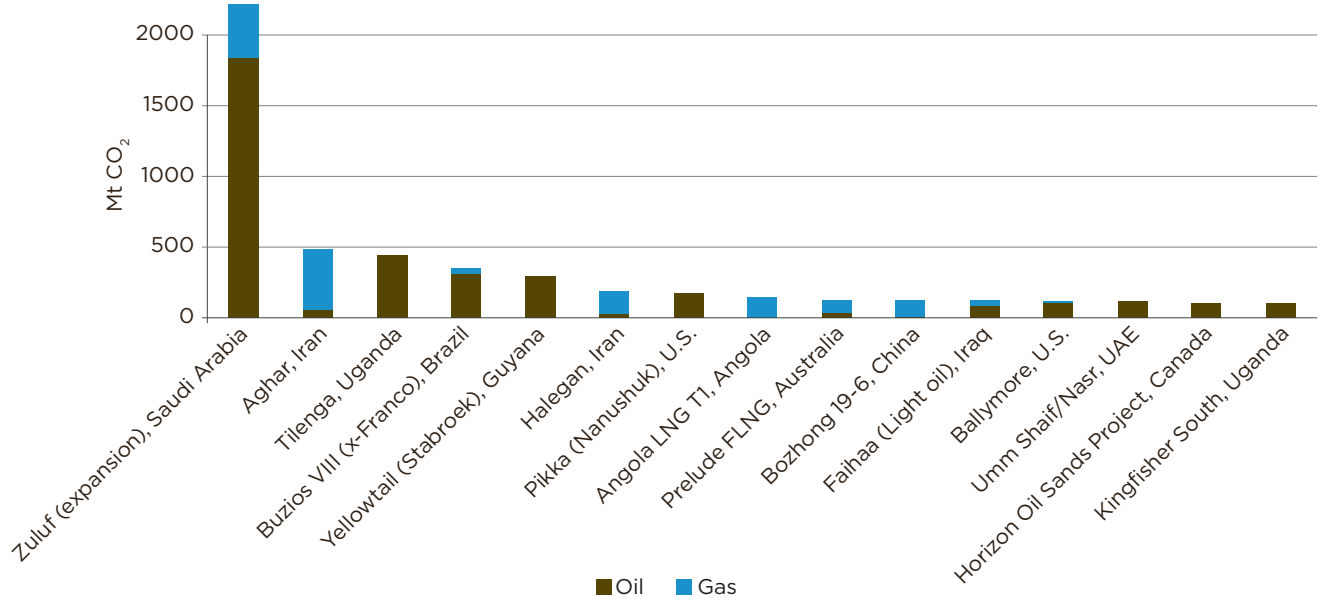
Saudi Arabia is the country with the second-largest expansion of new oil and gas production in 2022. Much of the new expansion sanctioned in 2022 has resulted from Saudi Aramco's sanctioning of a major expansion of its Zuluf field, an offshore oil field in the Arabian Gulf. Western financial institutions, in particular U.S. banks, have actively funded Saudi Aramco's expansion over the past few years, with the top three Aramco funders alone (Citi, HSBC, and JPMorgan Chase) providing USD 25 billion in finance from 2016 to 2021.[59] Saudi Arabia is also one of the top recipients of G20 and Multilateral Development Bank finance for fossil fuel energy projects. It was the sixth-largest recipient of such finance between 2019 and 2021.[60]

From the Zuluf field expansion alone, Saudi Aramco is by far the single worst company in terms of total new oil and gas supply and associated carbon emissions approved for development in 2022 (Figure 9).

Several of the largest conventional projects approved in 2022 are in countries the oil and gas industry has recently entered – Tilenga and Kingfisher in Uganda and Yellowtail in Guyana. These projects have been highly controversial and face local community and international opposition.

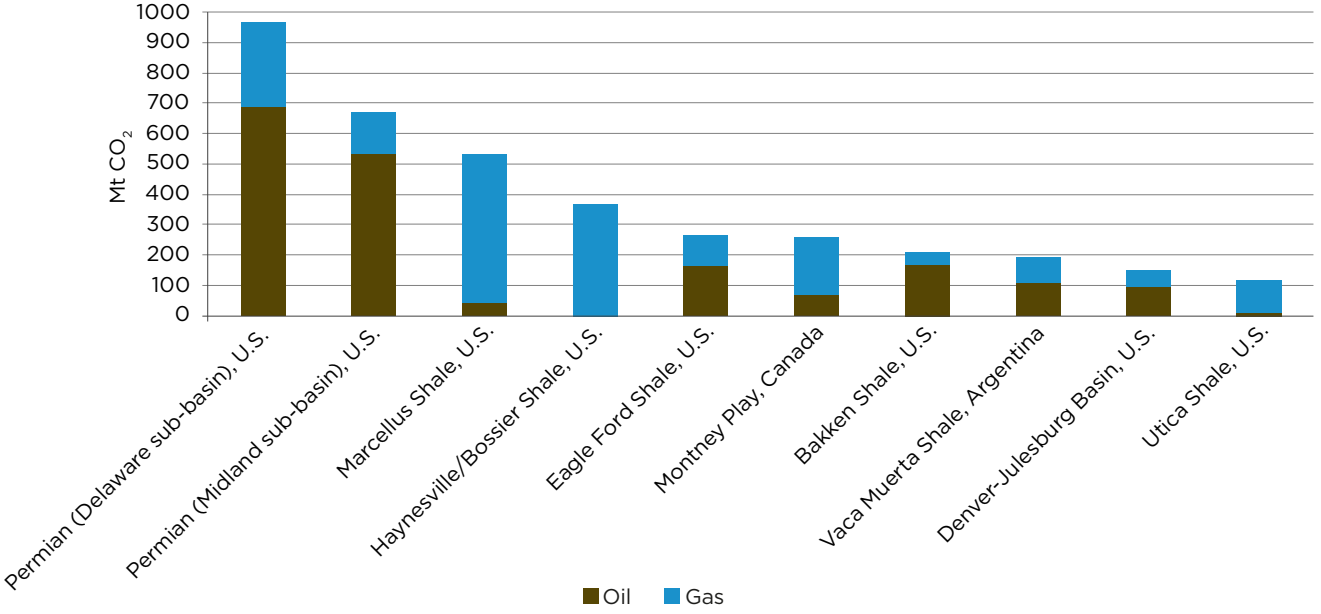
The Tilenga and Kingfisher projects in Uganda, led by TotalEnergies and the China National Offshore Oil Corporation (CNOOC), are particularly fraught. Their viability depends on the construction of a heated oil pipeline — at a cost of USD 5 billion.[61] The 1443-kilometer East African Crude Oil Pipeline is designed to transport 246,000 barrels per day of waxy crude oil from the Tilenga and Kingfisher projects to the coastal city of Tanga, Tanzania.[62] EACOP is one of Africa's most controversial new fossil fuel projects.[63] Analysis estimates that it will unlock an additional 34 million tons of carbon pollution per year; the project is also connected to allegations of significant human rights violations.[64] Civil society organizations, including the StopEACOP coalition, have sounded the alarm about

Figure 7: Largest 15 conventional oil and gas projects approved for development in 2022, by cumulative CO_2 emissions



Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

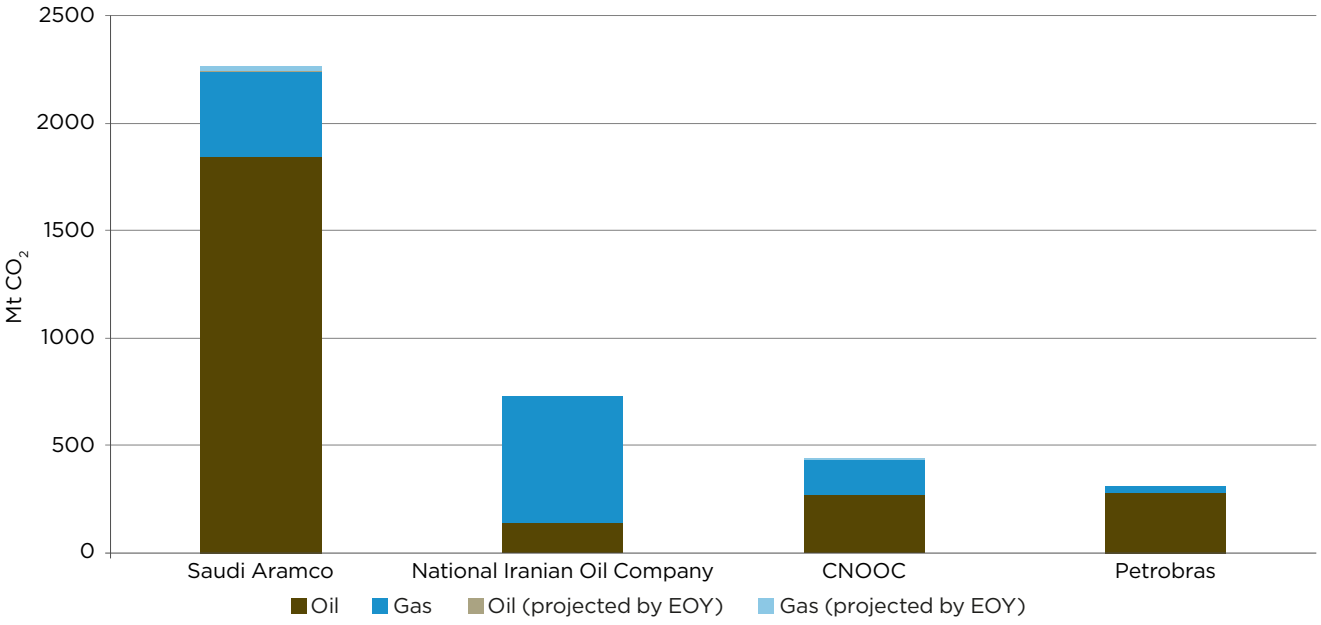
Figure 8: Largest 10 fracking expansion hotspots of 2022, by cumulative CO_2 emissions committed by new drilling



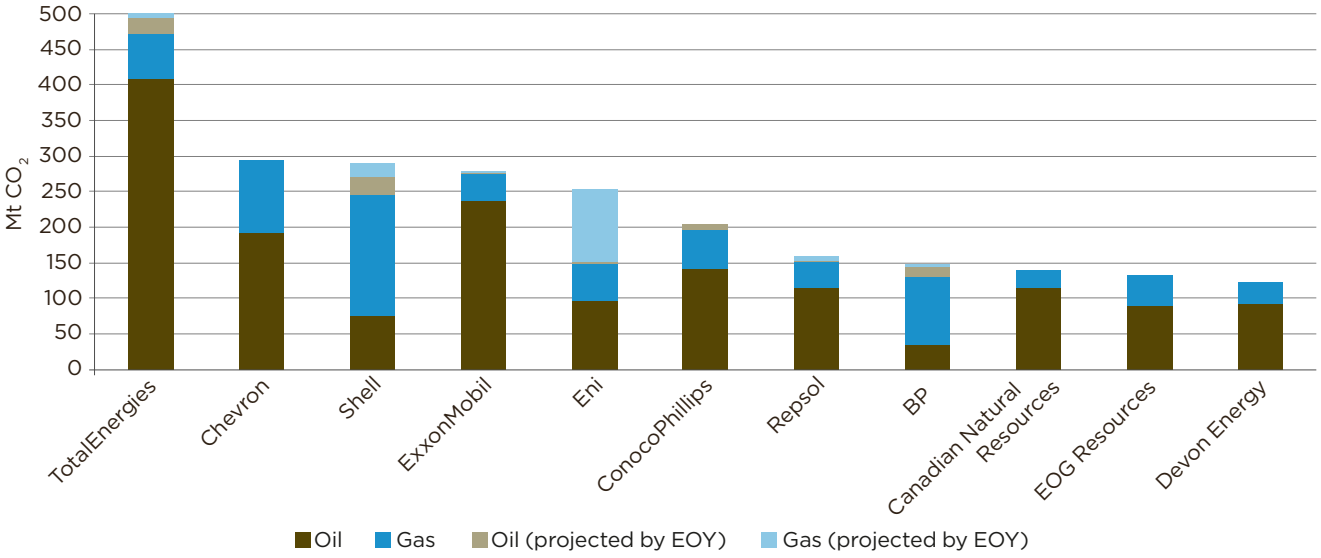
Source: Oil Change International analysis based on data from Rystad Energy's UCube (October 2022)

Figure 9: Top 15 companies responsible for the most oil and gas expansion in 2022, by cumulative CO_2 emissions committed by new FIDs

a. Top Nationally Owned Oil Companies



b. Top International and Independent Oil Companies



Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

many aspects of the project. Over 100,000 people could be displaced in 10 districts across Uganda for the EACOP and the Tilenga and Kingfisher projects.[65]

ExxonMobil's oil and gas buildout offshore of Guyana has met significant resistance from Guyanese citizens and could be halted. Nine separate court cases have been filed at multiple levels, including challenges to the petroleum production license, environmental permits, flaring, the petroleum agreement between the government and ExxonMobil, and related onshore activities.[66] Guyanese advocates are also demanding an unlimited parent company guarantee for all damage from ExxonMobil's operations.[67] One case has already reduced ExxonMobil's environmental permits from over 20 years to 5 years.[68] The constitutional case challenges the oil and gas buildout in Guyana on the account that it violates the right to a healthy environment by significantly fueling the climate crisis.[69] Citizens and advocates have raised alarms about the risk of stranded assets, an exploitative petroleum deal, oil spills, a proposed gas project, and ExxonMobil's use of faulty equipment and production above permitted design capacity. ExxonMobil and partners Hess and CNOOC are producing oil at two fields to date.

International oil and gas majors have played a significant role in driving new expansion. Every single big oil and gas company previously considered in Oil Change International's *Big Oil Reality Check* reports has sanctioned new projects in 2022, all of which are inconsistent with limiting warming to 1.5°C. TotalEnergies, which this year approved massive new greenfield extraction in Uganda related to its controversial EACOP pipeline, is the oil and gas major that approved the most significant expansion in 2022, followed by Chevron and Shell; 11 of the 15 companies that approved the most expansion in 2022 are majors or independents.

Ultimately, the continued upward trend in oil and gas production since the COVID-19-induced lows of 2020 is inconsistent with the Paris Agreement. It highlights the need for governments to implement policies to ensure a managed phase-out of fossil fuel production, alongside just transition measures and demand-destruction policies.

BOX 4: MULTINATIONAL COMPANIES' FOSSIL FUEL EXPANSION PLANS RISK LOCKING OUT A JUST TRANSITION IN AFRICA

As a result of a wave of new oil and gas exploration driven by European majors in the early 2010s, 40 percent of the fossil gas discovered worldwide between 2010 and 2020 was in Africa, leading to a recent surge of large gas export projects proposed or under development.[70] Studies reveal industry plans to put USD 230 billion into the development of new oil and gas extraction projects in Africa by 2030, and at least USD 98 billion in new fossil gas pipeline and LNG export infrastructure.[71] The fossil fuel crunch resulting from the Russian war against Ukraine has led oil and gas proponents to make a concerted push to position gas as a transition fuel in Africa[72] and to cement the position of Nigeria, Senegal, Mozambique, and other countries as enduring major potential gas suppliers to Europe, arguing that increased fossil fuel production would lead to prosperity and stronger national sovereignty.[73]

In reality, oil and gas extraction in Africa has a long history of failing to bring forth energy access and development, and disproportionately benefiting corporations and governments in the Global North over local communities in Africa. OCI research shows that 66 percent of the planned new oil and gas extraction projects on the continent will belong to international fossil fuel companies, and the vast majority of new projects are intended for export markets.[74] Table 1 shows that European oil and gas companies are responsible for the largest planned expansion projects in Africa that could be approved in 2023. Oil and gas expansion in Africa is poised to continue perpetuating an extractivist and colonialist dynamic, whereby resources exported from the continent benefit the Global North while local populations are saddled with environmental impacts, continued poverty, human rights violations, and debt.

Oil and gas expansion in Africa also risks further locking African countries that are oil and gas producers into a "Fossil Fuel Trap:"[75] dependence on volatile global fossil fuel markets increases the macroeconomic risks countries face and could cause them to miss out on the renewable energy revolution and its co-benefits in terms of health, jobs, and resilience. Seventy-one percent of the planned expansion in Africa faces extra risks of becoming stranded assets – leaving behind unfunded clean-up and shortfalls in government revenue – because it either relies on relatively costly methods of production like deep-water offshore or fracking, is in new entrant countries with extra legal and regulatory costs, or both.[76]

African communities, such as the Ogoni people of the Niger Delta, have been resisting fossil fuel production as one face of Northern extraction for decades,[77] fighting instead for a clean, equitable future free of fossil fuels, and that resistance continues. For example, citizens, Indigenous groups, and civil society organizations have come together to oppose Canadian company ReconAfrica's pursuit of oil and gas drilling in the Okavango River Basin, where extraction could devastate a unique ecosystem and endanger the livelihoods of hundreds of thousands of people.[78] In 2022, communities in South Africa won a legal battle against oil and gas giant Shell, halting the company's plans to explore for more oil and gas off the country's Wild Coast.[79] Global North countries must stop blocking a clean energy transition by ending public and private finance of fossil fuel projects and amending international legal and trade agreements so that all countries have affordable access to use and develop green technologies. **They must also pay the historical climate debts they owe to Africa by dramatically scaling up support for renewable energy, climate finance, debt cancellation, and loss and damage.**

Table 1: Largest oil and gas extraction projects on track to be approved in Africa in 2023

	Country	Lead Company (by equity share)	Oil	Gas	Total	Type
			Reserves, Million barrels of oil equivalent (BOE)			
A&E Structures (Bahr Es Salam)	Libya	Eni	105	601	706	Offshore deepwater
Greater Tortue Ahmeyim FLNG (Ahmeyim Phase 2)	Mauritania	BP	22	298	320	LNG (Offshore deepwater)
Cameia-Golfinho	Angola	TotalEnergies	209	25	234	Offshore deepwater
Agogo FFD (Phase 3)	Angola	Eni & BP	208	0	208	Offshore deepwater
South Lokichar Phase 1 (Amosing, Ekales, Twiga South, Ngamia)	Kenya	Tullow Oil	178	0	178	Onshore
OCTP (Eban & Akoma)	Ghana	Eni	104	65	170	Offshore

Source: Rystad Energy's UCube (October 2022)

THE PROJECTED NEW EXPANSION FROM 2023 TO 2025

Analysis of the new projects and shale wells forecast to receive FIDs from 2023 to the end of 2025 reveals the risk of a major surge of new expansion, with 2024 forecast to exceed the previous post-Paris Agreement record set in 2019. New drilling approved during this three-year period could lock in an additional 59 Gt of carbon pollution, equivalent to almost 400 new coal plants.

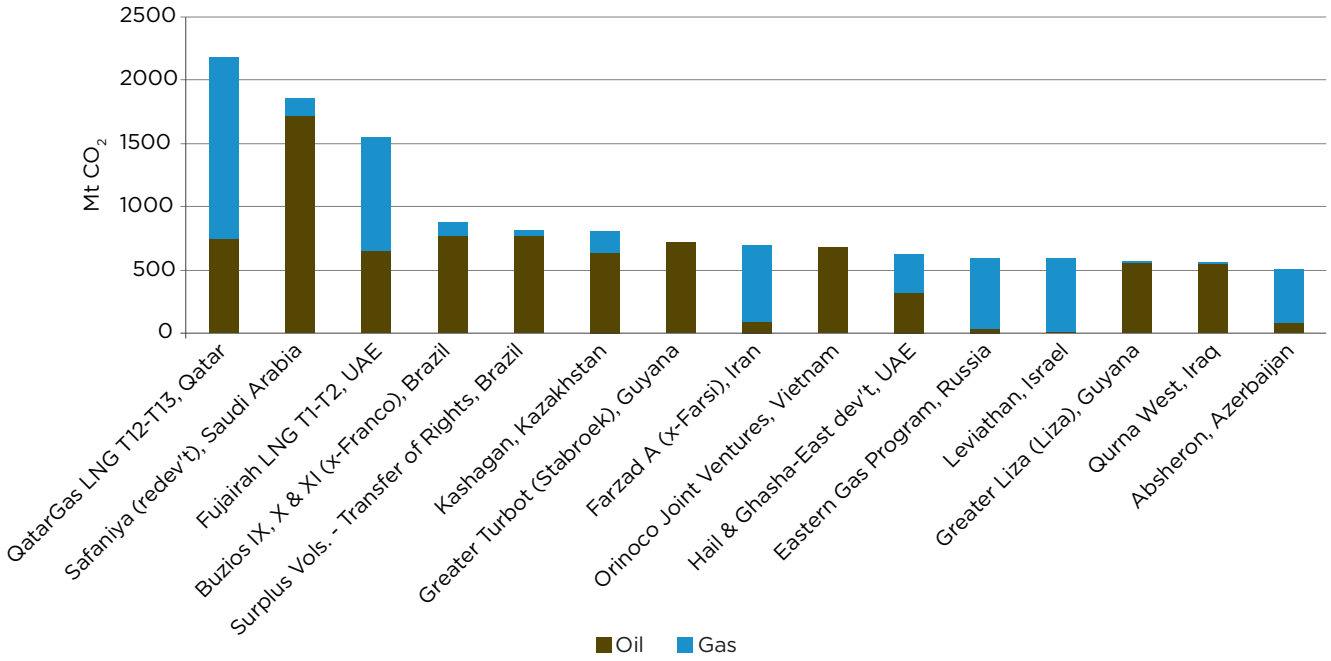
However, as these projects have not yet been sanctioned, there remains a small window for people and communities, governments, and decision-makers in public and private finance institutions to stop them. Projects on track for approval in 2023 (Table 2) demand particular urgency, as the timeframe for halting approval of them is very short.

Table 2: 2023 Watchlist: Largest oil and gas extraction projects at risk of approval in 2023, by potential cumulative CO_2 emissions

	Country	Lead Company (by equity share)	Oil	Gas	Total	Reserves, Million BOE	Type
			Mt CO_2				
QatarGas LNG T12-T13 (NFE-South)	Qatar	Qatar Energy	749	1433	2182	6418	LNG (Offshore)
Buzios IX & X (x-Franco)	Brazil	Petrobras	775	100	874	2170	Offshore deepwater
Hail & Ghasha-East development	U.A.E.	Abu Dhabi NOC	317	301	618	1697	Offshore
Papua LNG T1-T2	Papua New Guinea	TotalEnergies	26	350	376	1129	LNG (Onshore)
Pearl Project	Kurdistan Region of Iraq	Dana Gas & Crescent Petroleum	110	265	374	1125	Onshore
Pao de Acucar	Brazil	Equinor	206	164	370	998	Offshore deepwater
Greater Liza (Liza)	Guyana	ExxonMobil	333	16	349	841	Offshore deepwater
East China Sea	China	CNOOC & Sinopec	1	271	272	826	Offshore
Greater Mooses Tooth (Willow)	U.S.	ConocoPhillips	266	0	266	631	Onshore
A&E Structures	Libya	Eni	44	197	242	706	Offshore deepwater
Mabrouk North East	Oman	Shell	45	167	212	615	Onshore
Xi'an-SINOPEC	China	Sinopec	0	197	197	599	Onshore
Lower Zakum	U.A.E.	Abu Dhabi NOC	187	0	187	445	Offshore
Al Shaheen (Gallaf)	Qatar	Qatar Energy	187	0	187	444	Offshore
Block B Gas project	Vietnam	PetroVietnam	7	179	186	561	Offshore
Lang Lebah	Malaysia	PTTEP & Kuwait Petroleum Corp	16	168	184	575	Offshore
Trion	Mexico	Woodside	168	2	170	406	Offshore deepwater
Umm Shaiff (Khuff Gas Expansion)	U.A.E.	Abu Dhabi NOC	33	134	167	502	Offshore
North Field Compression Phase 1	Qatar	Qatar Energy	0	160	160	486	Offshore
North Platte (Sparta)	U.S.	Shell	132	17	140	345	Offshore deepwater

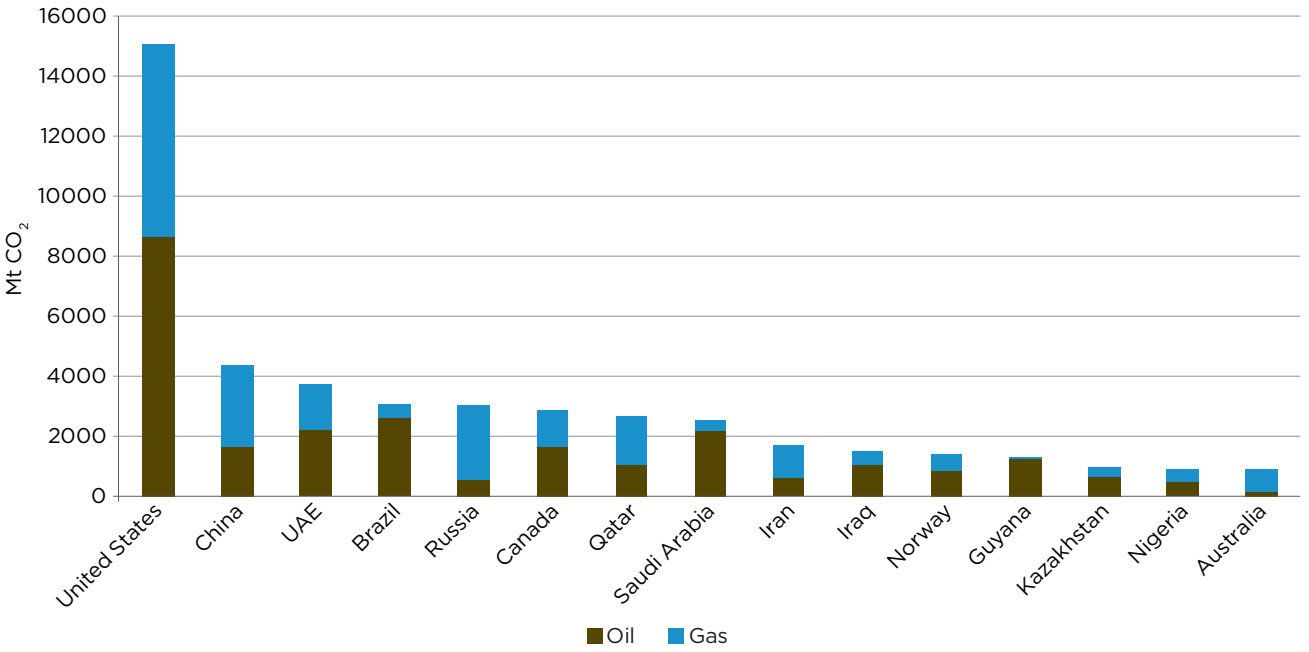
Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

Figure 10: Largest 15 conventional oil and gas expansion projects that could receive an FID from 2023-2025, by cumulative CO_2 emissions



Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

Figure 11: Countries with the most oil and gas expansion from projected 2023-2025 FIDs, by cumulative CO_2 emissions

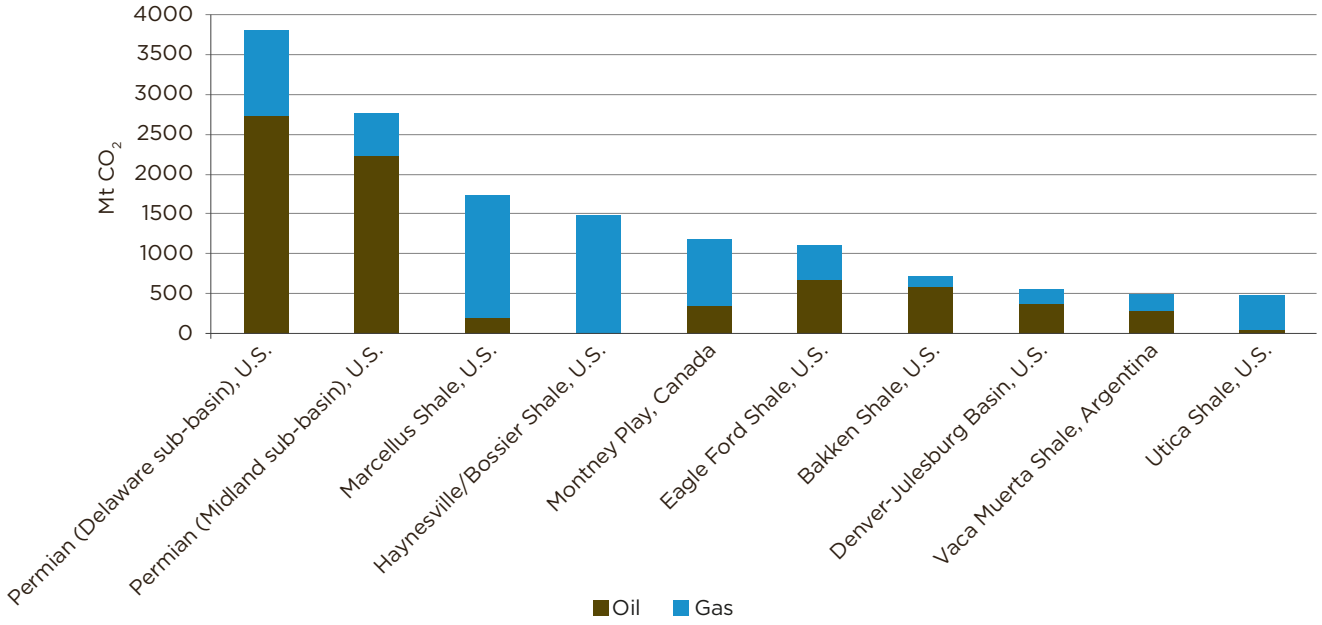


Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

The expansion projects at risk of approval between 2023 and 2025 are spread across the world, but, as in 2022, the U.S. is the largest projected expander among countries (Figure 11). This is driven by a projected ongoing expansion of fracking (Figure 12), highlighting the deep discrepancy between the U.S.'s stated goal of reclaiming climate leadership through the passage of the Inflation Reduction Act and the reality of the country's continued investments in unsustainable levels of additional fossil fuel production. These new fossil fuel investments endanger both the climate and impacted communities in fracking hotspots in the U.S.[80]

The investment decisions anticipated between 2023 and 2025 reveal that national oil companies (NOCs) — such as, Saudi Aramco (Saudi Arabia), National Iranian Oil Company (NIOC, Iran), and China National Offshore Oil Corporation (CNOOC, China) — play a significant role in driving increased oil and gas production. Nine of the 15 companies projected to account for the largest new FIDs from 2023 to 2025 are NOCs (Figure 13). Although the countries that own these NOCs have ratified the Paris Agreement, none has identified a plan to align the energy production policies of their NOCs with the objectives of the Paris Agreement. The lock-in of new extraction projects also raises the prospect of countries with NOCs further entrenching their reliance on fossil fuel revenues even while the current energy crisis may hasten global decarbonization efforts and accelerate the peaking of fossil fuel consumption. This is particularly true for

Figure 12: Largest 10 projected fracking expansion hotspots in 2023-2025, by cumulative CO_2 emissions committed by new drilling



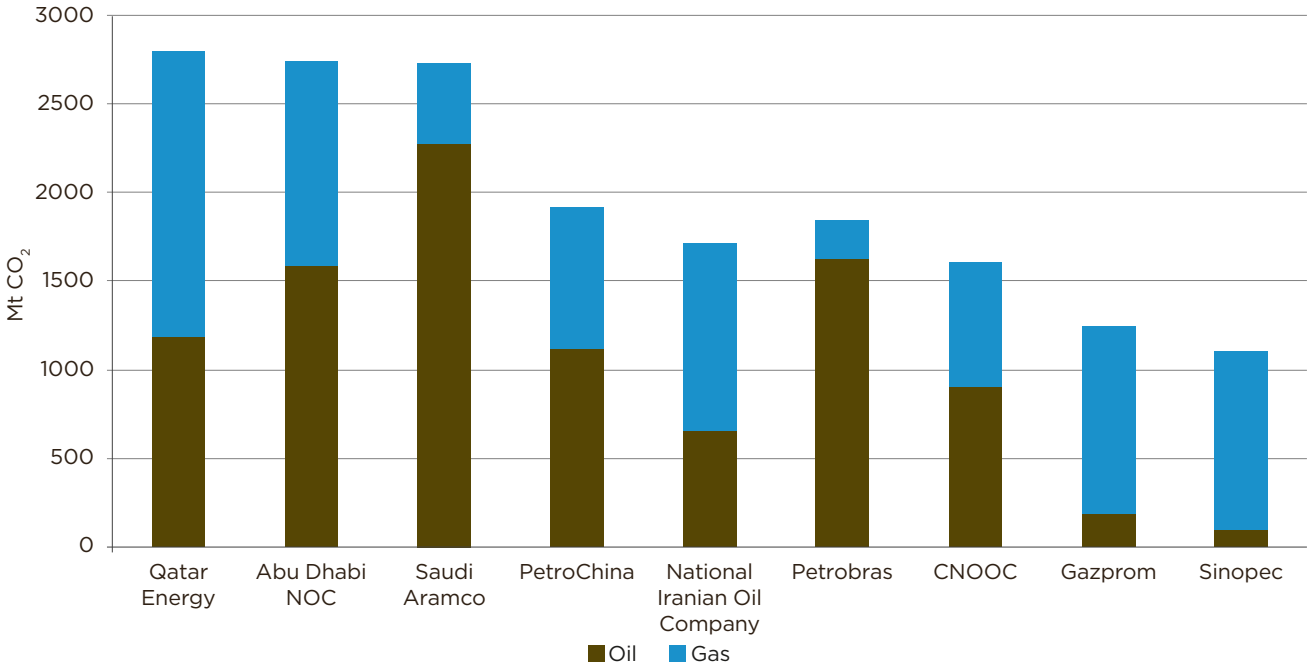
Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

Saudi Arabia, where oil and gas revenues account for 50 percent of the gross domestic product, as well as Qatar (40 percent), the U.A.E. (27 percent), and Iran (23 percent).[81]

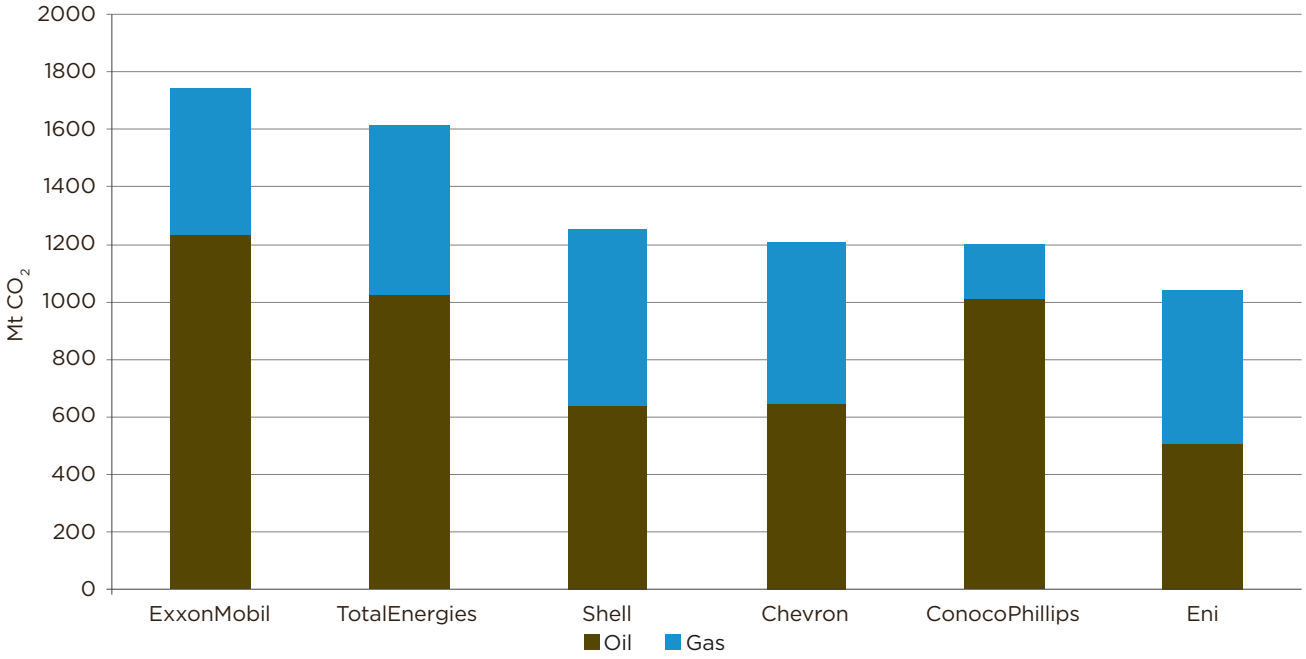
However, some international oil and gas companies — including some that have nominally committed to reaching "net zero emissions" by 2050 (e.g., TotalEnergies and Shell) — are still among the top projected expanders globally. This highlights the clear disconnect between the greenwashing some of these companies have deployed over the past few years[82] and the protraction of their business models dependent upon climate failure. As the clean energy transition gathers pace and major economic centers adopt policies to reduce their dependence on fossil fuels, all oil and gas companies will face growing risks of their investments becoming stranded.[83] In the words of the IEA's World Energy Outlook 2022 report, "Any new projects would face major commercial risks. The countries or companies choosing to undertake them need to recognize that these developments may fail to recover upfront costs."[84]

Figure 13: Top 15 companies responsible for the most oil and gas expansion from projected 2023-2025 FIDs, by cumulative CO_2 emissions

a. Top Nationally Owned Oil Companies



b. Top International and Independent Oil Companies



Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

CONCLUSION

Despite escalating climate impacts around the world and strong and growing evidence that continued fossil fuel expansion is incompatible with a stable climate, the oil and gas industry is still investing in disaster. By continuing to propose new projects for approval, the industry shows its desire to slow or prevent a Paris-aligned energy transition, further entrenching a volatile energy system that is wreaking climate, economic, and social havoc around the world.

The FIDs in favor of new oil and gas production anticipated by the end of 2022 alone could lock in an additional 11 Gt of carbon pollution, unless governments step in to close some fields and mines early. This is equivalent to the lifetime emissions of building 75 new coal power plants, and amounts to more than double the United States's total carbon emissions from energy in 2021.

If all the new oil and gas extraction projects and shale wells anticipated for FIDs between 2023 and 2025 are sanctioned, they threaten to lock in an additional 59 Gt of carbon pollution, equivalent to building almost 400 new coal power plants.

In total, new oil and gas production sanctioned from 2022 to 2025 could lock in 70 Gt of additional CO_2 pollution – equal to almost two years of global annual energy-related carbon emissions at current levels.

Investing in more fossil fuel production that will take years to materialize is not a solution to an immediate fossil fuel crisis. It will, however, make the transition to a fossil-free energy system slower and more expensive, while making the climate crisis worse. Every drop of new oil and gas sanctioned for production in 2022 will, if burned, jeopardize the world's ability to stay within the 1.5°C limit of the Paris Agreement. Further, high energy prices could drive a new wave of investment in oil and gas projects from 2023 to 2025, which would be incompatible with limiting warming to 1.5°C.

The oil and gas industry will not manage its own decline. Instead, governments must step in to stop further expansion and must adopt policies that ensure a managed phase-out of fossil fuels alongside a rapid scale-up of just transition support and clean-energy solutions. Specifically, we recommend:

- Governments in oil- and gas-producing countries halt new licensing and permitting of fossil fuel extraction projects and commit to phasing out production on a timeline that aligns with equitably limiting warming to 1.5°C.
  - In particular, wealthy producer governments in the Global North must plan for the fastest phase-outs of production and hold oil and gas companies headquartered in their jurisdictions accountable for human rights violations, environmental damages, and just transition costs associated with their projects around the world.
  - As part of wider climate reparations, governments in the Global North must provide support for economic diversification policies in oil- and gas-producing countries of the Global South that have higher dependence on fossil fuel revenues and fewer resources to invest in alternatives.
- Governments in all countries, and the public finance institutions they control, should immediately end new public direct and indirect support for oil, gas, and coal projects both domestically and abroad, while rapidly increasing support for a clean energy transition. They should prioritize clean energy funding in low-income regions as well as support for transformative solutions like distributed renewable energy to reach universal energy access, energy efficiency, and worker and community-led just transition plans in the most fossil fuel dependent regions.
- Wealthy governments must provide their fair share of debt cancellation, climate finance, and loss and damage support to countries in the Global South. This will allow for the rapid scale-up of affordable clean energy access and other climate solutions.

The alternative is a massive buildup of fossil fuel infrastructure. Such a buildup will either end up stranded as fossil fuel consumption falls globally or push the world further into climate chaos, or both. In many cases, these projects replicate extractive, colonial relationships, as companies owned in some of the world's wealthiest countries push forward with new oil and gas fields in the Global South, often in the face of significant opposition from people and communities directly impacted by these projects. Economic exploitation and environmental injustice are endemic to oil and gas extraction across the world, including in some of the largest, wealthiest producer countries. In the U.S. and Canada, for example, Indigenous Peoples and people of color face disproportionate impacts from oil and gas infrastructure, and those communities are active in efforts to stop new oil and gas projects. Ultimately, big, wealthy producer nations like the U.S. are undercutting their stated climate goals by continuing to drive up fossil fuel production.

The continued expansion of new oil and gas production shows that the world's governments and investors risk failing to capitalize on the energy crisis as an opportunity to break free from dependence on fossil fuels – even though it is this very dependence that has caused the energy crisis and fueled Russia's illegal and indefensible invasion of Ukraine.

METHODOLOGY NOTE

Rystad Energy's UCube database is OCI's primary source for data on the historical and projected timeline of oil and gas companies' upstream FIDs and the associated volumes of oil and gas reserves committed for extraction by those FIDs. The UCube is a commercial, asset-based database and model that contains data on reserves, production, economics, and valuation for every oil and gas field, resource discovery, and exploration license globally. Rystad uses company reports, regulatory information, and modeling to project the volumes of oil and gas that will be commercially viable to extract under a given price assumption. The projections used in this analysis are current to the October 2022 UCube update and Rystad's base oil price case as of October 2022, which sees the benchmark Brent oil price declining from USD 100/bbl on average in 2022 to USD 75/bbl by 2025 and remaining at a flat USD 50/bbl from 2030 to 2050 (all expressed in real $2022). For companies, reserves and associated CO_2 emissions estimates reflect their ownership share in new projects. Oil volumes include all liquids: crude oil, natural gas liquids, and condensate.

We consider a FID the key point at which reserves are 'committed' to extraction.[85] That is when the largest portion of capital is sunk and construction of a new field can begin. For shale oil and gas, however, separate investment decisions are made for the initial development of an area (building the infrastructure) and then for drilling new wells in that area. The shale estimates in this report consider the latter point of commitment – the reserves associated with individual wells approved for drilling in the given year(s).

All calculations of the CO_2 emissions that would result from burning the oil and gas reserves approved by new FIDs are by Oil Change International. We apply CO_2 emissions factors of 0.421 tCO_2/bbl of oil and condensate, 0.235 tCO_2/bbl of natural gas liquids, and 54.7 tCO_2/mmcf of gas to the oil and gas volumes taken from Rystad. These emissions factors are derived from the IPCC.[86] End-use combustion accounts for the vast majority of CO_2 emissions associated with oil and gas production (and in this case includes oil and gas that is burned in the production and processing of other fuels).

The CO_2 emissions estimates we present do not capture the full climate impact of new projects or shale wells. We do not account for the significant warming effects of methane or other short-lived greenhouse gasses associated with oil and gas extraction, processing, and transport. We also do not calculate lifecycle emissions per project, due to the complexity of doing so and the risk of double-counting emissions across projects.

To compare the carbon emissions committed by new FIDs to those of coal plants, we use data from the U.S. Environmental Protection Agency on the average annual CO_2 emissions of U.S. coal plants as of 2019 (3.74 Mt CO_2 per plant per year).[87] We assume an average 40-year plant lifetime, a historical lifetime commonly used by researchers estimating committed CO_2 emissions from power plants.[88] From these two data points, we use 149.6 Mt CO_2 as total lifetime emissions per power plant.

APPENDIX: DATA TABLES

THE LARGEST PROJECTS

Table A1: Largest 25 projects (conventional & shale), by CO_2 emissions committed by current and projected 2022 FIDs

Project	Lead company (by equity share or shale drilling activity)	Oil	Gas	Total	Reserves, Million BOE	Type
		Mt CO_2				
Zuluf (expansion), Saudi Arabia	Saudi Aramco	1839	377	2216	5568	Offshore
Permian (Delaware sub-basin), U.S.	EOG Resources, ConocoPhillips, Mewbourne Oil Devon Energy, Chevron	686	280	966	2671	Fracking
Permian (Midland sub-basin), U.S.	Pioneer Natural Resources, Endeavor Energy, Diamondback Energy, ExxonMobil, ConocoPhillips	536	136	672	1824	Fracking
Marcellus Shale, U.S.	Coterra Energy, EQT, Range Resources	43	488	532	1657	Fracking
Aghar, Iran	National Iranian Oil Company	55	428	483	1435	Onshore
Tilenga, Uganda	TotalEnergies	443	0	443	1053	Onshore
Haynesville/Bossier Shale, U.S.	Aethon Energy, Comstock Resources, Southwestern Energy	1	367	368	1122	Fracking
Buzios VIII (x-Franco), Brazil	Petrobras	311	33	344	848	Offshore deepwater
Yellowtail (Stabroek), Guyana	ExxonMobil	291	0	291	692	Offshore deepwater
Eagle Ford Shale, U.S.	ConocoPhillips, EOG Resources, Marathon Oil	167	101	268	753	Fracking
Montney Play, Canada	Arc Resources, Tourmaline Oil, Canadian Natural Resources	69	191	260	791	Fracking
Bakken Shale, U.S.	Continental Resources, Hess, Chord Energy	170	41	211	571	Fracking
Vaca Muerta Shale, Argentina	YPF, ExxonMobil, Vista Energy	110	83	193	520	Fracking
Halegan, Iran	National Iranian Oil Company	25	164	189	560	Onshore
Pikka (Nanushuk), U.S.	Santos	168	0	168	399	Onshore
Denver-Julesburg Basin, U.S.	Civitas Resources, PDC Energy, Chevron	95	52	147	419	Fracking
Angola LNG T1, Angola	Eni & BP (Azule Energy)	1	138	139	424	LNG (Offshore)
Prelude FLNG (Crux field), Australia	Shell	35	88	123	365	LNG (Offshore deepwater)
Bozhong 19-6, China	CNOOC	8	114	122	367	Offshore
Faihaa (Light oil), Iraq	United Energy	84	36	121	312	Onshore
Utica Shale, U.S.	Ascent Resources, Encino Energy, Hilcorp Energy	11	108	118	362	Fracking

Ballymore, U.S.	Chevron	104	9	114	277	Offshore deepwater
Umm Shaif/Nasr, U.A.E.	Abu Dhabi NOC	108	0	108	258	Offshore
Horizon Oil Sands Project, Canada	Canadian Natural Resources	105	0	105	250	Tar sands
Kingfisher South, Uganda	TotalEnergies	101	0	101	239	Onshore

Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

Table A2: Largest 25 projects (conventional & shale), by CO_2 emissions committed by potential 2023-2025 FIDs

Project	**Lead company** (by equity share or shale drilling activity)	**Oil**	**Gas**	**Total**	**Reserves, Million BOE**	**Type**
		Mt CO_2				
Permian (Delaware sub-basin), U.S.	Chevron, EOG Resources, ConocoPhillips, Devon Energy, ExxonMobil	2731	1061	3792	10726	Fracking
Permian (Midland sub-basin), U.S.	Pioneer Natural Resources, Endeavor Energy Resources, ExxonMobil, Diamondback Energy, Chevron	2224	538	2761	7694	Fracking
QatarGas LNG T12-T13 (NFE-South), Qatar	Qatar Energy	749	1433	2182	6418	LNG (Offshore)
Safaniya (redevelopment), Saudi Arabia	Saudi Aramco	1724	131	1855	4582	Offshore
Marcellus Shale, U.S.	Antero Resources, EQT Corporation, Range Resources, Southwestern Energy, Chesapeake	202	1544	1746	5510	Fracking
Fujairah LNG T1-T2, U.A.E.	Abu Dhabi NOC	654	900	1553	4657	LNG (Onshore)
Haynesville/Bossier Shale, U.S.	Chesapeake, Aethon Energy, Comstock Resources, Southwestern Energy, Rockcliff Energy	7	1477	1484	4526	Fracking
Montney Play, Canada	Arc Resources, Tourmaline Oil, Canadian Natural Resources, Ovintiv, Shell	356	840	1197	3678	Fracking
Eagle Ford Shale, U.S.	BP, ConocoPhillips, EOG Resources	675	434	1109	3175	Fracking
Buzios IX, X & XI (x-Franco), Brazil	Petrobras	775	100	874	2170	Offshore deepwater
Surplus Volumes - Transfer (Atapu & Sepia), Brazil	Petrobras, TotalEnergies	771	46	818	1973	Offshore deepwater
Kashagan (Phase 2A & gas injection), Kazakhstan	Eni, ExxonMobil, Shell, TotalEnergies	629	177	806	2033	Offshore deepwater
Bakken Shale, U.S.	Continental Resources, Hess, Chord Energy	592	136	728	2019	Fracking
Greater Turbot (Stabroek), Guyana	ExxonMobil	723	0	723	1717	Offshore deepwater
Farzad A (x-Farsi), Iran	National Iranian Oil Company	91	603	694	2107	Offshore
Orinoco Joint Ventures, Vietnam	PDVSA	676	0	676	1606	Onshore
Hail & Ghasha-East dev't, U.A.E.	Abu Dhabi NOC	317	301	618	1697	Offshore
Eastern Gas Program, Russia	Gazprom	30	562	592	1783	On/Offshore
Leviathan, Israel	Delek Group	11	576	587	1780	Offshore deepwater
Greater Liza (Liza), Guyana	ExxonMobil	559	16	575	1377	Offshore deepwater

Qurna West, Iraq	PetroChina	548	17	565	1352	Onshore
Denver-Julesburg Basin, U.S.	PDC Energy, Civitas Resources, Chevron	376	181	557	1613	Fracking
Absheron, Azerbaijan	Total Energies & Socar	84	425	510	1496	Offshore
Vaca Muerta Shale, Argentina	YPF, Vista Energy, Techint	290	200	490	1320	Fracking
Utica Shale, U.S.	Ascent Resources, National Fuel Gas, Encino Energy	54	435	488	1503	Fracking

Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

THE COUNTRIES WITH THE MOST NEW OIL AND GAS EXPANSION

Table A3: Top 20 countries with the most oil and gas expansion approved in 2022, by cumulative CO_2 emissions committed by new FIDs

	FIDs made to date		**FIDs pending by end of 2022**			
Country	**Oil**	**Gas**	**Oil**	**Gas**	**Total**	**% from new shale wells (if applicable)**
	Mt CO_2					
United States	2204	1817	1	1	4023	90
Saudi Arabia	1843	395	5	22	2266	1
Iran	139	594	0	0	733	
Canada	291	271			561	72
Brazil	353	33	154	23	563	
Uganda	544	0	0	0	544	
Guyana	291	0	0	0	291	
Argentina	61	208			269	70
China	34	208			242	28
Angola	68	138	0	0	206	
Norway	45	118	33	7	204	
UAE	167	0	37	0	203	
Iraq	137	40	0	0	178	
Australia	37	107	5	20	170	
Congo	0	0	0	155	155	
Algeria	68	36	0	0	104	
Malaysia	5	63	0	0	68	
Russia	44	2	19	0	64	
Trinidad and Tobago	5	58	0	0	63	
Egypt	31	4	6	5	46	

Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

Table A4: Top 20 countries with the most oil and gas expansion from projected 2023-2025 FIDs, by cumulative CO_2 emissions

Country	**Oil**	**Gas**	**Total**	**% CO_2 from new shale wells (if applicable)**
	Mt CO_2			
United States	8654	6393	15047	93
China	1653	2735	4388	28

UAE	2260	1494	3754	
Brazil	2639	421	3060	
Russia	554	2487	3041	
Canada	1669	1176	2845	64
Qatar	1080	1595	2675	
Saudi Arabia	2194	353	2547	6
Iran	656	1060	1716	
Iraq	1066	483	1548	
Norway	873	536	1409	
Guyana	1281	16	1298	
Kazakhstan	699	280	979	
Nigeria	503	397	900	
Australia	145	744	889	
United Kingdom	634	195	830	
Israel	17	775	792	
Mexico	670	40	711	
Venezuela	681	0	681	
Libya	345	239	584	

Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

THE COMPANIES RESPONSIBLE FOR THE MOST NEW OIL AND GAS EXPANSION

Table A5: The 20 companies responsible for the most oil and gas expansion in 2022, by cumulative CO_2 emissions committed by new FIDs

	FIDs made to date		**FIDs pending by end of 2022**			
Company	**Oil**	**Gas**	**Oil**	**Gas**	**Total**	**% from new shale wells** (if applicable)
	Mt CO_2					
Saudi Aramco	1843	395	5	22	2266	1
National Iranian Oil Company	139	594	0	0	733	
TotalEnergies	408	64	22	5	500	2
CNOOC	274	161	0	1	436	2
Petrobras	277	29	0	0	306	
Chevron	193	100	0	0	293	62
Shell	76	169	26	18	290	10
ExxonMobil	238	36	2	3	279	39
Eni	97	52	3	102	253	
ConocoPhillips	142	54	8	0	204	88
Repsol	115	35	1	7	159	19
BP	34	97	13	3	147	41
Canadian Natural Resources	115	25	0	0	139	24

EOG Resources	89	42			132	100
Devon Energy	93	30			123	100
Abu Dhabi NOC	100	0	22	0	122	
Hess	108	4	0	0	112	22
Pioneer Natural Resources	80	19			99	100
Endeavor Energy Resources	74	19			92	100
Southwestern Energy	7	84			91	100

Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

Table A6: The 20 companies responsible for the most oil and gas expansion from potential 2023-2025 FIDs, by cumulative CO_2 emissions

Company	**Oil**	**Gas**	**Total**	**% from new shale wells** (if applicable)
	Mt CO_2			
Qatar Energy	1187	1610	2796	
Abu Dhabi NOC	1584	1156	2740	
Saudi Aramco	2272	460	2731	6
PetroChina	1120	796	1916	30
ExxonMobil	1236	510	1746	36
National Iranian Oil Company	656	1060	1716	
Petrobras	1622	224	1846	
TotalEnergies	1027	589	1615	1
CNOOC	886	694	1581	2
Shell	642	612	1254	9
Gazprom	187	1059	1246	
Chevron	648	558	1206	67
ConocoPhillips	1011	193	1203	55
Sinopec	101	1002	1103	55
Eni	505	536	1041	
Equinor	569	302	871	10
BP	348	505	853	31
EOG Resources	423	223	645	100
Rosneft	77	549	625	
Lukoil	293	271	564	

Source: Oil Change International analysis using data from Rystad Energy's UCube (October 2022)

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