



Transitioning Away From Oil and Gas

A production
phase-out primer

IISD REPORT



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Transitioning Away From Oil and Gas: A production phase-out primer

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Cover photo: Curtis Shuck, chairman of the Well Done Foundation, measures the cement used to plug an orphan oil well in Louisiana, USA. The Well Done Foundation is a nonprofit organization that carries out environmental restoration of abandoned oil fields. (Stacey Shuck/Well Done Foundation)

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Executive Summary

Stopping climate change requires a phase-out of oil and gas, alongside coal. In a breakthrough at the 28th United Nations Climate Change Conference (COP 28) in late 2023, 198 governments officially recognized the imperative of “transitioning away from fossil fuels in energy systems.” Oil and gas no longer escape the global scrutiny of climate action that previously focused predominantly on coal.

However, producers continue to expand exploration and drill for resources that cannot be burned under safe climate targets. Far from reducing production, oil companies plan to keep expanding production for decades and enjoy government support. Governments collectively expect to produce 29% more oil and 82% more gas by 2030 than is consistent with a 1.5°C global warming pathway. The gap widens by 2050, to 260% for oil and 210% for gas.

This could go one of two ways. If governments stick to their oil and gas production plans, the world overheats. If they get serious about meeting the targets of the Paris Agreement, the bottom falls out of the market. Either route spells disruption for economies and workers. To minimize this disruption, the wisest course is to phase out production in lockstep with consumption of oil and gas. Scaling up clean energy production is essential but not sufficient.

There is no room for new oil and gas fields in a 1.5°C world. Further, existing oil and gas production needs to fall by at least 65% by 2050 based on Intergovernmental Panel on Climate Change [IPCC] 1.5°C scenarios with feasible and sustainable amounts of carbon dioxide removal and carbon capture and storage—and significantly faster with lower use of these technologies.

In international climate action, developed countries are expected to move first and fastest and provide support to developing countries. The same approach applies to phasing out oil and gas production, with a few extra considerations. These include a just transition for affected workers and communities, attention to human rights concerns, and a faster transition in countries with low economic dependence on the oil and gas-extracting sector compared to highly dependent economies.

Production management is starting to get traction in international forums. The need for “transitioning away from fossil fuels in energy systems” within the United Nations Framework Convention on Climate Change Global Stocktake text at COP 28 captures both supply and demand aspects. The G7 is adopting increasingly forward-leaning language. The IEA calls for no new oil and gas fields to be developed. Early-mover clubs have started to actively move beyond oil and gas production but have yet to recruit major producers. OPEC+¹ imposes quotas on oil production but solely to increase prices and profits.

Several economic reforms could accelerate an oil and gas production phase-out. Investment in infrastructure for alternative energy sources makes switching easier during times of high oil prices. Reforming the hundreds of billions of dollars in subsidies to fossil fuels would promote

¹ OPEC+ is an enlarged grouping of the Organization of the Petroleum Exporting Countries, comprising additional oil-producing country members.



innovation and make renewable energies more competitive. So, too, would shifting international public finance from fossil fuel production to renewable energy development. Treaties that protect investors in oil and gas production create financial disincentives to phasing out fossil fuels; therefore, collective approaches must be found to end these frameworks.

Other policy tools currently in use to curb oil and gas production—although in many cases not motivated for climate protection reasons—include emissions caps, bans and moratoriums, quotas on production and exports, ending the expansion and production licenses, diversification of national oil and gas companies, and imposing stringent environmental standards. Other proposals that have been put forward in the academic literature but not implemented include an international production rights trading scheme and monetary transfers from the Global North to the South to leave oil and gas in the ground (Lazarus & van Asselt, 2018).

The oil and gas sector contributes to employment and government revenue; moving away from it will have social and economic impacts. The transition must be fair and orderly, both for moral reasons and to ensure acceptance. We know this is possible from a handful of coal-mining regions that are reinventing themselves. That process has barely started for oil and gas, though, and the challenge is roughly twice the size. Economies built on oil and gas production must diversify into growth sectors or risk being left behind.

The implications of inaction on just, equitable, and predictable oil and gas phase-outs should not be underestimated. To reduce both the risks and costs of “transitioning away from fossil fuels in energy systems,” governments, companies, and other stakeholders need to change their strategies and practices today (United Nations Framework Convention on Climate Change, 2023).



Table of Contents

1.0 The Rationale for Oil and Gas Production Phase-Out	1
Closing the Accountability Gap	3
Non-Climate Concerns.....	3
2.0 Phase-Out Ambition and Pathways to 1.5°C	4
Variability in Phase-out Pathways.....	6
The Case for No New Oil and Gas Fields to Keep Warming Within 1.5°C.....	6
3.0 Projections for Oil and Gas Production	8
High vs. Low Pricing	9
4.0 Phasing Out Oil and Gas Production Equitably.....	11
Fairness Principles and Climate Mitigation.....	11
Focus on Transitional Costs, not Developmental Benefits	12
Principles for an Equitable Phase-Out of Fossil Fuel Production.....	12
5.0 Phase-Out Discussions in International Forums	14
Fossil Fuels Phase-Out in the UNFCCC	14
The G7 and G20	15
The Beyond Oil and Gas Alliance	15
The Clean Energy Transition Partnership	16
The Fossil Fuel Non-Proliferation Treaty Initiative	16
6.0 Economic Risks and Accelerating Production Phase-Out	18
Economic Risks	18
Acceleration of Production Phase-Out.....	18
7.0 Phase-Out Policies and a Just Transition.....	22
Just Transitions.....	24
8.0 Recommendations	26
Recommendations to Governments	26
Recommendations for International Processes.....	27
Recommendations to Other Stakeholders	27
References	28



List of Figures

Figure 1. Global oil and gas decline in various 1.5°C scenarios, compared with CDR and CCS.....	5
Figure 2. Global oil and gas production, based on IEA NZE and selected IPCC 1.5°C pathways	7
Figure 3. Overview of oil and gas production plans for largest fossil fuel producers	9
Figure 4. Oil and gas supply and demand curves	19

List of Tables

Table 1. Select examples of phase-out policies	23
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List of Boxes

Box 1. Coal vs. oil and gas	2
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Glossary

Carbon budget	The carbon budget represents the maximum amount of CO ₂ that can be emitted over a period of time to limit global temperature under a certain threshold, e.g., 1.5°C above pre-industrial levels.
Carbon capture and storage	Technology that captures carbon dioxide emissions from burning fossil fuels or resulting from other industrial processes and stores them in deep underground geological formations to prevent their release into the atmosphere.
Carbon dioxide removal	Set of technologies and approaches designed to remove carbon dioxide from the atmosphere. Common methods include afforestation/ reforestation and ocean fertilization, as well as technological solutions such as direct air capture and enhanced weathering.
Clean Energy Transition Partnership	Formally known as the Glasgow Statement on International Public Support for the Clean Energy Transition initiative, launched at 26th United Nations Climate Change Conference in Glasgow, is a collaborative initiative that aims to end new direct public support for the international unabated fossil fuel energy sector involving various stakeholders, from governments to civil society organizations.
Carbon lock-in	Refers to the entrenched dependence on carbon-intensive infrastructure and technologies. It occurs when investments, policies, or societal norms become deeply rooted in carbon-based energy systems, creating inertia against adopting alternatives.
Common But Differentiated Responsibilities and Respective Capabilities	Principle at the core of the Paris Agreement that acknowledges that all countries share a collective responsibility to mitigate greenhouse gas emissions while recognizing their differing historical contributions to climate change and varying capacities to mitigate and adapt to its impacts. It underscores the need for developed countries to lead in emission reductions and support developing nations in their climate actions while emphasizing equity, fairness, and shared accountability in global efforts to combat climate change.
Emissions Scopes: Scope 1, 2, and 3	In the fossil fuel industry, Scope 1 emissions refer to direct emissions from sources controlled by a company during production. Scope 2 emissions entail indirect emissions associated with purchased electricity heat or steam purchase for operations. Scope 3 emissions encompass all other indirect emissions occurring due to the company's activities, such as the combustion of fossil fuels sold to third parties.



Fenceline community	People who live immediately adjacent to polluting facilities, such as extraction sites and fossil fuel infrastructure. Fenceline communities are directly affected by the operation’s traffic, noise, operations, and chemical and fossil fuel emissions. Fenceline communities can overlap with “frontline communities,” a term used to describe vulnerable households who experience the impacts of climate change “first and worst.”
Final investment decision	This decision represents the conclusive commitment by stakeholders to proceed with a particular project, such as developing a new oil or gas field after commercial discoveries are confirmed in the exploration phase. It marks the culmination of extensive evaluation processes, including technical assessments, economic analyses, and risk evaluations, that determine the project’s feasibility and potential profitability.
Integrated assessment model	A comprehensive tool used in climate research to analyze the complex interactions between human activities, socio-economic factors, energy systems, and the climate. The model assesses the impacts of different policy interventions, technological advancements, and socio-economic pathways on the climate to support policy-makers and researchers in exploring alternative scenarios and identifying mitigation strategies.
Investor–state dispute settlement	A mechanism in international or bilateral investment treaties that allows foreign investors to bring claims against host states, suing them for alleged violations of investment protections. These protections provide investors with the means to seek compensation for perceived harm to their investments resulting from government actions.
Just transition	A guiding principle in energy policy forums that supports an inclusive and equitable transition that ensures workers, communities, and vulnerable groups are not left behind. It emphasizes the need to address social and economic justice concerns, such as protecting workers in the fossil fuel industry and providing them with job training and opportunities in emerging sectors.
Leakage risk	Refers to the possibility that efforts to reduce emissions in one jurisdiction may inadvertently lead to increased emissions elsewhere. This can occur through various channels, such as relocating carbon-intensive industries to regions with less stringent climate regulations.
Nationally determined contributions	Commitments made by countries that have ratified the Paris Agreement to achieve its long-term temperature goal of limiting warming to 1.5°C. These submissions outline each country’s specific efforts and targets for reducing greenhouse gas emissions at the national level. Updated NDCs are expected to be submitted every 5 years, with the next round of submissions planned in 2025.



Overshoot scenarios	Projections used in climate modelling that involve temporarily exceeding a specified temperature target before gradually returning to the target level. These scenarios explore the potential consequences and feasibility of allowing short-term exceedances of climate goals, such as the 1.5°C warming limit set by the Paris Agreement, with subsequent efforts to stabilize the climate by the end of the century.
Production	For the purposes of this primer, this term includes such stages of project life cycles as gaining access, exploration and appraisal, field development, extraction, transportation of fossil fuels, and decommissioning of fossil fuel facilities. Refining, power generation, and distribution are excluded from this definition of “production.”
Resource curse	Refers to the phenomenon where countries rich in natural resources, such as oil, gas, or minerals, experience economic underperformance, political instability, and social challenges. This situation can arise due to overreliance on resource exports, currency appreciation, corruption, weak governance, and various economic distortions, which can hinder economic development.
Stranded asset	Refers to investments in assets, such as oil and gas infrastructure, that become unviable or economically noncompetitive before the end of their expected economic lifetime. This situation often arises due to shifts in market conditions, regulatory changes, or advancements in emerging technologies, rendering assets obsolete or unable to generate expected returns.
Territorial emissions	The approach adopted by the United Nations Framework Convention on Climate Change (UNFCCC) to account for the quantities of GHGs physically emitted within a country’s territory by households (cars and dwellings) and economic activities (fossil energy consumption, industrial processes, and emissions from agriculture).
Unabated fossil fuel	Use of fossil fuels without employing any (or a significant) amount of CCS technologies to mitigate associated greenhouse gas emissions.
UNFCCC greenhouse gas accounting framework	Standardized methodology established by the UNFCCC to quantify and report greenhouse gas emissions. It provides guidelines and protocols for measuring domestic emissions from various sources, such as energy production, transportation, industry, agriculture, and land-use changes.



1.0 The Rationale for Oil and Gas Production Phase-Out

Fossil fuels are the main driver of the climate crisis. More than 90% of global annual carbon emissions comes from the extraction, processing, and burning of fossil fuels (Global Carbon Budget, 2024). Fossil fuel production and consumption also account for the overwhelming majority of all anthropogenic greenhouse gas (GHG) emissions since the Industrial Revolution (Friedlingstein et al., 2022). Our ability to limit climate damage and ensure a livable climate depends on transitioning away from coal, oil, and gas to reach net-zero carbon emissions around the middle of the 21st century. However, producers are still digging for more coal and drilling for more oil and gas, with governments collectively forecasting their production growth until the 2050s (Stockholm Environment Institute [SEI] et al., 2023).

For decades, climate policies and international agreements have focused on reducing demand for fossil fuels through energy efficiency and low-carbon technology (Lazarus et al., 2015). A range of factors have limited the impact of these important initiatives on global oil, gas, and coal production. As global energy demand continues to grow, clean energy sources have been added to fossil fuel sources rather than displacing them (Ritchie & Rosado, 2024). Perversely, the expectation that fossil fuel demand will not last forever gives producers an incentive to accelerate their production to use reserves while demand still exists. This is referred to as the “green paradox” (Sinn, 2012).

In recent years, there has been an increasing focus on coal due to its high contribution to climate change. However, separating coal from oil and gas in climate policy discussions may trigger the substitution of one fossil fuel (coal) with another (gas) rather than support the scaling up of renewables. Further, focusing strictly on coal penalizes economies reliant on this fuel, primarily countries in the Global South. Meanwhile, rich countries in the Global North continue extracting, using, and exporting oil and gas.

The challenge for oil and gas phase-out is like that of coal phase-out but on a bigger scale. In 2019, both the energy supply from and labour force in the oil and gas sector was almost double the size of the coal sector (54.1% compared with 26.2%, and 11.9 million compared with 6.3 million, respectively) (International Energy Agency [IEA], 2021, 2022b).

Oil and gas producers actively pursue continued growth. They justify expansion by arguing that if they don’t supply the market, somebody else will. Some producers go further and actively promote oil-intensive activities. For example, it is Saudi policy to “sustain and develop the demand for hydrocarbons as a competitive source of energy” (Ministry of Energy, Kingdom of Saudi Arabia, 2023). Large oil and gas producers have considerable market power and can put downward pressure on oil and gas prices, sustaining demand.

In recent years, the need to tackle fossil fuel supply head-on has gained traction in research, policy, and advocacy discourses² (SEI et al., 2023). Supply-side policies include removing

² See also, Lofoten Declaration, Suva Declaration, and the Fossil Fuel Non-Proliferation Treaty Initiative.



producer subsidies, increasing taxes on production, restricting resource development via moratoriums, caps and bans, stopping production expansion, diversification of national oil and gas companies, or giving resource owners an incentive to leave fossil fuels in the ground.

There are several advantages to promoting GHG emission reductions by “cutting with both sides of the scissors” (Green & Denniss, 2018). The combination of managed decreases in oil and gas production with demand policies and carbon taxes has been demonstrated to be the most rapid way to reduce emissions (van Asselt et al., 2024). In tandem with demand-side measures, supply-side policies can

- broaden the portfolio of emission-reducing measures available to policy-makers;
- offer higher certainty of emissions abatement due to their ease of monitoring, reporting, and verification (Green & Denniss, 2018);
- reduce carbon production lock-in by slowing investment in fossil fuel production and trade infrastructure (Seto et al., 2016). This makes it easier for lower-carbon alternatives to compete with fossil fuels;
- decrease the risks of economic disruptions and impacts on oil and gas sector workers and communities by promoting a well-managed transition and reducing the risk of stranded assets and other negative economic costs (Ansar et al., 2013);
- increase moral pressure and public support for climate action. Production policies target a narrower set of actors, and action to reduce production is easy to observe (Collier & Venables, 2014).

Box 1. Coal vs. oil and gas

Most cost-optimizing 1.5°C scenarios tend to phase out coal extremely fast since it generates significantly more carbon emissions per unit of energy produced while phasing out oil and gas more slowly. Since coal use is mostly concentrated in the Global South and oil and gas more in the Global North, the pace of coal phase-out can allocate an unfair or even infeasible share of mitigation efforts to poorer countries.

In the median IPCC 1.5°C pathway, global coal power generation falls by 87% by 2030 and by 96% by 2035. This would require some coal-dependent developing countries to replace almost their entire fleet of power stations within about a decade. By comparison, global gas power generation—the majority of which occurs in high-income countries—declines by just 14% by 2030 in the median pathway, and all oil use by just 10% (Muttitt et al., 2023).

A study by Muttitt et al. (2023) finds that this pace of coal phase-out would require power sector transitions in South Africa, India, and China twice as rapid as any achieved historically by any country and with any fuel, including due to wars, sanctions, or major policy efforts (such as reducing oil generation after the 1970s oil price shocks). The study finds that limiting coal phase-out to a more feasible pace in all countries would require oil and gas to decline significantly faster.



Closing the Accountability Gap

Emissions reporting under the United Nations Framework Convention on Climate Change (UNFCCC) greenhouse gas accounting framework—which oversees government nationally determined contributions (NDCs)—allows producers to avoid reporting their climate impact. Countries are only held responsible for emissions generated within their borders. Oil and gas exporting countries can increase production while reducing their reported emissions. Disclosure of fossil fuel production plans and projections in NDCs and long-term low-emission development strategies would add transparency in the current UNFCCC territorial emissions accounting framework (SEI et al., 2023). This would help tracking progress and standardize reporting on the COP 28 Global Stocktake decision to transition away from fossil fuels.

This is analogous to oil and gas companies accounting only for their emissions related to the extraction, refining, and transport of the fossil fuels they produce and sell (so-called Scope 1 and Scope 2 emissions). Around 80%–85% of emissions from the oil and gas sector occur when fossils are burned for the generation of various types of energy (Scope 3 emissions). This incomplete carbon accounting incentivizes producers to ignore overall production levels and focus on upstream carbon capture and storage (CCS) instead.

CCS technologies have limited efficiency and commercialization potential, particularly when looked at from a system-wide perspective (Cameron et al., 2023). Despite more than 30 years of attempts to commercialize CCS, only about 30 commercial projects were in operation globally in 2022, barely capturing about 40 MtCO₂e/year (Carter & Cameron, 2023). Seventy per cent of this is used for enhanced oil recovery—a process that pumps the captured CO₂ into aging wells to extract more oil (Carter & Cameron, 2023). However, the extensive use of CCS remains a central component of many future production forecasts.

Non-Climate Concerns

Besides overheating the planet, fossil fuel production and use harm ecosystems, communities, and economies. Burning fossil fuels causes air pollution and exacerbates health problems, causing an estimated 5 million premature deaths worldwide yearly (Lelieveld et al., 2023; SEI, 2022). Reliance on volatile energy markets tends to increase global financial instability and economic vulnerability while undermining efforts to achieve the Sustainable Development Goals (SDGs) (Daley & Lawrie, 2022). Dependence on fossil fuel production and commodity exports can affect domestic manufacturing through currency appreciation, leading to the outflow of capital from other domestic industries (Ross, 2012). In many countries, oil and gas production tends to worsen social inequalities and weaken government institutions, a phenomenon known as the “resource curse” (Kashi & Watts, 2008; Ross, 2012).



2.0 Phase-Out Ambition and Pathways to 1.5°C

How fast should global oil and gas production decrease to limit warming consistent with the goals of the Paris Agreement? Most answers to this question are generated using integrated assessment models (IAMs) of energy and climate systems. These models calculate ways to meet both international climate goals and people's projected energy needs at the lowest overall economic cost.

IISD's analysis of scenarios from the IPCC, IEA, International Renewable Energy Agency, and other authoritative sources point to the need for drastic production reductions. These scenarios indicate that oil and gas production must decline between 58% and 99% by 2050 to limit warming to 1.5°C by the end of the century (Bois von Kursk et al., 2022). These oil and gas phase-out pathways are based on a carbon budget estimated at 210 GtCO₂, the equivalent of 5 years of current global emissions (Forster et al., 2023; Lamboll et al., 2023)

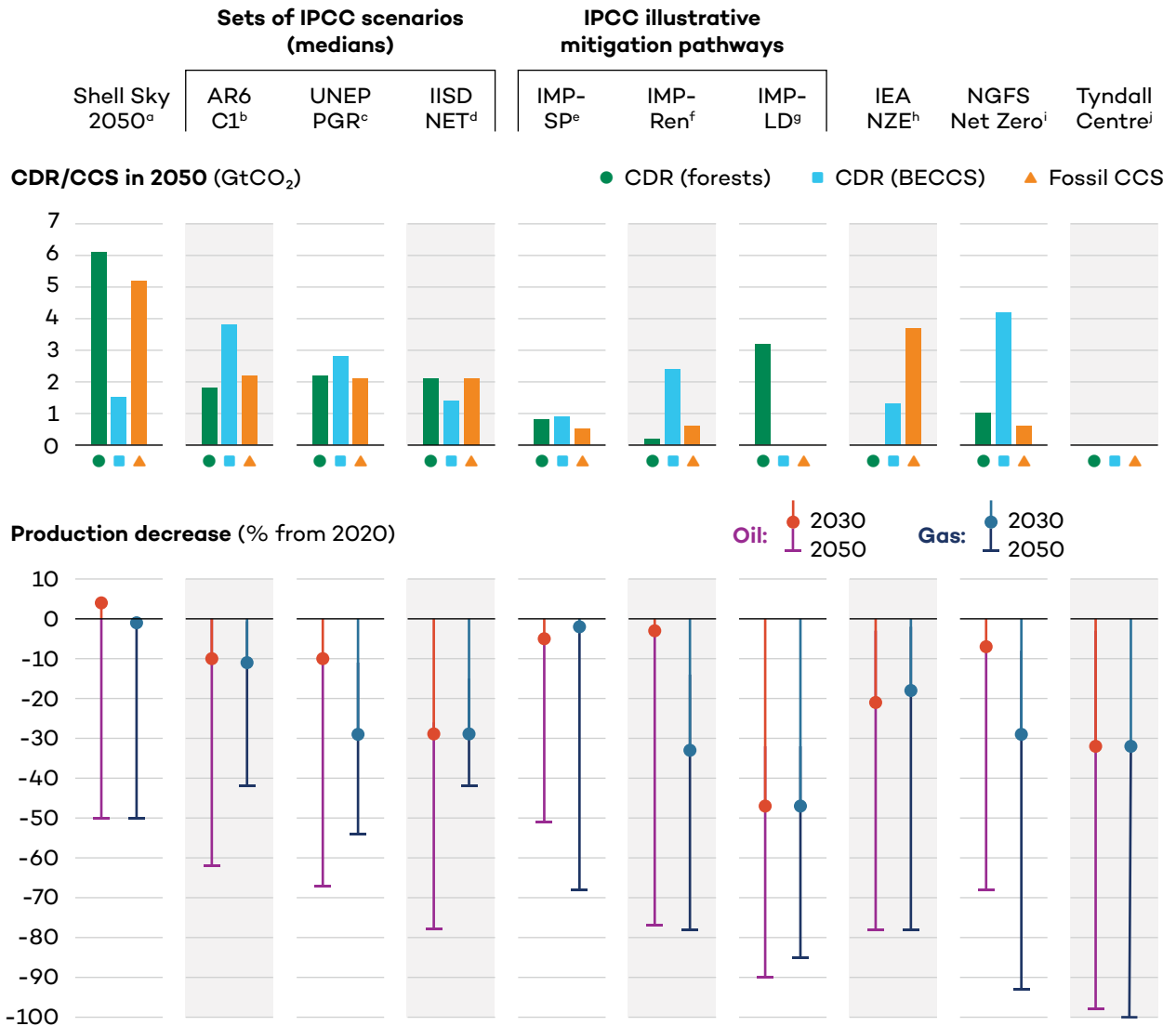
One of the biggest drivers of variability in the pace of fossil fuel decline in modelled scenarios is the assumed scale of carbon dioxide removal (CDR) from the atmosphere and CCS from fossil fuel combustion and industrial processes³ (Achakulwisut et al., 2023). IAMs have been widely criticized for over-relying on CDR and CCS. The future deployment of these technologies remains highly uncertain, given their high costs, extremely limited field testing to date and concerns about their sustainability impacts (Center for International Environmental Law, 2023; Grant et al., 2021; Low & Schäfer, 2020). As shown in Figure 1, global oil and gas consumption and production decline fastest in scenarios that rely the least on CDR and fossil CCS. At the other end of the spectrum, Shell's Sky 2050 scenario sees no decline in oil and gas production this decade but relies on forest CDR to an extent considered unsustainable by scientists (Figure 1) (Fuss et al., 2018).

A further limitation of using IAMs to guide fossil fuel production policy is that most energy/climate models incorporate technological and economic factors but omit social and political considerations. This misrepresents human behaviour (Li & Strachan, 2019; McCollum et al., 2017; Trutnevyte, 2016). Implementing climate policies requiring change in social institutions or consumption habits can be difficult to model. Accordingly, IAMs are useful for assessing global ambition levels but less so for determining national mitigation efforts equitably. Care is needed both in selecting which scenarios to use and in interpreting the results.

³ Models input assumptions commonly specify maximum limits on how much of each technology can be used, for example, based on sustainability constraints, or how quickly they can expand.



Figure 1. Global oil and gas decline in various 1.5°C scenarios, compared with CDR and CCS



Source: Compiled based on publicly available data extracted from the scenarios cited in the notes below.

^a Limit warming to 1.5°C by end of century, following high overshoot (Shell 2023, data tables).

^b AR6 scenario explorer (Byers et al., 2022).

^c 1.5°C-consistent scenario set from the IPCC AR6 with some limitations on CDR, CCS, and delayed action (SEI et al., 2023).

^d Selected 1.5°C scenarios from the IPCC AR6 with CDR and CCS within sustainability and feasibility limits based on the AR6 WG3 report (Bois von Kursk et al., 2022).

^e Achieve SDGs on energy with an emphasis on mitigating land-use emissions and short-lived climate pollutants (Soergel et al., 2021).

^f Continue present demand trends; decarbonization achieved mainly by technological substitution (e.g., renewable energy) (Luderer et al., 2021).

^g Societies change behaviours and systems (e.g., public transport) to reduce energy demand while meeting needs. No CCS (either on fossil fuel plants or in novel CDR) (Grubler et al., 2018).

^h Achieve energy-related SDGs while minimizing energy system disruption (e.g., stranded assets) (IEA, 2023c). CCS captured from fossil fuels and industry.

ⁱ Median estimates of 1.5°C scenarios reaching global net-zero CO₂ emissions around 2050 with limits of CDR and CCS (NGFS, 2023).

^j Heuristic pathway, based on carbon budgets. Avoid CDR reliance. Coal production phase-out by 2030 (Global North) or 2040 (Global South) (Calverley & Anderson, 2022). Base year 2021 instead of 2020.



Variability in Phase-out Pathways

The IEA and IPCC scenarios are among the most used models. The IEA Net Zero Emissions (NZE) scenario is published together with clear and actionable policy recommendations. The IPCC's Sixth Assessment Report (AR6) reviews 97 scenarios that limit warming to 1.5°C with no or low overshoot.⁴ These scenarios vary widely in their implications for oil and gas.

Figure 1 shows the levels of carbon sequestration used in selected policy-relevant scenarios, together with the percentage decrease in oil and gas production by 2030 and 2050. It shows three IPCC Illustrative Mitigation Pathways, several scenarios reviewed in the AR6 report, and a few other representative 1.5°C pathways.

As shown in Figure 1, levels of CDR and CCS vary significantly among different scenarios. We observe an inverse correlation between carbon sequestration and oil and gas production decrease in 2030 and 2050. Oil company scenarios rely more heavily on CCS and CDR to meet climate goals than other scenarios.

The Case for No New Oil and Gas Fields to Keep Warming Within 1.5°C

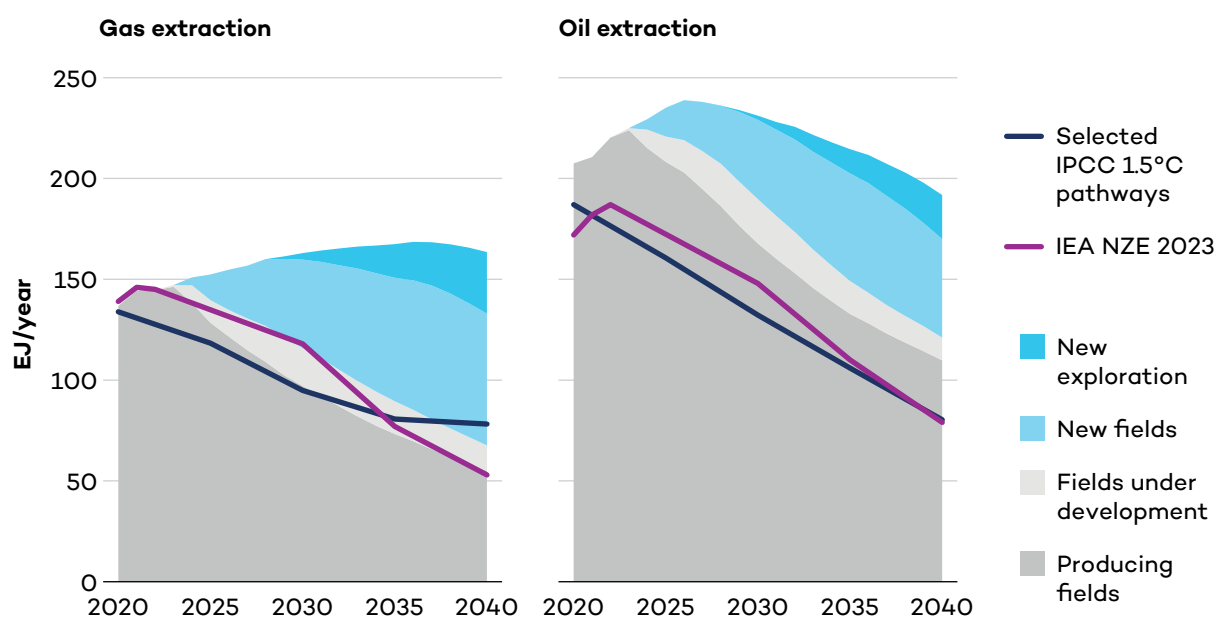
The IEA's first NZE scenario, released in 2021, concluded that the world's Paris-aligned energy needs could be met without developing new oil and gas fields (IEA, 2021). This finding, reiterated in subsequent World Energy Outlook reports, indicates that there is more than enough oil and gas available in fields already in production and under development to meet global demand in its 1.5°C scenario (IEA, 2023b). A new field is defined as an area where significant oil and gas reserves have been discovered but has not yet received a final investment decision for full-scale development.

Figure 2 shows that this finding is not unique to the IEA's modelling. IPCC 1.5°C scenarios with feasible and sustainable amounts of CDR and CCS also show that Paris-aligned oil and gas demand could be met without developing new oil and gas fields. The figure also shows that existing downstream fossil fuel infrastructure for power generation is sufficient to meet energy demands in the IEA and selected IPCC 1.5°C scenarios. IISD's analysis of a more comprehensive selection of credible 1.5°C scenarios shows that these conclusions are common (Bois von Kursk et al., 2022).

⁴ The key outcomes of these scenarios, and of scenarios leading to higher temperature outcomes, are presented in a user-friendly way at <https://data.ene.iiasa.ac.at/ar6/>.



Figure 2. Global oil and gas production, based on IEA NZE and selected IPCC 1.5°C pathways



Source: Byers et al., 2022; Global Energy Monitor, 2023; IEA, 2023c.

The committed carbon emissions from existing oil and gas production infrastructure would be enough—by themselves—to emit the equivalent of two times the remaining carbon budget for a 50% chance of limiting warming to 1.5°C (UNEP, 2023). Full use of all operating fossil fuel mines and fields would emit about 3.5 times the remaining carbon budget (Trout et al., 2022).



3.0 Projections for Oil and Gas Production

Most oil- and gas-producing countries are expanding production and heavily supporting industry with subsidies and other measures. While many are addressing operational emissions under their national climate plans or initiatives like the Global Methane Pledge, no major producer is curbing production.

Figure 3 shows that most of the largest oil and gas producers⁵ plan to increase production over the coming decade and beyond. The United States, Canada, and Australia plan significant production increases through 2050, despite the high capacity to diversify their economies away from fossil fuel production and large historical responsibility for global GHG emissions (Oil Change International, 2023). Two other Global North producers—the United Kingdom and Norway—balance existing fields reaching depletion in the coming decades with insignificant decreases. Many oil and gas producers in the Global South also have expansion plans. Brazil plans to almost double production by 2030 (SEI et al., 2023).

Collectively, governments expect to produce 29% more oil and 82% more gas by 2030 than is consistent with a 1.5°C global warming limit (SEI et al., 2023). With production projected to continue increasing, the gap will widen to 260% and 210% by 2050 (SEI et al., 2023). The financial viability of these expansion plans is tenuous, given predictions of future demand reduction (Financial Times, 2023).

Currently, major production cuts have nothing to do with climate action as they are mainly done by OPEC+ countries with the intention of raising prices and are considered temporary. As of early 2024, OPEC+ withholds an estimated 2.2 million barrels per day of available production (CNN Business, 2023) with a declared target of 3.6 million barrels per day (Cooban & Buchwald, 2023). Despite these cuts, OPEC+ members are also investing in expanding production capacity to maintain their market shares and power.

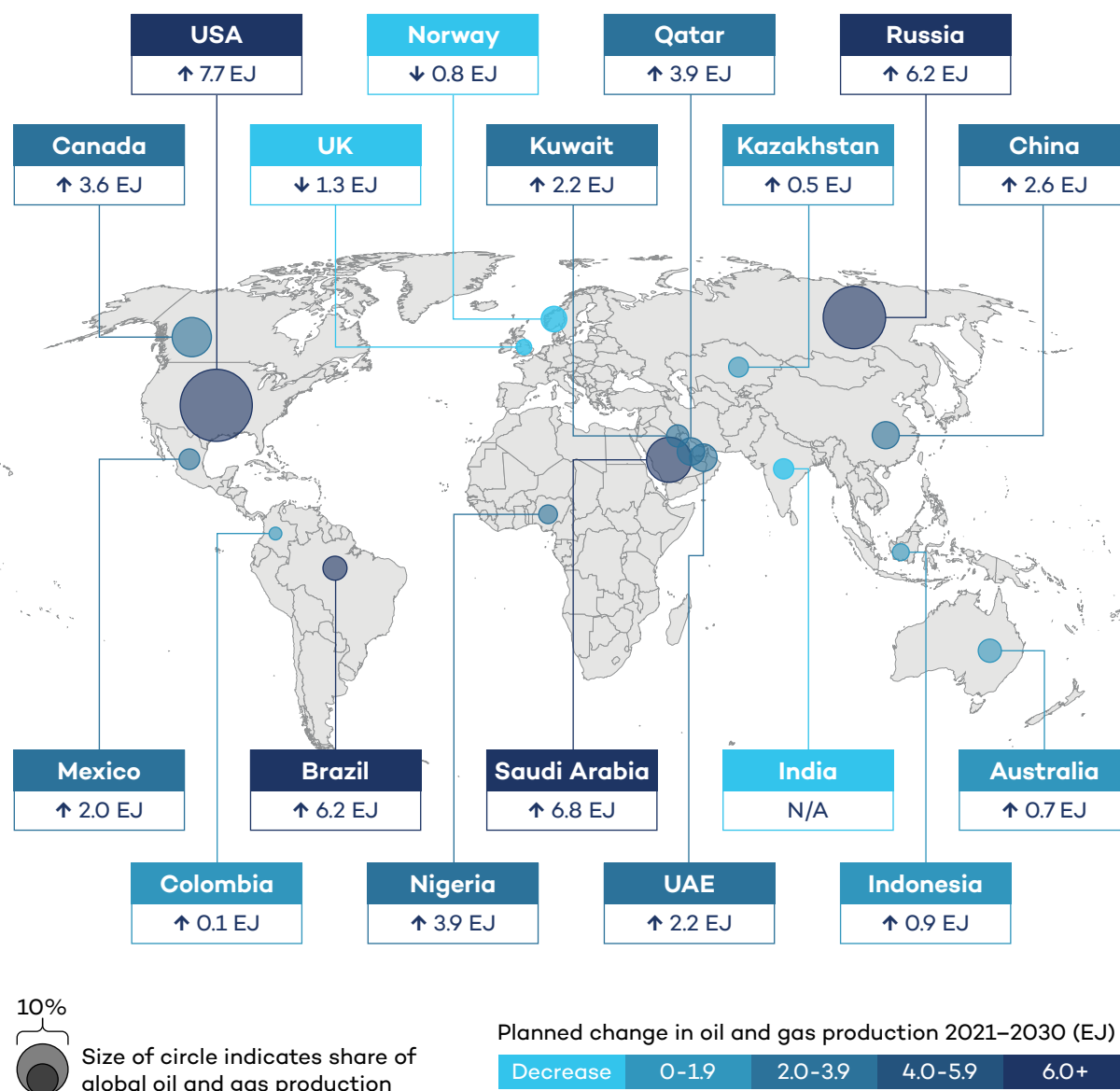
Large oil and gas producers who claim climate leadership are also committed to expanding production, including the United States and Canada (SEI et al., 2023). While in the short term, non-OPEC+ countries can increase their market share due to OPEC+'s approach to maintaining high prices, this leads to a race to increase production despite forecasts of declining consumption (IEA, 2023c).

Given forecasts of peak demand, increasing global production appears unsustainable. This could lead to a rapid tipping point in energy markets as those producers holding back production are no longer able or willing to do so. Similar price crashes have happened three times since 1980 as Saudi Arabia has tried to win back market share. The most recent crash occurred during the onset of the COVID-19 pandemic when OPEC and Russia failed to agree on coordinated production cuts, with prices hitting negative values (Ma et al., 2021).

⁵ Measured as the average production over the last 10 years by Rystad Energy UCube.



Figure 3. Overview of oil and gas production plans for largest fossil fuel producers



Source: Author elaboration based on SEI et al. (2023) and IEA Energy Statistics.

Oil and gas markets have historically been subject to rapid swings and volatility. Market swings in either direction tend to trigger calls for public subsidies, either as consumer protection or industry protection. A collapse in global prices could provide strong market incentives for greater cooperation between major producers on a managed decline.

High vs. Low Pricing

Oil and gas production levels are based on pricing. There is ongoing debate as to whether high or low prices are the more efficient way to lead to a clean energy transition (Boer et al., 2023). While van Asselt et al. (2024) show that higher costs lead to faster reductions in emissions, high pricing also allows for continued investment in new production capacity. This can “lock



in” production and attract more lavish subsidies. The debate over “ideal” pricing for fossil fuel phase-out also involves equity concerns. High prices involve greater rent transfers to producers and make the cost of living higher for consumers until alternatives are developed. As governments seek to cushion price shocks for consumers, higher oil and gas prices also lead to hikes in fossil fuel consumption subsidies.



4.0 Phasing Out Oil and Gas Production Equitably

Equity is another word for fairness. While equity principles for cutting territorial (consumption-based) emissions are well established, extra considerations apply to fossil fuel production. This section summarizes the differences and outlines five principles for an equitable phase-out.

Fairness Principles and Climate Mitigation

It is generally agreed that each country must do its fair share to tackle climate change based on two principles: responsibility for causing the problem and capacity to solve it. These are codified in the phrase “common but differentiated responsibilities and respective capabilities” in the 2015 Paris Agreement (United Nations, 2015). Both principles point in the same direction, as fossil fuel use and development have historically gone hand in hand. The onus is on developed countries to act first and fastest to cut emissions and provide support for climate action by developing countries.

Fairness is just as critical to phasing out fossil fuel production. As with territorial emissions, there is a moral case that developed countries should move first and fastest (Caney, 2016; Lenferna, 2018; Lofoten Declaration, 2017) and provide finance and other support to developing countries (Armstrong, 2019). Such support is envisaged as part of the technical assistance fund of the Beyond Oil and Gas Alliance (BOGA) and a global transition fund in proposals for a fossil fuel treaty alongside sequenced phase-outs and principles-based commitments related to historical responsibility and capacity to transition (Newell & Simms, 2020).

However, there are several differences from territorial emissions (Muttitt & Kartha, 2020):

- Production is more closely associated both with a workforce and with impacts on fenceline communities.
- Fossil fuel production is much less correlated with socio-economic development. There are developing countries that extract lots of oil, such as Iraq, Nigeria, and Venezuela, and rich countries that do not, such as France and Japan. It may lead to social benefits, as in Norway (Bang & Lahn, 2019; Treanor, 2014), or to a resource curse, as in Mozambique (Gaventa, 2021) or Nigeria (Kashi & Watts, 2008).
- “Capability” is shaped by economic diversity and income level. Diversifying economies that depend heavily on fossil fuel exports takes several decades of concerted efforts (Alsharif et al., 2017). A rushed phase-out can bring social costs, such as unemployment and reduced government revenues for public services, public sector salaries, and further investment in diversification.



Oil and Gas Not a Viable Path to Development

Some governments argue that prospective new producers in the Global South should be allowed their turn to develop fossil fuels. Countries with pressing development needs are understandably tempted to monetize their resources (Tucker & Reisch, 2021). However, not only is oil and gas expansion no longer viable from a climate perspective (as outlined in Section 2), it is unlikely today to be a viable path to development. This is for several reasons:

- By the time new producers see significant revenues from new production, the global energy transition will be well underway, pushing down prices and demand for oil and gas, and hence reducing or even eliminating those revenues. For example, while gas was discovered offshore Mozambique in the early 2010s, significant government revenues will not be seen until at least the mid-2030s.
- The countries that achieved the best historical outcomes from fossil fuel production, like Norway, took time to create governance structures, local supply chains, and a trained workforce, while countries that expanded production more rapidly generally suffered from a “resource curse,” with negative economic outcomes (Karl, 1997; Stevens et al., 2015). Fossil fuel development today would take place under the time pressure of the global energy transition, making it unlikely that economic benefits can be obtained.
- Oil and gas development is associated with increases in countries’ external debts (Steadman et al., 2023) and with perpetuation of historic global imbalances and injustices (Sokona et al., 2023). Countries that become new oil and gas producers are unlikely to experience a boost to development but rather to find themselves saddled with stranded assets (Denton et al., 2019; Ovadia et al., 2024), expensive energy (Muttitt et al., 2021) and debts that they cannot pay.

Considering these problems, equity becomes less about allocating the finite supposed benefits of fossil fuel extraction than about seeking to fairly share efforts towards a phaseout of existing production.

Principles for an Equitable Phase-Out of Fossil Fuel Production

Muttitt and Kartha (2020) propose five principles for an equitable phase-out of fossil fuel production:

1. Phase out global production at a pace consistent with limiting warming to 1.5°C;
2. Enable a just transition for workers and communities;
3. Stop production where it violates human rights;
4. Phase out fastest in the countries where dependence on production is lowest (where doing so will have the least social costs);
5. Share transition costs fairly, according to ability to bear those costs.



In applying these principles, it is most urgent to stop production where local people's rights are violated (principle 3). With what remains, scientific assessment establishes a global pace of phase-out consistent with limiting warming to 1.5°C (principle 1). Countries then phase out at different paces that add up to this global total: in order to minimize the social costs of transition, diversified economies phase out fastest, while others take more time (principle 4). Higher-capacity countries provide financial, technological and capacity-building support to enable this phase-out in countries with more limited capacity (principle 5). In each country, the process of transition is in line with the principles of just transition (principle 2) (International Labour Organization, 2015).

Present debates and research focus on how to apply these principles quantitatively. Calverley and Anderson (2022) propose phase-out pathways for five groups of countries, organized by their non-oil GDP (a composite measure combining both income and dependence). The Civil Society Equity Review (2023) combines three measures of dependence on fossil fuel production: for energy supplies, for government revenues, and for jobs. Both studies find that to limit warming to 1.5°C, the least-dependent countries—including the United States, Canada, Norway, and the United Kingdom—must end production by the early 2030s and the most dependent by 2050. The Civil Society Equity Review makes a first estimate of the financial support required to enable phase-out in poorer countries, totalling more than USD 200 billion per year, to be provided by the richest countries.



5.0 Phase-Out Discussions in International Forums

Production and consumption of oil and gas have historically been subject to active international cooperation, coordination, and competition. Since 1960, OPEC has worked to control global oil prices by managing its members' production levels. Member countries of the Organisation for Economic Co-operation and Development (OECD) founded the IEA in 1974 to ensure the security of the oil supply. Today, the IEA works on all types of energy and is increasingly promoting pathways to net-zero emissions. OPEC, in contrast, continues to predict and promote increased oil and gas production.

Oil and gas phase-out discussions in the UNFCCC context are still in their infancy. The COP 28 outcome included governments' first explicit agreement on the need to transition away from fossil fuels. Until now, the G7 and G20 have mainly focused on eliminating (with little success) fossil fuel subsidies and phasing out coal power generation. Among more forward-leaning actors, first-mover coalitions, such as BOGA, are mobilizing willing national and subnational actors to start phasing out production before global consensus is reached.

Fossil Fuels Phase-Out in the UNFCCC

It took more than three decades for 198 parties to the UNFCCC to finally agree on the need to transition away from fossil fuels at COP 28 in 2023. Earlier decisions at UNFCCC were framed around temperature goals and greenhouse gas emissions rather than their implications for fossil fuels. Several economically and politically entrenched countries in the oil and gas sector have and continue to resist the inclusion of fossil fuel language. Years of dedicated organizing from civil society based on scientific evidence and principles of justice, along with first-mover coalitions, helped to achieve the COP 28 result.

The COP outcome recognizes the need for “transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner.” The text also calls for “phasing out inefficient fossil fuel subsidies that do not address energy poverty or just transitions.”

In addition to the negotiated outcome, several climate clubs and coalitions advanced the fossil fuel supply phase-out agenda. At COP 28, new members joined the Powering Past Coal Alliance, BOGA, the Clean Energy Transition Partnership, and the Global Methane Pledge. Twelve countries, led by the Netherlands, committed to setting up an “international dialogue” to phase out fossil fuel subsidies (Carbon Brief, 2023).

While failing to commit to reducing production, the oil and gas industry took incremental steps at COP 28 to address some of its GHG emissions. Fifty oil and gas companies launched the Oil and Gas Decarbonization Charter, committing to net-zero emission operations by 2050, ending routine flaring by 2030, and near-zero upstream methane emissions (UNFCCC, 2023a). The signatories, representing over 40% of global oil production, include large national oil companies, making the charter a significant announcement. However, these agreements are voluntary and unenforceable. They cover only the industry's operational emissions, which are



much smaller than the emissions resulting from the burning of fossil fuels and do not address production phase-out (Climate Action Tracker, 2023).

The G7 and G20

As a small group of advanced economies, the G7 has the ability—and the historical responsibility—to show leadership and go beyond the international consensus. In April 2023, the G7 climate, energy and environment ministers agreed “to accelerate the phase-out of unabated fossil fuels so as to achieve net-zero in energy systems by 2050 at the latest” (G7, 2023a). This was repeated in the G7 leaders’ communiqué (G7, 2023b). It was a step forward from the 2022 ministers’ communiqué, which only addressed domestic unabated coal power generation (G7, 2022). In 2024, the G7 countries confirmed their commitment to accelerating the phase-out of unabated fossil fuels so as to achieve net-zero in energy systems by 2050 and gave another step forward by concretely committing to “operationalizing our contribution to the global transition away from fossil fuels in energy systems, through the development and implementation of domestic plans, policies and actions, including to inform and be reflected in our NDCs and LTSs [long-term strategies], and call on others, particularly other major economies, to act likewise” (G7, 2024).

The G20 brings together rich developed countries with major emerging economies, putting global equity questions at the heart of the debate. For India, as host of the 2023 summit, that meant broadening the focus from phasing down coal—its main energy source—to all fossil fuels. However, G20 countries failed to reach agreement on this issue. Instead, they merely reiterated a commitment on “efforts towards the phasedown of unabated coal power, in line with national circumstances and recognizing the need for support towards just transitions” (G20, 2022), leaving the door open for the continued use of coal with CCS or co-firing options.

The COP 28 outcome opens new possibilities for the G7 and G20 to show leadership for the agenda in 2024. As G7 President and one of the few EU members to have joined BOGA as a “friend,” Italy has a particular opportunity to introduce high-ambition policies for how the G7 could lead the transition away from fossil fuels. Brazil will host both the G20 Summit in 2024 and COP 30 in 2025, creating a unique opportunity to build support for higher ambition in the UNFCCC process.

The Beyond Oil and Gas Alliance

BOGA was launched at COP 26 with Denmark and Costa Rica as co-chairs. It is an international alliance of governments and stakeholders working together to facilitate the managed phase-out of oil and gas production (BOGA, n.d.). In 2023, Quebec became the third co-chair of BOGA to promote subnational action. BOGA aims “to elevate the issue of oil and gas production phase-out in international climate dialogues, mobilize action and commitments, and create an international community of practice on this issue” (BOGA, n.d.).



BOGA has three membership categories: full members, associate members, and friends. Full members of BOGA⁶ commit to ending new concessions, licensing, or leasing rounds for oil and gas production and exploration and to set a Paris-aligned date for ending oil and gas production and exploration on the territory over which they have jurisdiction. Associate members⁷ have taken steps to reduce oil and gas production but have not yet met the requirements of full membership. Finally, the friends of BOGA⁸ are not required to have taken any concrete steps to restrict fossil fuel production but are aligned with the initiative's goals.

At COP 28, BOGA announced grants of an initial USD 1 million to support Kenya and Colombia to “plan for a just, managed and orderly transition away from oil and gas dependency.” Those grants are the first disbursements of the BOGA fund, which was announced at COP 27 with USD 10 million from philanthropic organizations. The fund offers technical assistance to Global South governments to develop their vision of a “beyond oil and gas” economy and aims to catalyze bilateral and multilateral funding (BOGA, 2023).

While BOGA members represent only a small proportion of global oil and gas production, they set a strong example for other countries to follow. The coalition is growing, with Spain, Kenya, and Samoa joining at COP 28 in 2023. Moreover, the BOGA fund sets an important precedent for international finance mechanisms working to support oil- and gas-dependent countries in their economic diversification away from fossil fuels.

The Clean Energy Transition Partnership

The Clean Energy Transition Partnership (CETP), also known as the Glasgow Statement on International Public Support for the Clean Energy Transition, was launched at COP 26. It commits signatories to ending new direct public support for the international unabated fossil fuel energy sector within 1 year of signing the statement and to prioritize financial support toward the clean energy transition (UK Government, 2021). This was the first international political commitment that addressed not only public finance for coal but also for oil and gas. Signatories include some of the largest providers of energy finance, including Canada, the United States, Italy, and Germany.

While the CETP initiative sets a potentially transformative precedent, signatories are not yet living up to their full potential to shift international public finance to clean energy. In the first year of the CETP's implementation, signatories collectively moved a total of USD 6.5 billion out of fossil fuels and USD 5.2 billion into clean energy (Jones & Mun, 2023). This shift into clean energy is small compared to the CETP's potential to shift USD 28 billion in finance to clean energy annually, over and above existing financing levels (Jones & Mun, 2023).

At COP 28, the CETP welcomed Australia and Norway as its latest signatories (CETP, 2023), bringing the number of members to 41. While some notable providers of international

⁶ As of February 2024: Costa Rica, Denmark, France, Greenland, Ireland, Marschall Islands, Portugal, Quebec, Samoa, Spain, Sweden, Wales, Tuvalu, Vanuatu and Washington State.

⁷ As of February 2024: California and New Zealand.

⁸ As of February 2024: Chile, Colombia, Fiji, Finland, Italy, Luxembourg and Kenya.



finance for fossil fuels, such as Japan and South Korea, are still not part of the CETP, full implementation of existing commitments would greatly boost the clean energy transition.

The Fossil Fuel Non-Proliferation Treaty Initiative

A Fossil Fuel Non-Proliferation Treaty has been proposed to stop the expansion of fossil fuel production, phase out fossil fuel production, and manage a just transition (Simms & Newell, 2018). In the Port Vila Call for a Just Transition to a Fossil Fuel Free Pacific, adopted in March 2023, six Pacific nations, led by Vanuatu and Tuvalu, called on other countries to join them in developing a treaty, as well as to join BOGA (Fossil Fuel Non-Proliferation Treaty Initiative, 2023). Many non-state actors have expressed their support for the idea, including 89 cities and subnational governments, more than 2,000 civil society organizations, and 3,000 scientists and academics (Fossil Fuel Non-Proliferation Treaty Initiative, n.d.).

Academic literature has fleshed out what such a treaty could look like (Newell et al., 2022; Newell & Simms, 2020) and has identified potential first-mover coalitions for each fossil fuel (van Asselt et al., 2024). Work has also gone into defining required financial support and compliance mechanisms (Newell & Simms, 2022). At COP 28, Colombia became the first country with considerable coal, oil, and gas production to endorse the idea.



6.0 Economic Risks and Accelerating Production Phase-Out

The IEA (2023a) predicts that oil and gas demand will peak by 2030. This peak is far too late and modest to align with the IEA's Net Zero pathway (IEA, 2021). Some bullish industry forecasts, such as OPEC's World Oil Outlook (2023), predict continued demand growth. The predicted peaks in demand or even continued slow growth are starkly ignored by governments and industry charging ahead with the current high rates of global investment in production capacity (SEI et al., 2023) in both upstream and downstream assets.

Economic Risks

This misalignment between production and demand forecasts presents risks to investors and producer states heavily reliant on oil and gas rents, with potential investor losses in the trillions of dollars (Carbon Tracker, 2023). Much of this risk is from lower revenues relative to projections used to justify current investments, with the values of reserves estimated to decrease between USD 13 trillion and USD 15 trillion (Hansen, 2022). Sunk costs in infrastructure are also a growing risk for private and public investors.

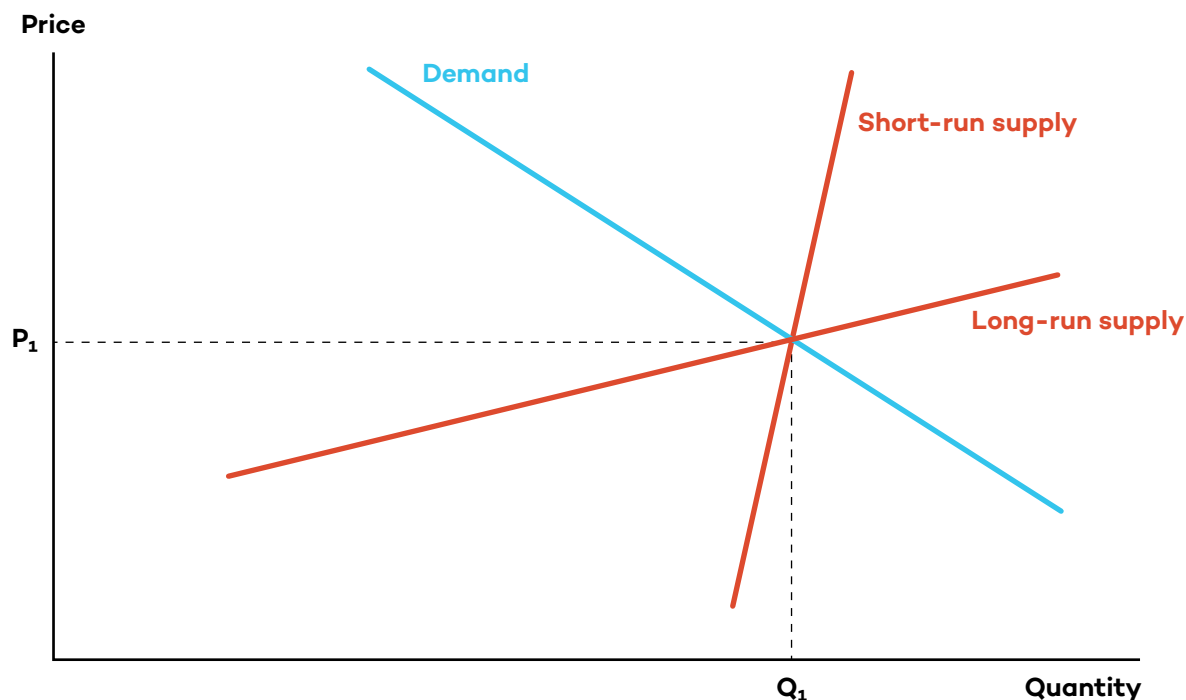
Stranded assets represent an additional financial risk from decreasing fossil fuel production. These assets may face rapid collapse in value or abandonment due to changes in policy and demand. Conservative estimates of the value of these physical assets already stood at well over USD 1 trillion in 2022 (Semeniuk et al., 2022), with costs rising alongside additional investment. Three quarters of these assets are publicly owned (Hansen, 2022). Assets at risk of stranding go beyond physical infrastructure. They include human capital and secondary industries, the costs of which are not usually included in calculations (von Dulong et al., 2023). Closure of production facilities often involves substantial cleanup costs. In the event of bankruptcies, these costs, such as closure and capping of orphaned wells, can be left in the hands of public authorities (Parliamentary Budget Office, 2022). Environmental cleanup costs can also be left to public authorities or may not happen at all, particularly in lower-income countries.

Acceleration of Production Phase-Out

In the long term, the amount of oil and gas produced is largely driven by market forces. Production levels are determined by price, which is determined by the intersection of the demand and supply curves. In their turn, both demand and supply curves are shaped by such factors as consumers' ability to switch to other energy sources (elasticity of demand) and producers' costs (which are affected, among other variables, by the geology of reserves, distance to markets, and government taxation and subsidies).



Figure 4. Oil and gas supply and demand curves



Source: Author figure, based on data from Gilmer, 2016.

Both the short-run supply and demand curves for oil and gas are inelastic: small increases in demand lead to large increases in price with little impact on supply. However, global supply is more responsive to demand and price changes in the long run. Several policy changes could make consumer shifts to alternative energy sources easier during times of high prices, decreasing required supply.

Cheaper, Accessible Alternatives for Oil and Gas Consumption

Rapid transitions to other alternative energy sources require that these options be available, practical, and affordable. For example, the diminishing costs of electric vehicles make them increasingly competitive. Public investment in improved charging infrastructure could accelerate their uptake (IEA, 2023b). Easy access to other electrification alternatives, such as heating (Thomassen, 2020), also makes them more attractive during oil and gas price peaks.

Fossil Fuel Subsidy Reform

Fossil fuel subsidies drive up production, either by reducing costs (producer subsidies) or supporting consumption (consumer subsidies). While there are varying methodologies to define and measure fossil fuel subsidies, the Fossil Fuel Subsidy Tracker (n.d.) registered over USD 1.5 trillion in subsidies in 2022. Reforming these subsidies would not only reduce emissions but also reduce the negative health impacts of fossil fuel combustion. Money saved through subsidy reduction could instead be used to support sustainable development causes such as education, health care, nature-positive solutions, and the transition to clean energy.



Since 2009, there has been increasing international momentum to reform fossil fuel subsidies. Commitments to reform, mostly non-legally binding and largely unmet, have been undertaken within the G7, G20, Asia-Pacific Economic Cooperation, the SDGs, and the UNFCCC Global Stock Take. Conversations about legally binding ways to manage fossil fuel subsidy reform have been held in the World Trade Organization (n.d.), but they have so far not yielded specific results (Baršauskaitė, 2022).

Shifting International Public Finance From Fossil Fuels to Clean Energy

International public finance is directly invested in fossil fuel projects. This takes place through national export credit agencies, development finance institutions, and multilateral public finance institutions. Public finance is often provided at below-market rates with government-backed credit ratings, making finance more accessible and less risky for investors. This form of guarantee can seed much larger flows of private capital (Oil Change International & Friends of the Earth U.S., 2022). Public finance is an important signal of government priorities and can lead to shifts in investments in the wider private market. The CETP, discussed above, has seen initial shifts of financial flows from member countries from fossil fuels to renewable energy development (Jones & Mun, 2023). There has likewise been progress to decrease public finance through international financial institutions such as the World Bank. The European Investment Bank, one of the CETP signatories, has moved to eliminate them entirely (European Investment Bank, n.d.)

Using National Oil Companies as a Vehicle of Phase-out

On the global scale, national oil companies (NOCs) account for half of global oil and gas production, 40% of investments in the sector, and two thirds of hydrocarbon reserves. However, most NOCs are pursuing continued expansion of oil and gas exploration and production. Their transition plans are drastically insufficient for safe climate targets, and their decarbonization policies mostly boil down to managing Scope 1 and Scope 2 emissions rather than changing their business model from oil and gas extraction toward becoming clean energy companies (Picciariello et al., 2023). The first step toward alignment with climate targets for NOCs would be stopping their expansion plans. Governments, as well as minority investors, have the primary role to play in making these decisions. In particular, the ability of OPEC and some of the OPEC+ countries to implement production cuts hinges on the government's ownership of major producing assets.

The next step would be the transformation of the NOCs' business model "from barrels to electrons" (IISD, 2021). To date, the anecdotal example of a NOC fully transforming itself from an oil and gas company into a renewable energy business is Orsted of Denmark (IISD, 2021). There are more examples of state-owned enterprises (SOEs) transformation in the coal sector, in both extraction and power segments, including in China, Sweden and India (Gerasimchuk et al., 2018). Early findings by the OECD point to a positive effect of government ownership on investment in renewable electricity generation in OECD and G20 countries. These positive effects could be attributed, among other reasons, to SOEs being influenced by government mandates to advance their climate targets and to the preferential



financing terms available to SOEs (Prag et al., 2018). Government ownership of energy assets could play a critical role in the energy transition globally for coal as well as oil and gas.

Local Initiatives to Stop or Defund Oil and Gas Production Projects

There have been thousands of local initiatives to reduce oil and gas production (Fossil Fuel Cuts Database, n.d.). These involve approaches such as stopping licensing, blockades by local communities, divestments by financial institutions (and other forms of defunding), and litigation. These initiatives either directly ban production or make projects costlier and less attractive for business. They build on decreasing social acceptance of new oil and gas developments.

It is difficult to estimate the combined global reduction in production from current national or local reduction initiatives. Not all production is completely fungible; however, significant unused production capacity by OPEC+ is a common argument discouraging localized production decreases in a global market. Greater research on supply fungibility could help inform which production project phase-outs could have the most significant impact on pricing and emissions.

Energy Investment Treaties

Removing legal barriers to exiting fossil fuel production is as important as ending economic barriers. Investment treaties and resulting investor–state dispute settlement cases are notable examples of such legal barriers. Investors protected by investment treaties can claim compensation when governments decide to scale down or exit fossil fuel production. These claims not only act as a deterrent to supply-side restrictions (Tienhaara et al., 2022) but also divert much-needed government money away from climate mitigation and adaptation.

Of the thousands of investment treaties that are in force, the Energy Charter Treaty (ECT) is one of the most significant. The ECT has over 50 members and covers 7% of the production volume of all treaty-protected fossil fuel projects. Compensation payments for investors can be significant. Facing the risk of compensation charges, Russia left the ECT in 2009, and Italy did so in 2016. Italy was ordered to pay out more than EUR 205 million in compensation to the fossil fuel company Rockhopper Explorations after it decided to ban new oil and gas projects within 12 nautical miles of the coast (Stefanini, 2016). This compensation dwarfed Rockhopper’s actual investment of EUR 29.2 million, as the treaty protects against the loss of potential future profit (Climate Action Network Europe, 2022). In February 2024, the United Kingdom announced its departure from the project, following 11 previous countries, including Germany, France, and Spain (ReedSmith, 2024). Continuing this trend, in April 2024, the EU Parliament overwhelmingly voted to withdraw from the ECT (European Parliament, 2024). However, the ECT has a 20-year sunset clause—a similar type of provision to many other investment treaties.



7.0 Phase-Out Policies and a Just Transition

There are three categories of instruments to curb oil and gas production: economic instruments, regulatory approaches, and public investment in the provision of goods and services (Lazarus & van Asselt, 2018). National phase-out plans should consider specific national circumstances, combining fossil fuel demand and supply-side policies, to maximize efficiency and minimize negative consequences (Rogge & Reichardt, 2016).

Table 1 classifies some fossil fuel supply-side policy options by category and provides some examples of policies already implemented. These include policies addressing coal production, for which more examples exist than for oil and gas production. Policy instruments proposed in academic literature that have rarely been used or not yet put into practice are also included.

Oil and gas producers have a long record of regulating production and export levels. In practice, these policies are motivated by the drive to maintain a certain price level and not by climate concerns. Examples include the OPEC quotas mentioned above or, historically, the Texas Railroad Commission (Downey, 2009). Recently, a few small and medium-sized producers have imposed regulatory restrictions, such as bans on new exploration (e.g., Denmark, Costa Rica, and Colombia). There are also restrictions for environmental concerns in sensitive ecosystems such as the Arctic (e.g., Canada and Norway) or offshore locations (e.g., New Zealand and Belize) (SEI et al., 2023).

In January 2024, the Biden Administration announced a temporary pause on authorizing proposed liquefied natural gas terminals to export gas to non-free trade agreement countries, during which it will reassess whether such projects are in the public interest—a requirement for export licence approval—as related to assessment of climate risks. This is a welcome sign of political leadership and should be replicated by other countries, including Canada (IISD in Toronto Star, 2024). Over 2024–2026, only 14% of potential capacity additions are affected by the pause, but in the longer run, it affects one-quarter of all export capacity in development in the United States and one-tenth of all such capacity globally (Global Energy Monitor, 2024).

Economic instruments, such as cutting subsidies for oil and gas production, have the advantage for governments of freeing up fiscal space for other policy priorities. However, even policies with high climate mitigation potential and cost savings, such as subsidy removal, are often politically challenging to implement because they create losers as well as winners (Parry et al., 2021). To succeed, they need to be accompanied by policies that soften the blow for those who lose support (Gass & Echeverria, 2017; Harring et al., 2023).

**Table 1.** Select examples of phase-out policies

Approach	Instrument
Instruments commonly implemented	
Economic instruments	Removal of fossil fuel producer subsidies, including exploration, extraction, and support for mid-stream infrastructure (fuel ports and pipelines). Example: The removal of coal mining subsidies mandated by the EU (Germany and Spain), phase-out of tax credits (the Atlantic tax credit in Canada), and removal of tax exemptions for large producers (Colombia).
	Introduction/increase of fees, taxes or royalties on fossil fuel production or export.
	Just Energy Transition Partnerships as a form of international finance (South Africa, Indonesia, Vietnam, Senegal).
Regulatory approaches	Limiting exploration, extraction, expansion of mid-stream infrastructure, or export (via moratoriums, bans, or quotas). Example: OPEC's production quotas; bans on exploration and licensing of new projects (e.g., New Zealand, Costa Rica, Belize, Denmark); fossil fuel export restrictions (Indonesia); emissions cap on production (Canada, which has not halted expansion); moratoria and pauses on new fossil fuel infrastructure, such as the Biden administration decision of January 2024.
	Raising environmental and social standards, ensuring oil and gas producers pay these costs.
	Changing government-mandated business models of NOCs and other energy SOEs from fossil fuels to alternative sectors like clean energy (Denmark, Sweden, China, India).
Government provision of goods and services to support diversification and transition	Provision of land and government-owned infrastructure for alternative economic activities in producing regions. Example: Just transition roadmaps and initiatives (EU, Colombia, Canada, Scotland).
	Assistance to workers and communities transitioning out of fossil fuel production.
Instruments discussed in the literature but rarely used or not implemented yet	
Economic instruments	Production rights trading scheme (comparable to an emissions trading scheme).
	Monetary transfers and debt cancellation from Global North countries to fossil fuel exporters in exchange for "unused" fossil fuel reserves left in the ground (e.g., Yasuni Ishpingo-Tambococha-Tiputini Initiative).
Regulatory approaches	Nationalization of private fossil fuel-producing companies to shut down their production.
	Setting targets for reducing fossil fuel production and reporting on progress alongside existing climate mitigation accounts (e.g., by using a production-based emissions accounting framework).

Source: Authors' elaboration based on Lazarus & van Asselt (2018) and Fossil Fuel Policy Tracker (n.d.).



Just Transitions

While climate change mitigation will create new economic opportunities and jobs in areas such as nature-positive solutions and renewable energy, it will inevitably require some industries and jobs to undergo a managed decline. Regions that rely on coal, oil, or gas for a large share of their economy face unique challenges and risk of economic downturn as fossil fuel production decreases.

The international labour movement has advocated for a “just transition” for affected workers and communities for decades. The UN climate process has adopted the principle and expanded its scope to include fenceline communities, energy consumers, youth, and Indigenous Peoples. However, there is a lack of coordination and consistency in support to just transitions from global governance institutions (Newell et al., 2023).

A just transition is not only a moral necessity to share the burden of the energy transition, it also facilitates the adoption of ambitious climate policies by reducing opposition (Cha, 2020). In the history of coal phase-outs, there have been many examples of traumatic transitions. These include the United Kingdom in the 1980s and 1990s and in Eastern Europe after the fall of the Soviet Union. Today, several just transition initiatives address coal phase-out, including in Global North countries such as Germany, Canada, and Spain, and Global South countries like South Africa and Indonesia.

Most of these processes are built around social dialogue and have resulted in measures like early retirement schemes for industry workers, extended unemployment insurance schemes, support for retraining and public funding for economic diversification (Brauers et al., 2022). Some of these processes have been criticized for resulting in insufficiently ambitious phase-out pathways, high costs for the taxpayers, or unfair compensation to fossil fuel companies (Bang et al., 2022).

The oil and gas phase-out would be structurally similar to the coal industry phase-out but roughly double the scale. In 2019, the oil and gas sector accounted for twice the share of global energy supply compared with coal (54.1% versus 26.2%) and double the number of direct jobs (11.9 million compared with 6.3 million) (IEA, 2021, 2022b). However, no major oil- and gas-producing country has started a government-led just transition process.

Smaller producers, such as Denmark, New Zealand, and Scotland, have started implementing just transition policies for the oil and gas sector (Government of Taranaki, 2020; Rummelhoff, 2018; United Kingdom of Great Britain and Northern Ireland, 2020). Colombia has started a national dialogue on just transition (Ministerio de Minas y Energías, 2023). Significant civil society-led just transition initiatives exist in places like the North Sea and the United States.⁹

⁹ See <https://oilandgastransitions.org/> or <https://climatejusticealliance.org/about/> for example.



8.0 Recommendations

The COP 28 agreement on “transitioning away from fossil fuels” has profound implications for policy-makers. Governments and international negotiators need to turn this global stocktake formula into concrete policies, structures, and targets for production phase-out in line with emissions reduction goals and move forward with implementation. This primer outlines the rationales for many of the required policy objectives.

Recommendations to Governments

- Governments should cease the licensing and development of any new oil and gas fields at both national and subnational levels.
- Governments should define individual pathways, develop national-level roadmaps, and implement managed phase-outs of oil and gas production based on global 1.5°C climate targets. NDCs represent one avenue for such operationalization.
- Government production phase-out plans should be based on differentiated timelines, considering national historical responsibility and economic and social capacities, using policies based on their respective national contexts. Governments of the Global North should expand their financial and other support to enable fossil fuel phase-out in Southern countries, alongside expanding other forms of support for mitigation, adaptation and loss and damage.
- Governments should increase transparency to ensure that emissions from the combustion of exported oil and gas are accounted for by both producers and consumers and that parties report on measures undertaken to cut the supply of fossil fuels as part of their NDCs.
- Given predicted peak fossil fuel demand, national and subnational governments should assess the economic risks of continued expansion of production capacity and address concerns such as stranded physical and social assets.
- National and subnational governments should remove economic incentives for continued fossil fuel production. This includes
 - ending all public finance for oil and gas, both domestically and internationally. All countries that provide international public finance for oil and gas should join the CETP. CETP members should rapidly implement their commitments;
 - reform of fossil fuel subsidies, shifting support to sustainable development causes, such as education, health care, and sustainable infrastructure, including nature-positive solutions and renewables;
 - using the government mandate to stop the production expansion of NOCs and to transform their business model “from barrels to electrons,” making SOEs a vehicle of transition from fossil fuels to renewables.



- Governments should remove legal barriers to fossil fuel phase-out, reforming, repealing, or abandoning investment treaties so that governments can enforce 1.5°C-compatible oil and gas phase-out pathways without being challenged by business.
- National and subnational governments should draft and enact just transition plans for workers and communities.

Recommendations for International Processes

- Build on the outcomes of COP 28 to increasingly incorporate the objective of no new fossil fuels and to align production targets with emissions reduction commitments in international policies and agreements (e.g., UN agencies' reports, UN forums, G20, G7, multilateral development banks).
- Include voluntary disclosure of exported fossil fuel emissions consumed outside of national borders in NDCs or long-term low-emission development strategies. Countries that already include these emissions—or are planning on doing so—should also report on their progress using available tools from the UNFCCC process, such as the Biennial Transparency Reports.
- Work toward global consensus on differentiated timelines for national phase-outs in line with 1.5°C targets, and on international support for fossil fuel phase-out, based on considerations of equity among countries and common but differentiated responsibility. For example, transition support to Southern countries can be included in the scope of the New Collective Quantified Goal under the UNFCCC or in just energy transition finance.
- The G7 should take on a leadership role on stronger commitments on fossil fuel phase-out and addressing public finance for fossil fuels, implementing their commitment to eliminate inefficient fossil fuel subsidies by 2025 and strengthening it to apply to all fossil fuel subsidies and other support measures. The G7 should encourage the G20 and UN Climate Change Conferences to adopt similar positions.

Recommendations to Other Stakeholders

- Other stakeholders (businesses, academia, media, and civil society) should work to promote the outcomes of COP 28, specifically “transitioning away from fossil fuels in energy systems,” in their respective domains. Progressive actors can play an important role in generating public demand for domestic policies and in intergovernmental forums, calling on governments to implement both supply and demand-side policies to phase out oil and gas with along equitable and managed pathways via just transitions.
- Stakeholders can support first-mover coalitions to accelerate the transition away from fossil fuel production.
- Stakeholders should advocate collaboratively to spearhead the call to action for “No New Oil and Gas Production” with immediate effect and call for an immediate moratorium on public finance for new oil and gas production.



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