G20 RESEARCH REPORT – SEPTEMBER 2025

THE FUTURE OF OIL AND GAS: STRATEGIES, CHALLENGES, AND REALITIES OF OIL AND GAS PHASE OUT IN THE G20

INSTITUTE FOR ECONOMIC JUSTICE
RESEARCH POLICY ADVOCACY

About the IEJ
The IEJ is an activist economic policy think tank in South Africa. It provides policy makers and progressive social forces in South Africa and Africa with access to rigorous economic analysis, and policy options, as a basis for concrete interventions. These interventions aim to advance social justice and reduce inequality, promote equitable economic development that realises socio-economic rights, and foster a thriving, democratic, environmentally sustainable, and inclusive economy that places the needs of the majority at the centre. In doing so, it recognises the need to change the landscape of economic knowledge production, challenge economic orthodoxies, and position excluded voices at the heart of economic decision-making.

Acknowledgements
Kamal Ramburuth, Nerissa Muthayan, Gilad Isaacs, Basani Baloyi, Joan Stott, Hamadziripi Tamukamoyo.
The authors would also like to thank external and anonymous reviewers of this report.

The authors
Meenakshi Ajith[1]
Mzwanele Ntshwanti

How to cite this resource:
Ajith, M. and Ntshwanti, M. (2025). *The future of oil and gas: Strategies, challenges, and realities of oil and gas phase out in the G20*. Institute for Economic Justice. https://iej.org.za/the-future-of-oil-and-gas-strategies-challenges-and-realities-of-oil-and-gas-phase-out-in-the-g20/

For further information contact: info@iej.org.za

CONTENTS

ACRONYMS AND ABBREVIATIONS

AR	Assessment Report
ARG	Argentina
AUS	Australia
BOGA	Beyond Oil and Gas Alliance
CAN	Canada
CBAM	Carbon Border Adjustment Mechanism
CBDR-RC	Common but differentiated responsibilities and respective capabilities
CCS	Carbon capture and storage
CDR	Carbon dioxide removal
CHN	China
COP	Conference of the Parties
ECT	Energy Charter Treaty
ETS	Emissions Trading System
EU	European Union
FFSAF	Fossil Fuel Support Accountability Framework
FRA	France
G20	Group of Twenty
GER	Germany
GHG	Greenhouse gas
GPP	Government plans and projections
G7	Group of Seven
IAM	Integrated Assessment Model
IEA	International Energy Agency
ILO	International Labour Organization
IDN	Indonesia
IMP-LD	Implementation - least developed scenario
IND	India
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
ITA	Italy
JETP	Just Energy Transition Partnership
JPN	Japan
KOR	South Korea
KSA	Kingdom of Saudi Arabia
LCOE	Levelised cost of electricity
LNG	Liquefied Natural Gas
LT-LED	Long Term-Low Emission Development Strategies
MEX	Mexico
NDC	Nationally Determined Contribution
NOC	National Oil Company
OCI	Oil Climate Index
OECD	Organisation for Economic Co-operation and Development
PGR	Production Gap Report
RE	Renewable Energy
RSA	Republic of South Africa
RUS	Russia
SDG	Sustainable Development Goal
SIDS	Small Island Developing States
STEPS	Stated Policies Scenario
TUR	Türkiye
UAE	United Arab Emirates
UK	United Kingdom
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
WTO	World Trade Organisation

FIGURES AND TABLES

Despite ambitious commitments to expand renewable energy, G20 countries are still on track to produce and consume more than twice the amount of fossil fuels permitted under a 1.5°C pathway outlined in the Paris Agreement, which all G20 members except the United States have signed.

1. EXECUTIVE SUMMARY

G20 countries face a stark dilemma that will have ripple effects on the global economy. They can either allow oil and gas production to surge and trigger climate breakdown, or scale it back and confront deep market disruption, reshaping energy markets in a way that many countries are unprepared for. To navigate this impasse, oil and gas production must decline in lockstep with falling consumption, coupled with a massive expansion of renewable energy. Without this synchronised transition, risks to both people and the planet will multiply.

However, as explained in this report, the dependency on fossil fuels, especially oil and gas, remains deeply entrenched. Despite ambitious commitments to expand renewable energy, G20 countries are still on track to produce and consume more than twice the amount of fossil fuels permitted under a 1.5°C pathway outlined in the Paris Agreement, which all G20 members except the United States have signed (SEI et al. 2023). This contradiction lies at the heart of the G20's inability to phase out oil and gas; climate ambition and fossil fuel dependence continue to coexist under the guise of transition.

This report, *The Future of Oil and Gas: Strategies, challenges, and realities of oil and gas phase out in the G20*, is a critical examination of why G20 countries remain locked into oil and gas systems despite climate commitments and what must change. In 2023, governments in emerging and developing economies spent USD 620 billion subsidising fossil fuels (IEA 2024a). G7 subsidies also surged to USD 282 billion, up from USD 71 billion in 2016, putting their 2025 phaseout goal at risk. Most of this support (88%) went to consumer subsidies for natural gas and petroleum, driven by energy price shocks and geopolitical instability (IISD 2025a). Despite climate pledges, many nations back new oil and gas projects, citing energy security, while relying on technologies like carbon capture to delay real decarbonisation. G20 talks remain divided, and while initiatives like South Africa's Just Energy Transition Partnership show promise, they face funding and accountability challenges.

This report sets out a strategic roadmap for phasing out oil and gas across the G20, guided by a proposed taxonomy for a just transition grounded in solidarity, equity, and sustainability. The opening chapter (*Between Commitments and Expansion*) examines the contradiction between G20 climate pledges and ongoing fossil fuel expansion, including exploration trends and negotiation deadlocks. Chapter 3 explores key technological and market shifts: renewables, carbon capture, hydrogen, and oil demand trajectories. Chapter 4 highlights the socio-economic impacts of a phaseout, especially on jobs and justice. Chapter 5 outlines policy levers across supply, demand, governance, and systemic reform. Chapter 6 proposes a G20-aligned just transition taxonomy. Chapter 7 sets out targeted recommendations: governments must legislate national phase-out plans, redirect subsidies, and reposition NOCs; industry must halt fossil fuel expansion and invest in low-carbon technologies; and multilateral institutions must reform fossil-protecting treaties and align finance with transition goals. Chapter 8 concludes with the opportunity for the 2025 G20 Summit to catalyse global ambition ahead of COP30.

2. OIL AND GAS IN THE G20: BETWEEN COMMITMENTS AND EXPANSION

Despite multiple multilateral commitments to reach net-zero emissions by mid-century, G20 governments continue to approve oil and gas developments at a scale that undermines the Paris Agreement target of limiting global warming below 2°C.

This contradiction is underpinned by a complex interplay of geographic, institutional and economic factors. The war in Ukraine and brewing geopolitical crises have increased the volatility of energy markets, prompting fears of supply shortages. Therefore, energy security concerns are heightened as countries seek to insulate themselves from external shocks by expanding domestic fossil fuel production and securing import contracts. However, this undermines long-term decarbonisation goals in the face of short-term stability. In addition, fossil fuels, especially oil and gas, remain deeply entrenched in the political economy of several G20 states. The table on the next page provides a snapshot of G20 countries and the nature of their reliance on oil and gas. Beyond their energy use, these sectors are also critical to these countries for employment, revenue generation and geopolitical influence (World Resources Institute 2024).

In 2024, fishermen in Saint-Louis, Senegal, protest a new BP-led offshore LNG development on the region's largest natural reef, saying it harms marine life and threatens their livelihoods. The 'Greater Tortue Ahmeyim' project, run with PETROSEN and Kosmos Energy, has sparked local opposition. (*Photo: Cem Ozdel/Anadolu via Getty Images*)

TABLE 1

Snapshot of G20 oil and gas dependency

Country	Producer	Exporter	Importer	Notes
Argentina	Moderate-High Producer (Gas-heavy)	Net Exporter (Rising)	Net Importer (Oil)	Vaca Muerta driving gas growth; growing export potential
Australia	High Producer (Gas)	Net Exporter (LNG)	Self-Sufficient	Major LNG exporter; self-sufficient in gas
Brazil	High Producer (Oil)	Net Exporter (Oil)	Net Importer (Gas)	Strong offshore oil; gas imports continue
Canada	High Producer (Oil Sands)	Net Exporter	Self-Sufficient	Major oil sands producer; large exports to US
China	Moderate Producer	Not an Exporter	Heavy Importer	Largest global oil/gas importer; moderate domestic production
France	Low Producer	Not an Exporter	Heavy Importer	High dependence on imports; strong nuclear sector
Germany	Low Producer	Not an Exporter	Heavy Importer	Heavy importer; limited fossil fuel reserves
India	Moderate Producer (Oil & Gas)	Net Exporter (Refined Products)	Heavy Importer	Large refining sector; imports >85% of crude; exports refined products
Indonesia	Moderate-High Producer (Oil & Gas)	Net Exporter	Net Importer	Significant production and exports; imports crude and LNG
Italy	Low Producer	Not an Exporter	Heavy Importer	Limited production; high dependency on imports
Japan	Low Producer	Not an Exporter	Heavy Importer	Minimal domestic production; high dependency
Mexico	Moderate Producer	Net Exporter	Net Importer	Diverse output; refined product exports
Russia	Top Producer (Oil & Gas)	Top Exporter	Not an Importer	Global top producer and exporter of oil & gas
Saudi Arabia	Top Producer (Oil)	Top Exporter	Not an Importer	Largest global oil exporter; vast reserves
South Africa	Low Producer	Not an Exporter	Net Importer	Minimal production; highly import-dependent
South Korea	Low Producer	Not an Exporter	Heavy Importer	Heavily reliant on imports; limited resources
Türkiye	Moderate Producer	Not Net Exporter	Net Importer	Imports most oil/gas; some refining capacity
United Kingdom	Low Producer	Net Exporter (Refined)	Net Importer	Declining North Sea output; net refined exporter
United States	Top Producer (Oil & Gas)	Top Exporter	Net Importer	Top producer and exporter; still imports some types
European Union	Low Producer (aggregate)	Mixed	Heavy Importers	Low production overall; high reliance on imports
African Union	Varied	Limited Exporters	Heavy Importers	Varied: some exporters, majority import-dependent

Source: Author's own infographic based on compiled data. Classification criteria and source details are provided in Appendix 1.

Oil powers around 90% of global transport energy consumption (IEA 2023a), fuelling everything from cars and trucks to ships and airplanes, where large-scale electrification or sustainable alternatives are either technologically limited or not yet economically viable. Gas is equally embedded, not only in electricity generation but in critical industrial processes such as steel, cement, and petrochemicals, and as a key feedstock in fertiliser production, placing it at the heart of global food security.

As evident in the Table 1 above, several G20 states heavily rely on hydrocarbon exports to sustain their economic stability and geopolitical posturing. Consequently, the leaders face political pressure from powerful industry lobbies to sustain or even expand oil and gas extraction activities (Global Reporting Initiative 2023). While export-heavy states face pressure to sustain fossil fuel output, import-dependent economies are inclined towards driving diversification and energy security reforms. This divergence complicates collective climate action and underscores the stakes of the energy transition. Moreover, gas is often considered as a 'bridge' fuel in transition pathways premised on its lower carbon intensity relative to oil and coal. Fiscal support provided by governments to natural gas producers and consumers has increased dramatically over the past five years.

Globally, fossil fuel support rose from USD 145 billion in 2018 to USD 343 billion in 2023, as countries increased subsidies to maintain energy security and affordability amid periods of market volatility (OECD 2024). Expanded gas infrastructure, in conjunction with Carbon Capture and Storage (CCS) technologies or the emerging low-carbon hydrogen solutions, have been expected to facilitate a smoother transition. This optimism, however, runs the risk of embedding fossil fuel dependence by locking in infrastructure with decades-long life spans while crowding out investment in renewable alternatives. Despite repeated pledges to reduce fossil fuel subsidies, national governments across the world spent USD 514 billion in 2023 on direct transfers and tax breaks supporting fossil fuel use (OECD 2024). This is part of a broader global support package that, while reduced from 2022 levels, still exceeded USD 1.1 trillion once underpriced energy is included (IEA 2024b).

Therefore, despite a clear scientific consensus that the unabated use of fossil fuels must steeply decline to meet Paris Agreement targets, progress on phasing out oil and gas remains minimal due to the world's deep and systemic dependence on them.

Oil powers around 90% of global transport energy consumption (IEA 2023a), fuelling everything from cars and trucks to ships and airplanes, where large-scale electrification or sustainable alternatives are either technologically limited or not yet economically viable. Gas is equally embedded, not only in electricity generation but in critical industrial processes such as steel, cement, and petrochemicals, and as a key feedstock in fertiliser production, placing it at the heart of global food security. Unlike coal, which is increasingly isolated, oil and gas enjoy entrenched infrastructure, liquid international markets, and expanding consumer bases, particularly in developing economies. For example, Mozambique is shifting from coal to liquefied natural gas (LNG), positioning itself as a regional gas hub despite global climate goals.

Similar trends can be observed in other developing countries, where gas is promoted as a cleaner alternative and a driver of economic growth. Crude oil remains the most traded commodity in the world, reinforcing powerful geopolitical and economic alliances. As a result, oil and gas have so far escaped the level of scrutiny and phaseout momentum coal has faced, remaining protected by systemic entrenchment, policy inertia, and their enduring geopolitical utility.

2.1 Current state of oil and gas exploration

In 2024, the IEA estimated that upstream oil and gas investment would rise by 7% reaching USD 570 billion, following a 9% rise in 2023 (IEA 2024c). This is largely led by the Middle East and Asian NOCs, which have increased their investments in oil and gas by over 50% since 2017. This level of spending signals a market belief in the long-term profitability of oil and gas. In fact, NOCs which control over 50% of global oil production and 60% of reserves are driving a significant share of new exploration as they are insulated, to an extent, from private investor climate pressures while also being under state mandates to maintain energy security and protect fiscal revenues (WEF 2022).

The Production Gap Report (PGR) 2023 prepared by the United Nations Environment Program (UNEP) highlighted that governments collectively plan to produce 110% more fossil fuels by 2030 than would be compatible with limiting global warming to 1.5°C with much of this expansion attributed to gas exploration and development. The 2023 PGR also presents several modelled scenarios assessing the alignment of oil and gas production with the climate goals of limiting global warming to 1.5°C. Using Integrated Assessment Models (IAMs) from the Intergovernmental Panel on Climate Change (IPCC) Assessment Report (AR) 6 database, the report evaluates median and illustrative pathways. In the median 1.5°C consistent scenario, oil production must decline by 67% and gas by 54% by 2050 from 2020 levels.

This scenario assumes that 2.1 $GtCO_2$/year will be captured via fossil-fuel-based, CCS, and a total of 5.2 $GtCO_2$/year will be removed through various carbon dioxide removal (CDR) methods. In more ambitious scenarios that rely less on CCS and novel CDR, such as the low-CDR pathway, oil production would need to fall by 76-90% and gas by 77–85% by 2050. For example, the Implementation-Least Developed (IMP-LD) scenario, which avoids fossil-CCS entirely, sees oil decline by 90% and gas decline by 85% by the mid-century. In stark contrast, governments' current plans and projections (GPP)[2] pathway would increase oil and gas production until at least 2050, resulting in production levels in 2030 that are 29% higher for oil and 82% higher for gas than those consistent with the 1.5°C target. By 2050, these planned levels would be 260% higher for oil and 210% higher for gas.

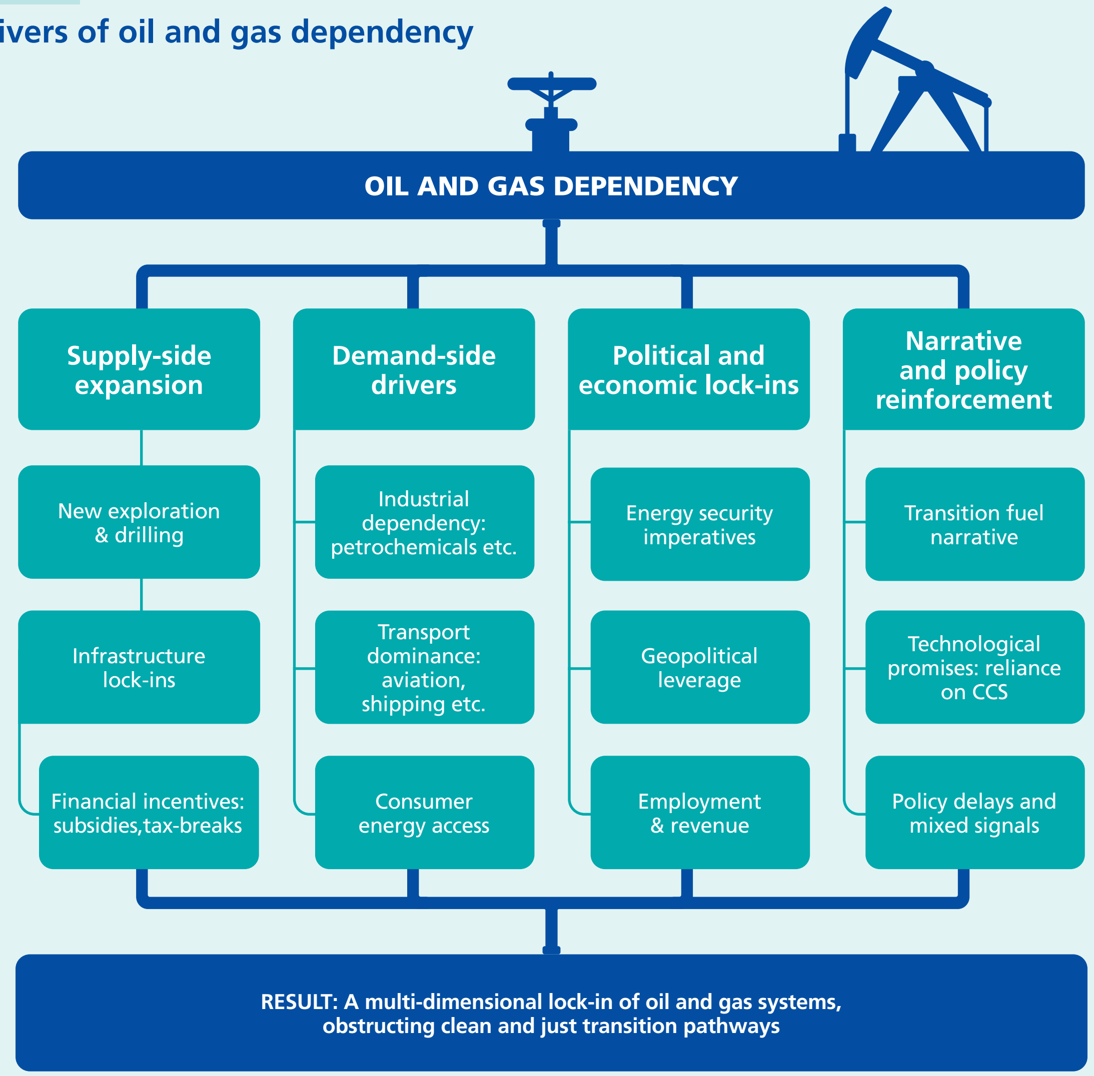
A section of Uganda's Kingfisher feeder pipeline, launched in 2023 by China's CNOOC, shows how national oil companies are expanding worldwide amid controversy. (Photo: Hajarah Nalwadda/Getty Images)

These findings underscore that existing fossil fuel infrastructure already exceeds the emissions budget compatible with 1.5°C, and reliance on uncertain technologies like CCS/CDR poses a significant risk, potentially requiring even more accelerated reductions in oil and gas production if those technologies fail to scale.

Therefore, what defines the current phase of oil and gas exploration is its increasingly unsustainable trajectory, marked by a disconnect between climate science and investment behaviour. The IEA's Net Zero by 2050 roadmap (2023 update) makes it unequivocally clear that no new oil and gas fields are required beyond those already in development if the world is to remain within the 1.5°C carbon budget. Nonetheless, upstream licensing continues to expand across the globe. Technological advancements such as improved seismic imaging and enhanced drilling efficiencies have reduced exploration costs and risks, incentivising the pursuit of oil and gas reserves in remote and ecologically fragile regions, including in the Arctic and ultra-deepwater zones. Figure 1 below illustrates the structure and systemic reinforcing oil and gas dependency. It highlights how supply-side expansion, demand-driven industrial and transport needs, political-economic interests, and policy narratives collectively create a multi-dimensional lock-in. These reinforcing dynamics obstruct clean and just transition pathways, making it difficult to shift away from oil and gas systems. This lock-in not only undermines global climate targets but also drives ecosystems towards irreversible harm. To align with scientific consensus and multilateral climate commitments, a decisive shift away from new fossil fuel exploration is urgently needed.

FIGURE 1

Drivers of oil and gas dependency



Source: Author's own infographic, based on compiled data.

2.2 Current state of play in international negotiations

The state of play in international negotiations remains complex and fragmented, shaped by the diverging national priorities and shifting geopolitical realities. The COP and G20 are two key fora driving the pathway to a just transition. At COP28 in the United Arab Emirates (UAE), a landmark decision (UNFCCC 2023) was adopted to 'transition away from fossil fuels' in a just, orderly, and equitable manner, marking progress from previous texts but falling short of firmer language like 'phase-out' or 'phase-down'. The compromise reflected deep divisions among parties. Developed nations, despite inconsistencies in their own domestic policies, pushed for stronger commitments, while oil-producing and developing countries called for flexibility, financial guarantees, and recognition of their development needs.

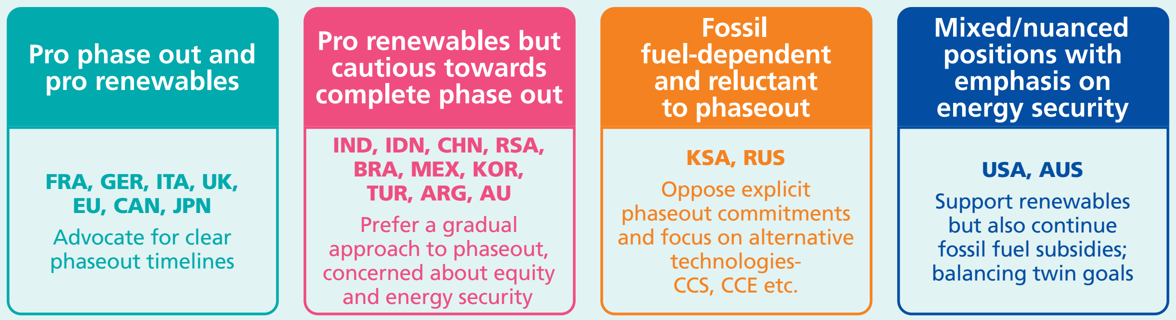
The European Union (EU) and Small Island Developing States (SIDS) explicitly pushed for language to phase out the use and production of fossil fuels with a warning that anything less would significantly undermine the credibility of the 1.5°C goal. The United States at COP28 advocated for a reduction in fossil fuel use, while also retaining flexibility through reliance on transitional technologies and CCS. While emerging and developing economies push for phase out, they put an emphasis on Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) citing historical responsibilities in emissions. They further underscore the imperative for developed economies to assume a leadership role in facilitating access to finance and transitional technologies. These contentions and fragmented positions continued at COP29 where these discussions stagnated.

The host nation, Azerbaijan, invoked oil and gas as a 'gift from god'. In line with the statement, the COP 29 Presidency also unveiled a climate action agenda that lacked any mention of the hard-won consensus on 'transitioning away from fossil fuels.' In contrast, the former COP presidency of the UAE, urged countries to honour their commitment to phase out fossil fuels, emphasising the importance of implementation and robust climate finance mechanisms. These diverging positions point to a possible deadlock in the pace and scope of the oil and gas phaseout at the COP. In the upcoming COP30, the Brazilian presidency has prioritised enhanced climate action and has mooted a 10-year roadmap to mitigate adverse environmental impacts with considerable focus given to the phasing out of fossil fuels (Goswami 2025). The Presidency, in its agenda, has mentioned fossil fuels as one of the root causes of the climate crises, thereby opening the space to revive phaseout discussions once again at COP30.

The G20, while making impressive progress in negotiations pertaining to renewables, also remains divided on the fossil-fuel phaseout, including for oil and gas. It was in the 2009 Pittsburgh Summit that the G20 first agreed to phase out fossil fuel subsidies. However, these subsidies have subsequently ballooned in many nations, including Saudi Arabia and Russia, following the 2008 global financial crisis. The G20's positions on fossil-fuel phaseout are a direct reflection of the geopolitical and economic realities that shape its members' priorities. Figure 2 captures the negotiating positions of G20 countries on phaseout discussions.

FIGURE 2

Snapshot of G20 country positions on fossil fuel phase out



Source: Author's own infographic, based on compiled data.

Rather than prescribing a uniform fossil-fuel phaseout, South Africa advocates for diversified energy systems including renewables, clean hydrogen, sustainable fuels, natural gas, and nuclear which is tailored to national capacities and development needs.

Countries like Saudi Arabia and Russia, with vast fossil-fuel reserves, are deeply entrenched in the belief that fossil fuels will remain central to global energy systems for decades to come. Their resistance to an accelerated phaseout is driven by fears of economic destabilisation and loss of global market influence. For Russia, this is compounded by its status as a geopolitical power, with its energy exports being a major tool of influence, particularly in Europe. In contrast, EU nations, which have significantly reduced their dependence on fossil fuels, have been the most vocal advocates for a swift transition. However, their push for carbon pricing mechanisms, alongside the growing push for a just transition for vulnerable populations, reflects the complexity of balancing environmental goals with economic fairness. India and China, the two largest developing countries, represent the middle ground. India is particularly focused on expanding its renewable capacity but faces challenges related to its growing population and higher energy needs. China's position, while similarly supportive of renewable expansion, reflects the difficulty in transitioning away from coal without undermining its energy security and economic growth.

The 2025 South African G20 Presidency adopted a balanced approach by emphasising the importance of integrating climate goals with socio-economic realities through supporting coal-reliant communities, protecting livelihoods, and promoting industrial transformation. Rather than prescribing a uniform fossil-fuel phaseout, South Africa advocates for diversified energy systems including renewables, clean hydrogen, sustainable fuels, natural gas, and nuclear, which are tailored to national capacities and development needs. A core priority is ensuring that no one is left behind in the transition, with targeted support for local value chains, renewable energy investments, and regional integration across Africa. Through this approach, South Africa seeks to champion a transition that is equitable, nationally determined, and aligned with both global climate commitments and developmental aspirations.

Ultimately, the G20's inability to reach a unified commitment on phasing out fossil fuels highlights the global climate divide. The future of climate action will depend on bridging the gap between the fossil fuel-producing countries and those seeking a rapid transition. The negotiations ahead, especially as we move toward the next G20 and COP summits, will be crucial in determining whether the G20 countries can move beyond aspirational goals and make substantial commitments to reducing fossil-fuel dependency. Political and economic risks are significant, but the environmental stakes are even higher.

3. TECHNOLOGICAL AND MARKET TRENDS IN THE OIL AND GAS PHASE OUT

The phase out of oil and gas is unfolding alongside a complex interplay of technological innovation, economic restructuring, political incentives and disincentives, and persistent infrastructure and financing deficits. Technological trajectories are highly uneven and characterised by non-linear progress, with rapid advancements in certain sectors juxtaposed against inertia or setbacks in others. This fragmented evolution of technology contributes to what may be termed a 'transitional gridlock': a condition in which structural, institutional, and market frictions impede coordinated progress. Moreover, the pace and direction of technological adoption, policy intervention, and market responses vary significantly across G20 countries, resulting in a fragmented and asymmetric pathway toward fossil fuel phaseout. A more precise understanding of this transitional gridlock is essential for anticipating the challenges and opportunities that lie ahead in the global energy transition.

3.1 Renewables and electrification

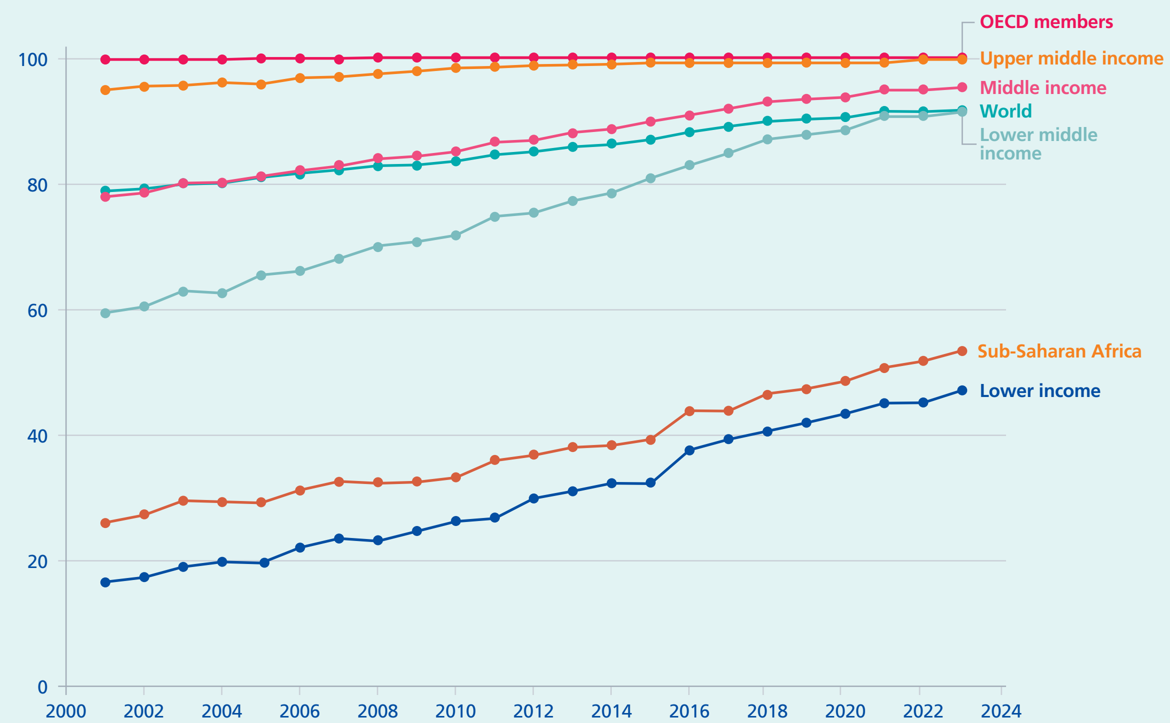
Electrification and renewable energy deployment are often addressed in parallel, yet in the context of the G20, they must be understood as deeply interdependent. Electrification is not only a development objective but also a structural enabler of deep decarbonisation. Renewables, in turn, are the most scalable and sustainable source of electricity to meet the rising demand across sectors such as transport, industry, and heating. For G20 countries, that are collectively responsible for over 80% of global energy demand and emissions, accelerating electrification through clean sources is both a climate imperative and a development necessity. Establishing this dual lens is essential to align policy, finance, and infrastructure planning over the critical years leading to 2030.

Wind turbines at the Umoya Energy wind farm in Hopefield, South Africa, underscore the promise of renewables. President Cyril Ramaphosa has warned sub-Saharan Africa will need $240 billion to finance its clean energy transition. (Photo: Dwayne Senior/Bloomberg via Getty Images)

Global electricity access has improved markedly in recent decades, rising from 72% in 2000 to 90% in 2023 (IEA 2024d). However, this global average masks substantial disparities. Sub-Saharan Africa lags far behind, with access at just 49.3% as of 2023. The need for accelerated action is urgent: achieving Sustainable Development Goal 7.1.1, which calls for universal electricity access by 2030, will require connecting roughly 135 million people per year from 2024 onward. Yet, under the IEA's Stated Policies Scenario, 645 million people are projected to remain without electricity by 2030 with 85% of them in Sub-Saharan Africa (IEA 2024e). Figure 3 below clearly illustrates these regional disparities.

FIGURE 3

Access to electricity (% of population)



Data source: World Bank

This persistent access gap is further compounded by inequities in clean energy finance. Despite significant growth in global renewable investment, reaching approximately USD 499 billion in 2022; emerging and developing economies received only 15% of these funds, even though they account for over half of the global population (IRENA 2023a). In per capita terms, the disparity is starker: by 2021, investment in renewables was 41 times higher in Europe and 57 times higher in North America compared to Sub-Saharan Africa (IRENA 2023a). These figures reflect a systemic imbalance in energy finance flows and highlight the barriers to equitable electrification.

Within the G20, electrification is no longer solely about extending access but also about improving quality, affordability, and reliability. Electricity demand across the bloc is expected to double, and in some countries triple, by mid-century, driven by the electrification of transport, heating, and industry (IEA 2023b). However, most national grids were originally designed for centralised, fossil-fuel-based power and are poorly suited to decentralised, variable renewable energy sources. Grid congestion, curtailment of renewable energy, and insufficient storage have become common in countries like India and China (IEA 2023b; Ember 2024).

Rather than prescribing a uniform fossil-fuel phaseout, South Africa advocates for diversified energy systems including renewables, clean hydrogen, sustainable fuels, natural gas, and nuclear which is tailored to national capacities and development needs.

Despite these challenges, the G20 has enormous potential to lead on renewable energy. According to recent modelling, just 5.3% of solar-suitable land or 10.5% of wind-suitable land across G20 countries would be sufficient to meet the group's total projected electricity demand in 2050 (Miyake et al. 2024). The bloc could collectively generate over 923,000 TWh/year from solar and 466,000 TWh/year from wind which is several times more than both current and projected demand. Even major fossil fuel exporters such as Russia, Saudi Arabia, and Australia possess some of the world's highest untapped renewable capacity, illustrating the feasibility and strategic value of an accelerated phaseout of fossil fuels (Miyake et al. 2024).

Several G20 members are already confronting the complexities of high-renewables grids. Germany, for example, experienced lower-than-expected wind output in 2024 due to seasonal anomalies, but maintained system reliability through grid integration, battery storage, and flexible demand (IEA 2024f; Ember 2024). India has reached over 46%-49% renewable capacity in its power mix, supported by strong growth in distributed solar, pumped hydro, and hybrid wind-solar systems (MNRE 2024). China has scaled ultra-high-voltage transmission lines and smart grid systems, allowing it to balance regional variability and integrate intermittent resources at scale (IEA 2023c). Similarly, the United States and European Union are investing heavily in regional interconnections and demand-response programs to improve system resilience. Nevertheless, progress across the G20 remains uneven. While countries like Brazil and Germany derive over 40% of their electricity from renewables, others such as Saudi Arabia, Japan, and Russia continue to rely heavily on fossil fuels, with renewables comprising less than 10% of primary energy supply (F20 2022). At the same time, fossil fuel subsidies persist, undermining policy coherence. Without coordinated policy reforms including subsidy phaseouts, carbon pricing, and robust regulation, the full potential of electrification and renewable integration will remain unrealised.

The G20 has the technological capability, financial capital, and policy influence to lead the global energy transition. What is needed is alignment on four key fronts: (1) accelerating grid modernisation and regional interconnection; (2) expanding energy storage, digital infrastructure, and demand-side flexibility; (3) mobilising equitable finance for clean energy in emerging and developing economies; and (4) embedding just transition principles to ensure that the benefits of electrification and renewables are widely shared. Electrification and renewables must be pursued in tandem as part of a coherent and inclusive G20 energy strategy. Their integration is essential not only for meeting climate goals, but for improving development outcomes, ensuring energy security, and reducing long-term economic and systemic risks. For the G20, this is not just an opportunity, but a responsibility.

3.2 CCS and hydrogen: Decarbonisation or fossil fuel diversion?

CCS and hydrogen are being mainstreamed today as breakthroughs in climate technology. However, the underlying economics and deployment trajectories portray an ambiguous reality. Currently, around 80% of global CCS capacity is used for enhanced oil recovery (EOR) - a process where captured CO_2 is injected into aging oil fields to increase pressure and extract additional oil that would otherwise be difficult to recover. While this extends the life of oil fields, it also enables further fossil fuel extraction, potentially undermining the climate benefits of CCS (Zero Carbon Analytics 2024).

Similarly, blue hydrogen produced from natural gas dominates investment pipelines owing to its lower production cost and easier alignment with existing infrastructure. Green hydrogen, though more sustainable and cleaner, also demands more initial investment (Santos et al. 2023). The infrastructure for green hydrogen, such as electrolysers, storage facilities, and dedicated renewables ports, is not well developed, and its levelised cost of energy is often double or triple that of grey or blue hydrogen. The only resolution is to evaluate hydrogen and CCS not by emission metrics, but by their opportunity cost. Every penny flowing towards blue hydrogen infrastructure is taking away from investment that could have gone to scaling renewables or electrifying transport.

While looking at the benefits of CCS it is also essential to look at what it hinders. CCS remains one of the highest-cost options for reducing industrial emissions, with significant variation in performance and high energy demands, consuming 30%-50% of a power plant's output. According to the IPCC, CCS ranks below fuel switching, electrification, energy efficiency, and enhanced recycling in terms of cost-effectiveness and mitigation potential. In the industrial sector for instance, CCS is expected to reduce emissions by only 0.2 gigatonnes of CO_2 per year by 2030, at a high cost of USD 100 to 200 per tonne. By contrast, energy efficiency can achieve over five times greater reductions at a much lower cost, often ten times cheaper (IPCC 2022). Its deployment risks prolonging the energy transition by reducing pressure to shift rapidly to renewables.

3.3 Managing oil demand and supply: The last barrel psychology

The IEA estimates that the global demand for oil will peak before 2030 owing to efficiency mandates, shifts in the transport sector, and other demographic shifts that will dampen long-term consumption. Even so, oil production capacity is rising, and it is projected to rise to 140 million barrels per day by 2030, which is an oversupply of 8 million barrels per day (IEA 2024f) This inevitably signals countries to monetise this opportunity, capture market shares and expand the production before the onset of structural demand decline. This anticipatory over investment poses a transition risk.

Today, the G20 countries are at the epicentre of a transition paradox wherein renewable energy is cheaper and more accessible than ever. According to the International Renewable Energy Agency (IRENA), between 2010-2022 the global weighted average levelised cost of electricity (LCOE) for solar photovoltaic (PV) projects decreased by 89% during this period. Similarly, onshore wind saw a 69% reduction, and offshore wind experienced a 59% decline in LCOE. Yet, fossil fuels like oil and gas continue to expand, as noted above. This is not accidental but an outcome of legacy infrastructure, path-dependent politics, and a capital ecosystem that is still on the lookout for short-term returns. To facilitate a meaningful oil and gas phaseout, G20 leaders must treat grid reform and storage as frontline infrastructure rather than secondary add-ons. Investment decisions must consider the carbon cost per dollar, especially when we talk about hydrogen and CCS. They should prioritise demand-side management and electrification strategies as fast-track tools, not long-term visions. Most importantly, phaseout plans should balance fiscal risk, job transitions, and regional equity, and not just emissions metrics. Only by breaking the transitional gridlock and aligning incentives, timelines, and infrastructure can G20 countries transform market trends from ambiguous/inconsistent signals into a coherent, collective push away from oil and gas.

3.4 Technological Divergence

The global energy transition is being shaped by promising developments such as cheaper renewables, rising EV adoption, and growing green finance. Yet, in the G20, these trends collide with deep timing mismatches across key low-carbon technologies. Many G20 countries are investing heavily in future-oriented solutions such as green hydrogen and carbon capture, even as these technologies are not expected to scale until after 2030. For example, the EU and U.S. each target 10 million tonnes of clean hydrogen production by 2030

(European Commission 2023; U.S. DOE 2023), while countries like India, Saudi Arabia, and Australia have launched national hydrogen missions. However, less than 2% of hydrogen projects aligned with a 1.5°C scenario is currently operational (Odenweller & Ueckerdt 2024), and key infrastructure including pipelines, electrolyser manufacturing, and dedicated renewables is still in its infancy.

Similar misalignments are seen in G20 carbon capture strategies. Countries such as the U.S., Australia, and Saudi Arabia include CCUS in long-term decarbonisation plans, but global CCUS capacity today captures just 0.1% of annual CO_2 emissions (IEA 2023d). Despite over USD 80 billion in government pledges since 2010, the commercial viability of CCUS remains limited without stronger carbon pricing and regulatory clarity. Meanwhile, the EV transition reveals sharp disparities: EVs accounted for over 25% of new car sales in China, the EU, and the U.S. in 2024 (IEA 2024g), but markets in India, Indonesia, and South Africa still struggle with affordability, infrastructure, and supply chains thereby slowing the pace of emissions reductions in transport.

These contradictions reflect a broader pattern of the transitional gridlock in the G20 where long-term technological visions are not matched by near-term deployment of mature solutions. As countries defer difficult trade-offs and over-rely on future technologies, fossil fuel use often continues unabated. To course-correct, G20 members should focus on scaling proven technologies such as solar, wind, heat pumps, and grid-scale storage in this critical decade, while investing more strategically in long-lead options. Without better sequencing and policy alignment, the clean energy transition risks being technically feasible but politically delayed and ultimately insufficient to meet 1.5°C targets.

South Africa relies on coal for 80–90% of its electricity, with plants like Eskom's Kriel station central to its energy system. While wind and solar are growing, the transition faces hurdles, from financing to job losses in coal-dependent Mpumalanga. (*Photo: Per-Anders Pettersson/Getty Images*)

4. THE SOCIO-ECONOMIC IMPACT OF OIL AND GAS PHASEOUT

A poorly managed phaseout carries substantial risks of fiscal destabilisation, rising unemployment, and deepening regional inequalities, especially in economies where hydrocarbons account for over half of government income. According to the IEA's Net Zero by 2050 roadmap, fossil fuel tax revenue could fall by 40% in the next decade alone, demanding fundamental fiscal restructuring and economic diversification (IEA 2021). Economically, the challenges are multi-dimensional and go beyond just physical capital. They also include depreciated human capital, and halted local supply chains, and social infrastructure reliant on hydrocarbon revenues. A rushed exit could undermine state capacity in rentier economies, where governments rely heavily on revenues from natural resource exports such as oil and gas. This dependence makes them especially vulnerable to sudden drops in fossil fuel income, weakening public services and potentially leading to social instability. In lower-income nations, environmental clean-up costs from decommissioned infrastructure often fall to the state, exacerbating debt and development constraints.

The social impacts are no less profound. Workers in fossil fuel-dependent regions face long-term unemployment, displacement, or informalisation. Historical examples, such as the coal phaseouts in the United Kingdom and Eastern Europe, illustrate how abrupt transitions in the absence of robust social protection can devastate communities for decades. Yet, the scope of oil and gas phaseout is much larger, both in scale and complexity. Unlike coal, which accounts for 26% of global energy supply, oil and gas combined represent over 54%, making the transition doubly challenging (IISD 2024).

Critically, the idea that oil and gas development is a viable path to prosperity, especially for new producers in the Global South, is increasingly untenable. Analysis by the International Institute for Sustainable Development (IISD) shows that most new fossil fuel projects will become fully operational just as global demand begins to decline, making cost recovery uncertain. Countries like Mozambique and Uganda risk falling into a resource trap, incurring debt for infrastructure that may never yield promised returns. Empirical evidence suggests that rapid fossil expansion rarely correlates with broad-based development. Successful cases like Norway reflect decades of institutional development and policy continuity. These are conditions that emerging economies often cannot replicate, given the compressed timelines and competing development pressures they face in responding to the climate crisis.

This reality has prompted a growing body of critical transition scholarship, particularly from and about the Global South to challenge the dominant, techno-centric paradigms of energy transition. These frameworks often overlook structural asymmetries in power, finance, and technology, while assuming that pathways successful in the Global North are universally replicable. Scholars argue that energy transitions in the Global South are not merely technical exercises in carbon substitution, but deeply political processes embedded in histories of underdevelopment, uneven integration into global energy markets, and environmental injustice (Baker et al. 2016; Broto 2019). For instance, countries like Mozambique and Ghana have hosted large-scale renewable projects that are externally financed and export-oriented, offering little benefit to local populations in terms of energy access, employment, or control over resources (Castán Broto et al. 2018). These cases illustrate what some describe as "green extractivism": a process in which decarbonisation efforts reproduce existing patterns of dispossession and marginalisation rather than disrupting them (Temper et al. 2023).

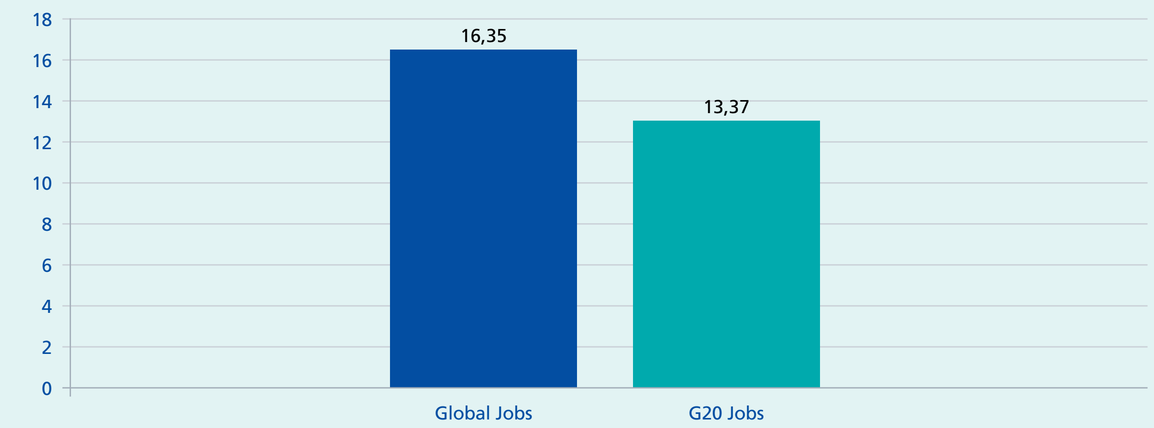
Rather than viewing the transition as a linear shift from fossil fuels to renewables, a critical analysis proposes a more pluralistic, justice-oriented approach. This includes recognising differentiated responsibilities and capabilities, and designing transition policies that prioritise energy access, sovereignty, and redistribution over mere decarbonisation (Lacey-Barnacle et al. 2020). Calls for a "just transition" in the Global South thus should go beyond compensating fossil fuel workers or managing stranded assets; they should demand systemic transformation that addresses colonial legacies, global financial inequities, and the concentration of technological power in the North (Sovacool 2021). As such, the viability of any energy strategy including the rapid buildout of renewables must be assessed not only by its emissions profile, but by its capacity to support inclusive development, restore agency to local communities, and resist new forms of dependency.

While affirming these profound structural concerns, the transition also offers positive opportunities that needs to be leveraged. The IRENA estimated in 2020 that 42 million clean energy jobs could be created globally by 2050, outpacing job losses in fossil fuel sectors (IRENA 2020). However, these jobs require different skills and are often located in different regions, underscoring the need for anticipatory retraining, labour mobility programmes, and inclusive industrial strategies. Countries like Denmark and Scotland initiated government-led just transition roadmaps for oil and gas workers, offering early retirement, retraining, and public investment in alternative sectors. No major producer has yet committed to a nationally coordinated oil and gas just transition, leaving a critical policy vacuum. There is also a lack of information on the skill gap between current fossil fuel-dependent industry and the transition to renewable technologies in developing countries that may already be short of specialised skilled workers. Globally, around 21 million people are employed in fossil fuel supply sectors, with approximately 8 million in oil and gas alone (IEA 2023e). In many developing countries, these jobs are concentrated in declining high-carbon sectors, while renewable energy workforces remain underdeveloped.

In 2023, global renewable energy employment reached an estimated 16.2 million jobs, marking a substantial rise from 13.7 million in 2022 (IRENA & ILO 2024). This surge underscores the growing momentum behind the energy transition. China accounted for nearly 46% of these jobs alone (7.4 million), followed by significant contributions from the EU, Brazil, the United States, and India. Solar photovoltaic (PV) remained the dominant employer, supporting over 7.1 million jobs which accounts for more than 44% of the global total, while liquid biofuels, hydropower, and wind followed (IRENA & ILO 2024). The chart below compares the total number of renewable energy jobs worldwide with those in G20 countries in 2023. It highlights the significant contribution of G20 nations to the global renewable energy workforce.

FIGURE 4

Total renewable energy jobs in 2023: Global vs G20 countries (millions)



Data Source: *IRENA 2023*

Gender disparities continue to persist, with women representing about 32% of the sector's workforce.

The rapid expansion of renewables not only highlights their growing role in global energy supply but also their potential as a powerful engine of employment. However, jobs remain geographically concentrated, with the majority located in a handful of countries. Gender disparities continue to persist, with women representing about 32% of the sector's workforce. These figures reinforce that the renewable sector is not only central to climate goals but also a vital pillar of inclusive economic development if backed by deliberate policies for skills, equity, and regional distribution. The phaseout must also be worker-centred, incorporating social dialogue, livelihood security, and regional redevelopment. Failure to do so risks reproducing the injustices of past transitions, undermining climate ambition, and destabilising fossil-dependent regions.

Workers install solar panels at South Africa's first municipally owned solar plant in Atlantis on June 5, 2025, illustrating how renewables are expanding as a source of both energy and employment, though most jobs remain concentrated in a few countries. (Photo: RODGER BOSCH/AFP via Getty Images)

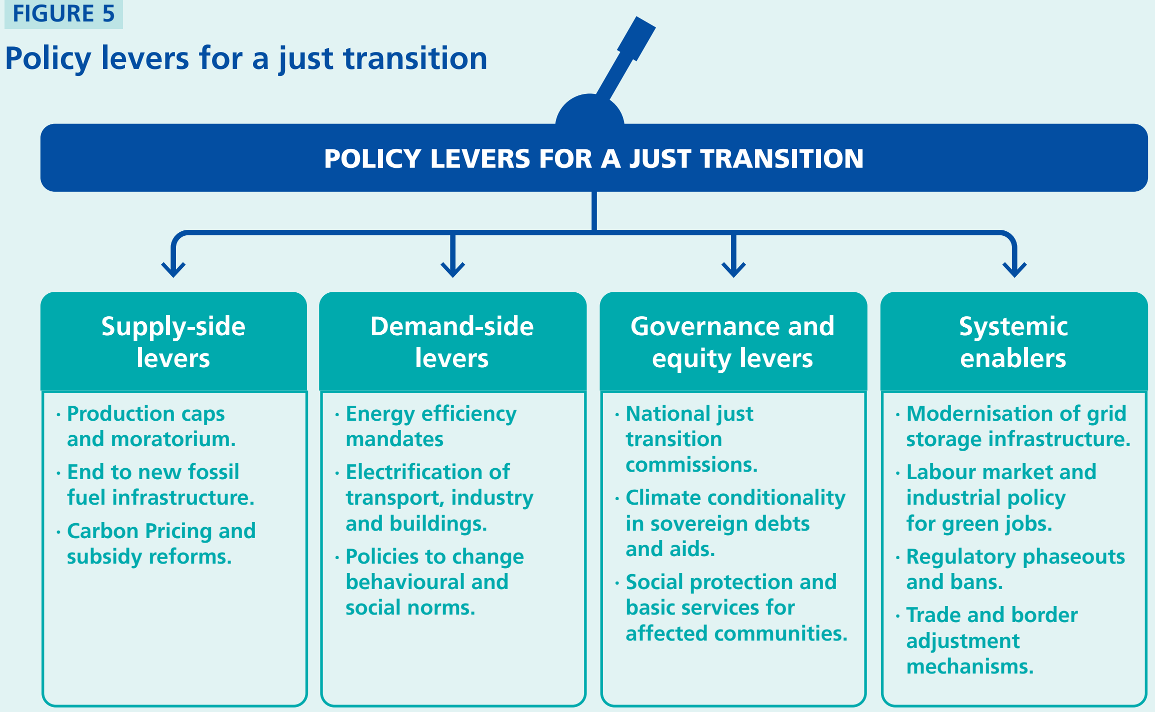
5. POLICY LEVERS FOR A JUST TRANSITION: ALIGNING INCENTIVES, EQUITY, AND URGENCY

Policy levers are central to shaping the direction, speed, and fairness of the energy transition. While technological progress expands possibilities, it is policy that determines whether transitions are inclusive, ambitious, and responsive to local needs. A just transition requires more than decarbonisation targets. It demands deliberate choices about how costs and benefits are distributed, how vulnerable groups are protected, and how institutional capacity is built. These goals cannot be achieved through isolated measures but require a coordinated suite of interventions across economic, social, and governance domains.

This framework in Figure 5 illustrates the multidimensional policy architecture required for a just transition. It identifies four categories of levers: supply side, demand side, governance and equity, and systemic enablers. Supply side levers constrain fossil fuel production through caps, infrastructure moratoria, and subsidy reforms. Demand side measures promote efficiency and electrification across sectors. Governance levers embed equity through inclusive institutions, social protection, and climate-linked financing conditions. Systemic enablers focus on foundational reforms such as grid modernisation, labour market policies, and regulatory instruments. Together, these levers underscore that a just transition demands coordinated intervention across economic, institutional, and infrastructural domain.

FIGURE 5

Policy levers for a just transition



Source: Author's own infographic, based on compiled data.

Reforming fossil fuel subsidies at both producer and consumer levels is critical to eliminating market distortions that favour carbon-intensive energy systems and to freeing up fiscal space for investments in clean energy, resilient infrastructure, and social support mechanisms.

5.1 Supply-side Levers

The most direct way to cut greenhouse gas (GHG) emissions is to limit the extraction of oil and gas at the source. The IPCC already acknowledges that current fossil fuel reserves exceed the carbon budget for a 1.5°C pathway. Therefore, production caps or moratoriums on new projects are a climate and life sustainability imperative.

The Beyond Oil and Gas Alliance (BOGA), led by countries like Denmark and Costa Rica, has demonstrated the feasibility of supply-side restraint through coordinated state action (van Asselt et al, 2022). This approach mitigates the risk of carbon leakage and pre-empts the moral hazard of over-reliance on uncertain carbon-removal technologies in the future. A supply-side focus also shifts the political economy of transition by reducing incumbent industry power and creating space for cleaner alternatives.

Regulatory measures to address supply include measures such as banning new exploration, phasing out existing licenses, removing fossil fuel subsidies, and mandating climate-related financial disclosures. Denmark and Costa Rica offer leading examples: Denmark, in 2020, became the first major oil-producing country to commit to a complete phase-out of oil and gas extraction by 2050, cancelling all future licensing rounds in the North Sea while supporting a just transition for affected workers (Farand 2020). Costa Rica, on the other hand, has maintained a permanent moratorium on oil exploration since 2002, embedding environmental protection into national policy and prioritising a 100% renewable electricity system (Climate Action Tracker, n.d.)

Supply side measures must also go beyond energy regulation to confront the financial structures that sustain fossil fuel investment. Despite formal restrictions, fossil fuels remain highly liquid and profitable, drawing capital through shadow banking channels. Regulated institutions often shift assets to unregulated vehicles like private equity firms, which increasingly serve as havens for carbon-intensive investments. Tackling this requires stricter oversight of non-bank financial actors and mandatory climate risk disclosure to close off pathways that enable opaque fossil fuel financing (FSB 2020).

Carbon pricing is a pivotal tool for internalising the external costs of GHG emissions. The EU's Emissions Trading System (ETS) exemplifies this, achieving a 47% reduction in emissions within covered sectors since its inception in 2005 (European Commission 2024.). Similarly, Canada and South Korea have implemented carbon pricing mechanisms that contribute to emissions reductions. However, the outcomes of carbon markets remain mixed. Critics highlight issues such as price volatility, overallocation of permits, and limited sectoral coverage, which can dilute their environmental impact. Moreover, the efficacy of carbon pricing is undermined when juxtaposed with substantial fossil fuel subsidies. Therefore, carbon pricing should go hand-in-hand with structural reforms, including the phasing out of subsidies, to ensure both environmental integrity and policy coherence.

At the fiscal level, G20 governments hold powerful levers to drive a fair and effective phase-out of oil and gas. Reforming fossil fuel subsidies at both producer and consumer levels is critical to eliminating market distortions that favour carbon-intensive energy systems and to freeing up fiscal space for investments in clean energy, resilient infrastructure, and social support mechanisms (IEJ 2025a). Table 2 on the next page captures the regressive impact of subsidies give particularly for oil and gas.

TABLE 2

Oil and gas subsidies in selected G20 countries: Regressive impacts and reallocation potential

G20 Country	Oil and Gas subsidies (USD B)	30% reallocated (USD B)	Renewable Capacity Potential (GW)	Renewable Energy Potential if reallocated (in GW)	Annual Climate Finance Gap (USD B)	% of Gap Covered	Share of Global Climate Gap- (%)	Regressive Impact of Subsidies
China	94.017	28.2	23.5	23.5	270.00	10.54%	11.25%	Moderate
India	47.359	14.2	11.84	10.7	68.00	20.89%	2.83%	High
Indonesia	29.267	13.93	11.61	6.58	19	73.34%	0.79%	High
Russia	126.309	37.89	31.58	28.42	NA	NA	NA	Very High
Saudi Arabia	59.285	17.78	14.82	13.34	NA	NA	NA	Very High
South Africa	0.351	1.67	1.39	0.079	17.50	9.54%	0.73%	Moderate

Source: Authors' calculations based on derived data. For detailed methodology, refer to Appendix.

Table 2 highlights significant disparities across G20 countries in fossil fuel subsidies, renewable capacity potential, and climate finance gaps. Russia and China have the largest fossil fuel subsidies, with potential reallocation unlocking substantial renewable capacity, yet subsidy reform alone covers only a fraction of their vast climate finance gaps. Indonesia stands out with the highest percentage of its climate finance gap potentially covered through subsidy reallocation, suggesting targeted reforms could significantly aid its transition. Smaller economies like South Africa demonstrate efficient use of smaller subsidy amounts to generate renewable capacity. The high regressive impact of subsidies in countries like India, and Indonesia underscores the social inequities tied to fossil fuel support. Overall, while reallocation of subsidies presents a meaningful opportunity to boost renewable energy and close financing gaps, it must be complemented by additional investment and policy measures tailored to each country's unique context. The broader transition requires a systemic policy framework that addresses the full spectrum of structural barriers and opportunities.

Additionally, carbon pricing instruments, such as taxes and cap-and-trade systems, can further reduce the economic viability of fossil fuel extraction when paired with progressive revenue recycling that channels funds toward income support, job retraining, and inclusive green industrial policy. Private capital, while important, has consistently fallen short in delivering climate finance at the scale and equity needed. In contrast, public financial institutions, particularly development finance institutions (DFIs) are uniquely positioned to provide patient, concessional capital that supports long-term investments in low-carbon development, especially in high-risk or socially strategic sectors. Redirecting public finance from de-risking private investments to proactively financing just transition outcomes would enable G20 countries to prioritise equity, localisation, and structural transformation over short-term returns (IEJ 2025b).

Instruments such as debt-for-climate swaps are also being explored as innovative tools for countries facing fiscal constraints, offering the prospect of financial relief in exchange for sustainability commitments, including fossil fuel phaseout. However, their overall effectiveness remains contested. Evidence from past swaps suggests that their fiscal and environmental impact can be limited, and concerns have been raised about whether they offer genuine long-term value or simply serve to ease creditor risk. As such, while potentially useful in specific contexts, debt-for-climate swaps should be approached with scrutiny and should not distract from more comprehensive, systemic approaches to climate finance.

Recognising that limited fiscal space constrains many developing countries, climate finance mechanisms must avoid reinforcing dependency or undermining sovereignty. Climate-linked conditions in concessional lending and aid should be co-designed with recipient governments to reflect national priorities and ensure local ownership. Disclosure of asset ownership, investment flows, and just transition plans, aligned with green finance taxonomies, can support risk assessments and guide decisions on interest rates, refinancing, and debt restructuring. However, such requirements must be applied fairly, with flexibility, positive incentives, and adequate technical support tailored to national capacities.

5.2 Demand-side levers

Energy efficiency remains one of the most cost-effective levers for emission reduction, yet it is often underutilised. Building codes, appliance standards, and industrial efficiency programmes can drive large-scale improvements without requiring new generation capacity. According to the IEA, doubling the rate of energy intensity improvement could reduce global emissions by nearly 5 $GtCO_2$/year by 2030 (IEA 2022). Importantly, efficiency also plays an equity role as it lowers household energy bills and enhances energy access for underserved communities. Deep retrofit programs, especially when integrated into public housing or urban renewal schemes, can serve as catalysts for both decarbonisation and social justice.

Electrification powered by renewable energy, supported by a fully decarbonised grid, is a foundational pillar of the energy transition. Electrifying transport, industry, and buildings reduces fossil fuel dependency and enables deeper integration of renewable energy. For example, EVs are projected to account for 60% of new car sales globally by 2030 under current policy trends, potentially displacing nearly 6 billion barrels of oil annually (IEA 2025). However, a truly sustainable mobility transition demands more than just electrifying private vehicles. It requires a fundamental shift toward prioritising public and shared transportation systems, which are far more energy-efficient, socially inclusive, and space-saving. Policy coherence is essential: EV subsidies should be matched with investments not only in charging infrastructure and local battery manufacturing, but also in high-quality, accessible public transport and urban design that reduces car dependency. Moreover, socio-spatial equity must be central, ensuring rural and low-income communities have access to the infrastructure and services needed to participate in the benefits of renewable electrification.

At the same time, demand-side ambition must extend beyond mobility: enhancing material efficiency in energy-intensive sectors such as cement, steel, and aluminium through lightweighting, reuse, and recycling could reduce demand for key materials by 15–24% by 2060, avoiding nearly 10 Gt of cumulative CO_2 emissions in buildings alone. (IEA 2019). Likewise, scaling up industrial heat pumps in food, paper, and chemicals manufacturing has the potential to meet a significant share of low- and medium-temperature process heat, reducing reliance on gas by the end of this decade. Together, these measures show how efficiency, electrification, and material use reduction across manufacturing, households, and transport can work in tandem to accelerate the phase-out of oil and gas while advancing a just and inclusive transition.

5.3 Governance and equity levers

A just energy transition demands inclusive, accountable, and coordinated governance structures that shape the transition process. Ensuring that all affected groups, particularly workers, youth, Indigenous peoples, and marginalised communities have a voice in decision making is as critical as fairly distributing the costs and benefits of the transition.

One practical model for embedding participation is the creation of Just Transition Commissions or similar multi-stakeholder platforms. These bodies institutionalise inclusive planning by bringing together actors from government, labour, business, civil society, academia, and frontline communities. For instance, South

Africa's Presidential Climate Commission serves as a statutory coordination platform embedded within government that facilitates social dialogue, navigates trade-offs, and builds cross-sectoral trust. Such mechanisms help ensure transparency, improve policy coherence across government departments and sectors, and strengthen accountability.

To accelerate fossil fuel phaseouts, national coordination structures must align with emerging international governance frameworks. The UNFCCC's Just Transition Work Programme (JTWP), established at COP27 and operationalised at COP28, now convenes two annual dialogues and ministerial roundtables to enhance international cooperation on just transition pathways (International Institute for Sustainable Development (IISD 2025b). In June 2025, negotiators reached a breakthrough at the Bonn climate meetings, producing a consolidated draft text that provides political momentum for adopting actionable governance mechanisms at COP30 in Belém (IISD 2025c). A proposed Global Just Transition Platform under the UNFCCC, grounded in the International Labour Organization's Guidelines for a Just Transition (ILO 2015), could serve as a formal multilateral forum for countries to report on progress, exchange best practices, and access financial and technical support. In parallel, international financial institutions and climate funds should require the presence of inclusive and participatory governance structures, aligned with the JTWP's social dialogue principles, as a condition for transition-related support. Embedding fossil fuel production decline within these governance frameworks is essential to ensuring equity, transparency, and alignment with both energy justice goals and Paris Agreement commitments.

Governments that manage NOCs also have a unique responsibility to align these powerful actors with climate goals. NOCs must halt further expansion of fossil fuel assets and instead redirect capital towards renewable energy technologies, decarbonisation, and diversification. This structural transition should be supported by dedicated just transition funds to enable job retraining, social protection, and economic revitalisation in fossil fuel-dependent regions. Parallel public investment in low-carbon infrastructure such as renewables, electric mobility, and clean heating will help reduce fossil fuel demand and facilitate a more orderly, managed decline. Transparency and accountability are essential: governments must embed oil and gas phaseout plans in their Nationally Determined Contributions (NDCs) and long-term strategies under the Paris Agreement, enforcing robust disclosure requirements.

A just transition must centre people, not only carbon metrics. Universal access to energy, clean water, education, health care, and food security must undergird any energy policy. Transition efforts must be deeply pro-poor, gender-responsive, and inclusive, recognising the intersecting vulnerabilities of those disproportionately affected by climate impacts and structural inequalities. Social protection policies including targeted income support, affordable renewable energy access, and climate adaptation measures must be woven into the broader welfare system to ensure resilience and dignity throughout the transition.

5.4 Enabling systemic levers

Systemic levers are foundational mechanisms that shape the structural conditions under which energy transitions unfold. Unlike isolated policy interventions, systemic levers reconfigure the broader institutional and economic landscape by shifting rules, incentives, and capacities that govern entire systems. They influence how markets evolve, how states intervene, and how risks; both economic and social are anticipated and managed.

One of the most critical levers is the transformation of electricity systems to accommodate the variability of renewable energy. Solar and wind power are inherently intermittent and geographically distributed, which challenges legacy grid architectures designed around centralised fossil generation. Meeting net-zero targets will require not just incremental upgrades but a full-scale reconfiguration of power networks, making them more intelligent, decentralised, and regionally integrated. The International Energy Agency (2025) estimates that annual investments in power grids must more than double to USD 30 billion by 2030. These investments are crucial for deploying smart grid technologies, expanding regional interconnectors, and enabling large-scale energy storage, all of which enhance reliability and improve access to clean power particularly in underserved areas.

Legal mandates must be paired with social protections and financial mechanisms to ensure they don't deepen inequality or stifle industrial competitiveness.

Critical transition minerals such as lithium, cobalt, nickel, copper, and rare earths form another systemic lever. These materials are essential inputs for batteries, solar panels, and electric mobility. Global demand is expected to rise four- to six-fold by 2040, requiring rapid development of dozens of new mines within this decade (IEA 2023f; UNSG Panel 2024). For mineral-rich developing countries, this presents an opportunity for structural transformation, generating employment, diversifying exports, and advancing industrial capabilities. However, without equitable governance and strong community safeguards, it could replicate extractive injustices of the past. Aligning extraction with local development goals, environmental protections, and value-addition strategies is critical to ensure that mineral wealth becomes a development catalyst, not a liability.

Labour market policies also operate as vital systemic levers. The global transition is projected to yield a net increase of 5.7 million energy jobs by 2030 (IRENA & ILO 2024), particularly in renewables, energy efficiency, and grid expansion. But these aggregate gains mask deep regional disparities. Fossil fuel-dependent regions face job losses, dislocation, and political backlash. Proactive labour policies such as wage guarantees, skills retraining, and public employment schemes are therefore not ancillary but essential. The German "Coal Commission" provides a replicable model, where inclusive dialogue among workers, industry, and civil society enabled a just coal phaseout grounded in regional development planning and social protection.

Industrial policy is another lever often underestimated in the transition conversation. When designed effectively, it can help channel investment toward sectors that deliver both decarbonisation and decent work. For instance, green hydrogen is widely touted as a decarbonisation solution for hard-to-abate sectors like steel, but production remains expensive, and global demand uncertain. In Southern Africa, projects such as Namibia's Hylron and Hyphen aim to export hydrogen to regional steelmakers. However, as seen in Europe, Australia, and Japan, similar ventures have faced delays or cancellation due to weak offtake agreements and high capital costs (RIFS 2023; Lombardi, Chestney, & Alkousaa 2025). These challenges highlight the need for selective deployment; directing hydrogen where its cost premium is justified by clear industrial use cases and infrastructure readiness.

The global trade architecture must evolve alongside climate action. Instruments like the EU's CBAM are designed to address carbon leakage by imposing carbon costs on imports. While potentially effective, such tools risk becoming protectionist unless designed transparently and accompanied by support for developing countries through green finance, technology transfer, and multilateral cooperation.

Legislation through clear phase-out dates and binding bans also signals long-term market direction. Bans on internal combustion engines or coal-fired generation, when properly sequenced and socially buffered, can accelerate technological innovation and investor confidence. Nevertheless, legal mandates must be paired with social protections and financial mechanisms to ensure they don't deepen inequality or stifle industrial competitiveness.

Enabling systemic levers are about more than infrastructure or policy; it is about redesigning the structural logic of energy and economic systems. When these levers are activated in concert with equity, planning, and scale, they unlock transitions that are not only cleaner, but also fairer and more resilient.

6. DEFINING A JUST TRANSITION TO EMBED FOSSIL FUEL PHASEOUTS

A just transition should entail *boldly phasing out oil and gas* in a way that protects people, not profits. It means transforming our energy systems while securing workers' rights, creating decent jobs, and empowering communities on the frontlines of climate and extraction. Anchored in ILO principles, it should foster social equity, economic justice, and full participation, ensuring no one is left behind as countries restructure energy systems from fossil fossil-fuel dependency to build cleaner, sustainable and fairer futures.

A G20 Just Transition Taxonomy proposed below proposed below as a common framework designed to guide and harmonise national efforts to phase out oil and gas in a socially inclusive, economically equitable, and environmentally sustainable manner. It would serve as a classification tool to define which policies, projects, and investments qualify as contributing to a 'just transition' especially for fossil-fuel-reliant workers, communities, and economies.

The taxonomy helps ensure that the shift away from oil and gas is aligned with climate goals, and delivers social protections, employment security, equitable development, and regional resilience. By standardising principles across G20 countries, the taxonomy can mobilise international finance, guide policy reform, and foster accountability while respecting national contexts. It can build on existing standards from the ILO, IEA, and EU Sustainable Finance Taxonomy, aiming to unlock both climate integrity and social justice in energy transitions. Table 3 below captures some key parameters that can be considered while framing a definition or taxonomy of a just transition that also facilitates phaseout of oil and gas.

An electrician tests a solar panel during a 2023 training programme equipping workers with skills to shift from fossil fuel dependence into jobs in the renewable sector. (Photo: Roberta Ciuccio/AFP via Getty Images)

TABLE 3

Key parameters for a Just Transition Taxonomy embedding oil and gas phaseout

Category	Parameter	Examples/indicators
Fossil fuel exit strategy	- Scientifically defined oil and gas phaseout timelines. - No new oil and gas project approvals. - Managed decline of production.	- National deadlines for exploration halt, production reduction, and full phaseout. - Policy bans on new licensing and infrastructure development (aligned with IEA Net Zero scenario). - Annual targets for reduction in upstream and midstream oil and gas activities.
Workforce transition	- Fossil fuel job mapping and redeployment. - Training and re-skilling programmes. - Social protection for displaced workers.	- Percentage of oil and gas workers transitioned to renewable energy sectors, other sectors or provided buyouts. - Funding allocated to fossil workforce retraining. - Job placement rate post-retraining.
Community and regional justice	- Regional transition planning in oil/gas-dependent areas. - Indigenous and local stakeholder inclusion. - Equitable energy access.	- Existence of community-led plans in fossil-heavy regions. - Compensation mechanisms for socio-economic loss. - Representation in decision-making bodies - Free, prior, and informed consent (FPIC) adherence. - Expansion of renewable energy to fossil-reliant, underserved communities.
Financial realignment	- Fossil-fuel subsidy phaseout - Just transition financing mechanisms. - Transparent use of carbon revenues.	- Percentage reduction in upstream subsidies annually - Subsidy reallocation to clean alternatives. - Dedicated national funds or JETP-type initiatives for oil and gas regions. - Share of carbon tax/Emission Trading System (ETS) revenues supporting oil and gas worker transition.
Clean energy substitution	- Renewable energy and electrification targets. - Domestic renewable energy manufacturing for displaced fossil fuel value chains. - Infrastructure readiness.	- Percentage replacement of oil/gas in electricity, transport, and industry by renewables or clean fuels. - Number of jobs created in localised wind, solar, hydrogen, and battery supply chains. - Grid upgrade investment for renewable integration in oil-reliant regions.
Governance and monitoring	- Just transition governance structures. - Monitoring, reporting, and verification (MRV) frameworks. - Policy alignment and accountability.	- National oil and gas transition commissions with labour, community, and industry reps. - Annual just transition impact reports, independent audits. - Coherence with Nationally Determined Contributions (NDCs), Long Term-Low Emission Development Strategies (LT-LEDS) and Sustainable Development Goals (SDGs). - NDCs, LT-LEDS, and SDGs - Sanctioned deviation protocols.

Source: Author's own compilation based on secondary research.

7. RECOMMENDATIONS AND ROADMAP

7.1 Proposed interventions for key stakeholders

GOVERNMENT INTERVENTIONS

Legislate national phase-out plans through petroleum laws and climate mandates

Governments should enshrine fossil-fuel production phase-out objectives in national laws and regulatory frameworks. A key precedent is the Danish North Sea Agreement (2020), where Denmark amended its Subsoil Act to include a phase-out date of 2050 for oil and gas production, becoming the largest oil producer to do so. Such legal frameworks should include detailed targets, action timelines, and Paris-aligned production caps.

Establish a Fossil-Fuel Support Accountability Framework (FFSAF)

To effectively redirect public resources toward climate goals, governments should adopt a FFSAF. This framework would systematically track the full fiscal cost of fossil-fuel support through three key components: direct budgetary transfers, tax expenditures (such as VAT or excise exemptions), and price support mechanisms (like regulated retail pricing below market rates). By quantifying these costs, the FFSAF enables policymakers to assess the true scale of fossil-fuel subsidies, identify inefficiencies, and unlock fiscal space for investments in renewable energy, targeted social protection, and climate resilience.

Ensure equitable pricing

The practice of charging discriminatory premiums like the 'Asia Premium'[3] undermines equitable energy transitions. With countries like India projected to drive 28% of oil demand growth in Organisation of the Petroleum Export Countries (OPEC) through 2030, fair-pricing policies are essential for capital to flow to renewable energy infrastructure.

Leverage NOCs for structural transition

Governments should mandate National Oil Companies (NOCs) to shift from oil and gas extraction to renewable energy investment and deployment. This includes revising their mandates, redirecting capital allocations, and integrating clear transition targets. NOCs must go beyond managing Scope 1 and 2 emissions[4] to fundamentally transform their business models. Drawing from the success of state-owned enterprises in countries like India, Sweden, and China, public ownership should be strategically used to accelerate clean energy transitions.

Recognise energy efficiency as the 'first fuel'

Governments must embed energy efficiency and conservation as central pillars of national energy strategy. Regulatory standards, building codes, and public awareness campaigns should prioritise reducing consumption. Importantly, short-term supply-side measures must not disincentivise efficiency investments, for example, by locking in high-carbon infrastructure that reduces demand for conservation.

INDUSTRY INTERVENTIONS

Reform business models from fossil fuel-centric to energy-centric

Oil companies, especially NOCs and large private-sector actors, must redirect capital from oil exploration to renewable energy. Companies like Saudi Aramco, despite being one of the most profitable globally, still allocate only 10% of investments to low-carbon solutions (ReNew 2024). This figure must rise significantly. True transformation requires a 'barrels to electrons' shift, not merely decarbonising operations but redefining the business model itself.

End fossil fuel-expansion and shift focus to emission reduction

The first step for industry is to stop exploration and production expansion. While some companies manage Scope 1 and 2 emissions, few meaningfully address Scope 3, which often accounts for 80%-90% of lifecycle emissions. Transparent, science-based climate targets must cover the full spectrum.

Strengthen transparency and innovation for technology uptake

Decarbonising oil and gas require more than research and development; it demands rapid deployment of clean technologies. Industry must treat innovation as a strategic response to climate risk and shifting markets. Appropriate public-private collaboration, stable policy signals, and targeted investment are essential to scale solutions. Transparent tools like the Oil Climate Index (OCI) should be mainstreamed to track lifecycle emissions and guide decisions. Without stronger innovation ecosystems and data accountability, the sector risks locking in high-emissions infrastructure instead of transitioning to low-carbon alternatives. Crucially, technology transfer to developing countries must be prioritised to ensure that innovation benefits are equitably shared and enable a truly global energy transition.

MULTILATERAL INTERVENTIONS

Withdraw from treaties that protect fossil fuels and reforms legal frameworks

Legal agreements such as the Energy Charter Treaty (ECT) and other investment treaties allow fossil-fuel firms to sue governments over climate policies. The ECT's 20-year sunset clause poses long-term risk, despite multiple countries (for example, the United Kingdom, France, and Germany) having exited. Global treaty reform is critical to remove legal barriers to phase-out. Countries should push for renegotiation of outdated clauses and establish new legal frameworks that explicitly exclude fossil-fuel protections and prioritise climate-aligned investments.

Mandate exported emissions accounting and transparency

Countries that export fossil fuels must disclose associated emissions consumed abroad. These can be included in NDCs or biennial transparency reports. Several countries such as Australia, Canada, Norway have begun this practice voluntarily (Moss & Pye 2023), but it should become standard under the UNFCCC framework.

Use multilateral institutions to signal investment priorities

International public finance should be adequately aligned for renewable energy financing. Institutions such as the World Bank and G7 Export Credit Agencies should end fossil fuel support and lead in creating low-risk, concessional finance for renewable deployment, particularly in developing regions.

Advance a global norm of no new fossil fuel expansion

Building on COP28's recognition of the need to transition away from fossil fuels, future COPs should work toward formalising a 'no new fossil fuel' principle. This includes stopping new licensing rounds, prohibiting exploration subsidies, and aligning production targets with Paris Agreement goals. A sequenced approach may be adopted with Global North countries being required to adopt such an approach first.

Support differentiated transition timelines and just transition finance

A just transition must respect common but differentiated responsibilities and capabilities. Developed countries should lead in cutting production while supporting the Global South with just transition finance, capacity building, and technology access, ideally under the New Collective Quantified Goal within the UNFCCC. Therefore, the transition must be governed by equity, predictability, and ambition. The principle of "common but differentiated responsibilities" applies not only to emissions but also to production. High-income countries with diversified economies should move first and offer financing and technical assistance to those with fewer capabilities.

CAPE TOWN, SOUTH AFRICA – Activists protest outside Cape Town High Court on May 5, 2025, opposing new oil and gas exploration and calling for stronger climate action. Their demands echo growing global calls for no new fossil fuel expansion. (Photo by Brenton Geach/Gallo Images via Getty Images)

8. CONCLUSION

Despite mounting polycrises and prescient scientific warnings, G20 negotiations have consistently faltered in discussions around oil and gas phase-out. This failure is rooted not only in the profound economic and geopolitical disruption such a transition entails, but also in the unequal distribution of power, the pursuit of profit over people, and the political imperative to maintain the status quo. As outlined earlier, G20 countries are investing in future oil and gas production at levels incompatible with climate goals, approving new projects and locking in billions of barrels per day that will far exceed a 1.5°C pathway. Other major multilateral fora, including the COP, have repeatedly locked horns over the distinction between a phase-down and a phase-out, often compromising ambition to accommodate deeply entrenched fossil-fuel interests. Unlike coal, oil and gas have remained politically insulated and are frequently omitted despite their significant contribution to global emissions.

As per net-zero aligned pathway of the IEA: no new oil and gas fields are required; production becomes increasingly concentrated among a small number of low-cost producers; and OPEC's share of a much-reduced oil market rises to 52% by 2050, the highest in history. Meanwhile, annual per capita income from oil and gas falls by approximately 75% in producer economies from USD 1,800 to around USD 450 by the 2030s. This projected contraction will have far-reaching macroeconomic, fiscal, and social implications, particularly for economies that lack diversification or rely heavily on hydrocarbons for employment, revenue, and geopolitical leverage. Structural reforms and alternative revenue streams are critical, and yet in many cases, they will be insufficient to fully offset the loss.

The South African G20 Presidency is an opportunity to bridge the global divides around energy and climate. As a nation simultaneously grappling with fossil fuel-dependency and energy security concerns while spearheading the landmark JETP, South Africa embodies the necessity, urgency, and the legitimacy for an equitable oil and gas phase-out. This is a historic chance to elevate the agenda, face discomforting questions, and anchor the ambitions for a just transition in the lived realities of the Global South. Discussions around phase-out should start pushing for transparent commitments, financing, and community-driven strategies to redefine the G20 as not just a club of economic powers, but as a platform for coordinated climate leadership rooted in solidarity, equality and sustainability. The G20 should come together to catalyse a new narrative: one where the energy transition is not seen as a cost to be managed, but a development opportunity to be equitably shared.

This moment calls for a new form of multilateralism that acknowledges the asymmetries of power and responsibility in the global energy economy and acts decisively to correct them. The G20, if it is to remain a relevant and legitimate force in global governance, must lead the charge. An orderly and equitable fossil-fuel phase-out is no longer a radical idea, but it is an economic and moral imperative. South Africa's G20 presidency can be the pivot point that transforms ambition into action.

REFERENCES

Andreucci, D., García López, G., Radhuber, I., Conde, M., Voskoboynik, D. M., Farrugia, J. D., & Zografos, C. 2023. The coloniality of green extractivism: Unearthing decarbonisation by dispossession through the case of nickel. Political Geography, 107, Article 102997. https://doi.org/10.1016/j.polgeo.2023.102997

Benjamin K. Sovacool 2021. Who Are the Victims of LowCarbon Transitions? Towards a Political Ecology of Climate Change Mitigation. Energy Research & Social Science, 73, Article 101916. https://doi.org/10.1016/j.erss.2021.101916

Castán Broto, V. 2019. A cultureled approach to understanding energy transitions in China. Transactions of the Institute of British Geographers, 44(3), 343–358. https://doi.org/10.1111/tran.12453

Castán Broto, V., Baptista, I., Kirshner, J., Smith, S., & Alves, S. N. 2018. Energy justice and sustainability transitions in Mozambique. Applied Energy, 228, 645–655. https://doi.org/10.1016/j.apenergy.2018.06.057

Climate Action Tracker. 2023. Costa Rica – Policies & action. Retrieved May 19, 2025, from https://climateactiontracker.org/countries/costa-rica/policies-action/

Cossa, C., & Mucari, M. 2025. Mozambique not looking to review terms of planned LNG projects, president says. Reuters. https://www.reuters.com/world/africa/mozambique-not-looking-review-terms-planned-lng-projects-president-says-2025-01-17/

European Commission. 2024. Record reduction in 2023 ETS emissions due largely to boost in renewable energy. https://climate.ec.europa.eu/news-your-voice/news/record-reduction-2023-ets-emissions-due-largely-boost-renewable-energy-2024-04-03_en

European Commission. 2023. Hydrogen strategy for a climate-neutral Europe. European Commission. https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen_en

F20 2022. Renewable Energy Target Mapping of the G20. Foundations 20. https://foundations-20.org

Farand, C. 2020. Denmark to phase out oil and gas production by 2050 in 'watershed' decision. Climate Home News. https://www.climatechangenews.com/2020/12/04/denmark-phase-oil-gas-production-2050-watershed-decision/

Financial Stability Board. 2020. Global Monitoring Report on NonBank Financial Intermediation 2020. FSB. https://www.fsb.org/2020/12/global-monitoring-report-on-non-bank-financial-intermediation-2020/

Foster, B. 2025. Green blackouts: Germany's energy transition comes at a steep price. Glass Almanac. https://glassalmanac.com/green-blackouts-germanys-energy-transition-comes-at-a-steep-price/#google_vignette

Goswami, U. 2025. COP30 chair moots 10-year road map to move away from fossil fuels. The Economic Times. https://economictimes.indiatimes.com/news/international/world-news/cop30-chair-moots-10-year-road-map-to-move-away-from-fossil-fuels/articleshow/118823947.cms

Global Reporting Initiative. 2023. Corporate lobbying and sustainability: Uncovering the influence of corporate political engagement on sustainable development. https://www.globalreporting.org/media/s5mjeqeh/research-paper_corporate-lobbying-impacts.pdf

Institute for Economic Justice. 2025a. Leveraging monetary policy to support the transitional needs of South African workers (Working Paper No. 7). https://iej.org.za/working-paper_monetary-policy-and-a-just-transition/

Institute for Economic Justice. 2025b. The G20 and external debt-service burden in Africa. https://iej.org.za/g20-and-external-debt-service-burden-in-africa/

International Energy Agency. 2019. Material efficiency in clean energy transitions. Paris: IEA. https://www.iea.org/reports/material-efficiency-in-clean-energy-transitions

International Energy Agency. 2022. The value of urgent action on energy efficiency. Paris: IEA. https://www.iea.org/reports/the-value-of-urgent-action-on-energy-efficiency

International Energy Agency. 2023a. Carbon capture, utilisation and storage 2023. Paris: IEA. https://www.iea.org/reports/ccus-in-clean-energy-transitions

International Energy Agency. 2023b. Electricity grids and secure energy transitions. Paris: IEA. https://www.iea.org/reports/electricity-grids-and-secure-energy-transitions

International Energy Agency. 2023c. Global hydrogen review 2023. Paris: IEA. https://www.iea.org/reports/global-hydrogen-review-2023

International Energy Agency. 2023d. Renewables 2023: Analysis and forecast to 2028. Paris: IEA. https://www.iea.org/reports/renewables-2023

International Energy Agency. 2023e. World energy outlook 2023. Paris: IEA. https://iea.blob.core.windows.net/assets/ed1e4c42-5726-4269-b801-97b3d32e117c/WorldEnergyOutlook2023.pdf

International Energy Agency. 2024a. Electricity access continues to improve in 2024 – after first global setback in decades. Paris: IEA. https://www.iea.org/commentaries/electricity-access-continues-to-improve-in-2024-after-first-global-setback-in-decades

International Energy Agency. 2024b. Oil 2024: Analysis and forecast to 2030. Paris: IEA. https://iea.blob.core.windows.net/assets/493a4f1b-c0a8-4bfc-be7b-b9c0761a3e5e/Oil2024.pdf

International Energy Agency. 2024c. Renewables 2024. Paris: IEA. https://www.iea.org/reports/renewables-2024

International Energy Agency. 2024d. SDG7: Data and Projections. Paris: IEA. https://www.iea.org/reports/sdg7-data-and-projections

International Energy Agency. 2024e. Tracking SDG7: The Energy Progress Report 2024. Paris: IEA. https://www.iea.org/events/tracking-sdg7-energy-progress-report-2024

International Energy Agency. 2024f. World energy investment 2024. Paris: IEA. https://iea.blob.core.windows.net/assets/60fcd1dd-d112-469b-87de-20d39227df3d/WorldEnergyInvestment2024.pdf

International Energy Agency. 2024g. World energy outlook 2024. Paris: IEA.

International Energy Agency. 2025. Global EV outlook 2025: Expanding sales in diverse markets. Paris: IEA. https://www.iea.org/reports/global-ev-outlook-2025

International Institute for Sustainable Development. 2025. How the G7 can advance action on fossil fuel subsidies in 2025. https://www.iisd.org/articles/how-g7-can-advance-action-fossil-fuel-subsidies-2025

International Renewable Energy Agency. 2020. Global renewables outlook: Energy transformation by 2050. Abu Dhabi: IRENA. https://www.irena.org/publications/2020/Apr/Global-Renewables-Outlook-2020

International Renewable Energy Agency & Climate Policy Initiative. 2023. Global landscape of renewable energy finance 2023. Abu Dhabi: IRENA. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2023/Feb/IRENA_CPI_Global_RE_finance_2023.pdf

International Renewable Energy Agency & International Labour Organization. 2024. Renewable energy and jobs: Annual review 2024. Abu Dhabi: IRENA & ILO. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Oct/IRENA_Renewable_energy_and_jobs_2024.pdf

Lacey-Barnacle, M., Robison, R., & Foulds, C. 2020. Energy justice in the developing world: A review of theoretical frameworks, key research themes and policy implications. Energy for Sustainable Development, 55, 122–138. https://doi.org/10.1016/j.esd.2020.01.010

Lombardi, P., Chestney, N., & Alkousaa, R. 2025. Green hydrogen retreat poses threat to emissions targets. Reuters. https://www.reuters.com/sustainability/climate-energy/green-hydrogen-retreat-poses-threat-emissions-targets-2025-07-23/

Miyake, S., Teske, S., Rispler, J., & Feenstra, M. 2024. Solar and wind energy potential under landresource constrained conditions in the Group of Twenty (G20). Renewable and Sustainable Energy Reviews, 202, Article 114622. https://doi.org/10.1016/j.rser.2024.114622

MNRE (2024). Ministry of New and Renewable Energy, Government of India. https://mnre.gov.in

Moss, J., & Pye, S. 2023. Why fossil fuel exporters must accept their emissions liability. University of New South Wales. https://climatejustice.co/wp-content/uploads/2023/11/JeremyMoss-Export-Emissions-Report-d4.pdf

Odenweller, A., & Ueckerdt, F. 2024. Hydrogen infrastructure requirements for a 1.5 °C pathway [Preprint]. arXiv. https://arxiv.org/abs/2406.07210

OECD. (2024). OECD Inventory of Support Measures for Fossil Fuels 2024: Policy trends up to 2023. OECD Publishing. https://doi.org/10.1787/a2f063fe-en

Power, M., Newell, P., & Baker, L. 2016. The political economy of energy transitions in Mozambique and South Africa: The role of the rising powers. Energy Research & Social Science, 17, 10–19. https://doi.org/10.1016/j.erss.2016.03.007

ReNew. 2024, July 15. Phasing out oil and gas: How realistic? How fast? https://www.renew.com/news-detail/phasing-out-oil-and-gas-how-realistic-how-fast

Research Institute for Sustainability. 2023. The politics of green hydrogen cooperation and project implementation challenges. RIFS. https://www.rifs-potsdam.de/en/output/publications/2023/politics-green-hydrogen-cooperation

Santos, R. G., & Silva, M. A. 2023. On the cost competitiveness of blue and green hydrogen. Journal of Energy Storage, 58, 106090. https://doi.org/10.1016/j.est.2023.106090

SEI, Climate Analytics, E3G, IISD, & UNEP. 2023. The Production Gap: Phasing down or phasing up? Top fossil fuel producers plan even more extraction despite climate promises. Stockholm Environment Institute. https://doi.org/10.51414/sei2023.050

Stott, J., & Chikowore, A. 2025. The role of development finance institutions in climate finance provision to support localisation and worker transitions (Working Paper). Institute for Economic Justice.

UN Climate Change. 2023. COP28 agreement signals "beginning of the end" of the fossil fuel era. https://unfccc.int/news/cop28-agreement-signals-beginning-of-the-end-of-the-fossil-fuel-era

United Nations. (n.d.). Key findings from the IPCC reports. https://www.un.org/en/climatechange/science/key-findings

U.S. Department of Energy. 2023. U.S. national clean hydrogen strategy and roadmap. Office of Energy Efficiency and Renewable Energy. https://www.hydrogen.energy.gov/docs/hydrogenprogramlibraries/pdfs/us-national-clean-hydrogen-strategy-roadmap.pdf

van Asselt, H., & Newell, P. 2022. Pathways to an international agreement to leave fossil fuels in the ground. Global Environmental Politics, 22(4), 28–47. https://doi.org/10.1162/glep_a_00674

World Economic Forum. 2022. How national oil companies can overcome the challenge of ESG reporting. https://www.weforum.org/stories/2022/09/how-national-oil-companies-overcome-challenge-esg-reporting/

World Resources Institute. 2024. Just transitions in the oil and gas sector: Energy transition implications for workers supported by oil and gas. https://publications.wri.org/just-transitions-oil-gas-sector/energy-transition-implications-for-workers-supported-by-oil-and-gas

Zero Carbon Analytics. 2024. A closer look at CCS: Problems and potential. https://zerocarbon-analytics.org/archives/energy/a-closer-look-at-ccs-problems-and-potential

APPENDIX-I

Standardisation Criteria for table 1: Snapshot of G20 oil and gas dependency

Producer Classification

Top Producer: Among top 5 global oil/gas producers

High Producer: >1 million barrels oil equivalent/day

Moderate Producer: 100k–1 million barrels/day

Low Producer: <100k barrels/day

Non-Producer: No meaningful production

Exporter Classification

Top Exporter: Among top 5 global exporters of crude or LNG

Net Exporter: Exports exceed imports annually

Not an Exporter: Imports exceed exports

Self-Sufficient: Minimal imports and exports

Limited Exporters: Few member states have export capacity

Importer Classification

Heavy Importer: >75% of oil/gas consumption is imported

Net Importer: Imports exceed domestic production

Self-Sufficient: Domestic supply meets majority of demand

Not an Importer: Primarily exports, not dependent on imports

Mixed: Import/export profile varies significantly within the group

Sources

IEA: International Energy Agency

BP: Statistical Review of World Energy

U.S.: Energy Information Administration (EIA)

APPENDIX-II

Rationale and methodology note for Table 3: Oil and gas subsidies in the G20: regressive impacts and reallocation potential

I. Fossil Fuel Subsidies (USD B)

Definition: Total public financial support provided to fossil fuels in a given country, expressed in 2023 constant USD billions.

Methodology: Taken from the International Energy Agency (IEA) fossil fuel subsidies database, converted from "Real 2023 USD million" to billions by dividing by 1,000.

Rationale: Reflects a country's ongoing commitment to fossil energy, often at odds with climate goals. It shows the size of redirected opportunity if repurposed for clean energy investment.

II. 30% Reallocated (USD B)

Definition: Hypothetical amount of fossil fuel subsidies redirected toward renewable energy, assuming 30% reallocation.

Methodology: Reallocated Amount=Fossil Fuel Subsidy×0.30

Rationale: Provides a moderate, politically feasible scenario (30%) for reallocating subsidies: not a full removal. Demonstrates realistic near-term financial potential for supporting clean energy transitions.

III. Renewable Capacity Potential (GW)

Definition: Renewable energy capacity (in gigawatts) that could be installed using the reallocated funds.

Methodology: A blended cost of $1.2 million per MW (from IRENA and IEA benchmarks for utility-scale solar and onshore wind in emerging economies) is used. Formula : Capacity (GW) = Reallocated USD B x 1000 / 1.2 , divided by 1000

Rationale: Demonstrates the physical, tangible renewable energy infrastructure that could be realised from subsidy reallocation. Highlights opportunity cost of maintaining fossil subsidies.

IV. Annual Climate Finance Gap (USD B)

Definition: The estimated shortfall between current climate investment and the amount needed to meet nationally determined contributions (NDCs) or net-zero targets.

Methodology: Derived from aggregated reports (IRENA, CPI, UNEP Gap Report) and national climate strategies. Where unavailable, marked as N/A.

Rationale: Contextualises the scale of unmet finance in climate action and how domestic reallocation (from fossil to clean) could help close this gap.

V. % of Gap Covered

Definition: Share of the country's annual climate finance gap that would be covered by redirecting 30% of fossil fuel subsidies.

Methodology: % of Gap Covered=(Annual Climate Finance Gap (in USD B)30% of Fossil Fuel Subsidies (in USD B))×100

Rationale: Measures effectiveness of subsidy reallocation in filling national-level finance gaps. Offers a powerful political and policy tool for showing the value of shifting support.

VI. Share of Global Climate Gap (%)

Definition: A country's share of the global annual climate finance gap (~$2.4 trillion/year as per IEA/UNEP 2023 estimate

Methodology: Country's Gap (USD B)/2400×100

Rationale: Places national gaps in global context. Useful for equity discussions and international financing cooperation. Countries with smaller gaps but high fossil subsidies may not need as much external help if reallocation is pursued.

VII. Regressive Impact of Subsidies

Definition: A qualitative rating of how socially and economically regressive fossil fuel subsidies are in each country.

Methodology: Based on literature from IMF, World Bank, and IEA, which show that:
- Fossil subsidies disproportionately benefit wealthier households.
- They reduce fiscal space for social programs and clean energy investment.

Rationale: Adds a social justice dimension to the analysis. Highlights that removing fossil subsidies can be not only climate-smart but pro-poor, if paired with targeted support.

Assumptions

The benchmark capital cost of $1.2 million per megawatt (MW) is a blended estimate based on recent data for utility-scale solar PV and onshore wind installations in emerging economies. According to IRENA's Renewable Power Generation Costs in 2023 report, the global weighted average installed cost was approximately $758,000 per MW for solar PV and $1.16 million per MW for onshore wind in 2023 (IRENA, 2024). Similarly, Statista reports a global average installed cost of $760 per kW ($0.76 million per MW) for solar PV in 2023 (Statista, 2024). Although costs vary by country, especially in emerging markets, this benchmark blends lower-cost solar and higher-cost wind figures while accounting for project-level soft costs, infrastructure, and financing variability. This makes $1.2 million per MW a reasonable conservative estimate for capacity potential calculations in global development contexts.

Data Limitations

Fossil fuel subsidy figures are sourced from the IEA (Real 2023 USD). Due to partial data availability:

China and Indonesia: 2022 gas subsidy data used, as 2023 figures are unavailable.

South Africa: Includes 2023 gas and 2022 electricity subsidy data; oil and coal subsidies not reported.

Coal subsidies: Not reported for any country in the dataset. As a result, total subsidies may be slightly underestimated in all cases.

Data Sources

Climate Policy Initiative. (2024). Global landscape of climate finance 2024. https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2024/

International Renewable Energy Agency. (2024). Renewable power generation costs in 2023. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Sep/IRENA_Renewable_power_generation_costs_in_2023.pdf

Statista. (n.d.). Global solar power installation cost per kilowatt. Statista. https://www.statista.com/statistics/809796/global-solar-power-installation-cost-per-kilowatt/

United Nations Environment Programme. (2024). Emissions Gap Report 2024: No more hot air … please! United Nations Environment Programme. https://www.unep.org/resources/emissions-gap-report-2024

International Energy Agency. (2020). Capital costs of utility-scale solar PV in selected emerging economies. https://www.iea.org/data-and-statistics/charts/capital-costs-of-utility-scale-solar-pv-in-selected-emerging-economies

ENDNOTES

1 Meenakshi Ajith is an independent expert on global south energy transitions and multilateral climate policy; Development Policy Lead at the Institute for Competitiveness, New Delhi; and former Lead Consultant – Climate for India's G20 Presidency.

2 The GPP (Global Policy Pathway) refers to a scenario developed by the International Energy Agency (IEA) that outlines a normative trajectory to achieve global net-zero greenhouse gas emissions by 2050, based on enhanced policy ambition, technological deployment, and international cooperation. For more refer to IEA NET Zero Roadmap

3 The Asia Premium refers to the higher prices Asian oil-importing countries pay for crude oil compared to buyers in Europe or North America, despite similar or greater volumes. This price differential is influenced by factors such as limited regional supply options, long-term contracts, and weaker collective bargaining among Asian countries. The term was popularised in the early 2000s, particularly in relation to pricing practices of major Middle Eastern oil exporters.

4 Scope 1 emissions refer to direct greenhouse gas emissions from sources owned or controlled by an organization, such as emissions from company facilities or vehicles. Scope 2 emissions are indirect emissions from the generation of purchased electricity, steam, heating, or cooling consumed by the organization. These classifications are defined under the Greenhouse Gas Protocol, the most widely used international accounting standard for emissions reporting.

INSTITUTE FOR ECONOMIC JUSTICE

RESEARCH
POLICY
ADVOCACY

IEJ.ORG.ZA