

# Roadmap on transitioning away from fossil fuels in a just, orderly and equitable manner

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31 March 2026

In the Global Stocktake decision at COP28 in 2023, governments agreed to transition away from fossil fuels in a just, orderly and equitable manner, accelerating action this decade. At COP30 in 2025, the COP Presidency offered to coordinate a process to elaborate a roadmap that would guide this transition.

This submission is a response to COP30 President's request for inputs to the roadmap. It summarises a University of Cape Town working paper published in March 2026:

*Transitioning away from fossil fuels in a just, orderly and equitable manner: A quantitative overview of countries' different national circumstances, fossil fuel dependence and opportunities for flourishing post-fossil economies.*

[https://commerce.uct.ac.za/sites/default/files/media/documents/commerce\\_uct\\_ac\\_z/869/prism-working-paper-2026-2-muttitt-winkler.pdf](https://commerce.uct.ac.za/sites/default/files/media/documents/commerce_uct_ac_z/869/prism-working-paper-2026-2-muttitt-winkler.pdf)

The working paper examines how countries' circumstances shape their readiness to implement equitable fossil fuel transitions. It analyses quantitative patterns of fossil fuel dependence, drawing out policy implications, including the challenges and opportunities in complex transitions. It thus especially tackles the last of the questions in the COP30 President's request for submissions:

(d) How can a just, orderly and equitable transition best reflect the diverse realities of countries at different stages of development and with different degrees of dependence on fossil fuels?

The paper compares countries' diverse realities through many indicators. Some of these data are summarised at the bottom of this submission, for G20 countries and selected others. Please refer to the working paper for full data on all countries.

## Overview

Energy systems are already changing, with global demand for oil and coal set to peak by 2030 and for gas by 2035, even without further policy efforts. Governments will need to pursue equitable fossil fuel transitions not only to help achieve shared climate goals, but also to make their economies more resilient to these changes.

Transitioning away from fossil fuels offers opportunities to reduce energy costs, create jobs and build more prosperous economies. However, the process of transition will be harder in countries that depend on fossil fuels for energy supplies, employment and/or national wealth generation, and socio-economic impacts must be carefully managed to avoid harmful shocks. Moving at equal speed in all countries would make transitions more disruptive, less just and less orderly in the most dependent countries.

The working paper makes six recommendations for equitable fossil fuel transitions:

- **Seek early wins where there are greater opportunities and benefits** from transitioning, such as cheaper energy or improved energy security.
- In parallel, **invest now to overcome entrenched dependence on fossil fuels**, as economic diversification and structural transformation take time.
- **Differentiate timelines between countries**, such that every country moves as fast as it can, understanding more time is needed in countries with greater dependence.
- **Provide and mobilise** finance and capacity-building **support for low- and middle-income countries**, to boost their capabilities to invest in and manage transitions.
- **Build inclusive international coalitions** to provide peer learning and gain momentum, including both early-movers and those that need more time. **Build domestic coalitions** to create political support and engage stakeholders.
- **Avoid building new fossil** fuel-consuming or -producing facilities and infrastructure, and instead focus investments on alternatives that reduce dependence.

## Where, what and why?

Fossil fuel production is geographically concentrated. Three countries – China, the US and Russia – produced 49% of the world’s fossil fuels in 2023 (in energy terms), and another 11 countries – Saudi Arabia, Canada, Indonesia, India, Australia, Iran, UAE, Iraq, Qatar, Brazil and Norway – take the share up to 80%. Per-capita consumption of fossil fuels varies by income, averaging 157 gigajoules (GJ) in high-income countries, 84 GJ in upper-middle-income countries, 19 GJ in lower-middle-income countries, and just 3 GJ in low-income countries. High-income countries consumed 52% of oil and 62% of gas, but just 17% of coal.

Coal, oil and gas have quite different properties, and so play different functions in energy systems and in economies. Oil is transported much more than the other two fuels: only about 30% of the world’s oil is consumed in the same country where it is extracted, compared to 80% of coal and 70% of gas. While coal and gas are commonly used in domestic power generation and industrial development, oil extraction contributes to economies more through fiscal revenues and export earnings.

This submission considers three types of transitions:

- **Energy transitions**, from fossil fuels to cleaner energy systems (all countries);
- **Energy-economy transitions**, from fossil-fuelled industry to alternative economic development and employment drivers (some countries, especially coal consumers);
- **Economic transitions**, from dependence on fossil revenues and exports to diversified economies (some countries, especially oil and gas exporters).

## Energy transitions

Equitable fossil fuel transitions will create opportunities and benefits:

- Renewable energy generates the cheapest power in countries accounting for over 80% of global power generation. However, in lower-income countries, there is less or no cost advantage due to the high cost of capital. Reducing the cost of capital would massively accelerate and broaden transitions.
- Fossil fuel importers will see energy security benefits from transitions. The cost of net fossil fuel imports exceeds 5% of GDP in 50 countries; it exceeds 10% in 12 of these.
- Energy transitions will reduce health-damaging air pollution. In 42 countries, fossil fuel pollution causes more than 50 deaths per 100,000 (living) population each year.

Transitions will take longer in energy systems that rely heavily on fossil fuel infrastructure, as they have further to go to decarbonize, need to overcome inertias, and face stranded assets.

- Phasing out global coal use faster than oil and gas can put disproportionate burden on emerging economies that rely heavily on coal power. To better balance burdens, faster oil and gas transitions are needed. High-income countries generate more gas power and less coal power on average, compared to middle-income countries.
- Coal plants in most developing countries are younger than in industrialised nations, meaning that initial investment costs have not yet been paid off, and transitions would come at greater cost in terms of stranded assets.
- In most developing countries, new supply is needed to meet growing energy demand, in addition to replacing existing fossil supply. Whereas the electricity access gap is primarily in rural areas that can mostly be electrified using distributed renewable energy, there are also wider problems of energy poverty – including limited, unreliable or costly supply - that require greater centralized supply too.

There are many solutions to integrating variable renewables into power grids; this can proceed fastest and most effectively in countries with strong institutional capabilities and infrastructure. Integration will take longer elsewhere: for example, in the 38 (mostly developing) countries where the average consumer experiences more than one blackout, or more than one hour of blackouts, per month.

## Energy-economy transitions

Energy–economy transitions are needed in contexts where fossil consumption shapes not only energy but the overall economy. For example, most coal is used domestically, and has strong forward and backward linkages, extending its economic impact beyond coal mining (upstream) to users of coal (downstream) such as power stations and industry. Examples include China, South Africa and India. Energy-economy transitions shift societies from fossil-dependent industrialisation to alternative drivers of economic development and employment.

Clean energy creates more jobs than fossil fuels, per unit of energy and per unit of investment. Transitions away from fossil fuels will thus be job-creating overall. However, not all new clean jobs will be in the same locations, of the same quality (in terms of job security, salary or unionisation) or requiring the same skills as declining fossil fuel jobs. Policy efforts will be needed to address these gaps, and to manage the process of transition in a just way. Countries differ in the scale of these tasks:

- Fossil fuel jobs (other than informal coal miners) are commonly among the highest-paid, and can play a more important economic and social role than their numbers alone would suggest, as a larger share of total earnings.
- Direct fossil fuel employment is rarely more than 1-2% of the national workforce. However, regionally it is more significant: between 5% and 8% in the coal-producing regions of Colombia, Indonesia and South Africa. The effects of dependence can be intensified where more people rely on each fossil fuel job.
- The number of jobs indirectly dependent on fossil fuel can be significantly larger than those in extraction, refining and or power generation. Others are employed in providing supplies or services to fossil fuel operations, in energy-consuming sectors; in local economies supported by fossil fuel workers' salaries, or in public sector jobs where fiscal revenue from fossil fuels pays their salaries.

Several fossil-dependent economies are failing to create jobs for growing populations, and face risks of becoming uncompetitive, unproductive and stagnating. Often fossil-producing regions have high levels of poverty and inequality, environmental degradation, weak institutions and few other sources of income. The solution is not simply to replace fossil jobs with alternative ones, but to transform economies to rest on a more diversified base. Providing jobs for growing populations can be enabled by a shift away from capital- and

energy-intensive, fossil-based economies. Such transformation is no small task, and will take time in the most dependent economies.

## Economic transitions

Economic transitions involve shifts from dependency on income from fossil-fuel exports, to more diversified economic structures. The extent to which fossil fuel revenues generate national wealth is the most significant difference in country circumstances for implementing equitable fossil fuel transitions:

- In 22 countries, oil and gas generated more than 20% of fiscal revenue in 2021; in about 10 of these countries, it is more than 50%, and in some as high as 90%. Other major producers are not significantly dependent on fossil revenues: for example, in the US and Canada, fossil fuels provide less than 2% of total fiscal revenues.
- About 20 countries rely on oil and gas for more than half of their exports, some of them at 90% or higher.
- As for coal, only in Mongolia does it constitute a major share of exports, at around 50% of the total (in no other country does it constitute more than 20%).

Countries that are highly dependent on oil and gas revenues face serious economic threats as the world transitions away from fossil fuels, and their export markets decline. Previous periods of low oil prices have caused reductions in delivery of public services and loss of jobs, and sometimes wider macroeconomic crises, including loss of investor confidence, economic contraction, inflation and falling exchange rates. Whereas past episodes have been temporary, the global energy transition must be systemic and long-term.

In an unfortunate irony, the countries that most need to boost economic resilience by transitioning away from oil and gas exports are the countries that will find it hardest to do so: high dependence on fossil revenues both creates vulnerability and creates barriers to reducing it. Too fast a transition of their economies may raise the same issues as the external demand shock: loss of fiscal revenue or of export earnings.

Governments will need to diversify both their economic base and their sources of fiscal revenue, while keeping their populations on board with the vision for the economic future. What is therefore required is a reimagined approach to structural transformation, moving from the focus in traditional economics on increasing productivity, to ensuring that economic transitions achieve multiple objectives of creating employment and reducing emissions. The process of diversifying and structurally transforming an economy faces economic and political barriers, and generally takes decades, meaning it is important to start now.

## Capability and readiness

A country's ability to overcome the challenges of dependence will be shaped by its capabilities. Many developing countries have the combined problems of less diversified energy systems and economies, and fewer financial and institutional capabilities to invest in the process. International support will be needed to help close this gap.

In coal transitions, governments have tended to make international political pledges only when coal power is already declining: national efforts and progress come first. For countries where fossil production or consumption are growing, transitions imply a change in the vision of the country's future, which takes time. Countries in decline or whose geological fossil fuel reserves are depleting are more ready to engage in accelerating transitions.

Transitions will be more achievable – and more just, orderly and equitable – through international cooperation than by each country acting on its own. Without international support, countries with limited budgets and pressing developmental priorities may be unable to transition, beyond strengthening their own economic resilience, and in some cases not even that. International coalitions promoting equitable fossil fuel transitions should be able to include those who find it easier to make commitments and support those who face greater challenges. Coalition-building should focus both on achieving early gains where opportunities are greater, while also including countries facing greater challenges and needing more time. By proactively building these broad coalitions, the international community can foster 'broad front politics' that mediate conflicting interests, and provide the necessary finance and capacity-building to help highly dependent nations manage their specific structural transformations.

Similar principles apply to building societal support for transitions at home. Governments can make progress through political coalitions benefiting from opportunities and early wins, while investing for the long term in overcoming dependence, together with key stakeholders.

Table 1 illustrates some key indicators for selected countries. We show near-term opportunities (green), and investments now in overcoming longer-term dependence (orange). Declining trends in fossil production and use (blue) suggest greater readiness to accelerate transitions, while increasing trends (red) require a change of course.

Having noted the challenges of fossil fuel dependence, there are clear dangers in deepening a country's dependence by adding more fossil fuel capital, which will make transitions harder and more costly. A key element of acting now for the long term is to focus investments on alternatives; indeed, avoiding future commitments to fossil fuels is an obvious first step on the path to reducing dependence.

## Policy recommendations

For all governments:

- **Ensure just transitions for workers and communities:** to address disparities in geography and skills, to sustain livelihoods and ensure the quality of new jobs, to build local and regional economies, and to manage the transition process fairly.
- **Stop building new fossil projects:** to focus capital investments instead on alternatives that reduce dependence.

For developed countries and financial institutions:

- **Reduce the cost of capital** for renewable energy development in developing countries: including by derisking investments, increasing international public finance, and removing biases in credit ratings agencies.
- **Adopt clean technologies** as early-movers, helping bring down their costs through learning-by-doing.
- **Provide and mobilise finance and capacity-building** to enable equitable transitions in low- and middle-income countries.

For governments of fossil-fuel-dependent countries:

- **Invest now in long-term transitions:** pursue economic diversification without delay, to stay ahead of changes in global energy markets, and putting in place enablers of long-term sustainable development; .

- **Diversify the economy:** Implement economic diversification including through infrastructure, skills and innovation support; and adopting industrial policies to support and invest in targeted sectors that play to the country's strengths.
- **Assess and manage economic risk:** while initiating transitions, hedge economic risks through economic diversification to build alternative sectors and sources of fiscal revenue.
- **Pursue structural transformation:** evolving from a narrow focus on increasing productivity per worker, to also increase employment, reduce fossil fuel dependence and achieve Sustainable Development Goals.
- **Diversify fiscal revenue sources:** by introducing new sources such as excise, value-added or income taxes, and by strengthening mechanisms for collection of existing revenue streams.

**Table 1: Indicators of dependence and barriers (orange), transition opportunities (green) and increase/decrease (red/blue) for selected countries**

Country	Power generation					Fossil imports share of GDP (2023)	Fossil air pollution deaths /100,000 population (2023)	Share of workforce			Oil and gas of fiscal revenues (2021)	Fossil share of gross exports (2023)	Change 2018-23		
	Coal share (2023)	Fossil share (2023)	Average age of coal plants, years (2024)	Solar PV cost of capital (2024)	Cheapest LCOE source of generation (2024)			Fossil extraction (2023)	Fossil-fuelled manufacturing <sup>j</sup> (2022)	Fossil-funded public sector <sup>ii</sup> (2023)			Coal generation	Oil & gas extraction	Gas consumption
Argentina	1%	53%	n/a	17%	wind	0.3%	29	0.3%	10%	4%	20%	3%	n/a	+13%	-11%
Australia	47%	66%	35.5	4%	solar	exp	11	0.5%	8%	0.3%	0.3%	28%	-19%	+34%	+31%
Brazil	2%	9%	n/a	8%	wind	exp	24	no data	4%	1%	5%	14%	-31%	+25%	-17%
Canada	4%	20%	n/a	5%	wind	exp	13	0.3%	4%	0.4%	2%	26%	-53%	+9%	+7%
China	62%	65%	12.6	4%	wind	2.6%	121	0.5%	22%	0.1%	0.5%	1%	+23%	+25%	+39%
France	1%	7%	n/a	3%	solar	2.4%	39	-	6%	-	-	3%	n/a	n/a	-24%
Germany	27%	44%	29.6	2%	solar	2%	55	0.1%	13%	-	-	3%	-44%	n/a	-16%
India	74%	78%	14.3	7%	solar	3.7%	88	0.4%	9%	0.1%	2.4%	14%	+23%	-5%	+11%
Indonesia	69%	84%	9.5	8%	coal	exp	46	0.2%	11%	1%	8%	19%	+62%	-11%	+12%
Italy	5%	55%	n/a	5%	solar	3%	82	-	15%	-	-	3%	-54%	-19%	-15%
Japan	29%	65%	22.8	3%	solar	4.5%	59	-	12%	-	-	1%	-15%	n/a	-20%
Mexico	9%	77%	n/a	9%	solar	0.7%	36	no data	15%	2%	19%	6%	+21%	+3%	+8%
Russia	18%	63%	42.1	11%	gas	exp	66	no data	8%	7%	23%	43%	+19%	-9%	+2%
Saudi Arabia	0%	99%	n/a	6%	no data	exp	6	no data	8%	7%	58%	77%	n/a	-5%	+10%

Country	Power generation					Fossil imports share of GDP (2023)	Fossil air pollution deaths /100,000 population (2023)	Share of workforce			Oil and gas share of fiscal revenues (2021)	Fossil share of gross exports (2021)	Change 2018-23		
	Coal share (2023)	Fossil share (2023)	Average age of coal plants (2024)	Solar PV cost of capital (2024)	Cheapest LCOE power generation (2024)			Fossil extraction (2023)	Fossil-fuelled manufacturing (2023)	Fossil-funded public sector (2021)			Coal generation	Oil & gas extraction	Gas consumption
South Africa	83%	87%	32.8	7%	solar	4.1%	50	0.4%	9%	-	0.2%	9%	-17%	n/a	-27%
South Korea	34%	62%	14.6	5%	coal	6.4%	70	-	11%	-	-	6%	-22%	n/a	-0%
Türkiye	36%	57%	19.0	11%	wind	1.2%	55	-	17%	-	-	4%	+5%	+44%	+1%
UK	2%	37%	n/a	3%	wind	1.4%	49	0.1%	6%	0.01%	0.2%	8%	n/a	-27%	-20%
US	17%	60%	43.2	5%	wind	exp	22	0.2%	7%	0.03%	0.2%	16%	-42%	+24%	+13%
Other countries	BWA 99% XKK 87% MNG 85%	BHR 100% BRN 100% KWT 100% LBY 100% TMN 100% TTO 100% DZA 99%	VNM 8	GHA 16%; PAK 16%; TUN 16%		CPV 34% LBN 22% MRT 16% LBR 15%	BGR 192 SRB 160 BIH 151	NOR 2.1% IRQ 1.4%	TUN 19% IRN 18%	IRQ 33% DZA 16%	LBY 97% IRQ 88% SSD 86% TLS 80% GNQ 80%	KWT 95% AGO 94% NGA 89% AZE 88%			

<sup>i</sup> Manufacturing share of workforce, multiplied by direct and indirect fossil share of manufacturing energy

<sup>ii</sup> Public sector share of workforce, multiplied by oil and gas share of fiscal revenue