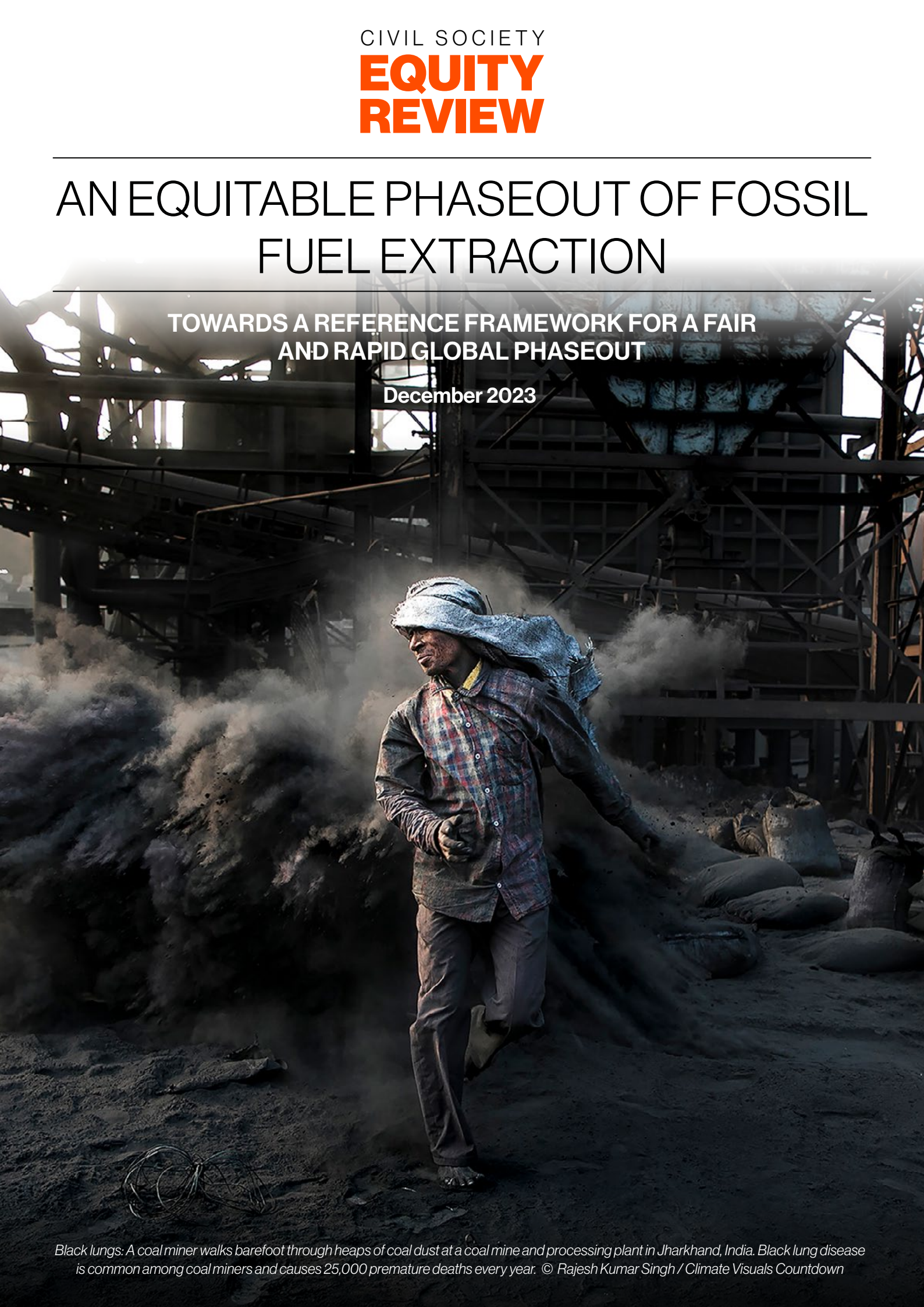
CIVIL SOCIETY

EQUITY REVIEW

AN EQUITABLE PHASEOUT OF FOSSIL FUEL EXTRACTION

TOWARDS A REFERENCE FRAMEWORK FOR A FAIR AND RAPID GLOBAL PHASEOUT

December 2023



Black lungs: A coal miner walks barefoot through heaps of coal dust at a coal mine and processing plant in Jharkhand, India. Black lung disease is common among coal miners and causes 25,000 premature deaths every year. © Rajesh Kumar Singh / Climate Visuals Countdown

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- Climate Watch Thailand
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- Fridays For Future India
- Ghani Welfare Foundation, Bangladesh
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- Human Rights Alliance, Nepal
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- United Kingdom Without Incineration Network (UKWIN)
- Uplift, United Kingdom
- Women's International League for Peace and Freedom UK, United Kingdom
- Zero Waste Alliance Ireland

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- CESTA Friends of the Earth El Salvador, El Salvador
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- Canadian Engaged Buddhism Association, Canada
- Canadian Interfaith Fast For the Climate
- Canadian Voice of Women for Peace
- Care About Climate, United States
- Center for Biological Diversity, United States
- Citizens Climate Lobby Canada
- Climate Action for Lifelong Learners (CALL), Canada
- Climate Action Network Canada (CAN-Rac)
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- Climate Emergency Coalition, United States
- Climate Emergency Unit, Canada
- Climate Nexus, United States
- ClimateFast, Canada
- David Suzuki Foundation, Canada
- Destination Zero, Canada
- Earth Action, Inc., United States
- Earth Justice Ministries, United States
- EcoEquity, United States
- Environmental Defence Canada
- For Our Kids, Canada
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- George Mason University Center for Climate Change Communication, United States
- Grandmothers Act to Save the Planet (GASP), Canada
- Grandmothers Advocacy Network, Canada
- Green 13, Canada
- Green Neighbours 21, Canada
- Institute for Policy Studies Climate Policy Program, United States
- Interfaith Power & Light, United States
- Kelly Creek Protection Project of Earth Island Institute, United States
- Movement Rights, United States
- New Progressive Alliance, Canada and the United States
- North American Climate, Conservation and Environment (NACCE), United States
- North Carolina Council of Churches, United States
- North Carolina Interfaith Power & Light, United States
- Ontario Climate Emergency Campaign, Canada
- Physicians for Social Responsibility Pennsylvania, United States
- Shift: Action for Pension Wealth & Planet Health, Canada
- Stop Line 9 Toronto, Canada
- The Climate Reality Project Canada
- The Earth Bill Network, United States
- Toronto East End Climate Collective, Canada
- Unitarian Universalist Service Committee, United States
- Vegans & Vegetarians of Alberta, Canada
- Wall of Women, United States
- Windfall Ecology Centre, Canada
- World Federalist Movement - Canada

Oceania

- Aotearoa New Zealand Human Rights Foundation
- ARRCC (Australian Religious Response to Climate Change)
- Climate Action Merribek, Australia
- Climate Action Monaro, Australia
- Climate Action Network Australia, Australia
- Climate Justice Programme, Australia
- College of Nurses Aotearoa, New Zealand
- GetUp, Australia
- New Zealand Climate Action Network
- New Zealand College of Public Health Medicine
- Parents for Climate Aotearoa, New Zealand

CONTENTS

Canada is home to the largest bitumen deposits in the world. The mining operations in the Alberta tar sands strip the boreal forest and deep layers of soil off thousands of square kilometers of land, leaving behind devastated landscapes and massive reservoirs of toxic sludge. Oil and gas extraction activities are Canada's largest source of greenhouse gas emissions. © Kris Krug

KEY MESSAGES

This report proposes a reference framework designed to guide a rapid phaseout of fossil fuel extraction. It seeks national actions that would be consistent with both scientific analysis of the 1.5 °C limit and fundamental fairness principles. It finds:

- Fossil fuel extraction must be stopped urgently where it violates human rights, especially the Rights of Indigenous Peoples.
- To have a decent chance of holding to the 1.5 °C limit, fossil fuel extraction must begin to decline immediately, phase down rapidly in the coming decades, and cease worldwide by 2050.
- There is no room for new oil and gas fields or coal mines to be opened anywhere in the world. All investment in the further build-out of fossil-fuel infrastructure must stop immediately.
- All countries must phase out fossil fuel extraction as quickly as possible. Given the challenges, this will be politically achievable only if it is widely accepted as fair.
- Countries that are highly dependent on extraction will need time to disentangle their societies from fossil fuels and build new economies (although this does not give them license to continue extraction when it violates human rights). This will be extremely difficult in poorer countries such as Iraq and South Sudan, where fossil fuels account for the vast majority of economic activity.
- To leave highly-dependent, poorer countries with enough carbon budget to phase out extraction in a reasonably just manner, less-dependent countries – which face much less challenging prospects – must phase out much more quickly. The least socio-economically dependent countries like Canada, the United States, Norway, Australia, and the UK, must end fossil fuel extraction by the very early 2030s.
- In addition, wealthy countries must provide significant amounts of climate finance and international phase-out support to the transition in poorer, dependent countries. This support and finance should eventually be based on proper country-led need-based assessment processes, however our initial analysis – which merely defines a very conservative lower bound – finds that support on the order of hundreds of billions of dollars per year will be needed.
- The support and climate finance necessary to empower rapid fossil-fuel extraction phaseout must be provided by the countries with the highest capacity and the highest responsibility for historic emissions. These include both countries that extract large amounts of fossil fuels (US, Canada etc.) and those that do not (France, Japan etc.), for after all the latter industrialized and grew wealthy in a world where they themselves benefitted from unconstrained fossil fuel use.

Since the beginning of oil production in Nigeria, leaks, spills and sabotage splashed oil throughout the Niger Delta destroying fisheries and farms of local people. Environmental grievances are met with force and intimidation as fisherfolks, farmers and small minorities continue to lose their traditional means of livelihoods. In 1992 the United Nations declared the Niger Delta to be the world's most ecologically endangered delta as a result of crude oil exploration and exploitation.
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EXECUTIVE SUMMARY

This report proposes a framework for equitably phasing out fossil fuel extraction. It specifies phaseout timeframes grounded in shared equity principles and the particular national circumstances of extracting countries, and makes an initial assessment of the nature and scale of the climate finance and international support that can make these timeframes achievable.

In our 2021 report,[1] the Civil Society Equity Review identified five principles to guide an equitable phaseout, with country examples that illustrate their practical application:

1. Stop extraction when it violates human rights,
2. Phase out global extraction at a pace consistent with the 1.5 °C limit,
3. Enable a just transition for workers and communities,
4. Reduce extraction fastest in countries least socially dependent on fossil extraction,
5. Share transition costs fairly, according to capacity to bear those costs.

This new report offers provisional quantitative estimates of the questions that follow from these principles: – how fast should each country phase out, with how much international support, provided by whom? In so doing, it draws on three fundamental concepts: capacity, responsibility and dependence (see box 1).

This framework emerged from long debate, and its central ideas are well established in both the equity literature and the climate justice movement. In particular, the Civil Society Equity Review has long championed an approach to common but differentiated responsibilities and respective capabilities based on clearly argued principles and dynamic underlying data, which reflects changing real-world circumstances (see online methodology supplement). We build also on the phaseout timeframes offered in the Tyndall Centre's 2022 report,[2] by expanding the concept of fossil fuel dependence and, even more importantly, integrating the analysis of national phaseout timeframes with the support necessary to actually achieve them.

Importantly, equitable phaseout should *not* be understood as allocating fair shares of the remaining extraction of fossil fuels, as in "extraction rights." Such an approach would make sense only if fossil fuel extraction was something beneficial to be shared, whereas in reality, extraction is commonly associated with pollution, human rights violations, tax avoidance, and the resource curse, not to mention the worsening climate crisis. Rather, an equitable approach aims to ensure the *social impacts of transition* are fairly shared.

OVERVIEW OF OUR EQUITABLE PHASEOUT FRAMEWORK

A 1.5 °C-consistent phaseout must be very rapid, because carbon budgets are now so depleted. All countries must therefore phase out fossil fuels as quickly as possible. However, the maximum possible phase-out pace differs between countries. In countries that are heavily dependent on fossil fuel extraction, too rapid a transition would risk energy poverty, loss of public services, and unemployment. Phaseout time frames must allow countries to manage these social impacts and develop alternatives, while providing the finance and support that they need to do so.

Our framework starts with the IPCC's Low Energy Demand pathway, which gives us a 1.5 °C-consistent global carbon budget and rate of fossil fuel phaseout. We then adjust each country's individual phaseout pathway from this global average rate, in proportion to a combination of three measures of the country's dependence on fossil fuel extraction: for domestic energy supplies, for government revenues, and for jobs. In the combined measure each component of dependence is weighted more heavily for countries with lower capacity to manage a transition, reflecting the greater challenges and potential disruption such a transition poses to poorer countries. We assess the degree of dependence separately for oil, gas and coal for each country.

Differentiated phaseout timelines will not alone be enough to ensure phaseouts are fair: many countries will only be able to phase out extraction if they are provided with international support. Therefore, the two defining elements of any plausibly fair quantitative extraction phaseout framework – timelines and support – are inseparable. And, again, there is no room for new oil and gas fields or coal mines – investment in fossil-fuel infrastructure must stop immediately, in wealthy and poor countries, regardless of how dependent they are on existing fossil-fuel extraction.

In this framework, the required financial support is divided into "fair shares" based on principles that have long been well accepted in the broader climate equity discussion: capacity (measured by financial resources above and beyond what is needed to sustain a modest but decent standard of living) and responsibility (cumulative historic emissions contributing to the climate problem). Here, countries with per-capita capacity above the global average, which together account for roughly ⅔ of global GDP, are providers of support, whether or not they themselves extract fossil fuels. All others are recipients of support. Fair shares of the global support are allocated in proportion to a combined index of countries' responsibility and capacity.

Non-financial elements of support include a restructuring of the global institutions responsible for investment, debt, trade, technology, and other overarching systems that govern the international economic system, and thus the developmental space within which poor countries must negotiate their futures (the 2022 Civil Society Equity Review report focused on the multiple dimensions of international support that are needed to enable an equitable global transition).

KEY FINDINGS - PHASE-OUT TIMELINES AND INTERNATIONAL SUPPORT

Here we present our preliminary results for phaseout timeframes, as well our conservative analysis of the associated support requirements. Figures ES-1, ES-2 and ES-3, and table ES-1 show the results. We underscore, however, that it has been necessary to rely on data that is not in all cases complete, and choices and assumptions that will benefit from broader civil society discussions.

PHASE-OUT TIMEFRAMES

These phase-out charts show, on their horizontal axes, the year by which each country must end extraction of each fossil fuel.[3] The vertical axis organizes countries by capacity. Note that those below the blue line will need international support to enable their phaseouts, while those above the line cannot expect such support, and should phase out by their own efforts as well as provide support to those that need it.

In this report, we specify years by which extraction must end as a neat, accessible way of thinking about phase-out timelines. However, this does not mean countries can continue however they like until that date: rather, achieving the Paris goals requires all countries to rapidly reduce their extraction, beginning immediately. Table ES-1 thus also states the required percentage reduction in each country's 2030 extraction, relative to current levels.

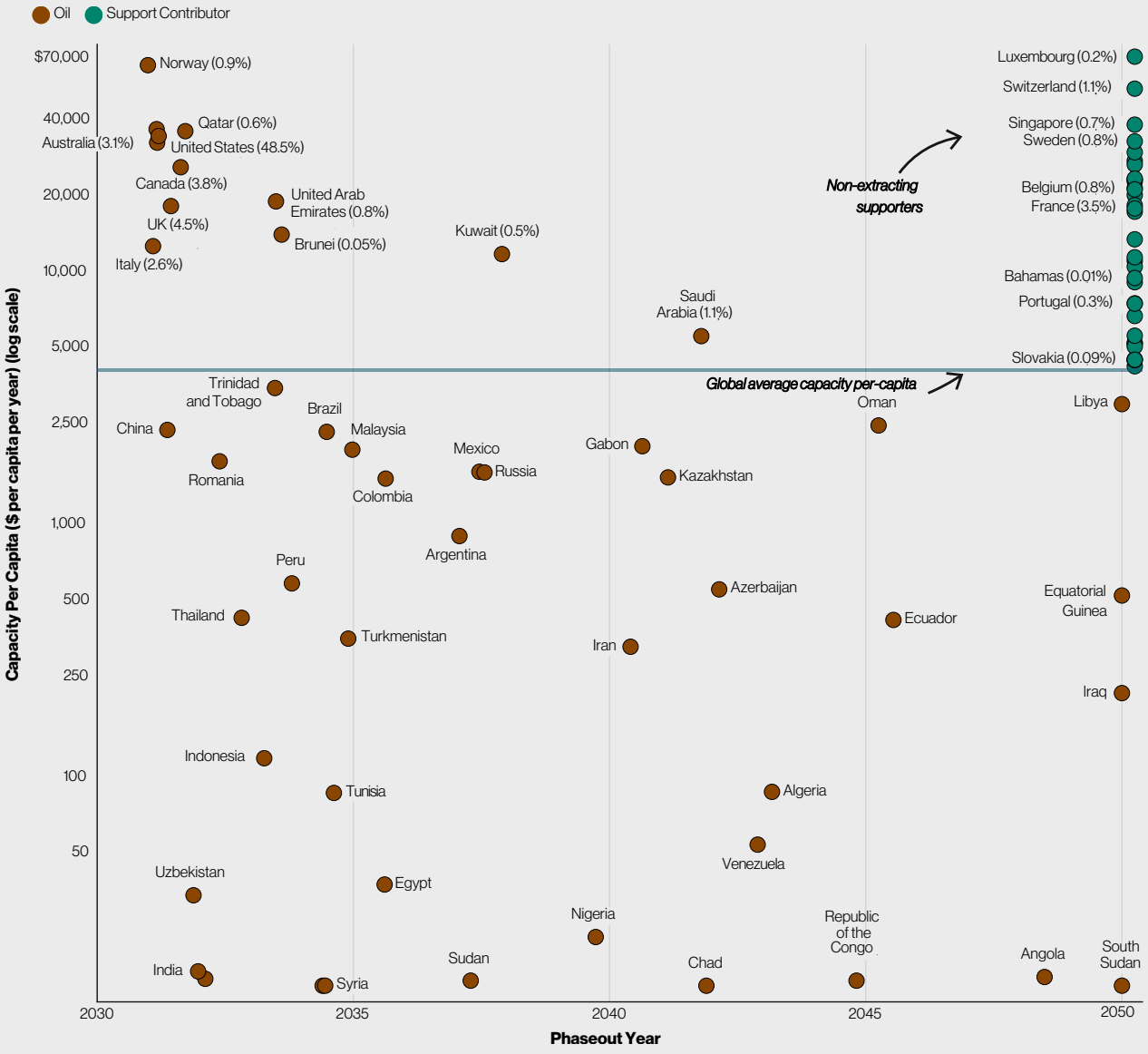


Figure ES-1: Phase-out years for oil-extracting countries plotted against their capacity, and provision of support.
The horizontal blue line, set at global average per-capita capacity, delineates countries eligible to receive support for their oil extraction phaseout (below the line) from those that are expected to contribute to this support. For the latter, the numbers in parentheses indicate the share of the global support they should provide. Support contributors listed on the right edge of the chart (green dots) do not have their own oil extraction to phase out; only some are identified with labels. Countries shown here are those included in the Statistical Review of World Energy, which contains some data gaps that will be closed in subsequent releases of this analysis.

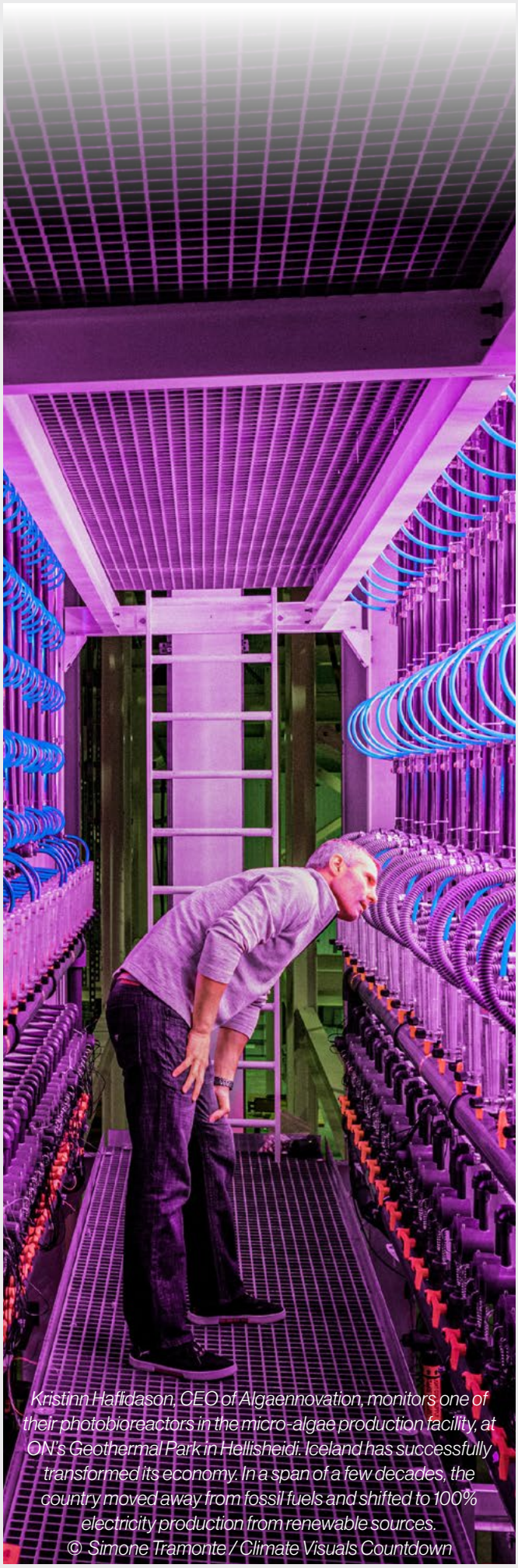
Obviously, these phase-out timeframes are enormously challenging: ending extraction by the early 2030s for the fastest phaseouts, and by 2050 for the very slowest. All countries must phase out much earlier than their governments would choose. However, this is the only way CO_2 emissions can conceivably be kept within the nearly depleted 1.5 °C budget. The stringency here results not from the constraints of equity, but from the extremely limited remaining 1.5 °C-consistent carbon budget. Some scenarios propose more forgiving budgets, even while claiming to be consistent with 1.5 °C, but they can only do so by betting on the widespread deployment of future technologies to justify significant near-term overshoot of the budget, with severe attendant risks if that bet does not pay off. Since one of our primary premises is that the welfare of the world's poor and vulnerable must be protected, we believe such a gamble on people's future well-being would be unjust as well as reckless.

Figure ES-1 (oil extraction phaseout) is probably the best place to start. We see that for countries with low dependence and high capacity – in the top-left of the graph – the calculated extraction end dates are between 2030 and 2035, and they are support providers as well. For example, the United Kingdom phases out oil extraction by 2031, and (see table ES-1) provides 4.5 % of the required global support. The United States phases out on the same timeline, but, being a large and wealthy economy, its very high capacity means it must also provide a sizable 48.5 % share of the support. Brunei and the UAE have higher levels of dependence on oil revenues and jobs, but only phase out slightly later, in 2033, because their considerable financial capacity enables them to invest in alternative sectors to overcome this dependence.

Conversely, the bottom-right of the graph contains countries with very high dependence on fossil fuels and very low capacity. Though they must begin reducing extraction immediately, their phaseout proceeds at a slower pace, winding down in the late 2040s. Countries such as Iraq, South Sudan, Angola, and Republic of Congo are among the most extreme examples, not least because of their high dependence on oil revenues for providing public services. With very low capacity, these countries will also need substantial international finance and support to be able to phase out oil extraction soon without enormous social disruption.

Toward the top-right are countries with high dependence and also high capacity, including Kuwait and Saudi Arabia, which phase out extraction respectively in 2037 and 2041. These countries need time to restructure their economies, but they have high per-capita capacity and are still providers of support to others – this includes the Middle East exporters, which are not Annex II countries in the UNFCCC.

In the bottom left are countries with low dependence but also low capacity, such as India, Tunisia and Peru. Since their dependence is relatively low, they should aim for a rapid transition by the early 2030s, but given their low capacity, this can only happen if they receive sufficient support. While it might seem counterintuitive to have Southern countries phasing out so rapidly, this group more than any other illustrates the central importance of international support in making rapid global fossil-fuel phaseout feasible – roughly half of current oil production occurs in countries below the capacity threshold shown above, and the same is true of gas.



Kristinn Hafidason, CEO of Algaennovation, monitors one of their photobioreactors in the micro-algae production facility, at ON's Geothermal Park in Hellisheidi. Iceland has successfully transformed its economy. In a span of a few decades, the country moved away from fossil fuels and shifted to 100% electricity production from renewable sources.
© Simone Tramonte / Climate Visuals Countdown

Figure ES-2, showing coal phaseout, is structurally identical to the oil chart above. As a whole, coal is phased out faster than oil and gas, with all phaseouts before 2040. This is because coal provides considerably less public revenue than oil or gas, as well as less employment, resulting in generally lower levels of dependence of coal producers on extraction than oil and gas producers. Dependence on coal mining is largely linked to its use for domestic energy supplies. This result is consistent however with the faster coal phaseouts seen in techno-economic climate model scenarios, which are driven by energy sector considerations that favor oil and gas over the more carbon intensive coal.

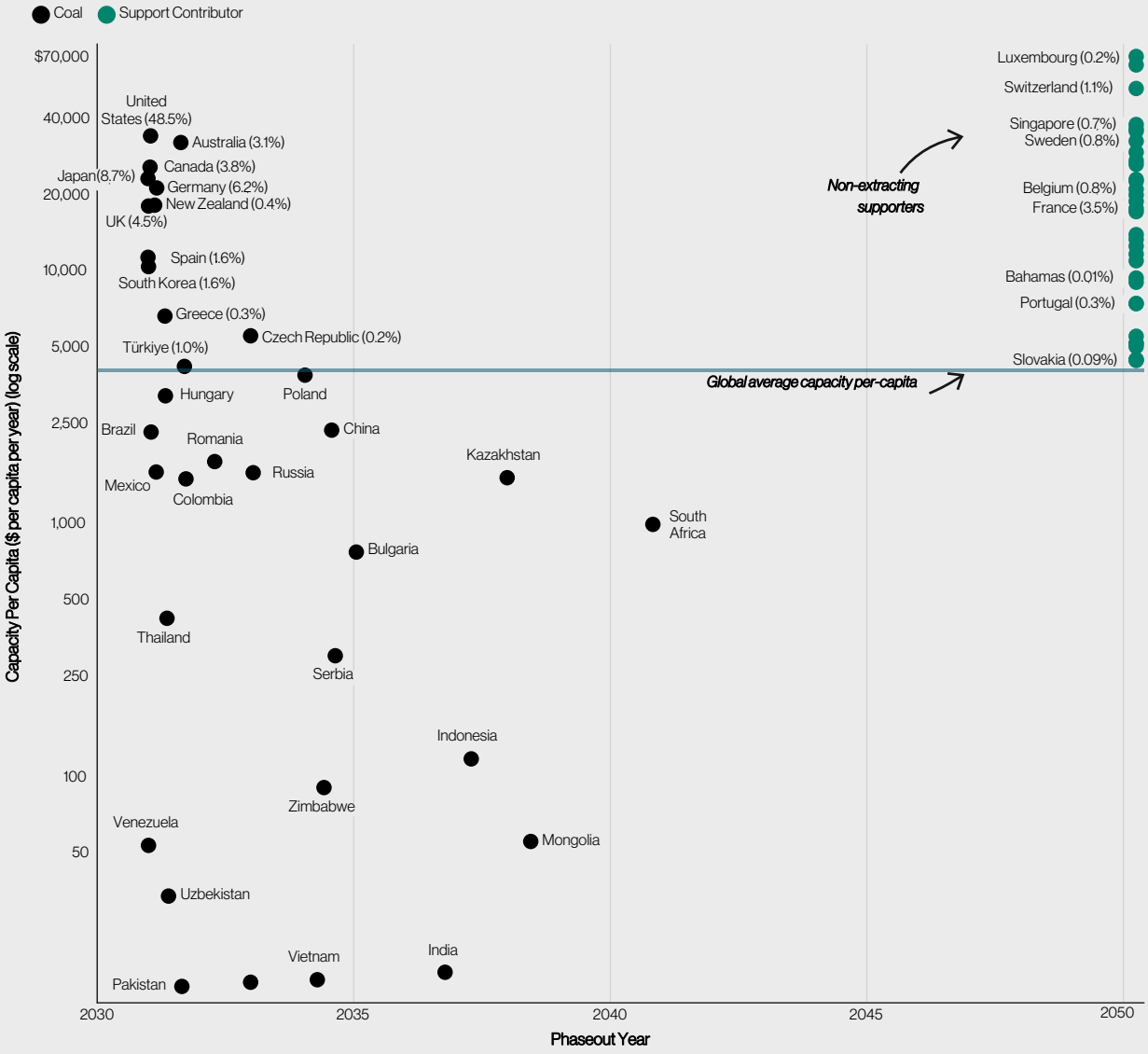


Figure ES-2: Phase-out years for coal-extracting countries plotted against their capacity, and provision of support.
See caption of Figure ES-1 for further details.

In particular, note the coal phaseout in India in 2036 and South Africa in 2040 – these are very challenging timeframes given these countries' low capacities. This result highlights the crucial role of support – without it, rapid phaseout will be nearly impossible, and given coal's large share of global carbon emissions, holding within the extremely small remaining 1.5 °C carbon budget will be impossible as well.

Finally, Figure ES-3 shows gas phaseout. We see the highest levels of dependence in Turkmenistan and Trinidad and Tobago, both of which depend on gas extraction in all three of our framework's dimensions – energy, revenue and jobs – and hence see phaseout dates in the late 2040s. All the producers above the line, most notably the US (which is responsible for more than 20 % of global gas production) are required to phase out quickly, all by the mid-2030s This is true even of Qatar, which - like UAE and Brunei for oil - is fairly dependent on gas extraction, but has a very high capacity that enables it to overcome this dependence, hence the early phaseout date of 2032. Venezuela is also an interesting example, in that it's dependence on coal production is low, and it is thus expected to phase it out rapidly (as shown in the first chart), in contrast to its dependence on oil and gas production, which is quite high, explaining the longer phaseout period seen in the oil and gas charts above.

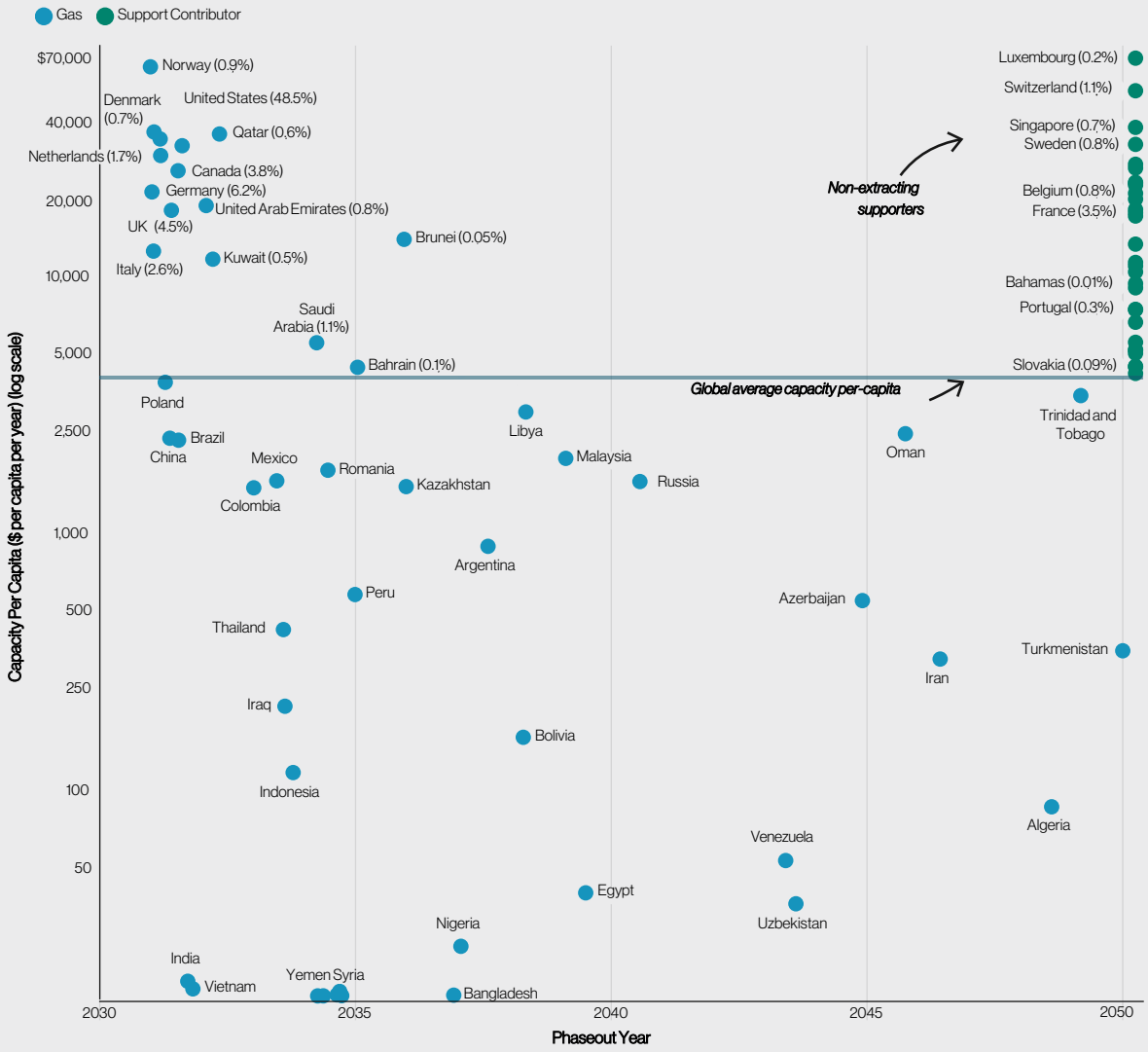


Figure ES-3: Phase-out years for gas-extracting countries plotted against their capacity, and provision of support.
See caption of Figure ES-1 for further details.

Destroyed infrastructure, buildings and businesses are among the damages caused by a gas explosion that took place along Bree Street in the Johannesburg Central Business District, South Africa. Picture: Itumeleng English / African News Agency (ANA)

INTERNATIONAL SUPPORT

The first two columns in table ES-1 show key results from the international support analysis, the fair share of the provision of the total global fossil-fuel extraction phase-out support needed for the main support-providing countries.

Recall that *all* extracting countries must immediately cease all new investment in extraction, and phase out their existing fossil extraction in line with the phaseout dates indicated above. Thus, the support fair shares assigned to, say, the UAE or Norway, are by no means the whole of the effort that an equitable global phaseout would demand of them, but rather a support obligation that comes in addition to their domestic efforts to phase out extraction.

Still, these obligations can be significant, particularly in the case of the US, which is assigned a 48.5 % share. This is a strikingly large figure, but it is not surprising – the US includes a large population of globally affluent people, and they contribute mightily to the US's very high share of total global capacity[4] (see *Implications by Country,* below).

	Fair Share of Support		Oil		Coal		Gas	
Country	%	$bn per year	Phaseout Year	Reduction in 2030 (%)	Phaseout Year	Reduction in 2030 (%)	Phaseout Year	Reduction in 2030 (%)
United States	48.5%	117	2031	81.4%	2031	82.5%	2031	81.5%
European Union	21.4% *	52						
Japan	8.7%	21			2030	82.9%		
Germany	6.2% *	15			2031	81.6%	2031	82.7%
United Kingdom	4.5%	11	2031	79.4%	2030	82.9%	2031	79.8%
France	3.9% *	9						
Canada	3.8%	9	2031	78.0%	2031	82.6%	2031	78.8%
Australia	3.1%	8	2031	81.6%	2031	78.0%	2031	78.2%
Italy	2.6% *	6	2031	82.1%			2031	82.4%
Netherlands	1.7% *	4					2031	81.4%
South Korea	1.6%	4			2030	82.9%		
Spain	1.6% *	4			2030	82.9%		
Switzerland	1.1%	3						
Saudi Arabia	1.1%	3	2041	27.4%			2034	59.1%
Norway	0.9%	2	2030	82.9%			2030	82.9%
United Arab Emirates	0.8%	2	2033	64.1%			2032	74.6%
Qatar	0.6%	2	2031	77.3%			2032	72.6%
Kuwait	0.5%	1	2037	39.9%			2032	73.6%
Libya	n/a		2050	11.0%			2038	38.1%
Oman	n/a		2045	20.4%			2045	19.6%
China	n/a		2031	80.0%	2034	57.0%	2031	80.0%
Brazil	n/a		2034	57.5%	2031	82.5%	2031	78.7%
Malaysia	n/a		2034	54.4%			2039	35.3%
Mexico	n/a		2037	41.7%	2031	81.7%	2033	64.4%
Russia	n/a		2037	41.3%	2033	67.3%	2040	30.6%
Kazakhstan	n/a		2041	29.0%	2037	39.5%	2035	48.8%
South Africa	n/a				2040	29.9%		
Argentina	n/a		2037	43.5%			2037	41.2%
Turkmenistan	n/a		2034	54.9%			2050	13.5%
Iran	n/a		2040	31.1%			2046	18.6%
Iraq	n/a		2050	7.6%			2033	63.2%
Indonesia	n/a		2033	65.8%	2037	42.4%	2033	62.1%
Algeria	n/a		2050	24.2%			2048	15.8%
Egypt	n/a		2035	50.8%			2039	33.9%
Uzbekistan	n/a		2031	76.1%	2031	79.8%	2043	23.3%
Nigeria	n/a		2039	33.2%			2037	43.5%
India	n/a		2031	75.4%	2036	44.8%	2031	77.4%
Angola	n/a		2048	15.9%				

Table ES-1: Fair share of support and extraction phaseout dates and rates. *For each country listed, the table shows the country's fair share of the provision of the total needed global phase-out support and an indicative (and conservative) lower bound of possible corresponding annual amounts (in $ billion). The EU and its member states are marked with an asterisk – listed member states' figures are included in the EU total, so adding the columns would result in double counting. The table further shows the phase-out year and the reduction of extraction in 2030 below current extraction levels according to this analysis, by fuel type, which in aggregate matches the IPCC LED pathway's global fossil fuel CO_2 emission cut of approximately 60 %. Countries are listed if they have a fair share of support above 1 %, extract more than 1 % of the total global volume of either oil, coal, or gas, or both. Countries shown here are those included in the Statistical Review of World Energy, which contains some data gaps that will be closed in subsequent releases of this analysis.*

The dollar numbers here are to be read as *indicative lower bounds* for each country's annual fair-share contribution. They are based on systematically conservative calculations (see "The scale of support" section) that suggest the total global fossil-fuel extraction phase-out costs and investment needs are at least $ 420 billion and up to $ 4.1 trillion annually. We've taken the lower of these numbers, then calculated the fraction of it that reflects the needs – in the subset of countries which are eligible to receive international support, the ones below the blue lines in the above charts – that should be internationally supported. This yields a minimum of $242 billion in extraction phase-out support per year, which is then allocated to the supporter countries to derive national contributions and thus a sense of their implied orders of magnitude. Crucially, these indicative figures should not be misconstrued as actual estimates. The necessary contributions would, in practice, probably be higher.

NEXT STEPS

This framework is based upon well recognized equity principles and widely supported approaches and methodologies. At the same time, it is in some of its details sensitive to gaps and inconsistencies in the underlying data used to calculate the results (see "Data: sources and limitations" in the Online Methodology Supplement[5]).

This framework is also dynamic in that its underlying data changes with changing real-world circumstances, and thus so do the details of findings, though the broad features are robust. Importantly, this framework offers the idea of a national fossil-fuel extraction "dependence indicator," as a keystone of a debate that itself is evolving and maturing. We do so with the expectation that improvements will continue, both as advancements in an ethically grounded understanding of fossil fuel dependence, and as improvements in the available data.

To emphasize again, there is no right to fossil-fuel extraction, but only rights to the energy services necessary to support just and sustainable development, and to human dignity within planetary limits, rights which cannot be supported by socially and ecologically catastrophic fossil fuels. This framework thus proposes concrete phaseout timeframes, and places a conservative lower-bound on the financial support that will have to be available to lower-capacity countries to enable them to achieve these timeframes.

Clearly, our results are challenging. We do not dispute that. But there is no easy route to a global, high-ambition climate mobilization that would limit warming to 1.5 °C while, at the same time, upholding the right to development for all.

Workers at a geothermal Installation in Landner County, Nevada. © NREL

Female workers sort plastic bottles for recycling in a factory in Dhaka, Bangladesh. Plastic poses an immense pollution problem and also exacerbates climate change. On its current trajectory, greenhouse gas emissions from plastic production could reach 1.34 GtCO2 per year by 2030, equivalent to adding 300 new 500 MW coal-fired power plants. Over 99% of plastic is made from chemicals sourced from fossil fuels, making the plastic industry a major driver of fossil fuel extraction. © Abir Abdullah / Climate Visuals Countdown

INTRODUCTION

This report proposes an equity reference framework designed to illuminate the demands of justice, in the context of an extremely rapid global phaseout of fossil-fuel extraction.

A number of reports have preceded this work, and we have built upon them. This report is the first to quantify both differentiated phaseout timeframes and the international support needed to enable rapid fossil-fuel extraction phaseouts in lower-income countries, which we view as being absolutely essential to any equitable phaseout proposal.

We knew from the outset that, by focusing on the transitional challenges that must be overcome if any rapid phaseout is to be fair enough to actually succeed, we would risk being misunderstood. As if we were arguing that fossil energy was a "good" we were urging developing countries to give up, a "good" that somehow must be fairly distributed among the peoples and countries of this world. To be clear, we fundamentally disagree with such conceptualizations of fossil energy. There is no right to fossil-fuel extraction, but only a right to the energy services necessary to support just and sustainable development, only a right to human dignity within planetary limits – a right which cannot be supported by socially and ecologically catastrophic fossil fuels.

A rapid and equitable global fossil-fuel extraction phase out is essential to meeting the goals of the Paris Agreement. This conclusion is based on scientific consensus, and is the view of hundreds of civil society organisations, who are at the frontlines of the climate crisis, as well as a range of nation states. There is no doubt that our world remains highly dependent on fossil fuels, so a phaseout presents extremely difficult challenges of widely varying type and magnitude, challenges that are particularly acute in fossil-fuel extracting countries. But these can be overcome through an approach underpinned by collaboration and equity.

Ending fossil fuel extraction is central to civil society's campaigns, marked by a worldwide mass mobilisation against fossil fuels in the run-up to the UN General Assembly in September 2023. A central demand by social movements and civil society organisations has been to stop new fossil fuels, from the Vaca Muerta shale gas expansion in Argentina to the East Africa Crude Oil Pipeline in Uganda to the indigenous-led fights against new fossil fuel extraction infrastructure in North America. Civil society is increasingly turning also to the phaseout of existing extraction, such as setting an end date for coal mining in Germany, and winning a referendum vote to stop ongoing oil extraction in the Yasuní National Park of Ecuador.

At the same time, such a phaseout presents multiple challenges to countries and societies, and that these must be managed equitably. It is critical to recognize the wide range of national contexts in terms of socio-economic dependence on fossil fuel extraction and the economic and institutional capacity to manage the potential disruption of a rapid phaseout. This is just one piece of a larger climate challenge – but it is a critical piece. Phasing out fossil fuel extraction must occur in lock step with rapidly curbing fossil fuel energy use. Both are key dimensions of mitigation, which must occur in parallel with finance, adaptation, and loss & damage equity, as part of a just climate transition.

Facing this challenge, in 2021 the Civil Society Equity Review (CSER) issued the "Fair Shares Phase Out" report,[6] which articulated a broad, widely-shared, civil society perspective on how to envision collaboration and equity. Because international cooperation is such a vital component of an equitable global transition, we released *The Imperative of Cooperation* in 2022 – a follow-up report detailing the multiple dimensions of international cooperation and support needed to make a global transition away from fossil fuels possible.[7] In this report, CSER's Extraction Equity Working Group (EEWG) builds on the existing literature, notably the Tyndall Centre's 2022 report on phaseout timeframes,[8] by expanding the concept of fossil fuel dependence and integrating national phaseout timeframes with the support necessary to actually achieve them. We believe that it will empower coherent and unified campaigns for an equitable fossil-fuel phaseout.

This report lays out an ethically transparent framework that shows, in detail, what it would actually mean to rapidly phase out fossil fuel extraction in a fair way. How can this be helpful? The question is rather how can we imagine success without such a framework! Political polarisation is on the rise, trust between different groups is waning,[9] and international relations are defined by vast disparities of power. Given this, and given that our results do indeed raise challenges to business-as-usual approaches to managing fossil-fuel extraction phaseout, equity frameworks like this one may raise concerns about the viability of consensus building across nation states. But, as a broad grouping of civil society organisations from across the world, we believe that fossil-fuel extraction phaseout will not occur quickly enough unless it is very widely accepted as fair. The question is what, exactly, this means.

Importantly, this framework requires more than just a set of techno-economic shifts. It demands substantial transformations of global and national institutions related to finance, trade, investment, international planning and coordination and, of course, labour rights and social inclusion. So while an equitable fossil-fuel phaseout could theoretically take place on its own, it is highly unlikely without other significant transformations.

This challenge is easy to see when considering that rich extractors like Norway enjoy highly developed and diversified economies, and thus phase out options that poor extractors like Nigeria or Equatorial Guinea cannot hope to match, due to the fundamental, entrenched, inequity of the global economy. The transition demanded by an equitable phaseout will itself require fundamental economic and socio-political changes to enable a great deal of mitigation, adaptation, and climate finance, as well as ways of managing the mounting loss and damage in a manner that is built upon, and deepens, global solidarity.

Section 1 of this paper briefly sets out the rationale for phasing out fossil fuel extraction. Section two proposes an equity framework for this, focused mainly on providing and applying a methodology for (1) setting national fossil fuel extraction phaseout timeframes that are consistent with science and equity; (2) spelling out the appropriate nature and scale of the international support needed to achieve those timeframes, and, (3) with that identifying the countries – from which and to which – support should flow. The phaseout timeframes and the provision of support are inextricably linked: If poorer countries are not properly supported through international cooperation, it is unlikely they will be either willing or able to meet any adequately ambitious timeframes, especially in light of their other pressing developmental priorities and the mounting stresses of a changing climate.

Section 3 then sketches some preliminary implications, including by applying the quantitative framework to identify the pace of phaseout for specific countries and the scale and sourcing of the support that will be necessary to these phaseouts.

Finally, we indicate some next steps for ongoing development of the framework, and recommend ways forward.

Dungarpur Renewable Energy Technologies is a renewable energy company completely funded, owned and operated by local tribal women of Dungarpur District, Rajasthan, India. The company not only manufactures a wide range of solar panel modules but also provides a range of solar solutions including solar home systems, solar lamps, solar street lights, solar based toys, and grid connected PV solar systems along with installation and service even to the most remote households in the Dungarpur. It also supports the local solar retailers and entrepreneurs and has been instrumental in providing local technology based livelihoods.
© Kunal Gupta / Climate Visuals Countdown

SECTION 1. FOSSIL FUEL EXTRACTION AND GLOBAL TARGETS

The IPCC 6th Assessment Report finds that it is still possible to limit warming to 1.5 °C "with no or limited overshoot." Achieving this requires fossil fuel extraction to decline immediately and rapidly, because emissions from fossil fuels are the predominant driver of climate change. However, as Figure 1 below (from the *Production Gap Report* [PGR], 2023) shows, fossil corporations and governments seem intent on continuing to increase extraction, and their plans and projections are now on track to extract more than *twice* as much fossil fuel in 2030 as would be consistent with 1.5 °C pathways.[10]

Their extraction plans, in fact, are *even farther off track* than the notoriously weak emission commitments in the national NDCs. By raising this alarm, the PGR's analysis has made it very difficult for honest observers to avoid the obvious conclusion – fossil fuel extraction itself is a decisive problem. This finding has been strongly reinforced by the International Energy Agency, which in 2021 released a Net Zero Emissions scenario that flatly stated "no new oil and gas fields approved for development in our pathway, and no new coal mines or mine extensions are required." Its 2023 update went further, noting "the rate of reduction in oil and gas demand necessary to reach net zero emissions by 2050 is now so fast that it may imply the early closure of some existing oil and gas fields."[11]

Taken together, these very clear statements from major international organizations have marked a new beginning in the climate battle. We must now focus as strongly on fossil-fuel extraction as we do on fossil-fuel emissions. Both must be phased out as quickly as humanly possible.

The extraction phaseout framework presented here has been developed alongside CSER's long standing technical analysis and advocacy of a fair-shares framework for rapidly cutting global emissions, which lays out principles for a fair and equitable sharing of the global mitigation challenge and assesses countries' NDCs against those principles. These two frameworks are consistent with and complementary to each other, both technically and ethically, as they must be, since extraction and emissions are just two sides of the same problem. Thus, we set a time frame for phasing out of fossil fuel extraction that matches the rapid decline in fossil fuel consumption. Likewise, we focus on the climate finance and international support needed to phase out extraction in addition to that required for reducing emissions by building renewables, so countries are neither left without vital energy resources nor left without vital fossil-fuel revenues. The balance here is key, and these two complementary global frameworks ensure it for both exporters and importers, for both energy resource-poor and energy resource-rich countries, for both providers and receivers of climate finance.

BOX 1: KEY CONCEPTS - CAPACITY, RESPONSIBILITY AND DEPENDENCE

Capacity and Responsibility are used both in the emissions equity framework and in this equitable phaseout framework..

Capacity refers to a country's ability to address the global climate problem. It relates to the financial, technological, and institutional resources available to contribute to a global climate transition. Though it is multidimensional, it is extremely strongly correlated with income, and, more specifically, the income that is not already committed to meeting basic needs. See "The sources of Support," below.

Responsibility refers to *historical* responsibility, a country's overall contribution to the climate problem, and empirically it is straightforwardly captured by a country's *cumulative* emissions. We attribute *ethical* responsibility to cumulative emissions arising from consumption at a level above mere basic needs.

Dependence, as it is used in this equitable phaseout framework, refers to the extent to which a society is entwined with the fossil fuel economy. Some countries will find it harder to phase out fossil fuels without causing social harms, particularly where their national or local economies are rooted in fossil fuel extraction. This is partly because dependence is structurally self-reinforcing, and partly because it creates social repercussions if phaseout occurs too fast, or unfairly. Countries' dependence on fossil fuel extraction is complex; some key dimensions include:

- Dependence on fossil fuel extraction to provide energy to the country's people and industries;
- Dependence on export revenues to fund government activities, including public services, public sector salaries and public investment, and as a source of foreign currency, particularly for the repayment of sovereign debt;
- Dependence on extraction and its support industries as a provider of jobs.

See "*Defining dependence*," below.

Turtle Rescue and Rehabilitation. Dr. Brian Stacy, NOAA veterinarian, prepares to clean an oiled Kemp's Ridley turtle after the BP Gulf of Mexico oil spill
© NOAA

SECTION 2. AN EQUITABLE PHASEOUT FRAMEWORK

PRINCIPLES FOR AN EQUITABLE PHASEOUT

While an equitable fossil-fuel phaseout framework must be consistent with the emissions equity framework, it is not the same. Extraction raises different fairness issues, because it is directly associated with workers and with fenceline communities, and because countries that extract fossil fuels do not always benefit from it (e.g. some countries gain little revenue, while foreign companies profit handsomely).

Mozambique's gas development provides a cautionary tale of how rushed fossil fuel investment can leave countries worse off than without it. Since gas investments began a decade ago, corruption has escalated, people living near the gas terminal have lost their land and homes, and the country's debts have spiralled, while promises of oil revenues and domestic energy access recede ever further into the future.

Building on earlier research,[12] the CSER 2021 report proposes a set of five principles to guide an equitable phaseout of fossil fuel extraction. These principles aim to justly address the rights and needs of those most directly impacted by fossil fuel extraction: for example pollution-affected frontline communities, marginalized and impoverished citizens of corrupt petrostates, politically disenfranchised citizens of wealthy nations that have been captured by the fossil fuel complex, and all those who are immediately threatened by climate change. At the same time, these principles were informed by a recognition of the harms that could follow from rapidly dismantling an economically entrenched sector: to workers employed in the sector, to those living within the regional economic communities they generate, and to all those relying on public services funded by fossil fuel revenues. See Box 2 for a summary.

BOX 2: KEY PRINCIPLES FOR AN EQUITABLE AND RAPID FOSSIL FUEL EXTRACTION PHASEOUT

1. Stop extraction when it violates human rights

The civil and human rights of affected communities must be an utmost priority where the harm to frontline communities justifies an immediate halt to extraction. In regions and communities that are disproportionately experiencing the harms of extraction, where pollution despoils the environment, harms communities, and undermines livelihoods, where extraction takes brutal forms that violate basic human rights, it should be reformed or cease immediately.

2. Phase out down global extraction at a pace consistent with the 1.5 °C limit

Climate records are shattered at a quickening pace, and evidence mounts that a destabilized climate is an existential threat to human societies. Even 1.5 °C warming is not "safe," but as warming increases irreversible climate extremes and tipping points become increasingly likely. The risks to poverty eradication, human and ecological health, global prosperity and peace rapidly grow incalculable.

3. Enable a just transition for workers and communities

People and communities at the heart of extraction activities must be engaged and supported. Workers and their unions as well as impacted communities, must be key stakeholders throughout the process of a just transition, with social dialogue and inclusive decision making as a central pillar. Key elements include: creating decent new jobs by investing in alternative sectors; retraining affected workers; and protecting the rights and incomes of workers and communities during transition. This is more substantive than merely 'protecting' workers with minimal subsistence benefits while 'retraining' them for the next dangerous and exploitative job. It also implies targeted support for regions historically dependent on fossil-fuel extraction, so that organized economic diversification, ecosystem restoration and creation of decent job opportunities can take place.

4. Reduce extraction fastest in countries least socially dependent on fossil extraction

Poorer countries whose economies depend on fossil fuels for jobs or revenues are at risk of greater social and economic disruption from an abrupt transition, so should be allowed more time to phase out. Given the pressing constraints of a very minimal global carbon budget, wealthier and less dependent countries should phase out most rapidly. They have the economic diversity and wherewithal to invest in economic alternatives and social protections during a more rapid transition.

5. Share transition costs fairly, according to ability to bear those costs

The world has delayed climate action for so long, that even if less wealthy, extraction-dependent countries are allowed *more time than less dependent countries, they must still undergo extremely rapid transitions, spanning less than two or three decades. They cannot reasonably be expected to manage these transitions without significant international support. The UNFCCC makes explicit provision for wealthier countries to provide support to enable mitigation and adaptation efforts. The same should apply to enabling poorer countries to rapidly phase out fossil fuel extraction: the ability to transition is dependent on this international support.*

With respect to Principle 2, and despite the recent push to replace the goal of phasing out fossil fuels with that of phasing out "unabated" fossil fuel "emissions," we continue to interpret climate adequacy through a precautionary lens, rather than assuming future technologies will remove our excess near-term emissions. In this regard, the IPCC's pithy statement, in 2018's *Special Report on Global Warming of 1.5 °C,* that "CDR [Carbon Dioxide Removal] deployed at scale is unproven, and reliance on such technology is a major risk in the ability to limit warming to 1.5 °C,"[13] is still very much the order of the day. The IPCC's Sixth Assessment Report (AR6) authors agree, when they warn that the prospect of large-scale CDR) could "obstruct near-term emissions reduction efforts, ... lead to an overreliance on technologies that are still in their infancy,... [and] impact food security, biodiversity or land rights," and still "might not deliver the intended benefit of removing CO_2 durably from the atmosphere."[14]

The AR6 presents three Illustrative Mitigation Pathways (IMPs) consistent with limiting warming to 1.5 °C, which use different balances of decarbonizing energy supply, reducing energy demand, reducing non-energy greenhouse gas emissions and deploying CDR. Given the risks of relying on future CDR, from among these IMPs, we select the carbon budgets corresponding to the Low Energy Demand, or LED, scenario (also known as IMP-LD) as our guide, in part because it does not rely on novel CDR technologies.[15]

In the LED scenario, fossil fuel production and consumption fall by 58 % from 2020 to 2030, and by 92 % from 2020 to 2050 (measured in CO_2 terms). Given this rapid pace of transformation, the question is not which countries can increase extraction and for how long, but rather which countries must phase out extraction rapidly, and which must phase out *even more rapidly*.

The remainder of this section considers how to apply Principles 4 and 5. To begin, we must emphasize that these two principles are inseparable and equally important. As the Tyndall Center's study of phase-out timeframes notes, "it is no longer possible to deliver an equitable division of the small and rapidly shrinking carbon budgets. An equitable transition will require wealthy high-emitting nations make substantial and ongoing financial transfers to poorer nations to facilitate their low-carbon development, against a backdrop of dangerous and increasing climate impacts."[16] Even the most precipitous feasible phase-out dates for wealthier fossil fuel extracting countries would leave poorer and more dependent countries with phase-out dates that would be unachievable if unsupported.

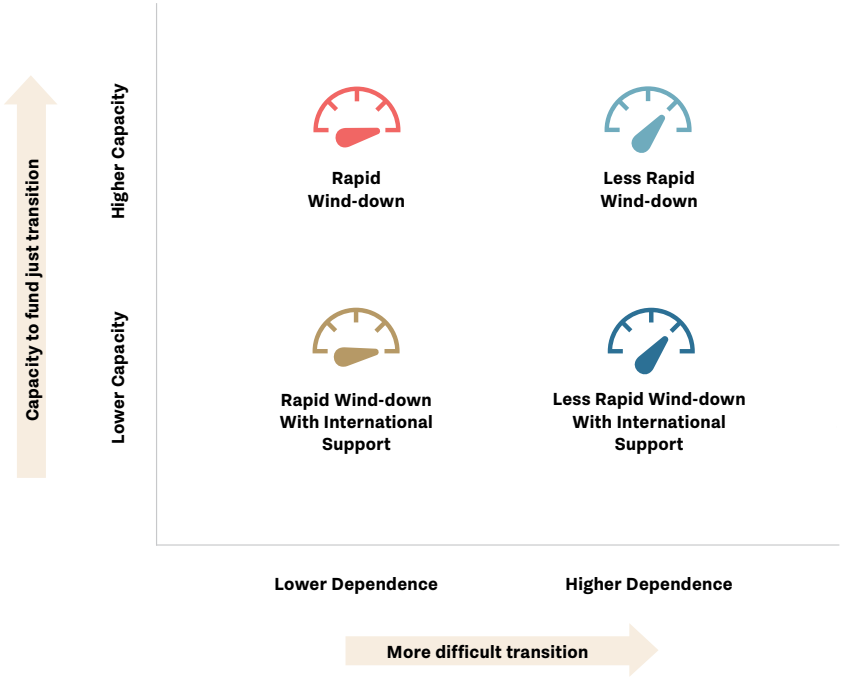


Figure 1: Adapted from CSER (2021), originally from Production Gap Report 2020

Our overall approach to principles 4 and 5 is captured in Figure 2 above (taken from our 2021 *Fair Shares Phaseout* report). It states, simply speaking, that:

- Countries with greater capacity to deal with the costs and disruptions, and greater responsibility for causing climate change, must provide support to those with less, and that support must be of a nature and scale needed to make their phaseout feasible and fair.
- Countries whose socio-economic welfare is more heavily dependent on extraction may take more time to phase out, while those that are less dependent must take less.

To elaborate this framework more concretely, the following analysis specifically proceeds as follows:

- Phaseout dates and rates are determined by means of a quantifiable indicator that reflects the essential features of national dependence on fossil fuel extraction.
- The nature and scale of the required support, along with which countries should receive support and which should provide it, and how much they should provide, are determined based on quantifiable indicators of capacity.

DIFFERENTIATED COUNTRY PHASE-OUT TIMEFRAMES

In generating policy recommendations for specific countries, most climate scenarios allocate actions among countries according to a principle of least cost. In our equitable phaseout framework, we instead aim to minimize social costs (harms). Central to this is the concept of dependence: in countries more dependent on fossil fuels, the social impacts of a rapid transition will be greater.

DEFINING DEPENDENCE

We measure dependence as a combination of three elements, reflecting different ways that economies and societies rely on fossil fuels: (i) the share of primary energy consumption that is met from domestically-extracted fossil fuels,[17] (ii) the share of government revenues that comes from fossil fuel extraction,[18] and (iii) the share of workforce employed in fossil fuel extraction.[19] We have equally weighted the three components as a default choice, although different weightings could be justified. After summing the equally weighted components, the combined measure is scaled to account for each country's level of development, reflecting the fact that dependence hangs more heavily on poorer countries than on those that have ample resources to manage and overcome it. Dependence is assessed separately for each of the three fossil fuels, and for each country (as a country may depend on oil extraction but not on coal extraction, for example). This section explains the rationale for our approach.

We stress again that we do not believe anyone has a right to extract fossil fuels, nor that fossil fuel extraction is an inherently beneficial activity to its host country or people (e.g. consider the Mozambique experience described above). Rather, we argue that all countries should phase out fossil fuel extraction as quickly as possible, while noting that countries differ in what speed of phaseout can be considered possible, when taking into account the social impacts of transition.

Phaseout should thus be fastest where the social costs of phaseout are smallest and most manageable. Conversely, more time should be given to countries that cannot phase out rapidly without causing major social harms. While there are many forms of dependence,[20] we focus on dependence through three key socio-economic roles that fossil fuel extraction plays: providing energy for a country's own use, generating revenues for public budgets, and providing jobs. In each respect, countries with greater dependence on fossil fuel extraction will suffer greater social harms from a rapid transition.

DEPENDENCE ON ENERGY FROM DOMESTIC FOSSIL FUELS

Many countries extract fossil fuels in order to meet their own energy needs. Imported coal is often considerably more expensive than domestically-mined coal, for example. Likewise, many net oil and gas importers rely on domestic production to reduce the severe impact of expensive and price-volatile imports on their economies, which can be crippling for lower-income and vulnerable countries. With sufficient international support, these importers have a strong incentive to decarbonise their economies; however, winding down domestic supply faster than demand would increase rather than decrease their vulnerability.

For example, in South Africa, domestically mined coal accounts for 80 % of power generation and 69 % of primary energy consumption.[21] Not only will replacing this be a huge undertaking, South Africans are currently without power for several hours a day, due to load shedding because of insufficient generation and transmission capacity. Too rapid a transition could worsen these problems in the near term, especially given the time and money it will take to build almost an entire new electricity infrastructure. In contrast, Norway's domestic oil and gas extraction provides for just 27 % of primary energy consumption.[22] With a hydro-dominated power system, and a car fleet that is rapidly transitioning to electric vehicles, Norway can wind down its fossil extraction much faster than South Africa, without causing unmanageable hardship for its energy consumers.

DEPENDENCE ON REVENUES FROM FOSSIL FUELS

Dependence on fossil fuel extraction also manifests in the use of revenues to fund government budgets, especially in the case of oil exporters. If fossil fuel extraction is ended before alternative sources of revenue are developed, consequences will include reduction in public services such as health and education, with particularly harmful consequences for the most vulnerable members of society; loss of public sector jobs that depend on extraction revenues; and public funds that could be used to invest in diversifying the economy. These countries will therefore need to diversify their economies, including developing new sources of fiscal revenue.

However, building new economic sectors and transforming an economy takes a lot of time. Economic diversification has been a policy priority for oil exporters since at least the 1970s; many attempts to diversify have failed, and even those that have been partially successful took decades. This is in large part because of the structurally self-reinforcing nature of fossil fuel dependence, which makes it extremely difficult – economically, politically and socially – for countries to free themselves from dependence.[23]

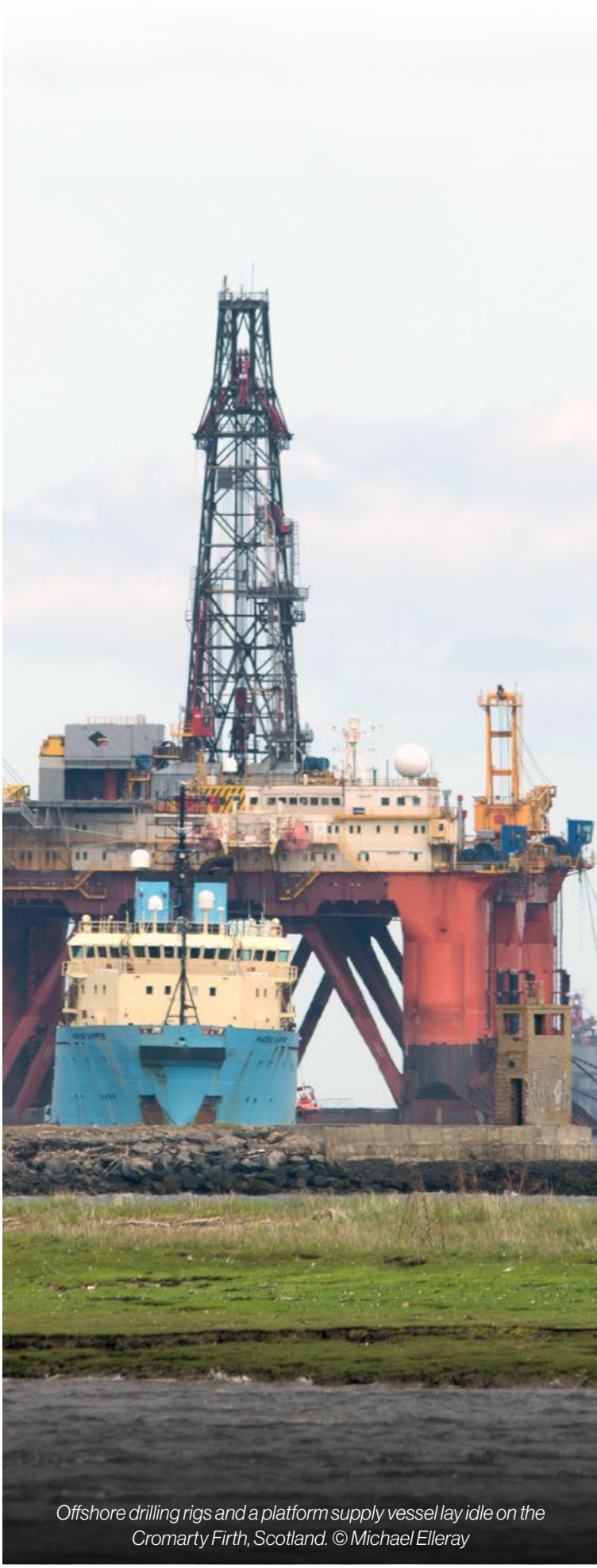
In any science-driven climate transition, fossil fuels must be largely phased out within less than three decades, even in the countries that phase out most slowly. Consider countries like Iraq or South Sudan, whose entire economies rest on oil production and exports, which provide over 85 % of government revenue. Building a whole new economy, of equivalent size, with a different basis on such a timeline is an immensely challenging endeavour, to the point of being difficult to imagine, even with large-scale international support. Given the finite nature of carbon budgets, a more rapid phaseout in less-dependent countries is the only way to give highly dependent countries more time. What would an equivalent challenge look like in a highly diversified economy such as in the United Kingdom or United States, where oil and gas provide about 0.1 % of government revenue? A challenging pace similarly at the boundaries of conceivability might perhaps be to end fossil-fuel extraction within a few years, and certainly in less than a decade.

DEPENDENCE ON FOSSIL FUEL JOBS

A third aspect of a country's dependence is in jobs in fossil fuel extraction. Clearly, if fossil fuel extraction is ended, that will end the jobs involved both directly in extraction and in supplying goods and services to the extraction sector. Time is required to enable a just transition for the workforce. Just transition is not simply about retraining or reallocating workers; it is a process in which workers themselves shape the course of the transition through active social dialogues. Furthermore, if fossil fuels account for a large share of the workforce, it will take time to build up alternative sectors in order to create jobs of an equivalent quality to the lost fossil fuel jobs.

Note that fossil fuel employment is concentrated in producing regions, such as Chhattisgarh and Jharkhand in India, the Niger Delta in Nigeria, Mpumalanga Province in South Africa, and Alberta in Canada. In these regions, larger proportions of workers will be employed in fossil fuels than at a national level. We focus on the national totals, for after all this is a world of nations, and nations, inevitably, will play a key role in the delivery of intranational equity in their regions. This raises the importance of regionally focused Just Transition approaches that think about regionally appropriate pathways to diversify away from fossil fuels.

One dimension of employment dependence that has not yet been quantified in the framework (we aim to address it in future work) is the number of people relying on each job. In some countries, large households may depend on income from a single earner; in others, significant numbers of unemployed workers may rely on social safety nets funded by well-paid fossil fuel jobs. In this first framework, these issues are partly addressed through progressivity, as discussed just below.



Offshore drilling rigs and a platform supply vessel lay idle on the Cromarty Firth, Scotland. © Michael Elleray

COMBINING THE COMPONENTS OF DEPENDENCE

In this report, we combine these three elements with equal weighting. A later online version of the framework will allow users more flexibility, including the ability to vary the weightings according to their own judgements of the relative social importance of each.

Finally, we account for the greater strains that a rapid transition would impose on poorer countries by adjusting the combined measure of dependence in a progressive manner. A progressive system is one in which the greatest proportional contribution is made by those with greatest capacity to contribute. For example, in a progressive tax system, richer people contribute a larger share of their income than poorer people, because at lower income levels, more of a person's income is required to meet the basic essentials of living a healthy life. Such considerations apply at a country level too: a lower-capacity country must spend more of its revenue on delivering basic needs, while a high-capacity country can spend more discretionarily. Thus a lower-capacity country which obtains 25 % of its revenue from fossil fuels will be more dependent on fossil fuels than a high-capacity country with the same fossil revenue share.

To address this, we use a concept that has long been recognized,[24] including in the UNFCCC itself, as essential to equitable international effort sharing: national capacity. Here, as in all of the work of the Civil Society Equity Review, capacity is defined in a manner that takes in-country inequality into account. It is defined, that is, as the sum of the income above a development threshold of all members of its population[25] (in this report, this threshold is set at $7,500 per person per year, as is also used and explained in our previous reports[26]). Thus income needed for each person to lead a healthy, dignified life is not counted towards capacity, which instead measures the discretionary portion of people's income. For the same reason, the degree to which incomes above this exemption threshold are counted towards capacity gradually increases, reflecting the increasing degree to which incomes became available for discretionary spending, until it passes a second threshold above which incomes are considered fully towards capacity (set here at $50,000 per person per year). Inequalities exist both within and between countries. All countries have some people living above and some below this threshold; countries of the Global North have proportionately more above it. This is one reasonable way of defining progressivity, though others could certainly be defended. In a future online version of the equitable phaseout framework, users will be able to vary this definition. To integrate this metric of progressivity into our dependence indicator, we multiply by the ratio of a country's gross national income to its capacity. A table showing the dependence indicator for the largest fossil fuel extracting countries is available in the online methodology supplement of this report.[27]

PHASE-OUT TIMEFRAMES BASED ON DEPENDENCE

With a framework in hand for sketching out each country's overall dependence, we can directly proceed to establishing phase-out timeframes. At the outset, we ensure that the total carbon dioxide emissions will be consistent with the 1.5 °C-consistent budget taken from the LED pathway featured in the most recent IPCC assessment, as mentioned above. This gives us an overall average phase-out rate for the world's fossil fuels, which we then allocate among coal, gas, and oil.

Given an average phase-out rate for each fuel, we can calculate the phase-out timeline for each country as a function of its dependence. For each fuel, countries with lower than average dependence are given correspondingly faster phase-out rates, which also implies earlier phase-out dates that require smaller carbon budgets. Similarly, countries with higher-than-average dependence are allowed correspondingly slower rates to ease their greater transitional challenges, which imply phaseout dates that are somewhat later and carbon budgets that are somewhat greater. The phaseout date (as reported in the tables included below) reflects the year in which production has declined by 90 % compared to 2023 levels. In all cases, the most forgiving phaseout dates – for the countries with the highest dependence – are no later than 2050; the phaseout dates for the least dependent countries are as early as 2030.

INTERNATIONAL SUPPORT FOR ENABLING FOSSIL FUEL PHASEOUT

THE SCOPE OF THE NECESSARY SUPPORT

Due to the limited remaining carbon budget, many fossil-fuel extracting countries must phase out their extraction activities faster than would otherwise be considered fair, or even feasible, given their lack of economic and institutional capacity to achieve a just transition at this pace. They may lack the financial resources to absorb or compensate for any disruptions to labour markets, government revenue etc., or to implement the economic diversification and just transition activities that are needed in a phase-out context. Consequently, international support is an absolute precondition of the required phaseout.

It is not yet possible to definitively specify the exact type and amounts of support that will be necessary, as it will depend on the specific national and local context, and the barriers that must be overcome to make the phaseout possible. However, we can make some overall observations about the transitional needs that are clearly in scope and eligible for international support.

Support must address needs relevant to the just transition concerns of fossil fuel workers and the families, communities and regions that depend on their incomes. Necessary responses must focus on creating decent new jobs with appropriate worker protections, and might include job guarantees, strengthening of employment insurance and/or social protection schemes, retraining and relocation supports, and replacements for benefits such as employer-provided health insurance or housing. They must also incorporate targeted economic diversification plans, as regional dependance (on jobs, on tax revenue and overall economic activity) is likely to be higher than national averages and the clean up, rehabilitation, and ecological restoration of sites of fossil fuel extraction projects.

Fossil fuel extraction phase-out support should also address the loss of critical contributions that fossil fuel extraction is currently making to a country's economy, e.g. to public services funded by fossil fuel royalties and taxes, to household incomes via employment, to income from activities supplying the fossil fuel extraction sector, to debt payment and a stable balance of trade. The loss of these contributions can be addressed through international support that facilitates economic diversification measures and enables investments into new economic activities suitable for replacing those contributions. Such diversification measures are complementary to just-transition measures that focus specifically on fossil fuel workers. While they considerably expand the scope of support, they must be within the scope of international support for fossil fuel phaseouts for practical as well as ethical reasons – without such support the timely phaseouts implied by the necessary timeframes is, frankly, unlikely to succeed.

Importantly, because of the specific support needs of the impacted countries and communities, the scope of support must be quite broad. For example, in order to facilitate rapid economic diversification a major overhaul of the global trade, investment and finance regime, including debt cancellation, or the global intellectual property rights regime will be required.[28] However, we also see limits to the scope of legitimate international phase-out support. For example, we consider payments to fossil fuel extraction companies' shareholders for foregone revenues (for example in the case of revocation of extraction licences or leases or early termination of contracts) to be inconsistent with the goal of a global phaseout that is not only rapid but also as just and equitable as possible.

THE SCALE OF SUPPORT

When setting out to establish how much financial, institutional and other support lower-capacity countries would require to achieve their fossil fuel extraction phaseouts on the challenging necessary timeframes, proper estimates of both the total global need and the national needs of individual countries would ideally be available. However, proper needs-based assessments simply have not been done. Such assessments would be designed to determine the scale of financial resources needed to overcome the economic and social challenges and potential disruptions that would be associated with phasing out fossil-fuel extraction, including just transitions, economic diversifications, and so on. In the Global North, most existing fossil fuels phase-out plans have been based not on needs but rather on political agreements. In particular, the scale of transition support provided to Global North workers and communities generally reflects the power balance of key constituencies (labour, business, government) rather than actual worker and community needs, which are generally much greater.

Box 3 below lists examples or studies that provide insights into the costs or investment needs associated with fossil fuel phasedown or phaseout. However, since these were usually done in wealthier countries (which, by virtue of their high capacity, would not be eligible for support in this framework), they can only with caution be applied to estimate the support needs of poor countries, since they do not consider the specific barriers and constraints faced by the latter. Rather, they usually calculate a limited range of phase-out costs (typically only exceptional business and worker-related transition costs), because in the Global North it is possible to count on mature (if often inadequate) social protection systems to absorb important parts of the social costs (i.e. pensions or early retirement support, unemployment guarantees). Also, current examples of social approaches to the transition assume phase-out timeframes much slower than what is needed for a 1.5 °C response.

BOX 3: EXAMPLES OF ESTIMATES OF FOSSIL FUEL EXTRACTION PHASE-OUT COSTS OR INVESTMENT NEEDS

Below are summaries of examples or studies that investigate costs or investment needs to support fossil fuel extraction phaseout. Each of these examples is nationally specific and has limited applicability in poorer countries. Along with these summaries, we listed some of these elements that might result in an over or under estimation of the transition costs, relative to globally average costs or costs in poorer countries.

Country	Narrative	Key elements of context leading to relatively lower/higher transition needs estimates
Scotland[29]	Analysis undertaken for the Scottish Government estimates that, in a scenario where oil and gas extraction is completely phased out by 2050, a total of $ 49 billion (£ 39.5bn) of investment in selected other "low-carbon energy" sectors is needed by 2050 to offset the loss of 57,000 current oil and gas jobs. If investments are also needed to replace the contribution of this sector to economic activity (gross value added) to the Scottish economy, the need increases by roughly 250 % to $ 120 billion (£ 95.8bn).	Leading to lower estimates: - Slow phaseout (not before 2050) - Lack of cost estimates for broader support for impacted communities - Mature social protection systems/welfare state in place Leading to higher estimates: - Average income in the sector $ 110,000 (£ 88,000) per year
EU	In order to address the Just Transition dimension of their mitigation package 2021-2027 the EU is dedicating € 19.2 billion to its Just Transition Fund, complemented by € 1.5 billion of grants (and € 10 billion in loans) for public sector support.	Leading to lower estimates: - No fossil fuel phase-out target. - Figures do not account for social protection systems' expenditure in the EU being deployed to cover for early retirement and unemployment benefits.
Spain[30]	Spain has been one of the countries that deployed EU funding as part of its strategy to phase out coal extraction and coal-based power production. Spain's approach to Just Energy Transition is comprehensive, including direct support for workers, economic diversification projects for communities (with intended impacts far exceeding the mere replacement of lost fossil fuel sector jobs), support for decommissioning and clean-up of fossil fuel extraction and power generation sites, and more. Their four year plan (2018-2022) affected roughly 6,000 directly employed workers and about 197 towns representing 1 % -2 % of Spanish population and mobilized in just four years € 5 billion.	Leading to lower estimates: - phaseout is limited to coal (not oil and gas) - Many costs (pensions, unemployment benefits) absorbed by social security and not counted as Just transition costs - Energy companies committed to retain, retrain and redeploy their direct workers. Without this agreement (reached through negotiation with unions), costs for workers' support would have been higher.
South Africa[31]	South Africa's Just Energy Transition Investment Plan (JET IP) focussed on the just transition needs of Mpumalanga Province, since it is where the country's coal mining and coal-fired generation activities are concentrated (85 % of South African coal sector employment, 90,000 direct jobs, and 200,000 employed in the coal value chain). The JET IP calculates a total loss of 26,000 to 35,000 jobs in the period up to 2030 due to decline in coal activities. Furthermore, coal currently contributes up to 35 % of municipal economies in this area. The JET IP breaks down "Just transition investments in Mpumalanga's coal communities" at $ 800 million (ZAR 12bn) per year over the five year period to 2027, of which the largest share is dedicated to economic diversification and infrastructure investments, and only about 10 % for direct support for workers.	Leading to lower estimates: - No phaseout but a reduction in coal production. - Limited support for workers and communities

Given the limitations of current understanding of the fossil-fuel extraction phase-out costs and investment needs (see box 3), an international process for further articulating the actual needs-based scope, scale and costs of phase-out support is urgently needed. While nothing like this has been established yet, we can use some educated judgement about the minimum level of this support that will need to be mobilized, and set up the mechanisms to start raising – and providing – this support.

Despite the limitations of the just transition cost calculations in the box – notably, they include only an extremely small fraction of the global fossil fuel extraction workforce – these examples provide some indications that can help us establish a conservative lower bound for such costs and investment needs. Specifically, if normalized in per-job terms, the examples from South Africa, Scotland, Spain, and the EU indicate possible costs or investment needs of between $ 23,000 and $ 225,000 per job per year. Other studies of phase-out costs are available but were not included here because they consider extraction phasedown speeds that are too inconsistent with the scenario we are exploring here, and/or focus too narrowly on support for current workers rather than replacement of jobs more generally.[32] Considering that there are currently 18.2 million fossil fuel extraction workers in the world,[33] extrapolating costs from these examples yields figures of $ 420 billion to $ 4.1 trillion per year globally in total, with the limitations of the examples generally suggesting that actual needs may be even higher. Note that the four examples in the box include broader types of investments and costs than those related specifically to jobs; for this heuristic estimate, we are simply postulating that size of investment (in all its forms) may be roughly proportional to number of jobs affected.

In principle, more precise cost estimates are possible, but they will depend on country-specific needs assessments. With such assessments, country-specific costs and investment needs could be compared to the fraction of the total global phase-out costs and investment needs that the country should be expected to contribute, given its capacity to do so. From this comparison, in turn, it could be determined whether the country can be expected to not only cover it's own need with its own resources but also (for high-capacity countries) provide phase-out support to others or whether (for lower-capacity countries) it can only be expected to cover a certain fraction of its own costs with its own resources and would be eligible to receive support for the remainder.

However, since such assessments do not currently exist, we cannot at this point follow such an approach. Instead, for this report, we will use as our starting point the figure calculated above for a conservative lower bound of $ 420 billion (and up to $ 4.1 trillion) for the total annual global phase-out cost and investment need. We can then use a simple heuristic (for example, the size of countries' fossil fuel workforce) to disaggregate these global figures and to subsequently derive the portion of the global figures that are needed in lower-capacity countries, exceed their own capacity, and therefore have to flow as support. Given that high-capacity countries will be expected to cover their own costs, we can say with relative certainty that the global fossil fuel extraction phase-out *support* needs in countries eligible for that support will not be less than several hundred billion per year.

THE SOURCES OF SUPPORT

When it comes to the sources of support, we first establish which countries ought to be responsible for collectively mobilizing the resources needed to support lower-capacity countries' phaseout. Specifically, we consider that countries that have a per-capita capacity above the global average level should provide the financial resources needed to support lower-capacity countries in phasing out their fossil fuel extraction at the required pace. Subsequently, we use an approach similar to the one we apply to the global mitigation effort to determine which fraction of the total support need each of these countries should provide. In this approach, each provider country's share of the needed fossil fuel extraction phase-out support is proportional to its responsibility and capacity index. Specifically, countries' capacity to mobilize financial resources that are not otherwise bound up with fulfilling their own citizens' basic needs, which can therefore be mobilized for climate action, and their historical responsibility for greenhouse gas emissions. In addition to capacity, we consider responsibility for GHG emissions an appropriate metric for apportioning responsibility for providing extraction support since it is a strong proxy for the extent to which a country benefited from abundant, cheap fossil energy sources; and thus acted as a driver of extraction, regardless of whether the country itself extracted these energy resources (income and emissions inequalities within countries are taken into consideration when estimating both national capacity and national responsibility; the incomes and emissions of the poor are not taken as equivalent to the incomes and emissions of the rich[34]).

This framework assigns fair shares of the provision of fossil fuel extraction phase-out support to all countries with above-average per-capita capacity, whether or not they extract fossil fuels. By so doing, it ensures that not only the high-capacity fossil fuel extracting countries participate in funding the rapid phaseout of lower-capacity extractors, but that likewise, high-capacity non-extracting countries (say, France, Singapore, or Switzerland) contribute to the global extraction challenge at an appropriate level.

Children walking to a nearby river to get water in Lao PDR. © ADB Asian Development Bank

SECTION 3. IMPLICATIONS

HUMAN RIGHTS COME FIRST

Equity-based national timeframes cannot be the last word. There are extremely important intra-national equity challenges they don't encompass. Specifically, where the harm to frontline communities justifies an immediate halt to extraction, their demands take moral precedence. For decades, in the face of human rights abuses and ecological degradation, civil society organizations and social movements in many communities have called for an immediate halt to local extraction based on concerns about human rights abuses, land appropriation, and local environmental degradation that undermines health and livelihoods. Such claims clearly conflict with phase-out timeframes suggested by our approach to dependence in terms of nationally assessed factors such as fossil sector jobs and government revenue.

Priority must be given to people and communities whose rights are violated by extraction processes, including through damage to their health, livelihoods, quality of life, land, cultural rights, security. Ending extraction is urgent in such cases. This particularly includes the rights of Indigenous peoples, where extraction must be immediately stopped where extraction has not received their free, prior, informed consent.

A good example is the Yasuní National Park in Ecuador, where campaigners successfully secured a vote to stop ongoing oil extraction, in an August 2023 referendum. The Park is home to Indigenous peoples living in voluntary isolation, and is one of the most biodiverse places on earth, creating a strong rationale for stopping extraction urgently, notwithstanding Ecuador's significant dependence on oil export revenues. The campaign now turns to implementing the referendum decision, including ensuring a proper cleanup once oil is stopped.

NO NEW FOSSIL FUEL FIELDS OR MINES

There is no room for new oil and gas fields or coal mines. This was a headline finding of the IEA's Net Zero Emissions scenario in 2021, but the same outcome follows from the IPCC's 1.5 °C scenarios and all major 1.5 °C scenarios published by universities, intergovernmental organizations and private sector consultancies.[35] The IEA's 2023 update goes further, noting "the rate of reduction in oil and gas demand necessary to reach net zero emissions by 2050 is now so fast that it may imply the early closure of some existing oil and gas fields."[36] If we do not rely on unproven carbon sequestration technologies, 60 % of oil, gas and coal reserves in producing fields and mines must be left in the ground.[37] This is the focus of the differentiated phase-out challenge in this report: how much more quickly existing fields and mines should be closed in some countries than others.

While the least dependent countries should lead in closing existing fields and mines, no country can hope to safely or justly develop new fossil resources, including developing countries that are just now uncovering oil and gas deposits. Our framework stipulates that wealthier fossil fuel producers must end production as quickly as technically and socially possible, to leave space for a less rapid and disruptive ramp-down in poorer countries, but this does not leave space for expansion. There is simply no carbon budget left for new commitments to fossil-fuel extraction.

While the temptation of fossil fueled development is understandable, especially in countries with extensive poverty and urgent economic and energy needs, including to obtain foreign currency for debt servicing and to stabilize trade balances, the reality is that fossil fuels are unlikely to deliver on the hopes vested in them. In most cases, new fossil fuel extraction has held back other sectors of the economy, undermined institutional development and greatly deepened the debt burden. Often, fossil fuels have worsened more than alleviated poverty; the recent experience of Mozambique (see above) should provide a cautionary tale in this regard.

One common lesson from studies of this so-called "resource curse" is that the only (very few) countries that have achieved positive development outcomes from resource extraction are those that have proceeded slowly, in order to build institutions to govern the resource and oversee foreign companies, and to establish a trained domestic workforce and domestic supply chain. This is what Norway did in the 1970s. Yet in the context of a global energy transition, this option is no longer open: governments tend to want to extract as quickly as possible, before their export markets dry up. Even in a rushed case, governments are unlikely to see significant revenues within less than 15 years of a discovery. Major new investments in extraction infrastructure are thus very likely to end up as costly stranded assets, adding to countries' debts, and locking them into costly fossil energy even as renewable energy systems become far cheaper.

Governance and oversight over fossil fuel extraction are important not only to effectively manage the revenues and avoid corruption, but also to avoid getting a raw deal from foreign companies, who deploy armies of lawyers and accountants to create one-sided contracts and fiscal terms, often allocating both risk and liabilities to the government. There are countless examples of governments with limited capacity signing extraction deals that looked good but where the devil was in the detail. The priority for countries with high levels of poverty must be to find and finance alternative economic pathways that lead to real development.

While the hopes for new fossil fuels are understandable - though, we believe, misplaced - in the case of countries with high levels of poverty and limited alternative options, it is particularly offensive

that very wealthy countries with low levels of dependence on extraction continue to open new fields and mines, when they should be leading the way in a phaseout. Examples abound. In 2023 alone, Norway has granted 47 new oil and gas exploration licenses; the UK is offering hundreds of new licenses in a bid to "max out" its oil and gas extraction; Canada is approving ever riskier deepwater oil drilling in the Baie du Nord oilfield; and the United States approved development of Willow, one of its largest oil fields ever.

DELIVERING A JUST TRANSITION

The imperative of supporting the peoples and communities who are immediately dependent on fossil fuel extraction is fundamental to the equitable phaseout challenge, so much so that the section on of this report, above, on "The scope of the necessary support" focuses on just these sorts of immediate dependence challenges. More precisely, it focuses on the financial challenges, and in particular the international financial challenges, of rapid fossil extraction phaseout. But we must emphasize that the just transition challenge is not *essentially* a financial challenge, and that it is not limited to peoples and communities that are immediately dependent on fossil extraction.

Workers and their unions, as well as impacted communities more generally, must be treated as key stakeholders throughout any real just transition process, which must have social dialogue and inclusive decision making as central pillars. Key challenges include the creation of new jobs in alternative sectors, the retraining of affected workers so that they can succeed in these new jobs, and protecting the rights and incomes of workers and communities during these transitions, which will in some cases be extremely difficult. Taken together, these define a challenge that is far more substantive than merely "protecting" workers with minimal subsistence benefits while "retraining" them for the next dangerous and exploitative job.

Past negative experiences of unplanned or ill-planned plant closures and deindustrialization in both the Global North and Global South have created a huge skepticism among workers and communities, which have excellent reasons to doubt that promises of a just well-managed transition from fossil fuels will ever materialize. A robust and properly funded investment plan aimed at alternative job and income opportunities in dependent regions would go a long way towards reducing this skepticism, and turning these workers and communities into allies. But it has to be real, and it has to show that governments are committed to focus support where it is really needed.

Also, it must be said that the transitional justice challenge posed by the fossil fuel extraction phaseout as a whole, and the still larger climate transition of which it is a part is itself, are themselves just transition challenges, albeit at larger scales. The focus on inclusivity and care that defines that transition challenge in highly dependent communities defines these challenges as well, and the climate transition as a whole.

SOURCES OF SUPPORT FOR RAPID AND EQUITABLE PHASEOUT

As discussed above, the availability of country-specific assessments of support needs, including those associated with rapid fossil-fuel extraction phaseout, would allow us to speak much more precisely about the scale of the total support need, and about how needs vary with the capacities of extracting countries, and thus about which countries are responsible for providing this support. For the time being, however, we will use a proxy approach that simply takes capacity into account – we will consider that countries whose per-capita capacity is above the global average should contribute phase-out support to lower-capacity countries. This proxy approach has many practical advantages, one of which is that it can be applied to both extracting and non-extracting countries.

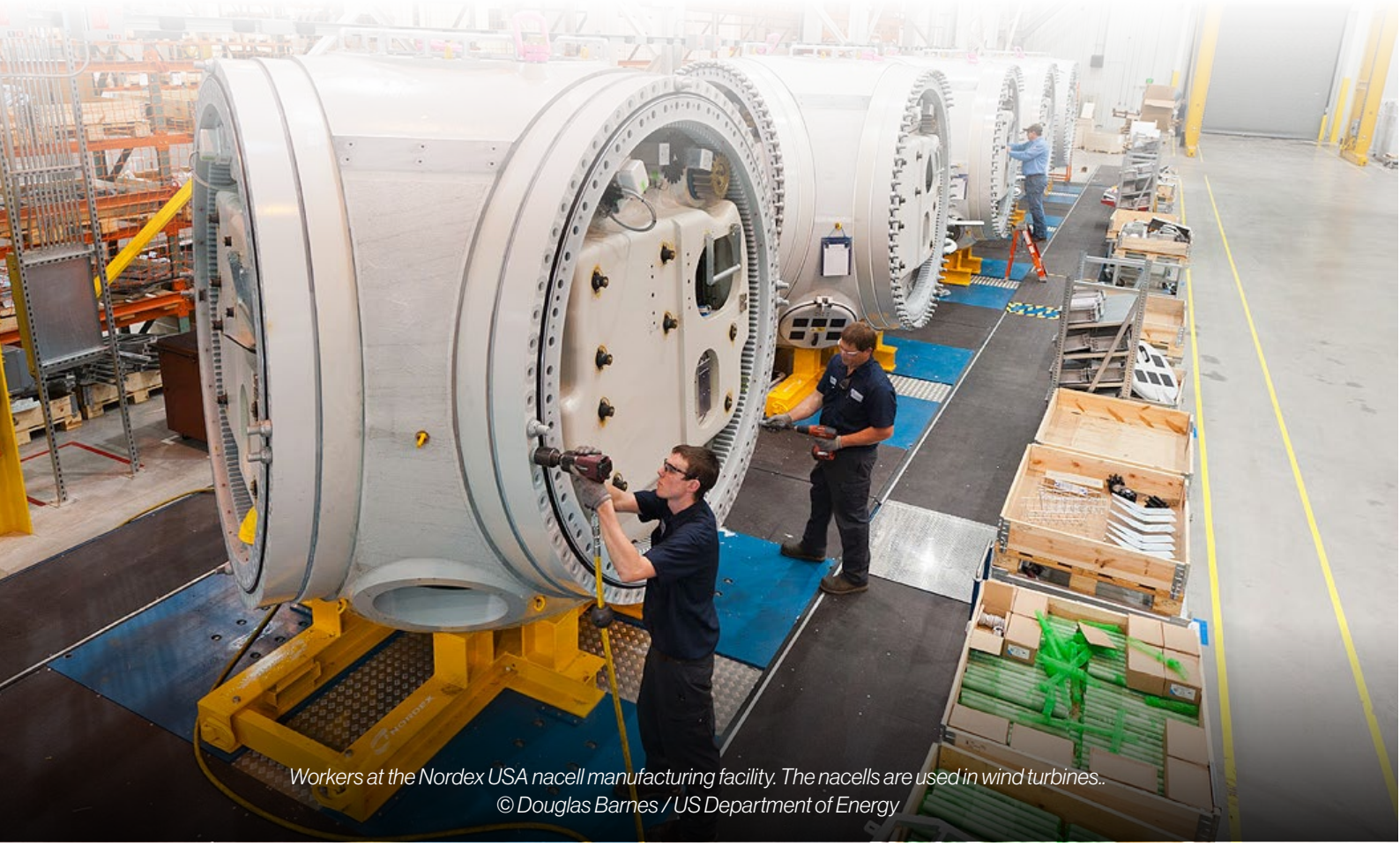
Table 1 below shows key results from this analysis, focusing on the countries that are found to be the main providers of support, and showing their fair shares of the provision of the total global fossil fuel extraction phase-out support need. These fair shares here are primarily expressed as percentages of the total global support needed, which these countries as a group should be expected to contribute. These are calculated relative to one of the equity benchmarks that have been used by the Civil Society Equity Review since its first report in 2015. These, as noted above, are based on historical responsibility for GHG emissions and a view of capacity that takes in-country inequality into account (see above for more detail).

Remember that the support fair shares assigned to high-capacity countries like the UAE or Norway are by no means the whole of the effort that an equitable global phaseout would demand of them, but rather obligations that come in addition to their domestic efforts to phase out extraction.[38]

The table also shows, for reference only, a possible indicative lower bound for each country's annual fair share contribution. It is important to realize that this entire table is based on a very conservative interpretation of our explorations (see "the scale of support" above) into the magnitude of the total fossil fuel extraction phase-out need, for which we have a conservative lower bound of $ 420 billion and up to $ 4.1 trillion. To calculate the indicative numbers below, we have disaggregated that indicative figure, of $ 420 billion per year, based on countries' current fossil fuel extraction workforce. For countries that are eligible to receive phase-out support, we then calculate the fraction of their needs they can be fairly expected to cover with their own resources, and calculate the global support need as the difference between their need and what they should cover themselves. This yields a value of $ 242 billion of extraction phase-out support need per year, which is then allocated to the supporter countries to derive a minimal contribution for each country and thus a sense of the implied proportions and orders of magnitude. Crucially, these indicative figures should not be misconstrued as actual estimates; our calculations have been systematically conservative. The necessary contributions would in all likelihood be higher.

Country	Fair Share of Support	in $ billion per year
United States	48.5%	117
European Union	21.4%	52
Japan	8.7%	21
United Kingdom	4.5%	11
Canada	3.8%	9
Australia	3.1%	8
Korea, Rep.	1.6%	4
Switzerland	1.1%	3
Saudi Arabia	1.1%	3
Turkey	1.0%	2
Norway	0.9%	2
United Arab Emirates	0.8%	2
Qatar	0.6%	1
Singapore	0.5%	1
Kuwait	0.5%	1
Israel	0.4%	1
Other Countries	1.4%	3
TOTAL	**100.0%**	**242**

Table 1: Countries' Fair Shares of the Provision of Fossil Fuel Extraction Phase-out Support.



Workers at the Nordex USA nacell manufacturing facility. The nacells are used in wind turbines..
© Douglas Barnes / US Department of Energy

IMPLICATIONS BY COUNTRY

Figures 3, 4 and 5 and table 2 show the implications of this quantification of our framework for countries. We reiterate, though, that it has been necessary to rely on data that is not in all cases complete, and choices that will benefit from broader civil society discussions.

On the horizontal axes, they show the year by which each country would need to effectively end extraction of each fossil fuel.[39] The vertical axis organizes countries by capacity: those below the blue line will need international support to enable their phaseouts; those above the line cannot expect such international support, and should phase out by their own efforts.

A first, clear implication is that **the phase-out timeframes are very rapid: ending extraction by the early 2030s for the fastest countries, and by the late 2040s for the slowest.** These timeframes result from the extremely limited remaining carbon budget associated with limiting warming to 1.5 °C, combined with the precautionary approach to unproven new technologies: slower timeframes might be possible if we were to bet on future sequestration removing some of the near-term emissions, with attendant severe risks if that bet does not pay off.

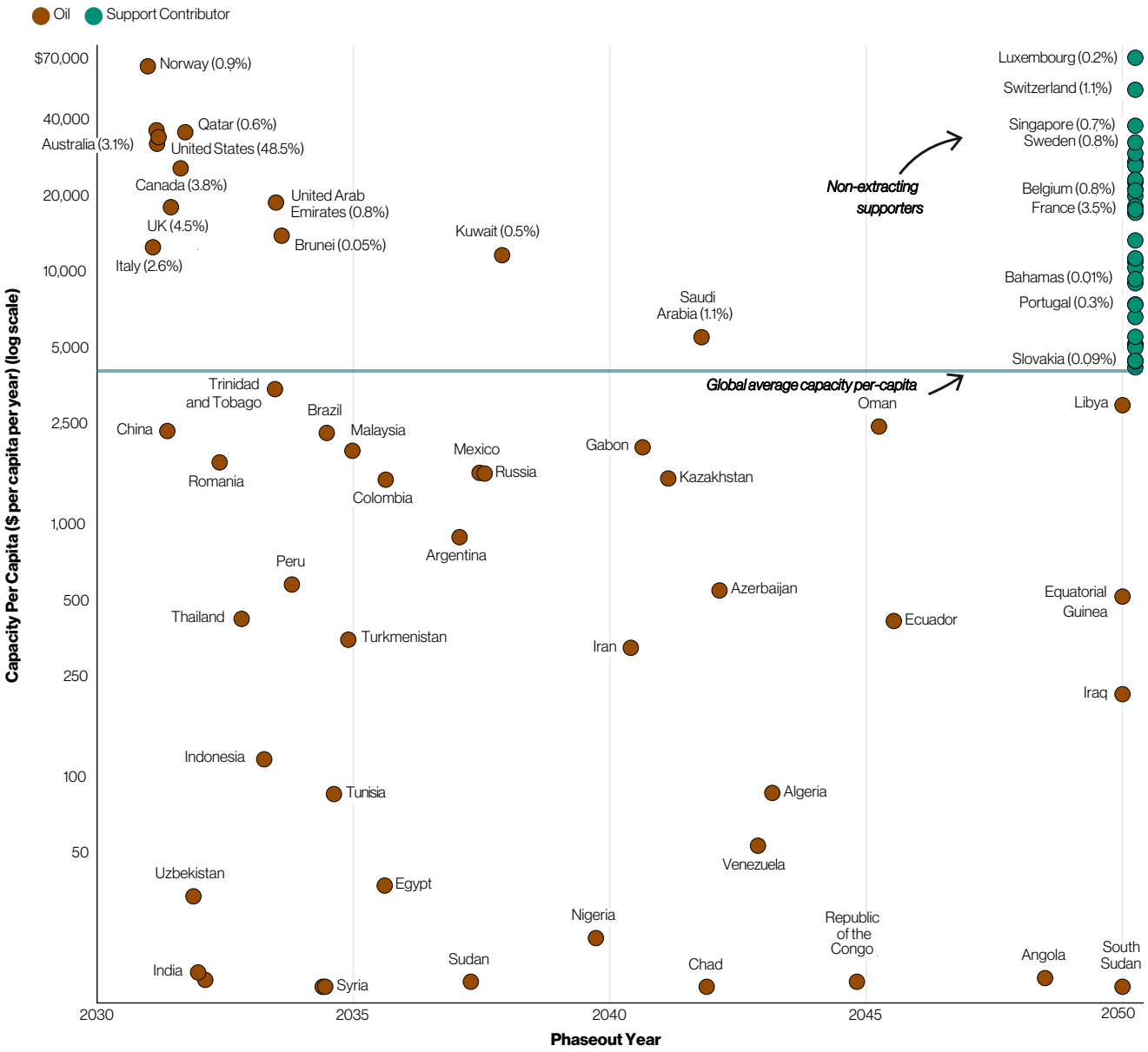


Figure 2: Oil – Phase-out years for oil-extracting countries plotted against their capacity, and provision of support. *The horizontal blue line, set at global average per-capita capacity, delineates countries eligible to receive support for their oil extraction phaseout (below the line) from those that are expected to contribute to this support. For the latter, the numbers in parentheses indicate the share of the global support they should provide. Support contributors listed on the right edge of the chart (green dots) do not have their own oil extraction to phase out; only some are identified with labels. Countries shown here are those included in the Statistical Review of World Energy, which contains some data gaps that will be closed in subsequent releases of this analysis.*

Coal trains in Wyoming. © Kimon Berlin

Figure 2 (oil extraction phaseout) is probably the best place to start. We see that for countries with low dependence and high capacity – in the top-left of the graph – the calculated extraction end dates are between 2030 and 2035, and they are support providers as well. For example, the United Kingdom phases out oil extraction by 2031, and (see Table 2) provides 4.5 % of the required global support. The United States phases out on the same timeline, and must provide 48.5 % of support. This is a strikingly large figure, but it is not surprising given that the US includes a large population of globally affluent people, and they contribute mightily to the US's very high share of total global capacity.[40] Note too that this finding is quite robust – much less progressive definitions of national capacity (i.e., definitions that assume a much lower development threshold, as explained more fully in the methodological appendix) results in a US share of required global support that is still well in excess of ⅓ of the total.

Brunei and the UAE have higher levels of dependence on oil revenues and jobs, and thus phase out later, in 2033, but only slightly later because their considerable financial capacity enables them to invest in alternative sectors and manage the potential disruptions of a rapid transition. Conversely, the bottom-right of the graph contains countries with very high dependence on fossil fuels and very low capacity. Though they must begin reducing extraction immediately, their phaseout proceeds at a slower pace, winding down in the late 2040s. Countries such as Iraq, South Sudan, Angola, and Republic of Congo are among the most extreme examples, not least because of their high dependence on oil revenues for providing public services. With very low capacity, these countries will also need substantial international finance and support to be able to phase out oil extraction soon without enormous social disruption.

Toward the top-right are countries with high dependence and also high capacity, including Kuwait and Saudi Arabia, which phase out extraction respectively in 2037 and 2041. These countries need time to restructure their economies, but they have high per-capita capacity and are still providers of support to others – this includes the Middle East exporters, which are not Annex II countries in the UNFCCC.

In the bottom left are countries with low dependence but also low capacity, such as India, Tunisia and Peru. Since their dependence is relatively low, they should aim for a rapid transition by the early 2030s, but given their low capacity, this can only happen if they receive sufficient support. While it might seem counterintuitive to have Southern countries phasing out so rapidly, this group more than any other illustrates the central importance of international support in making rapid global fossil-fuel phaseout feasible – roughly half of current oil production occurs in countries below the capacity threshold shown above, and the same is true of gas.

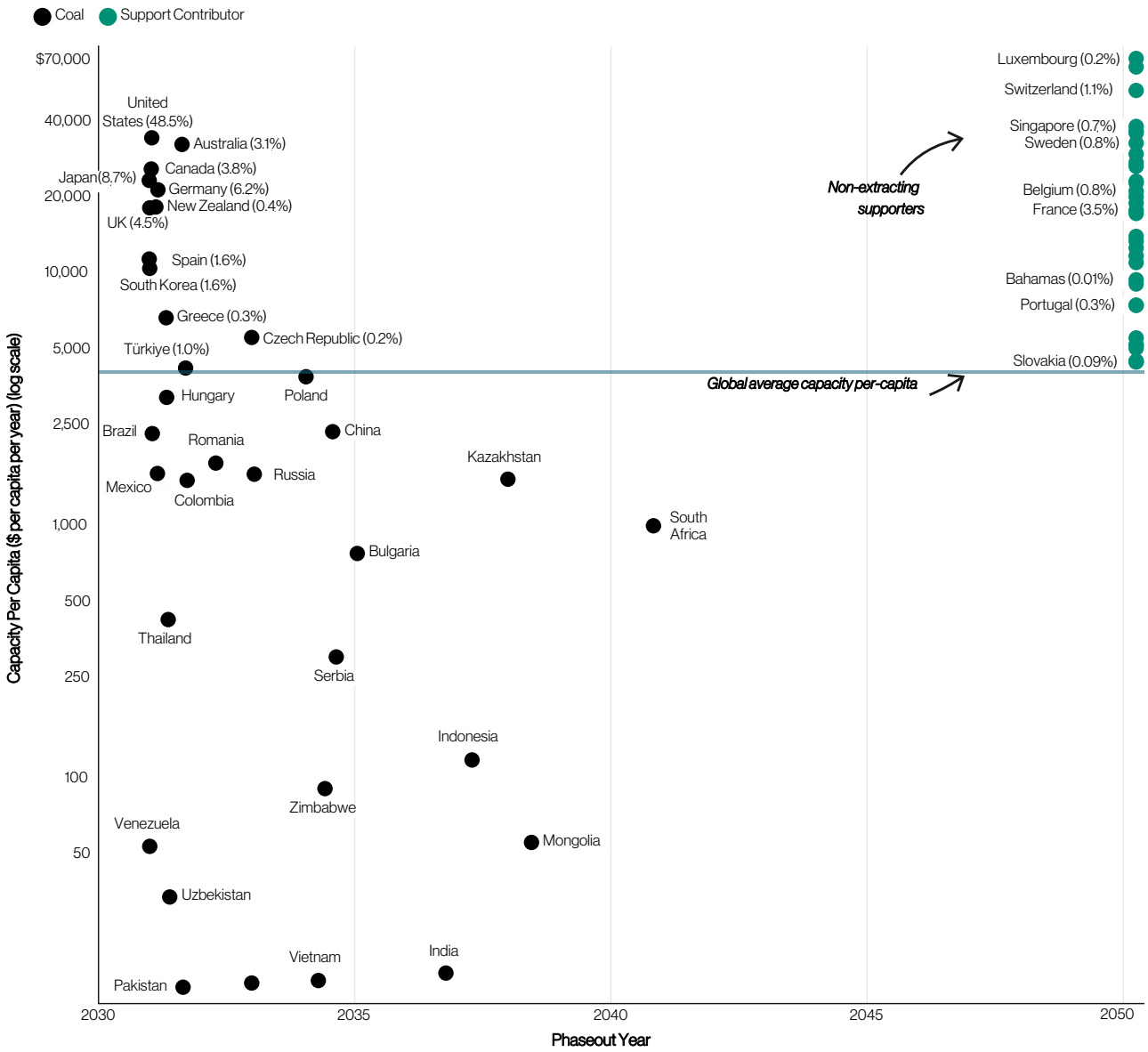


Figure 3: Coal – Phase-out years for coal-extracting countries plotted against their capacity, and provision of support.
See caption of Figure 2 for further details.

Figure 3, showing coal phaseout, is structurally identical to the oil chart above. As a whole, coal is phased out faster than oil and gas, with all phaseouts before 2040. This is because coal provides considerably less public revenue than oil or gas, as well as less employment, resulting in generally lower levels of dependence of coal producers on extraction than oil and gas producers. Dependence on coal mining is largely linked to its use for domestic energy supplies. This result is consistent however with the faster coal phaseouts seen in techno-economic climate model scenarios, which are driven by energy sector considerations that favor oil and gas over the more carbon intensive coal.

In particular, note the coal phaseout in India in 2036 and South Africa in 2040 – these are very challenging timeframes given these countries' low capacities. This result highlights the crucial role of support – without it, rapid phaseout will be nearly impossible, and given coal's large share of global carbon emissions, holding within the extremely small remaining 1.5 °C carbon budget will be impossible as well.

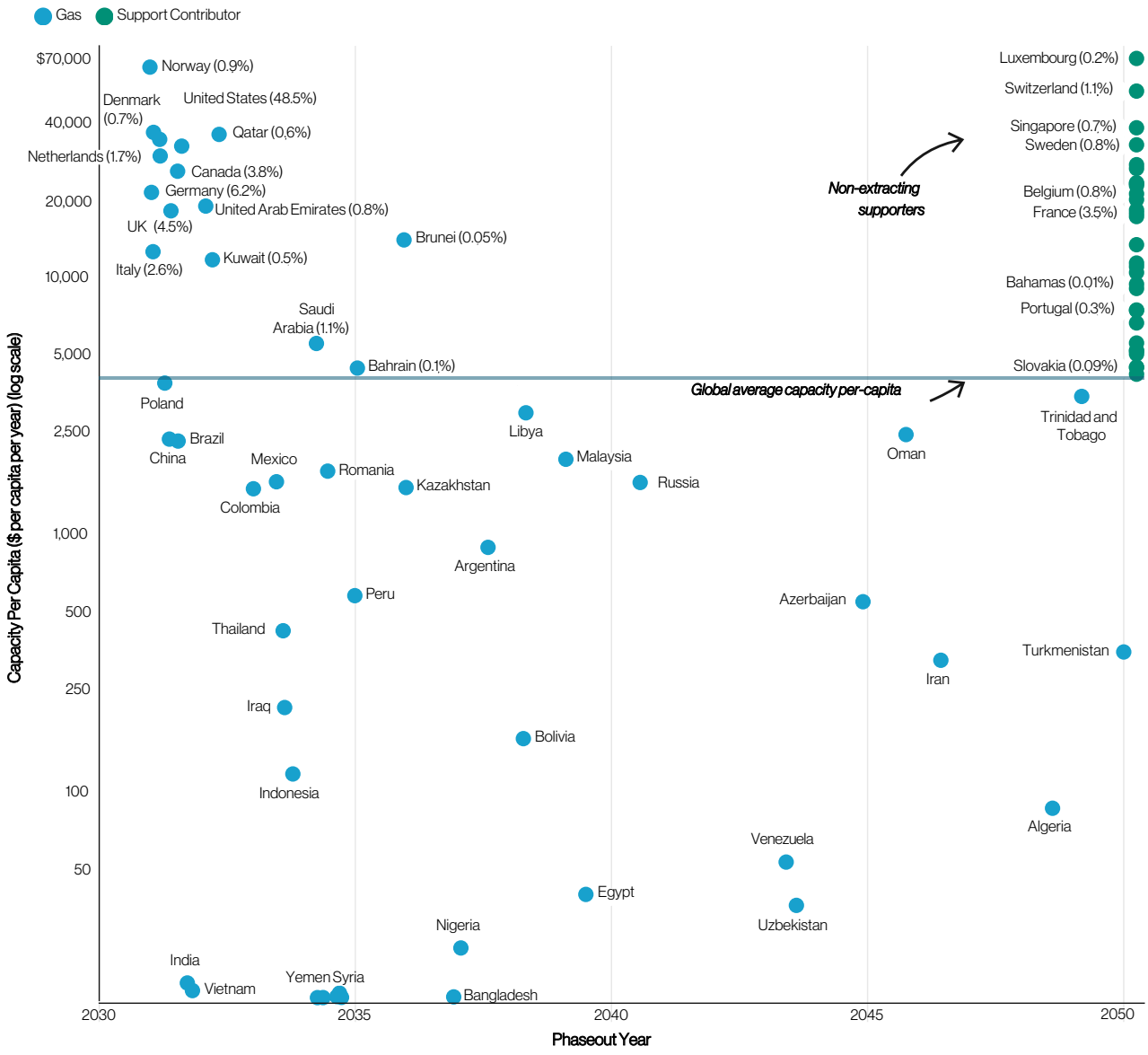


Figure 4: Gas – Phase-out years for gas-extracting countries plotted against their capacity, and provision of support.
See caption of Figure 2 for further details.

Finally, Figure 4 shows gas phaseout. We see the highest levels of dependence in Turkmenistan and Trinidad and Tobago, both of which depend on gas extraction in all three of our framework's dimensions – energy, revenue and jobs – and hence see phaseout dates in the late 2040s. Like UAE and Brunei for oil, all the producers above the line, most notably the US (which is responsible for more than 20 % of global gas production) are required to phase out quickly, all by the mid-2030s This is true even of Qatar, which - like UAE and Brunei for oil - is fairly dependent on extraction, but has a very high capacity that enables it to overcome this dependence, hence the early phaseout date of 2032. Venezuela is also an interesting example, in that it's dependence on coal production is low, and it is thus expected to phase it out rapidly (as shown in the first chart), in contrast to its dependence on oil and gas production, which is quite high, explaining the longer phaseout period seen in the oil and gas charts above.

Country	Fair Share of Support or 'R'ecipient	Oil		Coal		Gas	
		Phaseout Year	Reduction in 2030 (%)	Phaseout Year	Reduction in 2030 (%)	Phaseout Year	Reduction in 2030 (%)
United States	48.5%	2031	81.4%	2031	82.5%	2031	81.5%
European Union	21.4% *						
Japan	8.7%			2030	82.9%		
Germany	6.2% *			2031	81.6%	2031	82.7%
United Kingdom	4.5%	2031	79.4%	2030	82.9%	2031	79.8%
France	3.9% *						
Canada	3.8%	2031	78.0%	2031	82.6%	2031	78.8%
Australia	3.1%	2031	81.6%	2031	78.0%	2031	78.2%
Italy	2.6% *	2031	82.1%			2031	82.4%
Netherlands	1.7% *					2031	81.4%
South Korea	1.6%			2030	82.9%		
Spain	1.6% *			2030	82.9%		
Switzerland	1.1%						
Saudi Arabia	1.1%	2041	27.4%			2034	59.1%
Norway	0.9%	2030	82.9%			2030	82.9%
United Arab Emirates	0.8%	2033	64.1%			2032	74.6%
Qatar	0.6%	2031	77.3%			2032	72.6%
Kuwait	0.5%	2037	39.9%			2032	73.6%
Libya	R	2050	11.0%			2038	38.1%
Oman	R	2045	20.4%			2045	19.6%
China	R	2031	80.0%	2034	57.0%	2031	80.0%
Brazil	R	2034	57.5%	2031	82.5%	2031	78.7%
Malaysia	R	2034	54.4%			2039	35.3%
Mexico	R	2037	41.7%	2031	81.7%	2033	64.4%
Russia	R	2037	41.3%	2033	67.3%	2040	30.6%
Kazakhstan	R	2041	29.0%	2037	39.5%	2035	48.8%
South Africa	R			2040	29.9%		
Argentina	R	2037	43.5%			2037	41.2%
Turkmenistan	R	2034	54.9%			2050	13.5%
Iran	R	2040	31.1%			2046	18.6%
Iraq	R	2050	7.6%			2033	63.2%
Indonesia	R	2033	65.8%	2037	42.4%	2033	62.1%
Algeria	R	2050	24.2%			2048	15.8%
Egypt	R	2035	50.8%			2039	33.9%
Uzbekistan	R	2031	76.1%	2031	79.8%	2043	23.3%
Nigeria	R	2039	33.2%			2037	43.5%
India	R	2031	75.4%	2036	44.8%	2031	77.4%
Angola	R	2048	15.9%				

Table 2: Summary of the Results of our Analysis with the Equitable Fossil Fuel Phaseout Framework. *For each country listed, the table shows the country's fair share of the provision of the total global phase-out support need. The EU and its member states are marked with an asterisk to indicate the possibility of collectively implementing the EU's share, rather than each member state's individual share. For each fuel type, where applicable, the table further shows the phase-out year (i.e. when extraction levels for the fuel drop below 90 % of current levels), and the reduction of extraction in 2030 below current production levels according to this analysis. Countries are listed if they: have a fair share of support above 1%, or extract more than 1 % of the total global volume of either oil, coal, or gas. A version of this table for all countries is available in the online methodology supplement. That online version also shows data for each country for the elements of our composite dependence indicator. Countries shown here are those included in the Statistical Review of World Energy, which contains some data gaps that will be closed in subsequent releases of this analysis.*

Whilst these effective end-dates provide a useful, intuitive sense of timeline, they should not be interpreted as implying countries can wait until those dates before acting. A second implication is thus that **extraction of all fossil fuels needs to decrease in all countries, beginning immediately.** Again, this result flows Table 2 also shows the percentage reduction in each country's extraction that is required by 2030.

A third implication is that international support is crucial, at a much larger level than is currently being proposed. **Countries with above-average capacity should provide hundreds of billions of dollars per year to lower-capacity countries**, to make their transitions possible. While the countries of the Global North have long sought to separate national mitigation action from the provision of finance and other means of support, such a separation would make absolutely no sense. The necessary phase-out timeframes are meaningless without the provision of financial support that is absolutely required to enable them.

Looking at the implications for specific countries, we see an echo of the groupings in Figure 2. At the top-left of Figures 3, 4 and 5, countries with low dependence on fossil fuels and high capacity are assigned extraction end dates between 2030 and 2035, and are as well providers of support. For example, the United Kingdom phases out oil extraction by 2032 and gas by 2033, and provides 4.5 % of the required global support. The United States has only slightly greater dependence, and thus phases out only slightly later, in 2033 and 2034 respectively. But its very high capacity means it provides 48.5 % of the support.

Conversely, in the bottom-right are countries with very high dependence on fossil fuels and very low capacity. They phase out as late as possible, in the mid 2040s. The countries here include Iraq and Libya, which are highly dependent on oil revenues, and Trinidad and Tobago, which depends on both revenue and jobs from its gas extraction. With very low capacity, these countries need substantial international support.

In the top-right are countries with high dependence andalso high capacity, including the Middle East oil exporters such as Kuwait and Saudi Arabia, and gas exporter Qatar, all of which phase out extraction in the 2040s. Countries such as Norway and the UAE have higher dependence on oil extraction than the first group, but less than the most-dependent countries; they therefore end extraction in the late 2030s (Norway 2037 for oil and 2038 for gas; UAE respectively 2039 and 2036). While these countries may need more time to restructure their economies, they have high per-capita capacity, and are still providers of support to others – this includes the Middle East exporters that are not Annex II countries in the UNFCCC.

In the bottom left are countries with low dependence and low capacity, such as India, Tunisia and Peru. Since their dependence is relatively low, they can aim for a rapid transition by the early 2030s, but given their low capacity, this can only happen with sufficient support. Whilst it might seem counterintuitive to have Southern countries moving so fast, this group illustrates more than any the central importance of international support to our framework.

Finally, the countries marked in green do not extract meaningful amounts of fossil fuels; nonetheless, with above-average per-capita capacity, they should provide their fair share of transition-enabling support in lower-capacity countries. While they do not extract themselves, these countries are consumers and hence beneficiaries of fossil fuels, and so must play their part.

BOX 4: THE PROBLEM OF CORPORATIONS

We have, in this report, had little to say about corporations, despite the fact that oil and gas and coal corporations, both private or state owned, are major political and economic actors with immense wealth and power, actors that have done everything to ensure that humanity will remain dependent on fossil fuels for as long as possible.

This is an immense topic, but we will make only a few brief points. The first is simply that, for all the power of the fossil-fuel corporations, and corporations in general, this remains a world of nations. When push comes to shove, and it soon will, the world's nations have the power to regulate, the power to tax, even the power to nationalize. This should not be forgotten.

Second, in a strange and even ironic twist on today's injustice, the only entities that are legally protected from the adverse impacts of accelerated decarbonization are not workers, or governments, or communities, but the very corporations that have done most to cause the climate problem, under an extensive array of investment treaties. Changing those is also within the power of governments.

Third, the astute reader will note that this framework does ***not*** propose the creation of some new extraction-responsibility metric based on a country's cumulative historic extraction. This is in part because extraction is not well correlated with benefits – many countries have hosted immense mining and drilling operations that produced immense amounts of social and ecological damage, but seen very little by way of rewards. But note – this caveat does not apply to corporations, which have throughout history benefited in clear and unqualified ways from their extractivist enterprises.

Corporations, in other words, bear their own historical responsibilities. This follows from numerous moral principles including not only "polluter pays" but also "beneficiary pays," and of course "ability to pay."

Fossil fuel corporations will, when they are at last faced with strong policies designed to shut down their core activities, claim that they have the right to recompense. On the contrary, they should be made to contribute a large share of the costs of the climate transition, including for fossil fuel extraction phaseout.[41]

Also, these companies have the responsibility to reach agreements with trade unions on ways to support their direct and indirect workers in the transition. Bringing fossil fuels phase-out plans to collective bargaining is key to ensuring that companies realise their duty of care. As seen in the Spanish case, above, when governments mandate a no-lay-offs rule, important resources are freed up for other, more vulnerable workers and communities and for regional economic diversification.

Demolition of Richborough Power Station in the UK. © Shirokazan

REFLECTIONS, PATHS FORWARD

This equity reference framework is, we believe, both ethically and structurally appropriate to the challenges of rapid fossil fuel extraction phaseout. That said, we willingly admit that, in itself, it is not complete. Four points in particular bear focused consideration:

First, no-one knows what it would cost – at the whole of society level – to rapidly phase out fossil fuel extraction, either globally or within any given nation. What we can say, as discussed above, is that the cost will almost certainly be on the scale of $ 100s of billions, and that this knowledge alone takes us pretty far. Still, the equity challenges posed by an extraction phaseout, like the equity challenges posed by the other major aspects of the climate transition – mitigation, adaptation, and loss & damage – demand proper, concrete, bottom-up needs assessment processes that are capable of weighing the just transition challenges posed by any fair approach to rapid fossil-fuel extraction phaseout.[42]

Second, the fossil-fuel extraction phaseout must be taken together with an equally ambitious program of emissions mitigation. This seems almost too obvious to state, and yet it should be stated, if only to ensure that the challenge of equitable extraction phaseout is not misunderstood as a project that can be pursued on its own. Rather, we are turning towards extraction phaseout because it has become altogether impossible to believe that rapid emissions mitigation will occur entirely on the demand side of the problem, without simultaneous action on the supply side. Which in turn means that the 100s of billions of dollars needed for the extraction phaseout must be understood in addition to the similarly scaled need on the mitigation side of the decarbonization challenge, to the considerable global adaptation and loss & damage needs. This brings us to the overarching question of climate finance, which is very challenging indeed. We are talking about many hundreds of billions of dollars a year, much of which must be public, and of a transition that must provide such sums on a predictable basis for decades. Can finance on this scale be mobilized without an overarching agreement on the future of climate finance – an agreement that goes beyond extraction phaseout to include mitigation, adaptation, and loss & damage? And can such an overarching finance agreement be reached without a conjoint agreement on the future of differentiation? We do not know, for we do not know how willing the elites will prove to be when it comes to delivering truly meaningful reforms of the IMF, the multilateral banks, the international debt and subsidy systems, nor how willing they will be to tax the fossil-fuel corporations and, more generally, the rich countries and rich people that today consume so much of the fossil fuel that we are proposing to phase out.

Relatedly, there is the matter of non-financial conditions, including the reform of institutions and governance architectures at all levels. Such reform will absolutely be necessary if we're to meet the challenging fossil-fuel phase-out timeframes discussed above. At a minimum, we need a credible vision of a multilateral governance regime that is capable of "managing" a transition in which the phase out of fossil fuels and the phase in of a renewable-based global energy system are coordinated and balanced. Such balance cannot be left to chance, not given the tumult and disruption that's likely in any adequately rapid global energy transition. We must avoid wrenching price volatility and ensure a tolerably smooth phaseout, particularly for economically vulnerable countries and communities, and this cannot happen if conventional energy markets remain in command. Their reality – obscure interactions between competition, collusion, corruption, and subsidies – will need to be transformed, virtually beyond recognition, before they can be governed by equitable national phase-out timeframes.

Finally, and on a somewhat different note, the national dependence analysis at the heart of this framework will almost certainly have to become more nuanced. It is here laid out in terms of three principle factors – (i) the share of primary energy consumption that is met from domestically-extracted fossil fuels, (ii) the share of government revenues that comes from fossil fuel extraction, and (iii) the share of workforce employed in fossil fuel extraction – that, taken together, capture core aspects of the economic diversification and just transition challenges that confront any nation that sets out to earnestly eliminate its dependence on fossil extraction. However, these three factors may not be enough to assess national dependence properly. For example, the consideration of the share that fossil fuels play in overall economic activity, or in exports, may well produce a higher resolution picture of overall national dependence on fossil-fuel extraction.

FACING REALITY

Our key takeaways and conclusions are as follows:

- Fossil fuel extraction must be stopped urgently where it violates human rights, especially the Rights of Indigenous Peoples.
- To have a decent chance of holding to the 1.5 °C limit, fossil fuel extraction must begin to decline immediately, phase down rapidly in the coming decades, and cease worldwide by 2050.
- There is no room for new oil and gas fields or coal mines to be opened anywhere in the world. All investment in the further build-out of fossil-fuel infrastructure must stop immediately.
- All countries must phase out fossil fuel extraction as quickly as possible. Given the challenges, this will be politically achievable only if it is widely accepted as fair.
- Countries that are highly dependent on extraction will need time to disentangle their societies from fossil fuels and build new economies (although this does not give them license to continue extraction when it violates human rights). This will be extremely difficult in poorer countries such as Iraq and South Sudan, where fossil fuels account for the vast majority of economic activity.
- To leave highly-dependent, poorer countries with enough carbon budget to phase out extraction in a reasonably just manner, less-dependent countries – which face much less challenging prospects – must phase out much more quickly. The least socio-economically dependent countries like Canada, the United States, Norway, Australia, and the UK, must end fossil fuel extraction by the very early 2030s.
- In addition, wealthy countries must provide significant amounts of climate finance and international phase-out support to the transition in poorer, dependent countries. This support and finance should eventually be based on proper country-led need-based assessment processes, however our initial analysis – which merely defines a very conservative lower bound – finds that support on the order of hundreds of billions of dollars per year will be needed.
- The support and climate finance necessary to empower rapid fossil-fuel extraction phaseout must be provided by the countries with the highest capacity and the highest responsibility for historic emissions. These include both countries that extract large amounts of fossil fuels (US, Canada etc.) and those that do not (France, Japan etc.), for after all the latter industrialized and grew wealthy in a world where they themselves benefitted from unconstrained fossil fuel use.

Conclusions like these are not surprising. The global 1.5 °C carbon budget is almost entirely exhausted, making these takeaways almost inevitable. The real question is if our governance systems, societies, and economies are capable of responding to these realities, in time and in good faith.

ONLINE METHODOLOGY SUPPLEMENT

See https://www.equityreview.org/methodology-appendix-2023 for an online methodology supplement. This living document contains detailed information about our methodological approach, normative decisions, and data sources, as well as detailed and sometimes interactive versions of the charts and tables presented here and additional background information and supplementary analyses, which will be updated with new results (including sensitivity analyses) and improvements to the model as it evolves.

ENDNOTES AND REFERENCES

1 Civil Society Equity Review (2021) A Fair Shares Phase Out: A Civil Society Equity Review on an Equitable Global Phase Out of Fossil Fuels. https://www.equityreview.org/2021

2 Dan Calverley and Kevin Anderson (2022). Phaseout Pathways for Fossil Fuel Production within Paris-Compliant Carbon Budgets. Tyndall Centre, University of Manchester. https://www.iisd.org/publications/report/phaseout-pathways-fossil-fuel-production-within-paris-compliant-carbon-budgets

3 To be precise, we define the phaseout year as the year by which countries must reduce their fossil-fuel extraction by 90 %.

4 See for example Thomas Piketty, A Brief History of Equality, Belknap Press, 2022, pages 21 - 26.

5 https://www.equityreview.org/methodology-appendix-2023

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10 SEI, Climate Analytics, E3G, IISD, UNEP (2023) Production Gap Report 2023. http://productiongap.org/2023report

11 IEA (2023) Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach. 2023 Update. Paris: International Energy Agency. https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach

12 Greg Muttitt and Sivan Kartha (2020) "Equity, climate justice and fossil fuel extraction: principles for a managed phase out" in Climate Policy, 1–19. https://doi.org/10.1080/14693062.2020.1763900

13 IPCC (2018) Special Report on the Impacts of Global Warming of 1.5 °C... http://www.ipcc.ch/report/sr15

14 IPCC (2022) Climate Change 2022: Mitigation of Climate Change. Chapter 12: Cross-Sectoral Perspectives. https://www.ipcc.ch/report/ar6/wg3/chapter/chapter-12, p.1263

15 The LED scenario does assume a significant amount (217 GtCO2) of carbon dioxide removal through afforestation and reforestation. If this amount cannot be achieved because of governance or sustainability barriers (e.g. impacts on biodiversity and food production), emissions reductions would need to be correspondingly faster than in the scenario.

16 Dan Calverley and Kevin Anderson (2022). Phaseout Pathways for Fossil Fuel Production within Paris-Compliant Carbon Budgets. Tyndall Centre, University of Manchester. https://www.iisd.org/publications/report/phaseout-pathways-fossil-fuel-production-within-paris-compliant-carbon-budgets

17 In other words, this is a country's fossil fuel production minus exports, divided by total primary energy consumption. Data are taken from: Energy Institute (2023) Statistical Review of World Energy 2023. https://www.energyinst.org/statistical-review

18 For most countries, fossil fuels' contribution to government revenue is obtained from IMF Article IV reports. In some less-dependent countries, it is taken from government statistics.

19 We use the IEA's World Energy Employment report, which gives oil and gas extraction and coal mining job numbers for India, China, Other Asia Pacific, Africa, North America, Central & South America, Europe and Rest of World. For each multi-country region, we assume that job numbers are distributed between countries in proportion to their share of that region's production. The data include both direct extraction jobs and indirect jobs in sectors that specifically supply fossil fuel extraction activities, but not indirect jobs in production of general goods and services used in extraction, such as cement and steel.

20 Other measures of dependence include:
- Share of fossil fuels in overall economic activity or in added value;
- Share of fossil fuels in exports, which is a measure of a country's access to foreign currency, often needed for debt servicing;
- Quantity of fossil fuel capital stock that will be stranded in the transition.

Rather than attempting to build a very complex indicator including these and other elements, we focus on the three core components described in the text, which between them encompass the broad aspects of dependence.

21 2022 data. Energy Institute (2023) Statistical Review of World Energy 2023. https://www.energyinst.org/statistical-review

22 2022 data. Energy Institute (2023) Statistical Review of World Energy 2023. https://www.energyinst.org/statistical-review

23 Oil-dependent economies are generally structured around the collection and distribution of the unusually high profits (known as economic rents), which crowd out other sectors and distort the political settlement. For example, fossil fuel revenues inflate the currency, making alternative export sectors uncompetitive, such that the only way to run parts of the economy is by subsidizing them from the oil rents.

24 Peter Hayes and Kirk Smith (1993) The Global Greenhouse Regime: Who Pays?, Routledge.

25 For a thorough discussion and normative justification of our equity benchmarks, including the "High Progressivity" benchmark used throughout the present report to define countries' capacity, see earlier Civil Society Equity Review Reports, in particular https://www.equityreview.org/report2015, or the peer-reviewed methodology article for the Civil Society Equity Review approach: Ceecee Holz, Sivan Kartha and Tom Athanasiou (2018) "Fairly Sharing 1.5 – National Fair Shares of a 1.5 °C-compliant Global Mitigation Effort" in International Environmental Agreements: Politics, Law and Economics, 117–134. http://rdcu.be/u8C3

26 In 2005 US Dollars, expressed in purchasing power parity (PPP) terms.

27 https://www.equityreview.org/methodology-appendix-2023

28 Civil Society Equity Review (2022) The Imperative of Cooperation: Steps Towards an Equitable Response to the Climate Crisis. https://www.equityreview.org/report2022

29 Ernst & Young (2023) Just Transition Review of the Scottish Energy Sector. Chapter 3: Just Transition Analysis. https://www.energy-system-and-just-transition-independent-analysis.co.uk/chapter3.pdf, page 47: the numbers cited here are for the "Historical Emissions Scotland" scenario which completely phases out oil and gas extraction by 2050.

30 Government of Spain (2023) Spain, 4 Years Towards a Just Energy Transition. Ministry for Ecological Transition and Demographic Challenge. https://www.transicionjusta.gob.es/Documents/Publicaciones%20ES%20y%20EN/Spain_4%20years%20towards%20a%20just%20energy%20transition.pdf

31 The Presidency of the Republic of South Africa (2022) South Africa's Just Energy Transition Investment Plan (JET IP) for the Initial Period 2023–2027. https://www.thepresidency.gov.za/content/south-africa%27s-just-energy-transition-investment-plan-jet-ip-2023-2027

32 For example, an assessment of transition costs in the USA comes to $ 600 million per year to support transition for a current fossil fuel extraction work force of 258,000 direct jobs. That study considers only a minor decline in fossil fuel extraction activities (40-60 % over 20 years, depending on fuel). That decline is slow and limited enough that it allows the authors to conclude that most workers (70-76 %) currently employed in the sector will "age out" of the workforce and into retirement during that decline, and therefore not require support. However, not only would these numbers be much different in the phaseout scenario considered in this report, the focus on the transition needs of present workers also ignores the fact that a loss of a job does not only impact its current holder, but also represents a loss of an employment opportunity for others in the economy who are still impacted even if current workers can retire out of a lost job. Robert Pollin and Brian Callaci (2019) The Economics of Just Transition: A Framework for Supporting Fossil Fuel–Dependent Workers and Communities in the United States. Labor Studies Journal, 44(2), 93–138. https://doi.org/10.1177/0160449X18787051

33 International Energy Agency (2022) World Energy Employment. https://www.iea.org/reports/world-energy-employment. The figure cited is the sum of: oil supply, 8 million workers; coal supply, 6.3 million; gas supply, 3.9 million.

34 See Tom Athanasiou, Ceecee Holz and Sivan Kartha (2022) Fair Shares: Lessons from Practice, Thoughts on Strategy. A Report Prepared for the Climate Action Network International by the Climate Equity Reference Project, August. https://doi.org/10.5281/zenodo.2595504

35 IISD report.

36 IEA (2023) Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach. 2023 Update. Paris: International Energy Agency. https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach

37 Kelly Trout et al. (2022) "Existing Fossil Fuel Extraction Would Warm the World Beyond 1.5 °C" in Environmental Research Letters, 17(6). https://doi.org/10.1088/1748-9326/ac6228. For the update to 60 %, see Kelly Trout (2023) Sky's Limit Data Update, https://priceofoil.org/content/uploads/2023/08/skys-limit-data-update-2023-v3.pdf

38 For both the UAE and Norway, it's reasonable to ask if the methodology used in our equity model captures all of their national capacity, because both countries have large sovereign wealth funds, which could be used to finance both domestic economic diversification and economic diversification in other, lower-capacity countries. This is particularly the case for largest holders of sovereign wealth, China ($ 2,395 billion), the UAE ($ 1,889 billion) and Norway ($ 1,388 billion), though, notably, China's sovereign wealth does not flow from oil and gas revenues (as it does for both the UAE and Norway). Also, it is much smaller in per-capita terms, which is what matters here.

We note this for two reasons. First, even if the flow of fossil fuel profits was shut off tomorrow, both the UAE and Norway would have immense wealth they could use to finance their transitions. Second, it's not at all clear that this wealth can *fairly* be counted as part of a country's national capacity if other forms of wealth – say for example the wealth of private corporations, or private citizens – is not *also* counted. It may be fair to do so, for sovereign wealth is by definition public wealth, but the question is a legitimate one. We raise it here not to resolve it, but to note that, as the overarching question of climate finance comes to the fore, its scope is not going to be restricted in any simple way. Wealth, and its taxation, must be just as much on the table as debt, and its cancellation.

39 To be precise, countries reduce their fossil-fuel extraction by 90 % by this date.

40 See for example Thomas Piketty (2022) A Brief History of Equality. Belknap Press, pages 21 - 26.

41 As an example, and a prod to further thinking on fossil fuel company reparations, see Marco Grasso and Richard Heede (2023) "Time to Pay the Piper: Fossil Fuel Companies' Reparations for Climate Damages." One Earth, May 19, https://doi.org/10.1016/j.oneear.2023.04.012

42 See Xolisa Ngwadla et al. (2023), *A Needs-Based Approach to Climate Finance*, https://doi.org/10.5281/zenodo.7849943 and Tom Athanasiou et al. (2022), *A Needs-based Approach to Assessment and Stocktaking*, https://doi.org/10.5281/zenodo.7849988 - two of the negotiator briefings prepared by the Equity Working Group of the independent Global Stocktake, https://www.climateworks.org/programs/governance-diplomacy/independent-global-stocktake/igst-equity-working-group//

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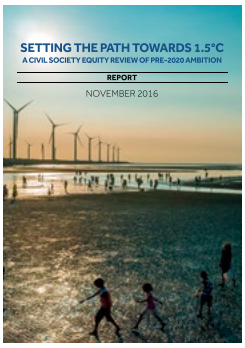

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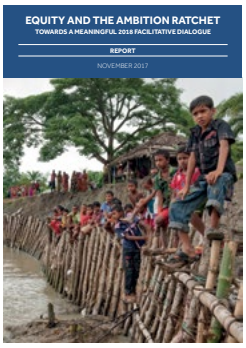

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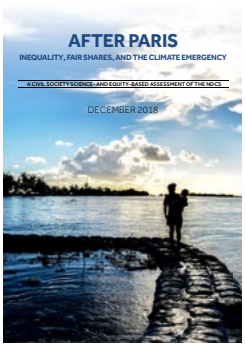

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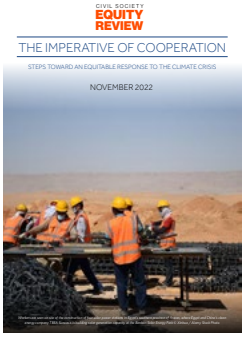

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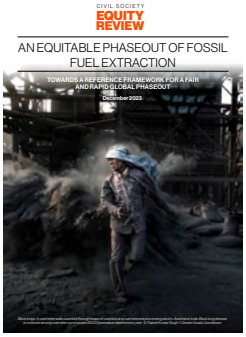

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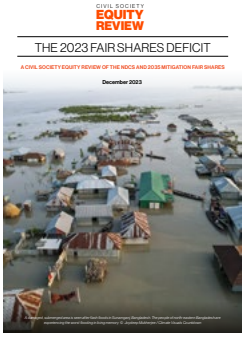

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CLIMATE EQUITY REFERENCE PROJECT

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