
AN EQUITABLE PHASEOUT OF FOSSIL FUEL EXTRACTION

TOWARDS A REFERENCE FRAMEWORK FOR A FAIR
AND RAPID GLOBAL PHASEOUT

December 2023

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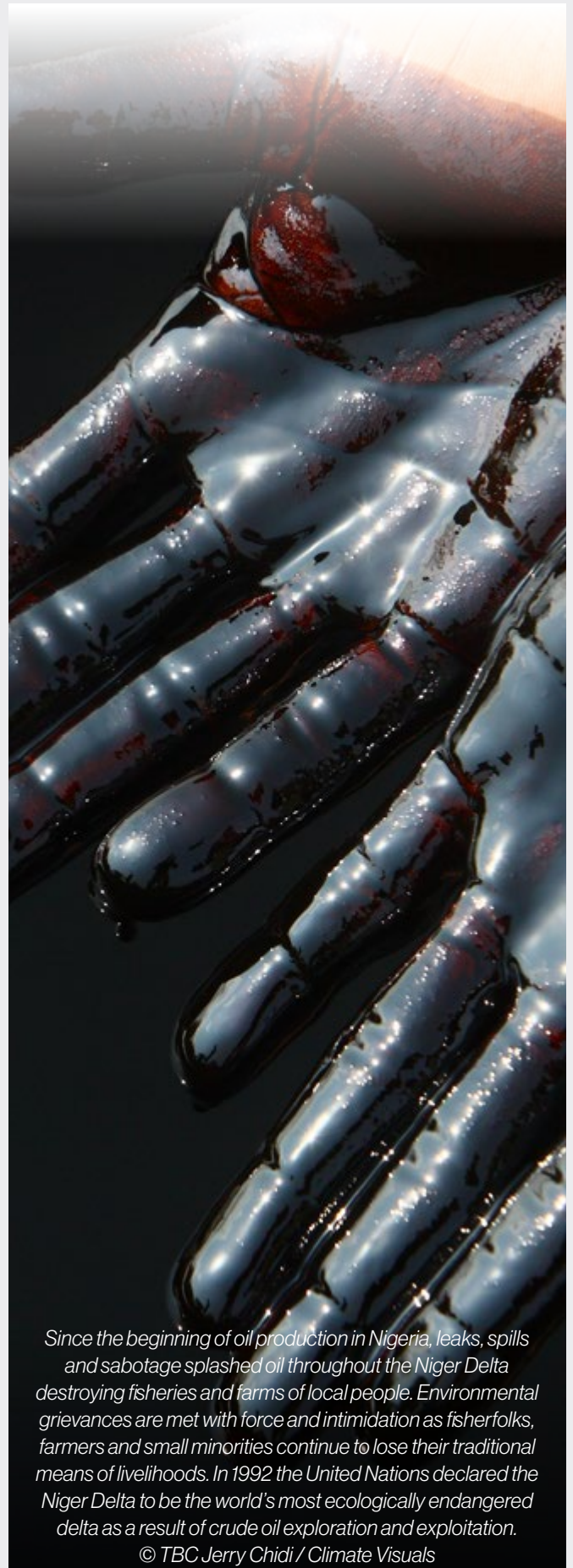
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KEY MESSAGES

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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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

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, 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, 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 2/3 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. 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.

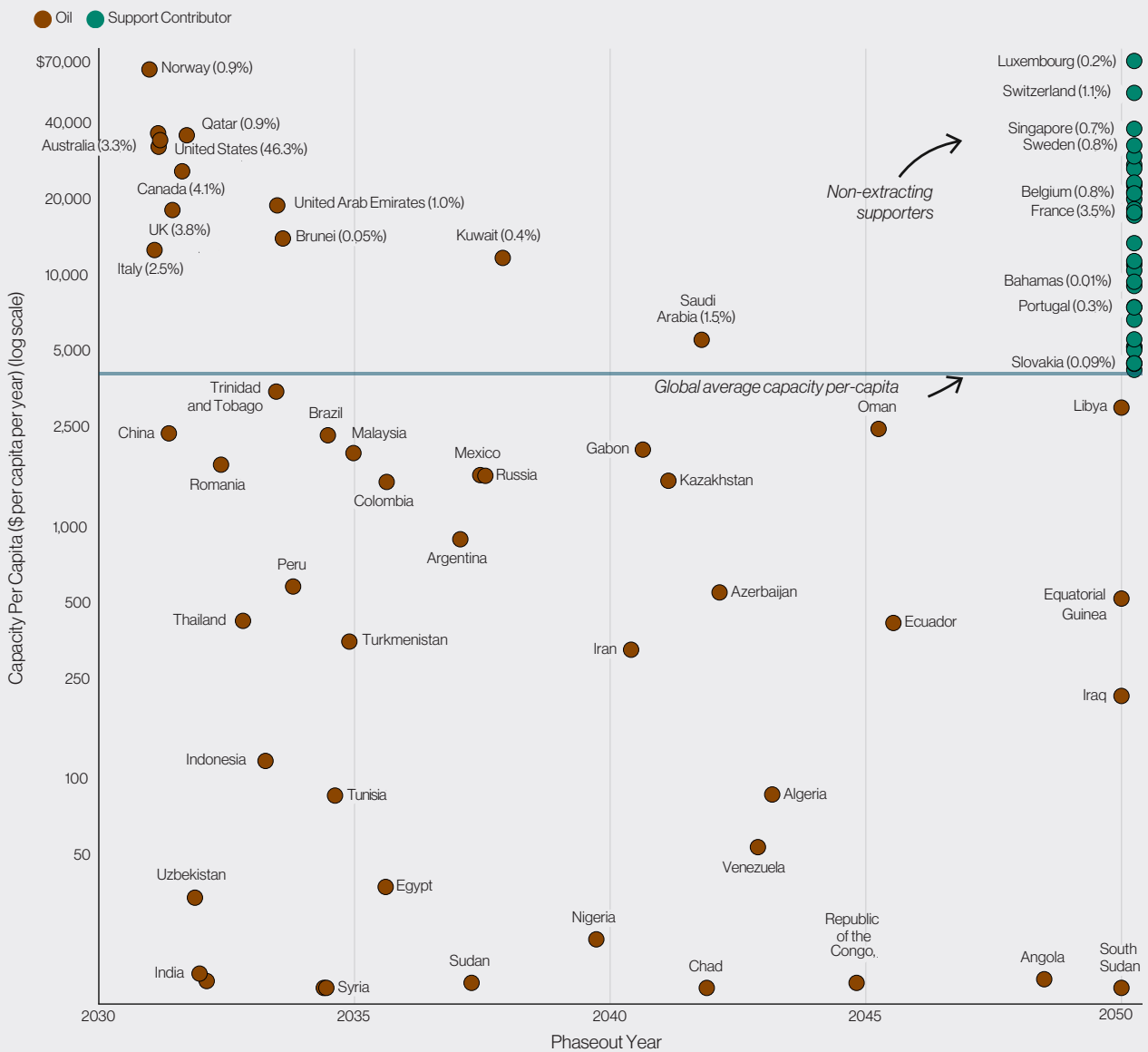


Figure ES-1: Phase-out years for oil-extracting countries plotted against their capacity, and provision of support.

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.

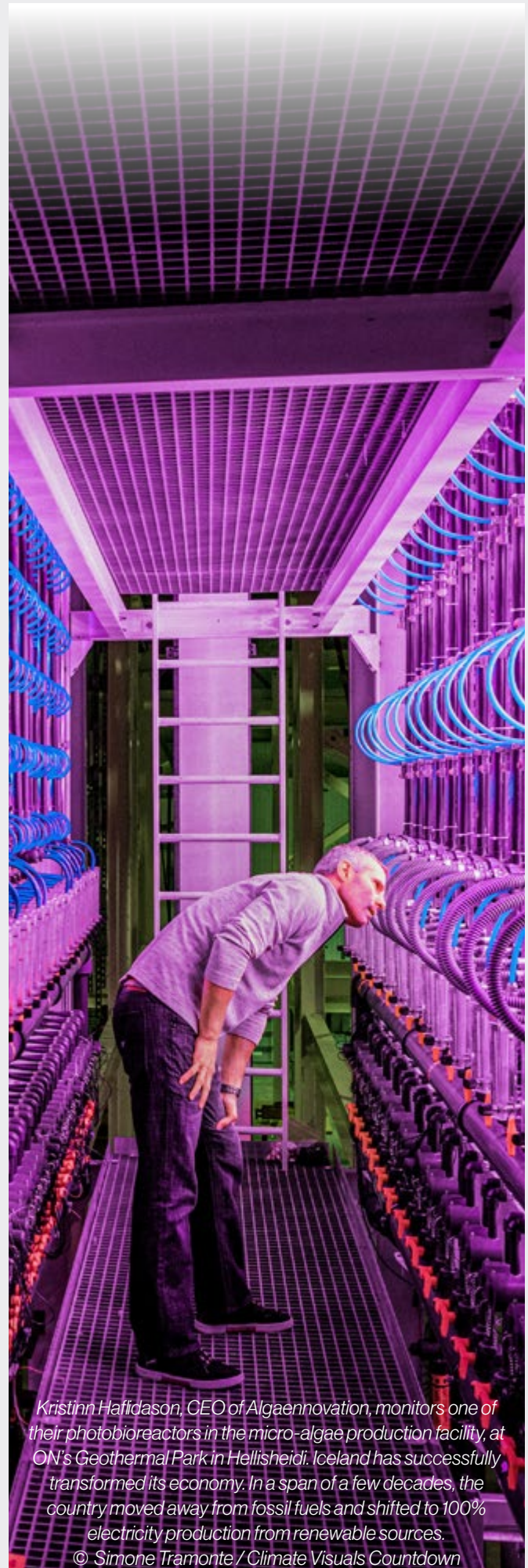
Obviously, these phase-out timeframes are enormously challenging: ending extraction by the early 2030s for the fastest phaseouts, and by 2050 for the very slowest. All countries must phase out much earlier than their governments would choose. However, this is the only way CO₂ emissions can conceivably 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 3.8 % 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 46.3 % 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 Algaenovation, 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.

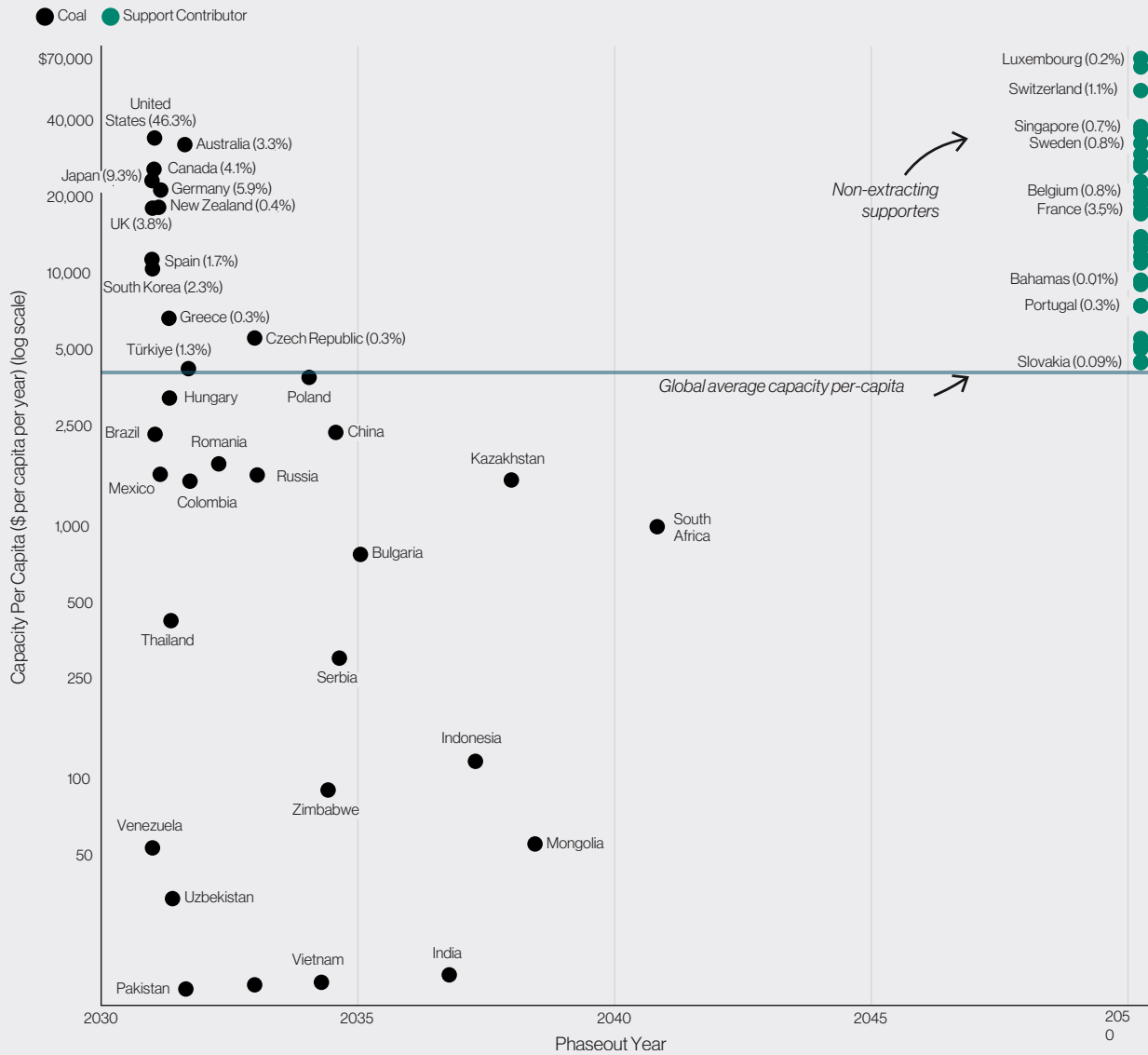


Figure ES-2: Phase-out years for coal-extracting countries plotted against their capacity, and provision of support.
See caption of Figure ES-1 for further details.

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 its 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.

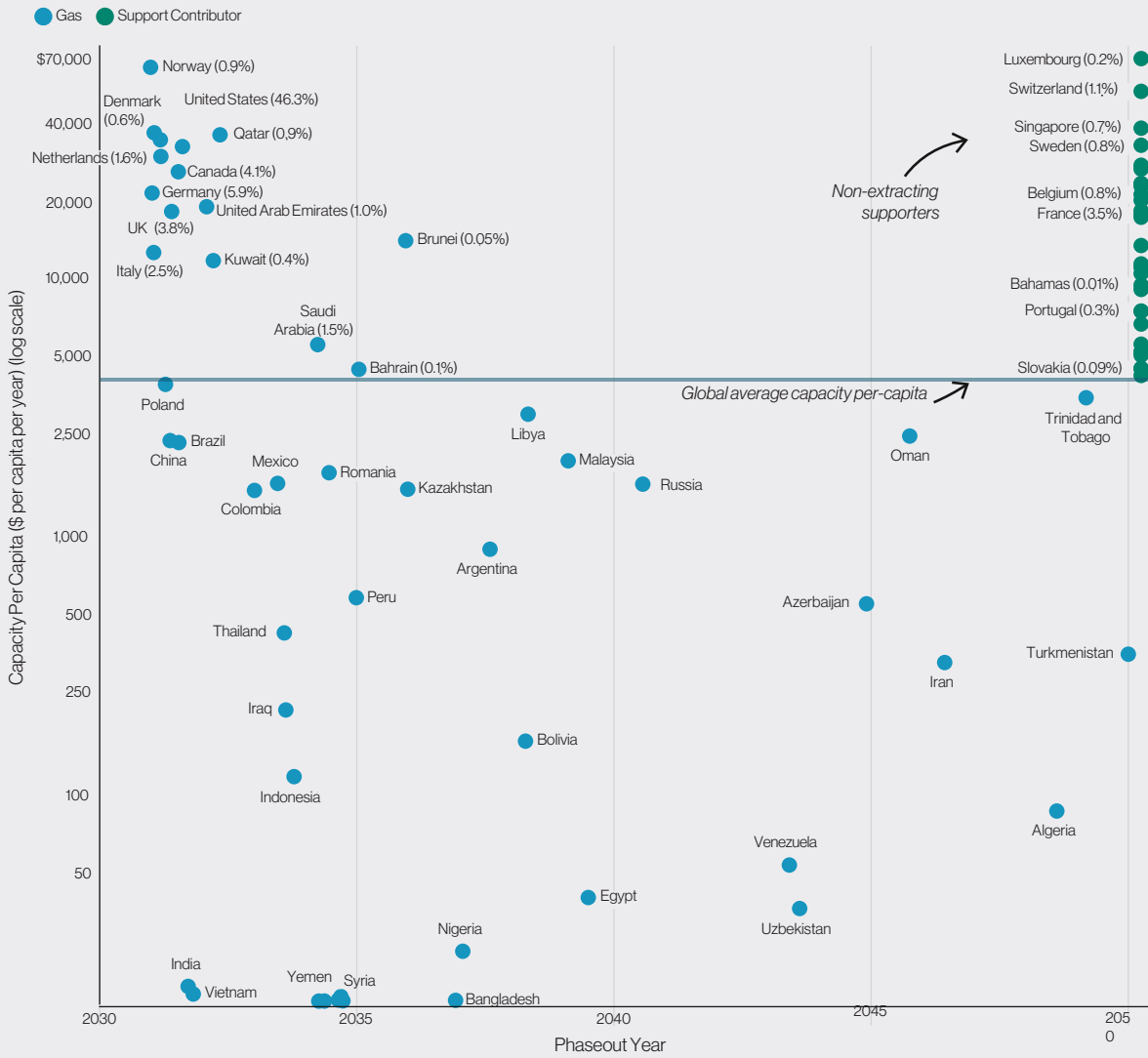


Figure ES-3: Phase-out years for gas-extracting countries plotted against their capacity, and provision of support.
See caption of Figure ES-1 for further details.



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 46.3 % 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 (see *Implications by Country*, below).

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	%	\$bn per year	Phaseout Year	Reduction in 2030 (%)	Phaseout Year	Reduction in 2030 (%)	Phaseout Year	Reduction in 2030 (%)
United States	46.3%	97.1	2031	81.4%	2031	82.5%	2031	81.5%
European Union	20.7%*	43.4						
Japan	9.3%	19.5			2030	82.9%		
Germany	5.9%*	12.4			2031	81.6%	2031	82.7%
Canada	4.1%	8.6	2031	78.0%	2031	82.6%	2031	78.8%
United Kingdom	3.8%	8.0	2031	79.4%	2030	82.9%	2031	79.8%
France	3.5%*	7.3						
Australia	3.3%	6.9	2031	81.6%	2031	78.0%	2031	78.2%
Italy	2.5%*	5.2	2031	82.1%			2031	82.4%
Korea, Rep.	2.3%	4.8			2030	82.9%		
Spain	1.7%*	3.6			2030	82.9%		
Netherlands	1.6%*	3.4					2031	81.4%
Saudi Arabia	1.5%	3.1	2041	27.4%			2034	59.1%
Turkey	1.3%	2.7			2031	77.5%		
Switzerland	1.1%	2.3						
United Arab Emirates	1.0%	2.1	2033	64.1%			2032	74.6%
Norway	0.9%	1.9	2030	82.9%			2030	82.9%
Qatar	0.9%	1.9	2031	77.3%			2032	72.6%
Kuwait	0.4%	0.8	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 CO₂ 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 \$ 209 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).

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 Lander County, Nevada. © NREL



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