



## Perspectives

## Can we equitably manage the end of the fossil fuel era?☆

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## ABSTRACT

This paper tracks the development of climate justice discourse around leaving fossil fuels in the ground. It then looks forward to the questions of equity that calls for the decline of fossil fuel production raise. It argues, following the *Lofoten Declaration for a Managed Decline of Fossil Fuel Production around the World*, that global distributive justice requires rich countries, who have benefited the most from fossil fuel extraction, and who have most alternative available development pathways must lead in leaving fossil fuels in the ground. However, the paper shows that equitably managing the end of the fossil fuel era is complicated by how economic efficiency or the interests of frontline communities might at times diverge from global distributive justice. In response, the paper argues that a useful short-term strategy is to focus on how equity and economic efficiency both suggest that wealthy historically polluting countries should leave high-cost, carbon-intensive fossil fuels in the ground. Beyond that, the paper highlights how difficult questions and trade-offs emerge at points where considerations of equity and economic efficiency diverge. Such points of divergence represent a considerable challenge for advocates of an equitable decline of fossil fuel production, and are areas of significant interest for future research and advocacy.

Across the world, momentum towards phasing out fossil fuels is gaining traction. Growing international cooperation on climate change, coupled with rapid advancements in clean energy and growing resistance to fossil fuels, potentially spell the beginning of the end of the fossil fuel era. In this essay, I consider some of the challenges related to determining which fossil fuels can or cannot be produced if we are to attempt to equitably transition away from fossil fuels. The paper begins by tracking the development of the interconnected concepts of the carbon budget and the carbon bubble, showing how they have informed calls to keep fossil fuels in the ground. It then discusses how such calls raise difficult questions of equity, both in terms of how we define what it means to equitably manage a transition away from fossil fuels, and also whether we can practically achieve an equitable transition, given competing political, moral and economic demands. The paper then demonstrates an emerging consensus among climate justice advocates and researchers, which argues that rich countries, who have benefited the most from fossil fuel extraction, and who have most alternative available development pathways must lead in leaving fossil fuels in the ground. I then argue that pushing such countries to leave more economically inefficient fossil fuels in the ground, such as Canada's tar

sands and Norway's deep-sea oil reserves, represents a strategic point of focus for climate justice advocates, as they can point to the convergence between economic efficiency and equity. I then go on to explore how questions of equity become more difficult when we consider areas where economic efficiency and equity diverge. These points of divergence represent a significant challenge for those who advocate for an equitable decline of fossil fuel production, and are areas of significant interest for future research and advocacy.

## 1. The carbon budget &amp; bubble

In 2009, at the United Nations Framework Convention on Climate Change (UNFCCC) 15th Conference of the Parties (COP 15) in Copenhagen, Denmark, governments across the globe began committing to the target of limiting global mean temperature change to below 2 °C above pre-industrial levels [1]. The same year, a study by Meinshausen et al. [2] highlighted a large contradiction between proven oil, coal and gas reserves and the 2 °C target.<sup>1</sup> They showed that to stand a 75% chance of staying below the 2 °C target, we could only afford to emit a cumulative amount of 1000 Gt CO<sub>2</sub> in the atmosphere – this was

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<sup>1</sup> While Meinshausen et al.'s paper did bring the concept of the carbon budget to prominence, it was not the first paper to highlight the contradiction between cumulative emissions targets and the fossil fuel industry. As Muttitt highlights, in 1997 Bill Hare, then Climate Policy Director of Greenpeace, showed that if burned, the fossil fuel reserves that were known at that time would release twice as much as the budget to keep below 2 °C [15]. Several campaign groups then used that analysis to argue that exploration for new reserves should be stopped. However, it was many more years before such calls started to gain wider traction, as they did within the broader fossil fuel divestment movement [10,11].

our carbon budget. They pointed out, that staying within our carbon budget meant that less than half the proven economically recoverable oil, gas and coal reserves could still be burnt, otherwise we would put ourselves at increasing risk of pushing passed the 2 °C.

In 2011, building on Meinshausen et al.'s analysis, the Carbon Tracker Initiative (CTI), a London-based financial think tank, pioneered analysis of a concept they coined the carbon bubble. The carbon bubble referred to the fact that proven fossil fuel reserves were jointly up to five times greater, than could be burnt to limit global warming below 2 °C [3–5]. In other words, the amount of fossil fuel reserves collectively held by the fossil fuel industry, would push us way passed our carbon budget if burned. On the other hand, if we acted on climate change in line with the 2 °C target, then fossil fuel companies would lose significant amounts of value and potential revenue, given that the value of their fossil fuel reserves is largely based on their ability to be burnt. In financial terms, this meant that fossil fuel reserves were at risk of turning into stranded assets – “assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities” [6].

Looking to the stock exchange, Carbon Tracker's analysis showed that approximately 73% of the reserves listed on the world's stock markets in the next 40 years contained enough emissions to blow passed the carbon budget for 2 °C [5]. Remarkably, the vast majority of fossil fuel reserves are not held by publicly traded companies, with 74% of fossil fuel reserves either owned by state or private-owned companies not registered on the stock market [7]. As such, not only would staying below 2 °C entail a potential financial asset bubble on the stock market, it would also entail major losses of revenue for state and private fossil fuel companies and countries reliant on fossil fuel rents and exports. Estimates suggested that adhering to the 2 °C target could result in \$28-trillion in lost revenue in the next two decades, with the oil industry accounting for \$19.3-trillion, gas \$4-trillion and coal \$4.9-trillion [8].

Recognition of the contradiction between the fossil fuel industry's business model and needed climate action helped to spur on the nascent fossil fuel divestment movement [3,9] – the movement also called for divestment from fossil fuels for reasons related to how the fossil fuel industry had blocked environmental action, spread misinformation, and perpetuated a range of injustices, especially against indigenous peoples and communities of color [10,11]. From the first divestment campaign starting in 2011, it became the fastest growing divestment movement in history, driving investors collectively representing over \$5 trillion in assets away from fossil fuel investments by December 2016 [9]. Reflecting on the divestment movement's growth, commentators, such as Bill McKibben, highlighted how in the space of a few years, divestment efforts had helped drive “the necessity of keeping carbon underground from the fringes into the heart of the world's establishment” into places as diverse as the G20, the world's major financial establishments, universities across the globe, and the world's largest pension funds [12].

In 2015 at COP 21 in Paris, 195 governments across the world unanimously agreed to keep global warming not just to “below 2 °C” as was the previous international target. More ambitiously, thanks in large part to the efforts of small island nations, least developed countries, and those most vulnerable to climate change, the agreement committed to keep warming “to well below 2 °C”, and “to pursue efforts” to limit warming to 1.5 °C [13]. While the world still needed to put in place many new policies and ramp up domestic ambition to meet the Paris Agreement targets, the overall commitment to keeping warming to well below 2 °C meant that the fossil fuel industry was even further out of line with the world's aspiration on climate change.<sup>2</sup> IPCC analysis

<sup>2</sup> For a variety of political reasons, the Paris Agreement did not specifically reference the need to phase out fossil fuel production even though the implication of its targets clearly entailed that the world would need to do so. As Piggot et al highlight, the UNFCCC's lack of explicit engagement with the need to manage the decline of fossil fuel production is an oversight which can detrimentally affect our ability to equitably manage the end of the fossil fuel era [26]. They argue that explicitly including discussion of and

showed that to meet the Paris targets, global carbon dioxide emissions needed to be cut by half by the 2030 s compared to 2010 levels, and to reach zero sometime between 2045 and 2070 [1,14]. Analysis showed that the potential carbon emissions just in the oil wells, coal mines or gas fields *already* in operation were sufficient, if burnt, to push passed 2 °C; and just the reserves in currently operating oil and gas fields, even with no coal, would take the world beyond 1.5 °C [15]. Contrary to the fossil fuel industry's business model, the evidence was clear: to meet the Paris Targets and avoid dangerous climate change, fossil fuel production would have to rapidly decline.

## 2. Managing the decline?

Recognition of the contradiction between the fossil fuel industry's business model and needed climate action spurred on increased global civil society calls for leaving fossil fuels in the ground, no additional fossil fuel development, no exploration for new fossil fuels, no expansion of fossil fuel projects, and for the managed decline of the fossil fuel industry [16,17]. These calls raised a significant, yet under-explored question: If we have far more fossil fuels than our carbon budget will allow, how do we determine which of the remaining fossil fuels we should extract? This question was in many ways a new and challenging one, particularly given that much conventional wisdom before the emergence of the carbon bubble was that we would run out of or hit a peak in fossil fuel supply [18]. However, conventional wisdom was turned on its head both by the growing recognition of the carbon bubble and by major advances in climate policy, clean energy, energy efficiency, and other factors, such as water constraints. The question became not how do we deal with peak fossil fuels, but rather, how do we deal with more supply than is consistent with staying within our carbon budget [19].

While a large body of evidence shows that it is clearly in the global collective interest to promote climate action in line with the Paris Agreements [20–23], the potential negative impacts created by the decline of the fossil fuel industry raised a number of complex questions of justice and equity, including how do we fairly determine who gets to produce the remaining fossil fuels consistent with the carbon budget? Civil society, governments, the UNFCCC, and policy and academic circles, had long debated how to fairly share the ability to *burn fossil fuels and emit* greenhouse gas emissions. However, the question of how to fairly decide who gets to *extract* the last fossil fuels in a carbon constrained world had remained largely unaddressed and even the Paris Agreement remained silent on fossil fuel production [24–26]. Unlike a long history of complex debates and international agreements on which countries could burn how much fossil fuels, the current international order on fossil fuel production was, in the words of Jeremy Moss, pretty much that “any country can dig up what it likes” [27].

One of the first major governmental initiatives attempting to push back against the established order that “any country can dig up what it likes” was the Yasuní-ITT Initiative. The proposal, put forward in 2007, asked the international community to pay Ecuador's government \$3.6 billion in exchange for not developing the Ishpingo Tambococho Tiputini (ITT) oilfields – doing so could prevent more than 400 million tons of potential carbon dioxide emissions, as well as protect an incredibly diverse area of significant importance to local indigenous peoples [28]. The proposed funds from the Yasuní ITT Initiative, which were approximately half the value of the oil fields, would have been placed into social and environmental development programs, helping provide resources for Ecuador to transition to a post-oil future.

Unfortunately, despite its benefits, the project collected only \$13 million of the demanded \$3.6 billion, and was called off in 2013 due to

(footnote continued)

measures to equitably manage winding down fossil fuel production within the UNFCCC can enhance ambition and help the world meet the targets of the Paris Agreement.

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