Environmental Justice, Carbon Pricing, and Universal Income

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Abstract: *Proposals for carbon pricing have met with criticism from environmental justice advocates on the grounds it (i) fails to reduce emissions significantly, (ii) fails to reduce the disproportionate impacts of hazardous co-pollutants on people of color and low-income communities; (iii) hits low-income households harder than richer households; and (iv) commoditizes nature. This paper discusses how these very real problems can be addressed, so that the carbon pricing baby is not thrown out with the market-based bathwater.*

Introduction

"Carbon pricing" refers to policies that raise the price of fossil fuels by charging money for emitting carbon dioxide into the Earth's atmosphere. This can be done directly by means of a carbon tax (a fixed price per ton of CO2) or indirectly by means of a carbon cap (a direct limit on the total amount of CO2 that can be emitted, with permits issued up to that limit). In both cases, the simplest and most comprehensive point at which to levy the price is where the fossil fuels first enter the economy – at pipeline terminals, tanker ports, coal mine heads – with firms required to surrender one permit (or pay the equivalent tax) per ton of CO2 that will be emitted when the fuel is burned. This charge then enters the prices that are ultimately paid by consumers.

Economists advocate carbon pricing on the grounds that it provides incentives to curb emissions in the short run (consumers buy less fossil fuels when the price rises) and in the long run (incentivizing more investment in energy efficiency and clean energy). Opposition has come not only from the fossil fuel lobby, as might be expected, but also from environmental justice (EJ) advocates seeking to end the disproportionate environmental harms imposed upon people of color and low-income communities. This paper focuses on the objections to carbon pricing that EJ advocates have raised.

In brief, critics have argued that carbon pricing (i) fails to reduce emissions significantly, (ii) fails to reduce the disproportionate impacts of hazardous co-pollutants on people of color and low-income communities; (iii) harms the purchasing power of low-income households; and (iv) commoditizes nature. Proponents of carbon pricing have often, in our view wrongly, dismissed these criticisms as misguided or baseless.

Here we chart a middle path between dismissal of carbon pricing and dismissal of its critics. The foundation for our position is a moral principle: we believe that the gifts of Nature should be shared in equal measure by all. These gifts include the right to a clean and safe environment and the right to share in revenue that is yielded by limiting the use of scarce resources. From this perspective, we have a moral imperative both to halt destabilization of the Earth's climate, in order to protect future generations and vulnerable present-day populations, and to eliminate the disparate pollution burdens that currently poison the air and water of vulnerable communities.

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Halting climate destabilization requires, first and foremost, that we keep fossil fuels in the ground. We do not advocate carbon pricing because it is an elegant policy or because it intrinsically desirable; rather we recognize that an elevated carbon price is an inevitable consequence of any policy that restricts the entry of fossil fuels into the economy and the environment, as climate stabilization requires. Efforts to reduce demand for fossil fuels, such as fuel economy standards for automobiles and incentives for solar and wind power, are not likely on their own to reduce emissions swiftly enough to meet the Paris Agreement goal for stabilizing the climate by mid-century. This means that supply restrictions, and *de facto* carbon pricing that result, will be a necessary component of the policy mix. We will face choices, however, about how the burdens and benefits of fossil-fuel reduction will be allocated. We argue that the carbon revenue should be recycled to the public as equal per person dividends, as a kind of universal income based on environmental protection.

Halting the disparate pollution exposure imposed on EJ communities requires, first and foremost, that we take the problem seriously, recognizing the complicity of government policies as well as markets in unjust environmental outcomes. This requires combating systemic failures of both the market and the state. EJ and climate stabilization are complementary goals, but to be advanced simultaneously explicit EJ provisions must be built into the design of climate policy. At a bare minimum, climate policy should ensure that existing pollution disparities are not exacerbated. But well-designed design policies also can achieve the more ambitious goal of reducing environmental disparities.

Here we discuss how carbon pricing policy can incorporate criticisms raised by EJ advocates and build wider support for carbon pricing as a needed and effective strategy for confronting the climate crisis. To this end, we argue that carbon pricing policy must be organized around four key principles.

PRINCIPLE #1: Protect the planet: keep fossil fuels in the ground

To attain the Paris objective of limiting average surface temperatures to 1.5-2 °C (3-4 °F) above pre-industrial levels, the U.S. and other major consuming countries must cut their emissions to something like 10 percent of their current level by the middle of the century. Cutting emissions by 90 percent over the next 28 years translates into reductions at a constant rate of 8 percent per year (the math is the logic of compound interest operating in reverse), a trajectory shown in Figure 1.

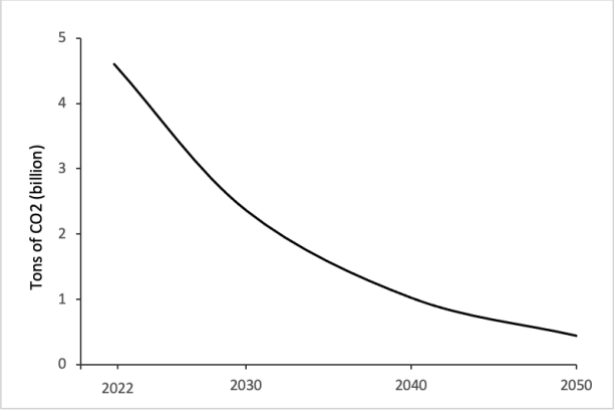

Figure 1: Keeping fossil fuels in the ground
Cutting emissions by 90% over 28 years is equivalent to reductions at the rate of 8% per year.

Although carbon pricing policies now cover more than one-fifth of fossil fuel emissions worldwide, they have failed to make a significant dent in the growth of emissions let alone the rapid decrease that is needed to meet the Paris Agreement goal. The main reason is that prices have been set too low. Only four relatively small countries -- Sweden, Finland, Switzerland, and Lichtenstein -- have prices above the range of USD40-80 per ton that many economists consider the minimum needed to begin making a serious dent in emissions.[1]

A helpful rule of thumb is that each dollar per ton of carbon dioxide emissions adds one cent to the price of a gallon of gasoline. A price of USD40-80/ton would raise the gasoline prices at the pump by 40-80 cents. Gasoline prices have risen more than this since the beginning of the current year, and no one thinks that we are on the road to solving the climate crisis. In other words, the price range recommended by many economists is at best a starting point.

It is hard to predict the needed carbon price to meet the Paris goal. The answer depends on the full policy mix and how quickly technological and institutional changes lower the cost of clean energy alternatives. For example, better fuel-economy standards for automobiles coupled with investments in EV charging stations would directly curtail the demand for gasoline, lowering the carbon pricing needed to achieve the needed emissions reduction.

Uncertainty about how price affects fuel demand and what other policies will be adopted point to importance of putting a hard ceiling, enforced with permits, on the total amount of carbon emitted into the atmosphere. The number of permits would decline over time as shown in Figure 1. Rather than issuing permits to corporations free-of-charge (a policy known as "cap and trade"), they can be auctioned, as discussed below. Firms would be required to surrender one permit for each ton of CO2 that will be emitted when the fuel they bring into the economy is burned. Implementing this policy at the point where fossil fuels first enter the economy would entail roughly 2,000 collection points nationwide in the U.S., and so the administrative cost would be modest (Congressional Budget Office, 2001).

In theory, a carbon tax could adapt over time to keep the economy on the required emissions reduction path. When emissions fail to decline enough, the tax would rise automatically. But a cap with auctioned permits is a proven and more straightforward way to achieve the needed reduction.[2]

To be sure that the policy meets the emissions reduction trajectory, it must rule out "offsets." Offsets allow firms to evade the carbon cap (or tax) by taking steps that ostensibly compensate for their continuing emissions, like planting trees, refraining from cutting existing forests, or paying others to do so via a "carbon credit" market. Offsets suffer from the problems of additionality (is the offsetting action genuinely a new reduction in emissions or an exercise in labeling for profit?) and verifiability (did it happen?). Real caps directly reduce emissions.

Policies to sequester carbon and to reduce greenhouse gas emissions from other sources should be undertaken. But these should be carried out in addition to, not instead of, cutting fossil fuel emissions. Keeping fossil fuels in the ground is not the only thing we need to do to address the climate crisis. It's just the most important.

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[1] For a review of carbon pricing policies across the world, see World Bank (2022).

[2] Quarterly auctions of carbon permits for power plants have been held since 2009 in the northeastern U.S. states, for example, in the Regional Greenhouse Gas Initiative.

PRINCIPLE #2: Protect the air: target emissions of hazardous co-pollutants

Because the impacts of carbon dioxide and other greenhouse gases are global, carbon pricing proponents sometimes insist that "carbon is carbon" and that it doesn't matter where the emissions occur. This ignores the fact that fossil fuel combustion simultaneously releases a host of hazardous air pollutants that impact nearby communities, including sulfur dioxide, nitrogen oxides, and airborne particulates.[3]

EJ communities are already disproportionately affected by localized pollutants, including hazardous air pollutants released in fossil fuel combustion.[4] Policies to address climate change will retool the activities and location of much of the polluting part of the economy. This realignment is likely to involve large, one-time changes that may persist for decades to come. If the policies that govern this transition fail to incorporate environmental justice principles and to make concrete environmental improvements in EJ communities a priority, then they will be unlikely to attract enthusiastic support from EJ activists and advocates.

The World Health Organization has identified ambient (outdoor) air pollution as a leading cause of premature mortality. A recent *Lancet* study concludes that it is responsible for more than four million deaths each year across the world (Fuller et al., 2022). Fossil fuels are the largest source of this pollution (Lelieveld, 2015). The death toll is especially heavy in China, India, and other newly industrializing countries, but air pollution leads to hundreds of thousands of deaths in high-income countries, too, including 38,000 per year in the U.S. according to World Health Organization (2016) estimates, and possibly more.[5]

A central objection to carbon pricing voiced by EJ advocates has been that by allowing polluters to decide whether, how much, and where to curtail their own emissions – a flexibility that economists hail as one of the policy's main attractions – it may result in continued or even increased emissions of hazardous co-pollutants in EJ communities, perpetuating and widening exposure disparities.

Potential adverse impacts on local air pollution – known as the "hot spot problem" in the environmental economics literature – were the main concern raised by EJ advocates in opposing the introduction California's cap-and-trade system for carbon emissions a decade ago. Their fears were dismissed at the time by many of cap-and-trade proponents, who assumed that lower carbon emissions would be accompanied by lower co-pollutant emissions across-the-board, despite local variations.

Subsequent events proved the EJ concerns to be well-founded. Comparing the socio-economic characteristics of California neighborhoods near cap-and-trade facilities (many of them electric power plants), Pastor et al. (2022) found that those that showed "least improvement" in greenhouse gas and

[3] For discussion, see Boyce and Pastor (2013) and Shindell et al. (2018).

[4] For evidence on pollution exposure disparities in the United States and their relationship with race, ethnicity, and class, see, for example, Bryant and Mohai (1992), Bullard (1994), Pastor (2007), Bullard et al. (2011), Zwickl et al. (2014), Mohai and Saha (2015), Mikati et al. (2018) and Liu et al. (2021). For evidence specifically on pollutants from fossil-fuel combustion, see Boyce and Pastor (2013) and Diana et al. (2019).

[5] In a recent study, for example, Mailloux et al. (2022) estimate that the eliminating emissions of fine particulate matter, sulfur dioxide, and nitrogen oxides from electricity generation, transportation, buildings, and industrial sources in the United States could prevent more than 50,000 premature deaths annually, providing more than $600 billion in benefits from avoided death and illness.

co-pollutant emissions – in fact, seeing absolute increases in both – generally had higher percentages of people of color and low-income households. To illustrate how this seemingly counter-intuitive increase could occur, the replacement of coal-fired electricity by natural gas plants (which emit less carbon per kilowatt hour) frequently entails not only a change in fuel but also a change in location. Whereas coal-fired plants tend to be sited relatively far from population centers, gas-fired plants tend to be located in or nearer to metropolitan areas, often in communities with higher percentages of minority and low-income residents. Overall reductions in emissions can therefore go together with increased emissions in some EJ communities.

Similar findings emerge from a 2021 study of the U.S. electric power sector that compared outcomes under three decarbonization scenarios: a 20% reduction in carbon emissions, an additional 50% reduction in health damages from co-pollutants, and a third scenario additionally mandating a 50% reduction in health damages for Black, Hispanic, and low-income populations (Diana et al., 2021). The results varied across the country, but in certain regions – notably California – the carbon-alone policy not only led to wider disparities in pollution exposure but also resulted in substantial increases in health damages for these populations. The study found that meeting clean air and EJ goals would have only modest effect on the total cost of the decarbonization policy, raising it by less than 5%. The study further found that that when the public health benefits of incorporating clean air and EJ goals are valued using conventional EPA valuation techniques, these would greatly outweigh the added cost. In other words, apart from the EJ logic for differentiating among polluters, as opposed to a one-size-fits-all (or one-price-fits-all) approach, there is a compelling efficiency case for doing so, too.

To address EJ concerns about localized pollution, carbon pricing policy at a minimum should mandate real-time monitoring of pollution levels in vulnerable communities and provide for corrective measures to be implemented when adverse impacts are found. More robustly, clean air and EJ objectives could be incorporated into the policy design by mandating reductions in co-pollutant emissions equal to or greater than the mandated reduction in carbon emissions, particularly in communities identified by an EJ screening tool as currently burdened by disproportionate pollution. This can be achieved through tighter caps, higher carbon prices, more stringent regulatory standards, or a combination of these tools.

These co-pollutant issues are relevant to not only carbon pricing but also other, non-price climate policies. The electricity decarbonization study cited above, for example, focused on Clean Energy Standards, a regulatory approach that would mandate increases in the share of clean and renewable energy in electricity generation. Co-pollutant concerns are not an argument against carbon pricing or other climate policies; rather they are an argument for incorporating clean air and EJ into policy design.

PRINCIPLE #3: Protect household incomes: carbon dividends for all

The most politically damaging criticism of carbon pricing – from across the spectrum, ranging from EJ advocates and others on the left to conservative lawmakers on the right – has been that the higher fuel prices what would result would harm consumers by raising their cost of living. This is the main reason why carbon pricing policies, when they have been implemented, usually carry a price tag too low to have much of an impact. It also helps explain why carbon pricing has practically disappeared from the U.S. policy debates under the Biden administration, now being supplanted by expressions of dismay over gasoline price increases in the wake of Russia's invasion of Ukraine.

As a share of household income, the harshest impact of carbon pricing is typically felt by lower-income families. This is because fuels are a necessity, not a luxury. Even though lower-income families consume less fuel than richer families in absolute terms, the share of fuel expenditures in the household budget is lower for richer families. In other words, carbon prices on their own are regressive, hitting the poor harder than the rich. In a cruel irony, those who bear the greatest harm from climate destabilization and air pollution also would bear the heaviest burden from increases in the price of fossil fuels.

There is a crucial difference, however, between price increases that fatten the profit margins of energy corporations and price increases that would result from either a hard cap on emissions or a carbon tax: where the money goes. With a tax or with auctioning of permits under a carbon cap (in sharp contrast to permit giveaways under cap-and-trade or price gouging by energy corporations), the extra money paid by consumers winds up as government revenue. With a stringent cap or a robust tax, the amount of revenue could be substantial.[6]

If all or most of the revenue is recycled directly to households on an equal per-person basis as "carbon dividends," akin to stimulus checks, the impact of carbon pricing on family incomes would be completely transformed. Instead of a regressive effect, the outcome would be strongly progressive. Most low-income households would come out ahead in straight financial terms, receiving more in dividends than they pay in higher fuel costs, not even counting their benefits from protecting the environment. The purchasing power of most middle-class households would be kept whole. High-income households, because they consume above-average amounts of carbon (think jet travel, outsized homes, yachts and helicopters), would pay more than they receive in dividends, but they can afford it.

The distributional impact is shown in Figure 2. At a price of $50/ton, returning 100% of the carbon revenue as dividends paid equally to all individuals would lift disposable incomes even after paying the higher price for fuel for the poorest 60% of households, the majority of working families. Only for the richest one-fifth of households would there be a non-trivial net cost. At the higher prices likely to result from a hard cap based on a Paris-consistent trajectory, the pattern would remain the same and the net benefit for working families and net cost to the most affluent households would be even larger.

Of course, one can think of other uses, some worthy and others not-so-worthy, for carbon revenues apart from dividends. High on the list of worthwhile uses are public investments in the clean energy transition and environmental protection, particularly in disadvantaged communities; transitional adjustment assistance for the workers and communities who depended in the past on fossil fuel extraction and processing; and assistance to local governments, including school boards, that also would feel the impact of higher fuel prices. Some have proposed dedicating a fraction of the total revenue, say 25%, to these and other uses, with the remainder to be paid as dividends.[7] We fully support such investments for environmental health and equity, but we would prefer to see these investments funded primarily by progressive taxation and carbon revenue returned directly to the people.

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[6] For illustrative calculations for the U.S., see Boyce (2019).

[7] This was proposed, for example, in the 2009 CLEAR Act co-sponsored by U.S. Senators Maria Cantwell and Susan Collins. For discussion, see Boyce (2019, chapter 4).

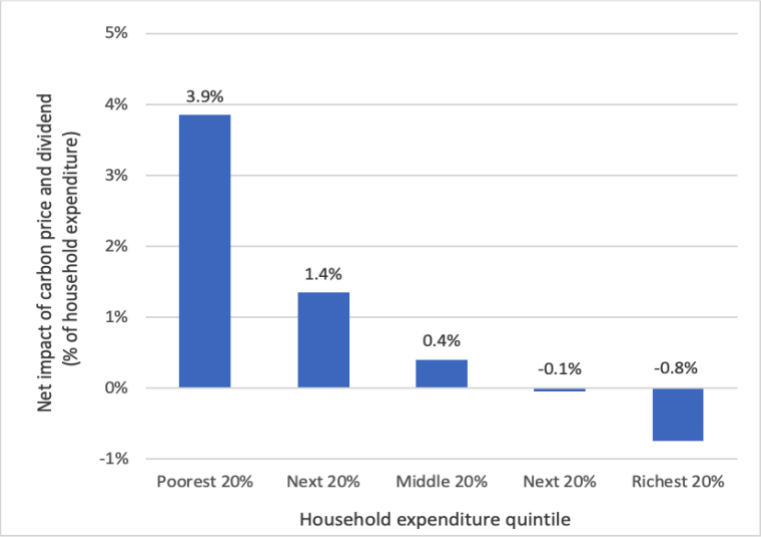

Figure 2: Net effect of $50/ton CO_2 price coupled with dividends in U.S.[8]
Dividends transform the distributional impact of carbon prices from regressive to progressive.

Carbon dividends paid to everyone would be a variant of universal basic income, founded on environmental protection. Why pay these dividends to everyone, instead of only to the low-income households who need them most? There are compelling reasons for universality, both philosophical and political. From a philosophical standpoint, universal dividends embody the ethical principle that all people own the gifts of Nature in equal and common measure.[9] From a political standpoint, universality can help to protect the durability of a policy of keeping fossil fuels in the ground through the decades needed to complete the clean energy transition, much as universality has protected Social Security and Medicare. EJ advocates likewise invoke the ethic of universality when they rebut accusations of NIMBYism (not-in-my-back-yard insularity) with the reply, "Not in anybody's back yard."

PRINCIPLE #4: Value nature, don't commoditize it

Another objection to carbon pricing voiced by EJ advocates and others is that it "commoditizes" nature, reducing something that ought to be treated as sacred – the integrity of the planetary ecosystem – into something prosaic, or even profane, to be bought and sold like soybeans or gold bullion or pork belly futures.

There is a crucial difference, however, between valuing nature and commoditizing it. When we fail to put a price on carbon and allow emissions free-of-charge, effectively we value the resulting climate impacts on present and future generations at zero. This is not treating Nature as sacred; it is treating it as worthless. Putting a price on emissions need not turn Nature into a commodity, any more than installing parking meters along busy city streets turns curb space into a commodity. Rather it charges for use of a scarce resource, helping – together with parking regulations – to prevent overuse and congestion. A carbon price similarly charges for parking CO2 in the atmosphere.

[8] Calculated from data in Fremstad and Paul (2019).
[9] For discussion of common wealth and universal property, see Boyce (2020), Barnes (2021) and Ranalli (2021).

Every commodity has a price, but not everything that has a price is a commodity. Commodities can be bought *and* sold. The EJ-friendly carbon price policy we have outlined above – with a hard cap on emissions, safeguards against hot spots, and auctioned permits coupled with dividends – is markedly different from the "carbon markets" established by cap-and-trade and carbon credit (aka offset) systems that commoditize carbon.

Cap-and-trade systems start with free permit giveaways to corporations, allocated by a formula based on historic emissions. In effect, those responsible for more pollution in the past are rewarded for their misdeeds with more permits in the present. The recipients are then free to trade permits among themselves – those firms that want more buying them from those that prefer to sell them – a feature whose sole rationale is to let each decide how much carbon to emit at the permit price. If permits are auctioned rather than allocated free-of-charge, no such trading is necessary. If we think of more familiar examples of permits – for parking, driving, hunting, fishing, building, landfills, and so on – none of them are tradeable; the permit is not a commodity that can be resold.

Some cap-and-trade systems go further, allowing permits to be bought and sold not only by the fossil fuel companies but also by financial firms and intermediaries hoping to profit from the market by buying low and selling high. The ultimate source of any such profits is the consumers, whose fuel bills then cover this margin on top of the windfall profits of the firms that got free permits in the first place. Such full-blown permit trading needlessly creates opportunities for market manipulation and speculation. This is not an intrinsic feature of carbon pricing; it is a feature of policies designed according to the interests of the rich and powerful as opposed to the interests of ordinary people.

A further step along the commoditization path is taken when carbon pricing systems include offsets that allow firms to continue polluting without permits as long as they pay for something else – like planting trees – that supposedly offsets their own emissions. In this set-up, those who plant trees get carbon credits that they can sell on the offset market. Offsets effectively turn the carbon cap into a sieve. This does not mean that land stewards who act to improve carbon sequestration in soils and biomass should not be rewarded. But such activities should be undertaken in addition to keeping fossil fuels in the ground, not instead of doing so.

Concluding remarks

Carbon pricing is not an end in itself, but rather a likely and logical consequence of any serious commitment to keeping fossil fuels in the ground. Starting from the moral premise that the gifts of Nature belong equally to all, this paper seeks to reconcile the twin goals of climate protection and environmental justice. We are convinced there is no intrinsic conflict between the two; on the contrary, they can and should go hand-in-hand.

Translating this compatibility into practice, however, has proven difficult. Many economists and other proponents regard carbon pricing as a vital instrument in the climate policy toolkit, whereas many EJ advocates view the idea with suspicion or downright antipathy. Their reasons for their skepticism cannot be dismissed lightly, for the record of past carbon pricing policies has left much to be desired. And their fears about being dealt out in the coming energy transition, replicating the environmental injustices of the previous era, are entirely legitimate.

The key to reconciling the carbon pricing with environmental justice, we believe, is to design the policy with this consciously in mind. To this end, we have identified four policy design principles:

- First, to ensure that carbon pricing meets the climate stabilization objective set forth in the Paris Agreement, the price must be grounded in a hard cap on emissions that declines steadily over time on a trajectory consistent with a net zero target by mid-century. The carbon price that emerges from this cap is not simply a tool for curbing emissions: it is a *result* of keeping fossil fuels in the ground by strictly limiting their supply.

- Second, to ensure that carbon pricing reduces disparities in exposure to hazardous air pollutants from fossil fuels, rather than maintaining or exacerbating them, decarbonization targets should be accompanied by targets for improving air quality overall and specifically in EJ communities. This can be achieved via location-specific caps in priority zones or sectors, differentiated carbon prices, regulatory instruments, and enhanced screening and monitoring.

- Third, to counter the adverse and regressive impact of carbon pricing on household incomes, carbon permits (up to the declining limit set by the cap) should be auctioned regularly, and most or all of the revenue then returned to the public as equal per-person dividends. Most households would come out ahead from this carbon price-and-dividend policy in sheer pocketbook terms, without even counting the environmental benefits, and low-income households generally would obtain the largest net benefits owing to their smaller-than-average carbon footprints. Carbon dividends are a form of universal income derived from charging money for use of a scarce resource that we own in common, in this case the biosphere's limited ability to safely absorb carbon.

- Finally, to prevent the risks that commoditization would pose to effectiveness and equity, carbon permits should not be tradeable, and offsets should be prohibited. Trading is completely unnecessary if permits are auctioned rather than given away as in cap-and-trade systems, and it creates opportunities for market manipulation and speculative activity. Offsets suffer from intractable problems of additionality and verifiability, turning the cap into a sieve. Measures to sequester atmospheric carbon should be pursued not as an alternative to keeping fossil fuels in the ground, but rather as one more component of the climate policy mix alongside public investment, regulatory standards and carbon pricing.

In sum, the question is not whether carbon pricing is desirable or not, but whether carbon pricing policies will be designed to be effective and just. We believe this is possible and necessary.

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