Ways Not to Think About Climate Change

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Introduction

A half-century ago, famed constitutional law scholar Laurence Tribe wrote an article discussing humanity's relationship to the natural environment. It was entitled "Ways Not to Think About Plastic Trees: New Foundations for Environmental Law" (Tribe 1974). The article was then and remains today a brilliant discussion of the root intellectual causes of contemporary environmental crises. Indeed, it is no overstatement to say that environmental law scholarship in the United States over the subsequent five decades consists largely of refinements and applications of the insights and debates that Tribe framed in the article's thirty-three pages. At the outset, Tribe identified a powerful but often unexamined set of assumptions that seemed ascendant concerning the appropriate way to design and pursue environmental policy. As he

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wrote, "[t]hese assumptions, which are implicit in developing uses of policy analysis as well as in emerging institutional structures, make all environmental judgment turn on calculations of how well human wants, discounted over time, are satisfied" (Tribe 1974, p. 1317).

As part of his agenda in the article, Tribe articulated several conceptual and methodological limitations of this narrow welfare economic mode of evaluating humanity's environmental role – limitations that remain largely unanswered today despite the enormous amount of academic and institutional attention devoted to regulatory cost-benefit analysis over the ensuing decades. As powerful as they were, these critiques were not the most significant contribution of *Ways Not to Think About Plastic Trees*. Instead, the article's most prescient and weighty warning concerns the potentially destructive endogenous effects of an environmental policy framework that is oriented narrowly around human welfare and preference satisfaction, irrespective of whether the internal shortcomings of the framework might be alleviated:

> What the environmentalist may not perceive is that, by couching his claim in terms of human self-interest – by articulating environmental goals wholly in terms of human needs and preferences – he may be helping to legitimate a system of discourse which so structures human thought and feeling as to erode, over the long run, the very sense of obligation which provided the initial impetus for his own protective efforts (Tribe, 1974, p. 1330-31).

The approaching golden anniversary of Tribe's seminal contribution to environmental thought is an important moment to take stock of its influence.[1] In brief, rather than acknowledge the inevitable coevolution of means and ends that Tribe identified – which forces policymakers to

[1] For readers who are aware of Tribe's late-career representation of fossil fuel companies in opposition to climate action and who wish to see the apparent dissonance addressed, see *infra* text accompanying notes __-__.

engage at least somewhat with the question of what kind of culture and values they wish to promote through their decisions – the United States seems instead to have moved ever further in the direction of a cabined, anthropocentric, and rigidly economic vision of environmental policymaking, so much so that leading scholars have referred approvingly to the country as "The Cost-Benefit State" (Sunstein, 2003). This trend has held largely true across nine presidential administrations, from Ford to Biden, irrespective of party affiliation and despite the dramatic polarization of environmental issues along party lines that opened over that time.

It also has held true despite the rise of climate change as an environmental challenge unlike any other created by Earth's most dominant species. Recognized by the U.S. national government as a profound, even existential threat as early as 1965 (Speth 2022), climate change nonetheless has tended to be analyzed, like any other environmental ill, through the lens of welfare economics (DeCanio 2003, pp. 2–4). Proponents argue that cost-benefit analysis of climate policy is necessary to ensure that societies do not overinvest in environmental protection, as if "excessive" environmental precaution were a genuine societal risk within the Great Acceleration – the current period that began in the mid-twentieth century of an unprecedented rise in human population size and a corresponding surge in numerous socioeconomic and ecological measures of human activity and its impacts. Advocates of climate economics also argue that policy instruments such as tradeable permits or carbon taxes are necessary to unleash the power of incentives and market exchange to promote emissions reductions efficiently, as if transitioning from an unsustainable pathway *at least cost* is more important than transitioning *well before* passing non-linear thresholds that carry potentially cataclysmic consequences. These efficiency rationales obscure the deeper way in which such neoliberal climate thinking is insensitive to historical and moral context (Agarwal and Narain 1991) and risks entrenching the

very systems that have brought the world to the brink of disaster (Böhm, Misoczky, and Moog 2012). Indeed, as discussed below, influential climate economic models cheerfully contemplate within their framework the possibility of greenhouse gas emissions pathways that entail the near-certain extinction of the human species, yet somehow preserve the bulk of global economic production long after humans may be gone.

Guided by such a way of thinking, it is perhaps not surprising that government leaders in the United States have achieved precious little in terms of domestic climate change legislation and regulation, leading learned observers to argue the framework has exhausted whatever utility it may once have had (Boyd 2021). Internationally, matters are similarly bleak: In the three decades since the 1992 international climate convention was signed, humanity has released more carbon into the atmosphere than during the rest of human history combined. In that respect, it is at least encouraging that the most recent three years of U.S. climate policy have signaled something of a shift away from obsession with neoliberal climate thinking in favor of unabashed industrial policy, transitional and environmental justice, and familiar, road-tested regulatory instruments, as evidenced by passage of the Inflation Reduction Act, the Justice40 Initiative, and the Biden Administration's efforts to implement the Clean Air Act and other existing statutory sources of agency authority in the face of an increasingly obstructionist Supreme Court. Much of the credit for that shift of narrative can be attributed to youth climate, environmental justice, and allied social movements that have refused to engage the climate issue in the terms dictated by welfare economics.

Still, despite the inadequacy of regulatory responses flowing from the welfare economic framework and despite hopeful signs that the climate policy community may be ready to tip into a more expansive mode of engagement with the climate crisis, Tribe's fundamental challenge

regarding the co-evolution of means and ends in environmental law remains a pressing theoretical and practical question. During these decades of what might be called neoliberal hegemony in climate policy, what has been lost and what has been gained *within us*, putting aside what government actions may or may not have been pursued and what climate progress may or may not have been achieved? Consider another instance of the careful and prescient language regarding such endogenous cultural implications that Tribe offered back in 1974 and that merits earnest reflection from the vantage point of today, especially in relation to climate change:

> [M]ost of the crucial environmental choices confronting industrialized nations in the last third of the 20th century will be choices that significantly shape and do not merely implement those nations' values with respect to nature and wilderness. Such choices will do more than generate a distribution of pay-offs and penalties to the persons affected in terms of their preexisting yardsticks of cost and benefit. Choices of this type will also greatly alter the experiences available to the affected persons, the concomitant development of their preferences, attitudes, and cost-benefit conceptions over time, and hence their character as a society of persons interacting with one another and with the natural order (Tribe, 1974, p. 1324).

Has our "character as a society" been impacted by the dominance of the standard environmental economic lens on climate change, again putting aside whatever influence it has or has not had on climate policies themselves?

This paper examines specific features of the conventional welfare economic approach to climate change, such as the social cost of carbon and carbon offset mechanisms, with a view toward identifying ways in which those features shape and constrain imagination. As will be

seen, the framework in key respects leaves us morally and politically blinkered, unable to perceive and address some of the most significant issues raised by the climate crisis. As a result, it is at least arguable, as Tribe surmised, that our ability to ethically engage with the climate crisis has been stunted by the very tools we have brought to the task. Our effort to promote "instrumental rationality" has carried with it an implicit worldview, one in which our "ends are exogenous, and the exclusive office of thought in the world is to ensure their maximum realization, with nature [merely] as raw material to be shaped to individual human purposes" (Tribe 1974, p. 1335). In addition to excavating and criticizing certain climate-relevant aspects of the standard welfare economic worldview, the paper also lays out two policy proposals that, despite being readily implementable within that framework, nevertheless contain within them seeds of dramatic shifts in thought. The fact that the proposals have not previously been identified or discussed widely in the climate literature suggests the limiting power of our conceptual anchoring in neoliberal climate thought. The hope, though, is that situating the two quietly radical proposals within that familiar and all-encompassing framework may help to denaturalize it, revealing some of the arbitrary constraints that are built into it and ultimately, perhaps, allowing questions such as whether humans will survive as a species to be confronted more directly and with less confusion.

Climbing the Wrong Mountain

At the core of environmental issues are questions regarding our moral obligations to people residing in other nations, members of future generations, and non-human life, all of which are deeply affected by choices and actions that are largely outside their influence or control (Kysar 2010b). In most countries, one must add domestic victims of environmental injustice –

presently living but subordinated people who suffer disproportionately from the negative effects of economic activity. The fundamental and unavoidable moral questions raised by these relationships must be addressed *before* turning to objective decision-making mechanisms such as economic cost-benefit analysis or their related implementation devices such as carbon permits and taxes. Yet those mechanisms and devices often give the appearance of having somehow already addressed and resolved the underlying moral questions, leaving observers falsely reassured that all relevant aspects of environmental decisions can be properly analyzed within the decision-making framework. Vital moral aspects of environmental law and policy become obscured and the ability of ordinary people to appreciate and participate in the process of future-making becomes occluded. All the while, the planet burns.

The recent history of national environmental law and policy in the United States illustrates these dangerous dynamics. Two presidents – Barack Obama and Donald Trump – took diametrically opposed positions and actions on climate change and other important environmental issues, yet both justified their positions and actions by appealing to economic cost-benefit analysis. In practice, the "game" of regulatory cost-benefit analysis has become just that, a structured exercise in which competing interests pursue policy outcomes not through direct argument and suasion, but through use of alternative modelling assumptions, valuation techniques, discount rates, and other seemingly technical trappings of the cost-benefit methodology. As a result, subjects of ordinary moral and political discourse are debated through a stylized cost-benefit vernacular that both enables power and renders it inaccessible (Kysar 2010a).

This criticism holds even for a nominally pro-environment president such as Barack Obama, who campaigned on a platform that included strong environmental messages and a

commitment to engage the climate change problem promptly and aggressively. In the opening moments of his administration, President Obama also signaled a strong desire to "mend it, not end it"[2] when it comes to economic cost-benefit analysis, both by nominating noted cost-benefit proponent Cass Sunstein to serve as the country's "regulatory czar" and by issuing an announcement that regulatory cost-benefit analysis would be retained in his administration, subject to some modest changes to acknowledge progressive goals such as incorporation of distributional and fairness concerns, respect for the interests of future generations, and avoidance of undue delay in rulemaking (Memorandum 2010). Unfortunately, the global economic recession of 2009 also coincided with these developments and worked to destroy all apparent political appetite in the United States for environmental, health, and safety reform, including especially with respect to climate change. President Obama instead prioritized healthcare for his first term legislative agenda and was forced to resort to executive actions only to address climate change during his second term.

Those executive actions were guided significantly by the "holy grail of climate economic analysis" (Hood 2020) – an analytical device known as the social cost of carbon which purports to capture in monetary terms the negative impacts of each additional ton of carbon dioxide (CO_2) or equivalent greenhouse gas emissions. The social cost of carbon in theory enables regulators to justify mandating emissions reductions by showing that the cost of doing so for industry is less than the harms that would be imposed on society without reductions. To develop a uniform federal measure of the social cost of carbon, an interagency task force under President Obama consulted existing integrated assessment models from the academic literature, such as Nobel Laureate William Nordhaus's influential DICE model (Nordhaus and Boyer 2003). In its

[2] *Cf.* Revesz and Livermore 2008, p. 10 (suggesting a pro-environment strategy of "mending, not ending cost-benefit analysis").

resulting report, the task force acknowledged serious limitations and shortcomings in the cost-benefit methodology as applied to the climate change problem.[3] Some of these moments of candor and humility even broached fundamental ethical subjects – such as whether it is appropriate at all to discount the interests of future generations – that cost-benefit proponents have tended to avoid. For these reasons, the task force should be applauded.

Nevertheless, after contemplating its various limitations and shortcomings, it is hard not to be left wondering whether a social cost of carbon estimate is useful at all (Keen 2020; Pindyck 2013). To be sure, agencies are under an executive branch mandate to conduct cost-benefit analysis of major proposed rules, and courts have held that such analyses must include a quantitative estimate of the benefits of avoiding further climate change when applicable (Center for Biological Diversity v. National Highway Traffic Safety Administration 2008). As a practical matter, analysts also frequently contend that having some number, however imperfect, is better than having no number at all. But is it? One might also conclude that the social cost of carbon is simply the wrong tool for the climate change job and that its policy advice is deeply confused and misleading. Indeed, it is a tool that contains – buried deep within its assumptions – deceptively narrow and limited answers to the most fundamental moral and political questions raised by climate change. This was the case even before, as explained below, the Trump Administration took office and turned economic cost-benefit analysis into an unabashed exercise in power and manipulation, rather than anything remotely displaying academic rigor and objectivity.

[3] *See* Interagency Working Grp. 2010, p. 4 ("In this context, statements recognizing the limitations of the analysis and calling for further research take on exceptional significance. The interagency group offers the new [social cost of carbon] values with all due humility about the uncertainties embedded therein and with a sincere promise to continue to work to improve them.").

To understand the core shortcoming of cost-benefit analysis in the environmental context, imagine the pursuit of social-welfare maximization as a quest to climb a mountain. By evaluating proposed changes to the status quo in terms of incremental welfare consequences, cost-benefit analysis promises to determine whether any given policy change will lead marginally higher up or down the mountain of social welfare. However, the fundamental problem in the climate change context is that cost-benefit analysis cannot tell us *whether we are on the right mountain*. While scrambling meticulously over the details of any cost-benefit exercise, it is easy to lose sight of the fact that at its base lies a set of fundamental assumptions about resource rights, income distribution, population size, intergenerational equity, international obligation, the likelihood of technological innovation, the capacity of individuals and communities to adapt to climate change, the trajectory of the economy, and so on. Alter these assumptions and one stands on a different mountain, where cost-benefit analysis once again can offer advice on whether a proposed step will lead incrementally up or down.

In the climate change context, the near universal view of natural scientists is that we are currently on the wrong mountain. Indeed, because of tipping points in a variety of planetary systems, we are heading up a mountain with a cliff at its peak (McKay et al. 2022; Steffen et al. 2018; Lenton et al. 2008). Thus, we are well advised at present to take policy steps that may appear *inefficient* when measured by marginalist cost-benefit analysis that is fixed to the assumptions of the status quo. Shuttering existing coal-fired power plants and capping still-productive oil wells are examples of actions that would likely fail a conventional cost-benefit analysis today but that might well be the most rational actions humanity could take from a perspective that sees beyond our current mountain. In the metric of conventional integrated assessment models, we may have to climb *down* for a while before we can again start ascending

a different peak. The ultimate result will be a mountain with a better and more enduring view, but the path of transition will not be a smooth, continuous, and incremental one, as marginalist cost-benefit analysis presumes.

The Obama task force report does stress this fundamental distinction between choosing and climbing a mountain, or to put the point more technically, between general and partial equilibrium, comprehensive and marginal analysis. Nevertheless, the authors confidently state in the report that their marginal social cost of carbon estimate will be useful because "[m]ost federal regulatory actions can be expected to have [only] marginal impacts on global emissions" (Interagency Working Grp. 2010, 2). The danger here is that the authors' assertion will become self-fulfilling: Whether an environmental law offers marginal or infra-marginal possibilities for altering greenhouse gas emissions trajectories depends very much on whether the environmental regulator decides to implement the statute with the vigorous, transformational teeth it was designed to have. For instance, when viewed individually, energy investment decisions such as whether to license new gas-fired power plants may appear to represent only marginal alterations to a status quo trajectory of emissions growth. But when one considers the durability of such investments combined with the fact that they occur within a national policy space in which dozens of such individual decisions are constantly being made, then the licensing decision may well be seen to raise an *infra*-marginal policy concerning the future trajectory of a nation's energy infrastructure (Liscow & Karpilow 2017).

The integrated assessment models relied on by the task force all are built on assumptions about matters that are central to the climate change problem, but that are not allowed to surface for direct inspection. That is, the cost and benefit outputs of the models depend critically on assumptions about such matters as whether and how quickly economies will de-carbonize

through technology innovation, what level of adaptive capacity communities will have to lessen the impacts of climate change, what population policies nations will pursue, what level of international action can be anticipated to follow from domestic leadership, and so on. These matters are treated as fixed inputs into the models rather than as *themselves* subjects of policy choice. As a result, regulations altering the trajectory of these matters may be assessed using the social cost of carbon, but the apparent "costs" and "benefits" of such regulations will be misleadingly calculated. To give just one example, none of the models relied on by the task force allow for the possibility that major shifts in U.S. policy will cause other nations to follow suit, such that the global emissions trajectory will be lowered by an amount greater than reflected in the direct domestic impacts of the U.S. policy change. Accordingly, the apparent benefits of U.S. climate policy proposals will be systematically understated by the models if indeed it is true – as countless knowledgeable observers suggest – that U.S. recalcitrance has long been a major stumbling block to international climate progress.[4]

Likewise, the foundational ethical questions at the heart of cost-benefit analysis – such as the debate over how to value lives or the best way to consider the rights of future generations – are typically treated by cost-benefit proponents as matters of elite expertise or disciplinary orthodoxy, rather than debatable moral and political issues. As a result, the prevailing principles

[4] The possibility of reciprocal climate action by other countries has been used as an argument by academics and policymakers in favor of counting global, as opposed to merely domestic, impacts when calculating the social cost of carbon (Pizer et al. 2014; Howard & Schwartz 2017). One analysis even goes so far as to argue that the ratio of the U.S. emissions reduction commitment to the aggregate commitments by other countries under the Paris Agreement is roughly equal to the ratio implied by incorporating extraterritorial damages into the social cost of carbon, thereby justifying use of the global damages estimate (Houser & Larsen 2021). Instrumentally valuable though they may be, these arguments remain strategically focused on national self-interest rather than on the underlying moral question of whether U.S. policymakers and the constituents they represent should care about the impact of their choices and actions on residents of other countries.

and assumptions of cost-benefit analysis are rarely subjected to transparent and sustained critique, even though they often work to stack the deck against aggressive regulatory action on behalf of environmental, health, and safety protection. Even the Obama task force, which in many respects was a model of open and self-critical disciplinary examination, nevertheless balked at key moments in its analysis just as foundational questions were coming into view. For instance, after noting that the practice of discounting future costs and benefits to a present value raises fundamental ethical questions regarding the care and consideration present generations owe to future generations (Interagency Working Grp. 2010, 17), the task force authors nevertheless concluded that discounting should be applied when calculating the social cost of carbon simply to maintain "consistency with the standard contemporary theoretical foundations of benefit-cost analysis" (Id., 19).

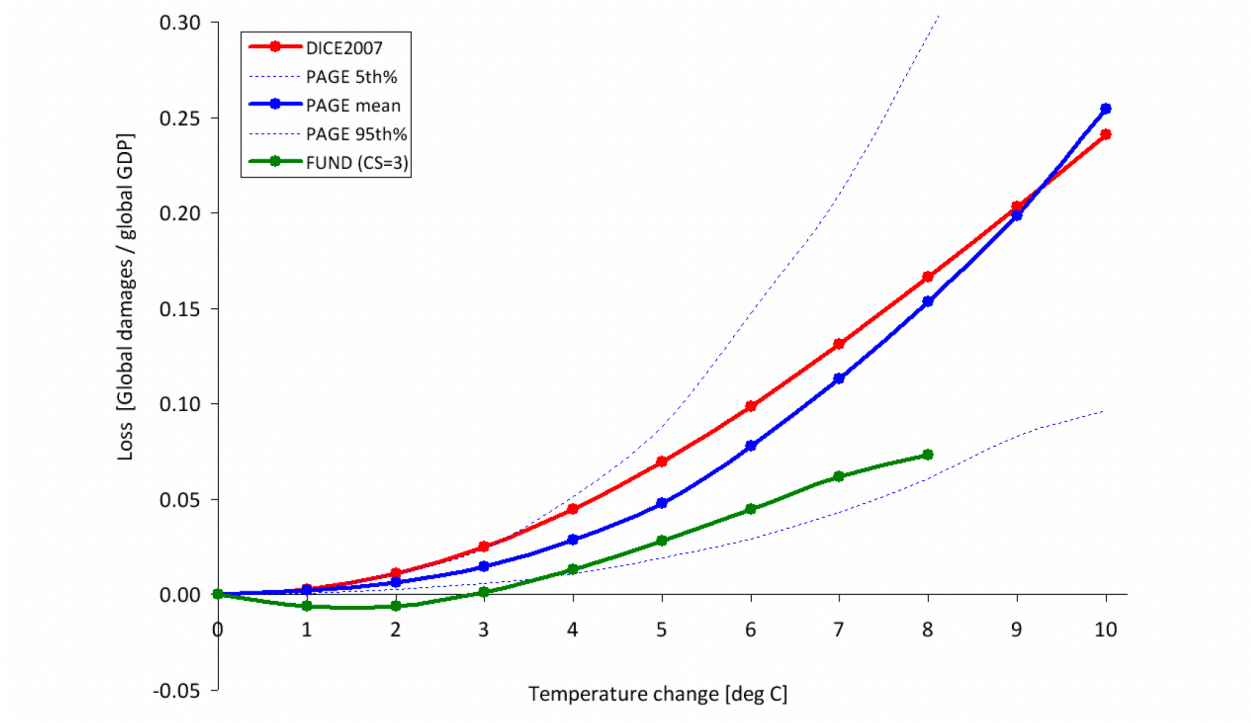
The particulars of the discounting debate have been reviewed at length elsewhere and will not be recounted here (Kysar 2007). For present purposes, it is enough to note that discounting is a crude and misleading way to incorporate matters of intergenerational ethics into the welfare-maximization exercise. If climate change policies must be evaluated using discounted cost-benefit analysis, then analysts must do so using shadow markets in which natural resources and other environmental goods are *first* endowed to future generations through sustainability constraints or other hypothetical regulatory measures (Farley 2008). Modeling a sustainable market economy in this way will generate an interest rate that regulatory analysts might *then* use to adjust future costs and benefits when evaluating policies. Significant intergenerational policy issues like climate change regulation will look dramatically different when evaluated in this way. If we first endow future generations with the right to a relatively safe and stable concentration of greenhouse gases in the atmosphere – as physical scientists implicitly

urge when they propose policy targets such as a maximum 1.5° C temperature increase over pre-Industrial levels or a 350 parts per million CO_2 concentration stabilization – then the present generation would be required to "purchase" those rights from future generations using prices that reflect a normatively defensible background allocation of atmospheric rights. As it is, conventional cost-benefit analysis proceeds as if the present generation owns everything, implicitly answering without analysis a question that lies at the very core of the climate change policy problem. Importantly, this question cannot be avoided even if one adopts the mainstream welfare economic view that future generations can be "compensated" through undifferentiated accumulation of capital whenever specific natural resources are compromised – even ones as basic and seemingly non-substitutable as atmospheric stability. Even on this bullish view of natural resource abundance and substitutability, the level of "compensation" that is due to future generations must be calculated in a way that *first* asks who owns the resources that have been destroyed. Any other procedure allows the present generation to play lord in a game of temporal feudalism.

Analytical confusion in the realm of climate economics carries grave consequences. Even the Nobel Prize-winning DICE model can be criticized for overstating the bounds of its competency. As figure 1 taken from the Obama task force report illustrates, within the DICE model – like the other two models relied upon by the task force – global temperatures can increase to unfathomable levels without fundamentally affecting world economic output. According to DICE, only one quarter of global GDP would be lost if temperatures increased 10° C above pre-Industrial levels. Indeed, only one half of global GDP would be lost in the DICE model at a temperature increase of 19° C (Ackerman, Stanton, and Bueno 2010). Consider this outcome in light of scientific calculations of a climate change "adaptability limit" due to the

human body's inability to dissipate heat and avoid hyperthermia above a certain temperature. Scientists studying this limit "conclude that a global-mean warming of roughly 7 ºC would create small zones where metabolic heat dissipation would for the first time become impossible, calling into question their suitability for human habitation. A warming of 11-12 ºC would expand these zones to encompass most of today's human population" (Sherwood and Huber 2010).

Figure 1



Annual Consumption Loss as a Fraction of Global GDP in 2100 Due to an Increase in Annual Global Temperature in the DICE, FUND, and PAGE Models

How can it be that one half of global GDP would continue to be generated and enjoyed at a temperature level several degrees Celsius above an adaptability limit for human survival? Quite simply because harm of that sort is an infra-marginal event not contemplated by the model's damage function. Rather than positing some degree of fundamental dependence between socioeconomic and natural systems, integrated assessment models typically assume that the

economy will continue to function more or less as is, even as damages from climate change grow ever larger (Stern 2013). In the extreme, this means that global GDP can continue to pour forth within the models even after all presently inhabited land on earth has been rendered unsuitable for human existence. The possibility of such extreme climate change scenarios suggests that cost-benefit optimizing may simply be the wrong framework for analyzing climate change policy. Rather than optimal consumption smoothing over time, policymakers instead should consider climate change from an insurance perspective, asking how much of present consumption is worth investing in the avoidance of truly intolerable outcomes (Weitzman 2014). Or, to give the question a more explicit moral valence, policymakers should ask whether the present generation wants to countenance global disaster among its legacy of achievements. Because catastrophic climate change scenarios are essentially uninsurable and intolerable events, this mode of thinking leads to a goal of prevention along lines the scientific community has been urging all along: Rather than a system in which all resources are optimally deployed to their highest valued use according to some set of fundamentally contestable assumptions, we should seek a system that displays characteristics like precaution, diversification, resilience, redundancy, and innovative capacity – characteristics that may appear to represent an "inefficient" use of resources from a narrow economic viewpoint, but that may be essential nonetheless.

Recall again that these integrated assessment models, with all their flaws and confusions, were embraced by Obama, a nominally *pro*-environment president. One of the first executive actions undertaken by the Trump Administration was to disband the interagency task force and disavow the social cost of carbon report. Administration officials quickly made clear that the "game" of cost-benefit analysis would be played differently under Trump, lowering the social cost of carbon from the Obama Administration's mean estimate of US$50 per ton to US$1-7 per

ton (U.S. GAO 2020). Three changes in particular worked to achieve this lowering and, in turn, to dramatically constrict the government's ability to address climate change and other environmental ills. First, the Trump Administration adopted a much higher social discount rate in order to lower the apparent value of undertaking climate mitigation policies. Second, the Administration barred agencies from considering any benefits that happen outside U.S. borders when considering the costs and benefits of environmental regulations. Third, agencies also were prohibited from weighing "co-benefits," i.e. supplementary benefits that occur in addition to the main target of a regulation, such as mercury emission reductions that occur when CO_2 limits are mandated for the utility sector. With these and other methodological adjustments to regulatory cost-benefit analysis, the Trump Administration was able to pursue the unraveling of nearly every federal action on climate change and environmental protection undertaken by President Obama, while still justifying the attempted rollbacks as social-welfare maximizing according to cost-benefit analysis.[5]

Presently, the pendulum of cynicism is swinging back toward earnest academic and technocratic engagement. Informed by a blue-ribbon academic report (National Academies of Sciences, Engineering, and Medicine 2017) and by evolving thinking within significant quarters of the environmental economics community (Rennert et al. 2022; Stern 2022; Wagner et al. 2021; Carleton & Greenstone 2021), the Biden Administration has undertaken a substantial review of the social cost of carbon. The Obama-era estimates of approximately $51 per ton adjusted for inflation were reinstated for immediate agency use, pending guidance from a new

[5] In some cases, federal judges called the Administration's bluff and ruled the attempted roll-backs unlawful based on the inadequacy of the administrative record regarding impacts. See, e.g. California v. Bernhardt, 472 F.Supp.3d 573 (N.D. Cal 2020). In such a case, the requirement that agencies produce a substantial cost-benefit analysis in support of their proposed actions can work in a salutary way to block attempted *de*-regulatory initiatives. Whether the requirement works in a salutary fashion for *pro*-regulatory aims is less clear.

interagency task force that was constituted to update the work of the Obama social cost of carbon experts alongside a broader effort by the Office of Management and Budget to update executive branch oversight of regulatory cost-benefit analysis across all agencies and tasks. Advances in empirical estimation of climate damages and more refined understanding of how climate change poses disproportionate risks to poor and marginalized communities are just two of the improvements expected to emerge from this process (Carleton & Greenstone 2021). Somewhat surprisingly, the Environmental Protection Agency proposed an estimate of about $190 per ton for a social cost of carbon to the interagency working group but also made that figure and supporting analysis publicly available as part of a Clean Air Act rulemaking process for methane emissions from the oil and gas sector. Observers speculate that the agency hoped to put political pressure on the task force to ensure that it would incorporate the latest scientific and economic research which justifies a much higher social cost of carbon estimate than even the Obama-era figure.

For some readers, these recent updates might feel like progress. But the progress is practical and contingent. The underlying conceptual failings of the social cost of carbon have not truly been addressed. Consider the case of extraterritorial effects. Unlike the Trump Administration which saw an opportunity to curtail federal agency regulatory "budgets" by simply excluding such effects, the Obama task force instead calculated both a domestic and a global social cost of carbon (Interagency Working Grp. 2010, n. 6). In contrast, the EPA under President Biden chose to include global lives lost within a single revised social cost of carbon, but only monetized the value of lives outside of the United States according to national income measures rather than the agency's standard practice of using a uniform monetary value of a statistical life. National income measures value the lives of most of the world's population at a

significantly lower dollar amount than U.S. lives. As legal scholar Daniel Hemel observed, applying a uniform value of a statistical life globally would have resulted in much higher estimated benefits from climate regulation, a level the agency presumably was unwilling to venture as a political proposition given that it had already come in supposedly "high" at $190 per ton (Hersher 2023). These shifting approaches have a certain kind of transparency about them, but they share a common defect: In each case, the profound moral question of whether the United States owes consideration to foreign countries in respect of its contributions to climate change is treated merely as a modelling assumption to be decided by economic experts, rather than as a subject of utmost importance for political discussion and resolution.

At least in the United States, regulatory cost-benefit analysis often feels like lobbying in a different, more specialized vernacular – politics by other meanings (Kysar 2010a). It is a language spoken by few and dominated by even fewer. Its diction is poor though it purports to speak everything meaningful. The fact that even Donald Trump's destructive environmental policies could be "justified" through cost-benefit analysis suggests that the enterprise has failed and that a return to fundamentals – to the openly moral and political questions that are raised by our relationship to the planet and its living beings – is necessary. Literally everything is at stake.

Counterfactual Carbon

As noted in the previous section, climate change policy is inseparable from foundational issues concerning international responsibility and coordination. For the better part of three decades, the deadlock on climate change policy at the global level has reflected a fundamental divide between developed and developing countries over how to allocate responsibility for greenhouse gas emissions reductions. Generally speaking, poorer countries – even major emitters

such as India, Indonesia, and Brazil whose absolute emission levels are high but whose per-capita levels remain lower than most developed countries – want to avoid aggressive reduction targets until they have achieved a level of development closer to that of wealthy nations. Many developed countries, for their part, are reluctant to take on stiff reduction targets because they fear a sucker's payoff: Whatever reductions they achieve may result in little climate benefit if highly populous and rapidly industrializing countries continue their massive growth in emissions.

One way that policymakers have attempted to bridge this divide is through use of carbon offsets. Under this approach, power plants, factories, and other regulated emitters in developed countries can satisfy their reduction requirements by purchasing carbon credits awarded through some official process, such as the Clean Development Mechanism under the Kyoto Protocol. Credits are awarded when a project undertaken in a developing country is less greenhouse gas-intensive than it would have been in the usual course. For instance, if a traditional coal-fired power plant normally would have been built, but financial support from a project sponsor instead leads to a lower-emitting natural gas plant, then the project can earn credits representing the difference in emissions levels between the respective technologies. These credits can then be sold in the international carbon market for use by entities subject to emissions limitations.

The idea behind the offset approach is that incrementally shifting development onto a cleaner path in poorer countries is likely to be a much cheaper way to reduce emissions than direct cuts in richer countries. In theory, the approach also has the benefit of channeling additional development dollars to poorer nations. In practice, however, critics point to numerous problems with offsets. For instance, documenting what would have happened in the absence of financial support is far more of an art than a science, though the acceptability of the offset system depends on its appearance as the latter: "The calculational imperatives of the market . . . dictate

that the counterfactual without-project scenario be presented not as indeterminate and dependent on political choice . . . but as singular, determinate and a matter for economic and technical prediction." (Lohmann 2005, 217). Accordingly, a complex field of "private sector science" (Lave, Doyle and Robertson 2010) has developed to lend apparent technical legitimacy to the international offset system. Project consultants within this field engage in a practice of "counterfactual display," in which "two future states of the world – one with the project and one without it – are played against each other and . . . the value of the project is derived from that interplay" (Ehrenstein & Muniesa 2013, 162).

As with any such "centre of calculation" (Latour 1987), the political implications are both deep and obscure. Numerous offset credits, for instance, are said to represent "anyway" credits, since projects receiving them likely would have happened regardless of outside financial support (Schneider 2009). The result is a sheer wealth transfer without any actual climate change benefit and often with serious local environmental and social costs for the communities visited with the sponsored projects. Worse than "anyway" credits are the substantial offset rewards that have been given to firms that committed to destroying hydrofluorocarbon-23 (HFC-23), a potent greenhouse gas that results when chemical companies produce a refrigerant and propellant called hydrochlorofluorocarbon-22 (HCFC-22). Researchers determined that, in many cases, firms were building new factories or otherwise raising HCFC-22 production levels solely in order to create more HFC-23 which they then reduced in order to claim offset credits (Wara 2007). Incentives work, even perverse ones.

Additional practical problems with offsets abound. Looming over all nature-based offset projects such as forest preservation and wetlands restoration are concerns about permanence, especially as climate-enhanced wildfires, hurricanes, and other threats render the character and

stability of natural landscapes increasingly vulnerable. But more prosaic threats to offset integrity also exist. For instance, in the case of forest preservation and management, project sponsors can overstate existing deforestration trends, understate the risk of leakage (whereby prohibited emissions activities simply relocate elsewhere), inflate project sequestration capacity, undertake inadequate monitoring, and take other strategic measures that cast considerable doubt on whether any "additional" carbon actually has been stored by virtue of the project's registration (Haya et al. 2023; Coffield et al. 2022). An analysis of academic research concerning rainforest carbon offsets registered by a leading certifier determined that 94% of purported carbon reductions did not occur, in large part because background deforestation rates had been overstated by as much as 400%. In other words, the counterfactual display at the heart of the offset methodology had opened opportunities for manipulation. As Oxford ecologist Yadvinder Singh Malhi put it, "[t]he challenge isn't around measuring carbon stocks; it's about reliably forecasting the future, what would have happened in the absence of [the offset incentive]. And peering into the future is a dark and messy art in a world of complex societies, politics and economics" (Greenfield 2023).

Due to examples like this, carbon offsets have struggled under a cloud of suspicion since their invention. Today, even mainstream economists and governments have grown wary of carbon offsets because of the practical difficulty of ensuring their integrity. This is especially the case with offsets generated from projects abroad where compliance monitoring depends on third party verifiers who labor under conflicts of interest generated by their fundamental desire to see the carbon offset market thrive. As a result, the European Union has chosen to phase out reliance on international carbon credits within its emissions trading scheme, and other major carbon trading jurisdictions like California sharply limit their use. With greater attention to

environmental justice, policymakers also have come to appreciate that outsourcing emissions reductions via offset markets often results in a lost opportunity to address serious domestic environmental problems that are often inequitably distributed along race and poverty lines. Greenhouse gases often are emitted from facilities that cause a variety of other, more locally harmful environmental ills. Allowing such facilities to satisfy their greenhouse gas emissions reduction responsibilities via carbon offsets leaves co-pollutants and other harmful impacts unaddressed.

Still, even if concerns about co-pollutants and environmental justice were addressed, and even if the various practical problems with carbon offsets were overcome, a more fundamental critique of the carbon offset approach would remain: The approach fails to incentivize the kind of dramatic, structural transformation toward a low-carbon future that is needed. "Carbon markets . . . serve as creative new modes of accumulation, but are unlikely to transform capitalist dynamics in ways that might foster a more sustainable global economy" (Böhm, Misoczky, and Moog 2012, 1). Even offset defenders acknowledge that the approach at best can achieve only minor changes to business-as-usual development. Yet the world's problem today is that business-as-usual development – even a marginally improved version of it – is a fast train to disaster. The impotence of the offset system in this respect is driven by its dependence on a narrow, essentially neoliberal imagination. Carbon offsets are a compliance device that proponents argue is necessary for the establishment of an efficient global carbon market, which proponents further argue is the only practical way to address climate change. These presumptions work to reinforce one another, as the actors operating within the carbon market become more and more anchored to an imagined world in which ownership and exchange under largely current conditions define what is achievable through politics. This narrow political imagination works to the exclusion of

alternatives in which collective decision-making shapes the preferences, values, equity conditions, technologies, and structures within which we would subsequently conduct market exchanges.

What is especially fascinating about carbon offsets is that they explicitly rely on legal imagination; they are, in essence, "counterfactual carbon" (Shapiro 2010, 38), legal instruments designed to represent and monetize the emissions that would have existed in a hypothetical business-as-usual-world without the intervention of an agent who is credited with having shifted downward the collective carbon trajectory. Once one admits the possibility of counterfactual carbon as a basis for distributing economic rewards and behavioral incentives, there should be no limit to the kinds of mitigation schemes one could concoct. Yet the offset system remains tightly anchored to a business-as-usual development vision: "While understanding what 'could have happened' in the absence of each particular project does mean funneling intellectual effort into speculation about hypothetical worlds, the hypothetical worlds that are relevant to determining 'what would have happened' without any particular project will all necessarily closely resemble the world with the project" (Lohmann 2005, 218). In this respect, the offset system seems politically palatable precisely because it is so consonant with the standard neoliberal path of finance and development: "[T]he logic of capitalization determines to a great extent the template of the imagined possible worlds" (Ehrenstein & Muniesa 2013, 181).

Carbon Upsets

What would an offset scheme look like that could reside within a neoliberal framework without being limited by its imagination? Consider a system of what we might call "carbon upsets" (Kysar, 2010). Rather than award credits based on economic development that moves us

from an imagined dirty path toward a marginally cleaner, but still very dirty future, why not award credits to legal and political actions that have a more dramatic effect? For instance, rather than transfer money to logging operations for incremental replanting programs, why not award credits to forest-dwelling communities that fight successfully to stop logging altogether? Rather than bribe powerful fossil fuel companies to stop flaring natural gas, why not reward indigenous groups that entirely block new resource exploitation activities on their lands? Rather than finance the construction of biopower facilities that deprive villagers of organic materials that are an essential part of centuries-old sustainable farming practices, why not give those villagers carbon credits when they manage to impede the project and hold onto their traditional, low-carbon way of living? Under the neoliberal offset approach, "[p]olicymakers, environmental movements, indigenous communities who have prevented oil extraction in their territories: all have arguably saved carbon, yet are excluded from selling credits." (Lohmann 2005, 214)

Upset credits could be awarded directly to groups and individuals when they work to achieve climate progress on their own. In addition, as with the existing offset approach, benefits could be shared in the case of legal and political activities that are "sponsored" by a financial partner. Imagine just for a moment a world in which global financial houses like Goldman Sachs devote their intellectual, financial, and political capital, not to the exploitation of dubious offset opportunities such as HFC-23 capture, but to the identification and promotion of critical sites of political intervention by disempowered voices for sustainability. Contrast such a world with the existing carbon markets' tendency "to encourage private corporations and technical experts to expend ingenuity on inventing novel, geographically far-flung market 'equivalents' for emissions reductions rather than finding ways to implement a structural shift away from fossil fuels" (Lohmann 2009, 6).

Again, nothing in the counterfactual logic of carbon offsets prevents their use in a more dramatic and politically ambitious fashion. The limitation lies in our imagination.[6] The upset approach could even be expanded to include domestic offset markets in wealthy countries, where political dynamics are equally, if not more, in need of upset. For instance, when Friends of the Earth sued and successfully forced the Overseas Private Investment Corporation and the Export-Import Bank of the United States to change the way those institutions evaluate the climate impact of funded projects (Friends of the Earth, Inc. v. Spinelli 2009), the organization could have been entitled to billions of dollars' worth of carbon upset credits. That single lawsuit may have a long-term positive climate impact that rivals all of the Clean Development Mechanism's projects combined. As it is, Friends of the Earth is lucky to even get credited attorneys' fees under current legal and political structures.

The carbon upset approach is targeted at challenging the political and economic inertia of the status quo. It seeks to introduce dynamism into our political economy by actively seeding disruption and potential transformative change. Conventional climate change policies such as carbon offsets and allowance giveaways have the perverse effect of further subsidizing already massively-subsidized and politically-dominant industries and their financial partners, thereby "entrenching institutions and procedures that are likely to stand in the way of constructive approaches to climate change" (Lohmann 2005, 204). Put bluntly, the main beneficiaries of the existing carbon offset system are the same industries and technologies that need to be radically

[6] It is fitting, then, that the only real-world instantiation of the carbon upsets concept the author is aware of takes the form of a digital art exhibition launched in 2023. As described by the artists, their "platform includes a registry of alternative offsets that focus on social exchanges and political actions in order to contribute to a program of highly financialized radical change" (Offset 2023).

transformed. Individuals and groups that are pursuing the transformation of such industries and technologies should be rewarded, and even encouraged into existence, through carbon upsets.

The Unbearable Lightness of Emitting

The offset system's tethering to neoliberal imagination becomes even more plain in the case of voluntary offsets. Unlike the compliance offset market, which exists to enable firms facing emissions caps to meet their regulatory obligations more cheaply, the voluntary offset market is targeted at individuals and organizations that wish to purchase credits to "offset" their emissions even in the absence of legal mandates. Greenhouse gas mitigation on this approach occurs through voluntary, decentralized choices generally made within the context of market transactions. Before completing an airline ticket purchase, for instance, passengers might be given the opportunity to offset their flight emissions for an additional fee. Before indulging in a porterhouse steak, a diner might be asked whether she wants to accept a surcharge so the restaurant could purchase emissions credits to "offset" her carbon-intensive meal choice.

On this approach the neoliberal order again is not threatened; rather, it is reinforced because the voluntary offset system, like the compliance offset system, obscures "the political nature of collective decisions" (Ehrenstein & Muniesa 2013, 174). Conveniently, agency and efficacy are seen to reside in individual economic choices in the market, rather than in mechanisms for political decision making. The yawning chasm between individual actions and collective consequences – perhaps the defining feature of climate change as a global conundrum – is bridged through the conjuring magic of counterfactual carbon.

This bridge is illusory for individuals are denied a way to imagine and realize an alternative world in which their choices do not contribute to climate change and therefore do not

demand off-setting in the first place. *That* conversation is one many are aching to hold, for our collective climate consciousness is finally awakening to the fact that we are, indeed, riding a bullet train to hell. The salient templates for that conversation, though, remain largely neoliberal and inadequate. As a result, public discourse now features plenty of debate and hand-wringing regarding the individual ethics of having children, eating meat, traveling via airplane, owning a car, etc. But there is all too little conversation regarding the structure and regulation of food systems, electricity grids, public transportation networks, or any of the other technopolitical assemblages that determine the level of harm to be anticipated from individual decisions. To be sure, the emerging climate responsibility discourse does represent an advance over prior iterations, in which consumers have been offered convenient salves (e.g., change that lightbulb, recycle that bottle) that are relatively disconnected from the major impacts of human choice and behavior. Still, the conversational template remains radically truncated.

Consider the decision whether to have children, which many now see as a profound moral question from the climate perspective – with good reason, for the choice to have a child is likely the single most substantial choice an individual can make with respect to their personal carbon footprint. The example is especially pertinent for this paper because one of the first academic proposals for a tradable permit regulatory scheme – the analytical engine of carbon offsets and the cap-and-trade climate schemes within which offsets reside – arose in the context of questioning how to address human population growth (Boulding 1964). Under the current carbon market system, an individual concerned about the greenhouse gas emissions of her offspring would have to purchase offsets representing the expected additional contribution of the child and its generational descendants to the climate problem. According to one study, this would represent nearly 60 tons of CO^2 equivalent emissions per year (Wynes & Nicholas 2017).

Assuming a conservative carbon price of US$50 per ton, the conscientious parent would need to purchase US$3,000 per year of credits to offset the impact of deciding to have a child. Alternatively, in a different political economy, the voluntarily childless might be entitled to receive US$3,000 per year of credits for having chosen not to reproduce. The critical point is that, whichever scheme is adopted, the environmental and regulatory consequences of the decision will be small in comparison to the impact that having or not having a child bears on one's life course. Because we exist embedded in systems not of our choosing and well beyond our control, our greenhouse gas emissions have a certain unbearable lightness. They are light in the sense that our choices within systems give rise to emissions with little thought or means to avoid them; they are light in terms of the actual environmental impact they cause on their own, disaggregated from the emissions of billions of other individuals; and they are light in comparison to the economic costs or benefits that they might bring us within currently imaginable regulatory schemes. Yet, despite their lightness, they are unbearable when we countenance them as beings with agency and responsibility who wish to be ethical in the Anthropocene.

Carbon Superspreaders

Some greenhouse gas emissions appear to be even lighter than others. Carbon markets trade on the fact that, from the perspective of atmospheric chemistry, it does not matter where greenhouse gas emissions are reduced. Once it disperses within the upper troposphere, a ton of carbon is just a ton of carbon. From the perspectives of history and justice, however, the source and use of emissions matters a great deal. Henry Shue's distinction between "subsistence emissions" and "luxury emissions" (Shue 1993) nicely captures the idea that it matters both *who*

is emitting and *for what purpose* they are emitting. Disparities among nations in terms of historical, absolute, and per-capita emissions levels mean that the climate change problem is rife with questions of responsibility and equity (Burkett 2018).

Not only have nations contributed at vastly different levels to the climate change problem, but the problem itself inflicts harm in unequal ways. Poor countries, disproportionately concentrated around the equator, are more vulnerable to the impacts of increasing temperatures. Indeed, they *already* have suffered significantly: Researchers estimate that the gap in per capita income between the richest and the poorest countries in the world is 25 percent larger than it would have been in the absence of human-induced climate change that occurred from 1961 to 2000 (Diffenbaugh and Burke 2020). Excluding the effects of anthropogenic climate change during that period, for instance, India would have been 30 percent wealthier and Nigeria 29 percent wealthier. Oil-rich Norway, on the other hand, has seen net *gains* from climate change as its high latitude climate has become more temperate (Sengupta 2020). A subsequent study coupled temperature-driven income losses with a warming attribution model to assign national shares of responsibility for the losses. Just five nations (the United States, China, Russia, Brazil, and India) were collectively responsible for US$6 trillion in income losses from warming since 1990, comparable to 11% of annual global gross domestic product (Callahan & Mankin 2022).

Climate justice typically is discussed in these country-to-country terms. Analysts have long recognized, however, that climate justice also raises questions of equity at the individual level (e.g., Baer, Kartha, Athanasiou, and Kemp-Benedict 2009). Global disparities in individual contributions to the climate change problem are significant. By one estimate, the greenhouse gas emissions of someone in the wealthiest 1% of individuals in the world are 175 times as great as someone in the poorest 10% (Oxfam 2015). Between 1990 to 2015 – a critical period in which

global annual emissions rose by 60% and cumulative emissions since the beginning of the Industrial Revolution doubled – the richest 10% of the world's population was responsible for an estimated 52% of the cumulative emissions increase (Oxfam 2020). Similarly, the United Nations calculates that the top 10% of income earners in the world in 2015 were responsible for 48% of global CO_2 consumption emissions, whereas the bottom half of earners contributed only 7%. The top 1% of earners were responsible for 15% of global CO_2 consumption emissions, more than double the share of half the world's population (United Nations 2020). Put another way, "just one-hundredth of the world population (77 million individuals) emits about 50% more than the entire bottom half of the population (3.8 billion individuals)" (Chancel 2020).

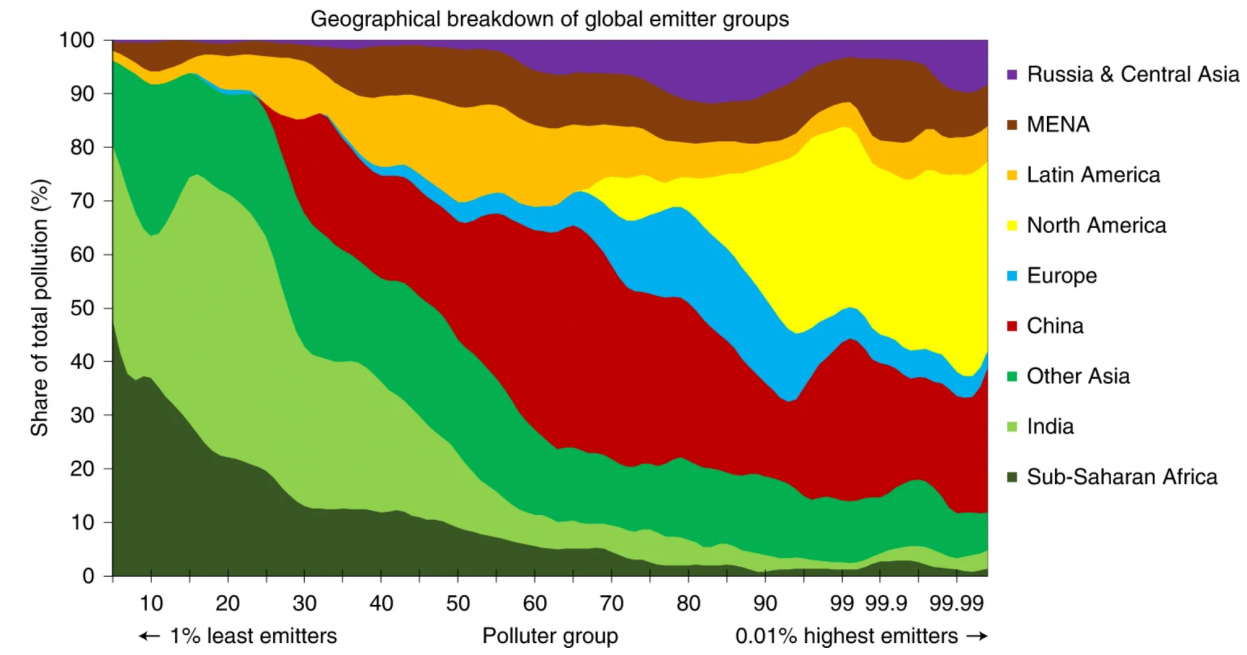
Analyses such as these prompted a leading academic research organization to conclude that the fundamental organizing principle of international climate negotiations – which remains largely focused on country-to-country comparisons as a basis for making equity and burden-allocation claims – no longer captures the empirical nuances of climate inequity:

> Carbon inequalities within countries now appear to be greater than carbon inequalities between countries. The consumption and investment patterns of a relatively small group of the population directly or indirectly contribute disproportionately to greenhouse gases. While cross-country emission inequalities remain sizeable, overall inequality in global emissions is now mostly explained by within-country inequalities by some indicators (Chancel et al. 2023).

More precisely, whereas 62% of global carbon inequality in 1990 was explained by country-to-country differences, by 2019 within-country differences had risen to account for 64% (Chancel 2022). Looking at the distribution of emissions by region and income group in Figure 2 reveals that the conventional typology of developed and developing countries within international

climate negotiations needs to be significantly refined. Carbon superspreaders exist in all regions of the world, even the poorest. [7]

Figure 2



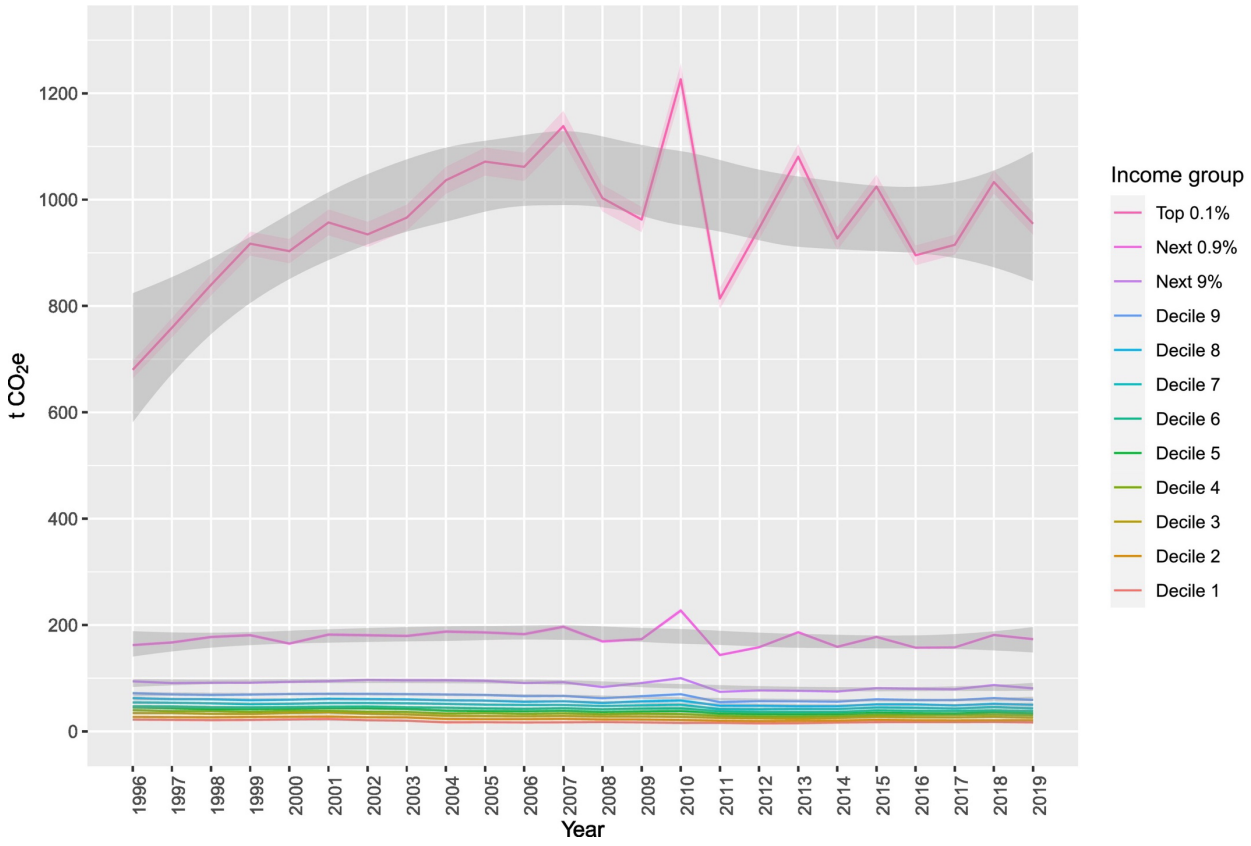
Source: Chancel 2022

Such trends appear poised to continue. Looking forward, the top 1% of earners are projected to have per capita consumption emissions levels in 2030 that are 30 times higher than the level that would be compatible with a 1.5° C pathway if emissions were equally distributed across the global population (Gore et al. 2021). Strikingly, while household emission levels in

[7] Additional aspects of this figure bear notice, such as the substantial concentration of low-emitting individuals in India and Sub-Saharan Africa, the surprising amount of high- and ultra-high-emitting individuals in China, the concentration of European individuals within relatively tight bands of medium to above-average emissions, and the extraordinary right-ward concentration of low-, medium-, and high-income individuals in the United States. As the author notes, "[i]t is striking that the poorest half of the population in the United States has emission levels comparable with the European middle 40%, despite being almost twice as poor as this group in purchasing power parity terms" (Chancel 2022).

the United States declined by an average 16% over the period from 1996 to 2019, emissions of the top 1% of households by income level increased by 23% and the top 0.1% by 50% (Starr et al. 2023). That latter extremely rarified slice of households each consumed an estimated 800 tons of CO_2 equivalent emissions per year (Figure 3), an amount dramatically higher than the rest of the 1% elite and radically out of line with the 2.3 tons per person by 2030 estimated to be needed to keep the world on track to limit warming to 1.5°C above pre-industrial levels (Oxfam 2023). Still, even that jarring statistic can be topped if one looks more closely at the very top of the very top: An ingenious study of the carbon footprint of the world's ultra-wealthy found that Russian oligarch Roman Abramovich's largest yacht, the *Eclipse*, by itself emitted more than 20,000 tons of CO_2 equivalent greenhouse gases in 2018 (Barros & Wilk 2021). That amount exceeded the annual emissions of the entire nation of Tuvalu, a low-lying Pacific island state that has begun archiving a virtual reality simulation of its territory in an effort to both preserve the island's heritage and attempt to claim continued sovereign existence under international law even after it becomes uninhabitable due to sea level rise (Our World in Data 2023; Craymer 2022).

Figure 3



Mean U.S. household carbon footprint (1996–2019) per income group. Source: Starr et al. 2023

Scholars and advocates have increasingly targeted the luxury emissions of the world's wealthiest individuals and families as a focus of study and potential policy intervention (Wallace & Welton 2024). A study in *Nature Climate Change*, for instance, reported results of a survey of high net-worth individuals and their consumption habits with respect to private motor vehicles, air travel, household energy use, and spending on food and education. While not as massive as the emissions of a Russian oligarch, the study still concluded that "a typical superrich household of two people produces a carbon footprint of 129.3 tCO^2e per year," an amount around ten times the global per capita average (Otto, Mi Kim, Dubrovsky and Lucht 2019, 82). A carbon footprint analysis of households within China found similar, though less pronounced disparities, with

urban ultra-rich households comprising just 5% of the population being found responsible for 19% of greenhouse gas emissions from household consumption in all of China (Wiedenhofer et al. 2016).

Aviation is particularly instructive as an example of climate inequality and the potential for effective climate policy intervention. The aviation sector is responsible for approximately 2.5% of emissions globally but drives a higher amount of warming due to various non-CO_2 effects (Sacchi et al. 2023; Lee et al. 2021). It is also a sector whose services are utilized by a concentrated few in global terms. Researchers estimate that during 2018 only 11% of people around the world traveled by plane at all, with no more than 4% taking an international flight. Without even considering private air travel, a mere 1% of the global population was responsible for half of all commercial flight emissions that year (Gössling & Humpe 2020). Another study estimates that the top 10% of earners in the world consume around 75% of all energy for air transport, compared with only 5% for the poorest 50% (Oswald et al. 2020). Similarly, in the United States, researchers estimate that over half of adults do not fly at all, while the 12% of adults who take six flights or more per year account for 68% of all flights taken in a given year (Gössling & Humpe 2020). In contrast to conventional carbon taxes which pose significant regressivity challenges in practice, a tax on aviation travel could easily be designed in a graduated way to target well-off frequent flyers without imposing undue hardship on lower- or middle-income households (Zheng & Rutherford 2022). Design of a yacht tax, one suspects, would be even easier.

Related to the issue of luxury emissions is the question of whether inequality itself – as distinct from absolute levels of income and wealth – could be a driver of higher greenhouse gas emissions. Research on the relationship between inequality and greenhouse gas emissions

remains underdeveloped, although the issue has received more scholarly attention of late. Consistent with the notion that the marginal propensity to consume declines with income, an early study using data from 42 countries between 1975 and 1992 found that income inequality is negatively associated with carbon emissions (Ravallion et al. 2000). The authors took their results to suggest that "a static trade off exists between reducing carbon emissions and promoting lower inequality both between and within countries" (667). Subsequent work has challenged this picture, finding a positive association between inequality and greenhouse gas emissions, especially but not only for higher-income countries and particularly in more recent decades as emissions levels have accelerated exponentially in most parts of the world (Briscoe et al. 2021; Grunewald et al. 2017; Jorgensen, Schor, Knight, and Huang 2016; Jorgensen 2015). Similarly, an analysis of state-level data within the United States found that emissions are positively associated with higher concentrations of income among the top 10% of a state's population (Jorgenson, Schor, and Huang 2017). In addition, a study focused on wealth rather than income inequality found a consistent positive relationship between wealth inequality and per capita greenhouse gas emissions in 26 high-income countries between 2000 and 2010 (Knight, Schor, and Jorgensen 2017). Finally, a more recent analysis found that among 35 developed countries from 1985 to 2011, rising income inequality led to a tighter coupling between economic growth and CO_2 emissions, precisely the opposite of the decoupling that is desperately needed (McGee & Greiner 2018).[8]

[8] Some of these studies have been criticized on methodological grounds (Mader 2018), underscoring the ambiguous state of the literature on inequality and greenhouse gas emissions. To complicate matters further, another study found that per capita emissions are positively associated with income inequality in developing countries, but not significantly associated in developed countries (Chen, Xian, Zhou, and Li 2020).

A number of theoretical explanations have been proposed for a positive relationship between inequality and per capita greenhouse gas emissions, including: 1) inequality exacerbates the "power-weighted social decision rule," according to which the wealthy – who benefit more and suffer less from environmental degradation – have greater power to protect their interests in social decision-making processes by keeping capital free of regulatory burdens (Boyce 1994; Boyce 2003; Boyce 2008); 2) inequality reduces social cohesion, cooperation, and trust, potentially inhibiting collective action to protect the environment (Ostrom 2008; Cushing et al. 2015); 3) inequality impedes diffusion of green innovations to the mass market (Vona and Patriarca 2011); and 4) inequality leads to Veblen effects whereby consumption of energy-intensive goods and services increases as individuals aim to emulate and compete with the status-based consumption of the wealthy (Jorgenson, et al. 2015).

The last explanation must be read in conjunction with evidence that ultrawealthy individuals exhibit consumption patterns that are disproportionately more destructive of the climate than poor people (Kenner 2019; Otto, Mi Kim, Dubrovsky and Lucht 2019). For instance, studies suggest that the elasticity of mobility-related consumption such as private vehicle use and air travel is greater than one (Lenzen et al. 2018), and that increasing housing wealth among the rich leads to more emissions than among the poor (Yang, Wu, and Cheung 2017). Given that private vehicle use, air travel, and housing selection are three of the most greenhouse-gas intensive consumption choices individuals can undertake, the same dollar in the hands of an ultrawealthy person may well cause more greenhouse gas emissions than a dollar in the hands of a poor person. Indeed, a comprehensive study of goods and services consumption among different income groups in 86 countries found income elasticity greater than 1 in several emissions-intensive categories such as vehicle fuel and packaged vacations (Oswald, Owen, and

Steinberger 2020). In short, the poor may have a higher marginal propensity to consume in general, as one would expect, but the rich seem to have a higher propensity to consume in ways that make them carbon superspreaders.

An overlooked way of understanding such disparities in emissions levels is through the lens of climate change mitigation (Wallace & Welton 2024; Grunewald et al. 2017; Jorgenson et al. 2017). That is, rather than seeing mitigation policy as posing separate dimensions of efficiency (e.g., how, and by how much, should emissions be reduced?) and equity (e.g., who should bear the costs of emissions reductions?), one can see the latter as offering a pathway to promote the former. This is because "lowering inequality will be good for the environment and decrease carbon dioxide levels in countries above a certain income threshold of GDP per capita" (Grunewald et al. 2017, 253). Accordingly, limiting luxury emissions and moving financial resources from very rich people to poor people through measures such as steeply progressive income taxes, wealth taxes, or financial transaction taxes may be seen as a climate change *mitigation* policy, not merely a policy concerning equitable redistribution.

As noted above, one also could target the carbon-intensive behaviors of the ultrawealthy directly through measures such as usage limits or consumption taxes on airline travel, vacation home ownership, meat consumption, and similarly impactful decisions.[9] To illustrate, a recent study modelled the effect of regulating energy use by high- and low-income households within 27 European countries, finding that limiting usage from the top fifth at a relatively high level (specifically, levelling down all members of the top fifth to the 80th percentile usage level) led to 9.7% overall reductions in greenhouse gas emissions from energy consumption, while increasing

[9] Likewise, one could also use the proceeds from progressive taxes to support targeted programs to improve the lives of poor people – such as improving public transportation or providing energy efficient housing – rather than merely offering lump sum transfers (Liscow & Pershing 2022).

usage from the bottom fifth who live in poverty to a relatively low level (levelling up all members to the 20th percentile level) increased emissions only by 1.4% (Büchs et al. 2023). Thus promoting greater energy usage equity worked simultaneously to lower overall emissions.

The point here is not to analyze which is preferable as a mitigation instrument, i.e., targeting the wealthy directly or the carbon-intensive behaviors that tend to increase with wealth. The point is simply to note, as a conceptual matter, that limiting wealth and reducing inequality may offer underappreciated climate change mitigation benefits. Neoclassical economic theory typically assumes that promoting equity goals imposes a deadweight *loss* to society that is thought to result from distorting labor and investment incentives through the tax-and-transfer system. But the climate crisis reveals there also may be efficiency *gains* to society in the form of reduced luxury emissions when wealth is limited or is moved from the very rich to the poor or public funds. Just as law and economics scholars have begun to perceive the equity effects embedded within efforts to promote efficiency (Liscow 2020), one should also attend to the efficiency effects of promoting equity.

As another example of this reconceptualization, consider the fact that research indicates nations with greater female representation in parliament or other governing bodies have lower climate footprints controlling for other drivers (McKinney & Fulkerson 2015; Ergas & York 2012). One particularly sophisticated econometric study found that "female representation in national parliaments leads to more stringent climate change policies across countries, and by doing so, it results in lower carbon dioxide emissions" (Mavisakalyan & Tarverdi 2019.). Studies of female access to education and national measures of carbon intensity find a similar emissions-mitigating influence from greater female educational opportunity (Ergas et al. 2021). In a noteworthy longitudinal study using an index of women's political empowerment across

numerous variables in 72 countries from 1971-2012, researchers found that CO_2 emissions decreased by about 11.51 percentage points in response to a one-unit increase in the empowerment index, leading the authors to conclude that "improving the status of women worldwide, especially in the developing countries, can reduce CO_2 emissions" (Lv & Deng 2019).

Again, the point is not to assert these causal claims definitively, but rather to point out that a low-cost, effective, and independently desirable climate mitigation policy tool might be lying hidden in plain sight, if only our dominant ideological framework would allow us to recognize it.

Out of Scale

Viewing the reduction of wealth and gender inequality as being, in part, climate mitigation measures might help more broadly to destabilize the neoliberal frame of policymaking. Neoclassical economics' conceptual separation of allocative efficiency and just distribution indirectly preferences the current market distribution of endowments and power in a society because any changes from that distribution appear "inefficient" on the allocation criterion. The government may only have a "leaky bucket" with which to *re*-distribute (Okun 1975, 91), but the government also sets policies that determine *initial* distributions and the resulting amount of so-called *re*-distribution that is required by principles of justice (Kennedy 1998). Unlike redistributive judgments, initial distributive judgments can be thought of as market-determining, not market-determined. Thus, social decisions regarding certain aspects of distribution – such as determining who may benefit from the atmosphere's finite ability to absorb greenhouse gases – should occur separate from and prior to the reallocation of resources through

the market. Proponents of neoclassical economics could *then* practice their bread and butter of maximizing the market's allocative efficiency, but only after both the optimal scale and distributive foundation of that market have been addressed through social consensus.

The neoliberal paradigm tends not to recognize environmental sustainability as an independent policy goal. Instead, sustainability is subsumed within efficiency with the claim that, once government addresses negative environmental externalities and "gets the prices right," markets will efficiently allocate all resources including environmental ones across both space and time. As noted above in discussing the social cost of carbon, insurmountable conceptual difficulties face the effort to incorporate sustainability into the framework of efficiency in this manner. Most notably, the appropriate allocation of environmental resources across generations cannot be resolved through the discount rate (Kysar 2007). Analytically distinct judgments regarding the equitable distribution of natural resources across generations must precede efficiency exercises such as discounted cost-benefit analysis. Whatever its strength in the case of conventional environmental policymaking, this conceptual objection in the context of climate change carries existential weight.

Again, it is time to return to fundamentals: Is the human economy a subsystem of the environment, or is the environment a subsystem of the economy? The former vision emphasizes natural constraints on the expansion of human production, including both the scarcity of resource inputs to the economic process and the scarcity of pollution sinks to absorb waste outputs of the process. The latter vision admits of no such limits to human economic growth, given that no conceptual superstructure such as the environment exists "around" the economy to constrain it. Economic growth is limited only by the availability of human-made capital and labor, not by natural resources. Specifically, economists typically deploy a Cobb-Douglas production function

in which natural and human capital are treated as substitutes (Samuelson and Nordhaus 1998, pp. 519-20). In that manner, although specific types of natural inputs can in fact become scarce or depleted, no general scarcity of natural resources can constrain economic growth: "It is of the essence that production cannot take place without some use of natural resources. But I shall also assume that it is always possible to substitute greater inputs of labor, reproducible capital [e.g., technology], and renewable resources for smaller direct inputs of the fixed resource" (Solow 1992, pp. 8-9). In an inspired and revealing contrast to this orthodoxy, two researchers recently developed a novel climate integration assessment model that includes "natural capital" as a distinct form of wealth that can become undermined by the impacts of climate change. In stark contrast to conventional models such as DICE, these researchers found that the economically "optimal" climate pathway limits the global average surface temperature increase to 1.5^{o} C by 2100 (Bastien-Olvera and Moore 2021). By incorporating in an analytically rigorous way humanity's dependence on the environment, the researchers offered a dramatic advance over DICE and other conventional models, which assume that as much as 90% of economic activity is immune from negative climate impacts simply because it takes place indoors (Keen 2020, pp. 3-5).[10]

This elementary distinction in pre-analytic vision leads to dramatically different orientations to policymaking. As pioneering ecological economist Herman Daly put it, "When we draw a containing boundary of the environment around the economy, we move from 'empty-world' economics to 'full world' economics. Economic logic stays the same, but the perceived pattern of scarcity changes radically and policies must be changed radically" (Daly 1991, 51;

[10] Even if the standard assumption that climate change will only impact certain industries like agriculture and forestry were somehow accurate, implicit in the conventional approach is an assumption that, because agriculture only contributes around 4% of global GDP, we can get along fine without it.

Kysar 2004b). Particularly, the goal of market regulation becomes far more complicated than merely seeking to maximize allocative efficiency while taking most all other social and natural conditions as given. In addition to establishing market conditions that allow resources to be devoted to their most-valued use, governments also must manage the absolute scale of the human macroeconomy to ensure that its impact does not exceed the carrying capacity of the environment. "Scale" refers to the material impact of the economy in relation to the natural environment. More precisely, it is a measure of "the physical volume of the throughput, the flow of matter-energy from the environment as low-entropy raw materials and back to the environment as high-entropy wastes." (Costanza et al. 1997, 80).

In addition to managing scale, societies must also attend more vigorously to the distribution of wealth. Outside of the neoliberal imagination, environmental crises and social inequities can no longer be ignored on the ground that nature and opportunity are both infinite in their bounty. Such limitless visions have always lacked a defensible scientific foundation; in the climate century, unmistakably so. Thus, once one accepts that the level of material throughput in the economy is subject to biophysical constraints such as the atmosphere's ability to receive greenhouse gas emissions without fundamental disruption to Earth systems, then the concerns of sustainability and distribution can no longer be pushed to the side in ever-intensifying pursuit of allocative efficiency (Kysar 2004a; Kysar 2001). Rising tides may lift boats, but they also flood coastlines, destroy wetlands, and salinize water supplies, and they do none of these things fairly.

As with the social cost of carbon, essential work has been done in welfare economics at the level of assumption. Neoliberal approaches to environmental policymaking assume nonmaterial factors such as consumer preferences, income distribution, resource rights, and societal desire for equity are given. The economist's task becomes simply to ensure that material

factors are most efficiently employed to suit the given nonmaterial parameters. In practice, the adjustment of material factors almost always involves economic growth created by ever-intensifying exploitation of natural and human resources. That same expansion in economic output provides the basis for political assurances that wealth inequality will somehow be alleviated through the undirected rising tide. In the climate century, by contrast, one must take the physical environment as posing fixed constraints and instead contemplate mechanisms for adjusting nonmaterial factors to best suit the physical world within which we inescapably reside. That is, one must study "how the nonphysical variables of technology, preferences, distribution, and lifestyles can be brought into feasible and just equilibrium with the complex biophysical system of which we are a part" (Daly 1991, 4). Such adjustment requires the enhancement of resource productivity and the equitable redistribution of wealth and income, all within the context of a biophysically sustainable economy.

Daly's call for deliberate societal focus on "the nonphysical variables of technology, preferences, distribution, and lifestyles" offers a striking parallel to Tribe's warning in *Ways Not to Think About Plastic Trees* that an unduly narrow welfare economic lens for environmental policymaking might unintentionally alter affected individuals' "preferences, attitudes, and cost-benefit conceptions over time, and hence their character as a society of persons interacting with one another and with the natural order" (Tribe 1974, p. 1324). Rather than recognize that the highest human rationality is to reason about the things we want to want – not merely reason about how to get what we (assume we) want[11] – the neoliberal policy approach aims simply to

[11] "What has been omitted is, at base, an appreciation of an ancient and inescapable paradox: We can be truly free to pursue our ends only if we act out of obligation, the seeming antithesis of freedom. To be free is not simply to follow our ever-changing wants wherever they might lead. To be free is to choose what we shall want, what we shall value, and therefore what we shall be" (Tribe 1974, pp. 1326-27).

maximize existing preferences, however crudely they may be apprehended and irrespective of whether their content implies a pathway to disaster. Failure to heed the warnings of scholars like Tribe and Daly has led not only to decades of continued emissions growth, but also to the naturalization of a worldview in which such growth is absurdly deemed welfare-maximizing. Indeed, in his Nobel address, Nordhaus continued to report such dangerously flawed DICE findings as "damages are estimated to be 2 percent of [global economic] output at a 3°C global warming and 8 percent of output with 6°C warming," and that "the cost-benefit optimum rises to over 3°C in 2100" (Nordhaus 2019). The world in which climate damages are somehow limited to 8 percent of output at 6°C warming or in which social welfare is maximized at over 3°C warming is a model world that existed first only in Nordhaus's imagination but then spread to become a convenient fantasy for us all. It is long past time to escape it.

Conclusion

Tribe's seminal contribution to environmental law scholarship carries an awkward postscript. In recent years, Tribe has become better known for his representation of the coal industry and other fossil fuel interests in their ardent opposition to climate change regulation and common law accountability. How do we make sense of the fact that the author of *Ways Not to Think About Plastic Trees* devoted his considerable talent and reputation to representing Peabody Energy and the American Petroleum Institute in their efforts to block, respectively, President Obama's Clean Power Plan and the ability of state courts to entertain claims that fossil fuel producers have substantially contributed to the public nuisance of climate change? Popular reaction to Tribe's fossil fuel advocacy has been harsh, with headlines asking questions such as, "Did Laurence Tribe Sell Out?", "Et tu Tribe?", and "Did Laurence Tribe Sell his Soul to Big

Coal?" In response, Tribe argued that, although he has long represented an array of clients for compensation, he has only done so when he is able to advance a position that he personally believes in. Indeed, in the case of the Clean Power Plan, Tribe deliberately injected his personal professional identity into the matter by submitting comments to the EPA not just on behalf of his client, Peabody, but also on behalf of "Laurence H. Tribe."

This personal vouching led some to speculate that Tribe might be suffering a sort of ideological capture: Having represented corporate interests with increasing frequency over the years, the famed scholar may have come to see arguments made on his clients' behalf as more compelling and reasonable through a sort of affiliation bias (Wu 2015). In other words, Tribe's views may have been altered by the very kind of endogenous cultural influence that he worried over in *Ways Not to Think About Plastic Tree* with respect to environmentalists who operate within the welfare economic policy framework.

On his retirement, Tribe gave an interview to the Harvard alumni magazine in which he expressed regret over his work for Peabody:

> When I agreed to argue against Obama's clean-power plan I thought that it was illegal. I still think it probably was. I think it was a stretch of the Clean Air Act. But in hindsight, because of the existential importance of dealing with climate change, I think that's a case where I should've basically looked the other way, not let my legal theories drive me to the conclusion they did (Pazzanese 2020).

Tribe's recognition of "the existential importance of dealing with climate change" in the interview stands in tension with a line that he regularly offered in opposition to the Clean Power Plan during his Peabody engagement: "I don't think burning the Constitution instead of coal will really be a way of saving the environment" (Rice 2015). The U.S. Constitution was written at a

time when the world contained less than one billion people and the Industrial Revolution had hardly begun. It is not surprising that the document failed to contemplate the governance challenges posed by climate change. Whether the Constitution constitutes a suicide pact with respect to climate change, however, is up to the scholars, parties, advocates, and judges whose actions today drive constitutional interpretation and lawmaking.

Even more germane to this paper is Tribe's hindsight wish not to have let his "legal theories drive [him] to the conclusion they did." This paper has argued that welfare economics also is a theory that drives regrettable conclusions when it comes to climate change. Rooted in neoliberal imagination and claiming to offer the only practical policy response to climate change, promoters of the welfare economic approach promise to maximize human wellbeing by identifying an emissions pathway that balances the negative impacts of greenhouse gas emissions against the cost of abating them, and by offering market-based policy instruments such as tradeable carbon emissions permits and carbon taxes to promote that pathway at least cost. As this paper has argued, however, the welfare economic approach is riddled with limitations and confusions that threaten to misstate in catastrophic ways what is considered desirable and possible in the realm of climate action.

Still, recognizing the framework's continuing purchase, the paper has described two thought projects that are locatable within the welfare economic framework and that hold potential to open space for new moral and political imagination to take root. First, the carbon upset approach was offered as an exercise in expansive thinking about how to incentivize greenhouse gas emissions reductions. The upset approach uses the same counterfactual reasoning as carbon offsets, but admits into consideration the role of activism, law, and politics in reducing emissions, not just finance, development, and business-nearly-exactly-as-usual. By enriching and

empowering agents that stand diametrically opposed to the interests of business-as-usual beneficiaries of the fossil fuel economy, the carbon upset approach offers a glimpse into a worldview that does not embrace calamity as a casual side effect of the current distribution of political and economic power. Instead, the carbon economy would be turned against itself so that a new political economy might eventually emerge.

Second, limiting wealth and reducing inequality were explored as greenhouse gas mitigation options. Over the past three decades of concerted international climate policy discussion, economists have consistently insisted that instruments such as carbon taxes and cap-and-trade systems should be utilized to achieve least-cost emissions reductions. It is curious that limiting wealth and reducing inequality have not been considered more seriously as means of slowing carbon throughput. Within mainstream economic theory, such measures are generally considered to impose a social welfare "loss" in the form of distorted incentives that must be weighed against whatever equity goals are achieved. But the enormous climate externalities of affluence suggest there may also be social welfare "gains" to be had from making the world a more equal place. Most striking about this example conceptually is the fact that inequality reduction is almost never discussed as a mitigation or "efficiency" measure in climate policy, notwithstanding its potential to reduce emissions at a cost that may be lower than heavily studied and subsidized alternatives like carbon capture and storage. Our current "ways of seeing" in environmental law are simply too narrow to perceive such possibilities (Boyd 2010).

Neither of these thought projects, it must be conceded, would be equal to the challenge of ensuring a just and sustainable economy, and, "in no event could we expect a purely instrumental strategy to liberate us from the grip of instrumentalism and manipulation in which we feel

trapped" (Tribe 1974, p. 1349). The thought projects are steps only . . . but we must start from the mountain we are on.

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