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A Rawlsian Approach to Climate Change Ethics

Challenged by the fact that no real historical act of contracting can be identified to legitimate the social contract view of state authority, John Rawls famously developed a justification based on a hypothetical contract agreed upon by idealized agents.[1] Because individuals cannot easily ignore their own life circumstances when reasoning about ethics and distributive justice, Rawls invented a 'veil of ignorance' and 'original position' where human beings stripped of knowledge about their own circumstances could decide upon principles of justice (§4). The intention behind the thought experiment was to develop basic principles of distributive justice, such as would be applied in a just society. As expressed in *A Theory of Justice*, Rawls' approach incorporates several mechanisms intended to prevent intergenerational injustice. When it comes to natural resources that can be exhausted, or the accumulation of wastes that cause problems for human beings, earlier generations face the temptation to improve their own life prospects at the expense of those who will follow. By incorporating features like a just savings rate, Rawls' theory seeks to avoid such outcomes.

This approach may function well when all generations exist in broadly similar circumstances. If the needs and available choices for each generation are similar, the ethics involved in reconciling their claims upon each other are fairly straightforward and easily incorporated into Rawls' framework. What is less easy to accommodate is circumstances where the needs of different generations and the options open to them shift substantially and in inter-linked ways across time. Most importantly in today's context, this applies to the fundamentally linked issues of fossil fuel use and anthropogenic climate change. Considering the generations that lived before the Industrial Revolution, those that lived during various phases of industrialization, and those who may yet come

[1] When citing Rawls, I am using the 1999 edition and indicating the section number, followed by the paragraph number within the section. For instance: (§19:1)

to exist in a post-fossil-fuels world, there isn't a single set of ethical precepts that cover all their cases. Rather, a larger plan for ethical global fossil fuel use must take into account the features of industrialization and the climate system. The plan must incorporate a series of generations into a structured process, first of industrialization and then of decarbonization. In order to sketch the outlines of such a plan, it is worthwhile to conduct a modified version of Rawls' thought experiment – imagining a meeting behind the veil of ignorance, in which representatives for all generations decide upon an acceptable pathway for the use and abandonment of fossil fuels. It seems likely that participants in such a meeting would agree on a global pathway for fossil fuel use in which vital human needs are prioritized over discretionary or recreational ones; where people in different places and time periods are given an equitable opportunity to benefit from fossil fuel use; and where the total use of fossil fuels is cut off before human and natural systems are seriously endangered by climate change. By comparing the postulated principles arising from such a meeting with the political dynamics of climate change in the world today, some aspects of a just response may be clarified.

1. Fossil fuels never? Fossil fuels forever?

Before explaining the limitations of the standard Rawlsian framework for dealing with climate change and proceeding with a modified thought experiment, two key empirical questions need to be considered. Before we can accept the idea of an ethically optimal pathway for fossil fuel use and abandonment, we need to consider whether the total avoidance of fossil fuels across human history could be desirable, as well as whether their eventual voluntary abandonment is really necessary. While some have argued that the political and ethical questions related to climate change can or should be discussed with only minimal reference to empirical questions about climate science and technological development, I don't see such an approach as credible. The ethical implications of

our choices flow naturally from the consequences they induce in the planet's natural systems, and the range of options open to us is defined by physical and technological possibilities. While we cannot have the optimal level of information about alternative pathways of industrial development and the functioning of the climate system such as we would desire, we do have reasonably strong grounds for assessing the limits of what is plausible in each case. We can also consider the implications of our uncertainty when it comes to building a margin of safety into our plans.

Imagining all the possible forms human civilization could take, there would be cases in which coal, oil, and natural gas are never exploited at all, and therefore never contribute to anthropogenic climate change (which would still occur to some extent due to land use change and other climate-altering human behaviours). The easiest way in which this could occur would be avoiding industrialization altogether, except perhaps along the lines of the wind- and water-driven equipment that emerged during the Early Modern Period.[2] The human transition from small groups of hunter-gatherers to major agricultural civilizations over the past 10,000 years was not inevitable. Nonetheless, if the purpose of ideal theory is to inform upon practical moral questions, it must be acknowledged that humanity today has no real prospect of rolling back this development. As a result, I will exclude possible human civilizations in which industrialization never occurs from the rest of this analysis.

The prospect of an Industrial Revolution without fossil fuels is also one that needs to be considered. Is such a thing possible? It would certainly differ substantially from what took place historically – in which a powerful positive feedback cycle developed between more efficient pumps capable of draining mines, cheaper coal, cheaper metal for rails, and cheaper locomotive transport. Once coal could be used efficiently in England to mine and transport more coal, an explosive

[2] To a degree, industrialization and automation in Europe predate the widespread use of fossil fuels, as in the case of textile and woodworking mills driven by water power, dating to the 14th century, and the draining of farmland with wind power in the Netherlands by the 13th century.

pattern of development was initiated which echoes into the present day. Indeed, the defining characteristic of the Industrial Revolution after 1750 is how, unlike the wind- and water-powered mechanization in earlier periods, it was driven by fossil fuel energy. As Bill McKibben explains: "One barrel of oil yields as much energy as twenty-five thousand hours of manual human labour – more than a decade of human labor per barrel".[3] He goes on to note that the average American now uses twenty-five barrels, equivalent to 300 years of labour, each year, in addition to energy from coal and gas. With such energy densities available, it is hard to believe that industrialization without fossil fuels could happen in a way that resembles what took place historically. The sudden availability of such massive amounts of energy is probably also a significant explanation for why rates of economic growth, which have been estimated at 0.1-0.2% per year from antiquity to the Industrial Revolution, rose after 1700.[4]

At the same time, it is conceivable that an industrial civilization could emerge very gradually through the use of renewable energy alone. This could include heating water and operating machinery by concentrating sunlight; producing useful mechanical energy from dammed rivers, wind turbines, and the operation of the tides; and making use of biomass to produce heat. Small amounts of electrically conductive metals including copper are naturally available on Earth and could, with a sufficient understanding of physics and engineering, be used to turn mechanical energy into electricity. Naturally occurring copper could be made into wires, wound into coils, and used to make water- or wind-powered electrical generators. These could in turn be used to refine other metals. It is theoretically possible that all the features of modern industrial society could eventually be created through such a progression, with the final result resembling the imagined post-fossil-fuel global economy aspired to by those concerned about climate change today.

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[3] McKibben, Bill. *Eaarth: Making a Life on a Tough New Planet.* p. 27
[4] Low growth rate estimate from: Piketty, Thomas. *Capital in the Twenty-first Century.* p. 74

Industrialization without fossil fuels, therefore, seems at least theoretically possible. At the very least, however, it seems fair to say that any such progression would be much slower than one aided by a moderate amount of fossil fuel use. For some applications (like the use of coke to make steel, or the use of energy-dense fuels in aircraft and rockets) it is hard to see how a purely renewable development pathway would work. Likewise, even if such a transition is physically possible, it may occur so slowly that it fails to serve human needs effectively, when compared to a form of development that makes controlled use of fossil fuels. The number of generations in which the majority of people lack the basic welfare benefits associated with industrialization has moral relevance, and the prospect of substantially reducing that number bears consideration, even if the acceleration carries an environmental cost. To take one example, a major reduction in rates of infant mortality has accompanied industrialization, and would likely be substantially delayed on a development pathway that makes no use of fossil fuels.

In their detailed examination of the science of climate change, the Intergovernmental Panel on Climate Change (IPCC) has repeatedly highlighted how the relationship between total fossil fuel use and damage done to the climate is not linear. Human and natural systems can adapt more easily to the earliest, lowest-magnitude changes and are threatened most by the latest, large-scale and unpredictable consequences of later stages of fossil fuel exploitation. If we accept that fossil fuels are highly useful (and perhaps even necessary) to the process of global industrialization, and if we accept that the earliest damage from making use of them is most manageable, it follows that the optimal level of cumulative human fossil fuel use is unlikely to be zero. What is critical from a normative perspective is that the total cumulative level of fossil fuel use be set at a level that is optimal from the perspective of all human generations, and not only from the perspective of those who will enjoy the immediate use of the fuels. I will further consider how this level may be approximated below, after discussing one more important empirical question.

Another possibility that should be considered is one where fossil fuel use never ends voluntarily, but only with the complete exhaustion of the world's economically viable supplies. This is essentially what fossil fuel corporations and their government supporters are now planning.[5] Even after 250 years of rapid global industrialization, vast quantities of coal, oil, and gas remain to be exploited. A detailed description of our most credible projections about the consequences of burning those reserves would take more space than is feasible here.[6] It suffices to say that global fossil fuel reserves are adequate to radically transform the planet, raising temperatures by over 5°C and shifting the climate into a state more closely resembling the Cretaceous period than anything experienced by human beings so far. Such warming may be accompanied with the melting of all ice on Earth, raising sea levels more than 70 metres. It would also involve radical challenges to existing infrastructure, including the global agricultural system. Faced with such dangers, it seems clear that any proposal to continue using fossil fuels until they are exhausted as economically viable forms of energy would require imposing intolerable harm and risk upon all future people, along with extensive and irreversible damage to the Earth's natural systems.[7]

If we accept that the optimal level of fossil fuel utilization is not zero, and we also accept that it doesn't extend to the full use of all the Earth's economically viable fossil fuel resources, the

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[5] Compelled by shareholders to assess the risk posed by a possible 'carbon bubble' of unburnable reserves, Exxon stated that: "we are confident that none of our hydrocarbon reserves are now or will become 'stranded.'" That is to say, they do not expect future regulation to stop them from burning all the fossil fuel they own. Exxon. "Energy and Carbon - Managing the Risks."

[6] For comprehensive accounts, see the assessment reports of the IPCC and Hansen, James. *Storms of My Grandchildren: The Truth About the Coming Climate Catastrophe and our Last Chance to Save Humanity.*

[7] The latest IPCC report explains that: "Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. Limiting climate change would require substantial and sustained reductions in greenhouse gas emissions which, together with adaptation, can limit climate change risks" and that: "Without additional mitigation efforts beyond those in place today, and even with adaptation, warming by the end of the 21st century will lead to high to very high risk of severe, widespread, and irreversible impacts globally (high confidence)". Intergovernmental Panel on Climate Change. *Climate Change 2014: Synthesis Report – Summary for Policymakers.* p. 8, 17

question becomes at what point humanity ought to stop exploiting the vast and easily-accessed energy stored in the chemical bonds in coal, oil, and gas. In addition, we must consider whether the eventual abandonment of fossil fuel energy would necessarily lead to a dramatic reduction in the quality of life of those living after. Several comprehensive studies have been undertaken with the intention of determining whether human beings can maintain a civilization akin to that which exists now – albeit with a much more equitable distribution of energy use within and between countries – without the use of fossil fuels.[8] In *Sustainable Energy – Without the Hot Air*, Cambridge physicist David MacKay concludes that the level of renewable energy available globally substantially exceeds our current total level of energy use, and is indeed sufficient to provide everybody on Earth with the standard of living of an average European, at least if feasible energy efficiency improvements are achieved.[9] This is echoed in the analysis of Mark Jacobson from Stanford, who has constructed a case for a "fully renewable all-purpose energy system" which could be constructed before our ongoing fossil fuel use definitively commits us to catastrophic climate change.[10] In his comprehensive analysis of the economics of climate change, undertaken on behalf of the British government, Nicholas Stern concluded that it would be possible to build a zero-carbon global energy system, capable of serving the needs of everyone, sufficiently quickly to avoid the worst impacts of climate change by spending 5% of global GDP per year.[11]

To summarize some of the key empirical factors related to climate change, it seems we can conclude that the most ethical level of fossil fuel use is not zero, and that a civilization that has

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[8] Piketty alludes to this when he describes "growth with much less pollution than is possible to imagine now, with output consisting of new, almost entirely nonmaterial goods and services produced with renewable energy sources exhibiting a negligible carbon footprint". p. 83

[9] MacKay, David. *Sustainable Energy – Without the Hot Air*.

[10] Jacobson, Mark. "Providing all global energy with wind, water, and solar power, Part I: Technologies, energy resources, quantities and areas of infrastructure, and materials."

[11] Stern, Nicholas. *The Economics of Climate Change: the Stern Review*.
See also: Stern, Nicholas. "The Economics of Climate Change" in Pachauri, Rajendra Kumar. *Climate Ethics: Essential Readings*. p. 39-76

industrialized at least partially through the use of fossil fuels can subsequently progress into a post-carbon state. These best guesses about the empirics behind the question of a just pathway for fossil fuel use can serve to inform our consideration of the normative dimensions, first within a standard Rawlsian framework and then within one modified to better address the structure of the problem.

2. Rawls' mechanisms for intergenerational justice

In order to consider climate ethics within a standard Rawlsian framework, the most straightforward mechanisms are his discussion of externalities (§42:7) and the "just saving rate" (§42:12, 44:3, 44:7, 44:14-15, 47:8, 47:10). Both have some utility in relation to the problem of climate change, but neither allows for the formulation of an adequate response. Rawls also lists a variety of additional considerations, regarding the imposition of harm on others, but doesn't provide a great deal of detail or clearly integrate these requirements into his overall theory. To begin with, I will summarize the places in *A Theory of Justice* where Rawls addresses intergenerational questions. In section 3, I will explain why they don't provide an adequate framework for dealing with climate change.

Rawls adopts the standard economists' definition of externalities, as circumstances where a transaction between two or more parties generates positive or negative consequences for others who are not participating in the transaction. He calls them "a divergence between private and social accounting that the market fails to register" (§42:7). This leads to inefficiency. In the case of 'positive' externalities, where third parties accrue benefits from the transactions of others, the operation of the market alone will under-provide the good in question. With 'negative' externalities, in which transactions have harmful consequences for third parties, the market will generate more transactions than would be optimal if the welfare of everyone was taken into consideration.

Rawls discusses a range of mechanisms through which the interests of future generations could be considered, including by asserting the existence of obligations from one generation to its immediate descendants, by imagining people as the heads of families with a continuing line of claims, or by requiring that all generations be subject to the same constraints (§22:6, 24:2). Ultimately, he aspires to an approach in which "the whole chain of generations can be tied together". He believes that with the addition of such a provision, "no generation is able to formulate principles especially designed to advance its own cause" and "each is forced to choose for all" (§24:7). This approach has intuitive appeal, in that it seems to effectively constrain each generation to make choices which will be acceptable from the perspective of others. It also follows the general Kantian logic of Rawls' overall framework, in which right conduct is essentially seen as making the kind of choices ourselves that we would want others to make in their own circumstances.

The just savings rate provides another potential mechanism to accommodate climate change within Rawls' framework. He explains that: "In following a just savings principle, each generation makes a contribution to those coming later and receives from its predecessors" (§44:5). Rawls is clear that the just saving rate is not expected to be constant between generations, and may be particularly expected to differ between stages of civilization (§44:9), though his expectation is that people at each successive stage will be richer. The objective of saving is specified as establishing "a state of society with a material base sufficient to establish effective just institutions within which the basic liberties can be realized" (§44:10).

Rawls also links the just savings rate with his notion of a social minimum. He explains that: "Each generation must not only preserve institutions that have been established, but it must also put aside in each period of time a suitable amount of real capital accumulation. This saving may take various forms from net investment in machinery and other means of production to investment in learning and education" (§43:3). In his final statement of the two principles of justice for institutions,

he includes the requirement that the arrangement of social and economic inequalities provide the greatest benefit to the least advantaged, subject with the just savings principle (§46:8). He states explicitly that the difference principle should be applied with consideration for "the long-term prospects of the least advantaged extending over future generations" (44:2). This seems like an appealing way to constrain each generation into taking the welfare of its successors into account.

Beyond Rawls' comments pertaining directly to intergenerational justice, he expresses further principles that provide guidance on these questions. Specifically, these include "the duty of helping another when he is in need or jeopardy, provided that one can do so without excessive risk or loss to oneself; the duty not to harm or injure another; and the duty not to cause unnecessary suffering" (§19:1). He also identifies "a natural duty not to be cruel" (§19:2) and "to support and to comply with just institutions that exist and apply to us" (§19:3). Rawls also discusses a "social minimum" to which all people are entitled (§43:4, 44:2). Each of these obligations can be interpreted in the context of addressing climate change, though gaps remain in terms of the specifics and in terms of constructing an equitable pathway for fossil fuel use across human history.

3. Challenges in addressing climate change under a Rawlsian framework

Rawls' *Theory of Justice* incorporates several mechanisms intended to prevent members of any one generation from making choices that will undermine the prospects of those in future generations. He highlights the difficulty of developing an ethical theory that addresses the problem of justice between generations, calling it a "severe if not impossible test" (§44:1). While the mechanisms Rawls provides are undoubtedly useful for helping to formulate a reasonably comprehensive theory of justice, their application to the special case of fossil fuels and climate change is problematic. In essence, this is because fossil fuels and human development are intertwined in complex ways, and humanity's decision about what fraction of the world's fossil fuels

to use cannot easily be made on the basis of all generations being treated equally or following the same rules. Rather, the case of climate change has sufficient novelty and importance to justify a reformulation of Rawls' famous thought experiment. By considering what a gathering of generations would decide at a meeting behind the veil of ignorance focused on total historical fossil fuel use, we can gain some insight into the moral character of the problem and better reconcile it with Rawls' overall framework.

One approach to making ethical and equitable use of fossil fuels across time would be to apply the simple Kantian rule that when any generation reaches the optimal level of cumulative fossil fuel use, they should shift completely to other forms of energy. While simple, structuring the ethical obligation in this way fails to produce optimal use across time. For instance, people are building large amounts of long-lived fossil fuel facilities shortly before the 'safety limit' is reached, that investment would be permanently wasted.[12] This formulation also provides no guidance about the distribution of legitimate fossil fuel use between and within generations. From the perspective only of how much the climate is changed, it doesn't matter whether one person in one generation used all the fossil fuels or whether their use was equally spaced over all human history. From the perspective of ethics, however, we have strong reasons to prefer some distributions over others. If the primary justification for allowing any level of fossil fuel use is to accelerate the advent of human development improvements, it follows that uses that serve this purpose are preferable to others.

As described above, the framework in *A Theory of Justice* is quite a bit more sophisticated than the 'stop at the red line' rule described immediately above. Nonetheless, neither the treatment of externalities nor the just saving rate is well-matched to the task of developing a multigenerational

[12] This is far from a theoretical danger in a world where unconventional oil and gas reserves, fossil fuel reserves in the arctic, and other high-cost high-risk fossil fuel resources are being developed at a cost of many billions of dollars.

timeline for ethical fossil fuel exploitation. While other elements of Rawls' theory speak to climate-relevant questions, he fails to discuss them in enough detail to provide usable guidance.

Climate change clearly represents a negative externality from fossil fuel use, which is one reason why many economists and policy-makers support a Pigouvian tax as a mechanism for internalizing climatic damage into the cost of fossil fuel use. Such taxes (or fees imposed through other systems, like cap-and-trade) are likely desirable responses to the climate problem. What they do not easily do, however, is guide the long-term transition between forms of energy use which the reality of climate change ultimately demands. If producing one tonne of carbon dioxide does $100 worth of damage to people around the world, it doesn't follow that a $100 per tonne carbon tax will automatically encourage the necessary technological transition, or that it will do so at the proper rate. Internalizing externalities may somewhat diminish the level of damage done at any particular time, but it is unlikely to generate an optimal fossil fuel use pathway by itself.

In addition, the problem of considering externalities grows more complex when a multigenerational component is added. A major debate has arisen within the community of economists about whether a 'discount rate' should be applied to expected damage from today's fossil fuel use on future generations. Such discount rates are routinely employed in cost-benefit analysis, based on the idea that future generations will be richer and therefore better able to bear costs or sacrifices than people living today.[13] By contrast, economists like Stern have argued that when it comes to damage from climate change, only a very low discount rate should be applied, to reflect the possibility that some other calamity like a meteor impact will obliterate humanity, rendering present-day sacrifices in fossil fuel use pointless. Because the discount rate applies to the welfare of all future generations to an extent that increases across time, the effect of choosing a conventionally large rate

[13] Rawls identifies one of the dangers associated with combining utilitarian calculations with a high discount rate, in that it may seem to require a very high saving rate in the present generation for the sake of those in the future (§44:4). See also: §45

is to render impacts that take place many decades from now essentially irrelevant. The choice of discount rate dominates any calculation of what the total harm associated with climate change (or with any particular unit of greenhouse gas (GHG) pollution) will be. Particularly because climate change threatens the assumption that future generations will be richer, downplaying the importance of the welfare of future generations in this way is problematic.

Rawls argues that externalities "necessitate collective agreements organized and enforced by the state" (§42:8). This seems straightforward enough, and conforms with the many attempts to control climate change through multi-party agreements including the United Nations Framework Convention on Climate Change and the Kyoto Protocol. Rawls' discussion of externalities, however, is not sufficiently detailed to provide much guidance on how GHG pollution should be addressed, particularly in terms of going beyond internalizing externalities and into encouraging a just developmental pathway.

Rawls' treatment of the just savings rate is also lacking, from the perspective of charting a moral optimal path for human fossil fuel use. For many issues of intergenerational justice, there is a fundamental symmetry which applies to the choices of all generations and supports the usefulness of Rawls' mechanisms. When it comes to building up useful infrastructure through saving, or protecting the integrity of natural systems that experience damage in a linear relationship with how much they are exploited, his caveat about the same limitations applying to all generations might be reasonably expected to avoid unjust outcomes. The problem in relation to climate change is two-fold: first, the use of fossil fuels cannot be practically separated from the emergence of industrial civilization, a transition that substantially alters the context in which decision-making takes place; second, and as a consequence of that, the ethical response to climate change must take the form of a multigenerational pathway in which those at the beginning must follow different principles from those at the middle and end. Simply enforcing equality in decision-making between generations does

not lead to the establishment of such a pathway. Instead, we need to consider what principles generations at each stage of development should follow, in order to produce the most desirable pathway for all.

McKibben comments on the discrepancy between investments in material capital and the degradation of the natural environment:

> "Our ancestors, and we ourselves in the decades just past, piled up a great deal of wealth precisely by ignoring the finite nature of the planet. We also, through that willful ignorance, simultaneously wrecked the prospects for future growth. So we are heir both to the wealth and to the increasingly degraded planet it came from. We have to make that wealth last us. We had better not squander what inheritance we still have, and we had better figure out how to share some of it with the people already suffering from the environmental woes our profligacy caused." [14]

This formulation sits uncomfortably with the assumptions underlying Rawls' discussion of just saving. Rawls speaks of "approving the economic and other arrangements necessary for the appropriate accumulation [of capital, knowledge, and culture "that make possible just institutions and the fair value of liberty"]" (§44:16, 11). In the assessment of McKibben and others, we have been accumulating the material bases for sustaining just institutions at the same time as we have been undermining the climatic stability that is ultimately required for their perpetuation. Since economic development is challenging without fossil fuels (the use of which inevitably causes climatic damage), accumulating economic wealth involves both the reinforcement and the undermining of the conditions required for sustaining just institutions. Escaping this paradox requires a more sophisticated approach to human development than the one included in Rawls' formulation of the just savings principle.

The various identified duties not to cause avoidable harm correspond with some of the judgments reached by theorists concerned with climate ethics, including Stephen Gardiner and Henry Shue. Shue frames the ethical question most forcibly in terms of the power asymmetry

[14] McKibben, Bill. *Eaarth: Making a Life on a Tough New Planet.* p. 127

between those making choices about fossil fuel use now and those who will later bear the consequences. As framed by Rawls, however, these principles are somewhat lacking in detail. It may well be that all people are entitled to a moral minimum, but accepting that claim yields limited guidance about how to carry out fossil-fuel-driven industrialization.

4. A meeting of the generations behind the veil of ignorance

In his analysis of climate ethics, Stephen Gardiner draws attention to a feature that is also central to Rawls' methodology: the difficulty moral agents have in abstracting their own position from their moral judgments. He explains:

> "In the perfect moral storm [in which the features of the climate problem undermine our ability to act ethically], our position is not that of idealized neutral observers, but rather judges in our own case, with no one to properly hold us accountable. This makes it all too easy to slip into weak and self-serving ways of thinking, supported by a convenient apathy or ideological fervor. Moreover, the devices of such corruption are sophisticated, and often function indirectly, by infiltrating the terms of ethical and epistemic argument." [15]

Faced with such a challenge, some remedy may be possible though the mechanism of adapting Rawls' original position, allowing us to consider what representatives from all human generations might conclude if stripped of the self-knowledge that may otherwise corrupt their reasoning and allowed to weigh the attractiveness of different development scenarios.

Participants in an ideal multigenerational gathering behind the veil of ignorance would require significantly more general knowledge and certainty than humanity now possesses, alongside the absence of personal awareness which is characteristic of Rawls' approach. The people at the gathering would need to be experts about different possible courses of development, whereas in the real world we can only discuss historical hypotheticals. They would also need to be experts on the Earth's complex climate system. While a high degree of scientific confidence has developed about the relationship between the atmospheric concentration of GHGs like carbon dioxide and global

[15] Gardiner, Stephen M. *A Perfect Moral Storm: The Ethical Tragedy of Climate Change.* p. xiii

temperature, scientists cannot say with certainty what the final temperature increase associated with any stabilization concentration will be. A key source of this uncertainty is the complex system of feedbacks that exists in the climate system. As the planet warms or cools, the amount of ice and cloud reflecting sunlight back into space changes; the rate of carbon absorption into different terrestrial and marine ecosystems changes; and major carbon sinks like permafrost either gain or lose the ability to sequester the GHGs in the air. Because we have only one planet to work with, and because we have already pushed climatic conditions outside the bounds for which historical evidence exists, scientists can only estimate what combined effect these feedbacks will have, as well as develop estimates about the level of risk associated with different emission pathways.[16] In contrast, the idealized individuals behind the veil of ignorance would have a perfect understanding of the full and final consequences of any particular level of fossil fuel use.

Beyond their superior knowledge about the dynamics of the climate system, the representatives meeting behind the veil of ignorance would be aware of all the alternative development pathways that human beings could pursue. This awareness would extend to the rate at which development would occur given different choices, the extent and distribution of extreme poverty they would each involve, and other salient features that are difficult or impossible for people in the real world to assess, given the lack of alternative planets to experiment upon.

The weight of the uncertainties that apply to us but not to representatives in this idealized state makes it challenging for us to imagine what decisions they would reach. Nonetheless, it seems plausible that such a gathering could form a consensus on principles in a manner akin to the formulation of Rawls' original principles of justice. Excluding the possibility of humanity remaining

[16] Ignoring the possibility of abrupt or runaway climate change scenarios is a common flaw in analyses of the problem. Thomas Piketty, for instance, discusses climate change as a likely downside risk for economic development in the 21st century, but doesn't consider scenarios where it seriously threatens human civilization (568). For accounts that take the possibility of catastrophe into account, see Hansen and Craven. The possibility of abrupt or runaway climate change is an important justification for building a safety factor into our ideal fossil fuel use timeline.

in a perpetual pre-industrial hunter gatherer or subsistence agricultural state, each generation could be expected to value the human development advantages associated with industrialization – from improved housing to medical care and sanitation. From a fair original position, the negotiating parties would also be unwilling to impose major permanent damage on the climate and the generations who will need to live within it. Provided the basic empirical conclusion about fossil fuels being necessary for industrialization across a sensible timespan is sound, it seems they would agree to temporary fossil-fuel-driven development, with an emphasis placed, first, on achieving widespread and equitable human welfare improvements and, second, on developing the means to move beyond fossil fuels before unjustifiable climatic damage is done.

In the end, it seems most likely that the meeting behind the veil of ignorance would endorse the idea of efficient fossil fuel use for egalitarian development, followed by an orderly and timely retirement in favour of climate-safe forms of energy. To illustrate why this is likely, two features of the current landscape of fossil fuel use and politics bear examination. First, there is a very wide discrepancy in *per capita* fossil fuel use (and consequential climate pollution) between various states, with places like Canada and Australia generating excessive *per capita* pollution while places like India generate very low levels. Particularly when it comes to the earliest emissions that accompany development, there is a close link between fossil fuel use and quality of life. Powering incubators for premature babies in India or tractors to provide basic nutrition in Chad is clearly more justified than providing further luxuries to the affluent. As a result, even under a framework where total fossil fuel use and GHG pollution is to be sharply constrained, redistribution of some use from the most profligate users, who bear the most responsibility for climate change so far, to those in extreme poverty, who are already suffering the harshest impacts from climate change, seems desirable.[17]

[17] The IPCC has concluded that: "Risks are unevenly distributed and are generally greater for disadvantaged people and communities in countries at all levels of development". Intergovernmental Panel on Climate Change. *Climate Change 2014: Synthesis Report – Summary for Policymakers*. p. 13

These imbalances exist within countries, as well as between them. Contrast the relatively high fossil fuel use by Chinese citizens living in industrialized and comparatively wealthy coastal cities, for instance, with that of subsistence farmers living in China's poorest regions. In addition to injustices in the distribution of usage at this specific point in time, many developing states – when confronted with the obligation to take action on climate change – point to how states which are now rich became so through heavy fossil fuel use and argue that they have an equivalent right to development. If we had the ability to turn back the clock to when global industrialization began, such complaints could be addressed through a more equitable distribution across time. Now that we have reached a point where we are already producing dangerous climate change, and where aggressive constraints on fossil fuel use are urgently needed, the most plausible fair response is to assert, first, an obligation that states with the highest *per capita* emissions cut them deepest and fastest and, second, that rich and technologically advanced states provide assistance in the form of funding and technology for developing states to improve their standards of living without generating the same level of ecological harm that rich states already have. This can be seen as retroactive compensation for rich countries having already used more than their fair share of the Earth's safe 'carbon budget'.

Henry Shue identifies several dimensions of climate ethics which are relevant to this discussion. In considering how the distribution of costs for mitigating climate change can be justly defined, Shue highlights how the sacrifices which may be demanded from those with the highest *per capita* fossil fuel use differ normatively from those that may be demanded from the most restrained users. He explains how, even in an emergency, we pawn the jewelry before we pawn the blankets.[18] Shue also characterizes the decisions of those in the present to use fossil fuels with little regard for consequences on those in the future as the unnecessary and deliberate imposition of harm upon

[18] Shue, Henry. "Subsistence Emissions and Luxury Emissions." in Pachauri, Rajendra Kumar. *Climate Ethics: Essential Readings.* p. 200-14

defenceless others: members of future generations whose life prospects will be profoundly affected by us, but who can do nothing to affect our own prospects.[19] [20] This asymmetry bears closely upon the danger highlighted by both Rawls and Gardiner, that we will adopt self-serving modes of thinking to justify such conduct, while missing the conclusions we would reach in circumstances of greater fairness.

There are many ways in which the plausible consensus arising from such a meeting would likely differ from contemporary political and diplomatic realities. Generally speaking, governments and citizens accept the principle that the owners of natural resources have the right to employ or sell them, and do not place fossil fuel resources into a special category. No leader of a major Canadian political party is willing to consider the idea of leaving the remaining oil sands undeveloped, despite how these extremely large reserves threaten climatic stability for everyone. The assumptions that the *status quo* is justified, that people have a normative claim to making use of what they legally possess, and that resource owners deserve compensation for any constraints imposed upon them remain widely accepted, though they are difficult to defend when the full facts of climate change are properly considered. Of course, in making the jump from ideal theory to practical politics, considerations of how to soften the opposition of some interest groups and secure the support of others take on considerable importance, though they are largely outside the scope of this discussion.

5. Conclusions

[19] Shue, Henry. "Deadly Delays, Saving Opportunities" in Pachauri, Rajendra Kumar. *Climate Ethics: Essential Readings*. p. 152

[20] Rawls raises a similar issue when discussing the just savings rate, pointing out that: "There is no way for later generations to help the least fortunate earlier generation" (§44:5). If human fossil fuel use is profoundly threatening the security and prosperity of future generations, Shue's view of this asymmetry in terms of future generations being unable to sanction or punish those who made harmful choices earlier may be more relevant.

The Rawlsian justice framework assumes a measure of stability in the basic parameters of civilization. His chain-link view of intergenerational ethics presupposes that people at different stages of human development face essentially similar choices. Applying it in the context of major global transformations – first, from reliance on plants and muscle power to intense fossil fuel use and, second, into a post-fossil-fuel world – strains the applicability of Rawls' means of protecting intergenerational justice. His basic concept of stripping people of self-knowledge in order to generate principles of justice, however, can be employed to consider what an ideal fossil fuel pathway for humanity would resemble.

We are inevitably at a remove from the people in this thought experiment, since we lack their precise certainty about possible technological pathways and the final climatic results of any level of fossil fuel use. We must consider the ethical implications of our lack of knowledge. In the case of uncertainty about the sensitivity of the climate system to GHGs, we ought to consider both the most likely projected outcomes and possible outliers. It may be that with all feedbacks taken into account, the climate system is more sensitive than the mean estimates of the IPCC, in which case any level of fossil fuel use will correspond to a higher level of damage to human and natural systems. The true plausibility of different post-carbon energy options also involve uncertainties for us: about the pace of technological development, which promising renewable energy sources will actually be able to deliver power effectively in the long term, and about the domestic and international political developments that will influence the rate at which fossil fuel use is curtailed (if ever). The sympathetic response – when it comes to taking the claims of future generations for a habitable world seriously – is probably to assert that we should take precautions against all these forms of uncertainty: capping the level of GHG pollution well below any major identifiable climatic thresholds, adopting a diverse portfolio of promising energy technologies to be sure of being left with some options that work, and pursuing multiple political strategies to facilitate our response to

climate change. Asked to provide guidance for members of a generation subject to our uncertainties, the representatives at the multigenerational meeting behind the veil of ignorance would likely insist on a conservative approach with a wide margin of safety.

Comparing the development pathway humanity has actually followed with the kind that we might expect to be chosen by an intergenerational meeting behind the veil of ignorance, a few conclusions seem defensible. To begin with, those alive now and those who have already lived have committed a grave injustice. The elements of this injustice are twofold. First, we have already used more fossil fuels than a fair meeting would have allocated to us. We have put human and natural systems into peril, ranging from the arctic sea ice to coral reefs to small island states. We may even have already committed ourselves to crossing key climatic thresholds, with severe future consequences in store. Second, our fossil fuel use to date has been deeply inequitable in terms of distribution across time, between countries, and within countries. Using Shue's analogy, some of us have built up vast hordes of jewelry while denying blankets to many more. The moral impulse that arises from this is an obligation to aggressively constrain global fossil fuel use, with an eye to moving to a post-fossil-fuel economy as rapidly as possible. This transition must be achieved in a way that mitigates the triple distributional injustice just described, with future fossil fuel use prioritized toward morally laudable purposes like reducing extreme poverty and building renewable energy systems, while intense and wasteful uses like discretionary travel (or, at the extreme, 'space tourism') are strongly discouraged. Rawls' discussion of providing assistance to those in need when the cost is tolerable is applicable in these circumstances.

Rawls' *Theory of Justice* does provide useful, if not fully specified, guidance on the question of intergenerational fossil fuel use. Conjuring a fair multigenerational meeting can help us to more effectively consider the possibilities that are open to us when making choices about climate and energy policy, as well as the ethical consequences likely to arise from different choices. As in Rawls'

original formulation, the veil of ignorance helps people avoid the moral confusion that arises as the result of having too much knowledge about their own circumstances, and helps with the development of a framework that everybody could accept, regardless of their position in space and time.

While diminished self-knowledge represents the desirable distinction between those in the real world and those at the multigenerational meeting, our ignorance when contrasted with their knowledge represents an unwelcome divide. When it comes to capping the atmospheric concentration of GHGs at a safe level, we essentially have one opportunity to get it right. Particularly in a scenario where the benefits of fossil fuel use are more widely distributed (meaning fewer suffer in extreme poverty while others enjoy affluence), the consequences of overshooting the safe limit are more worrisome than those of using less than the ideal cumulative amount of fossil fuels.[21] Losing out on potential benefits from fossil fuel use is less serious than creating global catastrophe. As such, there is a strong moral case for erring on the side of caution and adopting an aggressive global policy of reducing GHG pollution.

[21] For an accessible and convincing discussion of the relative risks of overshooting versus undershooting the ideal concentration, see: Craven, Greg. *What's the Worst that Could Happen?: A Rational Response to the Climate Change Debate.*

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