Canadian Climate Change Policy from a Climate Ethics Perspective

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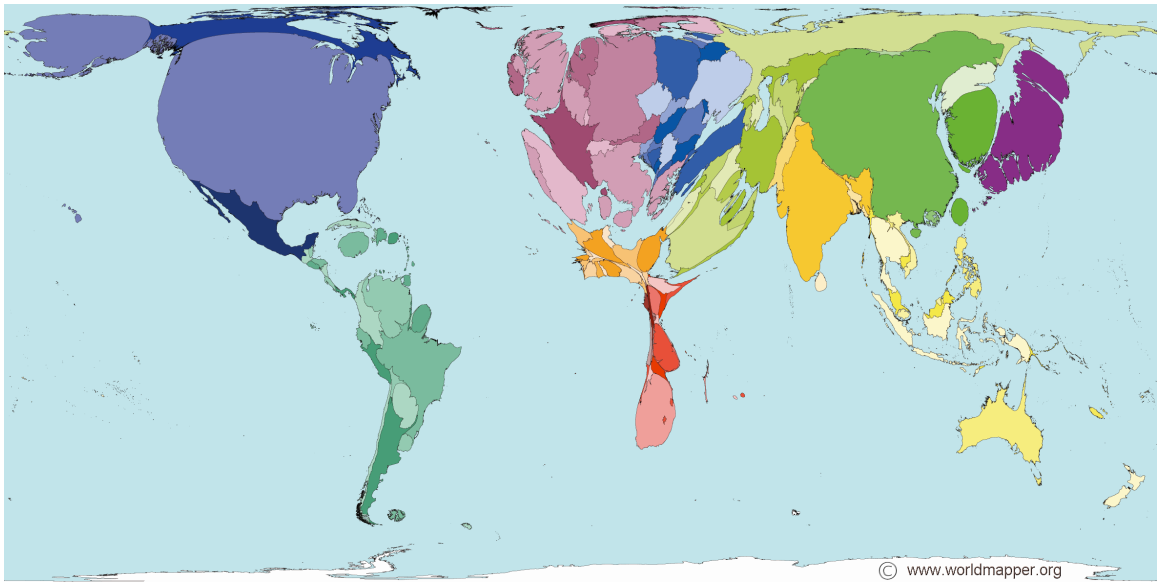

Figure 1: Countries scaled to the size of their greenhouse gas emissions (Worldmapper.org / Sasi Group (University of Sheffield) and Mark Newman (University of Michigan))

> "Our windigo stories strongly teach the consequences of self-destructive cannibalistic consumption. Individuals and entire communities can be eaten up by those possessed by unrestrained appetites."[1]

[1]Borrows, *Seven Generations, Seven Teachings: Ending The Indian Act*, p. 13.

No recent Canadian federal government — including that of Justin Trudeau today — has behaved ethically on the issue of climate change. I will seek to defend this claim through a series of linked propositions about the features of the problem including scientific, economic, political, and moral aspects. By not rapidly and drastically changing our climate and energy policies to conform to the objective of avoiding dangerous anthropogenic interference in the climate system, we are knowingly contributing to a global catastrophe and imposing intolerable burdens upon innocent people not yet born and non-human nature. I will begin by explaining the most morally salient features of what we know about the science of the Earth's climate, the effects human activities have had upon it already, and those projected for the future. I will then explain what kinds of behaviours need to be changed to avoid an intolerable climate change scenario, focusing on eliminating global fossil fuel use but also incorporating changes in agriculture, land use, and deforestation. The only ethically and politically plausible route to eliminating fossil fuel use with sufficient rapidity requires those states with the highest *per capita* use to begin cutting most quickly and aggressively, while states with low *per capita* emissions are granted some scope for increasing them but never allowed to reach levels akin to Canada's today (contraction and convergence). Achieving this phase-out is technically feasible at a level of expense that is entirely reasonable if done efficiently and fully justified by the risks associated with unchecked climate change. Canada thus faces an ethical obligation to act, based in part on our extremely high *per capita* emissions and a high degree of historical responsibility for the damage that has already been done to the climate. In the face of this obligation, Canada has never proposed adequate targets for the reduction of greenhouse gas (GHG) pollution; simultaneously, it has never been serious about achieving the inadequate targets it has chosen.[2]

[2]For discussion of a recent assessment, see: M.-D. Smith, *Emissions down slightly, but Canada not yet on track to meet 2030 climate targets: report*.

1 Moral consequences of different emission pathways

The seriousness of missing the 2 ˚C maximum temperature target which has emerged from the interpretation of the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and which was reiterated in the Paris Agreement is sufficient to require behaviour change from fossil fuel producers and consumers alike.[3,4,5] The far higher levels of warming which would arise from burning all the world's fossil fuel reserves are even more unacceptable for fossil fuel producers and consumers to impose. For a comprehensive account of the full expected consequences of global temperature rise beyond 2 ˚C the most authoratative reference is the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). Adverse effects on humans are expected to include sea level rise (which in scenarios with no mitigation may overwhelm the ability of low-lying areas and countries to adapt), impacts on agriculture, storms and extreme weather, wildfires, and human health impacts.[6,7] In 2009, an article in *Nature* warned that failing to constrain warming to below 2˚C "would threaten the ecological life-support systems that have developed in the late Quaternary environment, and would severely challenge the viability of contemporary human societies".[8] In the Summary for Policymakers from the AR5, the IPCC explains: "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".[9] For non-human nature, expected impacts

[3]More recently, Canada has endorsed the "Under2 Coalition", again emphasizing the importance of a temperature target which Canadian plans are inadequate to meet. D'Amato, *Sweden, Mexico and Canada Endorse Under2 Coalition*.

[4]On the adequacy of the 2 ˚C target, see: P. Smith et al., "Biophysical and economic limits to negative CO2 emissions".

[5]Mooney, *Scientists just undermined a key idea behind the Paris climate talks*.

[6]On sea level rise, see: Mooney, *Scientists keep upping their projections for how much the oceans will rise this century*.

[7]On impacts in general, see: Toronto350.org, *The Fossil Fuel Industry and the Case for Divestment: Update*, p. 25–60.

[8]Rockstrom et al., "A safe operating space for humanity", p. 473.

[9]Intergovernmental Panel on Climate Change, *Climate Change 2014: Synthesis Report*, p. 17.

include habitat destruction, the disruption of food webs, and potential mass extinctions.

The expected duration of effects is also of central importance. The synthesis report of the Millennium Ecosystem Assessment explains:

> [I]t will take centuries for global temperatures to reach equilibrium with changed concentrations of greenhouse gases in the atmosphere and even more time for biological systems to respond to the changes in climate.[10]

The Summary for Policymakers from the AR5 says:

> Many aspects of climate change and associated impacts will continue for centuries, even if anthropogenic emissions of greenhouse gases are stopped. The risks of abrupt or irreversible changes increase as the magnitude of the warming increases.[11]

Impacts including the extinction of species and the loss of ice sheets are irreversible. In summary, policy decisions made in the next few decades (continuing with present-day emissions for less than ten more years will make stabilization below 2 $^\circ$C impossible) will impact the stability of human civilization for centuries into the future.

Some have argued that uncertainty about exactly how damaging any particular level of climate change would be justifies avoiding or delaying mitigation. This argument fails on two fronts. In physical terms, staying below 1.5–2 $^\circ$C of warming is only possible with immediate action. Waiting to actually observe intolerable impacts would guarantee much worse effects to follow, or force humanity into a position of desperate geoengineering. Morally, the argument that imposing risk may be justified where imposing certain harm is not also fails to be convincing. In 1988, Margaret Thatcher argued: "The danger of global warming is as yet unseen, but real enough for us to make changes and sacrifices so that we do not live at the expense of future generations".[12] Moral philosopher Henry Shue equates our willingness

[10] Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Synthesis*, p. 11.

[11] Intergovernmental Panel on Climate Change, *Climate Change 2014 Synthesis Report: Summary for Policymakers*, p. 16.

[12] Griffiths, *The Munk Debates: Volume One*, p. 178.

to impose the risk of catastrophic or runaway climate change on future generations with playing Russian roulette with another person's head. Even if the hammer falls on an empty chamber when you pull the trigger, the person threatened has strong grounds to object to the risk that you imposed on them.[13] The idea that imposing an uncertain (even unquantifiable) but potentially catastrophic risk on others who have no power over us also illustrates Stephen Gardiner's point about how being judges in our own case corrupts our moral reasoning when making climate policy. Gardiner argues that "our position is not that of idealized neutral observers, but rather judges in our own case, with no one to properly hold us accountable".[14] As a result "we are susceptible to proposals for action that do not respond to the real problem".[15] For those who see continued fossil fuel exploitation as a foundation for prosperity, a scenario where we needlessly constrain emissions to avoid a problem that ends up being less severe than feared is more visceral and motivating than one where our rationalization and delay creates catastrophe for others. Of course, we also directly experience the pain associated with rapid decarbonization while the bulk of the suffering from climate change is experienced by strangers.

Explaining the precise reasoning for why persisting in a pattern of activity that would contribute to dangerous climate change is unethical exceeds the scope of a paper like this, though growing climate ethics and intergenerational justice literatures speak to the question.[16,17,18] The obligation can be phrased in utilitarian terms, emphasizing how the present-day utility we derive from fossil fuel use is dwarfed by the consequences of the resulting pollution for other people and non-human nature. This is essentially the logic of the major economic assessments described below, most importantly the Stern Review. Alternatively, it can be explained in libertarian terms, in which the right to make free use of coal, oil, and gas is

[13] Shue, "Deadly Delays, Saving Opportunities", p. 152.
[14] Stephen M Gardiner, *A Perfect Moral Storm: the Ethical Tragedy of Climate Change*, p. xii–xiii.
[15] Ibid., p. xiii.
[16] In particular: Stephen M. Gardiner et al., *Climate Ethics: Essential Readings*.
[17] Stephen M Gardiner, *A Perfect Moral Storm: the Ethical Tragedy of Climate Change*.
[18] Sikora and Barry, *Obligations to Future Generations*.

curtailed by the knowledge that this use is imposing major harm and risk on others. A Rawlsian perspective is also justifiable. While people behind the veil of ignorance would be unlikely to choose a rule that prohibits any fossil fuel use at any time in history, people in the original position would not permit use to the extent that effects of the sort projected for 2 $^{\circ}$C and would be experienced or likely.[19] Various perspectives on intergenerational ethics similarly support an obligation to act, whether based on a theological notion of caring for creation or Edmund Burke's contention that society is a partnership between present-day stewards, the dead, and those yet to be born. What does not seem justifiable is the assertion of the contrary claim: that continued fossil fuel use of a kind that will lead to dangerous climate change can be moral, even if alternative forms of energy are viable. Personally, I find Henry Shue's argument about how future generations are vulnerable to harm because of our choices but unable to harm us to be compelling.[20,21] Shue categorizes climate change as imposing "damage or the risk of damage on the innocent and defenseless". He argues that "it is highly significant morally whether one is choosing a risk for oneself or imposing it, conditionally or unconditionally, on others" and goes on to say: "That we are imposing risks that others will inherit at birth is extremely important".[22] It is particularly significant that the risks being imposed through climate change are potentially catastrophic and irreversible. The one-way relationship between the current generation and those that will follow also has ethical consequences, insofar as "they are at our mercy, but we are out of their reach".[23] Some arguments about the ethics of fossil fuel use have implicitly or explicitly argued that political jurisdictions (states, subnational units like provinces, or individual private land owners) have an unlimited right to make use of any resources contained in their territory, but if this right exists irrespective of the consequences for people elsewhere it requires a kind

[19]See: Ilnyckyj, *A Rawlsian Approach to Climate Change Ethics*.
[20]Shue, "Deadly Delays, Saving Opportunities".
[21]Shue, "Global Environment and International Inequality".
[22]Shue, "Deadly Delays, Saving Opportunities", p. 147.
[23]Ibid., p. 151.

of immoral chauvinism at odds with the ideas that all states have legitimate interests and all people have human rights.

2 Scale of action necessary to avoid dangerous warming

Only aggressive global action in curtailing the use of fossil fuels can produce pathways which lead plausibly to a 1.5–2 ˚C scenario. Working Group III (Mitigation of Climate Change) of the IPCC stated in the AR5 that:

> The scenarios indicating the feasibility of bringing temperatures down below 1.5 °C are characterised by (1) immediate mitigation action; (2) the rapid upscaling of the full portfolio of mitigation technologies; and (3) development along a low-energy demand trajectory.[24]

A 2014 United Nations Environment Programme report argues that "feasible total greenhouse gas emission pathways that are consistent with staying below a 1.5 °C limit up to 2100" require "immediate and strong mitigation action"; "the rapid upscaling of the full portfolio of mitigation technologies"; and "development along a low-energy demand trajectory".[25] Numerous assessments note the relationship between the year when global emissions peak and the maximum rate of emissions reduction necessary to stay below a 1.5 ˚C or 2.0 ˚C limit. A 2009 analysis estimated that a global emission peak before 2020 — followed by an 80–95% reduction in per capita emissions in developed countries by 2050 — is necessary for a sub-2 ˚C pathway.[26] If emissions had peaked in 2011, the maximum rate of global emissions reductions necessary were estimated at 3.7%; delaying the peak until 2020 increases the maximum necessary annual reduction to 9%.[27]

Some argue, explicitly or implicitly, that technological fixes in the absence of greenhouse

[24] Edonhofer et al. eds, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, p. 16.
[25] United Nations Environment Programme (UNEP), *The Emissions Gap Report 2014*, p. 17.
[26] The University of New South Wales Climate Change Research Centre, *The Copenhagen Diagnosis: Updating the World on the Latest Climate Science*, p. 7.
[27] Ibid., p. 51.

gas mitigation can avoid breaching the "dangerous" warming limit. These may include climate-safe energy options like renewables, nuclear fission, and potentially nuclear fusion, any or all of which could theoretically take over from fossil fuels for purely economic reasons in the absence of climate mitigation policies. Alternatively, there could be technological solutions to climate change itself: extracting and burying carbon dioxide (CO_2) chemically and mechanically with air capture and carbon capture and storage (CCS) equipment, or biologically through growth of biomass fuels and their combustion with CCS; or countering the radiative forcing effect of greenhouse gases through means like the stratospheric injection of sulfate aerosols or the placement of giant mirrors in outer space (both forms of solar radiation management).

All of these proposals have similar weaknesses from a moral standpoint. In some cases, the essential feasibility of the technology is in question, as with nuclear fusion and geoengineering. With some, expected side effects may be unacceptable, as with changed patterns of global precipitation from solar radiation management. In all cases, there is no cause for confidence that the technology would be implemented widely and quickly enough to avoid dangerous climate change, in the absence of strong climate change mitigation policies. Crucially, all involve imposing the risk of failure upon future human generations and non-human nature. Knowingly worsening a severe problem while putting some effort into developing potential solutions shows less respect for the welfare of those in the future than working with determination to solve the original problem, especially when it is already technically and economically feasible to do so.

Curbing and eventually virtually eliminating fossil fuel use are not the only behaviour changes necessary to control climate change, but they are those where current Canadian policy is most at odds with success and justice. The full extent of climatic changes experienced globally depends critically on the stabilization concentration of GHGs in the atmosphere,

which can be expressed in terms of CO_2 equivalent.[28] The peak concentration is also important because we know the Earth contains positive feedback loops in which warming causes physical changes which induce more warming, such as melting sea ice reducing the planetary albedo and the release of heat-trapping methane from melting permafrost. The higher the peak concentration, the greater the risks posed by such feedbacks — a further justification for immediate and meaningful action. The net rate of GHG accumulation and the peak and stabilization concentrations are both affected by Earth's biomass, which is in turn affected by land use policies. Agriculture can be undertaken in more and less high-carbon ways, depending on the sources of feedstock and energy for fertilizer production, actions which enhance or degrade carbon sequestration in soil, and choices about agricultural logistics. Similarly, deforestation has been and remains a significant contributor to global GHG concentration increase. While none of this can be ignored, its moral relevance for Canadian climate policy is limited. Neither domestic Canadian nor global land use changes intended to sequester carbon can plausibly offset the impact of humanity adding over 40 billion tonnes of CO_2 to the atmosphere annually. While land use policy change might complement reductions in fossil fuel production and use, it could not obviate the need to decarbonize. Likewise, too much cannot be expected from Canadian commitments to support reforestation or biological carbon sequestration elsewhere, as an alternative to domestic mitigation.

If the only choice on offer were between a low-population agrarian or even pre-agricultural society powered by sunlight and plants and a high-population technological civilization powered by fossil fuels, moral questions about fossil fuel use would be more complex, especially given that we already have a high-population world to deal with. Some who assert a strong moral case against climate action argue that any efforts to move beyond fossil fuel energy will constrain large portions of humanity to poverty, if not starvation. There are many rebuttals

[28] Non-CO_2 GHGs are also important targets for government action, including methane (including unintended "fugitive" emissions from gas production ands transport); nitrous oxide; and chlorofluorocarbons and hydrofluorocarbons, which can be especially potent tonne for tonne.

to this unconvincing argument (I will not consider those based on redistributive obligations here), and the most thorough assessments of the technical and economic feasibility of acting reach dramatically different conclusions.

Ignoring economics in the first instance, it's important to assess whether forms of energy aside from fossil fuels can be collectively sufficient to provide a decent quality of life for the present and projected populations of the Earth. An assessment of this question which is notable for its accessibility, transparency, and comprehensiveness is David MacKay's *Sustainable Energy — Without the Hot Air*.[29] In the first section of his book, MacKay considers all the types of energy use necessary to sustain a high-population, technologically-advanced civilization: from transport to electricity generation to agriculture. Crucially, he estimates the energy usage for a global society with substantially reduced resource inequality. It would not be politically or morally reasonable to assume continued access to hot showers, luxury products, and jet vacations for those in currently rich countries while imposing permanently energy-limited lifestyles on others. In the second section of MacKay's book, he considers every potentially climate-safe energy option, from fossil fuels with CCS to renewables to biomass to nuclear. Starting with first-principles analysis of the physics of energy available on Earth, he confidently concludes that there is more than enough scope for climate-safe energy generation, even if the entire world population is to have a lifestyle comparable to those in Western Europe today. This assessment is supported by other analyses, include the major reviews that have been undertaken of the economics of global decarbonization.

Conducted at the behest of the British government in 2006, the Stern Review on the Economics of Climate Change is likely the most comprehensive assessment that has been undertaken of the economics of decarbonization. It's conclusions are unambiguous: climate change "demands an urgent global response" and the costs of action "can be limited to around 1% of global GDP each year".[30] The 1% figure is based on an approach where emissions

[29]MacKay, *Sustainable Energy — Without the Hot Air*.
[30]Stern, *The Economics of Climate Change: The Stern Review*, p. vi.

reductions are efficiently encouraged across the board through government policy, and it was revised up to 2% in 2008 because a more aggressive peak GHG concentration target was deemed necessary.[31] All long-term economic assessments of climate change must make a choice about what discount rate to apply to costs and benefits expected in the future. Because of the huge number of future generations impacted by climate change, the choice of discount rate dominates the numerical assessment of whether urgent action is justified. With a low discount rate like the one used in the Stern Review, the mathematical case for action is clear. If instead standard commercial discount rates are used, they so completely discount any effects more than 50 years out that they make any investment for the welfare of people in the middle to distant future unjustifiable. The moral acceptability of such discounting, which is central to the case from William Nordhaus and others to do little about climate change, is very questionable. People routinely make decisions which suggest that they care about the state of the world 50 or 100 years out. An economic analysis that is willing to completely sacrifice the future for the sake of a bit more wealth in the near terms is at odds with the preferences of those alive today and at odds with the interests of those who will be forced to live with the consequences of our choices.

A central conclusion of the Stern Review and other comprehensive economic analyses is that rapid action serves three core objectives. First, the most economically efficient pathway to a low-carbon society is one where society-wide incentives to reduce GHG emissions are implemented immediately and steps are undertaken to avoid new investment in high-carbon infrastructure. The Trudeau government's efforts to establish a cross-Canada carbon tax advance this objective, although the initial level proposed and rate of proposed increase do not match plausible estimates about optimal carbon prices for decarbonization at a suitable rate.[32] Second, immediate action helps constrain the risks from potential positive feedback

[31] Jowit and Wintour, *Cost of tackling global climate change has doubled, warns Stern*.

[32] Some environmentalists have been encouraged by these incremental steps, but they still differ greatly from what a policy founded on a 1.5–2.0 $^{\circ}$C target would require: Demerse and M. Smith, *Don't Compare Trudeau's Climate Record To Trump's*.

effects, which might compound warming from direct human emissions and create harm to human and non-human nature at a substantially higher level than that projected from anthropogenic GHG emissions alone. Third, immediate action is expected to minimize the total harm experienced as a result of climate change. Collectively and in the context of the most credible technical and economic analyses of the climate problem, these arguments show that fast action and avoiding locking ourselves into high-carbon infrastructure is economically prudent and morally necessary.

Ken Caldeira — an atmospheric scientist at the Carnegie Institution — has written an elegant inversion of Stern's argument that 2% of global GDP is a reasonable price for controlling the risk of climate change:

> If we already had energy and transportation systems that met our needs without using the atmosphere as a waste dump for our carbon-dioxide pollution, and I told you that you could be 2% richer, but all you had to do was acidify the oceans and risk killing off coral reefs and other marine ecosystems, risk melting the ice caps with rapid sea-level rise, shifting weather patterns so that food-growing regions might not be able to produce adequate amounts of food, and so on, would you take all of that environmental risk, just to be 2% richer?[33]

Such high-level cosmopolitan analysis provides us with the most appropriate platform for reasoning about climate change ethics. Too obsessive a focus on the consequences of policy change for one state or jurisdiction risks producing an outcome which is universally undesirable, but such parochial analyses are nonetheless encouraged by contemporary democratic politics and the institutions and practices of Canadian federalism.

Admittedly, the costs of effective mitigation have risen since Stern's estimate as adjustment time has been lost and long-lived fossil fuel projects which will be politically difficult to shut down have been undertaken. The world's legacy of inaction means that we will need to pay more now to control climate change than we could have paid if we began taking action earlier. At the same time, as we set a new record for CO_2 concentration in the atmosphere

[33]The Economist, *Is it worth it?*

every year, we are constantly increasing the costs and risks associated with continuing to delay.

3 Moral and political constraints on the distribution of effort

A common line of argument about climate ethics is that countries like Canada have been able to develop economically through the use of environmentally-damaging fossil fuels, so states where extreme poverty remains widespread today have the right to follow the same development pathway. If broad conclusions about the adverse impacts of a world following a continued high-carbon growth trajectory are correct, this argument can only be answered by implementing a framework that allows some emission growth in states where historical and *per capita* emissions are comparatively low and where reducing extreme poverty remains an important priority. Trajectories of this type fall under the heading of "contraction and convergence", in which global GHG emissions contract rapidly enough to avoid dangerous climate change and *per capita* emissions between states converge. In addition to bearing an obligation to cut fastest and deepest under such a framework, states like Canada probably have an obligation to transfer resources and technology to low-income and low-carbon states seeking to develop without causing the kind of damage Canada already has. With a sub-2 $^{\circ}$C temperature target in mind and a contraction and convergence approach, Canada's fair share in a global climate change control strategy would be on the order of a 90% reduction in emissions by 2030, far beyond what any Canadian government has proposed.[34]

Seen through a contraction and convergence perspective, Canada's proposal to keep raising emissions from the bitumen sands from 70 megatonnes to 100 megatonnes seems misguided and even offensive.[35] Instead of acting like a rich, heavily-polluting state with an

[34]See: Monbiot, *An 87% Cut by 2030*.

[35]Notably, when Canada assesses the GHG emissions from the bitumen sands, it considers only emissions from extraction, processing, and transportation in Canada. The 85% of total emissions that arise when the fuel is burned are largely attributed to other states. Nonetheless, they must be considered when assessing

obligation to act quickly and convincingly, Canada is laying claim to the kind of emission growth which may be allowable for states with a low historical contribution to the problem and major issues of extreme poverty still to confront. Canada's inadequate 2030 target under the Paris Agreement is for a 30% reduction below 2005 levels, with total national emissions of 523 megatonnes. Allowing 30 megatonnes of growth in the oil sands would require equivalent reductions elsewhere in the economy, while also representing tens of billions of dollars in further investment in an industry that needs to contract.[36] It's also worth noting that even the 100 megatonne ceiling implies that most of Canada's bitumen sand resources can never be used, since they collectively represent about 1/3 of the entire planet's remaining safe carbon budget.

Canada has a special responsibility to act because we have contributed disproportionately to historical greenhouse gas pollution and continue to contribute disproportionately to present-day *per capita* emissions as fossil fuel producers, users, and exporters. We are already far beyond our fair historical share of total global emissions — there can be no justification for allowing future growth in Canadian emissions, or the development of new fossil fuel production, transport, or export infrastructure. Indeed, given our awareness of the risks associated with unchecked climate change, Canada should have discontinued new fossil fuel investment decades ago and should already be making a serious start in decommissioning existing fossil fuel production, transport, and usage infrastructure.

Canada's emission reduction targets have never been compatible with a global sub-2 °C, except if based on the assumption that other countries which are much poorer and much less responsible for the problem will be obligated to do more than their fair share under a contraction and convergence framework to cover for Canada's lagging. Even if other states can be legitimately expected to do this, Canadian fossil fuel exports remain a problem, as they perpetuate dependence on fossil fuel infrastructure from coal-fired power plants to

the general moral desirability of continued bitumen sands production and development.

[36] See: Rabson, *Canada is 200 million tonnes away from meeting international emissions promise*.

gasoline-powered automobiles that would be incompatible with such aggressive mitigation on the part of importing states. These fossil fuel exports are largely directed at major economies which themselves have a major moral imperative to pursue decarbonization, including China and the United States. Continued bitumen sands development shows how both oil producers and consumers are not yet making plans in which the need to decarbonize is being taken seriously.[37]

Unilateral Canadian action cannot determine what level of warming, sea level rise, or other climate change impacts occur globally. Many journalistic and political arguments opposing aggressive Canadian mitigation action highlight how it would be pointless if not reciprocated by major economies like China, India, and the United States. Furthermore, there is ample evidence that other countries are mirroring Canada's pattern of making inadequate promises and then taking inadequate action to realize them. American promises from the Obama era to cut GHG pollution by 26–28% by 2025 (based on 2005 levels) may well go unrealized during the Donald Trump presidency.[38] The Trump administration has already begun repealing the 2015 Clean Power Plan, a key part of the Obama-era plan for American decarbonization.[39,40] Signs elsewhere are similarly discouraging. Both Japan and Germany have significantly increased fossil fuel burning because of their decisions to shut down nuclear power stations after the meltdowns at the Fukushima Daiichi Nuclear Power Plant caused by the 2011 Tōhoku earthquake and tsunami. Recent analysis from the EU Climate Leadership Board found that among EU countries only Sweden, Germany, and France are pursuing the goals they chose under the Paris Agreement.[41]

At the same time, there is some justification for thinking that fast-growing economies like China and India are actually making policy choices compatible with a contraction and

[37]Healing, *Alberta oilsands production outlook bright despite gloomy headlines*.
[38]Milman, *Trump aides abruptly postpone meeting on whether to stay in Paris climate deal*.
[39]World Nuclear News, *US climate and energy policies repealed*.
[40]The Economist, *A scourge of the EPA takes over at the EPA*.
[41]Neslen, *Only Sweden, Germany and France among EU are pursuing Paris climate goals, says study*.

convergence pathway, under which their *per capita* GHG pollution will never reach the level of Canada's today. Motivated by its appalling effects on air quality as well as climate concerns, China may have already passed the peak amount of coal it will ever use in a year.[42] One 2017 report found that: "After a decade of unprecedented expansion, the amount of coal power capacity under development worldwide saw a dramatic drop in 2016, mainly due to shifting policies and economic conditions in China and India".[43,44] They go as far as to say that: "The slowdown in the coal power pipeline brings the possibility of holding global warming to below 2 °C from pre-industrial levels within feasible reach".

In response to all of this, the most important point is that Canada can either contribute to global leadership or continue as part of a planet-destroying inertia. Canada's wealth and history create a clear obligation to act, and the kind of commentator who would use Indian or Brazilian inaction as justification for Canadian inaction would be all the more willing to make the same argument in the other direction. There may be little in human history to suggest that wisdom and compassion will be sufficient to overcome this problem of coordinated action, but choosing inaction on that basis is a council of cynicism or despair.

While the point is secondary to this analysis, it remains noteworthy that non-climate benefits are linked to aggressive GHG mitigation. Fossil fuel production harms ecosystems and contributes substantially to air and water pollution. Fossil fuel transportation itself contributes to GHG pollution, as well as pipeline and tanker spills. Fossil fuel burning — whether by power plants, vehicles, domestic gas-powered appliances or otherwise — contributes to toxic air pollution, including in terms of nitrous and sulphur oxide pollution and particulate matter. In a more philosophical sense, we can think about the history of human civilization as a succession of energy eras. In a pre-agricultural era, the energy expended by human beings was collected manually from unmanaged ecosystems and consumed as food

[42] Carrington, *China's coal peak hailed as turning point in climate change battle*.
[43] Shearer et al., *Boom and Bust 2017: Tracking the Global Coal Plant Pipeline*, p. 3.
[44] See also: Roberts, *The global coal boom finally seems to be winding down*.

and fuel. The agricultural revolution began with the deliberate intensive cultivation of particular crops, and was accompanied by mass population increase. The industrial revolution was sustained by exponentially increasing use of coal, and later oil and gas. These fossil fuel energy sources provide most of the energy used by human beings today, yet their reserves would be finite even in a world where their wastes do not stabilize the climate. A global energy system founded on non-renewable fossil fuel reserves is necessarily temporary. By contrast, if we can build a climate-safe global energy system capable of producing enough total energy to sustain agriculture, housing, electricity, and transport at reasonable levels for all human beings, that system might be expected to continue to function indefinitely (except, perhaps, if it is highly dependent on finite sources of fissile metals). As such, the deployment of a renewable global energy system can be seen not only as a mechanism for controlling the harm and risk arising from climate change, but also of establishing the energy basis for an enduring human society.

Canada's extractivist, colonialist mindset, defined by a focus on extracting natural resources with little concern for the welfare of those in the affected areas, has been a key source of conflict between settlers and Canada's Indigenous Peoples.[45] This willingness to ignore objections from local populations can be seen in Canada's early history of fur trading and other forms of resource extraction; in Quebec's imposition of huge dams against the wishes of people who had been living on those rivers for millennia; and in the Trudeau government's current unwillingness to implement the principle of free, prior, and informed consent from the United Nations Declaration on the Rights of Indigenous Peoples. In terms of seeking reconciliation after its genocidal history and forging a relationship with Canada's Indigenous Peoples based on consent and mutual respect and benefit, the transition away from a high-carbon economy offers many opportunities. Respect for Indigenous sovereignty goes hand in hand with avoiding some of the most damaging fossil fuel projects which have been

[45] On "extractivism", see: Klein, *This Changes Everything: Capitalism vs. The Climate*.

proposed, from new bitumen sands projects to pipelines and export terminals. Simultaneously, the need to build climate-safe energy systems and improve energy efficiency across Canadian society creates opportunities to overcome the appalling inequality in infrastructure between Canada's Indigenous communities and the rest of Canadian society. Housing, water, sanitation, transportation, energy production and other necessary systems could be simultaneously improved and decarbonized, at the same time as Canada makes a good-faith effort to minimize the deleterious effects of its climate policy choices on Indigenous peoples globally, who have been identified by the IPCC as especially vulnerable to climate change.[46] Inadequate housing in Canada's Indigenous communities can be replaced with houses which are not only habitable but far more efficient than the lamentable Canadian average. Similarly, high-cost high-pollution diesel electricity generation in remote communities can be progressively phased out through the deployment of renewables and other climate-safe electricity generation technologies, improved efficiency, and energy storage to address intermittent production.

4 Conclusions

We have the ability to draw ethical conclusions about mandatory action on climate change, but we are psychologically and politically blocked in moving from the identification of these obligations to their implementation in our policies and behaviours. This blockage can be seen in the behaviour of every country on Earth, none of which are cutting GHG pollution at rates compatible with a 1.5–2 $^{\circ}$C target. The fact that our moral failing is widely replicated does not eliminate the obligation to change our conduct. Rather, it's more credible to argue that Canada needs to be among those taking the most rapid and large-scale action in committing to fossil fuel phase-out, in the hope that this will contribute to a global change of behaviour which allows us to collectively avoid catastrophe. The collective

[46] See: Asher et al., *U of T Community Response to the Report of the Fossil Fuel Divestment Committee*, p. 26–33.

action problem in the case of climate change, if not necessarily a suicide pact, is certainly a conscious conspiracy to rob millions of people of necessities of life as basic as food and water. Canadian shirking adds strength to this conspiracy, whereas Canadian leadership could help the world dismantle it.

This certainly does not imply that no moral consideration is due to people in Canada whose lives will be displaced through the campaign to decarbonize. It may well be ethically mandatory as well as politically prudent to assist them. In particular, Canada's government should devote resources to identifying ways in which fossil fuel production and transport expertise can be applied to the deployment of renewable energy. Engineered geothermal systems, for example, can use techniques from oil and gas drilling to exploit the heat available deep in the Earth all over the globe. What is not allowable is using the pain of adjustment as an argument for inaction, given the consequences such inaction would impose on people and the rest of nature.

I should be clear that this analysis of the ethics of Canadian climate policy does not assume that no other non-climate injustices create comparable or linked obligations on the part of Canada's government and citizenry. As Shue highlights, the presence of existing inequalities and the question of whether those equalities are justified is relevant to choosing appropriate climate policy, but the establishment of a suitable climate policy will not automatically address other forms of injustice.[47] In particular, large inequalities and wealth and resource use may need to be reduced through taxation and other forms of redistribution.[48] Likewise, societal changes beyond reformed energy and land use policies may well be necessary to avoid dangerous climate change. A credible case can be made that liberal democratic capitalism — in which governments prioritize GDP growth and firms are free to encourage resource consumption — cannot be reconciled with the behaviours that are

[47]Shue, "Global Environment and International Inequality".

[48]Ilnyckyj, *Resource Inequality and Environmental Sustainability*, Analyses about the justification for and appropriate form of any such redistribution ought to take into account the finite ability of the Earth to provide material inputs for production processes and absorb wastes produced through human activity. See:

necessary to avoid catastrophic climate change. We may need a society which encourages us all to restrain our appetites. Substantial changes in the functioning of politics and the economy of many countries with substantial GHG emissions may be necessary to overcome the international collective action problem, as well as the risk that each new government in any particular state will reverse any progress achieved by its predecessors.

The question of how much fossil fuel infrastructure to build and where is linked to deep enduring themes in Canadian politics, from national unity and federalism to Canada's global role and the place of Indigenous Peoples within Canada. At a minimum, adjudicating between these competing claims raises challenges for the present federal and provincial governments. These challenges must be managed, as during previous instances in which Canada has faced the need to reinvent itself economically, technologically, or politically.

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