## FW

#### The standard is consistency with utilitarianism.

#### Reductionism implies util specifically – alternative theories break down

MacAskill and Wilbin 18 – (Will MacAskill, Associate Professor in Philosophy at Oxford University, author of Doing Good Better, and one of the co-founders of the effective altruism community, interviewed by Robert Wilbin, studied both genetics and economics at the Australian National University (ANU), graduating top of his class and being named Young Alumnus of the Year in 2015. He worked as a research economist in various Australian Government agencies, and then moved to the UK to work at the Centre for Effective Altruism, first as Research Director, then Executive Director, then Research Director for 80,000 Hours, “Our descendants will probably see us as moral monsters. What should we do about that?”, 80,000 Hours, 1-19-18, Available Online at <https://80000hours.org/podcast/episodes/will-macaskill-moral-philosophy/#top>, accessed 8-26-18, HKR-AM)

Imagine that you’re in a car accident with 2 of your siblings. In this car accident your body is completely destroyed, and the brains of your 2 siblings are completely destroyed, but they still have functioning bodies, are preserved. As you’ll see, this is a very philosophical thought experiment. Robert Wiblin: One day maybe we can do this. Will MacAskill: Maybe. Finally, let’s also suppose that it’s possible to take someone’s brain and split it in 2, and implant it into 2 other people’s skulls such that the brain will grow back fully and will have all the same memories as that first person did originally. In the same way I think it’s the case that you can split up a liver and the 2 separate livers will grow back, or you can split up an earthworm – I don’t know if this is true – split up an earth worm and they’ll both wiggle off. Robert Wiblin: Maybe you could. Will MacAskill: Maybe you could. You’ve got to imagine these somewhat outlandish possibilities, but that’s okay because we’re illustrating a philosophical point. Now you’ve got these 2 bodies that wake up and have all the same memories of you. From their perspective they were just in this car crash and then woke up in a different… The question is, who’s you? Supposing we think there’s this Cartesian soul that exists within one of us, the question would be into which body does the soul go? Or, even if you don’t think there’s a soul but you think, no, there’s something really fundamental about me. Who’s the me? There’s 4 possible answers. One is that it’s one sibling. Second is it’s the other sibling. Third is it’s both. Fourth is it’s neither. It couldn’t be one brother or one sibling over the other because there’s a parity argument. Any argument you give for saying it’s the youngest sibling would also give an argument to the oldest sibling. That can’t be the case. It can’t be that it’s both people because, well, now I’ve got this person that consists of 2 other entities walking around? That seems very absurd indeed. It can’t be neither either. Now imagine the case where you’re in a car crash and your brain just gets transplanted to one person. Then you would think, well, we continue. I was in this terrible car crash, I woke up with a different body, but it’s still me. I still have all the same memories. But, if it’s the case that I can survive in the case of my brain being transplanted into one other person, surely I can survive if my brain is transplanted into 2 people. It would seem weird that a double win, double success, is actually a failure. And so, tons more philosophical argument goes into this. The conclusion that Derek Parfit ultimately makes is, there’s just no fact of the matter here. This actually shows that what we think of as this continued personal identity over time is just a kind of fiction. It’s like saying when the French Socialist party split into two, are there now two? Which one is really the French Socialist party? This is just a meaningless questions. Robert Wiblin: What’s actually going on is that there are different parties, and some of them are more similar than others. Will MacAskill: Exactly. That’s right. But, once you reject this idea that there’s any fundamental moral difference between persons, then the fact that it’s permissible for me to make a trade off where I inflict harm on myself now, or benefit myself now in order to perhaps harm Will age 70… Let’s suppose that that’s actually good for me overall. Well, I should make just the same trade offs within my own life as I make across lives. It would be okay to harm one person to benefit others. If you grant that, then, you end up with something that’s starting to look pretty similar to utilitarianism. Robert Wiblin: Okay, so the basic idea is we have strong reasons to think that identity doesn’t exist in the way that we instinctively think it does, that in fact it’s just a continuum. Will MacAskill: Mm-hmm (affirmative). Robert Wiblin: This is exactly what utilitarianism always thought and was acting as though it was true. Will MacAskill: Yes. Robert Wiblin: But for deontological theories or virtue ethics theories, they really need a sense of identity and personhood to make sense to begin with.

#### The principle of diminishing marginal utility for happiness ensures that util safeguards minority rights

Mattoo and Subramanian 13 — (Aaditya Mattoo is the research manager for trade and integration at the World Bank. Arvind Subramanian is a senior fellow at the Center for Global Development and the Peterson Institute for International Economics. “GREENPRINT: A New Approach to Cooperation on Climate Change”, Center for Global Development, 2013, Available Online at <https://www.cgdev.org/sites/default/files/Mattoo_Subramanian_Greenprint.pdf>, accessed 11-9-19, HKR-AM)

“Emissions mitigation” refers to actions to reduce emissions. It imposes economic costs on countries that undertake such actions in terms of reduced consumption and growth. Most theories of justice would suggest that insofar as costs are imposed, more of them should be borne by those whose incomes are greater. In a utilitarian view, in circumstances of diminishing marginal utilities—meaning that an additional unit of consumption and income forgone is more costly for a poor person than a rich one—world welfare will be maximized, or at least the loss in world welfare will be minimized, if those who are poorer incur lower costs. A Rawlsian perspective (based on the views of the politica l philosopher John Rawls) would, of course, be even more strongly redistributive. In terms of a carbon budget, therefore, most ethical perspectives would require future allocations to be inversely related to the ability (or, alternately, capacity) to pay for emissions reductions. This approach is also embedded in the Kyoto Protocol and reflected in the principle of common but differentiated responsibilities.

#### Threat of extinction destroys the value structures of life – the idea of value assumes there will be generations after us – their contention doesn’t assume our impacts

Scheffler 13 — (Samuel Scheffler, professor of philosophy and law at New York University, is the author of the forthcoming book “Death and the Afterlife, “The Importance of the Afterlife. Seriously.“, NYT Opinionator, 9-21-2013, Available Online at https://opinionator.blogs.nytimes.com/2013/09/21/the-importance-of-the-afterlife-seriously/#more-149307, accessed 12-25-2018, HKR-AM)

My belief in life after death is more mundane. What I believe is that other people will continue to live after I myself have died. You probably make the same assumption in your own case. Although we know that humanity won’t exist forever, most of us take it for granted that the human race will survive, at least for a while, after we ourselves are gone.

Because we take this belief for granted, we don’t think much about its significance. Yet I think that this belief plays an extremely important role in our lives, quietly but critically shaping our values, commitments and sense of what is worth doing. Astonishing though it may seem, there are ways in which the continuing existence of other people after our deaths — even that of complete strangers — matters more to us than does our own survival and that of our loved ones.

Consider a hypothetical scenario. Suppose you knew that although you yourself would live a long life and die peacefully in your sleep, the earth and all its inhabitants would be destroyed 30 days after your death in a collision with a giant asteroid. How would this knowledge affect you?

If you are like me, and like most people with whom I have discussed the question, you would find this doomsday knowledge profoundly disturbing. And it might greatly affect your decisions about how to live. If you were a cancer researcher, you might be less motivated to continue your work. (It would be unlikely, after all, that a cure would be found in your lifetime, and even it were, how much good would it do in the time remaining?) Likewise if you were an engineer working to improve the seismic safety of bridges, or an activist trying to reform our political or social institutions or a carpenter who cared about building things to last. What difference would these endeavors make, if the destruction of the human race was imminent?

If you were a novelist or playwright or composer, you might see little point in continuing to write or compose, since these creative activities are often undertaken with an imagined future audience or legacy in mind. And faced with the knowledge that humanity would cease to exist soon after your death, would you still be motivated to have children? Maybe not.

Notice that people do not typically react with such a loss of purpose to the prospect of their own deaths. Of course, many people are terrified of dying. But even people who fear death (and even those who do not believe in a personal afterlife) remain confident of the value of their activities despite knowing that they will die someday. Thus there is a way in which the survival of other people after our deaths matters more to us than our own survival.

The explanation for this may seem simple: if the earth will be destroyed 30 days after we die, then everyone we care about who is alive at that time will meet a sudden, violent end. Spouses and partners, children and grandchildren, friends and lovers: all would be doomed. Perhaps it is our concern for our loved ones that explains our horror at the prospect of a post-mortem catastrophe.

But I don’t think this is the full story. Consider another hypothetical scenario, drawn from P. D. James’s novel “The Children of Men.” In Ms. James’s novel, humanity has become infertile, with no recorded birth having occurred in over 25 years. Imagine that you found yourself living in such circumstances. Nobody now alive is younger than 25, and the disappearance of the human race is imminent as an aging population inexorably fades away. How would you react?

As in the case of the asteroidal collision, many activities would begin to seem pointless under these conditions: cancer research, seismic safety efforts, social and political activism and so on. Beyond that, as Ms. James’s novel vividly suggests, the onset of irreversible global infertility would be likely to produce widespread depression, anxiety and despair.

Some people would seek consolation in religious faith, and some would find it. Others would take what pleasure they could in activities that seemed intrinsically rewarding: listening to music, exploring the natural world, spending time with family and friends and enjoying the pleasures of food and drink. But even these activities might seem less fulfilling, and be tinged with sadness and pain, when set against the background of a dying humanity.

NOTICE that in this scenario, unlike that of the asteroidal collision, nobody would die prematurely. So what is dismaying about the prospect of living in an infertile world cannot be that we are horrified by the demise of our loved ones. (They would die eventually, of course, but that is no different from our actual situation.) What is dismaying is simply that no new people would come into existence.

This should give us pause. The knowledge that we and everyone we know and love will someday die does not cause most of us to lose confidence in the value of our daily activities. But the knowledge that no new people would come into existence would make many of those things seem pointless.

I think this shows that some widespread assumptions about human egoism are oversimplified at best. However self-interested or narcissistic we may be, our capacity to find purpose and value in our lives depends on what we expect to happen to others after our deaths. Even the egotistic tycoon who is devoted to his own glory might discover that his ambitions seemed pointless if humanity’s disappearance was imminent. Although some people can afford not to depend on the kindness of strangers, virtually everyone depends on the future existence of strangers.

Similarly, I think that familiar assumptions about human individualism are oversimplified. Even though we as individuals have diverse values and goals, and even though it is up to each of us to judge what we consider to be a good or worthy life, most of us pursue our goals and seek to realize our values within a framework of belief that assumes an ongoing humanity. Remove that framework of belief, and our confidence in our values and purposes begins to erode.

There is also a lesson here for those who think that unless there is a personal afterlife, their lives lack any meaning or purpose. What is necessary to underwrite the perceived significance of what we do, it seems, is not a belief in the afterlife but rather a belief that humanity will survive, at least for a good long time.

But will humanity survive for a good long time? Although we normally assume that others will live on after we ourselves have died, we also know that there are serious threats to humanity’s survival. Not all of these threats are human-made, but some of the most pressing certainly are, like those posed by climate change and nuclear proliferation. People who worry about these problems often urge us to remember our obligations to future generations, whose fate depends so heavily on what we do today. We are obligated, they stress, not to make the earth uninhabitable or to degrade the environment in which our descendants will live.

I agree. But there is also another side to the story. Yes, our descendants depend on us to make possible their existence and well-being. But we also depend on them and their existence if we are to lead flourishing lives ourselves. And so our reasons to overcome the threats to humanity’s survival do not derive solely from our obligations to our descendants. We have another reason to try to ensure a flourishing future for those who come after us: it is simply that, to an extent that we rarely recognize or acknowledge, they already matter so much to us.

## Case

#### Capitalism is key to achieving net-zero---otherwise the alt fails---profit motives, market competition, and trade all ensure green tech.

Adair Turner 19. a British businessman and academic and was Chairman of the Financial Services Authority until its abolition in March 2013. “Is capitalism incompatible with effective climate change action?.” World Economic Forum. 9-3-2019. https://www.weforum.org/agenda/2019/09/is-capitalism-incompatible-with-effective-climate-change-action/

Believers in a market economy are dismayed by radical voices arguing that capitalism is incompatible with effective climate action. But unless capitalism's defenders start supporting more ambitious targets and policies to achieve net-zero carbon emissions by mid-century, they should not be surprised if an increasing number of people agree.

This year, the evidence that global warming is occurring, and that the consequences for humanity could be severe and potentially catastrophic, has become more compelling than ever. Record global temperatures in June and July. Unprecedented heatwaves in Australia and India, with temperatures above 50°C. Huge forest fires across northern Russia. All of these things tell us that we are running out of time to cut greenhouse-gas emissions and contain global warming to at least manageable levels.

The response has been growing demand for radical action. In the United States, proponents of the Green New Deal argue that America should be a zero-carbon economy by 2030. In the United Kingdom, activists of the “Extinction Rebellion” movement demand the same by 2025, and have severely disrupted London transport through very effective forms of civil disobedience. And the argument that avoiding catastrophic climate change requires rejecting capitalism is gaining ground.

Against this growing tide of radicalism, companies, business groups, and other establishment institutions urge caution and more measured action. Achieving zero emissions as early as 2030, they argue, would be immensely costly and require changes in living standards which most people will not accept. Illegal actions that disrupt others’ lives, it is said, will undermine popular support for necessary measures. A more affordable and gradual path of emissions reduction would be better and still prevent catastrophe, and market instruments operating within the capitalist system could be powerful levers of change.

These counterarguments are robust. The costs of achieving a zero-carbon economy will increase dramatically if we try to get there in ten years, not 30. Most forms of capital equipment naturally need replacement within 30 years, so switching to new technologies over that timeframe would cost relatively little, whereas switching over ten years would require companies to write off large quantities of existing assets.

Technological progress – whether in solar photovoltaic panels, batteries, biofuels, or aircraft design – will make it much cheaper to cut emissions in 15 years than today. And the profit motive is spurring venture capitalists to make huge investments in the new technologies required to deliver a zero-carbon economy.

Meanwhile, decentralized market mechanisms such as carbon pricing are essential to drive change in key industrial sectors, given the multiplicity of possible routes to decarbonization. Socialist planning will not be as effective: Venezuela is an environmental as well as a social disaster. And there is a real danger that excessively rapid action could alienate popular support. After all, the gilets jaunes (yellow vest) movement in France was provoked by tax increases designed to make diesel cars uneconomic, but were imposed at a time when electric vehicles are not yet cheap enough and lack the range to be a viable alternative for less well-off people living outside major cities.

To survive climate change we have to transform both economics and design

But it is also true that the capitalist system has failed to respond to the challenge of climate change fast enough; and in some ways, capitalism has impeded effective action. Venture capitalists financing brilliant technological breakthroughs have been matched by industry lobby groups successfully arguing against required regulations or carbon taxes. If adequate policies had been adopted 30 years ago, we would be well on the way to achieving a zero-carbon economy at a very low cost. The fact that we did not is, in part, capitalism’s fault.

Massively accelerated action is now required. All developed economies should commit to achieving net-zero carbon emissions by 2050. And zero must mean zero, with no pretense that we can continue burning large quantities of fossil fuels in the late twenty-first century, balanced by equally large quantities of carbon capture and storage.

Developing economies should get there by 2060 at the very latest. That would still leave us vulnerable to significant and unavoidable climate change, but climate science suggests that it would be sufficient to avoid catastrophe. And as the Energy Transitions Commission described in its recent Mission Possible report, it is still possible to achieve that objective at relatively low economic cost, provided we adopt without delay the policies required to drive rapid change.

Carbon taxes should be introduced at a sufficiently high level, and with future increases declared well in advance, to drive the multi-decade investment plans required to decarbonize heavy industry. Carbon tariffs should be used to protect industry from being undercut by imports from countries that fail to apply adequate carbon prices. Airlines should face either steadily rising carbon prices, or regulations requiring them to use a rising proportion of zero-carbon fuels from clearly sustainable sources, with the percentage reaching 100% before 2050.

Blunt but effective instruments – such as banning new sales of internal combustion engine autos from a specific future date, such as 2030, should also be part of the policy armory. And regulations should ban putting plastics in landfills and plastic incineration, forcing the development of a complete plastics recycling system.

None of these policies is anti-capitalist. Instead they are the policies we need to unleash capitalism’s power to solve the problem. Once clear prices and regulations are in place, market competition and the profit motive will drive innovation, and economies of scale and learning-curve effects will force down the costs of zero-carbon technologies. And if we do not unleash that power, we will almost certainly fail to contain climate change.

#### Past the tipping point and the alt is dictatorship and genocide---only tech can solve and renewables are good.

Eric Levitz 5/17/21. Senior Writer at New York Magazine. MA Johns Hopkins. "We’ll Innovate Our Way Out of the Climate Crisis or Die Trying". Intelligencer. 5-17-2021. https://nymag.com/intelligencer/2021/05/climate-biden-green-tech-innovation.html

Today’s best-case ecological scenario was a horror story just three decades ago. In 1993, Bill Clinton declared that global warming presented such a profound threat to civilization that the U.S. would have to bring its “emissions of greenhouse gases to their 1990 levels by the year 2000.” Instead, we waited until 2020 to do so; in the interim, humanity burned more carbon than it had since the advent of agriculture. Now, it will take a historically unprecedented, worldwide economic transformation to freeze warming at “only” 2 degrees — a level of temperature rise that will turn “once in a century” storms into annual events, drown entire island nations, and render major cities in the Middle East uninhabitable in summertime (at least for those whose lifestyles involve “walking outdoors without dying of heatstroke”). This is what passes for a utopian vision in 2021. If we confine ourselves to mere optimism — and assume that every Paris Agreement signatory meets its current pledged target for decarbonization — then warming will hit 2.4 degrees by century’s end.

The reality of our ecological predicament invites denial of our political one. Put simply, it is hard to reconcile the scale of the climate crisis with the limits of contemporary American politics. Delusions rush in to fill the gap. Among these is the fantasy of national autonomy; the notion that the United States can save the planet or destroy it, depending on the precise timeline of its domestic decarbonization. A rapid energy transition in the U.S. is a vital cause, not least for its potential to expedite similar transformations abroad. But the battle for a sustainable planet will be won or lost in the developing world. Although American consumption played a central role in the history of the climate crisis, it is peripheral to the planet’s future: Over the coming century, U.S. emissions are expected to account for only 5 percent of the global total.

There is also the delusion of “de-growth’s” viability. The fact that there is no plausible path for global economic expansion that won’t entail climate-induced death and displacement has led some environmentalists to insist on global stagnation. Yet there is neither a mass constituency for this project, nor any reason to believe that there will be any time soon. Freeze the status-quo economy in amber, and you’ll condemn nearly half of humanity to permanent poverty. Divide existing GDP into perfectly even slices, and every person on the planet will live on about $5,500 a year. American voters may express a generalized concern about the climate in surveys, but they don’t seem willing to accept even a modest rise in gas prices — let alone a total collapse in living standards — to address the issue. Meanwhile, any Chinese or Indian leader who attempted to stymy income growth in the name of sustainability would be ousted in short order. It’s conceivable that one could radically reorder advanced economies in a manner that enabled living standards to rise even as GDP fell; Americans might well find themselves happier and more secure in an ultra-low-carbon communal economy in which individual car ownership is heavily restricted, and housing, healthcare, and myriad low-carbon leisure activities are social rights. But nothing short of an absolute dictatorship could affect such a transformation at the necessary speed. And the specter of eco-Bolshevism does not haunt the Global North. Humanity is going to find a way to get rich sustainably, or die trying.

Thus, the chasm between the ecologically necessary and the politically possible can only be bridged by technological advance. And on that front, the U.S. actually has the resources to make a decisive contribution to global decarbonization — and some political will to leverage those resources. Unfortunately, due to some combination of fiscal superstitions and misplaced priorities, the Biden administration’s proposed investments in green innovation remain paltry. An American Jobs Plan with much higher funding for green R&D is both imminently winnable and environmentally imperative. U.S. climate hawks should make securing such legislation a top priority.

The choice before us is techno-optimism or barbarism.

If governments are forced to choose between increasing income growth in the present, and mitigating temperature rise in the future, they are going to pick the former. We’ll get cheap, lab-grown Kobe beef before we get a U.S. Senate willing to tax meat, and steel plants powered by “green hydrogen” before we get anarcho-primitivism with Chinese characteristics.

The question is whether we’ll get such breakthroughs before it’s too late.

Techno-optimism has its hazards, but the progress we’ve made toward decarbonization has come largely through technological innovation. When India canceled plans to construct 14 gigawatts of new coal-fired power stations in 2019, it did not do so in deference to international pressure or domestic environmental movements, but rather to the cost-competitiveness of solar energy. The same story holds across Asia’s developing countries: Thanks to a ninefold reduction in the cost of solar energy over the past decade, the number of new coal plants slated for construction in the region has fallen by 80 percent. Meanwhile, the road to an electric-car revolution was cleared by a collapse in the cost of lithium batteries, the challenge of powering cities with solar energy on cloudy days was eased by a 70 percent drop in the price of utility-scale batteries, and wind power grew 40 percent cheaper. Our species remains lackluster at solidarity and self-government, but we’ve got a real knack for building cool shit.

The technological progress of the past decade was not sufficient to compensate for tepid climate policy. But real techno-utopianism has never been tried: As of 2019, global spending on clean energy R&D totaled $22 billion a year, or 3 percent of the Pentagon’s annual budget. Increasing spending on such research — while expediting cost-reductions in existing technologies by deploying them en masse — should be twin priorities of American climate policy.

The preconditions for green industrialization can be made in America.

The United States has more fiscal capacity and better-financed research universities than any nation on the planet. And, for all the pathologies of our politics, public investment in green tech inspires far weaker opposition than many less-indispensable climate policies. In fact, late last year, with Republicans controlling the Senate and Donald Trump in the White House, the U.S. increased funding for zero-emission technology R&D by $35 billion. America does not have sovereignty over enough humans to save the planet by slashing our domestic emissions. But we just might have the resources and political economy necessary to help the developing world save us all.

Although progress on renewables has exceeded optimistic expectations, the technical obstacles to global decarbonization remain immense. In the most optimistic scenario, scaling up existing, cost-competitive technologies can get us about 16 percent of the emissions reductions necessary for achieving net-zero by 2050, according to the International Energy Agency. Driving down the price of tech we already have will get us another 39 percent. The rest must come from technologies that have yet to be fully developed. We need electrified cement, hydrogen-powered steel plants, and evaporative cooling. We need utility-scale energy storage, electric airplanes, and ultra-high voltage transmission lines. And we’d be remiss to not toss a bit of our collective wealth at game-changing hail marys like nuclear fusion.

#### Warming leads to extinction

Kareiva 18, Ph.D. in ecology and applied mathematics from Cornell University, director of the Institute of the Environment and Sustainability at UCLA, Pritzker Distinguished Professor in Environment & Sustainability at UCLA, et al. (Peter, “Existential risk due to ecosystem collapse: Nature strikes back,” *Futures*, 102)

In summary, six of the nine proposed planetary boundaries (phosphorous, nitrogen, biodiversity, land use, atmospheric aerosol loading, and chemical pollution) are unlikely to be associated with existential risks. They all correspond to a degraded environment, but in our assessment do not represent existential risks. However, the three remaining boundaries (climate change, global freshwater cycle, and ocean acidification) do pose existential risks. This is because of intrinsic positive feedback loops, substantial lag times between system change and experiencing the consequences of that change, and the fact these different boundaries interact with one another in ways that yield surprises. In addition, climate, freshwater, and ocean acidification are all directly connected to the provision of food and water, and shortages of food and water can create conflict and social unrest. Climate change has a long history of disrupting civilizations and sometimes precipitating the collapse of cultures or mass emigrations (McMichael, 2017). For example, the 12th century drought in the North American Southwest is held responsible for the collapse of the Anasazi pueblo culture. More recently, the infamous potato famine of 1846–1849 and the large migration of Irish to the U.S. can be traced to a combination of factors, one of which was climate. Specifically, 1846 was an unusually warm and moist year in Ireland, providing the climatic conditions favorable to the fungus that caused the potato blight. As is so often the case, poor government had a role as well—as the British government forbade the import of grains from outside Britain (imports that could have helped to redress the ravaged potato yields). Climate change intersects with freshwater resources because it is expected to exacerbate drought and water scarcity, as well as flooding. Climate change can even impair water quality because it is associated with heavy rains that overwhelm sewage treatment facilities, or because it results in higher concentrations of pollutants in groundwater as a result of enhanced evaporation and reduced groundwater recharge. Ample clean water is not a luxury—it is essential for human survival. Consequently, cities, regions and nations that lack clean freshwater are vulnerable to social disruption and disease. Finally, ocean acidification is linked to climate change because it is driven by CO2 emissions just as global warming is. With close to 20% of the world’s protein coming from oceans (FAO, 2016), the potential for severe impacts due to acidification is obvious. Less obvious, but perhaps more insidious, is the interaction between climate change and the loss of oyster and coral reefs due to acidification. Acidification is known to interfere with oyster reef building and coral reefs. Climate change also increases storm frequency and severity. Coral reefs and oyster reefs provide protection from storm surge because they reduce wave energy (Spalding et al., 2014). If these reefs are lost due to acidification at the same time as storms become more severe and sea level rises, coastal communities will be exposed to unprecedented storm surge—and may be ravaged by recurrent storms. A key feature of the risk associated with climate change is that mean annual temperature and mean annual rainfall are not the variables of interest. Rather it is extreme episodic events that place nations and entire regions of the world at risk. These extreme events are by definition “rare” (once every hundred years), and changes in their likelihood are challenging to detect because of their rarity, but are exactly the manifestations of climate change that we must get better at anticipating (Diffenbaugh et al., 2017). Society will have a hard time responding to shorter intervals between rare extreme events because in the lifespan of an individual human, a person might experience as few as two or three extreme events. How likely is it that you would notice a change in the interval between events that are separated by decades, especially given that the interval is not regular but varies stochastically? A concrete example of this dilemma can be found in the past and expected future changes in storm-related flooding of New York City. The highly disruptive flooding of New York City associated with Hurricane Sandy represented a flood height that occurred once every 500 years in the 18th century, and that occurs now once every 25 years, but is expected to occur once every 5 years by 2050 (Garner et al., 2017). This change in frequency of extreme floods has profound implications for the measures New York City should take to protect its infrastructure and its population, yet because of the stochastic nature of such events, this shift in flood frequency is an elevated risk that will go unnoticed by most people. 4. The combination of positive feedback loops and societal inertia is fertile ground for global environmental catastrophes Humans are remarkably ingenious, and have adapted to crises throughout their history. Our doom has been repeatedly predicted, only to be averted by innovation (Ridley, 2011). However, the many stories of human ingenuity successfully addressing existential risks such as global famine or extreme air pollution represent environmental challenges that are largely linear, have immediate consequences, and operate without positive feedbacks. For example, the fact that food is in short supply does not increase the rate at which humans consume food—thereby increasing the shortage. Similarly, massive air pollution episodes such as the London fog of 1952 that killed 12,000 people did not make future air pollution events more likely. In fact it was just the opposite—the London fog sent such a clear message that Britain quickly enacted pollution control measures (Stradling, 2016). Food shortages, air pollution, water pollution, etc. send immediate signals to society of harm, which then trigger a negative feedback of society seeking to reduce the harm. In contrast, today’s great environmental crisis of climate change may cause some harm but there are generally long time delays between rising CO2 concentrations and damage to humans. The consequence of these delays are an absence of urgency; thus although 70% of Americans believe global warming is happening, only 40% think it will harm them (http://climatecommunication.yale.edu/visualizations-data/ycom-us-2016/). Secondly, unlike past environmental challenges, the Earth’s climate system is rife with positive feedback loops. In particular, as CO2 increases and the climate warms, that very warming can cause more CO2 release which further increases global warming, and then more CO2, and so on. Table 2 summarizes the best documented positive feedback loops for the Earth’s climate system. These feedbacks can be neatly categorized into carbon cycle, biogeochemical, biogeophysical, cloud, ice-albedo, and water vapor feedbacks. As important as it is to understand these feedbacks individually, it is even more essential to study the interactive nature of these feedbacks. Modeling studies show that when interactions among feedback loops are included, uncertainty increases dramatically and there is a heightened potential for perturbations to be magnified (e.g., Cox, Betts, Jones, Spall, & Totterdell, 2000; Hajima, Tachiiri, Ito, & Kawamiya, 2014; Knutti & Rugenstein, 2015; Rosenfeld, Sherwood, Wood, & Donner, 2014). This produces a wide range of future scenarios. Positive feedbacks in the carbon cycle involves the enhancement of future carbon contributions to the atmosphere due to some initial increase in atmospheric CO2. This happens because as CO2 accumulates, it reduces the efficiency in which oceans and terrestrial ecosystems sequester carbon, which in return feeds back to exacerbate climate change (Friedlingstein et al., 2001). Warming can also increase the rate at which organic matter decays and carbon is released into the atmosphere, thereby causing more warming (Melillo et al., 2017). Increases in food shortages and lack of water is also of major concern when biogeophysical feedback mechanisms perpetuate drought conditions. The underlying mechanism here is that losses in vegetation increases the surface albedo, which suppresses rainfall, and thus enhances future vegetation loss and more suppression of rainfall—thereby initiating or prolonging a drought (Chamey, Stone, & Quirk, 1975). To top it off, overgrazing depletes the soil, leading to augmented vegetation loss (Anderies, Janssen, & Walker, 2002). Climate change often also increases the risk of forest fires, as a result of higher temperatures and persistent drought conditions. The expectation is that forest fires will become more frequent and severe with climate warming and drought (Scholze, Knorr, Arnell, & Prentice, 2006), a trend for which we have already seen evidence (Allen et al., 2010). Tragically, the increased severity and risk of Southern California wildfires recently predicted by climate scientists (Jin et al., 2015), was realized in December 2017, with the largest fire in the history of California (the “Thomas fire” that burned 282,000 acres, https://www.vox.com/2017/12/27/16822180/thomas-fire-california-largest-wildfire). This catastrophic fire embodies the sorts of positive feedbacks and interacting factors that could catch humanity off-guard and produce a true apocalyptic event. Record-breaking rains produced an extraordinary flush of new vegetation, that then dried out as record heat waves and dry conditions took hold, coupled with stronger than normal winds, and ignition. Of course the record-fire released CO2 into the atmosphere, thereby contributing to future warming. Out of all types of feedbacks, water vapor and the ice-albedo feedbacks are the most clearly understood mechanisms. Losses in reflective snow and ice cover drive up surface temperatures, leading to even more melting of snow and ice cover—this is known as the ice-albedo feedback (Curry, Schramm, & Ebert, 1995). As snow and ice continue to melt at a more rapid pace, millions of people may be displaced by flooding risks as a consequence of sea level rise near coastal communities (Biermann & Boas, 2010; Myers, 2002; Nicholls et al., 2011). The water vapor feedback operates when warmer atmospheric conditions strengthen the saturation vapor pressure, which creates a warming effect given water vapor’s strong greenhouse gas properties (Manabe & Wetherald, 1967). Global warming tends to increase cloud formation because warmer temperatures lead to more evaporation of water into the atmosphere, and warmer temperature also allows the atmosphere to hold more water. The key question is whether this increase in clouds associated with global warming will result in a positive feedback loop (more warming) or a negative feedback loop (less warming). For decades, scientists have sought to answer this question and understand the net role clouds play in future climate projections (Schneider et al., 2017). Clouds are complex because they both have a cooling (reflecting incoming solar radiation) and warming (absorbing incoming solar radiation) effect (Lashof, DeAngelo, Saleska, & Harte, 1997). The type of cloud, altitude, and optical properties combine to determine how these countervailing effects balance out. Although still under debate, it appears that in most circumstances the cloud feedback is likely positive (Boucher et al., 2013). For example, models and observations show that increasing greenhouse gas concentrations reduces the low-level cloud fraction in the Northeast Pacific at decadal time scales. This then has a positive feedback effect and enhances climate warming since less solar radiation is reflected by the atmosphere (Clement, Burgman, & Norris, 2009). The key lesson from the long list of potentially positive feedbacks and their interactions is that runaway climate change, and runaway perturbations have to be taken as a serious possibility. Table 2 is just a snapshot of the type of feedbacks that have been identified (see Supplementary material for a more thorough explanation of positive feedback loops). However, this list is not exhaustive and the possibility of undiscovered positive feedbacks portends even greater existential risks. The many environmental crises humankind has previously averted (famine, ozone depletion, London fog, water pollution, etc.) were averted because of political will based on solid scientific understanding. We cannot count on complete scientific understanding when it comes to positive feedback loops and climate change.’

#### Cap is sustainable and solves poverty and every quality of life metric.

Radelet ’16 (Steven; February 2016; Ph.D. and M.P.P. from Harvard University, B.A. from Central Michigan University, Distinguished Professor of the Practice of Development, and is Director of the Global Human Development Program at Georgetown University, former Professor of Government and Economics at Harvard University, former economic advisor to President Sirleaf of Liberia; Foreign Affairs, “Prosperity Rising,” https://www.foreignaffairs.com/articles/2015-12-14/prosperity-rising)

Since the early 1990s, daily life in poor countries has been changing profoundly for the better: **one billion people** have escaped extreme poverty, average **incomes have doubled**, infant death **rates have plummeted**, millions more girls have enrolled in school, **chronic hunger** has been cut almost in half, deaths from malaria and other diseases have declined dramatically, **democracy has spread** far and wide, and the incidence of war—even with Syria and other conflicts—has fallen by half. This unprecedented progress goes way beyond China and India and has touched hundreds of millions of people in dozens of developing countries across the globe, from Mongolia to Mozambique, Bangladesh to Brazil. Yet few people are aware of these achievements, even though, in aggregate, they rank among the **most important in human history**. In 2013, the Swedish survey organization Novus Group International asked Americans how they thought the share of the world’s population living in extreme poverty had changed over the last two decades. Sixty-six percent of respondents said that they thought it had doubled, and another 29 percent said that it hadn’t changed. Only five percent knew (or guessed) the truth: that the share of people living in extreme **poverty had fallen by half**. Perhaps that ignorance explains why Washington has done so little to take advantage of these promising trends, giving only tepid support to nascent democracies, making limited investments in economic development and in new health and agricultural technologies, and failing to take the lead in building more **effective international institutions**. Whatever the reason, many developing countries are now responding to what they perceive as the United States’ indifference by looking elsewhere—especially toward China—for deeper engagement and advice on how to keep growing. At the same time, climate change, the slowdown in global growth, and rising tensions in the Middle East and beyond have begun to **threaten further progress**. As a result, the United States now risks missing out on a **historic chance** to strengthen its global leadership and help create a safer, more prosperous, and more democratic world—just at the moment when it could help the most. ONE GIANT LEAP Global poverty is falling faster today than at any time in human history. In 1993, about two billion people were trapped in extreme poverty (defined by the World Bank as living on less than $1.90 per day); by 2012, that number had dropped to less than one billion. The industrialization of China is a big part of the story, of course, but even excluding that country, the number of extreme poor has fallen by more than 400 million. Since the 1980s, **more than 60 countries** have reduced the number of their citizens who are impoverished, even as their overall populations have grown. This decline in poverty has gone hand in hand with much **faster economic growth**. Between 1977 and 1994, the growth in per capita GDP across the developing countries averaged zero; since 1995, that figure has shot up to three percent. Again, the change is widespread: between 1977 and 1994, only 21 developing countries (out of 109 with populations greater than one million) exceeded two percent annual per capita growth, but between 1995 and 2013, 71 such countries did so. And going backward has become much less common: in the earlier period, more than 50 developing countries recorded negative growth, but in the later one, just ten did. The **improvements in health** have been even bigger. In 1960, 22 percent of children in developing countries died before their fifth birthday, but by 2013, only five percent did. Diarrhea killed five million children a year in 1990 but claimed fewer than one million in 2014. **Half as many people** now **die** from malaria as did in 2000, and deaths from tuberculosis and AIDS have both dropped by a third. The share of people living with chronic hunger has fallen by almost half since the mid-1990s. **Life expectancy** at birth in developing countries has **lengthened by** nearly **one-third**, from 50 years in 1960 to 65 years today. These improvements in health have left no country untouched, even the worst-governed ones. Consider this: the rate of child death has declined in every single country (at least those where data are available) since 1980. Meanwhile, far more children are enrolling in and completing school. In the late 1980s, only 72 percent of all primary-school-age children attended school; now, the figure exceeds 87 percent. Girls in developing countries have enjoyed the biggest gains. In 1980, only half of them finished primary school, whereas four out of five do so today. These leaps in education are beginning to translate into better-skilled workers. Then there is the shift to democracy. Prior to the 1980s, most developing countries were run by left- or right-wing dictators. Coups and countercoups, violence and assassinations, human rights abuses—all formed part of regular political life. But starting in the 1980s, dictators began to fall, a process that accelerated after the Cold War. In 1983, only 17 of 109 developing countries qualified as democracies, based on data from Freedom House and the Center for Systemic Peace; by 2013, the number had **more than tripled**, to 56 (and that’s not counting the many more developing countries with populations of less than one million). As those numbers suggest, power today is far more likely to be transferred through the ballot box than through violence, and elections in most countries have become fairer and more transparent. Twenty years ago, few Indonesians could have imagined that a furniture maker from central Java would beat one of Suharto’s relatives in a free and fair election, as Joko Widodo did in 2014. Nor would many have predicted that Nigeria, then still under military rule, would in 2015 mark its first peaceful transfer of power between parties, or that Myanmar (also called Burma) would hold its most successful democratic election the same year. Across the developing world, individual freedoms and rights are honored to a much greater degree, human rights **abuses are rarer**, and legislative bodies have more power. Yes, many of these new democracies have problems. And yes, the march toward democracy has slowed since 2005—and even reversed in some countries, such as Thailand and Venezuela. But in many more—from Brazil to Mongolia to Senegal—democracy has deepened. Never before in history have so many **developing countries been so democratic**. As states have become wealthier and more democratic, **conflict and violence** within them have declined. Those who think otherwise should remember that as recently as the 1980s and early 1990s, much of the world was aflame, from Central America to Southeast Asia to West Africa. There were half as many civil wars in the last decade as there were in the 1980s, and the number of people killed in armed conflicts has **fallen by three-quarters**. Three major forces sparked this great surge in development progress. First, the end of the Cold War brought an end to the superpowers’ support for some of the world’s nastiest dictators and reduced the frequency of conflict. As ideas about economic and political governance began to change, developing countries introduced more market-based economic systems and more democracy. Second, globalization created vast new opportunities for economic growth. Increased flows of trade, investment, information, and technology created more jobs and improved living standards. Third, new and more effective leaders—in politics, business, religion, and civil society—began to forge deep change. Where courageous figures, such as Nelson Mandela in South Africa, stepped forward, countries progressed; where old-style dictators, such as Robert Mugabe in Zimbabwe, remained in power, countries languished. This **incredibly wide-ranging progress** should not obscure the considerable work that remains: progress has not reached everyone, everywhere. One billion people still live in extreme poverty, six million children die every year from preventable diseases, too few girls get the education they deserve, and too many people suffer under dictatorships. Countries such as Haiti, North Korea, Uzbekistan, and Zimbabwe lag far behind. But the fact remains that an **enormous transformation** is under way—one that has already substantially improved the lives of hundreds of millions of people. WIN-WIN The United States should welcome and encourage this progress. For starters, broad-based development **enhances global security**. It is not true that poverty necessarily breeds terrorism, as some argue—after all, most poor people are not terrorists, and many terrorists are not poor. But it is true that poor states tend to be weak states unable to prevent **terrorist and criminal networks** from operating on their soil. Sustained development strengthens government institutions and reduces the need for outside intervention. As former U.S. Secretary of Defense Robert Gates put it, “Development is a lot cheaper than sending soldiers.” Development also builds states’ capacities to fight pandemic disease. Guinea, Liberia, and Sierra Leone were overwhelmed by Ebola in 2014 largely because they all had weak health systems. The same was true in many of the countries hit hardest by the HIV/AIDS epidemic decades ago. As poor countries grow wealthier, however, they become better equipped to **fight diseases** that can spread quickly beyond their borders. A more prosperous developing world also benefits the U.S. economy. The spread of economic growth creates **new markets** for American businesses not just in China but also in Brazil, Indonesia, South Africa, and beyond. Developing countries are buying more and more aircraft, automobiles, semiconductors, medical equipment, pharmaceuticals, consultancy services, and entertainment. Although the growth in trade with developing countries has slowed during the last year, their economies will no doubt remain major market opportunities for U.S. companies. In 1990, such states accounted for one-third of the global economy; today, their share is half, and they purchase more than half of U.S. exports. In 2011, Walmart spent $2.4 billion to acquire a controlling share of a holding company that operates more than 350 retail stores in South Africa and 11 other African countries, signaling a level of interest in African consumers that would have been unimaginable two decades ago. To be sure, emerging markets also create competition for U.S. businesses and hardship for American workers who lose their jobs as a result. But they also create many new jobs, as American firms expand abroad and as companies in the developing world send more capital to the West. Moreover, developing countries are increasingly coming up with their own **innovations** and **technologies**, in medicine, agriculture, energy, and more. The United States should respond to this growing competition not with protectionism but by strengthening its own capacities: rebuilding its **infrastructure, improving** its **educational** system, and investing in new technologies. Finally, development helps spread and deepen the values that Americans hold dear: openness, economic opportunity, democracy, and freedom. These values tend to go hand in hand with growing prosperity: as incomes rise, citizens demand greater freedoms. History suggests that even governments that do not welcome these ideas eventually embrace them or are replaced by those that do. And as more developing countries achieve progress under market-based economic systems and democracy, other countries seek to **emulate the model**. The United States and Europe have a strong self-interest in encouraging this process, since it will enhance global stability and add to the number of like-minded partners that can help address future challenges. SUSTAINING THE SURGE What makes all this progress especially impressive is that it has continued despite a number of major shocks that in an earlier age could well have stopped it: the outbreak of the HIV/AIDS pandemic in the 1980s, the Asian financial crisis in 1997–98, the 9/11 attacks, the global food crisis of 2007–8, and the global financial crisis of 2008. In each case, pundits predicted that the disaster of the day would set back progress. Yet in each case, the gains continued. There are good reasons to believe they can continue well into the future. The forces that sparked these **changes were fundamental**, not transitory. Governments have learned from their mistakes and gotten much better at managing inevitable downturns. Global integration has made critical technologies available to more and more people. **State institutions** have become more effective, with improved (if imperfect) legal systems, clearer property rights, and greater respect for individual liberties. Democratic rules and norms governing the transfer of political power, free speech, and accountability have become more deeply entrenched. Civil society groups are more active. These deep-seated changes have put enormous additional gains well within reach. If **economic growth proceeds** along the lines of most projections over the next two decades, some 700 million more people will escape extreme poverty. Per capita incomes in poor countries will double again, **millions of** childhood **deaths** will be avoided, **tens of millions** of children will get the education they deserve, hunger will decline, and basic rights and freedoms will spread further. At least, that’s what should happen—but none of these future gains is guaranteed. Growth has slowed markedly since 2008 in emerging economies such as Brazil and China and throughout the developing world. Russia, Thailand, and Venezuela have turned less democratic, and South Africa and Turkey seem to be headed in that direction as well. The Middle East has seen the return of conflict and **authoritarian rule**. China’s aggressive actions in the South China Sea could **spark a major conflict** that could kill tens of thousands of people and devastate the region’s economies. Outbreaks of SARS and the H1N1 and Ebola viruses underscore humanity’s vulnerability to disease, and many doctors worry that growing resistance to antibiotics could reverse some of the hard-fought gains in health. Meanwhile, global population is on track to exceed nine billion by 2050, and the combination of more people, higher incomes, and warmer climates will place enormous strains on the world’s supplies of fresh water, food, and energy. Although there are ample grounds for pessimism, the doomsayers continue to **underestimate humanity’s growing ability** to cooperate in the face of new challenges. In the eighteenth century, when Thomas Malthus looked at population growth and foresaw catastrophic famine, he failed to appreciate the advances in agriculture, health, and governance that human ingenuity could create. The same was true for those that predicted a population disaster in Asia in the 1960s and 1970s. Today, the problems facing developing countries are plain to see, while the new ideas and innovations that will overcome them are harder to picture. Continued progress isn’t automatic or guaranteed. But with smart choices, it is within reach. LEADING BY EXAMPLE Most of the key choices will be made in developing countries themselves. Sustaining progress will require leaders there to reduce their countries’ dependence on natural resources, make their economies more inclusive, invest more in health and education, expand opportunities for women, and strengthen democracy and the rule of law. Yet the future of development will also **depend on the** actions of the **world’s leading countries**, since poorer countries can prosper only in a strong global system. The United States must do its part by regaining its economic leadership through major investments in infrastructure, education, and technological advances in health, agriculture, and alternative fuels. It must act to fix its long-term budget problems by improving the solvency of Social Security, Medicare, and Medicaid and strengthen the financial system through better regulation. The country must also do a much better job of leading by **example on democracy**. Deep political polarization, the lack of substantive debate, the unwillingness to compromise, misguided foreign policy adventurism, and the Great Recession have made liberal democracy look unattractive and ineffective. That malaise matters, because many developing countries are now engaged in a battle of ideas over which economic and political model they should follow. On the one side stands the model that has prevailed in the West since World War II: market capitalism coupled with **liberal democracy**. On the other is the model practiced by China, Vietnam, Ethiopia, and, increasingly, Russia, among others: state capitalism coupled with authoritarian rule. And there’s yet one more option, with a smaller but more dangerous following: religious fundamentalism, as promulgated by Iran and Saudi Arabia and groups such as the Islamic State (or ISIS) and Boko Haram in Nigeria. As the Western countries struggle and China continues to rise, authoritarian capitalism is becoming more appealing. Consider Beijing’s ties to Africa. China purchased $26 billion in imports from the continent in 2013; the United States purchased $9 billion. Chinese investment in Africa has been growing by 50 percent per year since 2000, whereas U.S. investment is growing by 14 percent per year. Make no mistake: many Africans still prefer to follow the American model and view China with suspicion. But those attitudes are beginning to shift, and Beijing’s apparent ability to get things done will only enhance China’s appeal, especially if Washington seems to talk big but deliver little. THE NEXT SURGE FORWARD Aside from the broader task of getting their own houses in order, the United States and other Western powers should also assert leadership in several specific areas to **keep the progress going**. The first is climate change, which presents one of the greatest threats to poverty reduction. Most of the world’s poor countries had little to do with creating the problem, yet they will bear the brunt of the damage. Rising sea levels, changing rainfall patterns, higher temperatures, and dwindling water supplies will derail progress, will undermine global food production, and could engender major conflict. Developing countries have an important role to play in curbing emissions, but they will not switch to low-carbon fuels and other clean technologies if their developed-world counterparts do not. Washington has taken important first steps to reduce power-plant emissions and raise automotive fuel-efficiency standards, but there is a very long way to go. Second, leading countries—especially the United States—should invest more in **technological innovation**. Much of the credit for recent improvements in living standards goes to vaccines, medicines, high-yielding seed varieties, cell phones, and the Internet. These new technologies (alongside old ones such as electricity and paved roads) have not yet reached everywhere, so simply making them more widely available would do wonders. But sustaining progress for the next several decades will also require **significant investments** in new vaccines, more powerful drugs, drought- and heat-resistant seeds, desalination techniques, and clean energy.

#### Cap’s sustainable thanks to dematerialization—their transition fails

McAfee, 20—cofounder and codirector of the MIT Initiative on the Digital Economy at the MIT Sloan School of Management, former professor at Harvard Business School and fellow at Harvard’s Berkman Center for Internet and Society (Andrew, “Why Degrowth Is the Worst Idea on the Planet,” <https://www.wired.com/story/opinion-why-degrowth-is-the-worst-idea-on-the-planet/>, dml)

Over that same span, an unexpected and encouraging pattern has emerged: The world's richest countries have learned how to reduce their footprint on Earth. They're polluting less, using less land and water, consuming smaller amounts of important natural resources, and doing better in many other ways. Some of these trends are also now visible in less affluent countries.

However, many in the degrowth movement seem to have trouble taking yes for an answer. The claims I just made are widely resisted or ignored. Some say they’ve been debunked. Of course, debate over empirical claims like these is normal and healthy. Our impact on our planet is hugely important. But something less healthy is at work here. As Upton Sinclair put it, “It is difficult to get a man to understand something when his salary depends upon his not understanding it.” Some voices in the conversation about the environment seem wedded to the idea that degrowth is necessary, and they are unwilling or unable to walk away from it, no matter the evidence.

But evidence remains a powerful way to persuade the persuadable. The one thing everyone agrees on is that the last 50 years have been a period of growth, not degrowth. In fact, growth has never been faster, except for the 25-year rebuilding period after World War II. The population and economic growth rates of the past half-century are remarkably fast by historical standards. Between 1800 and 1945, for example, the world’s economy grew less than 1.5 percent per year, on average. Between 1970 and 2019, that average increased to almost 3.5 percent.

It's natural to assume that, as this growth continued, every nation’s planetary footprint would only increase. After all, as people become more numerous and prosperous they consume more, and producing all the goods and services they consume uses up resources, takes over ecosystems, and generates pollution. The logic seems ironclad that our gains have to be the environment’s losses.

Easing Pollution, Not Exporting It

In some important areas, however, a very different pattern emerged after 1970: Growth continued, but environmental harm decreased. This decoupling occurred first with pollution, and first in the rich world. In the US, for example, aggregate levels of six common air pollutants have declined by 77 percent, even as gross domestic product increased by 285 percent and population by 60 percent. In the UK, annual tonnage of particulate emissions dropped by more than 75 percent between 1970 and 2016, and of the main polluting chemicals by about 85 percent. Similar gains are common across the highest-income countries.

How were these reductions achieved? The two possibilities are cleanup and offshoring. Either rich countries figured out how to reduce their “air pollution per dollar” so much that overall pollution went down even as their economies grew, or they sent so much of their dirty production overseas that the air at home got cleaner. The first of these paths reduces the total burden of human-caused pollution; the second just rearranges it.

The evidence is overwhelming that rich countries cleaned up their air pollution much more than they outsourced it. For one, a great deal of air pollution comes from highway vehicles and power plants, and rich countries haven’t outsourced driving and generating electricity to low-income ones. In fact, high-income countries haven't even offshored most of their industry. The US and UK both manufacture more than they did 50 years ago (at least until the Covid-19 pandemic sharply reduced output), and Germany has been a net exporter since 2000 while continuing to drive down air pollution. The rest of the world has been exporting its manufacturing pollution to Germany (to use degrowthers’ phrasing), yet Germans are breathing cleaner air than they were 20 years ago.

Rich countries have reduced their air pollution not by embracing degrowth or offshoring, but instead by enacting and enforcing smart regulation. As economists Joseph Shapiro and Reed Walker concluded in a 2018 study about the US, “changes in environmental regulation, rather than changes in productivity and trade, account for most of the emissions reductions.” Research about the cleanup of US waters also concludes that well-designed and enforced regulations have successfully reduced pollution.

It is true that the US and other rich countries now import lots of products from China and other nations with higher pollution levels. But if there were no international trade at all, and rich countries had to rely exclusively on their domestic industries to make everything they consume, they’d still have much cleaner air and water than they did 50 years ago. As a 2004 Advances in Economic Analysis and Policy study summarized: “We find no evidence that domestic production of pollution-intensive goods in the US is being replaced by imports from overseas.”

The rich world’s success at decoupling growth from pollution is an inconvenient fact for degrowthers. Even more inconvenient is China's recent success at doing the same. China’s export-led, manufacturing-heavy economy has been growing at meteoric rates, but between 2013 and 2017 air pollution in densely populated areas declined by more than 30 percent. Here again the government mandated and monitored pollution declines and so decoupled growth from an important category of environmental harm.

Prosperity Bends the Curve

China's progress with air pollution is heartening, but it's not surprising to most economists. It's a clear example of the environmental Kuznets curve (EKC) in action. Named for the economist Simon Kuznets, EKC posits a relationship between a country's affluence and the condition of its environment. As GDP per capita rises from an initial low level, so too does environmental damage; but as affluence continues to increase, the harms level off and then start to decline. The EKC is clearly visible in the pollution histories of today's rich countries, and it's now taking shape in China and elsewhere.

Also consider air pollution death rates around the world. As the invaluable website Our World in Data puts it, “Rates have typically fallen across high-income countries: almost everywhere in Europe, but also in Canada, the United States, Australia, New Zealand, Japan, Israel and South Korea and other countries. But rates have also fallen across upper-middle income countries too, including China and Brazil. In low and lower-middle income countries, rates have increased over this period.”

The EKC is a direct refutation of a core idea of degrowth: that environmental harms must always rise as populations and economies do. It's not surprising that today's degrowth advocates rarely discuss the large reductions in air and water pollution that have accompanied higher prosperity in so many places around the world. Instead, degrowthers now focus heavily on one kind of pollution: greenhouse gas emissions.

The claims made are familiar ones: that any apparent reductions in greenhouse gas emissions in rich countries are due to offshoring rather than actual decarbonization. Thanks to the Global Carbon Project, we can see if this is the case. GCP has calculated “consumption-based emissions” for many countries going back to 1990, taking into account imports and exports, yielding the greenhouse gas emissions embodied in all the goods and services consumed in each country each year.

For several of the world's richest countries, including Germany, Italy, France, the UK, and the US, graphs of consumption-based carbon emissions follow the familiar EKC. The US, for example, has 22reduced its total (not per capita) consumption-based CO2 emissions by more than 13 percent since 2007.

These reductions are not mainly due to enhanced regulation. Instead, they've come about because of a combination of tech progress and market forces. Solar and wind power have become much cheaper in recent years and have displaced coal for electricity generation. Natural gas, which when burned emits fewer greenhouse gases per unit of energy than does coal (even after taking methane leakage into account), has also become much cheaper and more abundant in the US as a result of the fracking revolution.

To ensure that these greenhouse gas declines continue to spread and accelerate, we should apply the lessons we've learned from previous pollution reduction success. In particular, we should make it expensive to emit carbon, then watch the emitters work hard to reduce this expense. The best way to do this is with a carbon dividend, which is a tax on carbon emissions where the revenues are not kept by the government but instead are rebated to people as a dividend. William Nordhaus won the 2018 Nobel Prize in economics in part for his work on the carbon dividend, and an open letter advocating its implementation in the US has been signed by more than 3,500 economists. It's an idea whose time has come.

How We Learned to Lighten Up

Tech progress and price pressure aren't just leading to the demise of coal. They're also causing us to exploit the planet less in many other important ways, even as growth continues. In other words, EKCs are not just about pollution any more.

A good place to start examining this broad phenomenon of getting more from less is US agriculture, where we have decades of data on both outputs—crop tonnage—and the key inputs of cropland, water, and fertilizer. Domestic crop tonnage has risen steadily over the years and in 2015 was more than 55 percent higher than in 1980. Over that same period, though, total water used for irrigation declined by 18 percent, total cropland by more than 7 percent. That is, over that 35-year period, US crop agriculture increased its output by more than half while giving an area of land larger than Indiana back to nature and eventually using a Lake Champlain less water each year. This was not accomplished by increasing fertilizer use; total US fertilizer consumption in 2014 (the most recent year for which data are available) was within 2 percent of its 1980 level.

The three main fertilizers of nitrogen, potassium, and phosphorus (NKP) are an interesting case study. Their total US consumption (once other uses in addition to agriculture are taken into account) has declined by 23 percent since 1980, according to the United States Geological Survey. Yet some within the degrowth movement find ways to argue that these declines are also an illusion. These materials thus serve to clearly illustrate the differences in methodology, evidence, and worldview between ecomodernists like myself and degrowthers.

The USGS tracks annual domestic production, imports, and exports of NKP and uses these figures to calculate “apparent consumption” each year. Consumption of each of the three resources has declined by 16 percent or more from their peaks, which occurred no later than 1998. This seems like a clear and convincing example of dematerialization—getting more output from fewer material inputs.

As I argue in my book More From Less, dematerialization doesn’t happen for any complicated or idiosyncratic reason. It happens because resources cost money that companies would rather not spend, and tech progress keeps opening up new ways to produce more output (like crops) while spending less on material inputs (like fertilizers). Modern digital technologies are so good at helping producers get more from less that they're now allowing the US and other technologically sophisticated countries to use less in total of important materials like NKP.

Forest products provide another clear example of dematerialization in the US. Total annual domestic consumption of paper and paperboard peaked in 1999, and of timber in 2002. Both totals have since declined by more than 20 percent. Could these be mirages caused by offshoring that’s not properly captured? That’s highly unlikely, as the country is now onshoring more than it’s offshoring. The US has been a net exporter of forest products since 2009 and is now the world’s largest exporter of these materials.

Is the US economy also dematerializing its use of metals? Probably, but it’s hard to say for sure. The USGS tallies do show dematerialization in steel, aluminum, copper, and other important metals. But these figures don’t include the metals contained in imports of finished goods like cars and computers. America is a net importer of manufactured goods, so it could be that we’re using more metal year after year, but that much of this consumption is “hidden” from official statistics because of imports of heavy, complex products. However, my estimates indicate that this is extremely unlikely and that the country is in fact now reducing its overall consumption of metals.

Constructing a Weak Argument

Degrowth exponent Jason Hickel responds to this broad evidence of dematerialization by making once again the shopworn argument that there are no real environmental gains; there’s only globalization of harms. Hickel has argued repeatedly that once offshoring is properly taken into account, dematerialization vanishes. How can this be, when tallies take into account imports and exports of raw materials like NKP, timber, and paper? Because, he contends, they don't take into account the true “material footprint” of production around the world.

At this point the degrowth argument departs from reality. I mean literally. As “The Material Footprint of Nations” (the main paper Hickel cites) states, material footprint measures do “not record the actual physical movement of materials within and among countries.” Instead, they’re derived from a “calculation framework [that] … enumerates the link between the beginning of a production chain (where raw materials are extracted from the natural environment) and its end.”

Material footprint models estimate the total weight of all the materials disturbed by humans around the world as they produce the goods they eventually consume. All of the ores mined to make metal, the rock quarried to make gravel, the sand scooped up to make glass and microchips—all of these are estimated by country by year in the material footprint calculation framework.

A nation’s material footprint, then, is always higher than its direct material consumption (DMC). This is straightforward enough. What’s puzzling is that according to “The Material Footprint of Nations,” some rich countries are seeing their footprint go up even as their consumption goes down. The paper shows that many countries are now dematerializing. DMC has been trending downward for some time in the US, UK, and Japan and may recently have peaked for the European Union and OECD as a whole. Yet in all these cases, the material footprint continues to rise.

How can this be? It’s not because the material footprint models do a better job than the USGS of accounting for the metals and other materials in finished goods imports. The technical annex for the global material flows database notes that, as is the case with the USGS tallies, “complex manufactured items are largely excluded.” Instead, the paper notes, “the main reason in most cases was increased indirect use of (dependency on) construction materials.”

This is problematic, because those materials are so poorly tracked. As the appendix states, “Many countries have no data on extraction of non-metallic minerals primarily used for construction … When they are available, they are often unreliable, partial, and underreported.” It’s a poor strategy to use sparse, low-quality data to overturn conclusions based on uniform, high-quality data, yet this is what Hickel is doing when he argues that material footprint calculations show dematerialization is an illusion.

There’s one other serious problem with this argument. It’s based largely on the estimated “raw material equivalents” of Chinese exports of construction minerals, yet China is not at all a big exporter of these minerals. Instead, China’s main exports are electrical and mechanical machinery, plastics, furniture, apparel, and vehicles. None of these contain a lot of sand, gravel, stone, or clay.

So then how do such huge quantities of these and other construction minerals end up somehow being counted among China’s exports? Because China is building a lot of factories, railroads, highways, and other industrial infrastructure each year. The materials footprint calculation framework estimates how much tonnage of construction minerals all this building requires, then allocates about one third of this tonnage to exports. So by this logic, the smartphones and solar panels the US imported from China in, say, 2018 “contain” some of the stone and gravel used to build up China that year. By that same logic, if my neighbors bring me a cake the same year they renovate their house, then my consumption of lumber, drywall, and copper pipe goes up as soon as I have a slice.

Hickel doesn’t stand on any firmer ground when he moves from conclusions to recommendations. He has often claimed that 50 billion tons is the maximum weight of global resource extraction that Earth can sustainably handle and that we’re already well past this limit. In the face of this alleged crisis, he maintains that “the only fail-safe strategy is to impose legally binding caps on resource use and gradually ratchet it back down to safe levels.” However, the paper he cites to support his views contains a frank admission: “There is still no hard scientific evidence of causal relationship between human-induced resource flows and the possible breakdown of life-supporting functions at continental or global scale from which … targets [like a 50 billion ton limit] could directly be derived.” Before taking the unprecedented step of setting up a central resource planning bureaucracy, it doesn’t seem like too much to ask for hard scientific evidence that it’s actually necessary.

Let’s Keep Climbing

Throughout our history, we humans have been climbing a difficult path toward longer, healthier, more prosperous lives. As we climbed that path, we turned the environment around it brown and gray. Our mania for growth was in many ways bad news for the planet we all live on.

Recently, however, we have figured out how to make our path a green one, how to continue to grow while reducing our impact on Earth. The world’s richest countries are also putting more land and water under conservation, reintroducing native species into ecosystems from which they had been hunted into oblivion, and improving Earth in many other ways.

For reasons that I don't understand well, and that I understand less the more evidence I look at, degrowthers want to make us turn around and start walking back down the path, away from higher prosperity. Their vision seems to be one of a centrally planned, ever-deepening recession throughout the rich world for the sake of the environment.

Thanks to Covid-19, we have an inkling of how this would feel. A “degrowth recession” wouldn't have the virus’ deaths and sickness, and it wouldn't require us to practice social distancing. But it would have all the economic contractions’ job losses, business closures, mortgage defaults, and other hardships and uncertainties. And it would have them without end—after all, growth can't be allowed to restart. Corporate and government revenue would decrease permanently, and therefore so would innovation and R&D.

How many of us would be willing to accept all of this in exchange for somewhat less pollution and resource use? To sharpen the question, how many of us would be willing to accept this recession if it wasn’t necessary—if it were clear that we could get environmental improvements while continuing to grow and prosper?

The ecomodernist argument is that that is in fact clear. Unlike the degrowth argument, it's supported by a great deal of evidence. What's at least important is that it will be supported by a great deal of the world's people, who will eagerly sign up to climb our new green path to prosperity.

## Tricks

#### 1 – We get new responses to spikes in the 2NR – none of the args are complete or contextualized and we’re reactive- their interp incentivizes blip storms of spikes which win b/c they’re dropped, not cause they’re true- turns norming and deterrence.

#### 2 – ROB is to prove the material consequences of the aff relative to the squo or a policy option – that’s key to debating the implications of the topic which maximizes topic education – outweighs bc it’s the only impact to topic rotation every 2 months which is intrinsic to debate

#### 5 – Reasonability- persuasive defense on theory means you ignore it- theory requires abandoning substance to set a norm, which means the benefit of that norm must outweigh voting on theory instead of substance.

#### 6 – Err neg on theory and implicit neg flex standard on all their offense- no timeskew since we both get 13 min speaking time, aff gets first and last word, means they have a persuasiveness advantage which 2n collapse doesn’t check cause no 3n, they set the playing field with advocacy choice, neg is reactive, and they get infinite prep. Skew inevitable- all args are designed to skew the aff.

#### 7 – Hold the line on blippy spikes – they need a claim, warrant, and impact, and if you can’t explain their argument back to me in their words you should disregard it

#### 9- Permissibility and presumption negate—if the aff hasn’t proven a moral obligation to do the aff, then they haven’t met their burden of proof AND reject permissibility—it contradicts basic moral intuitions in saying that things like slavery are okay which is a reason why it’s false. Reject presumption—any risk of offense outweighs.