## 1

#### Interp: Debaters must disclose round reports on the 2021-2022 NDCA LD wiki for every round they have debated this season. Round reports disclose which positions (AC, NC, K, T, Theory, etc.) were read/gone for in every speech.

#### Violation: screenshot in the doc – they have none

#### Standards:

#### 1] Level Playing Field – big schools can go around and scout and collect flows but independents are left in the dark so round reports are key for them to prep- they give you an idea of overall what layers debaters like going for so you can best prepare your strategy when you hit them. Accessibility first and independent voter – it's an impact multiplier.

#### 2] Strategy Education – round reports help novices understand the context in which positions are read by good debaters and help with brainstorming potential 1NCs vs affs – helps compensate for kids who can't afford coaches to prep out affs.

#### 3] Pre-round prep –1ARs gives especially give an idea of what type of debater someone is – they could go for 1AR theory every round– otherwise I enter every round unknowing whereas you have an idea of what you want to go for from the start.

#### Fairness and education are voters – debate’s a game that needs rules to evaluate it and education gives us portable skills for life like research and thinking.

#### Drop the debater – a) they have a 7-6 rebuttal advantage and the 2ar to make args I can’t respond to, b) it deters future abuse and sets a positive norm.

#### Use competing interps – a) reasonability invites arbitrary judge intervention since we don’t know your bs meter, b) collapses to competing interps – we justify 2 brightlines under an offense defense paradigm just like 2 interps.

#### No RVIs – a) illogical – you shouldn’t win for being fair – it’s a litmus test for engaging in substance, b) norming – I can’t concede the counterinterp if I realize I’m wrong which forces me to argue for bad norms, c) chilling effect – forces you to split your 2AR so you can’t collapse and misconstrue the 2NR, d) topic ed – prevents 1AR blipstorm scripts and allows us to get back to substance after resolving theory

## 2

#### The standard is maximizing expected well-being.

#### 1] Only pleasure and pain are intrinsically valuable – all other frameworks collapse.

Moen 16 [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] TDI

Let us start by observing, empirically, that a widely shared judgment about intrinsic value and disvalue is that **pleasure is intrinsically valuable and pain is intrinsically disvaluable**. On virtually any proposed list of intrinsic values and disvalues (we will look at some of them below), pleasure is included among the intrinsic values and pain among the intrinsic disvalues. This inclusion makes intuitive sense, moreover, for **there is something undeniably good about the way pleasure feels and something undeniably bad about the way pain feels**, and neither the goodness of pleasure nor the badness of pain seems to be exhausted by the further effects that these experiences might have. “Pleasure” and “pain” are here understood inclusively, as encompassing anything hedonically positive and anything hedonically negative.2 **The special value statuses of pleasure and pain are manifested in how we treat these experiences in our everyday reasoning about values.** If you tell me that you are heading for the convenience store, I might ask: “What for?” This is a reasonable question, for when you go to the convenience store you usually do so, not merely for the sake of going to the convenience store, but for the sake of achieving something further that you deem to be valuable. You might answer, for example: “To buy soda.” This answer makes sense, for soda is a nice thing and you can get it at the convenience store. I might further inquire, however: “What is buying the soda good for?” This further question can also be a reasonable one, for it need not be obvious why you want the soda. You might answer: “Well, I want it for the pleasure of drinking it.” If I then proceed by asking “But what is the pleasure of drinking the soda good for?” the discussion is likely to reach an awkward end. The reason is that the **pleasure is not good for anything further**; it is simply that for which going to the convenience store and buying the soda is good.3 As Aristotle observes: “We never ask [a man] what his end is in being pleased, because we assume that pleasure is choice worthy in itself.”4 Presumably, a similar story can be told in the case of pains, for if someone says “This is painful!” we never respond by asking: “And why is that a problem?” We take for granted that if something is painful, we have a sufficient explanation of why it is bad. If we are onto something in our everyday reasoning about values, it seems that **pleasure and pain are both places where we reach the end of the line in matters of value.**

#### 2] Extinction first --- moral uncertainty.

**Bostrom 12** [(Nick Bostrom, Faculty of Philosophy & Oxford Martin School University of Oxford) “Existential Risk Prevention as Global Priority.” Global Policy, 2012] TDI

These reflections on moral uncertainty suggest an alternative, complementary way of looking at existential risk; they also suggest a new way of thinking about the ideal of sustainability. Let me elaborate. **Our** present **understanding** of axiology **might** well **be confused**. We may not now know — at least not in concrete detail — what outcomes would count as a big win for humanity; we might not even yet be able to imagine the best ends of our journey. **If we are** indeed profoundly **uncertain about our** ultimate aims, **then we should** recognize that there is a great option **value** in preserving — and ideally improving — **our ability to** recognize value and to **steer the future accordingly. Ensuring** that there will be **a future** version **of humanity** with great powers and a propensity to use them wisely is plausibly the best way available to us to increase the probability that the future will contain a lot of value. To do this, **we must prevent any existential catastrophe**.

#### 3] Actor specificity: A] Governments must aggregate since every policy benefit some and harms others, which also means side constraints freeze action. B] States lack wills or intentions since policies are collective actions. C] Actor-specificity comes first since different agents have different ethical standings.

#### The role of the ballot is to evaluate consequences.

#### 1] Consequences first — anything else is irresponsible and escapes valuable discussions.

**Bracey 06** (Christopher A. Bracey 6, Associate Professor of Law, Associate Professor of African & African American Studies, Washington University in St. Louis, September, Southern California Law Review, 79 S. Cal. L. Rev. 1231, p. 1318)

Second, reducing conversation on race matters to an ideological contest allows opponents to elide inquiry into whether the results of a particular preference policy are desirable. Policy positions masquerading as principled ideological stances create the impression that a racial policy is not simply a choice among available alternatives, but the embodiment of some higher moral principle. Thus, the "principle" becomes an end in itself, without reference to outcomes. Consider the prevailing view of colorblindness in constitutional discourse. Colorblindness has come to be understood as the embodiment of what is morally just, independent of its actual effect upon the lives of racial minorities. This explains Justice Thomas's belief in the "moral and constitutional equivalence" between Jim Crow laws and race preferences, and his tragic assertion that "Government cannot make us equal [but] can only recognize, respect, and protect us as equal before the law." [281](http://web.lexis-nexis.com/universe/document?_m=cd9713b340d60abd42c2b34c36d8ef95&_docnum=9&wchp=dGLbVzz-zSkVA&_md5=9645fa92f5740655bdc1c9ae7c82b328) For Thomas, there is no meaningful difference between laws designed to entrench racial subordination and those designed to alleviate conditions of oppression. Critics may point out that colorblindness in practice has the effect of entrenching existing racial disparities in health, wealth, and society. But in framing the debate in purely ideological terms, opponents are able to avoid the contentious issue of outcomes and make viability determinations based exclusively on whether racially progressive measures exude fidelity to the ideological principle of colorblindness. Meaningful policy debate is replaced by ideological exchange, which further exacerbates hostilities and deepens the cycle of resentment.

## 3

#### Counterplan: Just gov ought to recognize an unconditional right of workers to strike except in the instance that strikes directly demand discrimination towards certain groups of individuals

BPSC[Unfair Labor Practices by Union, http://bpscllc.com/unfair-labor-practices-by-unions.html, N.D., Business & People Strategy Consulting Group, California's trusted source for workplace human resources and employment law] [SS]

Causing or Attempting to Cause Discrimination: Section 8(b)(2) makes it an unfair labor practice for a labor organization to cause or attempt to cause an employer to discriminate against an employee in violation of Section 8(a)(3). The section is violated by agreements or arrangements with employers, other than lawful union-security agreements, that condition employment or job benefits on union membership, on the performance of union membership obligations or on arbitrary grounds. But union action that causes detriment to an individual employee does not violate Section 8(b)(2) if it is consistent with nondiscriminatory provisions of a bargaining contract negotiated for the benefit of the total bargaining unit, or if the action is based on some other legitimate purpose. A union’s conduct, accompanied by statements advising or suggesting that action is expected of an employer, may be enough to find a violation of this section if the union’s action can be shown to be a causal factor in the employer’s discrimination. Contracts or informal arrangements with a union under which an employer gives preferential treatment to union members also violate Section 8(b)(2). However, an employer and a union may agree that the employer will hire new employees exclusively through the union hiring hall if there is no discrimination against nonunion members on the basis of union membership obligations. In setting referral standards, a union may consider legitimate aims such as sharing available work and easing the impact of local unemployment. The union may also charge referral fees if the amount of the fee is reasonably related to the cost of operating the referral service. A union that attempts to force an employer to enter into an illegal union-security agreement, or that enters into and keeps in effect such an agreement, also violates Section 8(b)(2), as does a union that attempts to enforce such an illegal agreement by bringing about an employee’s discharge. Even when a union-security provision of a bargaining contract meets all statutory requirements, a union may not lawfully require the discharge of employees under the provision unless they were informed of the union-security agreement and their specific obligation under it. A union violates Section 8(b)(2) if it tries to use the union-security provisions of a contract to collect payments other than those lawfully required, such as assessments, fines and penalties. Other examples of Section 8(b)(2) violations include: Causing an employer to discharge employees because they circulated a petition urging a change in the union’s method of selecting shop stewards Causing an employer to discharge employees because they made speeches against a contract proposed by the union Making a contract that requires an employer to hire only members of the union or employees “satisfactory” to the union Causing an employer to reduce employees’ seniority because they engaged in anti-union acts Refusing referral or giving preference on the basis of race or union activities when making job referrals to units represented by the union Seeking the discharge of an employee under a union-security agreement for failure to pay a fine levied by the union

#### Racist union strikes have happened before

Allison Keyes, JUNE 30, **2017**, "The East St. Louis Race Riot Left Dozens Dead, Devastating a Community on the Rise," Smithsonian Magazine, https://www.smithsonianmag.com/smithsonian-institution/east-st-louis-race-riot-left-dozens-dead-devastating-community-on-the-rise-180963885/ //SR

Racial tensions began simmering in East St. Louis—a city where thousands of blacks had moved from the South to work in war factories—as early as February 1917. The African-American population was 6,000 in 1910 and nearly double that by 1917. In the spring, the largely white workforce at the Aluminum Ore Company went on strike. Hundreds of blacks were hired. After a City Council meeting on May 28, angry white workers lodged formal complaints against black migrants. When word of an attempted robbery of a white man by an armed black man spread through the city, mobs started beating any African-Americans they found, even pulling individuals off of streetcars and trolleys. The National Guard was called in but dispersed in June.

## 4

#### The Global Economy is stabilizing and set for increases in 2021 but is still vulnerable to shocks

World Bank 6-8 6-8-2021 "The Global Economy: on Track for Strong but Uneven Growth as COVID-19 Still Weighs" <https://www.worldbank.org/en/news/feature/2021/06/08/the-global-economy-on-track-for-strong-but-uneven-growth-as-covid-19-still-weighs>

A year and a half since the onset of the COVID-19 pandemic, the global economy is poised to stage its most **robust post-recession recovery** in 80 years in 2021. But the rebound is expected to be **uneven across countries**, as major economies look set to register strong growth even as many developing economies lag. Global growth is expected to accelerate to 5.6% this year, largely on the strength in major economies such as the United States and China. And while growth for almost every region of the world has been revised upward for 2021, many continue to grapple with COVID-19 and what is likely to be its long shadow. Despite this year’s pickup, the level of global GDP in 2021 is expected to be **3.2% below** pre-pandemic projections, and per capita GDP among many emerging market and developing economies is anticipated to remain below pre-COVID-19 peaks for an extended period. As the **pandemic continues to flare**, it will shape the path of global economic activity.

#### Strikes hurt the Economy – two warrants:

#### 1] They hurt critical core industries that is necessary for economic growth

McElroy 19 John McElroy 10-25-2019 "Strikes Hurt Everybody" <https://www.wardsauto.com/ideaxchange/strikes-hurt-everybody> (MPA at McCombs school of Business)

This creates a **poisonous relationship** between the company and its workforce. Many GM hourly workers don’t identify as GM employees. They identify as UAW members. And they see the union as the source of their jobs, not the company. It’s an unhealthy dynamic that puts GM at a disadvantage to non-union automakers in the U.S. like Honda and Toyota, where workers take pride in the company they work for and the products they make. Attacking the company in the media also **drives away customers**. Who wants to buy a shiny new car from a company that’s accused of underpaying its workers and treating them unfairly? Data from the Center for Automotive Research (CAR) in Ann Arbor, MI, show that **GM loses market share during strikes and never gets it back**. GM lost two percentage points during the 1998 strike, which in today’s market would represent **a loss of 340,000 sales**. Because GM reports sales on a quarterly basis we’ll only find out at the end of December if it lost market share from this strike. UAW members say one of their greatest concerns is job security. But causing a company to lose market share is a sure-fire path to **more plant closings and layoffs**. Even so, unions are incredibly important for boosting wages and benefits for working-class people. GM’s UAW-represented workers earn considerably more than their non-union counterparts, about $26,000 more per worker, per year, in total compensation. Without a union they never would have achieved that. Strikes are a powerful weapon for unions. They usually are the only way they can get management to accede to their demands. If not for the power of collective bargaining and the threat of a strike, management would largely ignore union demands. If you took away that threat, management would pay its workers peanuts. Just ask the Mexican line workers who are paid $1.50 an hour to make $50,000 BMWs. But strikes don’t just hurt the people walking the picket lines or the company they’re striking against. They hurt **suppliers, car dealers and the communities located near the plants.** The Anderson Economic Group estimates that 75,000 workers at supplier companies were temporarily laid off because of the GM strike. Unlike UAW picketers, those supplier workers won’t get any strike pay or an $11,000 contract signing bonus. No, most of them lost close to a month’s worth of wages, which must be financially devastating for them. GM’s suppliers also lost a lot of money. So now they’re cutting budgets and delaying capital investments to make up for the lost revenue, which is a further drag on the economy. According to CAR, the communities and states where GM’s plants are located collectively lost a couple of hundred million dollars in payroll and tax revenue. Some economists warn that if the strike were prolonged it could knock the state of Michigan – home to GM and the UAW – **into a recession.** That prompted the governor of Michigan, Gretchen Whitmer, to call GM CEO Mary Barra and UAW leaders and urge them to settle as fast as possible. So, while the UAW managed to get a nice raise for its members, the strike left a path of destruction in its wake. That’s not fair to the innocent bystanders who will never regain what they lost. John McElroyI’m not sure how this will ever be resolved. I understand the need for collective bargaining and the threat of a strike. But there’s got to be a better way to get workers a raise without torching the countryside.

#### 2] Strikes create a stigmatization effect over labor and consumption that devastates the Economy

Tenza 20, Mlungisi. "The effects of violent strikes on the economy of a developing country: a case of South Africa." Obiter 41.3 (2020): 519-537. (Senior Lecturer, University of KwaZulu-Natal)

When South Africa obtained democracy in 1994, there was a dream of a better country with a new vision for industrial relations.5 However, the number of violent strikes that have bedevilled this country in recent years seems to have shattered-down the aspirations of a better South Africa. South Africa recorded 114 strikes in 2013 and 88 strikes in 2014, which cost the country about **R6.1 billion** according to the Department of Labour.6 The impact of these strikes has been hugely felt by the mining sector, particularly the platinum industry. The biggest strike took place in the platinum sector where about 70 000 mineworkers’ downed tools for better wages. Three major platinum producers (Impala, Anglo American and Lonmin Platinum Mines) were affected. The strike started on 23 January 2014 and ended on 25 June 2014. Business Day reported that “the five-month-long strike in the platinum sector pushed the economy to the brink of recession”. 7 This strike was closely followed by a four-week strike in the metal and engineering sector. All these strikes (and those not mentioned here) were characterised with violence accompanied by damage to property, intimidation, assault and sometimes the killing of people. Statistics from the metal and engineering sector showed that about 246 cases of intimidation were reported, 50 violent incidents occurred, and 85 cases of vandalism were recorded.8 Large-scale unemployment, soaring poverty levels and the dramatic income inequality that characterise the South African labour market provide a broad explanation for strike violence.9 While participating in a strike, workers’ stress levels leave them feeling frustrated at their seeming powerlessness, which in turn provokes further violent behaviour.10 These strikes are not only violent but **take long to resolve.** Generally, a lengthy strike has a **negative effect on employment, reduces business confidence and increases the risk of economic stagflation**. In addition, such strikes have a major setback on the growth of the economy and investment opportunities. It is common knowledge that consumer spending is directly linked to economic growth. At the same time, if the economy is not showing signs of growth, employment opportunities are shed, and poverty becomes the end result. The economy of South Africa is in need of rapid growth to enable it to deal with the high levels of unemployment and resultant poverty. One of the measures that may boost the country’s economic growth is by attracting potential investors to invest in the country. However, this might be difficult as investors would want to invest in a country where there is a likelihood of getting returns for their investments. The wish of getting returns for investment may not materialise if the labour environment **is not fertile** for such investments as a result of, for example, unstable labour relations. Therefore, investors may be reluctant to invest where there is an unstable or fragile labour relations environment. 3 THE COMMISSION OF VIOLENCE DURING A STRIKE AND CONSEQUENCES The Constitution guarantees every worker the right to join a trade union, participate in the activities and programmes of a trade union, and to strike. 11 The Constitution grants these rights to a “worker” as an individual.12 However, the right to strike and any other conduct in contemplation or furtherance of a strike such as a picket13 can only be exercised by workers acting collectively.14 The right to strike and participation in the activities of a trade union were given more effect through the enactment of the Labour Relations Act 66 of 199515 (LRA). The main purpose of the LRA is to “advance economic development, social justice, labour peace and the democratisation of the workplace”. 16 The advancement of social justice means that the exercise of the right to strike must advance the interests of workers and at the same time workers must refrain from any conduct that can affect those who are not on strike as well members of society. Even though the right to strike and the right to participate in the activities of a trade union that often flow from a strike17 are guaranteed in the Constitution and specifically regulated by the LRA, it sometimes happens that the right to strike is exercised for purposes not intended by the Constitution and the LRA, generally. 18 For example, it was not the intention of the Constitutional Assembly and the legislature that violence should be used during strikes or pickets. As the Constitution provides, pickets are meant to be peaceful. 19 Contrary to section 17 of the Constitution, the conduct of workers participating in a strike or picket has changed in recent years with workers trying to emphasise their grievances by causing disharmony and chaos in public. A media report by the South African Institute of Race Relations pointed out that between the years 1999 and 2012 there were 181 strike-related deaths, 313 injuries and 3,058 people were arrested for public violence associated with strikes.20 The question is whether employers succumb easily to workers’ demands if a strike is accompanied by violence? In response to this question, one worker remarked as follows: “[T]here is no sweet strike, there is no Christian strike … A strike is a strike. [Y]ou want to get back what belongs to you ... you won’t win a strike with a Bible. You do not wear high heels and carry an umbrella and say ‘1992 was under apartheid, 2007 is under ANC’. You won’t win a strike like that.” 21 The use of violence during industrial action affects not only the strikers or picketers, the employer and his or her business but it also affects innocent members of the public, non-striking employees, the environment and the economy at large. In addition, striking workers visit non-striking workers’ homes, often at night, threaten them and in some cases, assault or even murder workers who are acting as replacement labour. 22 This points to the fact that for many workers and their families’ living conditions remain unsafe and vulnerable to damage due to violence. In Security Services Employers Organisation v SA Transport & Allied Workers Union (SATAWU),23 it was reported that about 20 people were thrown out of moving trains in the Gauteng province; most of them were security guards who were not on strike and who were believed to be targeted by their striking colleagues. Two of them died, while others were admitted to hospitals with serious injuries.24 In SA Chemical Catering & Allied Workers Union v Check One (Pty) Ltd,25 striking employees were carrying various weapons ranging from sticks, pipes, planks and bottles. One of the strikers Mr Nqoko was alleged to have threatened to cut the throats of those employees who had been brought from other branches of the employer’s business to help in the branch where employees were on strike. Such conduct was held not to be in line with good conduct of striking.26 These examples from case law show that South Africa is facing a problem that is affecting not only the industrial relations’ sector but also the economy at large. For example, in 2012, during a strike by workers employed by Lonmin in Marikana, the then-new union Association of Mine & Construction Workers Union (AMCU) wanted to exert its presence after it appeared that many workers were not happy with the way the majority union, National Union of Mine Workers (NUM), handled negotiations with the employer (Lonmin Mine). AMCU went on an unprotected strike which was violent and resulted in the loss of lives, damage to property and negative economic consequences including a weakened currency, reduced global investment, declining productivity, and increase unemployment in the affected sectors.27 Further, the unreasonably long time it takes for strikes to get resolved in the Republic has a negative effect on the business of the employer, the economy and employment. 3 1 Effects of violent and long strikes on the economy Generally, South Africa’s economy is on a downward scale. First, it fails to create employment opportunities for its people. The recent statistics on unemployment levels indicate that unemployment has increased from 26.5% to 27.2%. 28 The most prominent strike which nearly brought the platinum industries to its knees was the strike convened by AMCU in 2014. The strike started on 23 January 2014 and ended on 24 June 2014. It affected the three big platinum producers in the Republic, which are the Anglo American Platinum, Lonmin Plc and Impala Platinum. It was the longest strike since the dawn of democracy in 1994. As a result of this strike, the platinum industries lost billions of rands.29 According to the report by Economic Research Southern Africa, the platinum group metals industry is South Africa’s second-largest export earner behind gold and contributes just over 2% of the country’s Gross Domestic Product (GDP).30 The overall metal ores in the mining industry which include platinum sells about 70% of its output to the export market while sales to local manufacturers of basic metals, fabricated metal products and various other metal equipment and machinery make up to 20%. 31 The research indicates that the overall impact of the strike in 2014 was driven by a reduction in productive capital in the mining sector, accompanied by a decrease in labour available to the economy. This resulted in a sharp increase in the price of the output by 5.8% with a **GDP declined by 0.72 and 0.78%**.32

#### Err Negative – over-estimate the effect on Strikes on the economy since traditional economic measures underestimate the damage.

Babb No Date Katrina Babb "Chapter 11: The Economic Impact of Unions" <http://isu.indstate.edu/conant/ecn351/ch11/chapter11.htm> (Professor of Economic at Indiana State)

Strikes ­ Simple statistics on strike activity suggest that strikes are relatively rare and the associated aggregate economic losses are relatively minimal. Table 11-3 provides data on major work stoppages, defined as those involving 1000 or more workers and lasting at least one full day or one work shift. But these data **can be misleading** **as a measure of the costliness of a strike.** On the one hand, employers in the struck industry may have anticipated the strike and worked their labor force overtime to accumulate inventories to supply customers during the strike period, so that the work lost data overstates the actual loss. On the other hand, the amount lost **can be understated** by the data if production in associated industries ( those that buy inputs from the struck industry or sell products to it) **is disrupted**. As a broad generalization, the adverse effects of a strike on nonstriking firms and customers are likely to be greater **when services are involved** and less when products are involved. Remember, that strikes are the result of the failure of both parties to the negotiation, so it is inaccurate to attribute all of the costs associated with a strike to labor alone.

#### Economic Collapse goes Nuclear.

Tønnesson 15, Stein. "Deterrence, interdependence and Sino–US peace." International Area Studies Review 18.3 (2015): 297-311. (the Department of Peace and Conflict, Uppsala University, Sweden, and Peace research Institute Oslo (PRIO), Norway)

Several recent works on China and Sino–US relations have made substantial contributions to the current understanding of how and under what circumstances a combination of nuclear deterrence and economic interdependence may reduce the risk of war between major powers. At least four conclusions can be drawn from the review above: first, those who say that interdependence may both inhibit and drive conflict are right. Interdependence raises the cost of conflict for all sides but asymmetrical or unbalanced dependencies and negative trade expectations may generate tensions leading to trade wars among inter-dependent states that in turn increase the risk of military conflict (Copeland, 2015: 1, 14, 437; Roach, 2014). The risk may increase if one of the interdependent countries is governed by an inward-looking socio-economic coalition (Solingen, 2015); second, the risk of war between China and the US should not just be analysed bilaterally but include their allies and partners. Third party countries could drag China or the US into confrontation; third, in this context it is of some comfort that the three main economic powers in Northeast Asia (China, Japan and South Korea) are all deeply integrated economically through production networks within a global system of trade and finance (Ravenhill, 2014; Yoshimatsu, 2014: 576); and fourth, decisions for war and peace are taken by very few people, who act on the basis of their future expectations. International relations theory must be supplemented by foreign policy analysis in order to assess the value attributed by national decision-makers to economic development and their assessments of risks and opportunities. If leaders on either side of the Atlantic begin to seriously fear or anticipate their own nation’s decline then they may blame this on external dependence, appeal to anti-foreign sentiments, contemplate the use of force to gain respect or credibility, adopt protectionist policies, and ultimately refuse to be deterred by either nuclear arms or prospects of socioeconomic calamities. Such a dangerous shift could happen abruptly, i.e. under the instigation of actions by a third party – or against a third party. Yet as long as there is both nuclear deterrence and interdependence, the tensions in East Asia are unlikely to escalate to war. As Chan (2013) says, all states in the region are aware that they cannot count on support from either China or the US if they make provocative moves. The greatest risk is not that a territorial dispute leads to war under present circumstances but that changes in the world economy alter those circumstances in ways that render inter-state peace more precarious. If China and the US fail to rebalance their financial and trading relations (Roach, 2014) then a trade war could result, interrupting transnational production networks, provoking social distress, and exacerbating nationalist emotions. This could have unforeseen consequences in the field of security, with nuclear deterrence remaining the only factor to protect the world from Armageddon, and unreliably so. Deterrence could lose its credibility: one of the two great powers might gamble that the other yield in a cyber-war or conventional limited war, or third party countries might engage in conflict with each other, with a view to obliging Washington or Beijing to intervene.

## Case

#### No 1ar theory – a)7-6, 2-1 skew proves its always skewed to the aff, b) resolvability double bind – either the judge has to intervene to decide whether the 2ar’s answers to the 2nr’s Counter interp are sufficient or they auto accept every answer and you auto win. Intervention ow since it takes the round out of the debaters hands. That also means reasonability on 1ar theory since some level of intervention is inevitable so it’s net better to focus on things like substance education, Drop the argument on 1ar theory – they can initiate offensive drop the debater theory in the aff and in the 1ar while no judge would vote on 2n theory on severance.

### Cap Sustainable – Environment

**Tech innovation and profit motives drive the Second Machine Age, which dematerializes capitalism and makes growth sustainable.**

**McAfee, 19**—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, “Looking Ahead: The World Cleanses Itself This Way,” *More from Less: The Surprising Story of How We Learned to Prosper Using Fewer Resources—and What Happens Next*, Chapter 14, pg 278-292, Kindle, dml)

**The decreases in resource use, pollution, and other exploitations of the earth** cataloged in the preceding chapters **are great news. But are they going to last? It could be that we're just living in a pleasant interlude between the Industrial Era and another** rapacious **period during which we massively increase our footprint on our planet and** eventually **cause a giant Malthusian crash**.

It could be, but **I don't think so**. Instead, I think **we're going to take better care of our planet from now on**. I'm confident that **the Second Machine Age will mark the time in our history when we started to progressively and permanently tread more lightly on the earth, taking less from it and generally caring for it better, even as we humans continue to become more numerous and prosperous**. The work of Paul Romer, who shared the 2018 Nobel Prize in economics, is one of the sources of this confidence.

Growth Mindset

Romer's largest contribution to economics was to show that it's best not to think of new technologies as something that companies buy and bring in from the outside, but instead as something they create themselves (the title of his most famous paper, published in 1990, is "Endogenous Technological Change"). These **technologies are like designs or recipes**; as Romer put it, they’re "**the instructions that we follow for combining raw materials**." This is close to the definitions of technology presented in chapter 7.

**Why do companies invent and improve technologies?** Simply, **to generate profits. They come up with instructions, recipes, and blueprints that will let them grow revenues or shrink costs**. As we saw repeatedly in chapter 7, **capitalism provides ample incentive for this kind of tech progress**.

So far, all this seems like a pretty standard argument for how the first two horsemen work together. Romer's brilliance was to highlight the importance of two key attributes of the **technological ideas** companies come up with as they pursue profits. The first is that **they're nonrival**, meaning that **they can be used by more than one person or company at a time, and that they don't get used up**. This is obviously not the case for most resources made out of atoms—I can't also use the pound of steel that you've just incorporated into the engine of a car—but it is the case for ideas and instructions. The Pythagorean theorem, a design for a steam engine, and a recipe for delicious chocolate chip cookies aren't ever going to get "used up" no matter how much they're used.

The second important aspect of corporate technologies is that **they're partially excludable**. This means that companies can kind of prevent others from using them. They do this by keeping the technologies secret (such as the exact recipe for Coca-Cola), filing for patents and other intellectual-property protection, and so on. However, none of these measures is perfect (hence the words partially and kind of). Trade secrets leak. Patents expire, and even before they expire, they must describe the invention they're claiming and so let others study it.

**Partial excludability** is a beautiful thing. It **provides strong incentives for companies to create useful, profit-enhancing new technologies** that they alone can benefit from for a time, **yet it also ensures that the new techs will eventually "spill over"—that with time they’ll diffuse and get adopted by more and more companies**, even if that's not what their originators want.

Romer equated tech progress to the production by companies of nonrivalrous, partially excludable ideas and showed that **these ideas cause an economy to grow**. What's more, he also demonstrated that **this idea-fueled growth doesn't have to slow down with time. It's not constrained by the size of the labor force, the amount of natural resources, or other such factors**. Instead, **economic growth is limited only by the idea-generating capacity of the people within a market**. Romer called this capacity "human capital" and said at the end of his 1990 paper, "The most interesting positive implication of the model is that an economy with a larger total stock of human capital will experience faster growth."

This notion, which has come to be called **"increasing returns to scale," is as powerful as it is counterintuitive. Most formal models of economic growth**, as well as the informal mental ones most of us walk around with, **feature decreasing returns—growth slows down as the overall economy gets bigger. This makes intuitive sense**; it just feels like it would be easier to experience 5 percent growth in a $1 billion economy than a $1 trillion one. **But** Romer showed that as long **as that economy continued to add to its human capital—the overall ability of its people to come up with new technologies and put them to use—it could actually grow faster even as it grew bigger. This is because the stock of useful, nonrivalrous, nonexcludable ideas would keep growing**. As Romer convincingly showed, economies run and grow on ideas.

The Machinery of Prosperity

Romer's ideas should leave us optimistic about the planetary benefits of digital tools—hardware, software, and networks—for three main reasons. First, **countless examples show us how good** these tools are at fulfilling the central role of **technology**, which **is** to provide "instructions that we follow **for combining raw materials**." **Since raw materials cost money, profit-maximizing companies are particularly keen to find ways to use fewer of them**. So they use digital tools to come up with beer cans that use less aluminum, car engines that use less steel and less gas, mapping software that removes the need for paper atlases, and so on and so on. **None of this is done solely for the good of the earth—it's done for the pursuit of profit that's at the heart of capitalism—yet it benefits the planet by**, as we've seen, **causing us to take less from it**.

Digital tools are technologies for creating technologies, the most prolific and versatile ones we've ever come up with. They're machines for coming up with ideas. Lots of them. **The same piece of computer-aided design software can be used to create a thinner aluminum can or a lighter and more fuel-efficient engine. A drone can be used to scan farmland** to see if more irrigation is needed, **or to substitute for a helicopter** when filming a movie. **A smartphone can be used** to read the news, listen to music, and pay for things, all **without consuming a single extra molecule**.

In the Second Machine Age, **the global stock of digital tools is increasing much more quickly than ever before. It's being used in countless ways by profit-hungry companies to combine raw materials in ways that use fewer of them**. In advanced economies such as America's, **the cumulative impact of this combination of capitalism and tech progress is clear: absolute dematerialization of the economy and society, and thus a smaller footprint on our planet**.

The second way Romer's ideas about technology and growth are showing up at present is via decreased excludability. **Pervasive digital tools are making it much easier for good designs and recipes to spread around the world**. While this is often not what a company wants—it wants to exclude others from its great cost-saving idea— excludability is not as easy as it used to be.

This isn't because of weaker patent protection, but instead because of stronger digital tools. **Once one company shows what's possible, others use hardware, software, and networks to catch up to the leader. Even if they can't copy exactly** because of intellectual-property restrictions, **they can use digital tools to explore other means to the same end. So, many farmers learn to get higher yields while using less water and fertilizer, even though they combine these raw materials in different ways**. Steve Jobs would certainly have preferred for Apple to be the only provider of smartphones after it developed the iPhone, but he couldn't maintain the monopoly no matter how many patents and lawsuits he filed. Other companies found ways to combine processors, memory, sensors, a touch screen, and software into phones that satisfied billions of customers around the world.

The operating system that powers most non-Apple smartphones is Android, which is both free to use and freely modifiable. Google's parent company, Alphabet, developed and released Android without even trying to make it excludable; the explicit goal was to make it as widely imitable as possible. This is an example of the broad trend across digital industries of giving away valuable technologies for free.

The Linux operating system, of which Android is a descendant, is probably the best-known example of free and open-source software, but there are many others. The online software repository GitHub maintains that it's "the largest open source community in the world" and hosts millions of projects. The Arduino community does something similar for electronic hardware, and the Instructables website contains detailed instructions for making equipment ranging from air-particle counters to machine tools, all with no intellectual-property protection. Contributors to efforts such as these have a range of motivations (Alphabet's goals with Android were far from purely altruistic—among other things, the parent of Google wanted to achieve a quantum leap in mobile phone users around the world, who would avail themselves of Google Search and services such as YouTube), but they're all part of the trend of technology without excludability, which is great news for growth.

As we saw in chapter 10, **smartphone use and access to the Internet are increasing quickly across the planet. This means that people no longer need to be near a decent library or school to gain knowledge and improve their abilities. Globally, people are taking advantage of the skill-building opportunities of new technologies**. This is the third reason that the spread of digital tools should make us optimistic about future growth: **these tools are helping human capital grow quickly**.

The free Duolingo app, for example, is now the world's most popular way to learn a second language. Of the nearly 15 billion Wikipedia page views during July of 2018, half were in languages other than English. Google's chief economist, Hal Varian, points out that hundreds of millions of how-to videos are viewed every day on YouTube, saying, "We never had a technology before that could educate such a broad group of people anytime on an as-needed basis for free."

Romer's work leaves me hopeful because it shows that **it's our ability to build human capital, rather than chop down forests, dig mines, or burn fossil fuels that drives growth and prosperity**. His model of how economies grow also reinforces how well capitalism and tech progress work together, which is a central point of this book. **The surest way to boost profits is to cut costs, and modern technologies, especially digital ones, offer unlimited ways to combine and recombine materials—to swap, slim, optimize, and evaporate—in cost-reducing ways.** **There's no reason to expect that** the two horsemen of **capitalism and tech progress will stop** riding together **anytime soon. Quite the contrary**. Romer's insights reveal that **they're likely to gallop faster and farther as economies grow**.

Our Brighter, Lighter Future

**The world still has billions of desperately poor people, but they won't remain that way. All available evidence strongly suggests that most will become much wealthier in the years and decades ahead. As they earn more and consume more, what will be the impact on the planet?**

The **history** and economics of the Industrial Era **lead to pessimism** on this important question. **Resource use increased in lockstep with economic growth throughout** the two **centuries** between James Watt's demonstration of his steam engine and the first Earth Day. **Malthus and Jevons seemed to be right, and it was just a question of when, not if, we'd run up against the hard planetary limits to growth.**

**But** in America and other rich countries **something strange, unexpected, and wonderful happened: we started getting more from less. We decoupled population and economic growth from resource consumption, pollution, and other environmental harms. Malthus's and Jevons's ideas gave way** to Romer's, and the world will never be the same.

This means that **instead of worrying about the world's poor becoming richer, we should instead be helping them upgrade economically as much and as quickly as possible**. Not only is it the morally correct thing to do, **it's** also **the smart move for our planet. As today’s poor countries get richer, their institutions will improve and most will eventually go through** what Ricardo Hausmann calls "**the capitalist makeover of production**." **This makeover doesn't enslave people, nor does it befoul the earth**.

**As today’s poor get richer, they'll consume more, but they'll also consume much differently** from earlier generations. **They won't read physical newspapers and magazines. They'll get a great deal of their power from renewables and** (one hopes) **nuclear because these energy sources will be the cheapest**. They’ll live in cities, as we saw in chapter 12; in fact, they already are. **They'll be less likely to own cars** because a variety of transportation options will be only a few taps away. Most important, **they'll come up with ideas that keep the growth going, and that benefit both humanity and the planet we live on**.

Predicting exactly how technological progress will unfold is much like predicting the weather: feasible in the short term, but impossible over a longer time. **Great uncertainty and complexity prevent precise forecasts about**, for example, the **computing devices** we’ll be using thirty years from now **or the dominant types of a**rtificial **i**ntelligence in 2050 and beyond.

**But** even though we can't predict the weather long term, **we can accurately forecast** the climate. We know how much warmer and sunnier it will be on average in August than in January, for example, and we know that global average temperatures will rise as we keep adding greenhouse gases to the atmosphere. Similarly, we can predict **the "climate" of future technological progress by starting from the knowledge that it will be heavily applied in the areas where it can affect capitalism the most. As we've seen over and over, tech progress supplies opportunities to trim costs (and improve performance) via dematerialization, and capitalism provides the motive to do so**.

As a result, **the Second Enlightenment** will continue as we move deeper into the twenty-first century. I'm confident that it **will accelerate as digital technologies continue to improve and multiply and global competition continues to increase**. We’ll see some of the most striking examples of slim, swap, evaporate, and optimize in exactly the places where the opportunities are biggest. Here are a few broad predictions, spanning humanity's biggest industries.

Manufacturing. Complex parts will be made not by the techniques developed during the Industrial Era, but instead by three- dimensional printing. This is already the case for some rocket engines and other extremely expensive items. **As 3-D printing improves and becomes cheaper, it will spread to** automobile engine blocks, manifolds and other complicated arrangements of pipes, airplane struts and wings, and **countless other parts. Because 3-D printing generates virtually no waste and doesn't require massive molds, it accelerates dematerialization**.

**We'll also be building things out of very different materials** from what we're using today. **We're rapidly improving our ability to use machine learning and massive amounts of computing power to screen the huge number of molecules available in the world. Well use this ability to determine which substances would be best for making flexible solar panels, more efficient batteries, and other important equipment. Our search for the right materials to use has so far been slow and laborious. That's about to change**.

**So is our ability to understand nature's proteins, and to generate new ones**. All living things are made out of the large biomolecules known as proteins, as are wondrous materials such as spiders' silk. The cells in our bodies are assembly lines for proteins, but we currently understand little about how these assembly lines work—how they fold a two-dimensional string of amino acids into a complicated 3-D protein. But thanks to **digital tools**, we're learning quickly. In 2018, as part of a contest, the AlphaFold software developed by Google DeepMind correctly guessed the structure of twenty-five out of forty-three proteins it was shown; the second-place finisher guessed correctly three times. DeepMind cofounder Demis Hassabis says, "We [haven't] solved the protein-folding problem, this is just a first step... but we have a good system and we have a ton of ideas we haven't implemented yet." As these good ideas accumulate, they **might** well **let us make spider-strength materials**.

Energy. **One of humanity's most urgent tasks** in the twenty-first century **is to reduce greenhouse gas emissions. Two ways to do this are to become more efficient in using energy and, when generating it, to shift away from carbon-emitting fossil fuels. Digital tools will help greatly with both**.

**Several groups have recently shown that they can combine machine learning and other techniques to increase the energy efficiency of data centers by as much as 30 percent**. This large improvement matters for two reasons. First, **data centers are heavy users of energy**, accounting for about 1 percent of global electricity demand. So efficiencies in these facilities help. Second, and more important, **these gains indicate how much the energy use of all our other complicated infrastructures— everything from electricity grids to chemical plants to steel mills—can be trimmed. All are a great deal less energy efficient than they could be. We have both ample opportunity and ample incentive now to improve them.**

**Both wind and solar power are becoming much cheaper**, so much so that **in many parts of the world they're now the most cost-effective options**, even without government subsidies, for new electrical generators. These energy sources use virtually no resources once they're up and running and generate no greenhouse gases; **they're among the world champions of dematerialization.**

**In the decades to come they might well be joined by nuclear fusion**, the astonishingly powerful process that takes place inside the sun and other stars. Harnessing fusion has been tantalizingly out of reach for more than half a century—the old joke is that it's twenty years away and always will be. A big part of the problem is that it's hard to control the fusion reaction inside any human- made vessel, but **massive improvements in sensors and computing power are boosting hope that fusion power might truly be only a generation away**.

Transportation. **Our current transportation systems are chronically inefficient**. Most vehicles aren't used much of the time, and even when they’re in use, they're not nearly full. Now that we have **technologies** that let us know where every driver, passenger, piece of cargo, and vehicle is at all times, we **can greatly increase the utilization and efficiency of every element of transportation**.

Renting instead of owning transportation is a likely consequence of this shift. Instead of owning cars, which typically sit idle more than 90 percent of the time, more people will choose to access transportation as needed. We're already seeing this with car-hailing companies such as Uber and Lyft. These services are quickly spreading around the world, and expanding to cover more modes of transportation, from motorbikes to bicycles to electric scooters. They're also moving into commercial applications such as long- and short-haul trucking. As this shift continues, **we’ll need fewer tons of steel, aluminum, plastic, gasoline, and other resources to move the world's people and goods around**.

We might also experience less congestion and gridlock as we try to get around. Bikes and scooters take up little space compared to cars, so streets can accommodate many more of them. Technology also gives us the ability to implement many forms of "congestion pricing," which has been shown to reduce gridlock by making car access to busy streets expensive enough that people use other options. The most intriguing future transportation platform of all might be the sky. The same technologies that power today's small drones can be scaled up to build "air taxis" with as many as eight propellers and no pilot. Such contraptions sound like science fiction today, but they might be carrying us around by midcentury.

Agriculture. As we saw in chapter 5, **leading farms have demonstrated an ability to increase their tonnage of output year after year while decreasing their use of inputs such as land, water, and fertilizer. This trend toward optimization will continue thanks to** a set of innovations under the label **precision agriculture**. The precision comes from many sources, including better sensors of plant and animal health, soil quality and moisture, and so on; the ability to deliver fertilizer, pesticides, and water just where they're needed; and machinery that adapts itself to each plant or animal. All these **varieties of precision will combine to allow traditional farms to generate more from less.**

**So will changes to the genomes of plants and animals. DNA modifications will increase disease and drought tolerance, expand where crops can be grown, and allow us to get more of what we want from each crop or herd**. As we saw in chapter 9, **they'll also allow us to take better care of vulnerable populations** such as infants in poor countries **by creating golden rice and other nutrition enhancers. We'll also be able to make much more precise and targeted genetic modifications** thanks to a new crop of gene-editing tools that are large improvements over their more scattershot predecessors. Opposition to genetically modified organisms is fierce in some quarters, but isn't based on reason or science. This opposition will, one hopes, fade.

Throughout human history, **just about all farming has been done in fields. For some crops, this is now changing. Agriculture has moved indoors, where parameters** such as light, humidity, fertilizer, and even the composition of the atmosphere **can be precisely monitored and controlled**. In everything from urban buildings to shipping containers, **crops are now being grown with progressively less labor and fewer material inputs. These completely contained farms will spread and help reduce the planetary footprint of our agriculture**.

These examples aren't intended to be comprehensive, and I don't have precise estimates of how likely each innovation is, or when it's most likely to occur. I offer them only to indicate how broad and exciting are the possibilities offered by the two horsemen of **capitalism and technological progress**, and how they’ll continue to **dematerialize our consumption and let us increase our prosperity while treading more lightly on our planet**.

**Innovation Solves**

Linus **Blomqvist 18**. Director of the Conservation and Food & Agriculture programs at the Breakthrough Institute, visiting researcher at the University of Tasmania where he is part of a team studying drivers of agricultural expansion and forecasting future land-use change, MESc from Yale’s School of Forestry and Environmental Studies, where he specialized in environmental economics, and a BA in Geography from Cambridge University. 04-04-18. “Decoupling or Degrowth? Why "Peak Stuff" May Not Be As Dire As You’ve Heard.” Breakthrough Institute. <https://thebreakthrough.org/issues/conservation/is-decoupling-doomed>

**Does humanity’s growing use of materials mean that decoupling is impossible?** In a word, **no**, **and attempts to reduce all resource and environmental problems to our material footprint won’t help us solve problems of resource scarcity or environmental impacts**. In a recent article for Fast Company, the University of London’s Jason Hickel claims that humanity can only consume 50 billion tons of “stuff” each year (compared to current consumption levels at about 80 billion tons). And according to several papers that Hickel cites, that can’t be achieved in the foreseeable future, given growing populations and economies. The only solution, according to Hickel, is to ditch our addiction to GDP growth. Hickel is challenging the concept of “green growth,” which he describes as “absolute decoupling of GDP from material use.” But before talking about evidence for or against decoupling, it's important to ask: decoupling of what? Broadly, **there are two reasons to worry about consumption: running out of materials (like fossil fuels) and environmental impacts (like pollution or habitat loss)**. **These often get conflated in unhelpful ways**. **What** Hickel **refers to when** he talks **about decoupling is material flows**, which are dominated by things like **fossil fuels, metal ores, construction minerals, biomass, and the like**. **Lumping different material flows together** can be **misleading**, in that it **groups together resources** that are being **used sustainably with those that aren’t**, **and**/or **resources that cause big environmental impacts with those that cause smaller** environmental **impacts**. So let’s look at the materials at play here. **For** several of the **materials with the biggest footprint in** terms of **volume** (**construction minerals, metal ores, etc**.), **the problem isn’t really that we're at risk of running out of stuff**. Construction minerals account for a large portion of global material flows, but those are resources like stone — last time I checked, we **weren't approaching peak stone**. (Cue joke about the end of the Stone Age.) We **could have a perfectly sustainable civilization without absolutely decoupling from stone for a long time**. The 50 billion tons limit is completely arbitrary — it was based on material consumption in the year 2000 — **and shouldn’t be taken as the dividing line between sustainability and environmental doom**. What **about environmental impacts**? Here, too, **aggregate resource consumption** can give a **misleading** picture. Some of **the big items in material flows (again, like construction minerals) account for a pretty small portion of environmental impacts like greenhouse emissions or land use**. For **biomass**, we've managed to **increase production and thus mass flows** a lot **using the same amount of land, so the impacts haven't gone up** in proportion to the mass flows. **When we look at the actual impacts — like g**reen**h**ouse **emissions, habitat loss, pollution of air and water, and so on — we're seeing some positive trends, and in fact some instances of absolute decoupling**. **Emissions of several pollutants (like sulfur dioxide) have peaked and declined globally**, although they are still going up in some developing nations; **nitrogen oxides and nitrous oxide emissions are flat globally**. **Total farmland area (the most important driver of biodiversity and habitat loss and an important driver of carbon emissions) has peaked**, although it's plausible that it will go up again. **Water extraction peaked several decades ago** in the United States, **in spite of increasing industrial and agricultural output**. **Greenhouse emissions have not peaked globally, and may continue to go up for a while, making carbon emissions perhaps the least decoupled and most concerning of all trends**. Even relative decoupling has come to a halt as coal-heavy China accounts for an increasing share of global emissions. As Breakthrough has written about for a long time now, we are still a long way from scalable food and energy systems that run without fossil fuels. **But here, too, the most pragmatic solutions involve accelerating technological substitution of clean energy for dirty energy — the same general process of decoupling that has driven progress in other resources**. Some or most of **these trends may be moving too slowly for** Hickel and other **observers**, and indeed, where acceleration is possible, that should be both the technological and policy goal**. But aggregate human consumption of resources doesn’t tell us much** of interest **about either resource sustainability or environmental impacts**. To get at those problems, we **need to look at things resource by resource, pollutant by pollutant. And when we do that, we see some significant progress**, along with some still-worrying trends. **Above all, though, we know that as societies develop, food and energy production gets more resource-efficient, economic growth slows down, and fertility rates decline. All of these trends still imply large environmental impacts in the future. But while intentional economic degrowth or hard limits on resource use seem far-fetched, absolute decoupling of the things that matter — environmental impacts — is still a very real possibility**.

#### Long term trends are driving decoupling– no reason this can’t continue, their limits to growth arguments are empirically unsupported

Brook, et al, 15—professor of environmental sustainability at the University of Tasmania (Barry, with John Asafu-Adjaye, University of Queensland, Linus Blomqvist, Breakthrough Institute, Stewart Brand, Long Now Foundation, Ruth DeFries, Columbia Univeristy, Erle Ellis, University of Maryland, Baltimore County, Christopher Foreman, University of Maryland School of Public Policy, David Keith, Harvard University School of Engineering and Applied Sciences, Martin Lewis, Stanford University, Mark Lynas, Cornell University, Ted Nordhaus, Breakthrough Institute, Roger Pielke, Jr., University of Colorado, Boulder, Rachel Pritzker, Pritzker Innovation Fund, Joyashree Roy, Jadavpur University, Mark Sagoff, George Mason University, Michael Shellenberger, Breakthrough Institute, Robert Stone, Filmmaker, and Peter Teague, Breakthrough Institute, “AN ECOMODERNIST MANIFESTO,” <http://www.ecomodernism.org/manifesto/>, dml)

Intensifying many human activities — particularly farming, energy extraction, forestry, and settlement — so that they use less land and interfere less with the natural world is the key to decoupling human development from environmental impacts. These socioeconomic and technological processes are central to economic modernization and environmental protection. Together they allow people to mitigate climate change, to spare nature, and to alleviate global poverty. Although we have to date written separately, our views are increasingly discussed as a whole. We call ourselves ecopragmatists and ecomodernists. We offer this statement to affirm and to clarify our views and to describe our vision for putting humankind’s extraordinary powers in the service of creating a good Anthropocene. 1. Humanity has flourished over the past two centuries. Average life expectancy has increased from 30 to 70 years, resulting in a large and growing population able to live in many different environments. Humanity has made extraordinary progress in reducing the incidence and impacts of infectious diseases, and it has become more resilient to extreme weather and other natural disasters. Violence in all forms has declined significantly and is probably at the lowest per capita level ever experienced by the human species, the horrors of the 20th century and present-day terrorism notwithstanding. Globally, human beings have moved from autocratic government toward liberal democracy characterized by the rule of law and increased freedom. Personal, economic, and political liberties have spread worldwide and are today largely accepted as universal values. Modernization liberates women from traditional gender roles, increasing their control of their fertility. Historically large numbers of humans — both in percentage and in absolute terms — are free from insecurity, penury, and servitude. At the same time, human flourishing has taken a serious toll on natural, nonhuman environments and wildlife. Humans use about half of the planet’s ice-free land, mostly for pasture, crops, and production forestry. Of the land once covered by forests, 20 percent has been converted to human use. Populations of many mammals, amphibians, and birds have declined by more than 50 percent in the past 40 years alone. More than 100 species from those groups went extinct in the 20th century, and about 785 since 1500. As we write, only four northern white rhinos are confirmed to exist. Given that humans are completely dependent on the living biosphere, how is it possible that people are doing so much damage to natural systems without doing more harm to themselves? The role that technology plays in reducing humanity’s dependence on nature explains this paradox. Human technologies, from those that first enabled agriculture to replace hunting and gathering, to those that drive today’s globalized economy, have made humans less reliant upon the many ecosystems that once provided their only sustenance, even as those same ecosystems have often been left deeply damaged. Despite frequent assertions starting in the 1970s of fundamental “limits to growth,” there is still remarkably little evidence that human population and economic expansion will outstrip the capacity to grow food or procure critical material resources in the foreseeable future. To the degree to which there are fixed physical boundaries to human consumption, they are so theoretical as to be functionally irrelevant. The amount of solar radiation that hits the Earth, for instance, is ultimately finite but represents no meaningful constraint upon human endeavors. Human civilization can flourish for centuries and millennia on energy delivered from a closed uranium or thorium fuel cycle, or from hydrogen-deuterium fusion. With proper management, humans are at no risk of lacking sufficient agricultural land for food. Given plentiful land and unlimited energy, substitutes for other material inputs to human well-being can easily be found if those inputs become scarce or expensive. There remain, however, serious long-term environmental threats to human well-being, such as anthropogenic climate change, stratospheric ozone depletion, and ocean acidification. While these risks are difficult to quantify, the evidence is clear today that they could cause significant risk of catastrophic impacts on societies and ecosystems. Even gradual, non-catastrophic outcomes associated with these threats are likely to result in significant human and economic costs as well as rising ecological losses. Much of the world’s population still suffers from more-immediate local environmental health risks. Indoor and outdoor air pollution continue to bring premature death and illness to millions annually. Water pollution and water-borne illness due to pollution and degradation of watersheds cause similar suffering. 2. Even as human environmental impacts continue to grow in the aggregate, a range of long-term trends are today driving significant decoupling of human well-being from environmental impacts. Decoupling occurs in both relative and absolute terms. Relative decoupling means that human environmental impacts rise at a slower rate than overall economic growth. Thus, for each unit of economic output, less environmental impact (e.g., deforestation, defaunation, pollution) results. Overall impacts may still increase, just at a slower rate than would otherwise be the case. Absolute decoupling occurs when total environmental impacts — impacts in the aggregate — peak and begin to decline, even as the economy continues to grow. Decoupling can be driven by both technological and demographic trends and usually results from a combination of the two. The growth rate of the human population has already peaked. Today’s population growth rate is one percent per year, down from its high point of 2.1 percent in the 1970s. Fertility rates in countries containing more than half of the global population are now below replacement level. Population growth today is primarily driven by longer life spans and lower infant mortality, not by rising fertility rates. Given current trends, it is very possible that the size of the human population will peak this century and then start to decline. Trends in population are inextricably linked to other demographic and economic dynamics. For the first time in human history, over half the global population lives in cities. By 2050, 70 percent are expected to dwell in cities, a number that could rise to 80 percent or more by the century’s end. Cities are characterized by both dense populations and low fertility rates. Cities occupy just 1 to 3 percent of the Earth’s surface and yet are home to nearly four billion people. As such, cities both drive and symbolize the decoupling of humanity from nature, performing far better than rural economies in providing efficiently for material needs while reducing environmental impacts. The growth of cities along with the economic and ecological benefits that come with them are inseparable from improvements in agricultural productivity. As agriculture has become more land and labor efficient, rural populations have left the countryside for the cities. Roughly half the US population worked the land in 1880. Today, less than 2 percent does. As human lives have been liberated from hard agricultural labor, enormous human resources have been freed up for other endeavors. Cities, as people know them today, could not exist without radical changes in farming. In contrast, modernization is not possible in a subsistence agrarian economy. These improvements have resulted not only in lower labor requirements per unit of agricultural output but also in lower land requirements. This is not a new trend: rising harvest yields have for millennia reduced the amount of land required to feed the average person. The average per-capita use of land today is vastly lower than it was 5,000 years ago, despite the fact that modern people enjoy a far richer diet. Thanks to technological improvements in agriculture, during the half-century starting in the mid-1960s, the amount of land required for growing crops and animal feed for the average person declined by one-half. Agricultural intensification, along with the move away from the use of wood as fuel, has allowed many parts of the world to experience net reforestation. About 80 percent of New England is today forested, compared with about 50 percent at the end of the 19th century. Over the past 20 years, the amount of land dedicated to production forest worldwide declined by 50 million hectares, an area the size of France. The “forest transition” from net deforestation to net reforestation seems to be as resilient a feature of development as the demographic transition that reduces human birth rates as poverty declines. Human use of many other resources is similarly peaking. The amount of water needed for the average diet has declined by nearly 25 percent over the past half-century. Nitrogen pollution continues to cause eutrophication and large dead zones in places like the Gulf of Mexico. While the total amount of nitrogen pollution is rising, the amount used per unit of production has declined significantly in developed nations. Indeed, in contradiction to the often-expressed fear of infinite growth colliding with a finite planet, demand for many material goods may be saturating as societies grow wealthier. Meat consumption, for instance, has peaked in many wealthy nations and has shifted away from beef toward protein sources that are less land intensive. As demand for material goods is met, developed economies see higher levels of spending directed to materially less-intensive service and knowledge sectors, which account for an increasing share of economic activity. This dynamic might be even more pronounced in today’s developing economies, which may benefit from being late adopters of resource-efficient technologies. Taken together, these trends mean that the total human impact on the environment, including land-use change, overexploitation, and pollution, can peak and decline this century. By understanding and promoting these emergent processes, humans have the opportunity to re-wild and re-green the Earth — even as developing countries achieve modern living standards, and material poverty ends. 3. The processes of decoupling described above challenge the idea that early human societies lived more lightly on the land than do modern societies. Insofar as past societies had less impact upon the environment, it was because those societies supported vastly smaller populations. In fact, early human populations with much less advanced technologies had far larger individual land footprints than societies have today. Consider that a population of no more than one or two million North Americans hunted most of the continent’s large mammals into extinction in the late Pleistocene, while burning and clearing forests across the continent in the process. Extensive human transformations of the environment continued throughout the Holocene period: as much as three-quarters of all deforestation globally occurred before the Industrial Revolution. The technologies that humankind’s ancestors used to meet their needs supported much lower living standards with much higher per-capita impacts on the environment. Absent a massive human die-off, any large-scale attempt at recoupling human societies to nature using these technologies would result in an unmitigated ecological and human disaster. Ecosystems around the world are threatened today because people over-rely on them: people who depend on firewood and charcoal for fuel cut down and degrade forests; people who eat bush meat for food hunt mammal species to local extirpation. Whether it’s a local indigenous community or a foreign corporation that benefits, it is the continued dependence of humans on natural environments that is the problem for the conservation of nature. Conversely, modern technologies, by using natural ecosystem flows and services more efficiently, offer a real chance of reducing the totality of human impacts on the biosphere. To embrace these technologies is to find paths to a good Anthropocene. The modernization processes that have increasingly liberated humanity from nature are, of course, double-edged, since they have also degraded the natural environment. Fossil fuels, mechanization and manufacturing, synthetic fertilizers and pesticides, electrification and modern transportation and communication technologies, have made larger human populations and greater consumption possible in the first place. Had technologies not improved since the Dark Ages, no doubt the human population would not have grown much either. It is also true that large, increasingly affluent urban populations have placed greater demands upon ecosystems in distant places –– the extraction of natural resources has been globalized. But those same technologies have also made it possible for people to secure food, shelter, heat, light, and mobility through means that are vastly more resource- and land-efficient than at any previous time in human history. Decoupling human well-being from the destruction of nature requires the conscious acceleration of emergent decoupling processes. In some cases, the objective is the development of technological substitutes. Reducing deforestation and indoor air pollution requires the substitution of wood and charcoal with modern energy. In other cases, humanity’s goal should be to use resources more productively. For example, increasing agricultural yields can reduce the conversion of forests and grasslands to farms. Humans should seek to liberate the environment from the economy. Urbanization, agricultural intensification, nuclear power, aquaculture, and desalination are all processes with a demonstrated potential to reduce human demands on the environment, allowing more room for non-human species. Suburbanization, low-yield farming, and many forms of renewable energy production, in contrast, generally require more land and resources and leave less room for nature. These patterns suggest that humans are as likely to spare nature because it is not needed to meet their needs as they are to spare it for explicit aesthetic and spiritual reasons. The parts of the planet that people have not yet profoundly transformed have mostly been spared because they have not yet found an economic use for them — mountains, deserts, boreal forests, and other “marginal” lands. Decoupling raises the possibility that societies might achieve peak human impact without intruding much further on relatively untouched areas. Nature unused is nature spared. 4. Plentiful access to modern energy is an essential prerequisite for human development and for decoupling development from nature. The availability of inexpensive energy allows poor people around the world to stop using forests for fuel. It allows humans to grow more food on less land, thanks to energy-heavy inputs such as fertilizer and tractors. Energy allows humans to recycle waste water and desalinate sea water in order to spare rivers and aquifers. It allows humans to cheaply recycle metal and plastic rather than to mine and refine these minerals. Looking forward, modern energy may allow the capture of carbon from the atmosphere to reduce the accumulated carbon that drives global warming. However, for at least the past three centuries, rising energy production globally has been matched by rising atmospheric concentrations of carbon dioxide. Nations have also been slowly decarbonizing — that is, reducing the carbon intensity of their economies — over that same time period. But they have not been doing so at a rate consistent with keeping cumulative carbon emissions low enough to reliably stay below the international target of less than 2 degrees Centigrade of global warming. Significant climate mitigation, therefore, will require that humans rapidly accelerate existing processes of decarbonization. There remains much confusion, however, as to how this might be accomplished. In developing countries, rising energy consumption is tightly correlated with rising incomes and improving living standards. Although the use of many other material resource inputs such as nitrogen, timber, and land are beginning to peak, the centrality of energy in human development and its many uses as a substitute for material and human resources suggest that energy consumption will continue to rise through much if not all of the 21st century. For that reason, any conflict between climate mitigation and the continuing development process through which billions of people around the world are achieving modern living standards will continue to be resolved resoundingly in favor of the latter. Climate change and other global ecological challenges are not the most important immediate concerns for the majority of the world's people. Nor should they be. A new coal-fired power station in Bangladesh may bring air pollution and rising carbon dioxide emissions but will also save lives. For millions living without light and forced to burn dung to cook their food, electricity and modern fuels, no matter the source, offer a pathway to a better life, even as they also bring new environmental challenges. Meaningful climate mitigation is fundamentally a technological challenge. By this we mean that even dramatic limits to per capita global consumption would be insufficient to achieve significant climate mitigation. Absent profound technological change **there is no credible path to meaningful climate mitigation**. While advocates differ in the particular mix of technologies they favor, we are aware of no quantified climate mitigation scenario in which technological change is not responsible for the vast majority of emissions cuts. The specific technological paths that people might take toward climate mitigation remain deeply contested. Theoretical scenarios for climate mitigation typically reflect their creators’ technological preferences and analytical assumptions while all too often failing to account for the cost, rate, and scale at which low-carbon energy technologies can be deployed. The history of energy transitions, however, suggests that there have been consistent patterns associated with the ways that societies move toward cleaner sources of energy. Substituting higher-quality (i.e., less carbon-intensive, higher-density) fuels for lower-quality (i.e., more carbon-intensive, lower-density) ones is how virtually all societies have decarbonized, and points the way toward accelerated decarbonization in the future. Transitioning to a world powered by zero-carbon energy sources will require energy technologies that are power dense and capable of scaling to many tens of terawatts to power a growing human economy. Most forms of renewable energy are, unfortunately, incapable of doing so. The scale of land use and other environmental impacts necessary to power the world on biofuels or many other renewables are such that we doubt they provide a sound pathway to a zero-carbon low-footprint future. High-efficiency solar cells produced from earth-abundant materials are an exception and have the potential to provide many tens of terawatts on a few percent of the Earth’s surface. Present-day solar technologies will require substantial innovation to meet this standard and the development of cheap energy storage technologies that are capable of dealing with highly variable energy generation at large scales. Nuclear fission today represents the only present-day zero-carbon technology with the demonstrated ability to meet most, if not all, of the energy demands of a modern economy. However, a variety of social, economic, and institutional challenges make deployment of present-day nuclear technologies at scales necessary to achieve significant climate mitigation unlikely. A new generation of nuclear technologies that are safer and cheaper will likely be necessary for nuclear energy to meet its full potential as a critical climate mitigation technology. In the long run, next-generation solar, advanced nuclear fission, and nuclear fusion represent the most plausible pathways toward the joint goals of climate stabilization and radical decoupling of humans from nature. If the history of energy transitions is any guide, however, that transition will take time. During that transition, other energy technologies can provide important social and environmental benefits. Hydroelectric dams, for example, may be a cheap source of low-carbon power for poor nations even though their land and water footprint is relatively large. Fossil fuels with carbon capture and storage can likewise provide substantial environmental benefits over current fossil or biomass energies. The ethical and pragmatic path toward a just and sustainable global energy economy requires that human beings transition as rapidly as possible to energy sources that are cheap, clean, dense, and abundant. Such a path will require sustained public support for the development and deployment of clean energy technologies, both within nations and between them, though international collaboration and competition, and within a broader framework for global modernization and development. 5. We write this document out of deep love and emotional connection to the natural world. By appreciating, exploring, seeking to understand, and cultivating nature, many people get outside themselves. They connect with their deep evolutionary history. Even when people never experience these wild natures directly, they affirm their existence as important for their psychological and spiritual well-being. Humans will always materially depend on nature to some degree. Even if a fully synthetic world were possible, many of us might still choose to continue to live more coupled with nature than human sustenance and technologies require. What decoupling offers is the possibility that humanity’s material dependence upon nature might be less destructive. The case for a more active, conscious, and accelerated decoupling to spare nature draws more on spiritual or aesthetic than on material or utilitarian arguments. Current and future generations could survive and prosper materially on a planet with much less biodiversity and wild nature. But this is not a world we want nor, if humans embrace decoupling processes, need to accept. What we are here calling nature, or even wild nature, encompasses landscapes, seascapes, biomes and ecosystems that have, in more cases than not, been regularly altered by human influences over centuries and millennia. Conservation science, and the concepts of biodiversity, complexity, and indigeneity are useful, but alone cannot determine which landscapes to preserve, or how. In most cases, there is no single baseline prior to human modification to which nature might be returned. For example, efforts to restore landscapes to more closely resemble earlier states (“indigeneity”) may involve removing recently arrived species (“invasives”) and thus require a net reduction in local biodiversity. In other circumstances, communities may decide to sacrifice indigeneity for novelty and biodiversity. Explicit efforts to preserve landscapes for their non-utilitarian value are inevitably anthropogenic choices. For this reason, all conservation efforts are fundamentally anthropogenic. The setting aside of wild nature is no less a human choice, in service of human preferences, than bulldozing it. Humans will save wild places and landscapes by convincing our fellow citizens that these places, and the creatures that occupy them, are worth protecting. People may choose to have some services — like water purification and flood protection — provided for by natural systems, such as forested watersheds, reefs, marshes, and wetlands, even if those natural systems are more expensive than simply building water treatment plants, seawalls, and levees. There will be no one-size-fits-all solution. Environments will be shaped by different local, historical, and cultural preferences. While we believe that agricultural intensification for land-sparing is key to protecting wild nature, we recognize that many communities will continue to opt for land-sharing, seeking to conserve wildlife within agricultural landscapes, for example, rather than allowing it to revert to wild nature in the form of grasslands, scrub, and forests. Where decoupling reduces pressure on landscapes and ecosystems to meet basic human needs, landowners, communities, and governments still must decide to what aesthetic or economic purpose they wish to dedicate those lands. Accelerated decoupling alone will not be enough to ensure more wild nature. There must still be a conservation politics and a wilderness movement to demand more wild nature for aesthetic and spiritual reasons. Along with decoupling humankind’s material needs from nature, establishing an enduring commitment to preserve wilderness, biodiversity, and a mosaic of beautiful landscapes will require a deeper emotional connection to them. 6. We affirm the need and human capacity for accelerated, active, and conscious decoupling. Technological progress is not inevitable. Decoupling environmental impacts from economic outputs is not simply a function of market-driven innovation and efficient response to scarcity. The long arc of human transformation of natural environments through technologies began well before there existed anything resembling a market or a price signal. Thanks to rising demand, scarcity, inspiration, and serendipity, humans have remade the world for millennia. Technological solutions to environmental problems must also be considered within a broader social, economic, and political context. We think it is counterproductive for nations like Germany and Japan, and states like California, to shutter nuclear power plants, recarbonize their energy sectors, and recouple their economies to fossil fuels and biomass. However, such examples underscore clearly that technological choices will not be determined by remote international bodies but rather by national and local institutions and cultures. Too often, modernization is conflated, both by its defenders and critics, with capitalism, corporate power, and laissez-faire economic policies. We reject such reductions. What we refer to when we speak of modernization is the long-term evolution of social, economic, political, and technological arrangements in human societies toward vastly improved material well-being, public health, resource productivity, economic integration, shared infrastructure, and personal freedom. Modernization has liberated ever more people from lives of poverty and hard agricultural labor, women from chattel status, children and ethnic minorities from oppression, and societies from capricious and arbitrary governance. Greater resource productivity associated with modern socio-technological systems has allowed human societies to meet human needs with fewer resource inputs and less impact on the environment. More-productive economies are wealthier economies, capable of better meeting human needs while committing more of their economic surplus to non-economic amenities, including better human health, greater human freedom and opportunity, arts, culture, and the conservation of nature. Modernizing processes are far from complete, even in advanced developed economies. Material consumption has only just begun to peak in the wealthiest societies. Decoupling of human welfare from environmental impacts will require a sustained commitment to technological progress and the continuing evolution of social, economic, and political institutions alongside those changes. Accelerated technological progress will require the active, assertive, and aggressive participation of private sector entrepreneurs, markets, civil society, and the state. While we reject the planning fallacy of the 1950s, we continue to embrace a strong public role in addressing environmental problems and accelerating technological innovation, including research to develop better technologies, subsidies, and other measures to help bring them to market, and regulations to mitigate environmental hazards. And international collaboration on technological innovation and technology transfer is essential in the areas of agriculture and energy

**The squo is sustainable.**

**Bailey ’18** [Ronald; February 16; B.A. in Economics from the University of Virginia, member of the Society of Environmental Journalists and the American Society for Bioethics and Humanities, citing a compilation of interdisciplinary research; Reason, “Is Degrowth the Only Way to Save the World?” https://reason.com/2018/02/16/is-degrowth-the-only-way-to-save-the-wor; RP]

**Unless** us folks in **rich countries drastically reduce** our **material living standards and distribute** most of what we have **to** people living in **poor countries, the world will come to an end**. Or at least that's the stark conclusion of a study published earlier this month in the journal Nature Sustainability. **The researchers** who wrote it, led by the Leeds University ecological economist Dan O'Neill, **think the way to prevent** the **apocalypse is "degrowth."**

Vice, pestilence, war, and "gigantic inevitable famine" were the planetary boundaries set on human population by the 18th-century economist Robert Thomas Malthus. **The new study gussies up old-fashioned Malthusianism by devising** a set of seven **biophysical indicators of** national **environmental pressure**, which they then link to 11 indicators of social outcomes. The aim of the exercise is to concoct a "safe and just space" for humanity.

Using data from 2011, the **researchers calculate that** the **annual per capita boundaries for the world's 7 billion** people **consist of** the emission of **1.6 tons of carbon dioxide per year** and the annual **consumption of 0.9 kilograms of phosphorus, 8.9 kilograms of nitrogen, 574 cubic meters of water, 2.6 tons of biomass** (crops and wood), **plus** the ecological services of **1.7 hectares of land and 7.2 tons** of material **per person**.

On the social side, meanwhile, the researchers say that life satisfaction in each country should exceed 6.5 on the 10-point Cantril scale, that healthy life expectancy should average at least 65 years, and that nutrition should be over 2,700 calories per day. At least 95 percent of each country's citizens must have access to good sanitation, earn more than $1.90 per day, and pass through secondary school. Ninety percent of citizens must have friends and family they can depend on. The threshold for democratic quality must exceed 0.8 on an index scale stretching from -1 to +1, while the threshold for equality is set at no higher than 70 on a Gini Index where 0 represents perfect equality and 100 implies perfect inequality. They set the threshold for percent of labor force employed at 94 percent.

So **how does the U.S. do with regard to** their **biophysical boundaries and social outcomes** measures? We **Americans transgress all seven of the biophysical boundaries**. Carbon dioxide emissions stand at 21.2 tons per person; we each use an average of 7 kilograms of phosphorus, 59.1 kilograms of nitrogen, 611 cubic meters of water, and 3.7 tons of biomass; we rely on the ecological services of 6.8 hectares of land and 27.2 tons of material. Although the researchers urge us to move "beyond the pursuit of GDP growth to embrace new measures of progress," it is worth noting that U.S. GDP is $59,609 per capita.

On the other hand, **those transgressions** have **provided a** pretty **good life** for Americans. For example, life **satisfaction is 7.1; healthy life expectancy is 69.7 years; and democratic quality stands at 0.8 points**. The only two social indicators we just missed on were employment (91 percent) and secondary education (94.7 percent).

On the other hand, **our hemisphere is home to one paragon of sustainability—Haiti**. Haitians breach none of the researchers' biophysical boundaries. **But the Caribbean country performs abysmally on all 11 social indicators. Life satisfaction** scores **at 4.**8; healthy **life expectancy is 52.3 years**; and Haitians average 2,105 calories per day. The country tallies -0.9 on the democratic quality index. **Haiti's GDP is $719 per capita**.

**Other near-sustainability champions include Malawi, Nepal, Myanmar, and Nicaragua. All of them score dismally on** the **social indicators, and** their **GDPs** per capita are $322, $799, $1,375, and $2,208, respectively.

**The country that** currently **comes closest to** the **researchers' ideal** of remaining within its **biophysical boundaries while** sufficient **social indicators is…Vietnam**. For the record, Vietnam's per capita GDP is $2,306.

**"Countries with higher levels of life satisfaction and** healthy life **expectancy** also **tend to transgress** more **biophysical boundaries,"** the researchers note. **A better way to put this** relationship **is that** more **wealth and technology** tend to **make people happier, healthier, and freer**.

O'Neill and his unhappy team fail drastically to understand how **human ingenuity unleashed in markets is** already **well on the way toward making** their **supposed planetary boundaries irrelevant. Take carbon dioxide emissions: Supporters of renewable energy technologies say** that their **costs are already or will** soon **be lower than** those of **fossil fuels. Boosters of** advanced **nuclear reactors** similarly **argue that they can supply all of the carbon-free energy the world will need**. There's a good chance that fleets of **battery-powered** self-driving **vehicles** will largely **replace** private cars and **mass transit** later in this century.

Are we about to run out of phosphorous to fertilize our crops? **Peak phosphorus is not at hand**. The U.S. Geological Survey (USGS) reports that **at current rates of mining, the world's known reserves will last 266 years. The estimated total resources of phosphate rock would last over 1,140 years. "There are no imminent shortages of** phosphate **rock,"** notes the USGS. **With respect to** the **deleterious effects** that using phosphorus to fertilize crops might have outside of farm fields, **researchers are working** on ways **to endow crops with traits that enable them to use less while maintaining yields**.

O'Neill and his colleagues are also concerned that farmers are using too much **nitrogen fertilizer**, which runs off fields into the natural environment and contributes to deoxygenated dead zones in the oceans, among other ill effects. This **is a problem, but** one that **plant breeders are** already **working to solve**. For example, **researchers** at Arcadia Biosciences have **used biotechnology to create nitrogen-efficient varieties of staples like rice and wheat that enable farmers to increase yields while** significantly **reducing fertilizer use**. Meanwhile, **other** researchers are moving on **projects** to **engineer** the nitrogen **fixation** trait from legumes into cereal crops. In other words, **the crops would make their own fertilizer from air**.

Water? **Most water is devoted to** the **irrigation** of crops; **the ongoing development of drought-resistant and saline-tolerant crops will help** with that. Hectares per capita? **Humanity** has probably **already reached peak farmland, and nearly 400 million hectares will be restored to nature by 2060—an area almost double the size of the U**nited **S**tates **east of the Mississippi** River. In fact, it is entirely possible that **most animal farming will be replaced by** resource-sparing **lab-grown steaks**, chops, **and milk.** Such **developments in food production undermine** the researchers' **worries about overconsumption** of biomass.

And **humanity's material footprint is likely to get smaller** too **as trends toward** further **dematerialization take hold. The price system is a superb mechanism for encouraging innovators to** find ways to **wring** ever **more value out less** and less **stuff**. Rockefeller University researcher Jesse Ausubel has shown that this process of **absolute dematerialization has** already **taken off** for **many commodities**.

After cranking their way through their models of doom, O'Neill and his colleagues lugubriously conclude: **"If all people are to lead** a good **life within planetary boundaries**, then **the level of resource use associated with** meeting **basic needs must be** dramatically **reduced." They are** right, but they are **entirely backward with** regard to **how to achieve those goals. Economic growth provides** the wealth and **technologies** needed **to lift people from poverty while** simultaneously **lightening humanity's footprint on the** natural **world. Rather than degrowth, the planet—and** especially its **poor people—need more and faster** economic **growth**.