## 1NC – T

#### Our interpretation is that the resolution should define the division of affirmative and negative ground and offense. It was *negotiated* and *announced in advance*, providing both sides with a reasonable opportunity to prepare to engage one another’s arguments.

**Resolved denotes a proposal to be enacted by law**   
**Words and Phrases 1964** Permanent Edition   
Definition of the word “resolve,” given by Webster is “**to express an opinion or determination by resolution or vote; as ‘it was resolved by the legislature;**” It is of **similar** force **to the word “enact,”** which is **defined** by Bouvier **as** meaning “**to establish by law**”.

#### Ought means should

Merriam Webster, No Date – Merriam Webster’s Learner’s Dictionary, “ought”, <http://www.learnersdictionary.com/definition/ought>  
ought /ˈɑːt/ verb  
Learner's definition of OUGHT [modal verb] 1 ◊ Ought is almost always followed by to and the infinitive form of a verb. The phrase ought to has the same meaning as should and is used in the same ways, but it is less common and somewhat more formal. The negative forms ought not and oughtn't are often used without a following to. — used to indicate what is expected They ought to be here by now. You ought to be able to read this book. There ought to be a gas station on the way. 2 — used to say or suggest what should be done You ought to get some rest. That leak ought to be fixed. You ought to do your homework.

#### Should requires legal effect

Summers 94 (Justice – Oklahoma Supreme Court, “Kelsey v. Dollarsaver Food Warehouse of Durant”, 1994 OK 123, 11-8, http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker3fn13)

¶4 The legal question to be resolved by the court is whether the word "should"[13](http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker3fn13) in the May 18 order connotes futurity or may be deemed a ruling *in praesenti*.[14](http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker3fn14) The answer to this query is not to be divined from rules of grammar;[15](http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker3fn15) it must be governed by the age-old practice culture of legal professionals and its immemorial language usage. To determine if the omission (from the critical May 18 entry) of the turgid phrase, "and the same hereby is", (1) makes it an in futuro ruling - i.e., an expression of what the judge will or would do at a later stage - or (2) constitutes an in in praesenti resolution of a disputed law issue, the trial judge's intent must be garnered from the four corners of the entire record. [CONTINUES – TO FOOTNOTE] [13](http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker2fn13) "*Should*" not only is used as a "present indicative" synonymous with *ought* but also is the past tense of "shall" with various shades of meaning not always easy to analyze. See 57 C.J. Shall § 9, Judgments § 121 (1932). O. JESPERSEN, GROWTH AND STRUCTURE OF THE ENGLISH LANGUAGE (1984); St. Louis & S.F.R. Co. v. Brown, 45 Okl. 143, 144 P. 1075, 1080-81 (1914). For a more detailed explanation, see the Partridge quotation infra note 15. Certain contexts mandate a construction of the term "should" as more than merely indicating preference or desirability. Brown, supra at 1080-81 (jury instructions stating that jurors "should" reduce the amount of damages in proportion to the amount of contributory negligence of the plaintiff was held to imply an *obligation* *and to be more than advisory*); Carrigan v. California Horse Racing Board, 60 Wash. App. 79, [802 P.2d 813](http://www.oscn.net/applications/oscn/deliverdocument.asp?box1=802&box2=P.2D&box3=813) (1990) (one of the Rules of Appellate Procedure requiring that a party "should devote a section of the brief to the request for the fee or expenses" was interpreted to mean that a party is under an *obligation* to include the requested segment); State v. Rack, 318 S.W.2d 211, 215 (Mo. 1958) ("should" would mean the same as "shall" or "must" when used in an instruction to the jury which tells the triers they "should disregard false testimony"). [14](http://www.oscn.net/applications/oscn/DeliverDocument.asp?CiteID=20287#marker2fn14) *In praesenti* means literally "at the present time." BLACK'S LAW DICTIONARY 792 (6th Ed. 1990). In legal parlance the phrase denotes that which in law is *presently* or *immediately effective*, as opposed to something that *will* or *would* become effective *in the future [in futurol*]. See Van Wyck v. Knevals, [106 U.S. 360](http://www.oscn.net/applications/oscn/deliverdocument.asp?box1=106&box2=U.S.&box3=360), 365, 1 S.Ct. 336, 337, 27 L.Ed. 201 (1882).

#### Member nations of the WTO are

Cal Chamber [“World Trade Organization,” California Chamber of Commerce] JL

The WTO and its 164 member nations is the only global international organization dealing with the rules of trade between nations. At its heart are the WTO agreements, negotiated and signed by the bulk of the world’s trading nations and ratified or approved in their parliaments or legislatures. The goal is to help producers of goods and services, exporters and importers conduct their business.

#### Reduce means

Cambridge n.d. [“Reduce,” Cambridge English Dictionary] JL

to become or to make something become smaller in size, amount, degree, importance, etc.:

#### Intellectual property protections are

USFG 14 [(US Mission to International Organizations in Geneva) “Key Forms of Intellectual Property Protection,” 4/24/2014] JL

The key forms of intellectual property protection are patents, copyrights, trademarks and trade secrets. Because intellectual property shares many of the characteristics of real and personal property, associated rights permit intellectual property to be treated as an asset that can be bought, sold, licensed or given away. Intellectual property laws enable owners, inventors and creators to protect their property from unauthorized use.

#### Medicine is

Lexico ND [(Lexico dictionary) https://www.lexico.com/definition/medicine] BC

The science or practice of the diagnosis, treatment, and prevention of disease (in technical use often taken to exclude surgery)

#### Vote negative to preserve limits and equitable division of ground – the resolution is the most predictable stasis point for debates, anything outside of that ruins prep and clash by allowing the affirmative to pick any grounds for debate. That greenlights a race away from the core topic controversies that allow for robust contestation, which favors the aff by making neg ground inapplicable, susceptible to the perm, and concessionary. Two additional impacts:

#### Accessibility – Cutting negs to every possible aff wrecks small schools, which has a disparate impact on under-resourced and minority debaters. Counter-interpretations are arbitrary, unpredictable, and don’t solve the world of neg prep because there’s no grounding in the resolution

#### Link turns their education offense – getting to the third and fourth level of tactical engagement is only possible with refined and well-researched positions connected to the resolutional mechanism. Repeated debates over core issues incentivize innovative argument production and improved advocacy based on feedback and nuanced responses from opponents.

#### Prefer our impact: they’ve skewed the game which necessarily comes first because it makes evaluating the aff impossible. The role of individual debate rounds on broader subject formation is white noise – *can you remember what happened in doubles of the Loyola tournament your junior year?* – individual rounds don’t affect our subjectivity, so fairness is the only impact your ballot can resolve. You should presume all their truth claims false because they have not been properly tested

#### At best, they’re egregiously extra T because they defend reducing IP for goods other than medicines – links to limits and ground because it justifies infinite Frankenstein planks

#### TVA – read a plan that waives COVID IP like Peninsula’s vaccine imperialism aff or a plan that reduces IP to solve biopiracy, like Westwood’s – solvency deficits are neg ground – proves there’s room for contestation

**Breske ’18** [Ashleigh, visiting assistant professor of international studies in the global politics and societies (GPS) department @ Hollins University. She earned her Ph.D. in planning, governance, and globalization at Virginia Tech, her M.A.L.S. in social sciences with a focus on Roman history from Hollins University, and her B.S. in biology with a concentration in classical studies and chemistry. Her current research explores how institutions and cultural values mediate changes in repatriation policy for indigenous cultural property, “Biocolonialism: Examining Biopiracy, Inequality, and Power”, Spectra, 6(2), pp.58–73. DOI: http://doi.org/10.21061/spectra.v6i2.a.6]//pranav

Through examples of epistemic exploitation and a review of current literature on biocolonialism, this paper will highlight issues of indigenous knowledge and resource appropriation and how they relate to neoliberal economic practices. According to Lorenzo Veracini, the least visible types of colonial subjugation, like informal colonialism and trade imperialism, are the most resistant to change.i **This is especially true for biocolonialism, which arises through the dominant discourse of neoliberal economic practices around the world.** This form of colonialism is based on the exploitation and extraction of traditional resources and knowledge through western conceptions of property ownership. Neoliberalism has created a polarization in the world through conflicts between ethnicities and socio-economic levels, resulting in a dichotomy between the Global North and the Global South. **Concepts of western legal practices, intellectual property rights, national property laws, and biotechnology innovations create a system of biocolonialism with the dominant North capitalizing on these policies and practices.**ii **This has adversely affected the Global South in many ways and acts as an ideology promoting profit and economic growth at the expense of the marginalized.** The shift to neoliberalism has increased the divide between the developed and developing world and the “ideology of the market, and the omnipresence of market forces, have left an indelible mark on the western conception of knowledge.”iii **Power is often in the hands of transnational corporations and lobbyist groups with the global economy becoming larger than individual nation-state economies.**iv Cori Hayden theorizes that bioprospecting is “an important site for thinking about how neoliberalism works.”v For Hayden, **biopiracy is an institutionalized practice garnering transnational capital**. In other words, the opening of the market on biodiversity is argued to be both a development strategy and an argument for conservation within an economic framework. For example, in Peru, foreign corporations have filed more than 11,690 patents on natural resources traditionally used by indigenous communities.vi **Corporate interest in medicinal plants and seeds stems from long-term economic goals.** This example illustrates the current trend of outside transnational corporations showing an interest in traditionally-used medicinal plants and seeds. **Within the globalized economy, free trade agreements create a power imbalance between multinational corporations (MNCs) and the indigenous communities holding traditional knowledges and resources.** **Since indigenous knowledge is disseminated among the community and no one person owns it in the western, legal sense,vii MNCs use bioprospecting projects in areas with rich biodiversity for future development of products.**viii It has been found that bioprospecting success rates greatly increase with the inclusion of indigenous knowledge or local guidance. These endeavors are financed as exploratory enterprises to find aspects of biodiversity and indigenous knowledge as resources that can be patented and used for future development. **Bioprospecting can be considered a form of colonization using a**

**“knowledge-based economy” with profit sought through marginalized peoples and their traditional resources**.ix But, according to Hayden, **“[b]ioprospecting is the new name for an old practice: it refers to corporate drug development based on medicinal plants, traditional knowledge, and microbes culled from the “biodiversity-rich” regions of the globe—most of which reside in the so-called developing nations.”** (Hayden 2003, 1). **Bioprospecting can quickly lead to biopiracy, or the appropriation of traditional knowledge and natural resources without due compensation**.x Biopiracy—and by extension, the intellectual property and patent system—is essentially a new apparatus of power used by MNCs. Bioprospectors make claims on biological resources based on the assumption that the resources are available and open to everyone.xi **Initially, corporations present themselves as the protectors and innovators of these “universally” valuable resources.** They claim that if it were not for their investments, the information and original sources might be lost. **However, it was only after the development of international patents and free trade agreements that indigenous groups understood their exclusion from the economic yields gained by utilizing their knowledge.**xii Essentially, **biocolonialism, in the form of pharmaceutical and agricultural industry development by transnational corporations, is a “continuation of the oppressive power relations that have historically informed the interactions of western and indigenous cultures, and part of a continuum of contemporary practices that constitute forms of cultural imperialism.”**xiii More simply**, it is a form of dispossession and conquest through the lens of neoliberalism**.

#### They can’t get offense:

#### The resolution is negative state action – fiating a plan doesn’t necessitate endorsing the government – you can say “the US government shouldn’t have invaded Iraq” and disagree with the USFG as an institution.

#### We don’t exclude them, only persuade you that our methodology is best. Every debate requires a winner and loser, so voting negative doesn’t reject them from debate, it just says they should make a better argument next time.

## 1NC ­– DA

#### Biotech industry strong now.

Cancherini et al. 4/30 [(Laura, Engagement Manager @ McKinsey & Company, Joseph Lydon, Associate Partner @ McKinsey & Company, Jorge Santos Da Silva, Senior Partner at McKinsey & Company, and Alexandra Zemp, Partner at McKinsey & Company), “What’s ahead for biotech: Another wave or low tide?“, McKinsey & Company, 4-30-2021, https://www.mckinsey.com/industries/pharmaceuticals-and-medical-products/our-insights/whats-ahead-for-biotech-another-wave-or-low-tide] TDI

As the pandemic spread across the globe in early 2020, biotech leaders were initially pessimistic, reassessing their cash position and financing constraints. When McKinsey and BioCentury interviewed representatives from 106 biotech companies in May 2020,4 half of those interviewed were expecting delays in financing, and about 80 percent were tight on cash for the next two years and considering trade-offs such as deferring IPOs and acquisitions. Executives feared that valuations would decline because of lower revenue projections and concerns about clinical-trial delays, salesforce-effectiveness gaps, and other operational issues.

Belying this downbeat mood, biotech has in fact had one of its best years so far. By January 2021, venture capitalists had invested some 60 percent more than they had in January 2020, with more than $3 billion invested worldwide in January 2021 alone.5 IPO activity grew strongly: there were 19 more closures than in the same period in 2020, with an average of $150 million per raise, 17 percent more than in 2020. Other deals have also had a bumper start to 2021, with the average deal size reaching more than $500 million, up by more than 66 percent on the 2020 average (Exhibit 3).6

What about SPACs?

The analysis above does not include special-purpose acquisition companies (SPACs), which have recently become significant in IPOs in several industries. Some biotech investors we interviewed believe that SPACs represent a route to an IPO. How SPACs will evolve remains to be seen, but biotechs may be part of their story.

Fundamentals continue strong

When we asked executives and investors why the biotech sector had stayed so resilient during the worst economic crisis in decades, they cited innovation as the main reason. The number of assets transitioning to clinical phases is still rising, and further waves of innovation are on the horizon, driven by the convergence of biological and technological advances.

In the present day, many biotechs, along with the wider pharmaceutical industry, are taking steps to address the COVID-19 pandemic. Together, biotechs and pharma companies have more than 250 vaccine candidates in their pipelines, along with a similar number of therapeutics. What’s more, the crisis has shone a spotlight on pharma as the public seeks to understand the roadblocks involved in delivering a vaccine at speed and the measures needed to maintain safety and efficacy standards. To that extent, the world has been living through a time of mass education in science research and development.

Biotech has also benefited from its innate financial resilience. Healthcare as a whole is less dependent on economic cycles than most other industries. Biotech is an innovator, actively identifying and addressing patients’ unmet needs. In addition, biotechs’ top-line revenues have been less affected by lockdowns than is the case in most other industries.

Another factor acting in the sector’s favor is that larger pharmaceutical companies still rely on biotechs as a source of innovation. With the top dozen pharma companies having more than $170 billion in excess reserves that could be available for spending on M&A, the prospects for further financing and deal making look promising.

For these and other reasons, many investors regard biotech as a safe haven. One interviewee felt it had benefited from a halo effect during the pandemic.

More innovation on the horizon

The investors and executives we interviewed agreed that biotech innovation continues to increase in quality and quantity despite the macroeconomic environment. Evidence can be seen in the accelerating pace of assets transitioning across the development lifecycle. When we tracked the number of assets transitioning to Phase I, Phase II, and Phase III clinical trials, we found that Phase I and Phase II assets have transitioned 50 percent faster since 2018 than between 2013 and 2018, whereas Phase III assets have maintained much the same pace. There could be many reasons for this, but it is worth noting that biotechs with Phase I and Phase II assets as their lead assets have accounted for more than half of biotech IPOs. Having an early IPO gives a biotech earlier access to capital and leaves it with more scope to concentrate on science.

Looking forward, the combination of advances in biological science and accelerating developments in technology and artificial intelligence has the potential to take innovation to a new level. A recent report from the McKinsey Global Institute analyzed the profound economic and social impact of biological innovation and found that biomolecules, biosystems, biomachines, and biocomputing could collectively produce up to 60 percent of the physical inputs to the global economy. The applications of this “Bio Revolution” range from agriculture (such as the production of nonanimal meat) to energy and materials, and from consumer goods (such as multi-omics tailored diets) to a multitude of health applications.

#### IP protections are key to innovation – recouping startup costs and high risk of failure

Grabowski et al 15 [(Henry, Professor of Economics, member of the faculty for the Health Sector Management Program, and Director of the Program in Pharmaceuticals and Health Economics at Duke University) “The Roles of Patents and Research And Development Incentives In Biopharmaceutical Innovation,” Health Affairs, 2/2015] JL

The essential rationale for patent protection for biopharmaceuticals is that long-term benefits in the form of continued future innovation by pioneer or brand-name drug manufacturers outweigh the relatively short-term restrictions on imitative cost competition associated with market exclusivity. Regardless, the entry of other branded agents remains an important source of therapeutic competition during the patent term.

Several economic characteristics make patents and intellectual property protection particularly important to innovation incentives for the biopharmaceutical industry. **5** The R&D process often takes more than a decade to complete, and according to a recent analysis by Joseph DiMasi and colleagues, per new drug approval (including failed attempts), it involves more than a billion dollars in out-of-pocket costs. **6** Only approximately one in eight drug candidates survive clinical testing. **6**

As a result of the high risks of failure and the high costs, research and development must be funded by the few successful, on-market products (the top quintile of marketed products provide the dominant share of R&D returns). **7**,**8** Once a new drug’s patent term and any regulatory exclusivity provisions have expired, competing manufacturers are allowed to sell generic equivalents that require the investment of only several million dollars and that have a high likelihood of commercial success. Absent intellectual property protections that allow marketing exclusivity, innovative firms would be unlikely to make the costly and risky investments needed to bring a new drug to market.

Patents confer the right to exclude competitors for a limited time within a given scope, as defined by patent claims. However, they do not guarantee demand, nor do they prevent competition from nonidentical drugs that treat the same diseases and fall outside the protection of the patents.

New products may enter the same therapeutic class with common mechanisms of action but different molecular structures (for example, different statins) or with differing mechanisms of action (such as calcium channel blockers and angiotensin receptor blockers). 9 Joseph DiMasi and Laura Faden have found that the time between a first-in-class new drug and subsequent new drugs in the same therapeutic class has been dramatically reduced, from a median of 10.2 years in the 1970s to 2.5 years in the early 2000s. 10 Drugs in the same class compete through quality and price for preferred placement on drug formularies and physicians’ choices for patient treatment.

Patents play an essential role in the economic “ecosystem” of discovery and investment that has developed since the 1980s. Hundreds of start-up firms, often backed by venture capital, have been launched, and a robust innovation market has emerged. **11** The value of these development-stage firms is largely determined by their proprietary technologies and the candidate drugs they have in development. As a result, the strength of intellectual property protection plays a key role in funding and partnership opportunities for such firms.

#### Biopharmaceutical innovation is key to prevent future pandemics and bioterror.

Marjanovic and Feijao 20 [(Sonja Marjanovic, Ph.D., Judge Business School, University of Cambridge. Carolina Feijao, Ph.D. in biochemistry, University of Cambridge; M.Sc. in quantitative biology, Imperial College London; B.Sc. in biology, University of Lisbon.) "How to Best Enable Pharma Innovation Beyond the COVID-19 Crisis," RAND Corporation, 05-2020, https://www.rand.org/pubs/perspectives/PEA407-1.html] TDI

As key actors in the healthcare innovation landscape, pharmaceutical and life sciences companies have been called on to develop medicines, vaccines and diagnostics for pressing public health challenges. The COVID-19 crisis is one such challenge, but there are many others. For example, MERS, SARS, Ebola, Zika and avian and swine flu are also infectious diseases that represent public health threats. Infectious agents such as anthrax, smallpox and tularemia could present threats in a bioterrorism context.1 The general threat to public health that is posed by antimicrobial resistance is also well-recognised as an area in need of pharmaceutical innovation. Innovating in response to these challenges does not always align well with pharmaceutical industry commercial models, shareholder expectations and competition within the industry. However, the expertise, networks and infrastructure that industry has within its reach, as well as public expectations and the moral imperative, make pharmaceutical companies and the wider life sciences sector an indispensable partner in the search for solutions that save lives. This perspective argues for the need to establish more sustainable and scalable ways of incentivising pharmaceutical innovation in response to infectious disease threats to public health. It considers both past and current examples of efforts to mobilise pharmaceutical innovation in high commercial risk areas, including in the context of current efforts to respond to the COVID-19 pandemic. In global pandemic crises like COVID-19, the urgency and scale of the crisis – as well as the spotlight placed on pharmaceutical companies – mean that contributing to the search for effective medicines, vaccines or diagnostics is essential for socially responsible companies in the sector. 2 It is therefore unsurprising that we are seeing industry-wide efforts unfold at unprecedented scale and pace. Whereas there is always scope for more activity, industry is currently contributing in a variety of ways. Examples include pharmaceutical companies donating existing compounds to assess their utility in the fight against COVID19; screening existing compound libraries in-house or with partners to see if they can be repurposed; accelerating trials for potentially effective medicine or vaccine candidates; and in some cases rapidly accelerating in-house research and development to discover new treatments or vaccine agents and develop diagnostics tests.3,4 Pharmaceutical companies are collaborating with each other in some of these efforts and participating in global R&D partnerships (such as the Innovative Medicines Initiative effort to accelerate the development of potential therapies for COVID-19) and supporting national efforts to expand diagnosis and testing capacity and ensure affordable and ready access to potential solutions.3,5,6 The primary purpose of such innovation is to benefit patients and wider population health. Although there are also reputational benefits from involvement that can be realised across the industry, there are likely to be relatively few companies that are ‘commercial’ winners. Those who might gain substantial revenues will be under pressure not to be seen as profiting from the pandemic. In the United Kingdom for example, GSK has stated that it does not expect to profit from its COVID-19 related activities and that any gains will be invested in supporting research and long-term pandemic preparedness, as well as in developing products that would be affordable in the world’s poorest countries.7 Similarly, in the United States AbbVie has waived intellectual property rights for an existing combination product that is being tested for therapeutic potential against COVID-19, which would support affordability and allow for a supply of generics.8,9 Johnson & Johnson has stated that its potential vaccine – which is expected to begin trials – will be available on a not-for-profit basis during the pandemic.10 Pharma is mobilising substantial efforts to rise to the COVID-19 challenge at hand. However, we need to consider how pharmaceutical innovation for responding to emerging infectious diseases can best be enabled beyond the current crisis. Many public health threats (including those associated with other infectious diseases, bioterrorism agents and antimicrobial resistance) are urgently in need of pharmaceutical innovation, even if their impacts are not as visible to society as COVID-19 is in the immediate term. The pharmaceutical industry has responded to previous public health emergencies associated with infectious disease in recent times – for example those associated with Ebola and Zika outbreaks.11 However, it has done so to a lesser scale than for COVID-19 and with contributions from fewer companies. Similarly, levels of activity in response to the threat of antimicrobial resistance are still low.12 There are important policy questions as to whether – and how – industry could engage with such public health threats to an even greater extent under improved innovation conditions.

#### Extinction – defense is wrong

Piers Millett 17, Consultant for the World Health Organization, PhD in International Relations and Affairs, University of Bradford, Andrew Snyder-Beattie, “Existential Risk and Cost-Effective Biosecurity”, Health Security, Vol 15(4), http://online.liebertpub.com/doi/pdfplus/10.1089/hs.2017.0028

Historically, disease events have been responsible for the greatest death tolls on humanity. The 1918 flu was responsible for more than 50 million deaths,1 while smallpox killed perhaps 10 times that many in the 20th century alone.2 The Black Death was responsible for killing over 25% of the European population,3 while other pandemics, such as the plague of Justinian, are thought to have killed 25 million in the 6th century—constituting over 10% of the world’s population at the time.4 It is an open question whether a future pandemic could result in outright human extinction or the irreversible collapse of civilization.

A skeptic would have many good reasons to think that existential risk from disease is unlikely. Such a disease would need to spread worldwide to remote populations, overcome rare genetic resistances, and evade detection, cures, and countermeasures. Even evolution itself may work in humanity’s favor: Virulence and transmission is often a trade-off, and so evolutionary pressures could push against maximally lethal wild-type pathogens.5,6

While these arguments point to a very small risk of human extinction, they do not rule the possibility out entirely. Although rare, there are recorded instances of species going extinct due to disease—primarily in amphibians, but also in 1 mammalian species of rat on Christmas Island.7,8 There are also historical examples of large human populations being almost entirely wiped out by disease, especially when multiple diseases were simultaneously introduced into a population without immunity. The most striking examples of total population collapse include native American tribes exposed to European diseases, such as the Massachusett (86% loss of population), Quiripi-Unquachog (95% loss of population), and theWestern Abenaki (which suffered a staggering 98% loss of population).

In the modern context, no single disease currently exists that combines the worst-case levels of transmissibility, lethality, resistance to countermeasures, and global reach. But many diseases are proof of principle that each worst-case attribute can be realized independently. For example, some diseases exhibit nearly a 100% case fatality ratio in the absence of treatment, such as rabies or septicemic plague. Other diseases have a track record of spreading to virtually every human community worldwide, such as the 1918 flu,10 and seroprevalence studies indicate that other pathogens, such as chickenpox and HSV-1, can successfully reach over 95% of a population.11,12 Under optimal virulence theory, natural evolution would be an unlikely source for pathogens with the highest possible levels of transmissibility, virulence, and global reach. But advances in biotechnology might allow the creation of diseases that combine such traits. Recent controversy has already emerged over a number of scientific experiments that resulted in viruses with enhanced transmissibility, lethality, and/or the ability to overcome therapeutics.13-17 Other experiments demonstrated that mousepox could be modified to have a 100% case fatality rate and render a vaccine ineffective.18 In addition to transmissibility and lethality, studies have shown that other disease traits, such as incubation time, environmental survival, and available vectors, could be modified as well.19-2

**Moral uncertainty means preventing extinction should be our highest priority.  
Bostrom 12** [Nick Bostrom. Faculty of Philosophy & Oxford Martin School University of Oxford. “Existential Risk Prevention as Global Priority.” Global Policy (2012)]  
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** nowknow — 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** indeedprofoundly **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.

**Reducing the risk of extinction is always priority number one.   
Bostrom 12** [Faculty of Philosophy and Oxford Martin School, University of Oxford.], Existential Risk Prevention as Global Priority.  Forthcoming book (Global Policy). MP. [http://www.existenti...org/concept.pdf](http://www.existential-risk.org/concept.pdf)Even if we use the most conservative of these estimates, which entirely ignores the   possibility of space colonization and software minds, **we find that the expected loss of an existential   catastrophe is greater than the value of 10^16 human lives**.  **This implies that the expected value of   reducing existential risk by a mere one millionth of one percentage point is at least a hundred times the   value of a million human lives.**  The more technologically comprehensive estimate of 10  54 humanbrain-emulation subjective life-years (or 10  52  lives of ordinary length) makes the same point even   more starkly.  Even if we give this allegedly lower bound on the cumulative output potential of a   technologically mature civilization a mere 1% chance of being correct, we find that the expected   value of reducing existential risk by a mere one billionth of one billionth of one percentage point is worth   a hundred billion times as much as a billion human lives. **One might consequently argue that even the tiniest reduction of existential risk has an   expected value greater than that of the definite provision of any ordinary good, such as the direct   benefit of saving 1 billion lives.**  And, further, that the absolute value of the indirect effect of saving 1  billion lives on the total cumulative amount of existential riskâ€”positive or negativeâ€”is almost   certainly larger than the positive value of the direct benefit of such an action.

#### Independent of considerations of future happiness or life, death is the worst evil since it destroys the subject itself

Paterson, 03 – Department of Philosophy, Providence College, Rhode Island (Craig, “A Life Not Worth Living?”, Studies in Christian Ethics, http://sce.sagepub.com)

Contrary to those accounts, I would argue that it is death per se that is really the objective evil for us, not because it deprives us of a prospective future of overall good judged better than the alter- native of non-being. It cannot be about harm to a former person who has ceased to exist, for no person actually suffers from the sub-sequent non-participation. Rather, death in itself is an evil to us because it ontologically destroys the current existent subject — it is the ultimate in metaphysical lightening strikes.80 The evil of death is truly an ontological evil borne by the person who already exists, independently of calculations about better or worse possible lives. Such an evil need not be consciously experienced in order to be an evil for the kind of being a human person is. Death is an evil because of the change in kind it brings about, a change that is destructive of the type of entity that we essentially are. Anything, whether caused naturally or caused by human intervention (intentional or unintentional) that drastically interferes in the process of maintaining the person in existence is an objective evil for the person. What is crucially at stake here, and is dialectically supportive of the self-evidency of the basic good of human life, is that death is a radical interference with the current life process of the kind of being that we are. In consequence, death itself can be credibly thought of as a ‘primitive evil’ for all persons, regardless of the extent to which they are currently or prospectively capable of participating in a full array of the goods of life.81 In conclusion, concerning willed human actions, it is justifiable to state that any intentional rejection of human life itself cannot therefore be warranted since it is an expression of an ultimate disvalue for the subject, namely, the destruction of the present person; a radical ontological good that we cannot begin to weigh objectively against the travails of life in a rational manner. To deal with the sources of disvalue (pain, suffering, etc.) we should not seek to irrationally destroy the person, the very source and condition of all human possibility.82

## 1NC – Case

#### ROB better debater – anything else arbitrary, self serving, impact justified

#### Vote neg on presumption:

#### Zero risk they solve the existence of international institutions like the WTO or global IP regimes absent fiating legal change – they can’t explain how new academic thoughts spill up

#### If settler colonialism is so entrenched that legal change is irredeemable, decolonizing academia does nothing – also means no reason the ballot is key if they’ve already done the research

#### Legal reforms solve it – an interrogation of specific instances of state repression that radically challenge the squo

Brenna Bhandar 13, Senior Lecturer in Law at SOAS, University of London Strategies of Legal Rupture: the politics of judgment, http://www.forensic-architecture.org/wp-content/uploads/2013/02/BHANDAR-Brenna.-Strategies-of-Legal-Rupture.pdf

Strategies of Rupture In this article, my aim is to consider the use of law as a political strategy of rupture in colonial ¶ and post-colonial nation states. The question of whether and how to use law in order to ¶ transform and potentially shatter an existing political-legal order is one that continues to plague ¶ legal advocates in a variety of places, from Australia, to India, to Canada to Israel/Palestine. For ¶ example, the struggle for the recognition of indigenous rights in the context of colonial settler ¶ regimes has often produced pyrrhic victories.21 The question of indigenous sovereignty is ¶ ultimately quashed, and aboriginal rights are paradoxically recognised as an interest that derives ¶ from the prior occupation of the land by aboriginal communities but is at the same time parasitic ¶ on underlying Crown sovereignty; an interest that can be justifiably limited in the interests of ¶ settlement.22 Thus, the primary and inescapable question remains: how does one utilise the law ¶ without re-inscribing the very colonial legal order that one is attempting to break down?23 I ¶ argue that this is an inescapable dilemma; as critical race theorists and indigenous scholars have ¶ shown, to not avail ourselves of the law in an effort to ameliorate social ills, and to promote and ¶ protect the rights of oppressed minorities is to essentially abrogate one’s political responsibilities. ¶ Moreover, the reality of political struggle (particularly of the anti-colonial variety) is that it is of ¶ a diffuse and varied nature, engaging multiple different tactics in order to achieve its ends.¶ The notion of the ruptural defence emerges from the work of Jacques Vergès, a French advocate ¶ and subject of a film by Barbet Schroder entitled Terror’s Advocate. The film is as much a portrait ¶ of Vergès’ life as it is a series of vignettes of armed anti-colonial and anti-imperial struggle during ¶ the decades between the late 1940s and the 1980s. I should say at the beginning that I do not ¶ perceive Vergès as a heroic figure or defender of the oppressed; we can see from his later ¶ decisions to defend Klaus Barbie, for instance, that his desire to reveal the violence wrought by¶ European imperial powers was pursued at any cost. But in tracing the development of what¶ Verges called the ruptural defence, the film takes us to the heart of the inescapable paradoxes¶ and contradictions involved in using law as a means of political resistance in colonial and post-¶ colonial contexts. I want to explore the strategy of rupture as developed by Verges but also in a ¶ broader sense, to consider whether there is in this defence strategy that arose in colonial,¶ criminal law contexts, something that is generalisable, something that can be drawn out to form a¶ notion of legal rupture more generally.¶ To begin then, an exploration of Verges\* 'rupture defence', or rendered more eloquently, a¶ strategy of rupture. At the beginning of the film, Verges comments on his strategy for the trial of¶ Djamila Bouhired, a member of the KLN, who was tried in a military court for planting a bomb¶ in a cafe in Algiers in 1956. Verges states the following in relation to the trial:¶ The problem wasn't to play for sympathy as left-wing lawyers advised us to do, from the¶ murderous fools who judged us, but to taunt them, to provoke incidents that would reach¶ people in Paris, London, Brussels and Cairo...¶ The refusal to play for sympathy from those empowered to uphold the law in a colonial legal¶ order hints at the much more profound refusal that lies at the basis of the strategy of rupture,¶ which we see unfold throughout the film. In refusing to accept the characterisation of Djamila s¶ acts as criminal acts, Verges challenges the very legal categories that were used to criminalise,¶ condemn and punish anti-colonial resistance. The refusal to make the defendants' actions¶ cognisable to and intelligible within the colonial legal framework breaks the capacity of the¶ judges to adjudicate in at least two senses. First, their moral authority is radically undermined by¶ an outright rejection of the legal terms of reference and categories which they are appointed to¶ uphold. The legal strategy of rupture is a politics of refusal that calls into question the¶ justiciability of the purported crime by challenging the moral and political jurisdiction of the¶ colonial legal order itself.¶ Second, the refusal of the legal categorisation of the FLN acts of resistance as criminal brought¶ into light the contradictions inherent in the official French position and the reality of the¶ Algerian context. This was not, as the official line would have it, simply a case of French criminal¶ law being applied to French nationals. The repeated assertion that the defendants were¶ independent Algerian actors fighting against colonial brutality, coupled with repeated revelations¶ of the use of torture on political prisoners made it impossible for the contradictions to be¶ "rationally contained" within the normal operations of criminal law. The revelation and¶ denunciation of torture in the courtroom not to prevent statements or admissions from being¶ admissable as evidence (as such violations would normally be used) but to challenge the¶ legitimacy of the imposition of a colonial legal order on the Algerian people made the normal¶ operation of criminal law procedure virtually impossible.24 And it is in this making impossible of¶ the operation of the legal order that the power of the strategy of rupture lies.¶ In refusing to render his clients\* actions intelligible to a colonial (and later imperial) legal¶ Framework, Verges makes visible the obvious hypocrisy of the colonial legal order that attempts¶ to punish resistance that employs violence, in the same spatial temporal boundaries where the¶ brute violence of colonial rule saturates everyday life. In doing so, this is a strategy that¶ challenges the monopoly of legitimate violence the state holds. Verges aims to render visible the¶ raise distinction between common crimes and political crimes, or more broadly, the separation of¶ law and politics.25 The ruptural defence seeks to subvert the order and structure of the trial by¶ re-defining the relation between accuser and accused. This illumination of the hypocrisy of the¶ colonial state questions the authority of its judiciary to adjudicate. But more than this, his¶ strategy is ruptural in two senses that are fundamental to the operation of the law in the colonial¶ settler and post-colonial contexts. The first is that the space of opposition within the legal¶ confrontation is reconfigured. The second, and related point, is that the strictures of a legal¶ politics of recognition are shattered.¶ In relation to the first point, a space of opposition is, in the view of Fanon, missing in certain¶ senses, in the colonial context. A space of opposition in which a genuinely mutual struggle¶ between coloniser and colonised can occur is denied by spatial and legal-political strategies of¶ containment and segregation. While these strategies also exhibit great degrees of plasticity2", the¶ control over such mobility remains to a great degree in the hands of the colonial occupier. The¶ legal strategy of rupture creates a space of political opposition in the courtroom that cannot be¶ absorbed or appropriated by the legal order. In Christodoulidis' view, this lack of co-option is¶ the crux of the strategy of rupture.¶ This strategy of rupture also points to a path that challenges the limits of a politics of recognition, ¶ often one of the key legal and political strategies utilised by indigenous and racial minority¶ communities in their struggles for justice. Claims for recognition in a juridical frame inevitably¶ involve a variety of onto-epistemological closures.2' Whether because of the impossible and¶ irreconciliable relation between the need for universal norms and laws and the specificities of the¶ particular claims that come before the law, or because of the need to lit one's claims within legal-¶ political categories that are already intelligible within the legal order, legal recognition has been¶ critiqued, particularly in regards to colonial settler societies, on the basis that it only allows¶ identities, legal claims, ways of being that are always-already proper to the existing juridical¶ order to be recognised by the law. In the Canadian context, for instance, many scholars have¶ elucidated the ways in which the legal doctrine of aboriginal title to land imports Anglo-¶ American concepts of ownership into the heart of its definition; and moreover, defines¶ aboriginality on the basis of a fixed, static concept of cultural difference. The strategy of rupture¶ elides the violence of recognition by challenging the legitimacy of the colonial legal order itself.¶ In an article discussing Verges\* strategy of rupture, Emilios Christodoulidis takes up a question¶ posed to Verges by Foucault shortly after the publication of Verges' book, De La Strategic¶ Jiwuiare, as to whether the defence of rupture in the context of criminal law trials in the colony¶ could be generalised more widely, or whether it was "not in fact caught up in a specific historical¶ conjuncture." In exploring how the strategy of rupture could inform practices and theory'¶ outside of the courtroom, Christodoulidis characterises the strategy of rupture as one mode of¶ immanent critique. As individuals and communities subjected to the force of law, the law itself¶ becomes the object of critique, the object that needs to be taken apart in order to expose its¶ violence. To quote from Christodoulidis:¶ Immanent critique aims to generate within these institutional frameworks¶ contradictions that are inevitable (they can neither be displaced nor¶ ignored), compelling (they necessitate action) and transformative in that¶ (unlike internal critique) the overcoming of the contradiction does not¶ restore, but transcends, the 'disturbed' framework within which it arose.¶ It pushes it to go beyond its confines and in the process, famously' in¶ Marx's words, "enables the world to clarify' its consciousness in waking it¶ from its dream about itself” 29¶ Christodoulidis explores how the strategy of rupture can be utilised as an intellectual resource¶ for critical legal theory and more broadly, as a point of departure for political strategies that¶ could cause a crisis for globalised capital. Strategies of rupture are particularly crucial when¶ considering a system, he notes, that has been so successful at appropriating, ingesting and¶ making its own, political aspirations (such as freedom, to take one example) that have also been¶ used to disrupt its most violent and exploitative tendencies. Here Christodoulidis departs from¶ the question of colonialism to locus on the operation of capitalism in post-war European states. It¶ is also this bifurcation that I want to question, and rather than a distinction between colonialism¶ and capitalism, to consider how the colonial (as a set of economic and political relations that rely¶ on ideologies of racial difference, and civilisational discourses that emerged during the period of¶ European colonialism) is continually re-written and re-instantiated through a globalised¶ capitalism. As I elaborate in the discussion of the Salwa Judum judgment below, it is the¶ combination of violent state repression of political dissent that finds its origins (in the legal form¶ it takes) during the colonial era, and capitalist development imperatives that implicate local and¶ global mining corporations in the dispossession of tribal peoples that constitutes the legal-¶ political conflict at issue.¶ After the Trial: From Defence to Judgement¶ "Les bons juges, comme les hero¶ de la presse du coeur, n'existent pas."30¶ In response to a question from Jean Lapeyrie (a member of the Action Committee for Prison-¶ Justice) during a discussion of De La Strategic Judiciare published as the Preface to the second¶ edition, Verges remarks that there are actually effective judges, but that they are effective when¶ forgetting the essence of what it is to be a judge.51 The strategy of rupture is a tactic utilised to¶ subvert the order and structure of a trial; to re-define the very terms upon which the trial is¶ premised. On this view, the judge, charged with the obligation to uphold the rule of law is of¶ course by definition not able to do anything but sustain an unjust political order.¶ In the film Terror'^ Advocate, one is left to wonder about the specificities of the judicial responses¶ to the strategy deployed by Verges. (Djamila Bouhired, for instance, was sentenced to death, but¶ as a result of a worldwide media campaign was released from prison in 1962). While I would¶ argue that the judicial response is clearly' not what is at stake in the ruptural defence, I want to¶ consider the potentiality of the judgment to be ruptural in the sense articulated by¶ Christodoulidis. discussed above. Exposing a law to its own contradictions and violence,¶ revealing the ways in which a law or policy contradicts and violates rights to basic political¶ freedoms, has clear political-legal effects and consequences. Is it possible for members of the¶ judiciary to expose contradictions in the legal order itself, thereby transforming it? Would the¶ redefinition, for instance, of constitutional provisions guaranteeing rights that come into conflict¶ with capitalist development imperatives constitute such a rupture? In my view, the re-definition¶ of the limitations on the guarantees of individual and group freedom that are inevitably and¶ invariably utilised to justify state repression of rights in favour of capitalist development¶ imperatives, security, or colonial settlement have the potential to contribute to the re-creation of¶ political orders that could be more just and democratic.¶ We may be reluctant to ever claim a judgment as ruptural out of fear that it would contaminate¶ the radical nature of this form of immanent critique. Is to describe a judgment as ruptural to¶ belie the impossibility of justice, the aporia that confronts every moment of judicial decision-¶ making? I want to suggest that it is impossible to maintain such a pure position in relation to law,¶ particularly given its capacity (analogous to that of capital itself) for reinvention. Thus, I want to¶ explore the potential for judges to subvert state violence engendered by particular forms of¶ political and economic dispossession, through the act of judgment. In my view, basic rights¶ protected by constitutional guarantees (as in the Indian case) have been so compromised in the¶ interests of big business and development imperatives, that re-defining rights to equality, dignity¶ and security of person, and subverting the interests of the state-corporate nexus is potentially¶ ruptural, in the sense of causing a crisis for discrete tentacles of global capitalism.¶ At this juncture, we may want to explicitly account for the specific differences between criminal¶ defence cases and Verges' basic tactic, which is to challenge the very jurisdiction of the court to¶ adjudicate, to define the act of resistance as a criminal one and constitutional challenges to the¶ violation of rights in cases such as Salwa Judum. While one tactic seeks to render the illegitimacy¶ of the colonial state bare in its confrontation with anti-colonial resistance, the other is a tactic¶ used to re-define the terms upon which political dissent and resistance take place within the¶ constitutional bounds of the post-colonial state. These two strategies appear to be each other's¶ opposite; one challenges the legitimacy of the state itself through refusing the jurisdiction of the¶ court to criminalise freedom fighters, while the other calls on the judiciary to hold the state to¶ account for criminalising and violating the rights of its citizens to engage in political acts of¶ dissent and resistance. However, the common thread that situates these strategies within a¶ singular political framework is the fundamental challenge they pose to the state's monopoly over¶ defining the terms upon which anti-colonial and anti-capitalist political action takes place.

#### Non-reformist reforms avoid their offense and is more viable than their alt

Wright 07 [Wright, Erik Olin (American analytical Marxist sociologist, specializing in social stratification, and in egalitarian alternative futures to capitalism. He was the 2012 President of the American Sociological Association). "Guidelines for envisioning real utopias." SOUNDINGS-LONDON-LAWRENCE AND WISHART- 36 (2007): 26] AJ

The final guideline for discussions of envisioning real utopias concerns the importance of waystations. The central problem of envisioning real utopias concerns the viability of institutional alternatives that embody emancipatory values, but the practical achievability of such institutional designs often depends upon the existence of smaller steps, intermediate institutional innovations that move us in the right direction but only partially embody these values. Institutional proposals which have an all-or-nothing quality to them are less likely to be adopted in the first place, and may pose more difficult transition-cost problems if implemented. The catastrophic experience of Russia in the 'shock therapy' approach to market reform is historical testimony to this problem. Waystations are a difficult theoretical and practical problem because there are many instances in which partial reforms may have very different consequences than full-bodied changes. Consider the example of unconditional basic income. Suppose that a very limited, below, subsistence basic income was instituted: not enough to survive on, but a grant of income unconditionally given to everyone, One possibility is that this kind of basic income would act mainly as a subsidy to employers who pay very low wages, since now they could attract more workers even if they offered below poverty level earnings. There may be good reasons to iItitute such wage subsidies, but they would not generate the positive effects of a UBI, and therefore might not function as a stepping stone. What we ideally want, therefore, are intermediate reforms that have two main properties: first, they concretely demonstrate the virtues of the fuller programme of transformation, so they contribute to the ideological battle of convincing people that the alternative is credible and desirable; and second, they enhance the capacity for action of people, increasing their ability to push further in the future. Waystations that increase popular participation and bring people together in problem-solving deliberations for collective purposes are particularly salient in this regard. This is what in the 1970s was called ‘nonreformist reforms': reforms that are possible within existing institutions and that pragmatically solve real problems while at the same time empowering people in ways which enlarge their scope of action in the future.

#### Growth is sustainable and inevitable – unparalleled data proves tech solves, but transition doesn’t.

Bailey ’16 (Ronald; 12/16/16; B.A. in Philosophy and B.A. 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 Economic Growth Environmentally Sustainable?” <http://reason.com/archives/2016/12/16/is-economic-growth-environmentally-sust1)>

Is economic growth environmentally sustainable? No, say a group of prominent ecological economists led by the Australian hydrologist James Ward. In a new PLoS ONE article—"Is Decoupling GDP Growth from Environmental Impact Possible?"—they offer an analysis inspired by the 1972 neo-Malthusian classic The Limits to Growth. They even suggest that The Limits to Growth's projections with regard to population, food production, pollution, and the depletion of nonrenewable resources are still on track. In other words, they think we're still heading for a collapse. I think **they're wrong**. But they're wrong in an instructive way. The authors describe two types of "decoupling," relative and absolute. Relative decoupling means that economic growth increases faster than rates of growth in material and energy **consumption** and **environmental impact**. Between 1990 and 2012, for example, China's **GDP rose 20-fold** while its energy use increased by a factor of four and its material use by a factor of five. Basically this entails increases in efficiency that result in using fewer resources to produce more value. Absolute decoupling is what happens when continued economic growth actually **lessens resource use** and impacts on the natural environment, that is, creating more value while using less stuff. Essentially humanity becomes richer while withdrawing from nature. To demonstrate that continued economic growth is unsustainable, the authors recycle the hoary I=PAT model devised in 1972 by the Stanford entomologist and population alarmist Paul Ehrlich and the Harvard environmental policy professor (and chief Obama science adviser) John Holdren. Human Impact on the environment is supposed to equal to Population x Affluence/consumption x Technology. All of these are presumed to intensify and worsen humanity's impact on the natural world. In Ward and company's updated version of I=PAT, the sustainability of economic growth largely depends on Technology trends. Absolute decoupling from resource consumption or pollutant emissions requires technological intensity of use and emissions to decrease by at least the same annual percentage as the economy is growing. For example, if the economy is growing at three percent per year, technological intensity must reduce 20-fold over 100 years to maintain steady levels of resource consumption or emissions. If technological intensity is faster then resource use and emissions will decline over time, which would result in greater wealth creation with ever lessening resource consumption and environmental spillovers. Once they've set up their I=PAT analysis, Ward and his colleagues assert that "for non-substitutable resources such as land, water, raw materials and energy, we argue that whilst efficiency gains may be possible, there are minimum requirements for these resources that are ultimately governed by physical realities." Among the "physical realities" they mention are limits on plant photosynthesis, the conversion efficiencies of plants into meat, the amount of water needed to grow crops, that all supposedly determine the amount of agricultural land required to feed humanity. They also cite "the upper limits to energy and material efficiencies govern minimum resource throughput required for economic production." To illustrate the operation of their version of the I=PAT equation, they apply it to a recent study that projected it would be possible for Australia's economy to grow 7-fold while simultaneously reducing resource and energy use and lowering environmental pressures through 2050. They **crank the notion** that there are nonsubstitutable physical limits on material and energy resources through their equations until 2100, and they find that eventually consumption of both rise at the same rate as economic growth. QED: Economic growth is unsustainable. Or as they report, "Permanent decoupling (absolute or relative) is impossible for essential, non-substitutable resources because the efficiency gains are ultimately governed by physical limits." **Malthus wins again!** Or does he? GDP growth—increases in the monetary value of all finished goods and services—is a crude measure for improvements in human well-being. Nevertheless, rising incomes (GDP per capita) correlate with lots of good things that nearly everybody wants, including access to more and better **food**, longer and **healthier lives**, more educational **opportunities**, and greater scope for life choices. Ward and his colleagues are clearly right that there is only so much physical stuff on the Earth, but even they know that wealth is not created simply by using more stuff. Where they go wrong (as so many Malthusians do) is by implicitly assuming that there are limits to human creativity. Interestingly, Ward and his colleagues, like Malthus before them, focus on the supposed limits to **agricultural productivity**. For example, they cite the limits to photosynthesis, which will limit the amount of food that humanity can produce. But as they acknowledge, human population may not continue to increase. In fact, **global fertility rates** have been **decelerating** for many decades now, and demographer Wolfgang Lutz calculates that world population will peak after the middle of this century and begin falling. Since the number of mouths to feed will stabilize and people can eat only so much, it is unlikely that the **biophysical limits** of agriculture on Earth will be exceeded. But it gets even better. Agricultural **productivity is improving**. Consider the biophysical limit on photosynthesis cited by the study. In fact, researchers are already making progress on installing more efficient C-4 photosynthesis into rice and wheat, which would **boost yields by** as much as **50 percent**. British researchers just announced that they had figured out how to boost photosynthetic efficiency to create a super-wheat would increase yields by 20 percent. In a 2015 article for the Breakthrough Journal, "The Return of Nature: How Technology Liberates the Environment," Jesse H. Ausubel of Rockefeller University reviews how humanity is **already decoupling** in many ways from the natural world. "A series of 'decouplings' is occurring, so that our economy no longer advances in tandem with exploitation of land, forests, water, and minerals," he writes. "American use of almost everything except information **seems to be peaking**." He notes that agricultural applications of fertilizer and water in the U.S. peaked in the 1980s while yields continued to increase. Thanks to increasing agricultural productivity, humanity is already at **"peak farmland"**; as a result, "an area the size of India or of the United States east of the Mississippi could be released globally from agriculture over the next 50 years or so." Ward is worried about biophysical limits on water use. But as Ausubel notes, U.S. **water use has peaked** and has declined **below the level of 1970**. What about meat? Ausubel notes the **greater efficiency** with which chickens and cultivated fish turn grains and plant matter into meat. In any event, the future of farming is not fields but factories. Innovators are already seeking to replace the entire dairy industry with milk, yogurt, and cheeses made by genetically modified bacteria grown in tanks. Others are figuring how to culture meat in vat. Ausubel also notes that many countries have already been through or are about to enter the "forest transition," in which forests begin to expand. Roger Sedjo, a forest economist at Resources of the Future, has projected that by the middle of this century most of world's **industrial wood** will be produced from planted forests covering a remarkably small land area, perhaps **only 5 to 10 percent** of the extent of today's global forest. Shrinking farms and ranches and expanding forests will do a lot toward turning around the alarming global reduction in wildlife. How about unsubstitutable stuff? Are we running out of that? Ausubel notes that the U.S. has apparently already achieved **absolute decoupling**—call it peak stuff—for a lot of materials, including plastics, paper, timber, phosphate, aluminum, steel, and copper. And he reports relative decoupling for **53** other **commodities**, all of which are likely heading toward absolute decoupling. Additive manufacturing is also known as 3-D printing, in which machines build up new items one layer at a time. The Advanced Manufacturing Office suggested that additive manufacturing can reduce material needs and costs by up to **90 percent**. And instead of the replacement of worn-out items, their material can **simply be recycled** through a printer to return it to good-as-new condition using only 2 to 25 percent of the energy required to make new parts. 3-D printing on demand will also eliminate storage and inventory costs, and will significantly cut transportation costs. Nanomanufacturing—building atom-by-atom—will likely engender a **fourth industrial revolution** by spurring exponential economic growth while reducing human demands for material resources. Ward and company project that Australians will be using 250 percent more energy by 2100. Is there an upper limit to energy production that implies unsustainability? In their analysis, the ecological economists apparently assume that energy supplies are limited. Why this is not clear, unless their model **implicitly assumes** a growing **consumption** of fossil fuels (and even then, the world is not close to running out of those). But there is a source of energy that, for all practical purposes, is limitless and has few deleterious environmental effects: **nuclear power**. If demand for primary energy were to double by 2050, a back-of-the-envelope calculation finds that the **entire world's energy needs** could be supplied by 6,000 conventional nuclear power plants

The deployment of fast reactors would supply "renewable" energy for thousands of years. The development of thorium reactors could also supply **thousands of years** of energy. And both could do so without harming the environment. (Waste heat at that scale would not be much of a problem.) Such power sources are in any relevant sense "decoupled" from the natural world, since their fuel cycles produce **little pollution**. Recall that GDP measures the monetary value of all finished goods and services. Finished goods will become a shrinking part of the world's economy as more people gain access to food, clothing, housing, transportation, and so forth. Already, services account for 80 percent of U.S. GDP and 80 percent of civilian employment. Instead of stuff, people will want to spend time creating and enjoying themselves. As technological progress enables economic growth, people will consume more pixels and less petroleum, more massages and less mortar, more handicrafts and less hardwood. Ultimately, Ward and his colleagues make the **same mistake as Malthus** and the Limits to Growth folks: They **extrapolate trends** without taking adequate account of human **ingenuity**. Will it be possible to grow the economy 7-fold over this century while reducing resource consumption and restoring the natural world? Yes.

#### Our ev is just better – prefer data over buzzwords.

Newman ’17 (Peter; 7/27/17; Curtin University Sustainability Policy Institute, conducting a twenty-year statistical analysis based on third-party meta studies; EDP Sciences, “The rise and rise of renewable cities,” <https://www.rees-journal.org/articles/rees/pdf/2017/01/rees170008s.pdf)>

Abstract. The **decoupling of fossil fuels** from growth in economic activity has been **proceeding rapidly** for most of the 21st century and is analyzed globally in terms of structures and technologies for energy efficiency and for switching to renewable energy in the world’s cities. This is leading to the **decline of coal** and oil. The evidence suggests that the changes are **based on demand** for the structures and technologies that are emerging, facilitating a **disruptive process**. The rise of renewable cities can therefore be expected to accelerate. 1 Introduction The rise of renewable cities began in the 1990s but has accelerated in the 21st century [1,2]. As shown below, both coal and oil have begun to fall in the nations of the world driven mostly by their cities as this is where **growth and change** is happening [3]. The question raised by this paper is whether the rise will continue and even accelerate. The theory behind whether the rise in renewable cities is likely to continue or accelerate is partly left to economists who project the future based on the past [4] and more recently by those who see disruptive innovation as causing the future and thus leading to much accelerated change [5,6]. Disruptive innovation is caused by demand rather than supply. The costs of supply need to be competitive but may not be the cheapest option when people discover they want it for many reasons and this changes the whole system that the market is based around. An example often given by Christensen [5] is how small floppy discs outcompeted the larger discs which were cheaper per unit of memory storage but were not as convenient to carry; the system changed in response by developing the portable lap top computer. Disruptive innovations can surprise businesses who focus just on supply costs and they can go bankrupt whilst their product is still the cheapest and the whole structural system around them changes in response to the new demand. This is known as the “Kodak effect” due to the way Kodak chose not to develop their digital cameras as they saw them as too expensive. This paper seeks to find evidence of whether the renewable city is being driven by disruptive innovations based on demand, as well as competitive costs of supply, leading to a whole system change. If it is so, then the rise in renewable cities is likely to continue and even accelerate based on demand for the structures and products of the renewable city at a surprising rate. The decoupling of economic growth and fossil fuels In 2017, the International Energy Agency confirmed that economic growth has been **decoupling from** greenhouse **emissions** and fossil fuels since the start of the 21st century and that this was now leading to the first **drop in fossil fuel consumption** a

nd subsequent emissions [7]. How this relates to the rise of the renewable city is the focus of this paper. The mechanisms are first understood by looking at a range of national data as set out in Figure 1. Denmark decoupled relatively from the 1990s but absolutely over the last 17 years and is typical of many European nations and cities. The US and Australia have been slower but have now decoupled relatively from the 2000s and absolutely over the past 5–9 years. China decoupled relatively from 2005 and absolutely over the past few years with coal whilst **oil has plateaued**. India has started relative decoupling in the past decade and may change to an absolute decline in fossil fuels as it is investing strongly in renewables and urban electric rail [11]. These trends suggest a global process the rise of the renewable city as outlined by Droege [1,2]; this appears to be occurring much faster than expected and invites the question as to whether it will accelerate [3]. 3 Mechanisms for the rise of the renewable city The mechanisms behind the decoupling of wealth and fossil fuels and the resulting rise of renewable cities are likely to be based around **structural energy** efficiencies and **growth** in renewables. Whether they are disruptive, demand driven changes, will be examined with coal and oil. 3.1 The fall of coal 3.1.1 Structural built environment energy efficiencies In the period from 2000 to 2013 the Organization for Economic Cooperation and Development improved energy efficiency by a steady 0.6% per year but in 2013/14 it improved 1.5% and in 2014/15 it improved 1.8% [12]. This rapid growth seems to be more **structural** in its base as appliances and buildings are becoming **significantly more efficient** as shown by the Intergovernmental Panel on Climate Change [13]. This does appear to be a demand driven process involving digital smart systems in appliances and in construction and management of buildings leading to declines in electricity consumption [14]. 3.1.2 Renewable fuel growth Bloomberg New Energy Finance (BNEF) has made projections of the growth in renewables based on the relative costs of fuels. They suggest that from 2015 to 2040 renewables will become the **dominant power source** in the world; wind and solar will account for **64% of** the **new** generating **capacity**, and globally there will be 60% zerocarbon power, replacing coal and gas, which will decline from 57% to 31% [15]. The predictions are made based on trends and on declining costs for renewables relative to fossil fuels. The **biggest growth** is predicted to be roof top solar which will drop in cost by 60%. However, it may be driven at an **even faster rate** if it has demand driven characteristics. Carbon tracker researchers have suggested that the changes may be even more radical than BNEF are predicting as they appear to be following more rapidly than any previous predictions and are indicating elements of disruptive innovation [16,17]. The question is therefore whether there is any new evidence of the changes being disruptive with adoption of renewables proceeding more rapidly than supply cost projections. There is evidence from Australia of a **remarkably rapid adoption** of roof top solar at a time when little investment in power was happening in the aftermath of abandoning the Australian carbon-pricing scheme [18]. Perth in particular showed this as the city grew rapidly in wealth over the past decade and 25% of households invested in roof-top solar photovoltaics (PV). This happened well beyond what would have been predicted based just on supply costs and household solar is now the largest power station in the grid [18]. Battery storage is now following the same trends [19] and analysis in Perth shows solar-storage systems enable over **90% gridfree** electricity as well as producing more renewable energy to feed into the grid and generate income [18]. The technology of PV and batteries seems to fit into a niche for ordinary single residential householders [20]; recent demonstrations are showing similar heavy demand in medium density shared households that integrate PV and batteries using Citizen Utilities and blockchain software to enable peer to peer trading [21]. The signs are there that demand is driving the electricity system toward a rapid decline in coal even faster than supply costs would indicate. This may involve more gas in some cities like in the US where this is significantly cheaper but the attractions of roof-top solar and batteries are more than likely going to outcompete gas when the **market enables it to work** as it is in Australia with simple financing, permitting and installation [22,23]. 3.2 The fall of oil 3.2.1 Structural transport energy efficiencies Oil is embedded in the structure of cities through 50 years of automobile dependence in the practice of town planning; however this is changing as an unpredicted peak in car use per capita has occurred across the world’s developed cities and even into emerging cities [24]. This is driven by: – increases in density that have led to exponential declines in car use [24]; – rapid growth in transit across all the world’s cities as traffic congestion has led to faster rail options that bypass the traffic [25]; – similar trends in walking and cycling driven by health considerations and the demand for better networks [26,27]. These trends are all demand driven. Vehicle efficiency has also been slowly increasing despite an increase in vehicle size washing out some of this improvement [28]. 3.2.2 Electric mobility Electric vehicles are growing globally at **over 40% per year** and are expected to reach at least 25% of the vehicle fleet by 2040 [29]. Most of this growth is in China which is likely to mean cheaper exports. The demand for electric vehicles is high whether they are personal cars, buses, trains or electric bikes and certainly with cars this is happening well before the **supply cost** is competitive though the daily costs of operation are significantly lower and this is a strong demand factor for most consumers; some are therefore predicting even higher adoption rates [30]. There is another demand-based trend that will impact on the shift to **electric mobility**. The trend in electricity to become more **based on renewables** means that growth in solar-powered EVs are likely to be driven by demand similar to roof top solar. EVs are already being used to fit cleverly into home PV and battery systems with the high potential for “vehicle to grid (V2G)” transfers of power to enable extra storage options in the grid. Electric transit is also beginning to be switched to renewable power as demand for clean transport grows across cities [24] and new ways of financing this demand are being found [31]. 4 Will the demand for renewable cities rise and rise? The rise of the renewable city has been quite dramatic and this paper suggests that it will continue to rise due to demand which **facilitates disruptive innovation** in replacing both coal and oil. Such demand is seen in the improved electricity systems that are emerging as a result of the demand for roof top solar and in the demand for re-urbanized cities where electric mobility can better service the needs of the community. There are two other demand factors that are likely to continue to drive the need for a **renewable city** the knowledge economy and the digital economy The knowledge economy is based around creative interactions where people work together in dense urban centers as these are where the innovative, face-to-face synergies occur between people [32]. Old central business districts and new suburban centers have been transformed back into functional walking cities and those which have done this best have attracted the most capital and young talent to work there [33]. The six most walkable cities in the US have 38% higher GDP. In Boston 70% of the knowledge economy workers live in walkable locations [24]. Transit systems and walking are the most spatially efficient forms of transport as well as being the most free of carbon. If one km of a lane of road was considered as a unit of travel then car traffic can fit about 800 people per hour down that lane in a suburban street, a freeway up to 2500, a busway around 5000, a light rail between 10,000 and 20,000 and a heavy rail up to 50,000 [24]. These striking differences in spatial efficiency are translating into competitive advantage based on the need to bring people together in centers. There is a strong demand for such cities because they represent the places where the new knowledge economy will most likely emerge and provide new opportunities. The data is also strong that there is demand for **low carbon buildings** in these new regenerating urban centers [34]. Indeed, cities are competing for residents and workers through the provision of new sustainability oriented precincts and neighborhoods; the data shows that sustainability features in buildings are a close third behind **affordability and location** [3,32,35]. As with many economic changes, there is another cultural dimension to this change that perhaps explains the rapidity of the changes observed above as well as the demographic complexion of the change. Young people (especially those involved in knowledge economy jobs) are moving to reduce their car use and switch to alternative transport faster than any other group. This has been recognized by a few commentators and has been related to the use of social media devices in the digital economy. On transit or walking (and even to an extent while biking) young people are already connected by their smart technology phones and tablets. They are hardly usable while driving a car. The report by Davis et al. [34] shows that the mobile phone is a far more important device than a car for younger people. This is a cultural revolution that partly underlies the rail revolution as well as the re-urbanization of cities. It is essentially a smart city phenomenon. Thus, the structural expression of this change is that younger people are moving to live in the walking city or transit city as these locations more readily enable them to express the kind of urban experience and culture that they aspire to as well as save precious time. This is the demand that enables peak car, the rail revival and city center renewal to continue. This can explain why cities like Washington, D.C. and Portland are demonstrating the decoupling of GDP from car use per capita (Fig. 2). 5 Conclusion The evidence gathered in this paper has shown that there is a **new trend**: the rise of the renewable city which has emerged this century from the **decoupling of fossil fuels** and economic **growth**. The fall of coal and the fall of oil are both caused by structural **energy efficiency gains** (smart technology and smart buildings for coal; smart, dense transit-oriented cities that reduce car dependence for oil) and by switching to renewable fuels (coal is being replaced by wind and solar especially roof-top PV; oil is being replaced by electric mobility). This appears to be led by demand in cities as well as somewhat competitive supply costs. The rise and rise of the renewable city is thus to be expected as demand is likely to continue to rise for the urban living advantages associated with renewable city technologies and structures.

#### Capitalism solves inequality – historical analysis proves

Zitelmann 20 [(Dr.Rainer, a historian and sociologist. He is also a world-renowned author, successful businessman and real estate investor. Zitelmann has written a total of 24 books and has a doctorate in political science and sociology) “‘System Change Not Climate Change’: Capitalism And Environmental Destruction” Forbes, 7/13/2020] BC

As one argument would have it, capitalism is responsible for the destruction of the environment because capitalism is based on growth. And yes, capitalism has led to tremendous economic growth. But without this growth, an ever-expanding world population would not have been able to provide even the most basic necessities. After all, in 1800, there were just one billion people on the planet; today there are more than seven billion.

Economic Growth Helps To Combat Hunger And Poverty

It is all the more astonishing that, despite this rapid population growth, the world has not been overcome by rampant poverty. Looking back to 1800, most people in the world were extremely poor—average incomes were the same as they are in the poorest countries in Africa today and more than 90% of the global population was living in extreme poverty. The development of capitalism and economic growth reduced the proportion of extremely poor people in the world to less than 10%—despite the sevenfold increase in the global population during this same period. So growth is not a bad thing in and of itself. In fact, growth has led to a reduction in hunger and poverty.

Life expectancy at birth has increased more than twice as much in the last century as in the previous 200,000 years. The probability of a child born today reaching retirement age is higher than the probability of previous generations ever celebrating their fifth birthdays. In 1900, the average life expectancy worldwide was 31 years; today it stands at 71 years. Of the roughly 8,000 generations of Homo sapiens since our species emerged approximately 200,000 years ago, only the last four have experienced massive declines in mortality rates.

In the last 140 years there have been 106 major famines, each of which has cost more than 100,000 lives. The death toll has been particularly high in socialist countries such as the Soviet Union, China, Cambodia, Ethiopia and North Korea, killing tens of millions of people through the forced transfer of private means of production to public economies and the weaponization of hunger. On its own, the biggest socialist experiment in history, Mao’s Great Leap Forward in the late 1950s killed more than 45 million Chinese.

The number of deaths due to major famines fell to 1.4 million per year in the 1990s—not least as a result of the collapse of socialist systems worldwide and China increasingly embracing capitalism. In the first two decades of the 21st century approximately 600,000 people perished of hunger. That is equivalent to roughly 2% of the death toll from the early 20th century—despite the fact that the global population is four times larger today than it was back then.

#### It’s key to CCS – link-turns every impact.

Graciela ‘16 (/16 – Professor of Economics and of Statistics at Columbia University and Visiting Professor at Stanford University, and was the architect of the Kyoto Protocol carbon market (being interviewed by Marcus Rolle, freelance journalist specializing in environmental issues and global affairs, “Reversing Climate Change: Interview with Graciela Chichilnisky,” http://www.globalpolicyjournal.com/blog/01/09/2016/reversing-climate-change-interview-graciela-chichilnisky)//cmr

GC: Green capitalism is a new economic system that values the natural resources on which human survival depends. It fosters a harmonious relationship with our planet, its resources and the many species it harbors. It is a new type of market economics that addresses both equity and efficiency. Using carbon negative technology™ it helps reduce carbon in the atmosphere while fostering economic development in rich and developing nations, for example in the U S., EU, China and India. How does this work? In a nutshell Green Capitalism requires the creation of global limits or property rights nation by nation for the use of the atmosphere, the bodies of water and the planet’s biodiversity, and the creation of new markets to trade these rights from which new economic values and a new concept of economic progress emerges updating GDP as is now generally agreed is needed. Green Capitalism is needed now to help avert climate change and achieve the goals of the 2015 UN Paris Agreement, which are very ambitious and universally supported but have no way to be realized within the Agreement itself. The Carbon Market and its CDM play critical roles in the foundation of Green Capitalism, creating values to redefine GDP. These are needed to remain within the world’s “CO2 budget” and avoid catastrophic climate change. As I see it, the building blocks for Green Capitalism are then as follows; (1) Global limits nation by nation in the use of the planet’s atmosphere, its water bodies and biodiversity - these are global public goods. (2) New global markets to trade these limits, based on equity and efficiency. These markets are relatives of the Carbon Market and the SO2 market. The new market create new measures of economic values and update the concept of GDP. (3) Efficient use of Carbon Negative Technologies to avert catastrophic climate change by providing a smooth transition to clean energy and ensuring economic prosperity in rich and poor nations. These building blocks have immediate practical implications in reversing climate change and can assist the ambitious aims of Paris COP21 become a reality. MR: What is the greatest advantage of the new generation technologies that can capture CO2 from the air? GC: These technologies build carbon negative power plants, such as Global Thermostat, that clean the atmosphere of CO2 while producing electricity. Global Thermostat is a firm that is commercializing a technology that takes CO2 out of air and uses mostly low cost residual heat rather than electricity to drive the capture process, making the entire process of capturing CO2 from the atmosphere very inexpensive. There is enough residua heat in a coal power plant that it can be used to capture twice as much CO2 as the plant emits, thus transforming the power plant into a “carbon sink.” For example, a 400 MW coal plant that emits 1 million tons of CO2 per year can become a carbon sink absorbing a net amount of 1 million tons of CO2 instead. Carbon capture from air can be done anywhere and at any time, and so inexpensively that the CO2 can be sold for industrial or commercial uses such as plastics, food and beverages, greenhouses, bio-fertilizers, building materials and even enhanced oil recovery, all examples of large global markets and profitable opportunities. Carbon capture is powered mostly by low (85°C) residual heat that is inexpensive, and any source will do. In particular, renewable (solar) technology can power the process of carbon capture. This can help advance solar technology and make it more cost-efficient. This means more energy, more jobs, and it also means economic growth in developing nations, all of this while cleaning the CO2 in the atmosphere. Carbon negative technologies can literally transform the world economy. MR: One final question. You distinguish between long-run and short-run strategies in the effort to reverse climate change. Would carbon negative technologies be part of a short-run strategy? GC: Long-run strategies are quite different from strategies for the short-run. Often long-run strategies do not work in the short run and different policies and economic incentives are needed. In the long run the best climate change policy is to replace fossil fuel sources of energy that by themselves cause 45% of the global emissions, and to plant trees to restore if possible the natural sources and sinks of CO2. But the fossil fuel power plant infrastructure is about 87% of the power plant infrastructure and about $45-55 trillion globally. This infrastructure cannot be replaced quickly, certainly not in the short time period in which we need to take action to avert catastrophic climate change. The issue is that CO2 once emitted remains hundreds of years in the atmosphere and we have emitted so much that unless we actually remove the CO2 that is already there, we cannot remain long within the carbon budget, which is the concentration of CO2 beyond which we fear catastrophic climate change. In the short run, therefore, we face significant time pressure. The IPCC indicates in its 2014 5th Assessment Report that we must actually remove the carbon that is already in the atmosphere and do so in massive quantities, this century (p. 191 of 5th Assessment Report). This is what I called a carbon negative approach, which works for the short run. Renewable energy is the long run solution. Renewable energy is too slow for a short run resolution since replacing a $45-55 trillion power plant infrastructure with renewable plants could take decades. We need action sooner than that. For the short run we need carbon negative technologies that capture more carbon than what is emitted. Trees do that and they must be conserved to help preserve biodiversity. Biochar does that. But trees and other natural sinks are too slow for what we need today. Therefore, negative carbon is needed now as part of a blueprint for transformation. It must be part of the blueprint for Sustainable Development and its short term manifestation that I call Green Capitalism, while in the long run renewable sources of energy suffice, including Wind, Biofuels, Nuclear, Geothermal, and Hydroelectric energy. These are in limited supply and cannot replace fossil fuels. Global energy today is roughly divided as follows: 87% is fossil, namely natural gas, coal, oil; 10% is nuclear, geothermal, and hydroelectric, and less than 1% is solar power — photovoltaic and solar thermal. Nuclear fuel is scarce and nuclear technology is generally considered dangerous as tragically experienced by the Fukushima Daichi nuclear disaster in Japan, and it seems unrealistic to seek a solution in the nuclear direction. Only solar energy can be a long term solution: Less than 1% of the solar energy we receive on earth can be transformed into 10 times the fossil fuel energy used in the world today. Yet we need a short-term strategy that accelerates long run renewable energy, or we will defeat long-term goals. In the short term as the IPCC validates, we need carbon negative technology, carbon removals. The short run is the next 20 or 30 years. There is no time in this period of time to transform the entire fossil infrastructure — it costs $45-55 trillion (IEA) to replace and it is slow to build. We need to directly reduce carbon in the atmosphere now. We cannot use traditional methods to remove CO2 from smokestacks (called often Carbon Capture and Sequestration, CSS) because they are not carbon negative as is required. CSS works but does not suffice because it only captures what power plants currently emit. Any level of emissions adds to the stable and high concentration we have today and CO2 remains in the atmosphere for years. We need to remove the CO2 that is already in the atmosphere, namely air capture of CO2 also called carbon removals. The solution is to combine air capture of CO2 with storage of CO2 into stable materials such as biochar, cement, polymers, and carbon fibers that replace a number of other construction materials such as metals. The most recent BMW automobile model uses only carbon fibers rather than metals. It is also possible to combine CO2 to produce renewable gasoline, namely gasoline produced from air and water. CO2 can be separated from air and hydrogen separated from water, and their combination is a well-known industrial process to produce gasoline. Is this therefore too expensive? There are new technologies using algae that make synthetic fuel commercially feasible at competitive rates. Other policies would involve combining air capture with solar thermal electricity using the residual solar thermal heat to drive the carbon capture process. This can make a solar plant more productive and efficient so it can out-compete coal as a source of energy. In summary, the blueprint offered here is a private/public approach, based on new industrial technology and financial markets, self-funded and using profitable greenmarkets, with securities that utilize carbon credits as the “underlying” asset, based on the KP CDM, as well as new markets for biodiversity and water providing abundant clean energy to stave off impending and actual energy crisis in developing nations, fostering mutually beneficial cooperation for industrial and developing nations. The blueprint proposed provides the two sides of the coin, equity and efficiency, and can assign a critical role for women as stewards for human survival and sustainable development. My vision is a carbon negative economy that represents green capitalism in resolving the Global Climate negotiations and the North–South Divide. Carbon negative power plants and capture of CO2 from air and ensure a clean atmosphere together innovation and more jobs and exports: the more you produce and create jobs the cleaner becomes the atmosphere. In practice, Green Capitalism means economic growth that is harmonious with the Earth resources.

**Warming causes extinction**

**Ramanathan et al. 17** [Veerabhadran Ramanathan is Victor Alderson Professor of Applied Ocean Sciences and director of the Center for Atmospheric Sciences at the Scripps Institution of Oceanography, University of California, San Diego, Dr. William Collins is an internationally recognized expert in climate modeling and climate change science. He is the Director of the Climate and Ecosystem Sciences Division (CESD) for the Earth and Environmental Sciences Area (EESA) at the Lawrence Berkeley National Laboratory (LBNL), Prof. Dr Mark Lawrence, Ph.D. is scientific director at the Institute for Advanced Sustainability Studies (IASS) in Potsdam, Örjan Gustafsson is a Professor in the Department of Environmental Science and Analytic Chemistry at Stockholm University, Shichang Kang is Professor, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences (CAS); CAS Center for Excellence in Tibetan Plateau Earth Sciences, and Molina, M.J., Zaelke, D., Borgford-Parnell, N., Xu, Y., Alex, K., Auffhammer, M., Bledsoe, P., Croes, B., Forman, F., Haines, A., Harnish, R., Jacobson, M.Z., Lawrence, M., Leloup, D., Lenton, T., Morehouse, T., Munk, W., Picolotti, R., Prather, K., Raga, G., Rignot, E., Shindell, D., Singh, A.K., Steiner, A., Thiemens, M., Titley, D.W., Tucker, M.E., Tripathi, S., & Victor, D., authors come from the following 9 countries - US, Switzerland, Sweden, UK, China, Germany, Australia, Mexico, India, “Well Under 2 Degrees Celsius: Fast Action Policies to Protect People and the Planet from Extreme Climate Change,” Report of the Committee to Prevent Extreme Climate Change, September 2017, http://www.igsd.org/wp-content/uploads/2017/09/Well-Under-2-Degrees-Celsius-Report-2017.pdf] TDI

Climate change is becoming an existential threat with warming in excess of 2°C within the next three decades and 4°C to 6°C within the next several decades. Warming of such magnitudes will expose as many as 75% of the world’s population to deadly heat stress in addition to disrupting the climate and weather worldwide. Climate change is an urgent problem requiring urgent solutions. This paper lays out urgent and practical solutions that are ready for implementation now, will deliver benefits in the next few critical decades, and places the world on a path to achieving the longterm targets of the Paris Agreement and near-term sustainable development goals. The approach consists of four building blocks and 3 levers to implement ten scalable solutions described in this report by a team of climate scientists, policy makers, social and behavioral scientists, political scientists, legal experts, diplomats, and military experts from around the world. These solutions will enable society to decarbonize the global energy system by 2050 through efficiency and renewables, drastically reduce short-lived climate pollutants, and stabilize the climate well below 2°C both in the near term (before 2050) and in the long term (post 2050). It will also reduce premature mortalities by tens of millions by 2050. As an insurance against policy lapses, mitigation delays and faster than projected climate changes, the solutions include an Atmospheric Carbon Extraction lever to remove CO2 from the air. The amount of CO2 that must be removed ranges from negligible, if the emissions of CO2 from the energy system and SLCPs start to decrease by 2020 and carbon neutrality is achieved by 2050, to a staggering one trillion tons if the carbon lever is not pulled and emissions of climate pollutants continue to increase until 2030.

There are numerous living laboratories including 53 cities, many universities around the world, the state of California, and the nation of Sweden, who have embarked on a carbon neutral pathway. These laboratories have already created 8 million jobs in the clean energy industry; they have also shown that emissions of greenhouse gases and air pollutants can be decoupled from economic growth. Another favorable sign is that growth rates of worldwide carbon emissions have reduced from 2.9% per year during the first decade of this century to 1.3% from 2011 to 2014 and near zero growth rates during the last few years. The carbon emission curve is bending, but we have a long way to go and very little time for achieving carbon neutrality. We need institutions and enterprises that can accelerate this bending by scaling-up the solutions that are being proven in the living laboratories. We have less than a decade to put these solutions in place around the world to preserve nature and our quality of life for generations to come. The time is now.

The Paris Agreement is an historic achievement. For the first time, effectively all nations have committed to limiting their greenhouse gas emissions and taking other actions to limit global temperature change. Specifically, 197 nations agreed to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels,” and achieve carbon neutrality in the second half of this century.

The climate has already warmed by 1°C. The problem is running ahead of us, and under current trends we will likely reach 1.5°C in the next fifteen years and surpass the 2°C guardrail by mid-century with a 50% probability of reaching 4°C by end of century. Warming in excess of 3°C is likely to be a global catastrophe for three major reasons:

• Warming in the range of 3°C to 5°C is suggested as the threshold for several tipping points in the physical and geochemical systems; a warming of about 3°C has a probability of over 40% to cross over multiple tipping points, while a warming close to 5°C increases it to nearly 90%, compared with a baseline warming of less than 1.5°C, which has only just over a 10% probability of exceeding any tipping point.

**•** Health effects of such warming are emerging as a major if not dominant source of concern. Warming of 4°C or more will expose more than 70% of the population, i.e. about 7 billion by the end of the century, to deadly heat stress and expose about 2.4 billion to vector borne diseases such as Dengue, Chikengunya, and Zika virus among others. Ecologists and paleontologists have proposed that warming in excess of 3°C, accompanied by increased acidity of the oceans by the buildup of CO2 , can become a major causal factor for exposing more than 50% of all species to extinction. 20% of species are in danger of extinction now due to population, habitat destruction, and climate change.

The good news is that there may still be time to avert such catastrophic changes. The Paris Agreement and supporting climate policies must be strengthened substantially within the next five years to bend the emissions curve down faster, stabilize climate, and prevent catastrophic warming. To the extent those efforts fall short, societies and ecosystems will be forced to contend with substantial needs for adaptation—a burden that will fall disproportionately on the poorest three billion who are least responsible for causing the climate change problem**.**

Here we propose a policy roadmap with a realistic and reasonable chance of limiting global temperature to safe levels and preventing unmanageable climate change—an outline of specific science-based policy pathways that serve as the building blocks for a three-lever strategy that could limit warming to well under 2°C. The projections and the emission pathways proposed in this summary are based on a combination of published recommendations and new model simulations conducted by the authors of this study (see Figure 2). We have framed the plan in terms of four building blocks and three levers, which are implemented through 10 solutions. The first building block would be fully implementing the nationally determined mitigation pledges under the Paris Agreement of the UN Framework Convention on Climate Change (UNFCCC). In addition, several sister agreements that provide targeted and efficient mitigation must be strengthened. Sister agreements include the Kigali Amendment to the Montreal Protocol to phase down HFCs, efforts to address aviation emissions through the International Civil Aviation Organization (ICAO), maritime black carbon emissions through the International Maritime Organization (IMO), and the commitment by the eight countries of the Arctic Council to reduce black carbon emissions by up to 33%. There are many other complementary processes that have drawn attention to specific actions on climate change, such as the Group of 20 (G20), which has emphasized reform of fossil fuel subsidies, and the Climate and Clean Air Coalition (CCAC). HFC measures, for example, can avoid as much as 0.5°C of warming by 2100 through the mandatory global phasedown of HFC refrigerants within the next few decades, and substantially more through parallel efforts to improve energy efficiency of air conditioners and other cooling equipment potentially doubling this climate benefit.

For the second building block, numerous subnational and city scale climate action plans have to be scaled up. One prominent example is California’s Under 2 Coalition signed by over 177 jurisdictions from 37 countries in six continents covering a third of world economy. The goal of this Memorandum of Understanding is to catalyze efforts in many jurisdictions that are comparable with California’s target of 40% reductions in CO2 emissions by 2030 and 80% reductions by 2050—emission cuts that, if achieved globally, would be consistent with stopping warming at about 2°C above pre-industrial levels. Another prominent example is the climate action plans by over 52 cities and 65 businesses around the world aiming to cut emissions by 30% by 2030 and 80% to 100% by 2050. There are concerns that the carbon neutral goal will hinder economic progress; however, real world examples from California and Sweden since 2005 offer evidence that economic growth can be decoupled from carbon emissions and the data for CO2 emissions and GDP reveal that growth in fact prospers with a green economy.

The third building block consists of two levers that we need to pull as hard as we can: one for drastically reducing emissions of short-lived climate pollutants (SLCPs) beginning now and completing by 2030, and the other for decarbonizing the global energy system by 2050 through efficiency and renewables. Pulling both levers simultaneously can keep global temperature rise below 2°C through the end of the century. If we bend the CO2 emissions curve through decarbonization of the energy system such that global emissions peak in 2020 and decrease steadily thereafter until reaching zero in 2050, there is less than a 20% probability of exceeding 2°C. This call for bending the CO2 curve by 2020 is one key way in which this report’s proposal differs from the Paris Agreement and it is perhaps the most difficult task of all those envisioned here. Many cities and jurisdictions are already on this pathway, thus demonstrating its scalability. Achieving carbon neutrality and reducing emissions of SLCPs would also drastically reduce air pollution globally, including all major cities, thus saving millions of lives and over 100 million tons of crops lost to air pollution each year. In addition, these steps would provide clean energy access to the world’s poorest three billion who are still forced to resort to 18th century technologies to meet basic needs such as cooking. For the fourth and the final building block, we are adding a third lever, ACE (Atmospheric Carbon Extraction, also known as Carbon Dioxide Removal, or “CDR”). This lever is added as an insurance against surprises (due to policy lapses, mitigation delays, or non-linear climate changes) and would require development of scalable measures for removing the CO2 already in the atmosphere. The amount of CO2 that must be removed will range from negligible, if the emissions of CO2 from the energy system and SLCPs start to decrease by 2020 and carbon neutrality is achieved by 2050, to a staggering one trillion tons, if CO2 emissions continue to increase until 2030, and the carbon lever is not pulled until after 2030. This issue is raised because the NDCs (Nationally Determined Contributions) accompanying the Paris Agreement would allow CO2 emissions to increase until 2030. We call on economists and experts in political and administrative systems to assess the feasibility and cost-effectiveness of reducing carbon and SLCPs emissions beginning in 2020 compared with delaying it by ten years and then being forced to pull the third lever to extract one trillion tons of CO2

The fast mitigation plan of requiring emissions reductions to begin by 2020, which means that many countries need to cut now, is urgently needed to limit the warming to well under 2°C. Climate change is not a linear problem. Instead, we are facing non-linear climate tipping points that can lead to self-reinforcing and cascading climate change impacts. Tipping points and selfreinforcing feedbacks are wild cards that are more likely with increased temperatures, and many of the potential abrupt climate shifts could happen as warming goes from 1.5°C in 15 years to 2°C by 2050, with the potential to push us well beyond the Paris Agreement goals.

Where Do We Go from Here?

A massive effort will be needed to stop warming at 2°C, and time is of the essence. With unchecked business-as-usual emissions, global warming has a 50% likelihood of exceeding 4ºC and a 5% probability of exceeding 6ºC in this century, raising existential questions for most, but especially the poorest three billion people. A 4ºC warming is likely to expose as many as 75% of the global population to deadly heat**.** Dangerous to catastrophic impacts on the health of people including generations yet to be born, on the health of ecosystems, and on species extinction have emerged as major justifications for mitigating climate change well below 2ºC, although we must recognize that the uncertainties intrinsic in climate and social systems make it hard to pin down exactly the level of warming that will trigger possibly catastrophic impacts. To avoid these consequences, we must act now, and we must act fast and effectively. This report sets out a specific plan for reducing climate change in both the near- and long-term. With aggressive urgent actions, we can protect ourselves. Acting quickly to prevent catastrophic climate change by decarbonization will save millions of lives, trillions of dollars in economic costs, and massive suffering and dislocation to people around the world. This is a global security imperative, as it can avoid the migration and destabilization of entire societies and countries and reduce the likelihood of environmentally driven civil wars and other conflicts.

Staying well under 2°C will require a concerted global effort. We must address everything from our energy systems to our personal choices to reduce emissions to the greatest extent possible. We must redouble our efforts to invent, test, and perfect systems of governance so that the large measure of international cooperation needed to achieve these goals can be realized in practice. The health of people for generations to come and the health of ecosystems crucially depend on an energy revolution beginning now that will take us away from fossil fuels and toward the clean renewable energy sources of the future. It will be nearly impossible to obtain other critical social goals, including for example the UN agenda 2030 with the Sustainable Development Goals, if we do not make immediate and profound progress stabilizing climate, as we are outlining here.

1. The Building Blocks Approach The 2015 Paris Agreement, which went into effect November 2016, is a remarkable, historic achievement. For the frst time, essentially all nations have committed to limit their greenhouse gas emissions and take other actions to limit global temperature and adapt to unavoidable climate change. Nations agreed to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels” and “achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century” (UNFCCC, 2015). Nevertheless, the initial Paris Agreement has to be strengthened substantially within fve years if we are to prevent catastrophic warming; current pledges place the world on track for up to 3.4°C by 2100 (UNEP, 2016b). Until now, no specifc policy roadmap exists that provides a realistic and reasonable chance of limiting global temperatures to safe levels and preventing unmanageable climate change. This report is our attempt to provide such a plan— an outline of specifc solutions that serve as the building blocks for a comprehensive strategy for limiting the warming to well under 2°C and avoiding dangerous climate change (Figure 1). The frst building block is the full implementation of the nationally determined mitigation pledges under the Paris Agreement of the UN Framework Convention on Climate Change (UNFCCC) and strengthening global sister agreements, such as the Kigali Amendment to the Montreal Protocol to phase down HFCs, which can provide additional targeted, fast action mitigation at scale. For the second building block, numerous sub-national and city scale climate action plans have to be scaled up such as California’s Under 2 Coalition signed by 177 jurisdictions from 37 countries on six continents. The third building block is targeted measures to reduce emissions of shortlived climate pollutants (SLCPs), beginning now and fully implemented by 2030, along with major measures to fully decarbonize the global economy, causing the overall emissions growth rate to stop in 2020-2030 and reach carbon neutrality by 2050. Such a deep decarbonization would require an energy revolution similar to the Industrial Revolution that was based on fossil fuels. The fnal building block includes scalable and reversible carbon dioxide (CO2 ) removal measures, which can begin removing CO2 already emitted into the atmosphere. Such a plan is urgently needed. Climate change is not a linear problem. Instead, climate tipping points can lead to self-reinforcing, cascading climate change impacts (Lenton et al., 2008). Tipping points are more likely with increased temperatures, and many of the potential abrupt climate shifts could happen as warming goes from 1.5°C to 2°C, with the potential to push us well beyond the Paris Agreement goals (Drijfhout et al., 2015). In order to avoid dangerous climate change, we must address these concerns. We must act now, and we must act fast. Reduction of SLCPs will result in fast, near-term reductions in warming, while present-day reductions of CO2 will result in long-term climate benefts. This two-lever approach—aggressively cutting both SLCPs and CO2 –-will slow warming in the coming decades when it is most crucial to avoid impacts from climate change as well as maintain a safe climate many decades from now. To achieve the nearterm goals, we have outlined solutions to be implemented immediately. These solutions to bend down the rising emissions curve and thus bend the warming trajectory curve follow a 2015 assessment by the University of California under its Carbon Neutrality Initiative (Ramanathan et al., 2016). The solutions are clustered into categories of social transformation, governance improvement, market- and regulation-based solutions, technological innovation and transformation, and natural and ecosystem management. Additionally, we need to intensely investigate and pursue a third lever—ACE (Atmospheric Carbon Extraction). While many potential technologies exist, we do not know the extent to which they could be scaled up to remove the requisite amount of carbon from the atmosphere in order to achieve the Paris Agreement goals, and any delay in mitigation will demand increasing reliance on these technologies. Yet, there is still hope. Humanity can come together, as we have done in the past, to collaborate towards a common goal. We have no choice but to tackle the challenge of climate change. We only have the choice of when and how: either now, through the ambitious plan outlined here, or later, through radical adaptation and societal transformations in response to an ever-deteriorating climate system that will unleash devastating impacts—some of which may be beyond our capacity to fully adapt to or reverse for thousands of years.

2. Major Climate Disruptions: How Soon and How Fast? “Without adequate mitigation and adaptation, climate change poses unacceptable risks to global public health.” (WHO, 2016)

The planet has already witnessed nearly 1°C of warming, and another 0.6°C of additional warming is currently stored in the ocean to be released over the next two to four decades, if climate warming emissions are not radically reduced during that time (IPCC, 2013). The impacts of this warming on extreme weather, droughts, and foods are being felt by society worldwide to the extent that many think of this no longer as climate change but as climate disruption. Consider the business as usual scenario:

15 years from now: In 15 years, planetary warming will reach 1.5°C above pre-industrial global mean temperature (Ramanathan and Xu, 2010; Shindell et al., 2012). This exceeds the 0.5°C to 1°C of warming during the Eemian period, 115,000– 130,000 years ago, when sea-levels reached 6-9 meters (20-30 feet) higher than today (Hansen et al., 2016b). The impacts of this warming will affect us all yet will disproportionately affect the Earth’s poorest three billion people, who are primarily subsistence farmers that still rely on 18th century technologies and have the least capacity to adapt (IPCC, 2014a; Dasgupta et al., 2015). They thus may be forced to resort to mass migration into city slums and push across international borders (U.S. DOD, 2015). The existential fate of lowlying small islands and coastal communities will also need to be addressed, as they are primarily vulnerable to sea-level rise, diminishing freshwater resources, and more intense storms. In addition, many depend on fsheries for protein, and these are likely to be affected by ocean acidifcation and climate change. Climate injustice could start causing visible regional and international conficts. All of this will be exacerbated as the risk of passing tipping points increases (Lenton et al., 2008).

30 years from now: By mid-century, warming is expected to exceed 2°C, which would be unprecedented with respect to historical records of at least the last one million years (IPCC, 2014c). Such a warming through this century could result in sea-level rise of as much as 2 meters by 2100, with greater sea-level rise to follow. A group of tipping points are clustered between 1.5°C and 2°C (Figure 2) (Drijfhout et al., 2015). The melting of most mountain glaciers, including those in the Tibetan-Himalayas, combined with mega-droughts, heat waves, storms, and foods, would adversely affect nearly everyone on the planet.

80 years from now: In 80 years, warming is expected to exceed 4°C, increasing the likelihood of irreversible and catastrophic change (World Bank, 2013b). 4ºC warming is likely to expose as much as 75% of the global population to deadly heat (Mora et al., 2017). The 2°C and 4°C values quoted above and in other reports, however, are merely the central values with a 50% probability of occurrence (Ramanathan and Feng, 2008). There is a 5% probability the warming could be as high as 6°C due to uncertainties in the magnitude of amplifying feedbacks (see Section 4). This in turn could lead to major disruptions to natural and social systems, threatening food security, water security, and national security and fundamentally affecting the great majority of the projected 11.2 billion inhabitants of the planet in 2100 (UN DESA, 2015).

3. What Are the Wild Cards for Climate Disruption? Increasing the concentrations of greenhouse gases in the atmosphere increases radiative forcing (the difference between the amount of energy entering the atmosphere and leaving) and thus increases the global temperature (IPCC, 2013). However, climate wild cards exist that can alter the linear connection with warming and anthropogenic emissions by triggering abrupt changes in the climate (Lenton et al., 2008). Some of these wild cards have not been thoroughly captured by the models that policymakers rely on the most. These abrupt shifts are irreversible on a human time scale (<100 years) and will create a notable disruption to the climate system, condemning the world to warming beyond that which we have previously projected. These climate disruptions would divert resources from needed mitigation and upset mitigation strategies that we have already put in place.

1. Unmasking Aerosol Cooling: The frst such wild card is the unmasking of an estimated 0.7°C (with an uncertainty range of 0.3°C to 1.2°C) of the warming in addition to mitigating other aerosol effects such as disrupting rainfall patterns, by reducing emissions of aerosols such as sulfates and nitrates as part of air pollution regulations (Wigley, 1991; Ramanathan and Feng, 2008). Aerosol air pollution is a major health hazard with massive costs to public health and society, including contributing to about 7 million deaths (from household and ambient exposure) each year (WHO, 2014). While some aerosols, such as black carbon and brown carbon, strongly absorb sunlight and warm the climate, others refect sunlight back into space, which cools the climate (Ramanathan and Carmichael, 2008). The net impact of all manmade aerosols is negative, meaning that about 30% of the warming from greenhouse gases is being masked by co-emitted air pollution particles (Ramanathan and Carmichael, 2008). As we reduce greenhouse gas emissions and implement policies to eliminate air pollution, we are also reducing the concentration of aerosols in the air. Aerosols last in the atmosphere for about a week, so if we eliminate air pollution without reducing emissions of the greenhouse gases, the unmasking alone would lead to an estimated 0.7°C of warming within a matter of decades (Ramanathan and Feng, 2008). We must eliminate all aerosol emissions due to their health effects, but we must simultaneously mitigate emissions of CO2 , other greenhouse gases, and black carbon and co-pollutants to avoid an abrupt and very large jump in the near-term warming beyond 2°C (Brasseur and Roeckner, 2005).

2. Tipping Points**:** It is likely that as we cross the 1.5°C to 2°C thresholds we will trigger so called “tipping points” for abrupt and nonlinear changes in the climate system with catastrophic consequences for humanity and the environment (Lenton, 2008; Drijfhout et al., 2015). Once the tipping points are passed, the resulting impacts will range in timescales from: disruption of monsoon systems (transition in a year), loss of sea ice (approximately a decade for transition), dieback of major forests (nearly half a century for transition), reorganization of ocean circulation (approximately a century for transition), to loss of ice sheets and subsequent sea-level rise (transition over hundreds of years) (Lenton et al., 2008). Regardless of timescale, once underway many of these changes would be irreversible (Lontzek et al., 2015). There is also a likelihood of crossing over multiple tipping points simultaneously. Warming of close to 3°C would subject the system to a 46% probability of crossing multiple tipping points, while warming of close to 5°C would increase the risk to 87% (Cai et al., 2016). Recent modeling work shows a “cluster” of these tipping points could be triggered between 1.5°C and 2°C warming (Figure 2), including melting of land and sea ice and changes in highlatitude ocean circulation (deep convection) (Drijfhout et al., 2015). This is consistent with existing observations and understanding that the polar regions are particularly sensitive to global warming and have several potentially imminent tipping points. The Arctic is warming nearly twice as quickly as the global average, which makes the abrupt changes in the Arctic more likely at a lower level of global warming (IPCC, 2013). Similarly, the Himalayas are warming at roughly the same rate as the Arctic and are thus also more susceptible to incremental changes in temperature (UNEP-WMO, 2011). This gives further justifcation for limiting warming to no more than 1.5°C.

While all climate tipping points have the potential to rapidly destabilize climate, social, and economic systems, some are also self-amplifying feedbacks that once set in motion increase warming in such a way that they perpetuate yet even more warming. Declining Arctic sea ice, thawing permafrost, and the poleward migration of cloud systems are all examples of self-amplifying feedback mechanisms, where initial warming feeds upon itself to cause still more warming acting as a force multiplier (Schuur et al., 2015).