## T

#### We are analyzing via ourselves – this is self experimentation

#### Interpretation: appropriation involves permanent, exclusive use of land and resource extraction. The aff must defend that appropriation of outer space by private entities is unjust.

Stephen Gorove, Stephen Gorove (1917-2001) was a space law education pioneer. He served as a professor of space law and director of space studies and policy, from 1991-1998, at the University of Mississippi., 1969 " Interpreting Article II of the Outer Space Treaty" Fordham Law Review, https://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=1966&context=flr

With respect to the concept of appropriation the basic question is **what constitutes "appropriation,"** as used in the Treaty, especially in contradistinction to casual or temporary use. The term "appropriation" is used most frequently to denote the taking of property for one's own or exclusive use with a sense of permanence. Under such interpretation the establishment of a permanent settlement or the carrying out of commercial activities by nationals of a country on a celestial body may constitute national appropriation if the activities take place under the supreme authority (sovereignty) of the state. Short of this, if the state wields no exclusive authority or jurisdiction in relation to the area in question, the answer would seem to be in the negative, unless, the nationals also use their individual appropriations as cover-ups for their state's activities.5 In this connection, it should be emphasized that the word "appropriation" indicates a taking which involves something more than just a casual use. Thus a temporary occupation of a landing site or other area, just like the **temporary or nonexclusive use of property, would not constitute appropriation**. By the same token, any use involving consumption or **taking with intention of keeping for one's own exclusive use would amount to appropriation.**

#### Violation – creation of medicines is NOT permanent appropriation, 1AC Kulu specifically cites space craft and the ISS as the perfect condition to create medicine, rather than a permanent settlement

#### Plan text in a vacuum bad for fairness because it allows for incongruency between 99% of the aff and 1% of the aff – the worst version of their model is that the plan text is different from the advantage, so it makes no sense – hold them to reading a plan text defined contextually with the advantage

#### Vote neg –

#### 1] Ground – allowing affs to not defend permanent appropriation kills negative ground – we can’t read the innovation DA, since they can say innovative appropriation efforts are allowed, we can’t read asteroid mining or disads to specific types of appropriation since they can defend an exemption for that, etc. – Since the government gets to interpret whether or not the PTD applies to appropriation in specific instances, the negative can’t reasonably predict what the aff defends restricting and what it doesn’t. Ground controls the internal link to clash and fairness since the aff makes being neg impossible.

#### Fairness- consittutive of comp activites, args presume

#### Edu- funded ny schools

#### DTD- dta illogical, time skew

#### No RVI’s- illogical, baiting

#### CI- intervention, race to bottom, collapses, yours vs best

#### T isn’t violent – A] I don’t have the power to impose a norm – only to convince you my side is better.  T doesn’t ban you from the activity – the whole point is that norms should be contestable – I just say make a better arg next time.  B] Exclusion is inevitable – every role of the ballot excludes some arguments and even saying T bad excludes it – that means we should delineate ground along reciprocal lines, not abandon division altogether.

#### Reading T isn’t psychic violence – that was above, but especially if we’re not going for it since reading T can be used to prevent aff shiftiness and make substance a viable option.

#### No silencing DA - T is just like a disad or critique we’ve said a certain practice the aff took was bad and it would’ve been better had they done it differently not that they are bad debaters – just like the cap k says the aff engaged in some practice that reinforced capitalism and it would’ve been better if they had emphasized Marxism – impositions in some form are inevitable because the negative has the burden of rejoinder and needs link arguments – every disad link says the aff did something wrong and theres an implicit version of the aff that wouldn’t have linked

#### Theory before the K – A] Prior question. My theory argument calls into question the ability to run the argument in the first place. They can’t say the same even if they criticize theory because theory makes rules of the game not just normative statements about what debaters should say. B] Fair testing. Judge their arguments knowing I wasn’t given a fair shot to answer them. Prefer theory takes out K because they could answer my arguments, but I couldn’t answer theirs. Without testing their args, we don’t know if they’re valid, so you prefer fairness impacts on strength of link. Impact turns any critical education since a marketplace of ideas where we innovate, and test ideas presumes equal access.

#### Q of what the ballot can solve for – even if ableism is the highest impact- a ballot only signsals an impact on fairness

# Case

## AC

#### (1) Allies da - using debate as a mode of advocacy ensures the failure of their radical project – competition means debaters ally themselves with individuals who vote for them and alienate those who are positioned with the burden of rejoinder and forced to negate – at worst you vote negative on presumption because they don’t use debate as a stepping stone for their advocacy outside the space and don’t have a net benefit to affirming the 1ac.

#### (2) Eval only the amount of violence the aff solves for – they make the claim that semio capitalism is the root cause of queet violence, if they cant completely destroy the semio capitalist structure then they don’t get access to their impact

#### (3) Ballot turn – tying ballots to survivability or the aff is violent as it forces the judge to determine whether their method of survival was “good enough” to get the ballot, which causes self hatred given loses

#### (4) Perf con – the AC defends that capitalism and the state are bad but by passing the resolution give the state more power, keeping space exclusively in the hands of the state

#### (5) – the aff doesn’t know what it defends if all debating is good then theres no uq NB to voting aff, if they have to spill up ask yourself how they do that, if its about dominant forms in debate where do they identify, vote neg on presump bc what is the aff

### AT Debate bad

#### 1] Trying to eliminate debate produces cruel optimism and repetition compulsion because they target discriminatory acts produced by the state at large i.e debate, instead of the structure itself. Turns the case – causes endless repetitious targeting of smaller structures never destroying the structure itself and ensuring the failure of the 1ac’s project.

#### 2] Even if debate is bad it can tactically be used to teach people their correct positioning in the world and the capitalist project so they can approach the world without investing hope in it – the alternative is not learning this position and investing hope in everything which recreates cruel optimism and turns the case.

#### 3] Debate is good, double bind either the AC performance is strong enough to destroy debate which should have been done many bids ago or the Ac’s performance doesn’t have anything to prove which means the squo is quite strong and that causes presumption.

## AT Preciado

#### 1] This card specifically highlights root causes of things being patents, aff cant solve for so just negate on presumption

#### 2] They re create this broken logic within the debate space, positing the aff as a cure but restricting access through the ballot and judges decisions. Turns the aff case

#### IP protection is critical to innovation – it incentivizes risk-taking by boosting investments

Ezell and Cory 19 [(Stephen, vice president, global innovation policy, at the Information Technology and Innovation Foundation, B.S. from the School of Foreign Service at Georgetown University, and Nigel, associate director covering trade policy at the Information Technology and Innovation Foundation, former researcher in the Southeast Asia Program at the Center for Strategic and International Studies, MA in public policy from Georgetown University) “The Way Forward for Intellectual Property Internationally,” Information Technology and Innovation Foundation, 4/25/2019] TDI

IPR reforms also introduce strong incentives for domestic innovation. Sherwood, using case studies from 18 developing countries, concluded that poor provision of intellectual property rights deters local innovation and risk-taking.47 In contrast, IPR reform has been associated with increased innovative activity, as measured by domestic patent filings, albeit with some variation across countries and sectors.48 For example, Ryan, in a study of biomedical innovations and patent reform in Brazil, found that patents provided incentives for innovation investments and facilitated the functioning of technology markets.49 Park and Lippoldt also observed that the provision of adequate protection for IPRs can help to stimulate local innovation, in some cases building on the transfer of technologies that provide inputs and spillovers.50 In other words, local innovators are introduced to technologies first through the technology transfer that takes place in an environment wherein protection of IPRs is assured; then, they may build on those ideas to create an evolved product or develop alternate approaches (i.e., to innovate). Related research finds that trade in technology—through channels including imports, foreign direct investment, and technology licensing—improves the quality of developing-country innovation by increasing the pool of ideas and efficiency of innovation by encouraging the division of innovative labor and specialization.51 However, Maskus notes that without protection from potential abuse of their newly developed technologies, foreign enterprises may be less willing to reveal technical information associated with their innovations.52 The protection of patents and trade secrets provides necessary legal assurances for firms wishing to reveal proprietary characteristics of technologies to subsidiaries and licensees via contracts.

The relationship between IPR rights and innovation can also be seen in studies of how the introduction of stronger IPR laws, with regard to patents, copyrights, and trademarks, affect R&D activity in an economy. Studies by Varsakelis and by Kanwar and Evenson found that R&D to GDP ratios are positively related to the strength of patent rights, and are conditional on other factors.53 Cavazos Cepeda et al. found a positive influence of IPRs on the level of R&D in an economy, with each 1 percent increase in the level of protection of IPRs in an economy (as measured by improvements to a country’s score in the Patent Rights Index) equating to, on average, a 0.7 percent increase in the domestic level of R&D.54 Likewise, a 1 percent increase in copyright protection was associated with a 3.3 percent increase in domestic R&D. Similarly, when trademark protection increased by 1 percent, there was an associated R&D increase of 1.4 percent. As the authors concluded, “Increases in the protection of the IPRs carried economic benefits in the form of higher inflows of FDI, and increases in the levels of both domestically conducted R&D and service imports as measured by licensing fees.”55 As Jackson summarized, regarding the relationship between IPR reform and both innovation and R&D, and FDI, “In addition to spurring domestic innovation, strong intellectual property rights can increase incentives for foreign direct investment which in turn also leads to economic growth.”56

#### Medical innovations key to future

Remes et al 20 (<https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/ten-innovations-that-can-improve-global-health>, [McKinsey Global Institute](https://www.mckinsey.com/mgi/overview) Ten innovations that can improve global health July 15, 2020 | Article, [Jaana Remes](https://www.mckinsey.com/our-people/jaana-remes) is a partner of the McKinsey Global Institute, where [Jonathan Woetzel](https://www.mckinsey.com/our-people/jonathan-woetzel) is a director and [Sven Smit](https://www.mckinsey.com/our-people/sven-smit) is co-chair and a director. [Katherine Linzer](https://www.mckinsey.com/our-people/katherine-linzer) is a partner in McKinsey’s Chicago office. [Shubham Singhal](https://www.mckinsey.com/our-people/shubham-singhal) is a senior partner in the Detroit office. [Martin Dewhurst](https://www.mckinsey.com/our-people/martin-dewhurst) and [Penelope Dash](https://www.mckinsey.com/our-people/penny-dash) are senior partners in the London office, where [Kristin-Anne Rutter](https://www.mckinsey.com/our-people/kristin-anne-rutter) is a partner. [Matthias Evers](https://www.mckinsey.com/our-people/matthias-evers) is a senior partner in the Hamburg office. Matt Wilson is a senior partner in the New York office. Aditi Ramdorai is a consultant in the Berlin office.//lex AL)

By 2040, new technologies could reduce the total burden of disease by 6 to 10 percent. Today’s interventions are the innovations of the past. Without them, healthy lifespans would not be as long as they are. Innovation continues to be critical to tackle diseases without known cures and to help increase uptake and adherence to interventions that work. As part of the report [Prioritizing health: A prescription for prosperity](https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/prioritizing-health-a-prescription-for-prosperity), the McKinsey Global Institute identified ten promising innovations, now in progress, that could have a material impact on health by 2040. Focusing on technologies that address the greatest unmet needs, we determined the impact of these innovations by interviewing experts and evaluating the current biological understanding of each disease, as well as the effort and excitement surrounding the new techniques as measured by funding. Identifying and sizing the potential scope of innovations now in the pipeline is inherently difficult, but we estimate that these technologies could reduce the burden of disease by a further 6 to 10 percent, assuming aspirational yet realistic adoption rates by 2040—on top of the 40 percent from known interventions. Some of these innovations could not only fully cure a number of diseases but also significantly extend healthy lifespans by tackling the underlying biology of aging and therefore postponing the onset of several age-related conditions. These possibilities make a sharp contrast with the innovations of the past 30 years, many of which reduced the symptoms or delayed the progression of diseases but rarely prevented or cured them. In addition, the innovations we have identified here are more digitally enabled than those of the past; for example, [artificial intelligence](https://www.mckinsey.com/featured-insights/artificial-intelligence/applying-artificial-intelligence-for-social-good) (AI) systems make advances in omics and molecular technologies, such as gene editing, faster and more accurate. How can we improve health globally over the next two decades? Omics and molecular technologies These technologies—key components of the [Bio Revolution](https://www.mckinsey.com/industries/pharmaceuticals-and-medical-products/our-insights/the-bio-revolution-innovations-transforming-economies-societies-and-our-lives)—are therapeutics or diagnostics that harness the various types of molecules within cells (such as DNA, RNA, and proteins). Some omics and molecular technologies (for instance, genome editing) engineer these intracellular components or analyze them (such as proteomics and transcriptomics). Example: CRISPR and curbing malaria The current treatment includes antimalarial prophylactics and nonpharmaceutical measures (such as indoor residual spraying and insecticide-treated bed netting) and antimalarial medications. Genetically modifying malaria-carrying mosquitos by using gene-editing technologies, such as [CRISPR](https://www.mckinsey.com/industries/pharmaceuticals-and-medical-products/our-insights/programming-life-an-interview-with-jennifer-doudna), may significantly reduce disease levels by propagating the modified genes across the mosquito population. Next-generation pharmaceuticals Newer iterations of traditional chemical compounds (small molecules) and classes of molecules could be used as medicinal drugs, possibly with multiple and concurrent target structures. Example: Senolytics and the regulation of cellular aging Cellular aging (senescence) is considered an unavoidable physiological process that is not a viable field for drug development. But senolytics (a class of small molecules) may decrease or eliminate aging cells that can cause cellular inflammation, dysfunction, and tissue damage. This has implications for delaying age-related diseases. Cellular therapy and regenerative medicine Cellular therapy is a biological product, derived from living cells, used for therapeutic purposes to replace or repair damaged cells or tissues. Regenerative medicine has the power to restore diseased or injured tissues and organs, potentially decreasing reliance on transplantation. Example: CAR T-cell therapy and the treatment of solid tumors Today, treatment is based primarily on unspecific radiotherapy and chemotherapeutic agents, plus surgical interventions. In many cases, these approaches are ineffective. [CAR T-cell therapy](https://www.mckinsey.com/industries/pharmaceuticals-and-medical-products/our-insights/driving-the-next-wave-of-innovation-in-car-t-cell-therapies) reprograms a patient’s T-cells (immune-system cells) to target tumor cells. When infused into the patient, the T-cells bind to an antigen on tumor cells, attacking and destroying them. Innovative vaccines Vaccines stimulate the immune system to respond to and destroy a bacterium or virus. Historically, they have eradicated or controlled the spread of infectious diseases around the world. In the future, vaccines may target noncommunicable diseases, such as cancer. Example: The AT04A vaccine and the lowering of cholesterol At present, patients take statins (lipid-lowering medicines) to control or lower high cholesterol levels in the blood. Patients with cardiovascular disease must take these daily, but adherence is often poor. AT04A is a vaccine made up of molecules that bind to blood cholesterol and degrade it. The vaccine would be required only once a year, potentially improving outcomes. Advanced surgical procedures These include treating injuries or disorders of the body with minimally invasive incisions or small instruments (including robotic surgery), as well as any technique that improves surgery-related processes outside the operating room. Example: Suspended animation for severe-trauma patients After patients suffer acute trauma (such as an accident) it may take time to get them to hospitals for surgery. That significantly decreases their chances of survival. Suspended animation for severe-trauma patients would involve, for example, injecting a cold saline solution into them on first contact to cool the body to 10–15ºC and stop its normal functions. This would give the surgeon time to operate before resuscitating the patient. Connected and cognitive devices Portable, wearable, ingestible, or implantable devices can monitor health and fitness information, engage patients and their communities of caregivers, and deliver self-regulated therapies autonomously. Example: E-tattoos for heart diagnostics Today’s technology relies on a Holter monitor (a battery-operated device) to monitor the heart continuously. The monitor’s batteries last for no more than 48 hours, and the procedure can cause immense discomfort for patients. Ultrathin e-tattoos can monitor hearts for longer periods and make patients more comfortable while providing a wider range of data to enhance clinical decision making. Electroceuticals Small therapeutic agents can target the neural circuits of organs. Such therapies map neural circuitry with neural impulses (administered by an implantable device) delivered to these specific targets. Example: Implantable microchips to mitigate chronic pain Today, managing chronic pain involves nonindividualized treatment with multiple drugs (including opioids) and relatively ineffective late-stage surgery. But one technique now under development—stimulating the spinal cord—can improve the patient’s quality of life by increasing mobility, enhancing sleep, and reducing the need for pain medication. Robotics and prosthetics A wide variety of programmable, self-controlled devices consisting of electronic, electrical, or mechanical units and of artificial substitutes or replacements for body parts are now under development. Example: Next-generation exoskeletons and mobility support Today’s mechanical mobility aids do not fully restore movement in the elderly, so they do not prevent a loss of independence and the risk of accidental injuries. Next-generation exoskeletons, powered by small motors that mimic human muscles, could allow older patients to recover their autonomy while reducing the likelihood of accidents and falls. Digital therapeutics These preventive and therapeutic evidence-based interventions, for a broad spectrum of physical, mental, and behavioral conditions, are controlled by software. Example: An AI-powered app to change behavior Apart from brief consultations, doctors now have few tools to help patients with chronic conditions adopt healthy lifestyles. In the future, digital therapeutics, powered by AI, patient data, and behavioral science, can use gamification and other forms of engagement to help patients adopt and sustain healthy behaviors. Tech-enabled care delivery These ways to deliver care incorporate new and larger data sets, use new analytics capabilities to generate insights, and help providers apply them to patients to improve the outcome, experience, and efficiency of care. Example: Multichannel care delivery Inefficient data management and poor communication among patients, payers, and providers hinder the continuity of care and therefore make treatment significantly less efficient. Innovative multichannel care delivery using online platforms may facilitate data sharing and make treatment more efficient. This is particularly relevant for chronic diseases, such as diabetes, because the glucose levels and other vital signs of patients are continuously shared with clinicians. Innovation—in the form of new medicines, procedures, medical devices, technologies, and delivery models—will clearly be critical to go on improving the health of the world’s population. Realizing these innovations, however, will require continual R&D investments by pharmaceutical companies, medical and other technology companies, and academia.

## AT Preciado 2

#### Their political nihilism spreads beyond the classroom – it empowers violent conservatives like Trump – forsaking compromise is a dangerous, academic luxury – claiming the aff as a pre requisite to political engagement causes an infinite deferral that prevents engaging institutions

Claudio, 16 --- assistant professor of development studies and southeast Asian studies at the Ateneo de Manila University (7/1/2016, Lisandro, “Intellectuals have ushered the world into a dangerous age of political nihilism,” qz.com/721914/intellectuals-have-ushered-the-world-into-a-dangerous-age-of-political-nihilism/)

On the surface, it would seem that intellectuals have nothing to do with the rise of global illiberalism. The movements powering Brexit, Donald Trump and Third-World strongmen like Philippine president Rodrigo Duterte all gleefully reject books, history and higher education in favor of railing against common enemies like outsiders and globalization. And you’ll find few Trump supporters among the largely left-wing American professoriate. Yet **intellectuals are accountable** for the rise of these movements—albeit indirectly. Professors have offered stringent criticisms of neoliberal society. But they have failed to offer the public viable **alt**ernative**s**. In this way, they have promoted a **political nihilism** that has set the stage for new movements that reject liberal democratic principles of tolerance and institutional reform. Intellectuals have a long history of critiquing liberalism, which relies on a “philosophy of individual rights and (relatively) free markets.” Beginning in the 19th century, according to historian Francois Furet, left-wing thinkers began to arrive at a consensus “that modern liberal democracy was threatening society with dissolution because it atomized individuals, made them indifferent to public interest, weakened authority, and encouraged class hatred.” For most of the 20th century, anti-liberal intellectuals were able to come up with alternatives. Jean-Paul Sartre famously defended the Soviet Union even when it became clear that Joseph Stalin was a mass murderer. French, American, Indian, and Filipino university radicals were hopelessly enamored of Mao Zedong’s Cultural Revolution in the 1970s. The collapse of Communism changed all this. Some leftist intellectuals began to find hope in small revolutionary guerrillas in the Third World, like Mexico’s Subcomandante Marcos. Others fell back on pure critique. Academics are now mostly gadflies who rarely offer strategies for political change. Those who do forward alternatives propose ones so vague or divorced from reality that they might as well be proposing nothing. (The Duke University professor of romance studies Michael Hardt, for example, thinks the evils of modern globalization are so pernicious that only worldwide love is the answer.) Such thinking promotes political hopelessness. It rejects gradual change as cosmetic, while patronizing those who think otherwise. This nihilism **easily spreads from the classroom** and academic journals to op-ed pages to Zuccotti Park, and eventually to the public at large. For academic nihilists, the shorthand for the world’s evils is “neoliberalism.” The term is used to refer to a free market ideology that forced globalization on people by reducing the power of governments. The more the term is used, however, the more it becomes a vague designation for all global drudgery. Democratic politics in the age of neoliberalism, according to Harvard anthropologists Jean and John Comaroff, is “something of a pyramid scheme: the more it is indulged, the more it is required.” They argue that our belief that we can use laws and constitutional processes to defend our rights is a form of “fetishism” that is ultimately “chimerical.” For the University of Chicago literary theorist Lauren Berlant, the democratic pursuit of happiness amid neoliberalism is nothing but “cruel optimism.” The materialist things that people desire are “actually an obstacle to your flourishing,” she writes. According to this logic, we are trapped by our own ideologies. It is this logic that allows left-wing thinkers to implicitly side with British nativists in their condemnation of the EU. The radical website Counterpunch, for example, describes the EU as a “neoliberal prison.” It also views liberals seeking to reform the EU as “coopted by the right wing and its goals—from the subversion of progressive economic ideals to neoliberalism, to the enthusiastic embrace of neoconservative doctrine.” Across the Atlantic, Trump supporters are singing a similar tune. Speaking to a black, gay, college-educated Trump supporter, Samantha Bee was told: “We’ve had these disasters in neoconservatism and neoliberalism and I think that he [Trump] is an alternative to both those paths.” The academic nihilists and the Trumpists are in agreement about a key issue: The system is fundamentally broken, and liberals who believe in working patiently toward change are weak. For the Portuguese sociologist Boaventura de Sousa Santos, “indifference” is the “the hallmark of political liberalism.” Since liberals balance different interests and rights, Santos writes, they have no permanent friends or foes. He proposes that the world needs to “revive the friend/foe dichotomy.” And in a profane way, it has: modern political movements pit Americans against Muslims, Britain against Europe, a dictatorial government against criminals. Unfortunately, academic anti-liberalism is not confined to the West. The Cornell political scientist Benedict Anderson once described liberal democracy in the Philippines as a “Cacique Democracy,” dominated by feudal landlords and capitalist families. In this system, meaningful reform is difficult, since the country’s political system is like a “well-run casino,” where tables are rigged in favor of oligarch bosses. Having a nihilist streak myself, I once echoed Anderson when I chastised Filipino nationalists for projecting “hope onto spaces within an elite democracy.” Like Anderson, I offered no alternative. The alternative arrived recently in the guise of the Duterte, the new president of the Philippines. Like Anderson and me, Duterte complained about the impossibility of real change in a democracy dominated by elites and oligarchs. But unlike us, he proposed a way out: a strong political leader who was willing to kill to save the country from criminals and corrupt politicians. The spread of global illiberalism is unlikely to end soon. As this crisis unfolds, we will need intellectuals who use their intellects for more than simple negation—professors like the late New York University historian Tony Judt, who argued that European-style social democracy could save global democracy. Failing that, we need academics who acknowledge that liberal democracy, though slow and imperfect, enables a bare minimum of tolerance in a world beset by xenophobia and hatred. For although **academics have the luxury of imagining a completely different world, the rest of us have to figure out what to do with the one we have**

#### Paternalism DA – even if you think that the world is bad its immoral to justify death for every other person within the system.

#### Eval through pascals wager – if they are right then we are all dead anyways but if they are wrong they cause extinction for no reason

## Cap Good

#### Extinction outweighs it precludes the possibility for future generations and denies any possible value to life – any other metric is paternalistic resulting in involuntary death turns their offense. Framing issue alt solvency is dependent upon generating social life, which is impossible in a state of biological death. Any 1AR argument should be rejected cuz it’s paternalistic for them to justify the INVOLUNTARY death of queer individuals.

**We’re past the tipping point – but carbon capture is attainable and solves**

**Mack 19** (Eric Mack, May 28, 2019, “Carbon positive: Turning a planetary pollutant into an asset”, Nesta, https://www.nesta.org.uk/feature/tipping-point/carbon-positive-turning-planetary-pollutant-asset/)

Last year, **the International Panel on Climate Change estimated** in a widely publicised and disturbing report that to avoid catastrophic change **we must not only drastically reduce our carbon dioxide output, but also begin actively pulling about 20 billion metric tons of CO2 out of the atmosphere each year** (IPCC, 2018). A suite of technologies known as “**carbon capture and utilisation” could go a long way** towards addressing the second part of the equation. While the name may sound drab and technical, these innovations could be one of our most powerful levers in addressing climate change. With justifiable scepticism about our collective ability and will to reduce emissions quickly enough, **carbon capture may be needed to stave off runaway climate change.** And even if it isn’t, there’s still a long-term need to get excess CO2 out of the system, a process that could take an extremely long time if left to nature’s depleted capacities. As “carbon wrangler” Julio Friedmann wrote in 2018: “We have a moral responsibility to clean up our mess and restore the world’s atmosphere to how we found it.” The basic concept behind capturing CO2 is to move vast amounts of air through a filter or solution that traps the carbon dioxide molecules. From there, it can be stored, used as-is or converted to a more useful molecule with the help of a little chemistry. Considerable attention has been paid to the idea of **simply burying it underground**: the idea that we can put it to good use has been comparatively neglected. But it is starting to gain traction. A **recent proposal suggests that the world’s air conditioners could also double as carbon capture systems, collecting CO2 and water vapor from the air** (Dittmeyer, R, et.al. 2019). Simple electrolysis can peel H2 off the water and combine it with carbon dioxide to locally produce hydrocarbon fuel using the Fischer-Tropsch process. Laboratory experiments have also used captured CO2, electricity and a little lithium to create carbon nanofibers (Ren, J., et.al. 2015) that **can be used in the manufacture of everything from better batteries and golf clubs to aircraft.** Climeworks is one of a handful of companies that has taken similar technology beyond the lab and is already pulling CO2 directly from the air. The Swiss start-up has set the ambitious goal of removing one per cent of global carbon dioxide emissions by 2025. The company’s small, modular direct air capture system is up and running in Switzerland and other locations in Europe, including a small demonstration unit in Italy that will capture 150 tons of CO2 per year to be converted into natural gas fuel. **Canada’s Carbon Engineering has also been capturing CO2 for several years, converting it into liquid fuels that could be used in today’s cars, trucks and even commercial jets.** CEO Steve Oldham claims the **technology can be “scaled up to capture gigatons of CO2 directly from the atmosphere**… we’re now ready to move into much larger scale.” The company published a breakdown of its technology in a peer-reviewed journal last year (Keith, 2018), and is aiming to scale up enough to pull a gigaton of CO2 from the air per year – more than two per cent of what the world emits in the same time-span.

**Carbon capture is necessary to reach emissions targets – we’ve gone past core tipping points and legitimately can’t decarbonize in time absent CCS**

**Moniz 19** - 13th Secretary of Energy (2013 to 2017) and is the founder and CEO of the Energy Futures Initiative (Fredd Krupp is president of the Environmental Defense Fund, Ernest Moniz, “Cutting Climate Pollution Isn’t Enough — We Also Need Carbon Removal,” Text, TheHill, September 23, 2019, <https://thehill.com/opinion/energy-environment/462609-cutting-climate-pollution-isnt-enough-we-also-need-carbon-removal>)

It has been almost four years since the Paris climate agreement was signed. But as leaders gather in New York this week for the United Nations Climate Change Summit, **the world remains far off track from meeting the Paris objective of limiting global warming to well below 2 degrees Celsius** -- and pursuing efforts at 1.5 degrees. **To meet that target, the world must achieve a 100 percent clean economy** — one that produces net zero emissions, or no more climate pollution than can be removed from the atmosphere — soon after mid-century, with the United States and other advanced economies reaching that milestone **no later than 2050.** It’s a daunting but doable task. The consequences of falling short are enormous. This year, the U.S. government’s fourth National Climate Assessment documented the huge economic and social impacts of unchecked warming. The Pentagon has repeatedly warned of the impacts on national security and our troops. Achieving a 100 percent clean economy will require a swift transition to renewables and other zero-carbon energy sources. But **we also need to face the reality that meeting the Paris target will require taking carbon out of the atmosphere at massive scale.** In part, that’s because **eliminating emissions will be very challenging for some sectors, especially the transportation industry and agriculture. Removing carbon from the atmosphere would also bring concentrations down, helping to stabilize the climate at safer levels.** So, the push for clean energy must be supplemented by a suite of technologies known as carbon dioxide removal (CDR). It is not a question of what we’d prefer. It’s a question of insurmountable math. The crucial role carbon removal must play is becoming more widely recognized. **The 2018 Intergovernmental Panel on Climate Change report stressed the importance of carbon removal, and the U.S. National Academies of Sciences, Engineering and Medicine late last year estimated that ten billion tons of CO2 will need to be pulled from the atmosphere annually by 2050, and double that by 2100.** For context, today’s global emissions are less than 40 billion tons per year. **If the 10 billion tons of CO2 from CDR were stored underground, that would be roughly double the world’s annual oil production.** The good news is that **there are a surprisingly large number of promising pathways for carbon dioxide removal.** **Nature-based approaches** include reforestation and forest management as well as agricultural practices that increase carbon stored in soils. Some of the attendant challenges include competition for land and permanence of the carbon sequestration. **Technological approaches include direct air capture** — machines that actually suck carbon from the air — **and technologically-enhanced natural processes**, such as plants genetically modified with deep roots to fix carbon in the soil; enhanced mineralization, which uses certain reactive rocks to bind with carbon from the air; and accelerated ocean uptake in phytoplankton. These technologies are immature and require considerable research, development and demonstration to ensure viability and affordability at very large scale. Despite the urgency, there is no dedicated federal effort to develop these crucial technologies; existing programs are piecemeal and largely focused on sequestering emissions from industrial and electricity generating sources. The National Academies recommended the rapid establishment of a robust, focused, scalable and accelerated federal research program spanning the Departments of Energy and Agriculture, the National Oceanic and Atmospheric Administration and the National Science Foundation, among others. Such a program would encompass the full range of technological pathways that can remove CO2 from the environment. ‘’Clearing the Air,’’ an analysis of CDR’s value and a proposed plan to deploy it, has been completed by the Energy Futures Initiative. **Over the next decade, the program scale would be about a billion dollars a year.** Carbon dioxide removal is not a magic bullet. **We must do everything we can to deploy innovative low- and zero-carbon methods to generate electricity, heat homes, fuel vehicles, and power industry, creating new economic opportunities in the process.** Tackling the climate crisis also requires placing a declining limit and a price on carbon pollution, as well as a significant increase in energy technology innovation and deployment across the board. **But CDR is also not a “Plan B.” It is a critical part of any “Plan A” for climate, a necessary complement to emission reduction.** It can provide more flexibility and optionality in policy planning, which could ease the transition to a carbon-neutral economy while **minimizing transition costs and providing greater assurance that science-based climate goals can be met in a timely manner. It would eventually enable a net negative global economy that could bring the atmospheric carbon concentrations down — and global temperatures with it.** Reforming environmental review to build a cleaner and brighter future ACA is the safety net we need... to protect We have delayed meaningful action for far too long. As a result, the scale and urgency of the challenge is such that we cannot simply work on doing better in the future. We need to correct what we did in the past. Carbon removal is the enabler.

**Structural impacts – it’s a filter for reductions in poverty, disease, and war.**

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