## 1

#### Text: States ought to establish an international space debris organization modelled off the International Civil Aviation Organization that is granted exclusive and mandatory standard-setting authority over space debris;

#### A new organization solves debris.

Larsen 18 [Paul B. Larsen, taught air and space law for more than forty years respectively at Southern Methodist University and at Georgetown University, “Solving the Space Debris Crisis,” 2018, *Journal of Air Law and Commerce*, Vol. 83, Issue 3, https://scholar.smu.edu/cgi/viewcontent.cgi?article=4092&context=jalc, EA]

D. OPTION OF AN INTERNATIONAL SPACE DEBRIS ORGANIZATION

1. ICAO Analogy Option

An international space debris organization capable of establishing international mandatory standards for old as well as for new space debris would require new decision-making authority. One model for such an organization could be the ICAO, which is a sub-agency of the United Nations. ICAO’s main purpose is to establish international standards and procedures for air traffic that are mandatory and uniform.153 The authorizing treaty is the 1944 Chicago Convention.154 Its Article 37 establishes ICAO’s standard-setting functions for civil aviation.155 Article 56 provides for the creation of the ICAO Air Navigation Commission, which is a standing commission of nineteen experts.156 Its function is to draft standards and to continuously update existing standards as needed by new developments.157 The technical experts do not represent states and are therefore not beholden to specific states. The Commission has subcommittees on specific subjects. In their examinations, the experts solicit contributions from private operators, users, and air services, as well as from states. The standards are agreed to by the Air Navigation Commission and submitted to the ICAO Council for approval, after which the standards are submitted to the ICAO member states. At that point in time the individual states have the option of filing deviations from the international standards.158 The standards apply only to civil users.159 Military operators tend to observe the civil standards for the sake of uniformity and safety.

a. Strengths

Focusing decision-making on international standards and procedures for all kinds of space debris would remove the decision-making from all the other many issues that are now discussed in COPUOS. If the ICAO model were adopted, then an expert technical commission would be charged with examination of the technical and physical ways of best limiting and removing debris. The commission would not be distracted by political issues as COPUOS is now. The decision-making would take place in a UN forum. It would not be dependent on an outside group like the IADC. The standards and procedures developed by a space debris commission would become mandatory upon approval by a small space debris council and only subject to deviations by individual states for good cause. States would appreciate the safety and navigation advantages of uniform international space debris rules. Decision-making would be expedited because the space debris commission would only be motivated by the urgency of the need for space debris regulation. As in ICAO, the space debris standards and procedures would establish the minimum requirements with states free to create more comprehensive rules. The individual states would implement and enforce the space debris standards and procedures, subject to oversight by a new international space debris organization. It would be a small UN sub-agency with universal participation and decision-making powers, similar to ICAO. The ICAO model has certainly worked for commercial aviation. Applied to space traffic, the aim would be an ICAO-like transparency, certainty, and reliability.

b. Weaknesses

The weakness of adopting the ICAO model would be that it is very difficult for states to adopt a new framework. However, major devastating collisions, like a destructive collision with the International Space Station or cascades of collisions caused by cascades of debris would convince the world of the need for drastic action.160 Such collisions in outer space will happen. The wise choice would be to adopt new regulation before the big collisions happen. Another weakness is that there would be additional costs because the ICAO model would require more technology and operations. Finally, the major problem with this option would be the difficulty of organizing and adopting new international law on space debris regulation. Unfortunately, that may happen after major outer space collisions and the consequent urgency to remedy the debris problem that would follow a disaster.

c. Evaluation: Option of Using the ICAO Model for Space Debris Regulation161

It is generally agreed that the space debris problem is universal. It requires action and decisiveness for its resolution. ICAO is constantly faced with resolving aviation safety issues and regulating air space. ICAO, as a UN sub-agency, is within the UN umbrella of specialized agencies. Space has similarities to air space. Most of air space is not sovereign. Outer space is also not sovereign. ICAO has proven successful in organizing and resolving joint use of air space by all the states. Using the ICAO model to form a similar world safety organization for outer space debris should be considered. ICAO regulations are mandatory and uniform. International space debris regulations also need to be mandatory and uniform. ICAO regulation is accepted and even appreciated by military users as being of a technical nature. A similar arrangement should work for space debris regulation. A commission of space debris experts would be charged with drafting international space debris regulations. The space commission would be able to constantly evaluate the success of existing regulations and be able to make adjustments and improvements as needed. The space debris commission would prepare regulations for generation of new debris. It should also establish acceptable regulations for significant removal of existing debris sufficient to stabilize, if not reduce, the existing debris accumulation.

A small representative space debris council would be formed to approve the draft regulations. The mandatory space debris regulations would be sent to states, who would be able to file necessary individual deviations as occurs with aviation standards and procedures. The council would be guided by long term policies established by an assembly of states. Such an assembly of ICAO member states meets every three years. A similar assembly would establish long term policy for the space debris organization.

For its work on new regulations, a new space navigation commission would need substantial input of information from the users of outer space about their needs, evaluations of regulations that are successful and beneficial, and their negative reaction to regulations that do not work and are too restrictive. Users of outer space should be able to contribute technology, both for mitigation of new debris and for effective ways of removing old debris. The actual implementation of the new regulations would occur through the states themselves. They and their authorized non-governmental users would have to comply with the international regulations. The burden of actual removal of old debris would fall on the states, unless states in the debris organization agree to contract out debris removal to commercial companies. New international law would be established by a diplomatic conference to authorize the space organization and to detail its duties. The organization would be funded by the member states the same way ICAO is presently funded.

## 2

#### Interpretation: Affirmatives must defend a ban on a form of private appropriation.

#### Violation: Recognition as a “global commons” does not ban private appropriation in any form AND theyre extra T

#### Global commons isn’t common ownership and can’t prevent private property interests.

Goehring 21- John S. Goehring [B.A., University of California, Berkeley; J.D., Tulane Law School; LL.M., McGill University, Institute of Air and Space Law) is a space and international law attorney for the Department of Defense and a judge advocate in the United States Air Force Reserve], “Why Isn’t Outer Space a Global Commons?” *Journal of National Security Law and Policy*. Vol. 11:573. (June 3, 2021).<https://jnslp.com/wp-content/uploads/2021/09/Why\_Isnt\_Outer\_Space\_a\_Global\_Commons\_2.pdf> BCortez

The question of accuracy raises a second lesson: discourse about the global commons, particularly with regard to the space domain, is not as simple as the EO may suggest. “Global commons” is not some talismanic term that demands every utterance invoke Elinor Ostrom, even though the EO may treat it as such. Instead, it has multiple legitimate meanings, and they can apply to outer space in different ways. Outer space is a global commons in the sense of being a domain beyond national jurisdiction and with free and open access, but it is not a global commons in the sense of being commonly owned such that nations cannot assert private property interests in space resources. Both of these interpretations find support in the Outer Space Treaty (although the latter interpretation remains a point of contention for some). It is also not a global commons in the sense of being a singular type of open access physical resource, yet particular resources within outer space, such as LEO, may reasonably be regarded as such. Accordingly, accuracy depends on the intended meaning. These ideas should be discussed with language that is precise and used consistently.

#### Vote negative for limits - enabling affirmatives to defend any space policy related to limiting access to space massively explodes negative prep burdens: any article of the OST, any other space treaty, ASAT bans, BMD bans, Limited test flight bans, etc. all have different backgrounds and negative ground – that causes quantity over quality debates which decimates clash which outweighs because it’s the only unique and portable skill we get from debate

#### Drop the debater – abusive advocacies skew substance – 1AR restart doesn’t check 1NC construction.

#### Competing interps – offense proves they’re not reasonable and anything else encourages arbitrary judge intervention.

No RVIs – leads to baiting T and chilling checks on abusive AFFs – causes substance crowdout.

## 3

#### Interpretation: the affirmative must specify what a “global commons” entails if they defend it’s implementation.

#### It has no authoritative definiton - causes misunderstood debates

Goehring 21- John S. Goehring [B.A., University of California, Berkeley; J.D., Tulane Law School; LL.M., McGill University, Institute of Air and Space Law) is a space and international law attorney for the Department of Defense and a judge advocate in the United States Air Force Reserve], “Why Isn’t Outer Space a Global Commons?” *Journal of National Security Law and Policy*. Vol. 11:573. (June 3, 2021).<https://jnslp.com/wp-content/uploads/2021/09/Why\_Isnt\_Outer\_Space\_a\_Global\_Commons\_2.pdf> BCortez

The term “global commons” has no authoritative definition.2 Consequently, discourse on the subject is often fraught with misunderstanding because the intended meanings may be unclear or applied inconsistently. Taking this into account, it is submitted that “global commons” is best understood as a label for one of two concepts: an enabling concept or a constraining concept.3

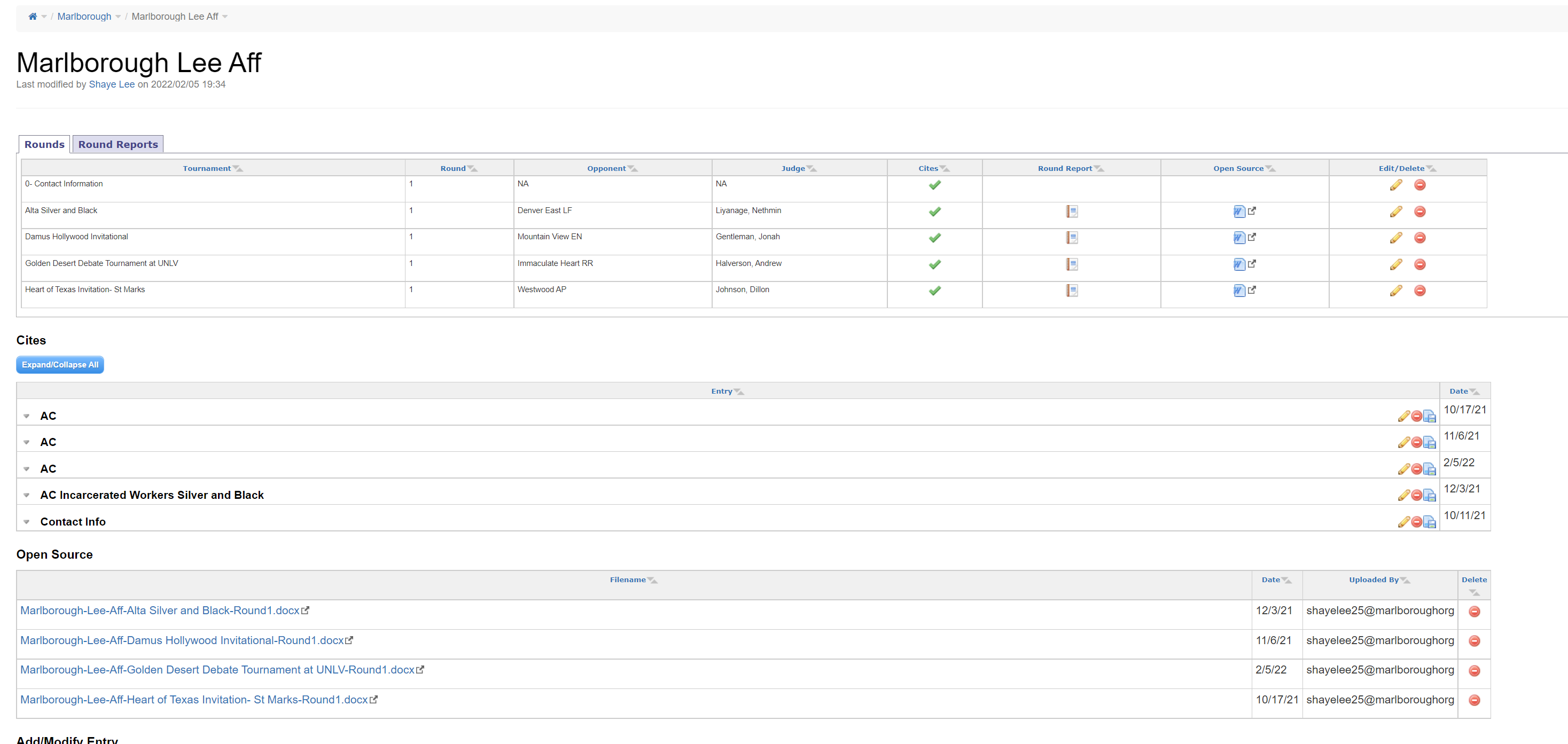
#### Vote neg for clash

#### 1 - Unclear definitions create prep gray zones decimating prep quality because we have to split time between separate strategies

2 - Vagueness lets the 1ar reclarify to shift out of disadvantages and counterplans decimating negative ground

## 4

**Interp: Debaters must disclose round reports on the 2020-2021 NDCA LD wiki for every round they have debated at the Palm Classic Tournament. Round reports disclose which positions (AC, NC, K, T, Theory, etc.) were read/gone for in every speech**

Violation: like 1 round report on this topic

**The standard is strategy education--knowing what people go for in later speeches like the 1ar and 2nr are necessary to prepare a robust and well thought out strategy that adapts to the specific debater. Otherwise, you could just go for 1ar theory or an RVI every round and we would never know which 1] gives you a huge pre-round prep advantage since you know our strategy 2] worsens the quality of debates since strategies are less adaptive so you can stick to the same old boring 1ar restarts and 3] worsens accessibility because a] big schools can go around and scout/collect flows while independents are left in the dark, so only round reports can level the playing field and b] round reports help novices understand how good debaters strategically deploy certain positions which helps to better understand their strategic value. Accessibility outweighs--all arguments presume we can access them and impact turns are repugnant since no political strategy should willingly exclude people**

## Case

#### Vote neg on circumvention – definitions as an “enabling concept” enable unprecedented expansion of space appropriation which turns the aff

Goehring 21- John S. Goehring [B.A., University of California, Berkeley; J.D., Tulane Law School; LL.M., McGill University, Institute of Air and Space Law) is a space and international law attorney for the Department of Defense and a judge advocate in the United States Air Force Reserve], “Why Isn’t Outer Space a Global Commons?” *Journal of National Security Law and Policy*. Vol. 11:573. (June 3, 2021).<https://jnslp.com/wp-content/uploads/2021/09/Why\_Isnt\_Outer\_Space\_a\_Global\_Commons\_2.pdf> BCortez

* The PDF copy and pasted the footnotes where they were supposed to be.

When used in a military or geopolitical context, “global commons” is typically used as an enabling concept. It refers to domains “that lie outside the exclusive jurisdiction of any particular state but may be accessed and used by those states or their nationals.”4 The Obama Administration, for instance, referred to the global commons as simply “those areas beyond national jurisdiction that constitute the vital connective tissue of the international system.”5 U.S. DEP’T OF DEFENSE, SUSTAINING GLOBAL LEADERSHIP: PRIORITIES FOR 21ST CENTURY DEFENSE 3 (Jan. 2012), https://perma.cc/47T3-698E. These domains include the high seas, the airspace outside of a state’s territorial waters, and outer space.6 See JOINT CHIEFS OF STAFF, U.S. DEP’T OF DEFENSE, JOINT OPERATING ENVIRONMENT 2035: THE JOINT FORCE IN A CONTESTED AND DISORDERED WORLD 30 (July 14, 2016) [hereinafter JOE 2035], https://perma.cc/JUE9-FLLC. The electromagnetic spectrum and cyberspace have also been described as global commons.7 This concept is enabling in the sense that these traits – lying beyond national jurisdiction and free for access by all – are thought to enable prosperity and security. “Prosperity of the United States depends upon its largely uncontested ability to access and use the global commons,” according to the 2016 Joint Chiefs of ∂ Staff report Joint Operating Environment (JOE) 2035. 8 JOE 2035 further asserts “[o]pen and accessible global commons,” including outer space, “are the pillars of the current international economy and empower states that use them to conduct commerce, transit, scientific study, or military surveillance and presence.” The Joint Chiefs of Staff also observed in the Joint Operational Access Concept, released in 2012, that U.S. access to the global commons, including outer space, is “vital to its national interests, both because the American way of life requires free access to the global marketplace and as a means for projecting military force into hostile territory.”9 In a defense review directed by President Obama, Secretary of Defense Leon Panetta identified the importance of protecting freedom of access to the global commons, including outer space, “to enable economic growth and commerce.”10 “The United States will continue to lead global efforts with capable allies and partners,” the report emphasized in italics, “to assure access and use of the global commons, both by strengthening international norms of responsible behavior and by maintain relevant and interoperable military capabilities.”11 More recently, Vice President Mike Pence embraced the importance of the commons. “[T]o make it clear to Beijing that no nation has a right to claim the maritime commons as territorial seas,” he said, “the United States, in the last year, has increased the tempo and scope of our freedom of navigation operations and strengthened our military presence across the Indo-Pacific.”12∂ While the Department of Defense is perhaps the most prominent organization to apply the label in this manner, it not the only entity that has espoused the importance of the global commons as an enabling concept. The Congressional Research Service has observed that the treatment of international waters, international air space, and outer space as “international commons” is a “key feature” of international order.13 Similarly, the U.S.-China Economic and Security Review Commission has observed that “norms against altering borders by force and for access to the open global commons (e.g., freedom of the seas) are inherent” to the concept of the “liberal rules-based international order.”14 Internationally, a NATO report has affirmed “[i]t is within, through, and from the Commons that trade, communications, transportation, and security operations take place.”∂ Private think tanks also recognize the global commons as an important enabling concept. A report by the RAND Corporation has concluded “[i]f the global commons of the high seas, the internet, or outer space are turned into arenas where actors of unknown provenance can carry out attacks on peaceful status quo powers with impunity, then the order that has supported peace and development will itself be at risk.”16 The Heritage Foundation also recently concluded that “a review of relevant top-level national security documents issued by a long string of presidential Administrations” consistently stated three national security interests, including the “[p]reservation of freedom of movement within the global commons: the sea, air, outer space, and cyberspace domains through which the nations of the world conduct their business.”17 THE HERITAGE FOUNDATION, 2020 INDEX OF MILITARY STRENGTH 2 (Dakota L. Wood, ed., 2020), https://perma.cc/Q3X4-C9KA. For its part, the Center for Strategic & International Studies (CSIS) has espoused a “Command the Commons Approach” to security, meaning “that the United States gets vastly more military use of the sea, space, and air than do others, that the United States can credibly threaten to deny their use to others, and that others would lose a military contest for the commons if they attempted to deny them to the United States.”18 KATHLEEN H. HICKS & JOSEPH FEDERICI, GETTING TO LESS? EXPLORING THE PRESS FOR LESS IN AMERICA’S DEFENSE COMMITMENTS, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES 3 (2020), https://perma.cc/26RA-5XJX. To be sure, “commons” and “global commons” can be used imprecisely in these contexts. Territorial seas, for example, are subject to national jurisdiction under international law, but this distinction is sometimes glossed over by those espousing the “sea” as a global commons. Nevertheless, the potential for a term with no authoritative meaning to be used imprecisely does not detract from the legitimacy of using it to describe the enabling concept.

Fiat doesn’t solve – you can fiat the plan not what happens after – I could fiat an impact otherwise – kills neg ground

Their empirics don’t solve either – people being willing to implement the plan doesn’t prove it’s effectiveness

### Space col good:

#### Private sector gets us off the rock.

Diakovska 20 [Halyna Diakovska and Olga Aliieva, Ph.D.s in Philosophy, Associate Professors, Donbass State Pedagogical University, “Consequentialism and Commercial Space Exploration,” 2020, *Philosophy and Cosmology*, Vol. 24, pp. 5-24, https://doi.org/10.29202/phil-cosm/24/1, EA]

The experience of the USA showed that leadership in space exploration, which is maintained solely through public funding, could be erroneous. Since 1984, the share of public funding has gradually decreased in space telecommunications, commercial space transportation, remote sensing, etc., while the share of participation of non-state enterprises has increased rapidly. A legal and regulatory framework has been modified to stimulate space commercialization. The stages of space law development are discussed in the research of Valentyn Halunko (Halunko, 2019), Larysa Soroka (Soroka & Kurkova, 2019), etc. Larysa Soroka and Kseniia Kurkova explored the specifics of the legal regulation of the use and development of artificial intelligence for the space area (Soroka & Kurkova, 2019).

As a result of changing the legal framework and attracting private investors to the space market, the US did not lose its leadership in space exploration, but rather secured it. Private investment along with government funding have significantly reduced the risk of business projects in the space industry. The quality and effectiveness of space exploration programs have increased.

In 2018, Springer published an eloquent book The Rise of Private Actors in the Space Sector. Alessandra Vernile, the author of the book, explores a broad set of topics that reveal the role of private actors in space exploration (Vernile, 2018). The book covers the following topics: “Innovative Public Procurement and Support Schemes,” “New Target Markets for Private Actors,” etc. In the “Selected Success Stories,” Vernile provides examples of successful private actors in space exploration (Vernile, 2018).

The current level of competition, which has developed on the space market, allows us to state the following fact. Private space companies have been able to compete with entire states in launching spacecraft, transporting cargo to orbital stations, and exploring space objects. The issue of mining on space objects, the creation of space settlements and the intensive development of the space tourism market are on the agenda.

In the 21st century, the creation of non-governmental commercial organizations specializing in the field of commercial space exploration, is regarded as an ordinary activity. They are established as parts of the universities around projects funded by private investors. For example, Astropreneurship & Space Industry Club based on the MIT community (Astropreneurship, 2019).

Large-scale research in the field of commercial space exploration, as well as the practical results achieved, led to the formation of a new paradigm called “New Space” ecosystem. The articles of Deganit Paikowsky’s (Paikowsky, 2017), Clelia Iacomino (Iacomino & Ciccarelli, 2018) et al. reveal its key meanings and the opportunities it offers in the space sector. The “New Space” ecosystem is a new vision for commercial space exploration. It is the formation of a cosmic worldview, in which the near space with all the wealth of its resources and capabilities, becomes a part of the global economy and the sustainable development of the society. The “New Space” ecosystem offers the following ways for commercial space exploration (Iacomino & Ciccarelli, 2018):

1. Innovative public procurement and support schemes, which significantly expand the role of commercial actors in space exploration.

2. Attracting new entrants in the space sector. First of all, these are companies working in the domain of Information and communications technology, artificial intelligence, etc. that are expanding their research in space markets. They offer innovative business models and new solutions to space commercialization.

3. Innovative industrial approaches based on new processes, methods, and industrial organization for the development and production of space systems or launchers.

4. Disruptive market solutions, which significantly reduce commercial space exploration prices, increase labor productivity, provide new types of services, etc.

5. Substantial private investment from different sources and involving different funding mechanisms. For instance, these are private fortunes, venture capital firms, business angels, private equity companies, or banks, etc.

6. Involvement of an increasing number of space-faring nations investing in the acquisition of turnkey space capabilities or even in the development of a domestic space industrial base. This expands the space markets and makes it more competitive.

The analysis of the research and advances in commercial space exploration allows us to draw the following conclusions:

1. In fact, the space market has already been created. It is currently undergoing continuous development that will integrate the resources and capabilities of the near space into the global economy over the next decade.

2. A new paradigm, denoted by the term “New Space” ecosystem, is at the heart of the created space market. The “New Space” ecosystem is a step towards the formation of cosmic thinking, in which outer space, with its resources and capabilities, is considered as a sphere of human activities.

3. Space market regulates space law, which is constantly evolving. The space law develops within the bounds of international law. In essence, the space market is integrated into the international legal field and is governed by its laws.

#### But private property is key to transform short-term goals into settlement.

Jonckheere 18 [Evarist Jonckheere, Master of Laws, Ghent University, “The Privatization of Outer Space and the Consequences for Space Law,” 2018, Master’s Thesis, https://libstore.ugent.be/fulltxt/RUG01/002/479/330/RUG01-002479330\_2018\_0001\_AC.pdf, EA]

The reality is that private enterprises are already moving in a direction that will need a similar regime. So, the big legal uncertainties concerning space property should be dealt with sooner rather than later.194 Legal certainty on an international level would greatly benefit the space industry. The existing risks of space ventures would be minimized as private companies would know what they are up against. This could give a boost to private enterprises to be more technologically innovative and entrepreneurial when it comes to outer space exploration. The prospect of gaining property rights might push them to undergo more fully realized expeditions for larger and fixed rewards. The legal regime should however ensure fairness and order between the competing space entrepreneurs.195

#### That prevents other-wise inevitable extinction – independently creates massive tech spillover, global coop, and new resources.

Green 21 [Brian Patrick Green, director of technology ethics at the Markkula Center for Applied Ethics, Santa Clara University, “Space Ethics,” 2021, Rowman, pp. 4-5, EA]

In favor of going into space are such basics as gaining scientific knowledge and developing beneficial new technologies, both of which space exploration and use have already begun to accomplish with dramatic and sometimes unexpected effects for humankind. Scientific advancements include astronomical and cosmological knowledge from various orbiting experiments and telescopes that have let us gain unprecedented understanding about our universe. But space activities have also contributed to a great deal of scientific knowledge about our Earth, including measurements of environmental status, habitat conversion and destruction, detailed knowledge of anthropogenic climate change, and much about Earth’s chemistry and geology. We have also learned a great deal about our local planets, for example, that a runaway “greenhouse effect” in the atmosphere of Venus makes the surface scorchingly hot, while too little greenhouse effect on Mars leaves the surface quite cold. There have also been significant contributions made to medical science, especially concerning the behavior of the human body when subjected to radiation, microgravity, nutritional restrictions, and so on.

On the technological side, everything with American global positioning system (GPS), Russian Glonass, or other global navigation systems—from smartphones to military vehicles—relies on a network of satellites above us, placed there by rocketry and painstakingly tracked with instruments developed for the task. So many technologies have been pioneered by space exploration and use that it is hard to list them all, but some of the more important ones include weather satellites (which are not only convenient but also allow preparation for and evacuation from severe weather), communication satellites, solar photovoltaic (PV) cells, advances in electronics and computers, advances in materials science, and so on.

Space is also an important location for the contention of national interests in a geopolitical and military sense. As the ultimate “high ground” in battle, space allows certain asset classes such as spy satellites to exist in a position unassailable by many or most opponents. While permanent weapons stations and weapons of mass destruction are banned from space by the United Nations Outer Space Treaty (OST), 6 that has not stopped the development of weapons that are impermanent (such as missiles, missile interceptors, and antisatellite weapons) or the research and development of possible space-based weapons platforms, such as were envisioned by U.S. president Ronald Reagan’s Strategic Defense Initiative, nicknamed “Star Wars.” While military and political interests may ultimately seem to be a less noble reason to explore and use space, relative power, safety, and security certainly are very human interests and are valuable to those who feel they are being protected by them.

Space activities are also a key way of promoting international cooperation and global awareness. While the international competition of the “space race” fueled one nation all the way to the Moon, shortly afterward, the Apollo-Soyuz program announced a thawing of this competition and commenced a period of cooperation between the United States of America and the Union of Soviet Socialist Republics. Currently the International Space Station continues this cross-national cooperation in space, with five space agencies (representing Canada, the European Space Agency nations, Japan, Russia, and the United States) participating. In addition to cooperation in space exploration itself, the perspective given from space has itself helped to produce some feelings of unity on Earth, with the famous “Blue Marble” and “Earthrise” pictures showing Earth’s oneness and scientific discoveries supported by space science, such as those related to climate change, helping to promote international cooperation to address these problems.

Gaining access to new critical resources may be another reason to go into space. Earth is a finite planet, and certain elements on Earth are very rare in the planetary crust, particularly platinum group metals that are very dense and siderophilic (iron-loving) and so have tended to sink toward the core over the natural history of the planet. However, asteroids and other objects in space (for example, planets, comets, and moons) can sometimes have these elements in abundance and in more available locations, making them potentially excellent sources for these valuable materials. Now-defunct asteroid-mining startup Planetary Resources once estimated that one “platinum-rich 500 meter wide asteroid contains . . . 1.5 times the known world-reserves of platinum group metals (ruthenium, rhodium, palladium, osmium, iridium, and platinum).” 7 In addition to returning elements to a resource-hungry Earth, further exploration and development of space will require access to resources that are not purely sourced from Earth. In particular, it will be necessary to gain access to water, which is relatively rare in the inner solar system and which would be far too costly to transport in any significant amounts from the Earth’s surface.

Another reason that humans may want to explore space would be to create a “backup Earth” to hedge against global catastrophic and existential risks (risks that may cause widespread disaster or human extinction, respectively) on our home planet. 8 Earth has always been a dangerous place for humans, with asteroid impacts, supervolcanic eruptions, pandemic disease, and other natural hazards threatening civilization. Now, in addition to these natural threats, human-made hazards such as nuclear weapons, climate change, biotechnology, nanotechnology, and artificial intelligence may threaten not only the viability of technological civilization but perhaps the survival of human life itself. A serious global-scale catastrophe could set back civilization many decades or centuries, and the worst disasters could cause human extinction. In one scenario, in which 100 percent of humanity dies, all of human effort for all of history would be for nothing. However, were the same global catastrophe to happen to Earth, yet humans were a multiplanetary species with just one self-sustaining settlement off-Earth, it would not result in the end of human civilization or human extinction. Instead while the same unimaginable fate would befall the Earth (certainly no mere triviality, with perhaps the deaths of 99.999 percent of all humans and possibly the destruction of the ecosphere and everything in it), at least all of human and planetory history would not be for nothing. Human life and culture would go on elsewhere, as well as other Earth species. This is a dire fate, but less terrible than the first.

#### Immeasurable expected value also outweighs.

Baum 16 – Executive Director of the Global Catastrophic Risk Institute [Seth D. Baum, “The Ethics of Outer Space: A Consequentialist Perspective,” 2016, Springer, pp. 115-116, EA]

Space colonization is notable because it may be able to bring utterly immense increases in intrinsic value. Early colonies might start small, given that other planets and moons have inhospitable environments. However, it may be possible to build large indoor colonies or create more hospitable outdoor environments (i.e., terraforming). Even just on other planets and moons in the Solar System, space colonies could multiply the total area available for human habitation. And there are many more planets around other stars, as ongoing research on exoplanets is now learning. One recent study estimates 22 % of Sun-like stars have Earth-like exoplanets (Petigura et al. 2013), implying billions to tens of billions of potentially habitable planets across the galaxy.

Opportunities at any given star may also be quite a bit greater than those available only on planets. Earth only receives about one two-billionth of the Sun’s radiation. To collect all the Sun’s radiation, humanity would need a Dyson swarm (named after Dyson 1960), which is a series of structures that surrounds a star, collecting its radiation to power a civilization. A Dyson swarm around the Sun could potentially enable a civilization a billion times larger than is possible on Earth. Likewise, Dyson swarms around one billion stars would bring humanity approximately 1018 (one billion–billion) times more energy per unit time.

Space colonies could also increase the amount of time available for human civilization. Earth will remain habitable for a few billion more years (O’Malley-James et al. 2014). Stars will continue shining for about 1014 more years (Adams 2008). That gives us an additional 105 times more energy, for a total of 1023 times more energy than is available on Earth. After the stars fade, other energy sources may be available. And even if our current universe eventually becomes uninhabitable, it may be possible to move to other universes (Kaku 2005). The physics here is speculative, but it cannot be ruled out, and hence there is a nonzero chance of a literally infinite opportunity for space colonization (Baum 2010a).

Whether the opportunity is infinite or merely, say, 1023 times larger than what can be done on Earth, the opportunity is clearly immense. As long as space colonization is an improvement (Sect. 8.3.1), then it would seem that the consequentialist should prioritize space colonization. The sooner space colonization begins, the more of its immense opportunity can be gained. Indeed, Ćirković (2002) estimates 5 × 1046 human lifetimes are lost for every century in which space colonization is delayed.

There can also be large value for space colonization under ecocentric intrinsic value. It is sometimes argued that Earth would be better off without humans. For example, the Voluntary Human Extinction Movement states that “Phasing out the human race by voluntarily ceasing to breed will allow Earth’s biosphere to return to good health” (http://vhemt.org, accessed 25 October 2015). However, this makes sense only if extraterrestrial locations are not intrinsically valued. Otherwise, exterminating humanity ruins the opportunity for humans to bring flourishing ecosystems into outer space. Terraforming other planets or bringing ecosystems into Dyson swarms could bring immense amounts of ecosystem flourishing.

### Mining Good

#### Mining solves sustainability and resource wars.

Aziz 15 [John Aziz, Economics and Business correspondent at The Week, “How asteroid mining could add trillions to the world economy,” 01/11/15, *The Week*, https://theweek.com/articles/462830/how-asteroid-mining-could-add-trillions-world-economy, EA]

The potential benefits to asteroid mining reach far beyond just profit, economic growth, and expanding Earth's resource base. While mining on Earth can be highly destructive to natural habitats — resulting in deforestation, soil erosion, chemical contamination, and the pollution of groundwater — mining in space doesn't damage any natural habitats. Even more significantly, less resource bottlenecks means less potential for future resource wars between competing countries — a frightening scenario which the Pentagon has begun planning to address if need be.

In the long run, being able to mine resources in space will help humans create space-based communities, and explore deeper and deeper into the universe, eventually transitioning us away from an entirely Earth-based civilization.

#### SpaceCol solves existential risks.

Green 21 [Brian Patrick Green, director of technology ethics at the Markkula Center for Applied Ethics, Santa Clara University, “Space Ethics,” 2021, Rowman, pp. 5, EA]

Another reason that humans may want to explore space would be to create a “backup Earth” to hedge against global catastrophic and existential risks (risks that may cause widespread disaster or human extinction, respectively) on our home planet. 8 Earth has always been a dangerous place for humans, with asteroid impacts, supervolcanic eruptions, pandemic disease, and other natural hazards threatening civilization. Now, in addition to these natural threats, human-made hazards such as nuclear weapons, climate change, biotechnology, nanotechnology, and artificial intelligence may threaten not only the viability of technological civilization but perhaps the survival of human life itself. A serious global-scale catastrophe could set back civilization many decades or centuries, and the worst disasters could cause human extinction. In one scenario, in which 100 percent of humanity dies, all of human effort for all of history would be for nothing. However, were the same global catastrophe to happen to Earth, yet humans were a multiplanetary species with just one self-sustaining settlement off-Earth, it would not result in the end of human civilization or human extinction. Instead while the same unimaginable fate would befall the Earth (certainly no mere triviality, with perhaps the deaths of 99.999 percent of all humans and possibly the destruction of the ecosphere and everything in it), at least all of human and planetory history would not be for nothing. Human life and culture would go on elsewhere, as well as other Earth species. This is a dire fate, but less terrible than the first.

#### Immeasurable expected value also outweighs.

Baum 16 – Executive Director of the Global Catastrophic Risk Institute [Seth D. Baum, “The Ethics of Outer Space: A Consequentialist Perspective,” 2016, Springer, pp. 115-116, EA]

Space colonization is notable because it may be able to bring utterly immense increases in intrinsic value. Early colonies might start small, given that other planets and moons have inhospitable environments. However, it may be possible to build large indoor colonies or create more hospitable outdoor environments (i.e., terraforming). Even just on other planets and moons in the Solar System, space colonies could multiply the total area available for human habitation. And there are many more planets around other stars, as ongoing research on exoplanets is now learning. One recent study estimates 22 % of Sun-like stars have Earth-like exoplanets (Petigura et al. 2013), implying billions to tens of billions of potentially habitable planets across the galaxy.

Opportunities at any given star may also be quite a bit greater than those available only on planets. Earth only receives about one two-billionth of the Sun’s radiation. To collect all the Sun’s radiation, humanity would need a Dyson swarm (named after Dyson 1960), which is a series of structures that surrounds a star, collecting its radiation to power a civilization. A Dyson swarm around the Sun could potentially enable a civilization a billion times larger than is possible on Earth. Likewise, Dyson swarms around one billion stars would bring humanity approximately 1018 (one billion–billion) times more energy per unit time.

Space colonies could also increase the amount of time available for human civilization. Earth will remain habitable for a few billion more years (O’Malley-James et al. 2014). Stars will continue shining for about 1014 more years (Adams 2008). That gives us an additional 105 times more energy, for a total of 1023 times more energy than is available on Earth. After the stars fade, other energy sources may be available. And even if our current universe eventually becomes uninhabitable, it may be possible to move to other universes (Kaku 2005). The physics here is speculative, but it cannot be ruled out, and hence there is a nonzero chance of a literally infinite opportunity for space colonization (Baum 2010a).

Whether the opportunity is infinite or merely, say, 1023 times larger than what can be done on Earth, the opportunity is clearly immense. As long as space colonization is an improvement (Sect. 8.3.1), then it would seem that the consequentialist should prioritize space colonization. The sooner space colonization begins, the more of its immense opportunity can be gained. Indeed, Ćirković (2002) estimates 5 × 1046 human lifetimes are lost for every century in which space colonization is delayed.

There can also be large value for space colonization under ecocentric intrinsic value. It is sometimes argued that Earth would be better off without humans. For example, the Voluntary Human Extinction Movement states that “Phasing out the human race by voluntarily ceasing to breed will allow Earth’s biosphere to return to good health” (http://vhemt.org, accessed 25 October 2015). However, this makes sense only if extraterrestrial locations are not intrinsically valued. Otherwise, exterminating humanity ruins the opportunity for humans to bring flourishing ecosystems into outer space. Terraforming other planets or bringing ecosystems into Dyson swarms could bring immense amounts of ecosystem flourishing.

#### Only property solves

Jacobsen 14 [Kyle A. Jacobsen, J.D. Candidate, Temple University Beasley School of Law, 2015, “From Interstate To Interstellar Commerce: Incorporating The Private Sector Into International Aerospace Law,” 2014, *Temple Law Review*, Vol. 87, No. 1, HeinOnline, EA]

The technology that will physically bring humans and machinery to these asteroids and extract minerals on a systematic and continuous basis is still in its infancy.178 However, necessity tends to breed innovation. Earth's increasing reliance on fossil fuels, coupled with rapid population growth, could soon force governments and companies alike to look to the sky for answers. As technology continues to reveal more efficient and effective ways to harvest these valuable resources from extraplanetary objects, the private sector will become increasingly involved with such recovery efforts. However, investors will only become more involved if they are assured that their efforts will be rewarded and legally recognized by the international community.179 Hence, private entities need a stable and predictable legal landscape to ensure that not only will they have the ability to recover these resources, but a legally recognized right to do so.180 Current international laws do not provide the private sector with this peace of mind.181

#### Non-appropriation kills space mining – incentives.

Jonckheere 18 [Evarist Jonckheere, Master’s of Law, Ghent University, “The Privatization of Outer Space and the Consequences for Space Law,” 2018, Master’s Thesis, https://libstore.ugent.be/fulltxt/RUG01/002/479/330/RUG01-002479330\_2018\_0001\_AC.pdf, EA]

75. The property rights discussion takes centerstage in the exploitation industry. In short, private enterprises will want legal certainty regarding the ownership of space resources they unearth. Ideally these private enterprises will have property rights in outer space. The common heritage of mankind principle as outlined above, 144 will be featured frequently in this part of the dissertation.

76. The main stumbling block is the non-appropriation principle of the Outer Space Treaty145 and the Moon Treaty.146This international principle establishes that there will be no ownership over outer space or parts of it. There is thus no legal ground for property rights in outer space, on the contrary, their very existence seems to be excluded. By design, the principle clashes with the wants of private space mining enterprises and is unsupportive of an exploitation-based industry in outer space.

### ASATs turn

#### Private actors solve space war and specifically ASAT restraint.

Cobb 21 [Wendy N. Whitman Cobb, Associate Professor of Strategy and Security Studies at the School of Advanced Air and Space Studies, “Privatizing Peace: How Commerce Can Reduce Conflict in Space,” 2021, Routledge, pp. 68-69, EA]

Finally, given the involvement of an ever-larger number of private actors in space, states also need to consider the lost opportunity costs if private actors choose to forego research, development, and deployment of new technologies because the danger in space is too high. As space becomes more commercialized, these private actors can exert pressure on states to behave peacefully in order to promote further economic development. Gartzke and Quan Li argue that this can happen through the movement of capital from conflict-prone states or areas to non-conflictual states.50 This is not necessarily applicable to space because there is no area in space which is formally protected, but commercial space actors may choose not to engage in new economic investment which can in turn affect a state’s economic performance. To date, the size of the space sector is comparatively small, so, arguably, the potential economic loss would not be that great. Where the harm comes from is state reliance on private actors for military and national security space services. As states contract out space services to a greater extent, private actors exert an even greater influence over the state by having a capability they do not.

Why might private companies want a more conflict-free space? If there is weaponized conflict in space, they could potentially benefit through new launches to send up replacement satellites; this is similar to an argument that war can actually be beneficial to an economy because companies are needed to create materiel and weapons.51 But, in a debris filled environment, sending replacements is more difficult and dangerous. Some private companies want to engage in human spaceflight; a conflictual or more dangerous orbital environment would likely prevent those activities or increase their costs to such an extent that it becomes economically infeasible. James Clay Moltz argues specifically that “the growing presence of space tourists in low-Earth orbit would greatly increase the incentives for restraint in any future [ASAT] test programs.”52 Those foregone development costs and commercial activities can have a similar cost to states simply by discouraging private actors from participating in the market.

#### That turns case and goes nuclear – extinction.

Blatt 20 [Talia M. Blatt, “Anti-Satellite Weapons and the Emerging Space Arms Race,” 05/26/20, *Harvard International Review*, https://hir.harvard.edu/anti-satellite-weapons-and-the-emerging-space-arms-race/, EA]

Nevertheless, a space race born from the Cold War continues to unfold. While the current space race may not have the same monopoly on the American imagination as the sprint to the moon held during the 1950s and 60s, it deserves our equal attention. We are now witnessing the rapid and increasingly international development of anti-satellite weapons. The race for these weapons not only increases the risk of global conflict—it could jeopardize all future space exploration.

What Are Anti-Satellite Weapons (ASATs)?

Difficult to define, ASATs occupy a gray zone in international arms control. On one level, they are exactly what the term suggests: weapons designed to destroy or limit satellites for military purposes, such as undermining the command and control centers of an adversary’s military. ASATs can function in several ways. For example, kinetic energy ASATs (KE-ASATs) destroy satellites by physically colliding with them at high velocities. Drones, ballistic missiles, and explosives detonated near satellites can all function as KE-ASATs.

Conversely, non-kinetic ASATs use any non-physical mechanism to render a satellite inoperative, such as blinding satellites with lasers, launching cyberattacks, or jamming frequencies.

But definitional issues arise because any technology that can physically or non-kinetically damage a satellite can be considered an ASAT weapon. For example, supposedly benign technology aimed at removing defunct satellites or other space junk—known as Active Debris Removal (ADR) technology—can also remove active satellites. With ostensibly civil but covertly military capabilities or functions, many space technologies, including ADR, are put in a category commonly known as “dual-use.” The dual-use nature of space infrastructure makes differentiating between weapon and non-weapon nearly impossible. As a result, regulating ASATs—and many other space-based weapons systems—is extremely difficult.

A Brief History of ASAT Proliferation

The earliest ASAT testing began during the Cold War, when the success of Sputnik I in October of 1957 catalyzed American fears about the Soviet Union’s potential goal of developing nuclear armed satellites capable of circling the globe. In response, the US developed its first ASAT: Bold Orion, an air-launched ballistic missile. The Soviet Union responded with its own ASAT program, developing weapons through the 1960s and 70s known as co-orbitals. Unlike previous KE-ASAT designs, these co-orbitals worked by syncing up with a target satellite’s orbit, then detonating.

The United States responded to Soviet co-orbitals in the 1980s with the ASM-135 weapon, an air-launched KE-ASAT distinguished by its hit-to-kill method. Unlike the Soviet co-orbitals, the hit-to-kill system did not require explosives; it just used the energy generated by the collision between the craft and the satellite, making delivery more stable. In a 1985 demonstration authorized by President Ronald Reagan, an ASM-135 successfully destroyed a defunct satellite.

Roughly 30 years later, China joined the space race. In 2007, China successfully tested a KE-ASAT, destroying an old weather satellite with a ballistic missile. And just last year, India also successfully tested an ASAT in what the Indian government referred to as Mission Shakti.

As of 2018, Russia and China were still developing more advanced non-kinetic ASATs. Russia is specifically developing an ASAT system known as Nudol, which operates in Lower Earth Orbit and can move between orbital paths, threatening more satellites than weapons limited to just one orbital path. So, despite the end of the Cold War era, more and more nations are jumping into a space arms race that is resulting in the rapid proliferation of advanced space weaponry.

The ASAT Appeal

A global fixation on anti-satellite weapons is arguably the logical end result of the main American project of the late 20th and early 21st century: the movement to digital communications. Via the telephone, computers, and eventually the internet, the United States pioneered the use of space-based communications for most civil and military functions. The benefits of satellite-based communications—namely increased efficiency, precision, and volume of information transmitted—are self-evident; however, the US lead in the transition to space-based systems posed a threat: relying on satellites for military use more than any other country created an asymmetric dependency. In other words, an unexpected denial of space-enabled information or capabilities would be more debilitating to the United States than to any other country because no other country is as dependent on satellite communications.

In an era of US hegemony, powers like Russia, China, and India are looking for arenas in which they can make the most gains against a conventionally stronger opponent. The space race has an asymmetric nature: the more the United States develops in space, the more it has to lose. Thus, space warfare provides an arena where emerging powers can gain a strategic advantage relative to the US.

More broadly, ASATs are also desirable because they can function as conflict deterrents. If a conflict arises, countries may be less likely to escalate if they believe their opponents are capable of essentially blinding their military. Just as two nuclear armed opponents risk mutually assured destruction (MAD), two ASAT armed countries risk mutual impotence. If they both can “turn off” each other’s militaries—or deny access to the satellites upon which their opponent’s conventional and nuclear forces rely—both countries are rendered close to defenseless, a risk they would be extremely reluctant to take.

A Uniquely Dangerous Arms Race

Despite their deterrent functions, ASATs are more likely to provoke or exacerbate conflicts than dampen them, especially given the risk they pose to early warning satellites. These satellites are a crucial element of US ballistic missile defense, capable of detecting missiles immediately after launch and tracking their paths.

Suppose a US early warning satellite goes dark, or is shut down. Going dark could signal a glitch, but in a world in which other countries have ASATs, it could also signal the beginning of an attack. Without early warning satellites, the United States is much more susceptible to nuclear missiles. Given the strategy of counterforcing—targeting nuclear silos rather than populous cities to prevent a nuclear counterattack—the Americans might believe their nuclear weapons are imminently at risk. It could be twelve hours before the United States regains satellite function, which is too long to wait to put together a nuclear counterattack. The United States, therefore, might move to mobilize a nuclear attack against Russia or China over what might just be a piece of debris shutting off a satellite.

Additionally, accidental warfare, or strategic miscalculation, is uniquely likely in space. It is much easier to hold an adversary’s space systems in jeopardy with destructive ASATs than it is to sustainably defend a system, which is expensive and in some cases not technologically feasible because of limitations on satellite movement. Space is therefore considered offense-dominant; offensive tactics like weapons development are prioritized over defensive measures, such as improving GPS or making satellites more resistant to jamming.

As a result, countries are left with poorly defended space systems and rely on offensive posturing, which increases the risk that their actions are perceived as aggressive and incentivizes rapid, risky counterattacks because militaries cannot rely on their spaced-based systems after first strikes.

There are several hotspots in which ASATs and offensive-dominant systems are particularly relevant. Early warning satellites play a central role in US readiness in the event of a conflict involving North Korea. News of North Korean missile launches comes from these satellites. Given North Korea’s history of nuclear provocations, unflinchingly hostile rhetoric towards the United States and South Korea, and diplomatic opacity, North Korea is always a threatening, unknowable adversary, but recent developments have magnified the risk. With the health of Kim Jong-un potentially in jeopardy, a succession battle or even civil war on the peninsula raises the chances of loose nukes. If the regime is terminal, traditional MAD risk calculus will become moot; with nothing to lose, North Korea would have no reason to hold back its nuclear arsenal. Or China might decide to seize military assets and infrastructure of the regime. If the US does not have its early warning satellites because they have been taken out in an ASAT attack, the US, South Korea, and Japan are all in imminent nuclear peril, while China could be in a position to fundamentally reshape East Asian geopolitics.

The South China Sea is another hotspot in which ASATs could risk escalation. China is developing Anti-Access Area Denial (A2/AD) in the South China Sea, a combination of long range radar with air and maritime defense meant to deny US freedom of navigation in the region. Given the disputed nature of territory in the South China Sea, the United States and its allies do not want China to successfully close off the region.

But the most effective way to break an A2/AD system would be with anti-satellite weapons. ASATs could neutralize the maritime surveillance China relies upon to deny access to the region and guide cruise missiles. Thus, China is extremely wary of US ASAT development: risks to Beijing’s South China Sea strategy are seen as threats to China itself because of territorial sovereignty claims that are deeply important to the regime and have only become more pronounced under President Xi Jinping. If a Chinese satellite went dark, Beijing might perceive it as a US ASAT designed to undermine the A2/AD approach, and escalate with conventional force.

An Even Greater Risk

Many of these conflict scenarios start with the loss of satellite function, which may seem unlikely. But ASATs threaten satellites through more than just direct attack. ASAT testing, rather than deployment, risks the exponential accumulation of debris, which endangers satellites and creates a host of other problems.

KE-ASATs rely on smashing satellites into thousands of pieces, so each test adds tremendous amounts of space debris. The 2007 Chinese KE-ASAT test alone increased the number of objects in orbit by 20 percent, producing more than two thousand pieces of debris large enough to be tracked and likely thousands more too small to be counted that will remain in orbit for centuries.

Even the smallest pieces of debris can do great damage; traveling at more than 15,000 miles per hour, they can crash into other debris in a proliferation known as the Kessler Syndrome. The situation in space could approach a critical mass in which collision cascading occurs even if all launches were halted, choking orbits with debris until all satellites are destroyed and spaceflight rendered impossible. Compared to the negligible debris created during commercial launches, ASAT tests—especially if the arms race continues to escalate and countries with less developed space programs join with cruder designs—may accelerate the debris in space closer and closer to this critical mass.

If debris knocks out a satellite, an increasingly likely possibility in a world with ASAT tests, then the aforementioned conflict scenarios become more likely. Conflict aside, ASAT-based debris clouds are terrifying in their own right. Public health, transportation, climate science, and a litany of other crucial infrastructures are dependent on satellites that are now at risk. Satellite GPS is a cornerstone of the modern economy; some pundits believe that the slightest glitch in GPS satellites could shock the stock market and further destabilize an unstable global economy. During the pandemic, satellites are playing a crucial role in geospatial data collection for infectious disease modeling.

### Debris Advantage

#### Public sector mining thumps

NASA 19 [“NASA Invests in Tech Concepts Aimed at Exploring Lunar Craters, Mining Asteroids,” NASA, June 11, 2019, <https://www.nasa.gov/press-release/nasa-invests-in-tech-concepts-aimed-at-exploring-lunar-craters-mining-asteroids>] TDI

NASA Invests in Tech Concepts Aimed at Exploring Lunar Craters, Mining Asteroids

Robotically surveying lunar craters in record time and mining resources in space could help NASA establish a sustained human presence at the Moon – part of the agency’s broader [Moon to Mars exploration](https://www.nasa.gov/specials/moon2mars/) approach. Two mission concepts to explore these capabilities have been selected as the first-ever Phase III studies within the [NASA Innovative Advanced Concepts](https://www.nasa.gov/niac) (NIAC) program.

“We are pursuing new technologies across our development portfolio that could help make deep space exploration more Earth-independent by utilizing resources on the Moon and beyond,” said Jim Reuter, associate administrator of NASA’s Space Technology Mission Directorate. “These NIAC Phase III selections are a component of that forward-looking research and we hope new insights will help us achieve more firsts in space.”

The Phase III proposals outline an aerospace architecture, including a mission concept, that is innovative and could change what’s possible in space. Each selection will receive as much as $2 million. Over the course of two years, researchers will refine the concept design and explore aspects of implementing the new technology. The inaugural Phase III selections are:

Robotic Technologies Enabling the Exploration of Lunar Pits

William Whittaker, Carnegie Mellon University, Pittsburgh

This mission concept, called Skylight, proposes technologies to rapidly survey and model lunar craters. This mission would use high-resolution images to create 3D model of craters. The data would be used to determine whether a crater can be explored by human or robotic missions. The information could also be used to characterize ice on the Moon, a crucial capability for the sustained surface operations of NASA’s Artemis program. On Earth, the technology could be used to autonomously monitor mines and quarries.

[Mini Bee Prototype to Demonstrate the Apis Mission Architecture and Optical Mining Technology](https://www.nasa.gov/directorates/spacetech/niac/2019_Phase_I_Phase_II/Mini_Bee_Prototype)

Joel Sercel, TransAstra Corporation, Lake View Terrace, California

This flight demonstration mission concept proposes a method of asteroid resource harvesting called optical mining. Optical mining is an approach for excavating an asteroid and extracting water and other volatiles into an inflatable bag. Called Mini Bee, the mission concept aims to prove optical mining, in conjunction with other innovative spacecraft systems, can be used to obtain propellant in space. The proposed architecture includes resource prospecting, extraction and delivery.

#### Nearly ZERO risk to any given satellite even ASSUMING cascades, Aff can’t solve it, and every other risk to spacecraft outweighs

Wein 9 [Lawrence M. Wein, Professor & Senior Fellow at Stanford’s Center for International Security and Cooperation Jeffrey S. Skoll Professor of Management Science at Stanford University and Senior Fellow at Stanford’s Center for International Security and Cooperation, former DEC Leaders for Manufacturing Professor of Management Science at MIT, and Andrew M. Bradley, PhD-Institute for Computational and Mathematical Engineering at Stanford University, Space debris: Assessing risk and responsibility, Advances in Space Research 43 (2009) 1372–1390]

More importantly, while our numerical results mimic earlier results (Liou and Johnson, 2005; Walker and Martin, 2004) that stressed the importance of postmission deorbiting, we do not necessarily agree with the claim that the only way to prevent future problems is to remove existing large intacts from space (Liou and Johnson, 2006, 2008). The divergence between our views and those in Liou and Johnson (2006, 2008) is perhaps due to the different performance metrics used. The root causes for alarm in Liou and Johnson (2006, 2008) appear to be the growth rate of fragments and the small increase in the rate of catastrophic collisions over the next 200 years (Liou and Johnson, 2008, Fig. 2). However, the great majority of catastrophic collisions in the SOI do not involve operational spacecraft, and are hazardous only in the sense that the fragments generated from such a collision could subsequently damage or destroy operational spacecraft. Therefore, we introduced the notion of the lifetime risk of an operational spacecraft as the primary performance metric. Our model predicts that the lifetime risk is <5x10^-4 [less than .0005%] over the next two centuries, and always stays <10^-3 [less than .001%] than if there is very high (>98%) spacecraft deorbiting compliance. These risks appear to be low relative to the immense cost and considerable technological uncertainty involved in removing large objects from space, are dwarfed by the ~20% historical mission-impacting (but not necessarily mission-ending) failure rate of spacecraft (Frost and Sullivan, 2004), and could be overestimated if improved traffic management techniques lower future collision risks (Johnson, 2004). Hence, the need to bring large objects down from space does not appear to be as clear cut as suggested in Liou and Johnson (2006, 2008). Nonetheless, our model does not incorporate the possibility of intentional catastrophic collisions (ASAT tests, space wars) that could conceivably occur in the future. In addition, Fig. 5 considers only catastrophic collisions, whereas noncatastrophic intact-fragment collisions could easily disable an operational spacecraft. If the operational lifetime risk is modified to include noncatastrophic collisions with fragments >= 10cm, then the sustainable risk rises by ~50%: it increases from 2.19x10^-2 [.0219%] to 3.09x10^-2 in the base case, and increases from 4.91x10^-4 [.000491%] to 7.94x10^-4 in the full compliance case. Moreover, if fragments >= 1 cm (rather than >= 10 cm) are harmful to spacecraft (Johnson, 2004), then we (as well as other researchers) could be underestimating the risk.

In summary, in the absence of the removal of large objects from space, the sustainable lifetime risks in Figs. 3–5 do not appear to be obviously above or below a tolerable level. Even if these risks are deemed acceptable, it is prudent to invest in research and development for space remediation technologies, which is a topic of current study (Proposal for forming an IAA study group, 2000). However, given the optimality of full deorbit compliance from a societal, sustainable perspective, and the sensitivity of sustainable lifetime risk to postmission deorbit compliance, the primary focus for policymakers should be on increasing compliance, which leads us to a discussion of economic instruments that could be used to address this issue.

### Neoliberalism Advantage

#### 1 - Presumption: preventing space appropriation is a drop in the bucket - globalized trade, expansion of deregulated markets, and keynesian monetary stimulus has propelled neoliberalism across the globe before commercial space and will do so after commercial space

#### Growth is sustainable and solves a laundry list of threats.

Mark **Budolfson 21**. PhD in Philosophy. Assistant Professor in the Department of Environmental and Occupational Health and Justice at the Rutgers School of Public Health and Center for Population–Level Bioethics "Arguments for Well-Regulated Capitalism, and Implications for Global Ethics, Food, Environment, Climate Change, and Beyond". Cambridge Core. 5-7-2021. https://www-cambridge-org.proxy.library.emory.edu/core/journals/ethics-and-international-affairs/article/arguments-for-wellregulated-capitalism-and-implications-for-global-ethics-food-environment-climate-change-and-beyond/96F422D04E171EECDEF77312266AE9DD

Discourse on food ethics often advocates the **anti-capitalist idea** that we need **less capitalism, less growth, and less globalization** if we want to make the world a better and more equitable place, with arguments focused on applications to food, globalization, and a just society. For example, arguments for this anti-capitalist view are at the core of some chapters in nearly every handbook and edited volume in the rapidly expanding subdiscipline of food ethics. None of these volumes (or any article published in this subdiscipline broadly construed) focuses on a defense of globalized capitalism.1∂ More generally, discourse on global ethics, environment, and political theory in much of academia—and in society—increasingly features this anti-capitalist idea as well.2 The idea is especially prominent in discourse surrounding the environment, climate, and global poverty, where we face a nexus of problems of which capitalism is a key driver, including climate change, air and water pollution, the challenge of feeding the world, ensuring sustainable development for the world's poorest, and other interrelated challenges.∂ It is therefore important to ask whether this anti-capitalist idea is justified by **reason and evidence** that is as strong as the degree of confidence placed in it by activists and many commentators on food ethics, global ethics, and political theory, more generally.∂ In fact, many **experts** argue that this anti-capitalist idea is **not supported by reason and argument and is actually wrong**. The main contribution of this essay is to explain the structure of the leading arguments against the anti-capitalist idea, and in favor of the opposite conclusion. I begin by focusing on the general argument in favor of **well-regulated globalized capitalism** as the key to a **just, flourishing, and environmentally healthy world**. This is the most important of all of the arguments in terms of its consequences for health, wellbeing, and justice, and it is endorsed by experts in the **empirically minded disciplines** best placed to analyze the issue, including experts in long-run global development, human health, wellbeing, economics, law, public policy, and other related disciplines. On the basis of the arguments outlined below, well-regulated capitalism has been endorsed by recent Democratic presidents of the United States such as Barack Obama, and by progressive Nobel laureates who have devoted their lives to human development and more equitable societies, as well as by a wide range of experts in government and leading **n**on**g**overnmental **o**rganization**s**.∂ The goal of this essay is to make the structure and importance of these arguments clear, and thereby highlight that discourse on global ethics and political theory should engage carefully with them. The goal is not to endorse them as necessarily sound and correct. The essay will begin by examining general arguments for and against capitalism, and then turn to implications for food, the environment, climate change, and beyond.∂ Arguments for and against Forms of Capitalism∂ The Argument against Capitalism∂ Capitalism is often argued to be a key driver of many of society's ills: inequalities, pollution, land use changes, and incentives that cause people to live differently than in their ideal dreams. Capitalism can sometimes deepen injustices. These negative consequences are easy to see—resting, as they do, at the center of many of society's greatest challenges.3∂ And at the same time, it is often difficult to see the positive consequences of capitalism.4 What are the positive consequences of allowing private interests to clear-cut forests and plant crops, especially if those private interests are rich multinational corporations and the forests are in poor, developing countries whose citizens do not receive the profits from deforestation? Why give private companies the right to exploit resources at all, since exploitation almost always has some negative consequences such as those listed above? These are the right questions to ask, and they highlight genuine challenges to capitalism. And in light of these challenges, it is reasonable to consider the possibility that perhaps a different economic system altogether would be more equitable and beneficial to the global population.∂ The Argument for Well-Regulated Capitalism∂ However, **things are more complicated than the arguments above would suggest**, and the benefits of capitalism, especially for the world's poorest and most vulnerable people, are in fact myriad and **significant**. In addition, as we will see in this section, many experts argue that **capitalism is not the fundamental cause of the** previously described **problems** but rather an essential component of the **best solutions** to them and of the best methods for promoting our goals of health, well-being, and justice.∂ To see where the defenders of capitalism are coming from, consider an analogy involving a response to a pandemic: if a country administered a rushed and untested vaccine to its population that ended up killing people, we would not say that vaccines were the problem. Instead, the problem would be the flawed and sloppy policies of vaccine implementation. Vaccines might easily **remain** absolutely **essential** to the correct response to such a pandemic and could also be essential to promoting health and flourishing, more generally.∂ The argument is similar with capitalism according to the leading mainstream arguments in favor of it: Capitalism is an essential part of the best society we could have, just like vaccines are an essential part of the best response to a pandemic such as COVID-19. But of course both capitalism and vaccines can be implemented poorly, and can even do harm, especially when combined with other incorrect policy decisions. But **that does not mean that we should turn against them**—quite the opposite. Instead, we should **embrace them as essential** to the best and most just outcomes for society, and educate ourselves and others on their importance and on how they must be **properly designed and implemented** with other policies in order to best help us all. In fact, the argument in favor of capitalism is even more dramatic because it claims that much more is at stake than even what is at stake in response to a global pandemic—what is at stake with capitalism is nothing less than **whether the world's poorest and most vulnerable billion people will remain in conditions of poverty and oppression**, or if they will instead finally gain access to what is minimally necessary for basic health and wellbeing and become increasingly affluent and empowered. The argument in favor of capitalism proceeds as follows:∂ Premise 1. Development and the past. Over the course of recorded human history, the majority of historical increases in health, wellbeing, and justice have occurred in the last two centuries, largely as a result of societies adopting or moving toward **capitalism**. Capitalism is a relevant cause of these improvements, in the sense that they could not have happened to such a degree if it were not for capitalism and would **not have happened to the same degree under any alternative** noncapitalist approach to structuring society. The argument in support of this premise relies on observed relationships across societies and centuries between indicators of degree of capitalism, wealth, investments in public goods, and outcomes for health, wellbeing, and justice, together with econometric analysis in support of the conclusion that the best explanation of these correlations and the underlying mechanism is that large increases in health, wellbeing, and justice are largely driven by increasing investments in public goods. The scale of increased wealth necessary to maximize these investments requires **capitalism**. Thus, as capitalist societies have become dramatically wealthier over the past hundred years (and wealthier than societies with alternative systems), this has allowed **larger investments in public goods**, which simply has not been possible in a sustained way in societies without the greater wealth that capitalism makes possible. Important investments in public goods include investments in basic **medical knowledge**, in health and nutrition programs, and in the institutional capacity and know-how to **regulate** society and **capitalism** itself. As a result, capitalism is a **primary driver** of positive outcomes in **health and wellbeing** (such as increased **life expectancy**, **lowered child and maternal mortality**, adequate calories per day, **minimized infectious disease rates**, a lower percentage and number of people in **poverty**, and more reported **happiness**);5 and in **justice** (such as reduced deaths from **war** and homicide; higher rankings in **human rights** indices; the reduced prevalence of **racist, sexist, homophobic opinions** in surveys; and higher literacy rates).6 These **quantifiable positive consequences of global capitalism** dramatically **outweigh** the negative consequences (such as deaths from pollution in the course of development), with the result that the net benefits from capitalism in terms of health, wellbeing, and justice have been greater than they would have been under any known noncapitalist approach to structuring society.7∂ Premise 2. Economics, ethics, and policy. Although capitalism has often been ill-regulated and therefore failed to maximize net benefits for health, wellbeing, and justice, **it can become well-regulated** so that it maximizes these societal goals, by including mechanisms identified by economists and other policy experts that do the following:∂ optimally8 **regulate negative effects** such as pollution and monopoly power, and invest in public goods such as education, basic healthcare, and fundamental research including biomedical knowledge (more generally, policies that correct the failures of free markets that economists have long recognized will arise from “externalities” in the absence of regulation);9∂ ensure equity and distributive justice (for example, via wealth redistribution);10∂ ensure basic rights, justice, and the rule of law independent of the market (for example, by an independent judiciary, bill of rights, property rights, and redistribution and other legislation to correct historical injustices due to colonialism, racism, and correct current and historical distortions that have prevented markets from being fair);11 and∂ ensure that there is no alternative way of structuring society that is more efficient or better promotes the equity, justice, and fairness goals outlined above (by allowing free exchange given the regulations mentioned).12∂ To summarize the implication of the first two premises, **well-regulated capitalism** is **essential** to best achieving our ethical goals—which is true even though capitalism has certainly not always been well regulated historically. Society can still do much better and **remove the large deficits** in terms of health, wellbeing, and justice **that exist under** the current inferior and **imperfect** versions of **capitalism**.∂ Premise 3. Development and the future. If the global spread of capitalism is allowed to continue, desperate **poverty can be** essentially **eliminated** in our lifetimes. Furthermore, this can be accomplished **faster** and in a more just way via **well-regulated** global **capitalism** than by **any alternatives**. If we instead opt for **less capitalism**, less growth, and less globalization, then desperate **poverty will continue** to exist for a significant portion of the world's population into the further future, and the world will be a **worse and less equitable** place than it would have been with more capitalism. For example, in a world with less capitalism, there would be more **overpopulation, food insecurity**, air **pollution**, ill health, injustice, and other problems. In part, this is because of the factors identified by premise 1, which connect a turn away from capitalism with a turn away from continuing improvements in health, wellbeing, and justice, especially for the developing world. In addition, fertility declines are also a consequence of increased wealth, and the size of the population is a primary determinant of **food demand and other environmental stressors**.13 Finally, as discussed at length in the next section of the essay, capitalism can be naturally combined with optimal **environmental regulations**.14 Even bracketing anything like optimal regulation, it remains true that sufficiently **wealthy nations reduce environmental degradation** as they become wealthier, whereas developing nations that are nearing peak degradation will remain **stuck at the worst levels of degradation if we stall growth**, rather than allowing them to transition to less and less degradation in the future via capitalism and economic growth.15 In contrast, well-regulated capitalism is a key part of the best way of coping with these problems, as well as a key part of **dealing with climate change**, global **food production**, and other specific challenges, as argued at length in the next section. Here it is important to stress that we should favor well-regulated capitalism that includes correct investments in public goods over other capitalist systems such as the neoliberalism of the recent past that promoted inadequately regulated capitalism with inadequate concern for externalities, equity, and background distortions and injustices.16∂ Conclusion. Therefore, we should be in favor of capitalism over noncapitalism, and we should especially favor well-regulated capitalism, which is the ethically optimal economic system and is essential to any just basic structure for society.∂ This argument is impressive because, as stated earlier in the essay, it is based on **evidence** that is so striking that it leads a bipartisan range of open-minded thinkers and activists to endorse well-regulated capitalism, including many of those who were not initially attracted to the view because of a reasonable concern for the societal ills with which we began. To better understand why such a range of thinkers could agree that well-regulated capitalism is best, it may help to clarify some things that are not assumed or implied by the argument for it, which could be invoked by other bad arguments for capitalism.∂ One thing the argument above does not assume is that health, wellbeing, or justice are the same thing as wealth, because, in fact, they are not. Instead, the argument above relies on well-accepted, **measurable indicators** of health and wellbeing, such as increased lifespan; decreased early childhood mortality; adequate nutrition; and other empirically measurable leading indicators of health, wellbeing, and justice.17 Similarly, the argument that capitalism promotes justice, **peace**, freedom, human rights, and tolerance relies on empirical metrics for each of these.18∂ Furthermore, the argument does not assume that because these indicators of health, wellbeing, and justice are highly correlated with high degrees of capitalism, that therefore capitalism is the direct cause of these good outcomes. Rather, the analyses suggest instead that something other than capitalism is the direct cause of societal improvements (such as improvements in knowledge and technology, public infrastructure, and good governance), and that capitalism is simply a **necessary condition** for these improvements to happen.19 In other words, the richer a society is, the more it is able to invest in all of these and other things that are the direct causes of health, wellbeing, and justice. But, to maximize investment in these things societies need well-regulated capitalism.∂ As part of these analyses, it is often stressed that current forms of capitalism around the world are highly defective and must be reformed in the direction of well-regulated capitalism because they lack investments in public goods, such as basic knowledge, healthcare, nutrition, other safety nets, and good governance.20 In this way, an argument for a particular kind of **progressive reformism** is an essential part of the analyses that lead many to endorse the more general argument for well-regulated capitalism.∂ Although these analyses are nuanced, and appropriately so, it remains the case that the things that directly lead to health, wellbeing, and justice require resources, and the best path toward generating those resources is well-regulated capitalism. And on the flip side, according to the analyses behind premise 1 described above, an anti-capitalist system would not produce the resources that are needed, and would thus be a **disaster**, especially for the **poorest billion** people who are most desperately in need of the resources that capitalism can create and direct, to escape from extreme poverty.21

#### 3 – Past the tipping point and the alt is dictatorship and genocide---only tech can solve.

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

Today’s best-case ecological scenario was a horror story just three decades ago. In 1993, Bill Clinton declared that global warming presented such a profound threat to civilization that the U.S. would have to bring its “emissions of greenhouse gases to their 1990 levels by the year 2000.” Instead, we waited until 2020 to do so; in the interim, **humanity burned more carbon than it had since the advent of agriculture**. Now, it will take a historically unprecedented, worldwide economic transformation to freeze warming at **“only” 2 degrees** — a level of temperature rise that will turn “once in a century” storms into annual events, **drown entire island nations**, and render **major cities** in the Middle East **uninhabitable** in summertime (at least for those whose lifestyles involve “walking outdoors without dying of heatstroke”). This is what passes for a **utopian vision in 2021**. If we confine ourselves to mere **optimism** — and assume that every Paris Agreement signatory meets its current pledged target for decarbonization — then warming will hit 2.4 degrees by century’s end.∂ The reality of our ecological predicament invites denial of our political one. Put simply, it is hard to reconcile the scale of the climate crisis with the limits of contemporary American politics. **Delusions rush in to fill the gap**. Among these is the fantasy of national autonomy; the notion that the United States can save the planet or destroy it, depending on the precise timeline of its domestic decarbonization. A rapid energy transition in the U.S. is a vital cause, not least for its potential to expedite similar transformations abroad. But the battle for a sustainable planet will be won or lost in the developing world. Although American consumption played a central role in the history of the climate crisis, it is peripheral to the planet’s future: Over the coming century, U.S. emissions are expected to account for only 5 percent of the global total.∂ There is also the **delusion of “de-growth’s” viability**. The fact that there is no plausible path for global economic expansion that won’t entail climate-induced death and displacement has led some environmentalists to insist on global stagnation. Yet there is neither a mass constituency for this project, nor **any reason to believe that there will be** any time soon. Freeze the status-quo economy in amber, and you’ll **condemn nearly half of humanity to permanent poverty**. Divide existing GDP into perfectly even slices, and every person on the planet will live on about **$5,500 a year**. American voters may express a generalized concern about the climate in surveys, but they don’t seem willing to accept even a modest rise in gas prices — **let alone a total collapse in living standards** — to address the issue. Meanwhile, any Chinese or Indian leader who attempted to stymy income growth in the name of sustainability **would be ousted** in short order. It’s conceivable that one could radically reorder advanced economies in a manner that enabled living standards to rise even as GDP fell; Americans might well find themselves happier and more secure in an ultra-low-carbon communal economy in which individual car ownership is heavily restricted, and housing, healthcare, and myriad low-carbon leisure activities are social rights. But nothing short of an **absolute dictatorship** could affect such a transformation at the necessary speed. And the specter of eco-Bolshevism does not haunt the Global North. Humanity is going to find a way to **get rich sustainably, or die trying**.∂ Thus, the chasm between the ecologically necessary and the politically possible can only be bridged by **technological advance**. And on that front, **the U.S.** actually **has the resources** to make a decisive contribution to global decarbonization — and some **political will** to leverage those resources. Unfortunately, due to some combination of fiscal superstitions and misplaced priorities, the Biden administration’s proposed investments in green innovation remain paltry. An American Jobs Plan with much higher funding for green R&D is both imminently winnable and environmentally imperative. U.S. climate hawks should make securing such legislation a top priority.∂ The choice before us is **techno-optimism** or **barbarism**.∂ If governments are forced to choose between increasing income growth in the present, and mitigating temperature rise in the future, they are going to pick the **former**. We’ll get cheap, lab-grown Kobe beef before we get a U.S. Senate willing to tax meat, and steel plants powered by “green hydrogen” before we get **anarcho-primitivism** with Chinese characteristics.∂ The question is whether we’ll get such **breakthroughs before it’s too late**.∂ Techno-optimism has its hazards, but the progress we’ve made toward decarbonization has come largely through **technological innovation**. When India canceled plans to construct 14 gigawatts of new **coal**-fired power stations in 2019, it did **not do so in deference to** international pressure or domestic **environmental movements**, but rather to the **cost-competitiveness of solar** energy. The same story holds across **Asia’s** developing **countries**: Thanks to a ninefold reduction in the cost of solar energy over the past decade, the number of new coal plants slated for construction in the region has fallen by 80 percent. Meanwhile, the road to an electric-car revolution was cleared by a collapse in the cost of lithium batteries, the challenge of powering cities with solar energy on cloudy days was eased by a 70 percent drop in the price of utility-scale batteries, and wind power grew 40 percent cheaper. Our species remains **lackluster at solidarity** and self-government, but **we’ve got a real knack for building cool shit**.∂ The technological progress of the past decade was not sufficient to compensate for tepid climate policy. But real techno-utopianism has never been tried: As of 2019, global spending on clean energy R&D totaled $22 billion a year, or 3 percent of the Pentagon’s annual budget. Increasing spending on such research — while expediting cost-reductions in existing technologies by deploying them en masse — should be twin priorities of American climate policy.∂ **The preconditions for green industrialization can be made in America**.∂ The United States has more fiscal capacity and better-financed research universities than any nation on the planet. And, for all the pathologies of our politics, public investment in green tech inspires **far weaker opposition** than many less-indispensable climate policies. In fact, late last year, with Republicans controlling the Senate and Donald Trump in the White House, the U.S. increased funding for zero-emission technology R&D by $35 billion. America does not have **sovereignty over enough humans to save the planet by slashing our domestic emissions**. But we just might have the **resources and political economy necessary to help the developing world save us all**.∂ Although progress on renewables has exceeded optimistic expectations, the technical obstacles to global decarbonization remain immense. In the most optimistic scenario, scaling up existing, cost-competitive technologies can get us about 16 percent of the emissions reductions necessary for achieving net-zero by 2050, according to the International Energy Agency. Driving down the price of tech we already have will get us another 39 percent. The rest **must come from technologies** that have yet to be fully developed. We need electrified cement, hydrogen-powered steel plants, and evaporative cooling. We need utility-scale energy storage, electric airplanes, and ultra-high voltage transmission lines. And we’d be remiss to not toss a bit of our collective wealth at game-changing hail marys like nuclear fusion.

#### 4 – System changes are infeasible---can’t get governmental or international buy-in---reform is comparatively quicker.

Ezra **Klein 8/31/21**. American journalist, political analyst, New York Times columnist, and the host of The Ezra Klein Show podcast. "Transcript: Ezra Klein Answers Listener Questions". No Publication. 8-31-2021. https://www.nytimes.com/2021/08/31/podcasts/transcript-ezra-klein-ask-me-anything.html

EZRA KLEIN: Yeah. And maybe we should do an episode on this. I have very complicated feelings about degrowth. So one is that it is tricky to talk about, as you say, because I find its advocates will continue to say that you’re defining it wrong. So let me use a definition from Hickel, which is, and I’m quoting him here, “Degrowth is a planned reduction of energy and resource throughput designed to bring the economy back into balance with the living world in a way that reduces inequality and improves human well-being.”∂ And so I’d note two things here. One is “**designed**.” Degrowth is, as its advocates understand it, a act of global economic planning really **without equal anywhere in human history**. It is an act of **extraordinary central planning**. So that’s one thing that is going to become important in my answer.∂ I’d say there’s part of this vision I’m sympathetic to, and then part of it that I just don’t think holds together. I would distinguish a critique of want and a critique of growth. And the way I would do that is that, as you hear if you listen to the show, I’m pretty critical of a lot of the ways capitalism generates desire.∂ Desire is something we build through advertising, through social mimicry. This is a show that is supported by advertising. This is part of the desire- generation complex in its business model. And we are told and taught to want a lot of things, not only that we don’t need, but that don’t make us happier. And so not all growth as measured by G.D.P. is good growth.∂ But a lot of what people want is fine, or great, or whatever. It’s their desire, and it’s not for me to tell them the jeans they’re interested in are incorrect. And a lot of it **I don’t think is under the power of policymakers to control**. I don’t think it’s all advertising. I don’t know that if you cut down advertising, the amount people would spend on consumption would go way down. They might simply consume other things.∂ And so I want people to have rich, materially fulfilling lives. And I think **it’ll be a very hard piece to change**. So in terms of having a counterweight to the materialism, the ideology of materialism in modern society, that’s a part of degrowth that I’m very open to.∂ But now let me talk about degrowth more in the terms of it is a direct political project, which is as an answer to climate change. I would cut this into a few pieces. Is degrowth necessary for addressing climate change? Is it the fastest way to address climate change? And is it desirable? It has to be at least one of those things to be the strategy you’d want to take.∂ And **I don’t think it is**. Let’s start with necessary. Many countries in Europe, even the United States, are growing while reducing their carbon footprint. Now, you could say they’re not doing so fast enough depending on the country. But they could all do so much faster if there was enough political will to deploy more renewable technology, to tax carbon, to do a bunch of things that we have not been able to pass. So it is clearly true that **we can decouple growth and energy usage**.∂ Hickel, to be fair, will say that that may be true. But given the speed at which we need to act, we can’t just be deploying renewable energy technology. It would also help the situation if we stopped using as much through material consumption. That is, I think, conceptually true and politically false.∂ I mean, let’s just state that speed is, first and foremost, a **political problem**. There is a delta between where we are right now in terms of what we are doing on climate change and where we could be. That delta is big, and that delta gets bigger every year because it gets harder every year. And the time we have to act before we start getting some of the really truly catastrophic feedback loops in play is shortening. So you’re now talking here about the **speed at which you can move politics**.∂ So for something to be **faster**, it doesn’t just need to be faster if you implemented it. It **needs to be something you can implement** such it accelerates the politics of radical climate action. And that’s where I think **degrowth completely falls apart**. And I have tried to look for the answer people give on this, and I’ve **never found one that is convincing**.∂ So again, I’ll quote Hickel on this: “Degrowth has a discriminating approach to reducing economic activity. It seeks to scale down ecologically destructive and socially less necessary production, i.e., the production of S.U.V.s, arms, beef, private transportation, advertising and planned obsolescence” — by which he means there, the fact that expiration dates are built into a lot of our electronics — “while expanding socially important sectors like health care, education, care and conviviality.”∂ And I’d urge people to think about that for a minute. I mean, you can listen to that and you will assume correctly that I am sympathetic to the idea that a lot of those goods are not great. I’m a vegan. I don’t eat beef. I would like nobody else to eat beef.∂ I think that if the political demand of the climate movement becomes you don’t get to eat beef, you will **set climate politics back so far, so fast, it would be disastrous**. **Same thing with S.U.V.s.** I don’t like S.U.V.s. I don’t drive one. But if you are telling people in rich countries that the climate movement is for them not having the cars they want to have, **you are just going to lose. You are going to lose fast**.∂ We watched this happen for years before Elon Musk and some others began inventing cars that were both electrified and were actually cool cars. You weren’t going to get everybody in a Prius. You **might,** over time, **get them into the post-Tesla generations** of electronic vehicles.∂ This is where **the politics of it** for me **fall apart**.

I’d at least like to see some **empirical evidence** for the claim that degrowthers are right, and that their appeal will **speed the politics of doing hard things** on climate change. Because I think it will **do the opposite**. And I don’t see politicians winning in the countries they would need to win on anything like this platform. **Quite the contrary**.∂ I watched the most effective attack against Joe Biden’s climate policies. It **dominated** the **news** for a day or two. It was Fox News just making up — just completely making up — a false claim that Biden was going to **limit or restrict red meat**.∂ ANNIE GALVIN: Right. [LAUGHS]∂ EZRA KLEIN: So my worry with degrowth is that it is trying to take the politics out of politics. It is attacking the flaws of the current strategy as not moving fast enough when the impediments are **political**, but then **not accepting the impediments to its own political path** forward.∂ I will say, because I think it’ll be weird to people if I don’t mention this, that there is the big problem, of course, that the rising generation of emissions is coming **from China, from India**. I think it’s something like ⅔ of emissions are now from **middle income countries**. That is **only going up**.∂ Hickel and other degrowthers will say that, yes, the point of this is that the rich countries, which have already used more than their fair share of the carbon budget, should cut their carbon usage so poor countries can grow. I cannot imagine how you are going to enforce this as a political and economic planning regime. **How you will get rich countries to agree** to do less so poor countries can have more. I mean, look at what has happened with **vaccine hoarding**.∂ I don’t want to say that this isn’t a good moral weight on the conversation or, in the long term, a good push for people to think about different ways of having growth, different ways of human flourishing. But the entirety — as the degrowth people will agree — the entire question of the climate change conversation is **speed**. And I just don’t see the argument for degrowth as being anything but an **extraordinarily slower way of approaching the politics**, probably **counterproductive compared to what we’re doing**, which is I think you can make tremendous strides on climate change by deploying renewable energy **technologies** and giving people the opportunity to have a more materially fulfilling life atop those technologies.∂ And by the way, when that happens in rich countries, as we have seen, it ends up subsidizing these renewable energy technological advances for poorer countries. So it is a fact that Germany and other countries did so much to subsidize solar for themselves, it has also made it possible for countries like China and India to have such a rapid advance in solar technology that it’s affordable for them to do a lot of their growth on that platform.∂ So I also think there are cross-subsidies in rich countries trying to maintain growth renewable energy deployment that end up helping poor countries change what they’re doing in a useful way, too. So that’s my take on degrowth. But I understand its appeal. I just **don’t understand its politics**.

#### 5 – Innovation solves climate---monetary incentives align even for climate deniers---abandoning capitalism fails.

Noah **Smith 9/24/21**. Assistant Professor of finance @ SUNY Stony Brook, an economics PhD student at the University of Michigan, an academic editor in Japan, and a physics major at Stanford. “Climate optimism of the will.” https://noahpinion.substack.com/p/climate-optimism-of-the-will

So yeah, I’m not going to tell young climate activists that things are going well. The planet is in a very tough spot. But what I am going to tell young climate activists is that despite their pessimism of the intellect, they should embrace optimism of the will. Not only does despair ultimately not help anything, but it’s increasingly unwarranted — yes, things are tough right now, but recent developments mean that the climate has more of a fighting chance than it has in recent memory. And the reason is that unlike the discouraged climate activists, can-do types in science, business and government have been rolling up their sleeves and fighting the good fight.

The fightback against climate doom has begun

Activists are understandably leery of the idea that new technologies will come along to save the planet just in the nick of time. After all, the incentives are in no way aligned for such a deus ex machina — given the fundamental externality of carbon emissions, there’s no reason why scientists and engineers should care enough about the climate to spend their lives inventing stuff to fix it.

And yet, they do. Even if the public doesn’t take the climate problem seriously enough, scientists and engineers do. And they have poured their hearts and souls and careers and fortunes into creating **cheap solar, cheap wind, cheap reliable batteries**. Let me just re-post my favorite graph:

Chart, diagram, line chart

Description automatically generated

This is the result of many decades of hard work by a huge number of actors in government, academia, and business.

Of course cheap solar and wind are only one piece of the technological puzzle here. For one thing, you need to store energy for when the sun isn’t shining and the wind isn’t blowing — not just from day to night, but from summer to winter. Normal lithium-ion batteries work great for the short term and have come down in cost enormously, but they won’t cut it for the longer-term stuff. But as David Roberts explains, some new longer-term storage technologies like Form Energy’s iron-based batteries may already be **competitive** with gas plants for firming up the grid in some markets.

Meanwhile, electricity and transportation only account for a little over half of emissions. But **technology is pressing ahead on every front**! Industrial processes need heat; so we’ll use **hydrogen** to store energy from renewable sources and burn it for heat. Steel requires carbon to make, but we have an increasing array of **new technologies** to address that too. Same for cement. And as for retrofitting buildings cheaply to use electricity instead of gas, I know of some very promising developments in that area as well (more to come on that later).

The point here is that we don’t have to depend on any one magical deus ex machina technology to come and save us. There is no single such technology. Instead, **everywhere you look**, scientists and **engineers are inventing new technologies to maintain our industrial society** while eliminating greenhouse emissions. And everywhere you look, companies are **eager** to both develop and purchase these technologies, promising to bring them down in cost the way solar and batteries have fallen in cost.

And a new report from the Institute for New Economic thinking suggests that this flurry of technological innovation has already changed the game in a fundamental way. In “Empirically grounded technology forecasts and the energy transition”, INET’s team notes that **we’ve consistently underestimated progress in renewable technology**. They argue that realistic forecasts mean that green energy will be so cheap that even businesses that don’t care about climate at all will now find it worth their while to **ditch fossil fuels**:

Here we take a new approach based on probabilistic cost forecasting methods that made reliable predictions when they were empirically tested on more than 50 technologies. We use these methods to estimate future energy system costs and find that, compared to continuing with a fossil-fuel-based system, a rapid green energy transition will likely result in overall net savings of many trillions of dollars - even without accounting for climate damages or co-benefits of climate policy. We show that if solar photovoltaics, wind, batteries and hydrogen electrolyzers continue to follow their current exponentially increasing deployment trends for another decade, **we achieve a near-net-zero emissions energy system within twenty-five years**. In contrast, a slower transition…is far more expensive. If non-energy sources of carbon emissions such as agriculture are brought under control, our analysis indicates that a rapid green energy transition would likely generate considerable economic savings while also meeting the 1.5 degrees Paris Agreement target. (emphasis mine).

Cheap renewable energy means that we **don’t have to convince everyone** in the world **to sacrifice** for the climate. **Every selfish businessperson** out there trying to make a buck now **has an incentive to switch** from coal to solar, just because it’s cheaper. (Note that **this completely blows degrowth arguments out of the water**, at least as regards climate change.)

And you can already see this start to materialize. The governments of **India and China** have been pushing back against emissions targets for years, arguing that their economies need to use fossil fuels in order to eliminate poverty. But thanks to the valiant efforts of the people pushing renewable technologies forward, these countries are now starting to **decarbonize out of pure self-interest**. India has been canceling coal plants left and right. China just announced that it’s canceling the financing of all new coal plants overseas, suggesting that Xi Jinping might have the political clout to take on the entrenched, hugely powerful coal industry. This would never have happened if technological innovation hadn’t made decarbonization an attractive economic prospect in its own right.

**Even** America’s **Republicans may be starting to come around**; despite controlling the Presidency and the Senate, they put significant climate provisions in the December Covid relief bill.

In other words, though we haven’t managed to convince the general public to make deep material sacrifices to fight climate change, we have managed to convince several key segments of society to join the fight in a highly effective manner. **The effort to invent green technologies has been broad, consistent, sustained, and vigorous**. And it’s pretty clear at this point — in a way that it wasn’t clear a decade ago — that **the effort is going to be successful**. That is what “optimism of the will” gets us; that is what it means to fight ourselves out of a tough situation.

The energy of optimism

This does not mean that the fight is won, and that we can kick back and watch technology stop climate change for us. As the INET report indicates, even optimistic technological scenarios still require strong government action on non-energy sources of emissions such as agriculture and land use. Moreover, technology might make decarbonization cheap, but the fossil fuel lobby is still incredibly powerful, especially in the United States — coal is dead, but oil and gas support tons of jobs and have the ear of the GOP and some Democrats as well. Innovation has opened the door to an emissions-free future, but activism will be needed to push us through that door.

That’s where optimism comes in. Activists need to realize that even though projections have worsened and the 1.5C target will probably be missed, technology has flipped what would otherwise be a truly hopeless situation into a very winnable battle. 10 years ago it looked like in order to stop climate change, activists would have to convince the world to make huge material sacrifices. But now, **there’s no need to embrace degrowth**, or demand that people live ascetic lives, **or abolish capitalism**, or any of that stuff. Economic logic is on the activists’ side now. All that’s needed is to overcome the entrenched political power of the lobbies of sunset industries, and their culture warrior allies. Those are powerful enemies, but they’re **fundamentally beatable** ones.

Climate activists will thus benefit from both a change in attitude and a change in tone. Optimism of the will — the determination to fight our way out of the hole we’ve dug for ourselves — is a reason to get up in the morning. And it also makes for a damn good message. Instead of histrionics, or increasingly shrill and despairing portents of doom, or insistence that **capitalism must end** NOW NOW NOW OR THE PLANET DIES — all of **which alienate more people** than they convert — climate activists can deliver a positive, optimistic, can-do message. Climate change is beatable. We can even **make money while beating it**! **Human ingenuity and will can triumph** over the brute elemental forces that would destroy us. Must triumph, in fact.