# Framework

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

#### 1. Death is bad and outweighs – agents can’t act if they fear for their bodily security which constrains every ethical theory

#### 2. Extinction outweighs -

Pummer 15 [Theron, Junior Research Fellow in Philosophy at St. Anne's College, University of Oxford. “Moral Agreement on Saving the World” Practical Ethics, University of Oxford. May 18, 2015] AT

There appears to be lot of disagreement in moral philosophy. Whether these many apparent disagreements are deep and irresolvable, I believe there is at least one thing it is reasonable to agree on right now, whatever general moral view we adopt: that it is very important to reduce the risk that all intelligent beings on this planet are eliminated by an enormous catastrophe, such as a nuclear war. How we might in fact try to reduce such existential risks is discussed elsewhere. My claim here is only that we – whether we’re consequentialists, deontologists, or virtue ethicists – should all agree that we should try to save the world. According to consequentialism, we should maximize the good, where this is taken to be the goodness, from an impartial perspective, of outcomes. Clearly one thing that makes an outcome good is that the people in it are doing well. There is little disagreement here. If the happiness or well-being of possible future people is just as important as that of people who already exist, and if they would have good lives, it is not hard to see how reducing existential risk is easily the most important thing in the whole world. This is for the familiar reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. There are so many possible future people that reducing existential risk is arguably the most important thing in the world, even if the well-being of these possible people were given only 0.001% as much weight as that of existing people. Even on a wholly person-affecting view – according to which there’s nothing (apart from effects on existing people) to be said in favor of creating happy people – the case for reducing existential risk is very strong. As noted in this seminal paper, this case is strengthened by the fact that there’s a good chance that many existing people will, with the aid of life-extension technology, live very long and very high quality lives. You might think what I have just argued applies to consequentialists only. There is a tendency to assume that, if an argument appeals to consequentialist considerations (the goodness of outcomes), it is irrelevant to non-consequentialists. But that is a huge mistake. Non-consequentialism is the view that there’s more that determines rightness than the goodness of consequences or outcomes; it is not the view that the latter don’t matter. Even John Rawls wrote, “All ethical doctrines worth our attention take consequences into account in judging rightness. One which did not would simply be irrational, crazy.” Minimally plausible versions of deontology and virtue ethics must be concerned in part with promoting the good, from an impartial point of view. They’d thus imply very strong reasons to reduce existential risk, at least when this doesn’t significantly involve doing harm to others or damaging one’s character. What’s even more surprising, perhaps, is that even if our own good (or that of those near and dear to us) has much greater weight than goodness from the impartial “point of view of the universe,” indeed even if the latter is entirely morally irrelevant, we may nonetheless have very strong reasons to reduce existential risk. Even egoism, the view that each agent should maximize her own good, might imply strong reasons to reduce existential risk. It will depend, among other things, on what one’s own good consists in. If well-being consisted in pleasure only, it is somewhat harder to argue that egoism would imply strong reasons to reduce existential risk – perhaps we could argue that one would maximize her expected hedonic well-being by funding life extension technology or by having herself cryogenically frozen at the time of her bodily death as well as giving money to reduce existential risk (so that there is a world for her to live in!). I am not sure, however, how strong the reasons to do this would be. But views which imply that, if I don’t care about other people, I have no or very little reason to help them are not even minimally plausible views (in addition to hedonistic egoism, I here have in mind views that imply that one has no reason to perform an act unless one actually desires to do that act). To be minimally plausible, egoism will need to be paired with a more sophisticated account of well-being. To see this, it is enough to consider, as Plato did, the possibility of a ring of invisibility – suppose that, while wearing it, Ayn could derive some pleasure by helping the poor, but instead could derive just a bit more by severely harming them. Hedonistic egoism would absurdly imply she should do the latter. To avoid this implication, egoists would need to build something like the meaningfulness of a life into well-being, in some robust way, where this would to a significant extent be a function of other-regarding concerns (see chapter 12 of this classic intro to ethics). But once these elements are included, we can (roughly, as above) argue that this sort of egoism will imply strong reasons to reduce existential risk. Add to all of this Samuel Scheffler’s recent intriguing arguments (quick podcast version available here) that most of what makes our lives go well would be undermined if there were no future generations of intelligent persons. On his view, my life would contain vastly less well-being if (say) a year after my death the world came to an end. So obviously if Scheffler were right I’d have very strong reason to reduce existential risk. We should also take into account moral uncertainty. What is it reasonable for one to do, when one is uncertain not (only) about the empirical facts, but also about the moral facts? I’ve just argued that there’s agreement among minimally plausible ethical views that we have strong reason to reduce existential risk – not only consequentialists, but also deontologists, virtue ethicists, and sophisticated egoists should agree. But even those (hedonistic egoists) who disagree should have a significant level of confidence that they are mistaken, and that one of the above views is correct. Even if they were 90% sure that their view is the correct one (and 10% sure that one of these other ones is correct), they would have pretty strong reason, from the standpoint of moral uncertainty, to reduce existential risk. Perhaps most disturbingly still, even if we are only 1% sure that the well-being of possible future people matters, it is at least arguable that, from the standpoint of moral uncertainty, reducing existential risk is the most important thing in the world. Again, this is largely for the reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. (For more on this and other related issues, see this excellent dissertation). Of course, it is uncertain whether these untold trillions would, in general, have good lives. It’s possible they’ll be miserable. It is enough for my claim that there is moral agreement in the relevant sense if, at least given certain empirical claims about what future lives would most likely be like, all minimally plausible moral views would converge on the conclusion that we should try to save the world. While there are some non-crazy views that place significantly greater moral weight on avoiding suffering than on promoting happiness, for reasons others have offered (and for independent reasons I won’t get into here unless requested to), they nonetheless seem to be fairly implausible views. And even if things did not go well for our ancestors, I am optimistic that they will overall go fantastically well for our descendants, if we allow them to. I suspect that most of us alive today – at least those of us not suffering from extreme illness or poverty – have lives that are well worth living, and that things will continue to improve. Derek Parfit, whose work has emphasized future generations as well as agreement in ethics, described our situation clearly and accurately: “We live during the hinge of history. Given the scientific and technological discoveries of the last two centuries, the world has never changed as fast. We shall soon have even greater powers to transform, not only our surroundings, but ourselves and our successors. If we act wisely in the next few centuries, humanity will survive its most dangerous and decisive period. Our descendants could, if necessary, go elsewhere, spreading through this galaxy…. Our descendants might, I believe, make the further future very good. But that good future may also depend in part on us. If our selfish recklessness ends human history, we would be acting very wrongly.” (From chapter 36 of On What Matters)

# Contention 1: Global Warming

#### Dwindling precious metals are key to innovation.

Jeremy Hsu 12 (Jeremy Hsu, Masters in Science Journalism from NYU, written in publications such as Popular Science, Scientific American Mind and Reader's Digest Asia.) Shortage of Rare Metals Could Threaten High-Tech Innovation 1-30-2012 livescience https://www.livescience.com/18167-shortage-rare-metals-threaten-high-tech-innovation-hitchhiker-metals-clean-technologies.html //DebateDrills TJ

A world in need of faster computers, smarter phones and more energy-efficient light bulbs threatens to strain the small supply of rare metals used by the global electronics industry. But limits on the production of such rare metals mean the supply can't easily expand to meet the demand for innovation in both consumer electronics and clean technologies.

Scarce metals such as gallium, indium and selenium — known as "hitchhiker" metals — come only as byproducts of mining major industrial metals such as aluminum, copper and zinc. That makes it hard to simply boost production of hitchhiker metals whenever industries face a shortage, even if the metals have become critical components of everything from high-performance computers to solar panels.

"With respect to metals that are hitchhikers, a higher price isn't going to lead to much more production," said Robert Ayres, a physicist and economist based at the international business school INSEAD in France. "And therefore it's much more important to think in terms of conservation, recycling and substitution."

That sobering message was delivered by Ayres at a Royal Society discussion meeting held in London Jan. 30. He wants both governments and industries to come up with a standard recycling process that could reuse rare metals.

"You produce something, you use it, but you don't just toss it in a landfill; it goes to another stage and another, and eventually the rare materials are recovered," Ayres told InnovationNewsDaily. "At present, hardly any are recovered."

Take gallium as an example. Gallium is a small byproduct of mining bauxite and zinc, but it has become a critical component for technologies such as lasers, energy-efficient LED lighting and solar panels. The metal has also become a replacement for silicon in faster microchips powering the latest generation of smartphones.

U.S. demand for gallium relied upon $66 million of overseas imports in 2011, according to the U.S. Geological Survey. And just one company, in Utah, recovered and refined gallium from scrap metal and impure gallium metal.

Indium has become a crucial ingredient in the liquid crystal displays for smartphones and in some types of solar panels. A third hitchhiker metal, selenium, also forms part of the solar panels containing both gallium and indium.

Ayres worries in particular about rare metal shortages crippling innovation in clean energy technologies such as solar power.

"Tellurium, part of the lowest-cost photovoltaic material, is only available from copper refineries," Ayres pointed out. "And so the quantity available in the world isn't anywhere near enough to satisfy the potential demand for thin-film photovoltaic surfaces (solar panels)."

#### Mining Industry destroying itself.

David Oni 19 (David Oni, Space industry and technology analyst at Space in Africa, Graduate of Mining Engineering from the Federal University of Technology Akure.) The Effect of Asteroid Mining On Mining Activities in Africa 9-24-2019 Space in Africa https://africanews.space/the-effect-of-asteroid-mining-on-mining-activities-in-africa/ //DebateDrills TJ

The earth, as we have come to know, is enriched with a vast array of mineral resources. But these resources are nonrenewable and hence, constant growing consumption in developing and developed countries, with the rising need for more resources to keep driving the fourth industrial revolution, will ultimately lead to a depletion in a couple of years to come. Experts say that elements needed for modern industry and food production could be exhausted on Earth within 50–60 years.

In terms of mineral resources, Africa has the most abundant of reserves. Currently, Africa hosts 30% of the world’s mineral reserve, 55% of the world’s diamond comes from Botswana and Congo, 60% of the mining in Africa is gold mining but to mention a few.

Given that the mining industry is consistently rising across sub-Saharan Africa, it is good news for the African mining sector as mining companies are beginning to expand operations, countries are already looking into improving regulatory frameworks that will enhance activities and also attract more investors.

But recent breakthroughs in space technology have led to many space scientists and engineers looking to explore alternatives to sustaining the earth while generating massive revenue and improving life generally. Currently, there are various comprehensive research documents on the Space Mining market, with detailed insights on growth factors and strategies. With the current advances and cutting edge technologies developed in preparation for the first stages of asteroid mining, one might want to ask if it is indeed good news for the African continent.

Apart from the environmental impacts, major mining activities are largely hindered in Africa by a handful of other factors such as access to energy, health and safety volatility of commodity prices, etc. Other issues such as political uncertainty, economic instability, religious and tribal wars, industrial unrest, and the fickle nature of regulatory bodies have also rendered foreign direct investment increasingly unattractive to global investors. Furthermore, most African countries have a relatively undeveloped infrastructure for exploiting resources effectively.

At the moment, Asteroid mining poses no threat to terrestrial mining; however, this will not hold for long. The space industry is progressing at such a rapid pace, and the prospects are unequivocally mouth-watering. The big question is, will asteroid mining lure away investors in Africa? The planetary resources company estimates that a single 30-m asteroid may contain 30 billion dollars in platinum alone and a 500m rock could contain half the entire world resources of PGM. Considering the abundance of minerals in asteroids, once asteroid mining materialises, it will severely affect the precious metals market, usurp the prices of rare earth minerals, and a whole lot more because minerals that are usually somewhat scarce on earth will be easily accessible on asteroids.

While foreign investors run the majority of the large-scale mining activities in the region, reports say that many African countries are dangerously dependent on mining activities. For some African countries, despite massive mineral wealth, their mining sectors are underdeveloped, and this is as a result of much focus on oil resources and a couple of other challenges. The million-dollar question is, what will become of the mining activities in Africa?

#### Fortunately, private sector asteroid mining is coming now – new tech and precious resources create concrete incentives.

Davenport 20 Davenport, Christian. [Reporter covering NASA and the space industry, Education: Colby College, B.A., American Studies]“A Dollar Can't Buy You a Cup of Coffee but That's What NASA Intends to Pay for Some Moon Rocks.” *The Washington Post*, WP Company, 3 Dec. 2020, https://www.washingtonpost.com/technology/2020/12/03/moon-mining-contracts-named/. //Debatedrills AS

NASA announced Thursday that several companies had won contracts to mine the moon and turn over small samples to the space agency for a small fee. In one case, a company called Lunar Outpost bid $1 for the work, a price NASA jumped at after deciding the Colorado-based robotics firm had the technical ability to deliver.

“You’d be surprised at what a dollar can buy you in space,” Mike Gold, NASA’s acting associate administrator for international and interagency relations, said in a call with reporters.

But the modest financial incentives are not the [driver of the program](https://www.washingtonpost.com/technology/2020/09/10/moon-mining-nasa-search/?itid=lk_inline_manual_6). Nor to a large extent is the actual lunar soil. NASA is asking for only small amounts — between 50 and 500 grams (or 1.8 ounces to about 18 ounces). While there would be scientific benefits to the mission, it’s really a technology development program, allowing companies to practice extracting resources from the lunar surface and then selling them.

It would also establish a legal precedent that would pave the way for companies to mine celestial bodies in an effort blessed by the U.S. government to help build a sustainable presence on the moon and elsewhere.

To do that, NASA says it needs its astronauts, like the western pioneers, to “live off the land,” using the resources in space instead of hauling them from Earth. The moon, for example, has plenty of water in the form of ice. That’s not only key to sustaining human life, but the hydrogen and oxygen in water could also be used as rocket fuel, making the moon a potential gas station in space that could help explorers reach farther into the solar system.

Asteroids also have significant resources, particularly precious metals that could be used for in-space manufacturing. While the prospect of large mining and manufacturing facilities in orbit is still many years away, NASA wants to use the mining program as a small step toward that goal.

NASA is now trying to return astronauts to the moon under its Artemis program for the first time since 1972. Unlike its predecessor, Apollo, where the astronauts visited the lunar surface for a short while before coming home, the Artemis program would create a permanent presence on and around the moon.

“The ability to extract and utilize space resources is the key to achieving this objective of sustainability,” Gold said. “We must learn to generate our own water, air and even fuel. Living off the land will enable ambitious exploration activities that will result in awe-inspiring science and unprecedented discoveries.”

In 2015, then-President Barack Obama signed a law that allowed private companies the right to own the resources they mined in space. Under the program announced Thursday, NASA said the materials would be transferred from the private companies to NASA.

The effort would not violate the 1967 Outer Space Treaty, NASA officials have said, which prohibits nations from claiming sovereignty over a celestial body. NASA Administrator Jim Bridenstine previously likened the policy to the rules governing the seas.

**“We do believe we can extract and utilize the resources of the moon, just as we can extract and utilize tuna from the ocean,” he said earlier this year.**

As part of its lunar exploration mission, NASA has been working to get countries around the world to adopt what it calls the Artemis Accords, a legal framework that would govern behavior in space and on celestial bodies such as the moon.

The rules would allow private companies to extract lunar resources and create safety zones to prevent conflict and ensure that countries act transparently about their plans in space, while sharing their scientific discoveries.

The mining announcement came during the same week that China landed a spacecraft on the moon, extracted resources and then lifted off from the lunar surface in an effort to return the sample to Earth.

Instead of developing and sustaining a big government sample-return mission, NASA is taking another approach by partnering with the private sector. “If you step back and think about how really amazing it is that NASA can essentially piggyback on the private-sector space capabilities to perform this mission, it would not have been possible 10 years ago,” said Phil McAlister, the director of NASA’s commercial spaceflight division.

In addition to Lunar Outpost, the other companies chosen for NASA’s program are: ispace Japan and Europe, which would each charge $5,000 for the material; and Masten Space Systems of California, would charge $15,000.

All of the companies would already be on the moon, according to NASA, conducting other missions. McAlister said Lunar Outpost would be ferried to the moon by the lunar lander known as Blue Moon being developed by Jeff Bezos’s Blue Origin. (Bezos owns The Washington Post.) The company later clarified that it was looking at a number of landers to get it to the lunar surface, and not just Blue Origin’s. The ispace companies would fly on a Japanese lander, McAlister said, and Masten, already part of another NASA lunar contract, would use its own Masten XL-1 lander.

#### Besides metals, Space Research is key to solving climate change.

Greg Autry 19 (Greg Autry, Clinical Professor of Space Leadership, Policy and Business at Thunderbird School of Global Management, Tech startup founder, Researcher on entrepreneurship, commercial space and economics. Former NASA Presidential Appointee. Writer & regular Forbes contributor, 2021 Space Advocate of the Year.) Space Research Can Save the Planet—Again 7-20-2019 Foreign Policy https://foreignpolicy.com/2019/07/20/space-research-can-save-the-planet-again-climate-change-environment/ //DebateDrills TJ

Indeed, understanding the evolution of other planets’ climates is essential for modeling possible outcomes on Earth. NASA probes revealed how, roughly 4 billion years ago, a runaway greenhouse gas syndrome turned Venus into a hot, hellish, and uninhabitable planet of acid rain. Orbiters, landers, and rovers continue to unravel the processes that transformed a once warm and wet Mars into a frigid, dry dust ball—and scientists even to conceive of future scenarios that might terraform it back into a livable planet. Discovering other worlds’ history and imagining their future offers important visions for climate change mitigation strategies on Earth, such as mining helium from the moon itself for future clean energy.

Spinoff technologies from space research, from GPS to semiconductor solar cells, are already helping to reduce emissions; the efficiency gains of GPS-guided navigation shrink fuel expenditures on sea, land, and air by between 15 and 21 percent—a greater reduction than better engines or fuel changes have so far provided. Modern solar photovoltaic power also owes its existence to space. The first real customer for solar energy was the U.S. space program; applications such as the giant solar wings that power the International Space Station have continually driven improvements in solar cell performance, and NASA first demonstrated the value of the sun for powering communities on Earth by using solar in its own facilities.

Promisingly, space-based solar power stations could overcome the inconvenient truth that wind and solar will never get us anywhere near zero emissions because their output is inherently intermittent and there is, so far, no environmentally acceptable way to store their power at a global scale, even for one night. Orbital solar power stations, on the other hand, would continually face the sun, beaming clean power back through targeted radiation to Earth day or night, regardless of weather. They would also be free from clouds and atmospheric interference and therefore operate with many times the efficiency of current solar technology. Moving solar power generation away from Earth—already possible but held back by the current steep costs of lifting the materials into space—would preserve land and cultural resources from the blight of huge panel farms and save landfills from the growing problem of discarded old solar panels.

Sustainable energy advocates in the U.S. military and the Chinese government are actively pursuing space-based solar power, but just making solar cells damages the environment due to the caustic chemicals employed. Space technology offers the possibility of freeing the Earth’s fragile biosphere and culturally important sites from the otherwise unavoidable damage caused by manufacturing and mining.

The U.S. start-up Made in Space is currently taking the first steps toward manufacturing in orbit. The company’s fiber-optic cable, produced by machinery on the International Space Station, is orders of magnitude more efficient than anything made on Earth, where the heavy gravity creates tiny flaws in the material. Made in Space and others are eventually planning to build large structures, such as solar power stations, in space. As these technologies develop, they will augment each other, bringing costs down dramatically; space manufacturing, for instance, slashes the cost of solar installations in space.

#### Elon Musk and other companies are taking actions to solve climate change

Whittington 22 (Mark Whittington is an author at The Hill) “SpaceX's Elon Musk is going into the carbon capture business.” 01/09/22 https://thehill.com/opinion/technology/588784-spacexs-elon-musk-is-going-into-the-carbon-capture-business

SpaceX and Tesla CEO [Elon Musk](https://thehill.com/people/elon-musk), who is Time magazine’s current Person of the Year, is often accused of neglecting problems on Earth in favor of conducting his private space program. The accusation is unfair on a number of levels. After all, Musk also runs an electric car company. Now, the space entrepreneur has [announced on Twitter](https://twitter.com/elonmusk/status/1470519292651352070) a new initiative that may prove flying into space could also benefit the Earth. “**SpaceX is starting a program to take CO2 out of atmosphere & turn it into rocket fuel**. Please join if interested,” he tweeted. Human-caused climate change, created by the emission of greenhouse gasses such as carbon dioxide into the atmosphere, is an obsession with many both in government and in the media. Musk’s proposal has interesting implications for the issue and the accusations that he wants to abandon Earth to go live on Mars**. The project will** not only **help alleviate climate change on Earth** but will be instrumental to Musk’s desire to build a settlement on Mars. Making rocket fuel with CO2 is the easy part of the proposal. A century-old process invented by a Nobel Prize-winning chemist named Paul Sabatier combines CO2 with hydrogen and a catalyst to create methane and water. **Musk’s rocket being developed by SpaceX** in Boca Chica, Texas **uses engines that burn liquid methane and liquid oxygen**. [NASA uses the Sabatier system](https://www.nasa.gov/mission_pages/station/research/news/sabatier.html) on the International Space Station (ISS) to create water for the crew. The methane is vented from the ISS. The first part of Musk’s plan, sucking CO2 out of the atmosphere, is likely to be more challenging. The idea that **carbon capture from the air would reduce the Earth’s greenhouse gasses and thus alleviate climate change** is a controversial one. One such project, [reported by Techcrunch](https://techcrunch.com/2021/12/03/co2-capture-iceland-climeworks-orca/), is being conducted by a company called Climeworks in Iceland. Thus far, the company spends between $600 and $800 to remove a ton of carbon dioxide, which is considered prohibitively expensive. Climeworks wants to reduce the cost to between $100 and $200 a metric ton (also known as tonne) to make the project more economically feasible. **Another form of carbon capture** involves sequestering CO2 directly from power plants. Indeed, [**NET Power**](https://netpower.com/?gclid=Cj0KCQiAnuGNBhCPARIsACbnLzpx9o6gwaXG_jKRSRN-_7Em6dNTEzBoeZnqNDLULBrCmA9p1eQDMuEaAkIlEALw_wcB) has a pilot plant a few hours’ drive away from Boca Chica in La Porte, Texas. It **burns natural gas but saves and store the CO2 emissions**. Could Musk buy the CO2 he needs from the NET plant or a similar source? Perhaps, but ever the environmentalist, the Musk might be reluctant to ship the gas to Boca Chica by diesel-fueled tanker truck. Would Tesla be interested in developing an electric-powered tanker truck? In any case, Musk is interested in developing both the carbon capture from the air and the Sabatier technologies for his planned Mars settlement. The idea is to capture CO2 from the Martian atmosphere, hydrogen from water ice, and then convert them to rocket fuel for spacecraft headed back to Earth from the Red Planet. Musk has funded a [$100 million X-Prize](https://www.xprize.org/prizes/elonmusk) to encourage development of carbon capture technologies, noting that “to win the grand prize, teams must demonstrate a working solution at a scale of at least 1000 tonnes removed per year; model their costs at a scale of 1 million tonnes per year; and show a pathway to achieving a scale of gigatonnes per year in future.” If and when a direct air capture solution is achieved, a win-win result will have been achieved. Human civilization will have available one or more technologies that will go a long way toward solving the climate crisis. Musk will have a source of CO2 to make his own rocket fuel and continue pursuing his grand design to build a Mars settlement, not to mention taking humans back to the moon and a number of other goals. A rocket whose engines burn liquid methane and liquid oxygen will create water and CO2 in its exhaust. But a world that has technology that can capture carbon from the atmosphere will likely be more than able to handle the situation. Sen. [**Bernie Sanders**](https://thehill.com/people/bernie-sanders) (I-Vt.) has **denounced carbon capture as a**[**“false solution.”**](https://berniesanders.com/issues/green-new-deal/)**But the delicious irony is that while Green New Dealers concoct schemes to deal with climate change that involve destroying the fossil fuels industry, billionaire capitalists such as Musk are developing solutions that do not involve such a wrenching, economic calamity**. **Musk and people like him** are more likely to **succeed where politicians and activists are certain to fail**. Musk promises to save the Earth and go to Mars.

#### Anthropogenic warming causes extinction --- mitigation efforts now are key

Griffin, 15 (David, Professor of Philosophy at Claremont, “The climate is ruined. So can civilization even survive?”, CNN, 4/14/2015, <http://www.cnn.com/2015/01/14/opinion/co2-crisis-griffin/> )

Although most of us worry about other things, climate scientists have become increasingly worried about the survival of civilization. For example, Lonnie Thompson, who received the U.S. National Medal of Science in 2010, said that virtually all climatologists "are now convinced that global warming poses a clear and present danger to civilization." Informed journalists share this concern. The climate crisis "threatens the survival of our civilization," said Pulitzer Prize-winner Ross Gelbspan. Mark Hertsgaard agrees, saying that the continuation of global warming "would create planetary conditions all but certain to end civilization as we know it." These scientists and journalists, moreover, are worried not only about the distant future but about the condition of the planet for their own children and grandchildren. James Hansen, often considered the world's leading climate scientist, entitled his book "Storms of My Grandchildren." The threat to civilization comes primarily from the increase of the level of carbon dioxide (CO2) in the atmosphere, due largely to the burning of fossil fuels. Before the rise of the industrial age, CO2 constituted only 275 ppm (parts per million) of the atmosphere. But it is now above 400 and rising about 2.5 ppm per year. Because of the CO2 increase, the planet's average temperature has increased 0.85 degrees Celsius (1.5 degrees Fahrenheit). Although this increase may not seem much, it has already brought about serious changes. The idea that we will be safe from "dangerous climate change" if we do not exceed a temperature rise of 2C (3.6F) has been widely accepted. But many informed people have rejected this assumption. In the opinion of journalist-turned-activist Bill McKibben, "the one degree we've raised the temperature already has melted the Arctic, so we're fools to find out what two will do." His warning is supported by James Hansen, who declared that "a target of two degrees (Celsius) is actually a prescription for long-term disaster." The burning of coal, oil, and natural gas has made the planet warmer than it had been since the rise of civilization 10,000 years ago. Civilization was made possible by the emergence about 12,000 years ago of the "Holocene" epoch, which turned out to be the Goldilocks zone - not too hot, not too cold. But now, says physicist Stefan Rahmstorf, "We are catapulting ourselves way out of the Holocene." This catapult is dangerous, because we have no evidence civilization can long survive with significantly higher temperatures. And yet, the world is on a trajectory that would lead to an increase of 4C (7F) in this century. In the opinion of many scientists and the World Bank, this could happen as early as the 2060s. What would "a 4C world" be like? According to Kevin Anderson of the Tyndall Centre for Climate Change Research (at the University of East Anglia), "during New York's summer heat waves the warmest days would be around 10-12C (18-21.6F) hotter [than today's]." Moreover, he has said, above an increase of 4C only about 10% of the human population will survive. Believe it or not, some scientists consider Anderson overly optimistic. The main reason for pessimism is the fear that the planet's temperature may be close to a tipping point that would initiate a "low-end runaway greenhouse," involving "out-of-control amplifying feedbacks." This condition would result, says Hansen, if all fossil fuels are burned (which is the intention of all fossil-fuel corporations and many governments). This result "would make most of the planet uninhabitable by humans." Moreover, many scientists believe that runaway global warming could occur much more quickly, because the rising temperature caused by CO2 could release massive amounts of methane (CH4), which is, during its first 20 years, 86 times more powerful than CO2. Warmer weather induces this release from carbon that has been stored in methane hydrates, in which enormous amounts of carbon -- four times as much as that emitted from fossil fuels since 1850 -- has been frozen in the Arctic's permafrost. And yet now the Arctic's temperature is warmer than it had been for 120,000 years -- in other words, more than 10 times longer than civilization has existed. According to Joe Romm, a physicist who created the Climate Progress website, methane release from thawing permafrost in the Arctic "is the most dangerous amplifying feedback in the entire carbon cycle." The amplifying feedback works like this: The warmer temperature releases millions of tons of methane, which then further raise the temperature, which in turn releases more methane. The resulting threat of runaway global warming may not be merely theoretical. Scientists have long been convinced that methane was central to the fastest period of global warming in geological history, which occurred 55 million years ago. Now a group of scientists have accumulated evidence that methane was also central to the greatest extinction of life thus far: the end-Permian extinction about 252 million years ago. Worse yet, whereas it was previously thought that significant amounts of permafrost would not melt, releasing its methane, until the planet's temperature has risen several degrees Celsius, recent studies indicate that a rise of 1.5 degrees would be enough to start the melting. What can be done then? Given the failure of political leaders to deal with the CO2 problem, it is now too late to prevent terrible developments. But it may -- just may -- be possible to keep global warming from bringing about the destruction of civilization. To have a chance, we must, as Hansen says, do everything possible to "keep climate close to the Holocene range" -- which means, mobilize the whole world to replace dirty energy with clean as soon as possible.

**Urgency continues to rise. Passing 2°C leads to extinction.**

**Worland, 20** (Justin Worland, Justin Worland is a Washington D.C.-based senior correspondent for TIME covering climate change and the intersection of policy, politics and society., 7-9-2020, accessed on 12-17-2021, Time, "2020 Is Our Last, Best Chance to Save the Planet", <https://time.com/5864692/climate-change-defining-moment/>) DD//SV

**We’re standing at a climate crossroads: the world has already warmed 1.1°C since the Industrial Revolution. If we pass 2°C, we risk hitting one or more major tipping points, where the effects of climate change go from advancing gradually to changing dramatically overnight, reshaping the planet**. To ensure that we don’t pass that threshold, we need to cut emissions in half by 2030. Climate change has understandably fallen out of the public eye this year as the coronavirus pandemic rages. Nevertheless, this year, or perhaps this year and next, is likely to be the most pivotal yet in the fight against climate change. “We’ve run out of time to build new things in old ways,” says Rob Jackson, an earth system science professor at Stanford University and the chair of the Global Carbon Project. **What we do now will define the fate of the planet–and human life on it–for decades.** The **time frame for effective climate action was always going to be tight, but the coronavirus pandemic has shrunk it further.** Scientists and policymakers expected the green transition to occur over the next decade, but the pandemic has pushed 10 years of anticipated investment in everything from power plants to roads into a monthslong time frame. Countries have already spent $11 trillion to help stem the economic damage from COVID-19. They could spend trillions more. “It’s in this next six months that recovery strategies are likely to be formulated and the path is set,” says Nicholas Stern, a former World Bank chief economist known for his landmark 2006 report warning that **climate change could devastate the global economy**. We don’t know where the chips will fall: Will a newfound respect for science and a fear of future shocks lead us to finally wake up, or will the desire to return to normal overshadow the threats lurking just around the corner? One of Los Angeles’ most crowded highway interchanges was nearly empty during rush hour on April 24. Stuart Palley We find ourselves on the brink of climate catastrophe in large part because of the decisions made during a past crisis. As the world came out of the Great Depression and World War II, the U.S. launched a rapid bid to remake the global economy–running on fossil fuels. In the first postwar years, Americans moved to suburbs and began driving gas-guzzling cars to work, while the federal government built a highway system to connect the country for those vehicles. The single biggest line item in the Marshall Plan, the U.S. government program that funded the European recovery, went to support oil, which ensured that the continent’s economy would also run on that fossil fuel. Meanwhile, plastic, an oil derivative, became the go-to building block for consumer goods after the U.S. had developed production capacity for use in World War II. The underlying philosophy of economic development in this time period was a focus on gross national product, a term developed by U.S. government economists during the Depression, which included consumption as a proxy for prosperity: the more we consume, the better off we are, according to this model, which, in the postwar era, the U.S. assiduously spread abroad. The promise of endless growth also required an endless supply of oil to power factories, automobiles and jet planes. In 1945, President Franklin D. Roosevelt sealed a deal with Ibn Saud, the first King of Saudi Arabia, trading security for access to the country’s vast oil reserves. Every U.S. President since, implicitly or explicitly, has continued that exchange. The coronavirus pandemic is the most significant disruption yet to the postwar fossil-fuel order. The global economy is expected to contract more than 5% this year, according to the International Monetary Fund (IMF). This is a challenge so big that it has also created a once-in-a-lifetime opportunity to change direction. This moment comes just in time. In 2018, a landmark report from the Intergovernmental Panel on Climate Change, the U.N.’s climate-science body, warned that **allowing the planet to warm any more than 2°C above preindustrial levels would drive hundreds of millions of people into poverty, destroy coral reefs and leave some countries unable to adapt.** **A 2019 analysis in the journal Nature identified nine tipping points**–from the collapse of the West Antarctic ice sheet to the thawing of Arctic permafrost–that the planet appears close to reaching, any one of which might very well be triggered if warming exceeds 1.5°C. “**Going beyond 2°C is a very critical step**,” says Johan Rockstrom, director of the Potsdam Institute for Climate Impact Research, “not only in terms of economic and human impact but also **in terms of the stability of the earth**.” To keep temperatures from rising past the 1.5°C goal, we would need to cut global greenhouse-gas emissions 7.6% every year for the next decade, according to a report from the U.N. Environment Programme (UNEP). That’s about the level the COVID-19 pandemic will reduce emissions this year, but virtually no one thinks a deadly pandemic and accompanying unemployment is a sustainable way to halt climate change–and recessions are typically followed by sharp rebounds in emissions. To achieve the 1.5°C goal without creating mass disruption has always meant thoughtfully restructuring the global economy, moving it away from fossil-fuel extraction slowly but surely. Scientists and economists agree this is the last opportunity we have to do so. “If we delay further than 2020,” says Rockstrom, “there’s absolutely no empirical evidence that it can be done in an orderly way.” As of late June, countries had spent some $11 trillion on measures to halt the pandemic and stem its economic impact, according to the IMF. Economists say that’s not enough, and countries and central banks plan to keep doling out money to help the global economy stay afloat. There are lots of things we could be buying with that money that would make our lives better and protect us from climate disaster. In recent months, leading institutions across the spectrum have offered approaches that are varied in their specifics but generally similar in philosophy: invest in greener infrastructure. The International Energy Agency (IEA), for example, calls for an annual $1 trillion investment in clean energy for the next three years. At a cost of about 0.7% of global GDP, this would represent a small portion of the funds spent to combat COVID-19 but could be transformative. Expansion and modernization of electric grids would allow for easier flow of renewable energy. Governments could buy out gas-guzzling vehicles, pushing consumers to go electric. Homes and buildings could be retrofitted to consume less energy. This spending would also help solve the immediate problem of lost jobs and economic stagnation by creating nearly 10 million jobs worldwide and increasing global GDP by 1.1%, meaning it would add more to the economy than it costs. Importantly, **green investment would result in** a slew of “co-benefits.” For example, some rural communities would receive access to electricity for the first time. For another, **air pollution** would **decline all over the world**. “**If governments do not make use of this opportunity, they may miss a very important tool for the economic recovery**,” says Fatih Birol, head of the IEA. But this moment is not just about opportunity; even **maintaining the status quo is dangerous**. **Research from the UNEP released last year shows that if nations stick with current plans to reduce emissions, global temperatures will rise more than 3°C by the end of this century**. For the past five years, climate advocates had positioned 2020 as critical in the fight against climate change. Under the Paris Agreement, countries are required to submit new plans to reduce emissions in 2020, and climate diplomats had planned a series of meetings around the world this year to build momentum, culminating with the U.N. climate conference in Glasgow, in November.

# Frontlines

#### NASA is establishing a legal framework to regulate private companies’ behaviors

Davenport 20 Davenport, Christian. [Reporter covering NASA and the space industry, Education: Colby College, B.A., American Studies] “NASA unveils new rules to guide behavior in space and on the lunar surface.” May 15, 2020 https://www.washingtonpost.com/technology/2020/05/15/moon-rules-nasa-artemis/

**NASA** on Friday **unveiled a legal framework that would govern the behavior of countries and companies in space and on the moon**, including the creation of “safety zones” around sites where mining and exploration would take place on the lunar surface. The United States has long held that nations and companies should be allowed to extract and use resources on the moon. The new legal framework, known as the Artemis Accords, comes as the U.S. space agency works to return people to the lunar surface by 2024. NASA would make signing the accords a requirement for allied countries to participate in its lunar exploration program. The proposal, some aspects of which were first reported by Reuters, would “in no way change the 1967 Outer Space Treaty,” which prohibits nations from laying claim to the moon and other celestial bodies, said NASA administrator Jim Bridenstine. Rather, the **series of principles** would follow the tenets of the treaty and “**promote peaceful purposes” that would allow nations “to participate safely in outer space**,” Bridenstine said in an interview. The accords already have run into resistance from the head of Russia’s space agency, Dmitry Rogozin, [who called them an invasion](https://twitter.com/Rogozin/status/1258088165732167681?s=20) that would lead to another “Iraq or Afghanistan.” NASA said it would be “premature to release” the accords ahead of sharing them with allied nations. But a copy obtained by The Washington Post said parties would be required to publicly release “the extent and general nature of operations taking place within” the safety zones “while taking into account appropriate protection of business confidential, national security, and export controlled information.” **Parties would also agree to use** the **zones “in a manner that encourages scientific discovery, technology demonstration, as well as the safe and efficient extraction and utilization of space resources.”** They would also be required to publicly reveal “the extent and general nature of operations taking place within” the zones.

#### Privatization is key to sustainable rocket launches – reliance on public entities is bad because they are too limited, expensive, and undo critical strides being made right now

#### The space junk has been put there by PUBLIC entities like governments as well as private entities, even a ban on private entities in space couldn’t solve the problem. As long as anyone is launching anything it is inevitable

**Polyakov 21**, Dr. Max Polyakov, Founder, Noosphere Ventures, Firefly Aerospace, EOS Data Analytics, 5-5-2021, "Where does space junk come from – and how do we clean it up?," World Economic Forum,<https://www.weforum.org/agenda/2021/05/why-we-need-to-clean-up-space-junk-debris-low-earth-orbit-pollution-satellite-rocket-noosphere-firefly/> Livingston RB

Where does space junk come from? **As long as humans launch objects into orbit, space debris is inevitable.** Rocket launches leave boosters, fairings, interstages, and other debris in LEO. So do rocket explosions, which currently account for seven of the top 10 debris-creating events. **Human presence also creates orbital flotsam** – such as cameras, pliers, an astronaut’s glove, a wrench, a spatula, even a tool bag lost during space walks. Some debris is created naturally from the impacts of micrometeoroids – dust-sized fragments of asteroids and comets. With limited lifetimes, **operational satellites can become space debris**. Satellites run out of maneuvering fuel, batteries wear out, solar panels degrade – causing an orbital debris feedback loop, in which the problem is exacerbated when solar panels are sandblasted by micrometeoroids and tiny debris. As with rocket debris, spent satellites eventually re-enter Earth’s atmosphere and burn up, but the process can take years – and the higher they orbit above Earth, the longer those orbits take to decay.

### Turn – Space Mining Good

We need more time before we make space mining regulations? Let the private sector work on space mining?

#### Asteroid mining is necessary to develop a new power source and fight climate change

Taylor 19 – veteran journalist and the author of 'How Star Wars Conquered the Universe.' Hailing from the U.K., Chris got his start working as a sub editor on national newspapers in London and Glasgow. He moved to the U.S. in 1996, and became senior news writer for Time.com a year later. In 2000, he was named San Francisco bureau chief for Time magazine. He has served as senior editor for Business 2.0, West Coast editor for Fortune Small Business and West Coast web editor for Fast Company. Chris is a graduate of Merton College, Oxford and the Columbia University Graduate School of Journalism. [Chris, “The Asteroid Boom”, Mashable, 2019, https://mashable.com/feature/asteroid-mining-space-economy]//AV

Secondly, there’s the climate change fix. Suarez sees asteroid mining as the only way we’re going to build [solar power satellites](https://en.wikipedia.org/wiki/Space-based_solar_power). Which, as you probably know, is a form of uninterrupted solar power collection that is theoretically more effective, inch for inch, than any solar panels on Earth at high noon, but operating 24/7. (In space, basically, it’s always double high noon). The power collected is beamed back to large receptors on Earth with large, low-power microwaves, which researchers think will be harmless enough to let humans and animals pass through the beam. A space solar power array like [the one China is said to be working on](https://www.forbes.com/sites/scottsnowden/2019/03/12/solar-power-stations-in-space-could-supply-the-world-with-limitless-energy/#2d3f78a54386) could reliably supply 2,000 gigawatts — or over 1,000 times more power than the largest solar farm currently in existence. “We're looking at a 20-year window to completely replace human civilization's power infrastructure,” Suarez told me, citing the report of the Intergovernmental Panel on Climate Change on the coming catastrophe. Solar satellite technology “has existed since the 1970s. What we were missing is millions of tons of construction materials in orbit. Asteroid mining can place it there.” The Earth-centric early 21st century can’t really wrap its brain around this, but the idea is not to bring all that building material and precious metals down into our gravity well. Far better to create a whole new commodities exchange in space. You mine the useful stuff of asteroids both near to Earth and far, thousands of them taking less energy to reach than the moon. That’s something else we’re still grasping, how relatively easy it is to ship stuff in zero-G environments.

**Kapoor & Todi 21**[Khushi Kapoor and Keshav Todi On March 20, 2021, 3-20-2021, "The Privatisation of Space Exploration – Finance and Investment Cell, SRCC," Finance and Investment Cell Shri Ram College of Commerce is a student-driven initiative to facilitate knowledge sharing on matters of finance, geopolitics and economy, at Shri Ram College of Commerce and at the university level. The cell aims to provide a stimulus to develop financial instincts among young minds through regular workshops, events and continued collaboration with the industry, to bridge the gap between pedagogy and practice. A small step, that will hopefully yield some great dividends. [https://ficsrcc.com/the-privatisation-of-space-exploration/]//DebateDrills](https://ficsrcc.com/the-privatisation-of-space-exploration/%5D//DebateDrills) ww

**Privatisation** of space exploration has had many benefits for the space industry in the 21st century. Private companies have a greater degree of autonomy in making decisions, which **enables** them to take up **new projects** while taxpayer-funded institutions are accountable to **the Government** and hence, have to often **limit themselves**. Moreover, there is quick decision making in **private companies** while the same process in a public enterprise would have to pass through a number of stages. This advantage has allowed companies like SpaceX, Blue Origin, etc. to cut their costs substantially and perform operations like **launch**ing a rocket to ISS **at** merely **$57 million per seat** as compared to **$80 million per seat** if aboard a Russian shuttle**, and $450 million** each mission before NASA ended its space shuttle program. Moreover, **making reusable landing rocket launchers, improvements in assembly lines and other** such **operations** further ensure lower costs. Due to the well- known success of the top few **p**rivate **s**pace **c**ompanies, many new small companies such as Firefly systems and Vector launch have been able to raise substantial private capital as well. The growth in the space industry also provides employment to millions all over the world, and the rise in the number of private space companies promotes competition amongst them and encourages constant improvements and advancements. Lastly, the publicity of their operations, like live streaming launches, has sparked widespread interest in space exploration among the general public.

#### Space privatization and capitalism is uniquely key to saving lives, spillover effect

**Sharma 21** [Maanas, “The privatized frontier: the ethical implications and role of private companies in space exploration”, The Space Review. 7 September 2021. https://www.thespacereview.com/article/4238/1] //DebateDrills LC

Another key matter to note is restricted **capitalism in space “could also be our salvation.”[**11] **Private space exploration could reap increased access to resources and other benefits that can be used to solve the very problems on Earth that critics of capitalism identify**. Since governments offset some of their projects to private companies, **government agencies can focus on altruistic projects that otherwise would not fit in the budget before and do not have the immediate commercial use that private companies look for**. Scott Hubbard, an adjunct professor of aeronautics and astronautics at Stanford University, discusses how “this strategy allows the space agency to continue ‘exploring the fringe where there really is no business case’” but still has important impacts on people down on Earth.[12]

Indeed, **this idea is a particularly powerful one when considering the ideal future of private companies in space exploration**. Though there is no one set way governments will interact with companies, the consensus is that they must radically reimagine their main purpose as the role of private space exploration continues to grow. **As governments utilize services from private space companies,** “[i]nstead of being bogged down by the routine application of old research, **NASA can prioritize their limited budget to work more on research of other unknowns and development of new long-term space travel technologies**.”[13] According to the Council on Foreign Relations, **such technologies have far-reaching benefits on Earth as well.** Past **developments obviously include communications satellites**, by themselves a massive benefit to society, but also “**refinements in artificial hearts; improved mammograms; and laser eye surgery**… thermoelectric coolers for microchips; high-temperature lubricants; and a means for mass-producing carbon nanotubes, a material with significant engineering potential; [and h]ousehold products.”[2] **Agencies like NASA are the only actors able to pursue the next game-changing missions**, “where the profit motive is not as evident and where the barriers to entry are still too high for the private sector to really make a compelling business case.”[8] **These technologies have revolutionized millions, if not billions, of lives, demonstrating the remarkable benefits of space exploration.** It follows then that it is net ethical to prioritize these benefits.

#### AT: China Space war is too risky for China to engage in.

MacDonald 13 (MacDonald, Bruce W. “Deterrence and Crisis Stability in Space and Cyberspace.” Defense Technical Information Center, 2013, discover.dtic.mil/.)//DebateDrills AY

Worst cases of space and cyber warfare may be avoidable, just as nuclear warfare was avoided during the Cold War. The United States, China, Russia and other developed countries should have a common interest in avoiding strategic conflict in the space and cyber domains, which would threaten crippling direct and indirect economic consequences in a way that the world has never experienced. Beijing, which has struggled to achieve levels of economic security previously unknown in Chinese history, should be reluctant to risk the economic advances of two generations of progress, as well as the promise of more progress to come. The demographic and other challenges facing China, where a high rate of economic growth has been deemed necessary to tamp down political unrest, would seem to offer cautionary notes against space and cyber warfare. Chinese leaders might, however, throw caution to the wind if they feared dire consequences for a failure to act in a severe crisis, or if they were unable to maintain tight control over a PLA that may not share their calculus of decision. China’s lack of a National Security Council-type decision-making body leaves open the possibility of a civil-military divide in a deep crisis. As was the case during the Cold War nuclear standoff, massive “bolt-out-of-blue” space or cyberattacks are unlikely. Generally speaking, it would be prudent to assume that any seeming offensive action of more than nuisance impact is a one-off, possibly accidental or even rogue event, or at most a way to demonstrate capabilities and send a signal. Some modest increase in defensive alert level also would be prudent, accompanied by a priority inquiry at an appropriate level to the suspected country of origin for explanation. This would be easier to accomplish if there would be some modality comparable to the US-Russian Risk Reduction Center or Hotline in existence, particularly between Washington and Beijing. Improved communication channels might 96 usefully accompany an international code of conduct for responsible spacefaring nations, if one can be agreed to, and is worthy of consideration even if it not. The US alliance structure can promote deterrence and crisis stability in space, as with nuclear deterrence. China has no such alliance system. If China were to engage in large-scale offensive counter-space operations, it would face not only the United States, but also NATO, Japan, South Korea and other highly aggrieved parties. Given Beijing’s major export dependence on these markets, and its dependence upon them for key raw material and high technology imports, China would be as devastated economically if it initiated strategic attacks in space. In contrast to America’s nuclear umbrella and extended deterrence, US allies make a tangible and concrete contribution to extended space deterrence through their multilateral participation in and dependence upon space assets. Attacks on these space assets would directly damage allied interests as well as those of the United States, further strengthening deterrent effects.