## FW

### 1NC---T/L

I agree with the criterion of maximizing pleasure and evaluating consequences. You should evaluate extinction first since it’s irreversible, and kills the ability for any possible life.

## OFF

### 1NC---1

C1---mining

#### Space platinum mining is better for the environment, this solves my opponents contention 3.

Hein et al 17 [Andreas Hein, Laboratoire Genie Industriel, Michael Saldani, Laboratoire Genie Industriel, Hortense Tollu, Laboratoire Genie Industriel, “Exploring Potential Environmental Benefits of Asteroid Mining,” 69th International Astronautical Congress, <https://arxiv.org/ftp/arxiv/papers/1810/1810.04749.pdf>] /Triumph Debate

If we compare these rough estimates with the CO2eq values for Earth-based platinum mining, **we immediately see that the global warming effect of Earth-based mining is several orders of magnitude larger,** even for secondary platinum. Table 2 shows the ratio between the Earth-based platinum mining emissions and the space-based mining emissions. **A difference of two orders of magnitudes for primary platinum and one order of magnitude for secondary platinum is observed. For a mixture of primary and secondary platinum, we get values with two orders of magnitude difference.**

#### Allowing companies to pursue stellar mining makes further exploration much more possible and also decreases asteroid risk

Ursul & Ursul 20 [Arkady Ursul, Ecology @ Academy of Sciences of Moldova, Tatiana Ursul, Philosophy @ National Research Technical University, “On the Path to Space Mining and a Cosmic Sustainable Way of Socio-Natural Interaction,” Philosophy and Cosmology, <http://ispcjournal.org/journals/2020/02/PhC_25_UrsulUrsul.pdf>] /Triumph Debate

The beginning of **the interaction between mining engineering, mining, and astronautics did not come by accident** at the present time of space exploration. It became obvious that **space activities would not continue to develop effectively without the “support” of the mining industry and its emergence beyond the terrestrial atmosphere. Along with this, both further space exploration and geospace safety promotion**, i.e., protection of the planet against threats from space, **will be impossible without the development of space mining**. It is appropriate to recall that Konstantin Tsiolkovsky proved the necessity of space exploration proceeding not only from the demands of social and economic development but primarily from the need to ensure the safety and preservation of mankind. He also reckoned the emergence of an “industry in the ether.” Therefore, **the development of mining,** and through it, the other industries, **is in line with the reduction of anthropogenic pressure on the biosphere** under the conditions of the population growth. **The development of space resources and their processing outside the Earth**, directly in space, **drastically changes the principles and trajectories of space missions**, as well as the ways of creating space technology, bringing this technological process beyond the biosphere. **The priority of space resources is water. It can be found in circumterrestrial asteroids in the amount of several trillion tons. If it becomes possible to extract water from natural cosmic bodies** (which decomposes under the influence of an electric current to oxygen and hydrogen) and other necessary products for space technology and to produce fuel outside the planet on the basis of hydrogen**, it will reduce the price of further space development by twenty times**. It is believed that the first space field is likely to be not asteroids (which may contain rare earth elements, platinoids, and other rare and precious metals) but the Moon, where the priority extracted resource will be the water used to provide life support to people and fuel for rockets and space vehicles. The need to use lunar natural resources for the creation of lunar bases, the construction of space infrastructure for the purposes of further space exploration, including mine shafts, tunnels and other underground structures, especially for refueling space vehicles, attests to the early development of the Moon (Krichevsky, 2020; Krichevsky & Bagrov, 2019; Mayboroda, 2018; Slyuta, 2017). However, **more than a thousand asteroids are flying near the Earth**, and they can be achieved much more easily than the Moon. At the same time**, some of them represent a very serious threat to our planet, which is often reported** by the media. However, the Moon still does not significantly affect the problem of geocosmic safety, while some asteroids and comets constitute a threat to the planet on a short-term horizon. **It is evident that the asteroid-comet hazard has to be prevented, and it can fundamentally affect the choice of further ways and methods of space activities since security is always more important than commercial and other activities.** In fact**, it is also necessary to stand secure in order to develop the economy.** The basic idea of SD in its terrestrial and space variants is to ensure the safe existence of mankind (Ursul, 2016). It is important not to place in jeopardy the ability of future generations to meet their needs and, **above** **all, the basic need for a safe existence and sustainable development on the Earth and in space.** After all, the more space and objects of space will be mastered on a larger scale, the greater the chance of a further continuation of mankind existence (Ursul & Ursul, 2019).

#### Expansion to space is necessary to avoid energy shortages and climate change,

Ursul & Ursul 20 [Arkady Ursul, Ecology @ Academy of Sciences of Moldova, Tatiana Ursul, Philosophy @ National Research Technical University, “On the Path to Space Mining and a Cosmic Sustainable Way of Socio-Natural Interaction,” Philosophy and Cosmology, http://ispcjournal.org/journals/2020/02/PhC\_25\_UrsulUrsul.pdf]

**In the near space future, mankind will have to massively ship the production of energy and materials outside the planet**, instead of deploying this industry in undeveloped territories, for example, in deserts, the Arctic, the Antarctic or in the oceans and seas. **The main reason for the relocation of the energy and some other industries outside the Earth is related to** the transition to SD and especially with a number of environmental issues, such as **global warming and depletion of the world’s fossil fuel and energy resources** with the increase of energy consumption. Therefore, **the development of any new terrestrial territories, for example, the ocean, is economically inefficient and environmentally impractical**. In the case of the development of space bodies, a new anthropogenically-space method and a method of preserving the terrestrial biosphere, as well as the creation of it of the most favorable conditions for the existence of mankind and other forms of life, appear. Therefore, those projects that in the acceptable future can be implemented in space are hardly worthwhile to implement on the planet. **A fundamental conclusion about the need for the future to “split” production into terrestrial, mainly agricultural and space, mainly industrial**, between which the products of activity can and will be exchanged **has already been made** on the basis of an analysis of current trends in the environmentalization of economic and other anthropogenic **activities in the context of achieving global sustainability. Agricultural production in the perspective of the transition to SD should fit into the biosphere**, using intensively-ecologized methods of economy management (Bazaluk et al., 2020). **The strategic perspective of the global-space production split is the most natural and effective one and is understandable in terms of ensuring eco-and geo-security of the civilization’s existence** (Zhuchenko & Ursul, 1983)

#### Warming causes extinction

**Garrison 21** (Dr. Jim Garrison 21, PhD from the University of Cambridge, MA from Harvard University, BA from the University of Santa Clara, Founder/President of Ubiquity University, “Human Extinction by 2026? Scientists Speak Out”, UbiVerse, 7/1/2021, https://ubiverse.org/posts/human-extinction-by-2026-scientists-speak-out)

This may be the most important article you will ever read, from Arctic News June 13, 2021. It is a presentation of current climate data around planet earth with the assertion that if present trends continue, rising temperatures and CO2 emissions could make human life impossible by 2026. That's how bad our situation is. We are not talking about what might happen over the next decades. We are talking about what is happening NOW. We are entering a time of escalating turbulence due to our governments' refusal to take any kind of real action to reduce global warming. We must immediately and with every ounce of awareness and strength that we can muster take concerted action to REGENERATE human community and the planetary ecology. We must all become REGENERATION FIRST RESPONDERS, which is the focus of our Masters in Regenerative Action.

## AT: Space Wars

### 1NC---AT: Space Wars

#### 1---space wars don’t happen, treaties, deterrence, de-escalation, and a laundry list of other checks solve.

Pavur 19[James, DPhil Researcher at the Cybersecurity Centre for Doctoral Training at Oxford University, and Ivan Martinovic, Professor of Computer Science in the Department of Computer Science at Oxford University, “The Cyber-ASAT: On the Impact of Cyber Weapons in Outer Space”, 2019 11th International Conference on Cyber Conflict: Silent Battle, <https://ccdcoe.org/uploads/2019/06/Art_12_The-Cyber-ASAT.pdf>]

A. Limited Accessibility Space is difficult. Over 60 years have passed since the first Sputnik launch and only nine countries (ten including the EU) have orbital launch capabilities. Moreover, a launch programme alone does not guarantee the **resources** and **precision required** to **operate a meaningful ASAT capability**. Given this, one possible reason why **space wars have not broken out** is simply because only the US has ever had the ability to fight one [21, p. 402], [22, pp. 419–420]. Although launch technology may become cheaper and easier, it is unclear to what extent these advances will be distributed among presently non-spacefaring nations. **Limited access to orbit** necessarily reduces the scenarios which could plausibly escalate to ASAT usage. Only major conflicts between the handful of states with ‘space club’ membership could be considered possible flashpoints. Even then, the **fragility of an attacker’s own space assets** creates **de-escalatory pressures** due to the **deterrent effect of retaliation**. Since the earliest days of the space race, dominant powers have recognized this dynamic and demonstrated an inclination **towards de-escalatory space strategies** [23]. B. Attributable Norms There also exists a **long-standing normative framework** favouring the **peaceful use of space**. The effectiveness of this regime, centred around the Outer Space Treaty (**OST**), is highly contentious and many have pointed out its serious legal and political shortcomings [24]–[26]. Nevertheless, this status quo framework has somehow supported over **six decades of relative peace** in orbit. Over these six decades, **norms have become deeply ingrained** into the way states describe and perceive space weaponization. This de facto codification was dramatically demonstrated in 2005 when the US found itself on the short end of a 160-1 UN vote after opposing a non-binding resolution on space weaponization. Although states have occasionally pushed the boundaries of these norms, this has typically occurred through incremental legal re-interpretation rather than outright opposition [27]. Even the most notable incidents, such as the 2007-2008 US and Chinese ASAT demonstrations, were couched in rhetoric from both the norm violators and defenders, depicting space as a peaceful global commons [27, p. 56]. Altogether, this suggests that **states perceive real costs** to breaking this normative tradition and may even **moderate their behaviours** accordingly. One further factor supporting this norms regime is the **high degree of attributability** surrounding ASAT weapons. For kinetic ASAT technology, **plausible deniability** and **stealth** are essentially **impossible**. The literally explosive act of launching a rocket cannot evade detection and, if used offensively, retaliation. This imposes **high diplomatic costs** on ASAT usage and testing, particularly during peacetime. C. Environmental Interdependence A third stabilizing force relates to the **orbital debris consequences** of ASATs. China’s 2007 ASAT demonstration was the largest debris-generating event in history, as the targeted satellite dissipated into thousands of dangerous debris particles [28, p. 4]. Since debris particles are indiscriminate and unpredictable, they often threaten the attacker’s own space assets [22, p. 420]. This is compounded by Kessler syndrome, a phenomenon whereby orbital debris ‘breeds’ as large pieces of debris collide and disintegrate. As space debris remains in orbit for hundreds of years, the **cascade effect** of an ASAT attack can constrain the attacker’s long-term use of space [29, pp. 295– 296]. Any state with kinetic ASAT capabilities will likely also operate satellites of its own, and they are necessarily exposed to this collateral damage threat. Space debris thus acts as a strong strategic deterrent to ASAT usage.

2---MAD checks.

3---No competition over resources, the universe is infinite which means we can always go find more places. Even if it is finite, the sun is going to blow up eventually and most likely we can’t exploit everything.

4---Logically people would share resources diplomatically instead of fighting each other.

## AT: Debris

### 1NC---AT: Debris

1---Companies have an incentive to clean up debris in the neg world because of competition---they want to get money and space debris hurts that.

2---Cross apply **Pavur 19---** Space debris thus acts as a strong strategic deterrent to ASAT usage.

3---Debris is caused now BECAUSE there are no priv prop rights.

**Blodger 16** [Ian Blodger, JD Candidate at University of Minnesota Law School, 2016, “Reclassifying Geostationary Earth Orbit as Private Property: Why Natural Law and Utilitarian Theories of Property Demand Privatization”, The Minnesota Journal of Law, Science, and Technology Vol 17, Issue 1, <https://scholarship.law.umn.edu/cgi/viewcontent.cgi?article=1006&context=mjlst> ] // Triumph Debate

**The impending catastrophic destruction of satellite communications necessitates an immediate reexamination of the underlying assumptions made about private property in outer space.**1 Recent **advances in technology have reduced barriers to space exploration and utilization, leading to increased investment in space in the form of satellites.**2 This increased investment has brought about numerous scientific discoveries,3 military applications,4 and may one day lead to a dispersal of the population across the solar system.5 **This increased saturation of Earth’s orbits has created a problem with debris that threatens to grow until it cuts off access to space.**6 To further complicate the issue, **some corporations are reluctant to commit large quantities of resources to space because of the current disposition of international law,**7 **even with the economic benefits gained from utilizing outer space as a resource.**8 **Rather than allowing for the private appropriation of space, the** Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, also known as the **Outer Space Treaty**, which governs actions taken in space, essentially **requires that all property remain communal.**9 **The communal approach to this area of space has affected the method of distributing geostationary Earth orbit (GEO) zones.**10 The International Telecommunications Union (ITU), an agency created during the 1860’s to help facilitate telegraph communications, now works to help companies find orbital zones and frequencies that are not currently in use by other GEO satellites, but **the ITU does not confer upon such companies a property right in either the frequencies or orbital zones.**11 **The current method of GEO allocation has created a number of problems including the increasing number of nonoperational satellites, and debris resulting from satellite collisions.**12 The current orbital zone surrounding Earth contains over 20,000 pieces of debris.13 While much of this debris remains in low Earth orbit (LEO), **the unique utility of the geostationary orbit has resulted in high concentrations of debris being located [in geostationary orbit].**14 **Orbital debris poses a severe threat to U.S. national security, and will present problems to future space operations.**15 While different programs have been offered to solve the orbital debris problem, none of these solutions focuses on whether GEO should be considered private or public property.16 In order to choose an effective and just solution to the problems facing GEO, it is important to understand whether GEO exhibits the same kinds of qualities found in areas capable of private ownership or whether GEO exhibits the kinds of qualities found in areas foreclosed to privatization.17

#### 4---Space privatiazation causes innovation to solve for debris

**Daly 2020** [James Daly, Business & Technology Journalist, “How space exploration is now being fueled by business innovation”, 10/27/2020, IBM, <https://www.ibm.com/blogs/industries/ibm-space-tech-business-innovation-space-exploration/>] /Triumph Debate

**Camera phones. Wireless headsets. Scratch-resistant lens. CAT scans. The portable computer. They’re just a few of the enduring technologies the space program helped create, and which made their way into improving everyday life on earth.** **Now the business world is returning the favor. Innovations in the terrestrial corporate world—both in products and practices—are spurring the exploration of our solar system and beyond.** In recent years, technologies like edge computing, artificial intelligence, quantum computing, Internet of Things (IoT), digital twins and blockchain have transformed the business world with new efficiency and insight**. Soon they will have a similar effect on how we expand our knowledge of outer space, reducing costs while gathering and processing critical information with expanding speed and scale. “**A new space age is dawning, and the business world is helping drive it,” Naeem Altaf, the CTO for space industry tech at IBM, told Industrious. “One great thing about technology is that an innovation focused on one area or problem can sometimes impact another in wonderful ways.” Want to create your own out-of-this-world innovations? In addition to business process innovation, **technological advances by the private commercial sector are modernizing traditional and costly space practices by reusing rockets and building more efficient spacecraft, reducing per-launch costs**. **The global space industry is expected to generate revenue of $1.1 trillion or more in 2040, up from the current $350 billion**, according to a recent report by Morgan Stanley. “This entrepreneurial space age will change the course of human history,” Altaf said. **Arguably no innovation is having as cosmic an impact on space exploration as cloud and edge—so much so that Industrious is devoting an entire post to it later this week.** Check back Thursday to learn how the ability to perform expansive, high-speed processing remotely will push the bounds of what’s possible in our solar system and beyond. (Update: Read all about it here.) That’s just the beginning. Several other business tools are also making a significant impact. Digital twins, for instance, are having a big impact on both experimenting with new ideas and reducing costs. The twin concept uses a digital representation of a physical thing or system to stress test and reimagine various scenarios, with applications as diverse as quality management, security and product design. Digital twins are a key tool used in the servicing, assembly and manufacturing of both satellites and spacecraft. They improve the entire processes; digital twins can take data from IoT-embedded in-flight assets and then map that to new models and simulations, with AI helping analyze and iterate throughout the process. The European Union is also creating an ambitious digital twin of Earth that maps and analyzes massive amounts of geospatial data gleaned from satellites to simulate changes in the atmosphere. The EU model is expected to use machine learning techniques to provide more accurate predictions of climate change. “The world is a dynamic place–deeply connected, constantly evolving and always presenting humanity with new challenges,” Jim Whitehurst, IBM’s president, said in a post on IBM’s THINK blog. “Answers to global problems are grounded in two powerful forces: innovation and human ingenuity.” Quantum, and blockchain, mechanics Blockchain, with its shared, replicated, decentralized ledger system, also has an expanded role in space exploration optimization. Just as it eases cross-border commerce on Earth, blockchain could simplify or speed development efforts, offering “major potential to reduce costs, accelerate processes and transactions, provides provenance and transparency and ultimately shortens the time to market,” Altaf said. One place where blockchain can be useful is in optimizing resupply journeys to the International Space Station, also known as the ISS. This part of the aerospace industry is rapidly growing, particularly with the most recent innovations in launch facilities and payload vehicles from both the public and private sectors. One of the main concerns is ensuring that ISS resupply components align with regulatory requirements. Blockchain provides near real-time information that can improve the scheduling and auditing of each payload. Blockchain may even play a role in the management of space junk, creating a centralized and verifiable database of tens of thousands of pieces of manmade detritus circling the planet. Looking further out, quantum computing will solve complex-as-the-cosmos problems not only on Earth. In July, as part of its Mars 2020 effort, NASA launched the car-size Perseverance rover, which will search for ancient microbial life on the red planet. The rover has a drill to collect core samples of Martian rock and soil, then store them in sealed tubes for pickup by a future mission that would ferry them back to Earth for detailed analysis. In 2026 these samples will be retrieved for a trip back to earth. Quantum computing in future can play a critical role in such decision optimization scenarios. Carl Sagan, the popular astronomer, once noted, “Somewhere, something incredible is waiting to be known.” **The symbiotic relationship between business, space exploration and the business of space could reveal these incredible things even sooner. “The future of space exploration is unlimited,” Altaf said. “Now we hope to use our best technology from here on earth to push it even further forward.”**

## AT: Warming

### 1NC---AT: Warming

#### 1---Space innovation leads to life saving technologies – commercialization is key

**Raghavan 21** [Seetha Raghavan, Seetha Raghavan is a professor in UCF’s Department of Mechanical and Aerospace Engineering, “The Impact of Innovation in the New Era of Space Exploration?”, 08/04/2021, UCF Today, <https://www.ucf.edu/news/the-impact-of-innovation-in-the-new-era-of-space-exploration/>] /Triumph Debate

Every once in a while, a confluence of discoveries, events and initiatives results in a breakthrough so significant that it propels the entire world to a higher level, redefining what is possible in so many different fields. **This breakthrough is taking centerstage now, as the new era of space exploration — catalyzed by increasing launch access — dawns upon us.** **The surge of innovation that comes with this will create new opportunities and inspire the next generation of doers.** When this happens, boundaries between scientific and social impact are blurred. Innovation leading to scientific discovery can benefit society in the same way that social innovation can diversify and support scientific innovators, who can contribute to global progress. **To ride this wave of progress, we must all participate and innovate in the new era of space exploration.** **The intersection of space exploration, innovation and impact isn’t a new phenomenon. In the past, technology developments and spin-offs from space research have consistently found their way into communities worldwide sometimes with lifesaving benefits. The International Space Station supports experiments that have led to discoveries and inventions in communication, water purification, and remote guidance for health procedures and robotic surgeries.** **Satellite-enabled Earth observation capabilities that monitor natural disasters, climate and crops often support early warnings for threats and mitigation strategies.** Space exploration has always been relevant to everyone no matter the discipline or interest. **Commercialization of space has been key in many ways to the current boost in “firsts” over the last few years. It has spurred innovation in launch vehicles and related technologies that led to firsts in vertical-takeoff-vertical landing rocket technology, reusability of rocket boosters and privately developed crewed missions to orbit.** Concurrently, NASA has continued to captivate our imagination with the first flight of a helicopter in another world, a mission to return an asteroid sample to Earth and sending a probe to make the closest ever approach to the sun. While we celebrate the scientific progress, there is a vastly important question that we all need to focus on: How can we drive the surge in innovation offered by increased access to space, to benefit humankind? Access to low-Earth orbit, and eventually human exploration of space, is a portal to achieve many impactful outcomes. The numbers and completion rate of microgravity experiments conducted by scientists will be greatly increased as a range of offerings in suborbital flights provide more opportunities to advance critical research in health, agriculture, energy, and more. Lunar, planetary, and even asteroid exploration may lead to discoveries of new materials — busting the limitations now imposed on capabilities for energy, transportation, and infrastructure or creating new sensors and devices that enhance safety on Earth. **Space tourism —one can hope — has the power to potentially create an awareness of our oneness that may lead to social change.** But much like all scientific endeavors, we cannot ignore the importance of pre-emptively identifying and mitigating negative impacts of new ventures some of which may have already taken shape. We need to consider space debris that threatens the very access that facilitates it, safety and rescue readiness to support increased crewed missions and space tourism, national security, and effects of light pollution on astronomy. Much of these can be approached and mitigated with new concepts and ideas that have already been set in motion. One thing is for certain, space has always been the inspiration for the next generation of innovators and creative thinkers. Architects of new ideas in this era will inspire many more. Ingenuity must also come from academic and research institutions building a new space-ready generation through innovative curriculum, scholarships, and research opportunities for key fields at all levels. Most of all, engaging participation is a responsibility anyone can take by steering the conversation and gathering ideas on how we can make this era one of positive benefit for all, while making opportunities inclusive to all.

#### 2---Technological innovation is driving environmental change – such as MethaneSAT tackling climate change

**EDF 21** [Environmental Defense Fund, “This space technology can cut climate pollution on Earth, 11/23/2021, https://www.edf.org/climate/space-technology-can-cut-climate-pollution-earth] /Triumph Debate

**The latest science warns that the window for preventing the most catastrophic global warming is closing fast. But we have a crucial opportunity to slow the rate of warming right now, even as we continue the transition to clean energy as quickly as possible. Deep reductions in carbon dioxide emissions remain critical over the long term.** But it turns out that methane emissions from fossil fuel operations, livestock production and other industries is responsible for more than 25% of current temperature rise**. Cutting these emissions is the fastest way to put the brakes on climate change.** But tracking these invisible emissions can be hard. That’s the reason for **MethaneSAT, a compact new satellite being built by a specially created new arm of EDF. MethaneSAT is specifically designed to locate, measure and track reductions in methane emissions virtually anywhere on Earth with greater precision than any other satellite.** First-of-its-kind satellite gets key data The oil and gas industry is a leading source of methane emissions. From remote wellheads to gas utility lines, companies release at least 75 million metric tons a year — enough gas to produce electricity for all of Africa twice over. Extensive research led by EDF suggests that oil and gas methane emissions in the U.S. are 60% higher than official EPA estimates. To fully understand the problem — and drive the solutions — we need more and better data about: How large methane emissions are. Where they're coming from. The biggest potential reductions. Progress of those reductions over time. **MethaneSAT will provide high-precision global coverage, measuring not just methane concentrations but the rate it’s escaping, from where and who is responsible. It will fill gaps left by other satellite systems, measuring large emission sources as well as those too small for other satellites to see. Because it will focus only on methane, MethaneSAT will be quicker and less expensive to launch than the complex, multi-function satellites built by government space agencies, so we can get data sooner.** 8 **EDF’s efforts using technological innovation to drive environmental change**, **the MethaneSAT mission is about turning data into action**. Video: Watch as EDF's president shares the vision of MethaneSAT in this TED Talk. **That data will be available to the public free of charge, so that stakeholders and the public can see and compare methane emissions by country or company. This unprecedented transparency will both enable and motivate faster reductions. And it will give the public objective assurance that both industry and government are delivering reductions**. Fred Krupp, EDF's president, unveiled the idea for MethaneSAT in a 2018 TED Talk at TED’s flagship event, as part of The Audacious Project, successor to the TED Prize. The purpose of MethaneSAT is to serve as a critical resource for realizing our goal of reducing methane emissions from a diversity of sources, especially global oil and gas. **A 45 percent reduction in oil and gas methane emissions by 2025 would deliver the same 20-year climate benefit as closing one-third of the world’s coal-fired power plants**. Cutting these emissions is the fastest, cheapest thing we can do to slow the rate of warming today, even as we continue to attack carbon dioxide emissions. Drawing from expertise and research MethaneSAT is due to launch in 2022. **The team responsible for getting it off the ground includes Tom Ingersoll, a successful satellite entrepreneur with three decades of experience, and a long list of experts in spaceflight, remote sensing and atmospheric sciences.** Steven Hamburg and Tom Ingersoll Steven Hamburg, left, EDF's chief scientist, and Tom Ingersoll, MethaneSAT project director, pictured at Harvard University And the MethaneSAT team has partnered with Harvard University and the Smithsonian Astrophysical Observatory to develop the science required for the mission. We’ve learned that emissions are much higher than either industry or government previously recognized, and occur across the supply chain. The challenge is, the sources are intermittent, unpredictable and widespread, making it hard to predict where they’ll occur. That means ongoing monitoring and measurement are essential. By providing reliable, fully transparent data on a worldwide scale, MethaneSAT will help transform a serious climate threat into a crucial opportunity.

3---No terminal impact to ozone depletion---they need ev voting aff is key---cx. Alt causes like oil and gas companies hurt the ozone depletion.

4---Public entities continue.