# 1AR

### 2nc – o/v

#### Low prices causes global war and lashout – price spike inevitable in the long run which triggers all of their offense. The brink is now.

Karl 16 (Terry Lynn Karl is professor of Political Science at Stanford University, “The Hidden Consequences of the Oil Crash,” 1-21-16, http://www.politico.com/magazine/story/2016/01/oil-crash-hidden-consequences-213550

Brace yourself for another stomach-churning ride. While predicting changes in the price of oil is a fool’s errand, at least two volatile scenarios lie ahead, and neither is promising. On the one hand, oil prices are likely to stay unacceptably low through 2016. On the other, today’s bust is likely to lay the basis for a sharp price spike down the road. Today’s oil glut is different from those of the past: It is due to the near-doubling of U.S. production of shale oil since 2009, as well as the response of Saudi Arabia and other petroleum exporters to this unwelcome competition. In the short term, the lifting of sanctions against Iranian oil will not help. While prices in the $20-30 per barrel range were once considered beneficial to the economy and the stock market, this is no longer the case. Low prices have led to painful budget cuts in North Dakota, Texas, Louisiana, New Mexico, Alaska and California; a $300 billion decline in capital investment in future extraction this year alone; the bankruptcies of dozens of energy companies; and the undercutting of incentives to build alternative clean energy. Most immediately, low prices are a catalyst for the rise in global conflict. Cheap oil translates into huge revenue losses and increased poverty, especially for Russia, Brazil and Mexico but also for Canada. In the 10 OPEC countries where oil comprises more than 85 percent of export revenue, the consequences are especially dire. Where regime stability rests on a classic “oil pact” (that is, the provision of economic benefits to key constituencies in exchange for political support or, at least, passivity), low prices create a toxic mix of weak currencies, inflation, growing debt, budget and trade deficits, rising food prices, cuts in essential services and soaring poverty. Such a grim prognosis traditionally spells the downfall of fragile governments—and, sometimes, even regimes that appear stable. In Venezuela, which is already in a constitutional crisis, this year’s projected 10 percent economic contraction will plunge its extremely polarized population into even more intense civil conflict. The already dangerous situation in the Middle East and North Africa will be intensified. Because national boundaries in that region are not resolved and political institutions are crumbling, the grim economic forecast for oil-exporting governments makes them less capable of appeasing their populations or securing their oil facilities and pipelines in the face of vicious insurgencies. The Islamic State, for example, lives off the earnings from oil fields in Syria and Iraq, and similar dynamics fund Boko Haram in Nigeria and al Qaeda affiliates in Central Asia and the Caucasus. Ironically, one likely impact of this oil glut is a future price spike. Despite all the current hype, only a relatively thin margin separates surplus from shortage. Global crude oil production has already dropped substantially, with U.S production falling to 2008 levels. The delayed actions of major producers like Chevron and ExxonMobil, which are holding off planned large-scale oil projects—and, hence, millions of barrels of future supply—has the potential to fuel a surge in prices as early as next year. And widespread conflict in oil regions—exacerbated by low and unstable oil prices—could significantly disrupt supply at almost any time. Oil-related violence underlies almost all of today’s major hotspots, even those conflicts that appear solely ethnic or religious in nature, including the Syrian Civil War and its spillover into Iraq, growing tensions between Iran and Saudi Arabia, and the continued civil unrest in Yemen, Afghanistan, South Sudan, Nigeria, Algeria, Somalia, Libya and the Sahel, Russia and the Ukraine and Venezuela, to name a few. Many of these governments—including, notably, Russia and Saudi Arabia—have every incentive to take aggressive nationalist political action abroad to deflect attention from deteriorating economic conditions at home. Whether oil prices stay too low or suddenly spike, their very volatility perilously whiplashes both winners and losers, destabilizes economies and polities and encourages war—a compelling reason to look for new sources of energy, just in case climate change alone was not enough reason to get off the fossil fuel roller coaster.

### 2nr – yes russia war

#### Russian economic crisis causes diversionary war

Chung 14 (writer at AU News. Dr Leonid Petrov, an expert in strategic intelligence and visiting fellow at the ANU School of Asia and the Pacific. “The Cold War is back, and colder,” December, [www.news.com.au/finance/economy/the-cold-war-is-back-and-colder/news-story/ac7ca11a978305cb4b13b4bb64902cd7](http://www.news.com.au/finance/economy/the-cold-war-is-back-and-colder/news-story/ac7ca11a978305cb4b13b4bb64902cd7))

PUTIN’S PROBLEM Vladimir Putin, who has enjoyed huge levels of popular support through more than 15 years of oil-fuelled prosperity, is trying to deflect blame, accusing the West of inflicting economic pain on Russia in an attempt to force a regime change. The real question is, how long will the Russian people believe him? As living standards fall through loss of savings, the flight of capital, rising unemployment and rising inflation, people could lose confidence in the government, leading to political instability. Dr Leonid Petrov, an expert in strategic intelligence and visiting fellow at the ANU School of Asia and the Pacific, has warned that the Russian economic crisis may quickly develop into a global strategic crisis on par with, or worse than, the Cold War. “Russia needs to maintain the slow-motion crisis in Eastern Ukraine, first to deflect attention from domestic economic issues and second to support Putin’s approval rating,” he said. “But pretty soon people are going to start asking questions.” If the instability continues, Moscow will pump more and more money into its military industrial complex — first, to shore up popular support by maintaining an artificially high level of employment through unproductive jobs; second, to prepare for further confrontation. “The military build-up benefits the Putin regime both politically and economically,” Dr Petrov said. “Already we have gone back to before where we were in 1991.” It’s a feedback loop with potentially deadly implications: if the instability continues, Russia’s oil-rich regions may decide they’re better off going it alone. And as the domestic economic situation worsens, Russia may ratchet up external conflicts to distract attention.

#### Yes escalation – nukes too

Rutland 16 (Peter, COLIN AND NANCY CAMPBELL PROFESSOR IN GLOBAL ISSUES AND DEMOCRATIC THOUGHT, WESLEYAN UNIVERSITY, “NATO and Russia Return to the Nuclear Precipice”, March 31, 2016, National Interest, http://nationalinterest.org/feature/nato-russia-return-the-nuclear-precipice-15633)

NATO seems to be underestimating Russia’s willingness to escalate. Whether it be assassinating opposition leaders abroad, shooting down civilian airliners or bombing Syrian hospitals, Putin appears indifferent to the collateral damage caused by his military assertiveness. The Iraq War and “color revolutions” that started in 2003 have fueled Russian insecurity, and apparently convinced Moscow that the United States is bent on “regime change” in Russia, if not the breakup of the Russian Federation itself. In the face of such an existential threat, any measures are justified. In contrast to Putin’s resolution, NATO threats lack credibility. No one seriously believes that NATO would risk a nuclear attack on a Western city in order to defend Daugavpils. (If you don’t know where that is, that proves the point.) Russia’s own military doctrine states that if it found itself losing a conventional war, it may use nuclear weapons to defend Russia’s security. NATO, too, has a nuclear doctrine that does not preclude first use in a conflict. Just because nuclear weapons were not used during the Cold War, we cannot complacently assume that “deterrence works.” There were several incidents where humanity came perilously close to the nuclear brink, from the 1962 Cuban Missile Crisis to NATO’s Able Archer exercise in 1983, which Moscow thought was a prelude to war. Our reliance on nuclear deterrence to preserve peace was what economist Carl Lundgren called a “desperate gamble” given the risks involved.

#### Russia could invade a Baltic state despite deterrence

Besch 16 (Sophia, Research Fellow at the Centre for European Reform, “NO DENIAL: HOW NATO CAN DETER A CREEPING RUSSIAN THREAT”, 2/9/16, Centre for European Reform, http://www.cer.org.uk/insights/no-denial-how-nato-can-deter-creeping-russian-threat)

But an all-out war is neither in Russia’s, nor NATO’s interest. Instead, NATO’s strategists (and those at the Pentagon) worry about something more opaque. Moscow feels surrounded by NATO, and a paranoid Russia is cause for concern. Russia’s 2014 military doctrine pointed to the perceived danger of NATO enlargement, the alliance’s missile defence system and “the establishment in states bordering Russia of regimes whose policies threaten Russian interests” ‒ a veiled reference to changes of government in Ukraine and Georgia. In response, Putin is trying to push the West out of a region he considers Russia’s ‘near abroad’. The ‘near abroad’ stretches, broadly, from the Arctic down across the Baltic states, Eastern Europe and towards the Black Sea, spanning many of the former Soviet republics, and possibly any country with a sizeable Russian-speaking minority. This includes Georgia, Moldova and Ukraine, but also NATO allies like Latvia, Estonia and Lithuania. Over the past year, Moscow has placed powerful weapons in strategically important locations like Crimea and Kaliningrad. The range of these weapons extends to allied territory and airspace and could threaten NATO’s maritime supply lines. NATO has a term for Putin’s tactics: Anti-Access Area Denial (A2/AD), which refers to an adversary’s attempts to make it impossible, or very costly, for NATO to gain access to a region to help its members or other countries. It challenges NATO’s freedom of movement. A2/AD capabilities can include missile defence systems, anti-ship cruise missiles, submarines, high-readiness brigades and special forces. A2/AD used to be jargon known only to China-watchers. By building artificial islands in contested areas of the South China Sea, and developing advanced ballistic missiles (so-called “carrier killers”) and anti-ship cruise missiles, China aims to keep the US Navy at bay and extend its influence in the Western Pacific. Russia is now doing something similar in Eastern Europe. In his speech on February 2nd 2016, Secretary Carter said that “[Russia and China] have developed and are continuing to advance military systems that seek to threaten our advantages in specific areas. And in some cases, they are developing weapons and ways of wars that seek to achieve their objectives rapidly, before, they hope, we can respond.” For instance, Russia’s decision to place advanced S400 air defence missiles in Kaliningrad has extended the reach of Russian launchers into NATO airspace, challenging NATO’s control of the skies and its ability to help its Baltic members in the event of Russian hostility. These missiles could help Moscow to invade Latvia, Estonia or Lithuania, forcing the alliance to recover the Baltic states in a military campaign of a size unseen in Europe since World War II.

#### Ows and turns all their imapcts

## DA

### Toplevel

#### Fossil fuel thumps

#### And our ev is about asteroid mining

### 1AR --- Impossible

#### Mining never happens --- Gravity, Power, prices, and markets means mining never gets big

Flicking 20 [David Flicking, Bloomberg Gadfly columnist covering commodities, as well as industrial and consumer companies. He has been a reporter for Bloomberg News, Dow Jones, the Wall Street Journal, the Financial Times and the Guardian,12-21-2020 “We’re Never Going to Mine the Asteroid Belt” Bloomberg, Accessed 12-16-2021, <https://www.bloomberg.com/opinion/articles/2020-12-21/space-mining-on-asteroids-is-never-going-to-happen> ww

Where would science fiction be without space mining?¶ From Ellen Ripley in Alien and Dave Lister in Red Dwarf, to Sam Bell in Moon and The Expanse’s Naomi Nagata, the grittier end of interstellar drama would be bereft if it weren’t for overalled engineers and their mineral-processing operations.¶ It’s such an alluring vision that real money has been put toward its realization. Alphabet Inc.’s Larry Page and Eric Schmidt, and Hollywood filmmaker James Cameron (director of the Alien sequel Aliens) all invested in Planetary Resources Inc., which raised venture finance with its mission of mining high-value minerals from asteroids and refining them into metal foams that could be shot back down to Earth. Deep Space Industries Inc., a rival startup, also had bold plans to extract resources from space. Though both companies have now been bought out and their projects put into mothballs, the idea of a space mining industry has refused to die.¶ It’s wonderful that people are shooting for the stars — but those who declined to fund the expansive plans of the nascent space mining industry were right about the fundamentals. Space mining won’t get off the ground in any foreseeable future — and you only have to look at the history of civilization to see why.¶ One factor rules out most space mining at the outset: gravity. On one hand, it guarantees that most of the solar system’s best mineral resources are to be found under our feet. Earth is the largest rocky planet orbiting the sun. As a result, the cornucopia of minerals the globe attracted as it coalesced is as rich as will be found this side of Alpha Centauri.¶ Gravity poses a more technical problem, too. Escaping Earth’s gravitational field makes transporting the volumes of material needed in a mining operation hugely expensive. On Falcon Heavy, the large rocket being developed by Elon Musk’s SpaceX, transporting a payload to the orbit of Mars comes to as little as $5,357 per kilogram — a drastic reduction in normal launch costs. Still, at those prices just lofting a single half-ton drilling rig to the asteroid belt would use up the annual exploration budget of a small mining company.¶ Power is another issue. The international space station, with 35,000 square feet of solar arrays, generates up to 120 kilowatts of electricity. That drill would need a similar-sized power plant — and most mining companies operate multiple rigs at a time. Power demands rise drastically once you move from exploration drilling to mining and processing. Bringing material back to Earth would raise the costs even more. Japan’s Hayabusa2 satellite spent six years and 16.4 billion yen ($157 million) recovering a single gram of material from the asteroid Ryugu and returning it to Earth earlier this month.¶ What might you want to mine from space? Water is an essential component of most earth-bound mining operations and a potential raw material for hydrogen-oxygen fuel that could be used in space. The discovery in October of ice molecules in craters on the Moon was taken as a major breakthrough. Still, the concentrations of 100 to 412 parts per million are extraordinarily low by terrestrial standards. Copper, which typically costs about $4,500 per metric ton to refine, has an average ore grade of about 6,000 ppm.¶ The more promising commodities are platinum, palladium, gold and a handful of rare related metals. Because of their affinity for iron, these so-called siderophile elements mostly sunk toward the metallic core of our planet early in its formation, and are relatively scarce in the Earth’s crust. Estimates of their abundance on some asteroids, such as the enigmatic Psyche 16 beyond the orbit of Mars, suggest concentrations several times higher than can be found in terrestrial mines.¶ Still, human ingenuity is all about cutting our coat according to our cloth. If such platinum-group metals are going to justify the literally astronomical costs of space mining, they’ll need to count on sustained high prices for the decade or so that would be needed to get such an operation up and running — and that sort of situation is all but unheard-of in the materials industry.¶ When prices of an essential commodity get excessively high, chemists get extraordinarily good at finding ways to avoid using it, scrap merchants improve their recycling rates, and miners discover new deposits that wouldn’t have been viable at lower prices. Even criminals get in on the game. That eventually pushes supply up and demand down, so that prices rebalance — a dynamic we’ve seen play out in the markets for rare earths, lithium and cobalt in recent years. The world mines about three times more platinum than it did in the early 1970s, but prices have barely changed once adjusted for inflation.¶ That might sound a disappointing prospect to those looking for excuses for humanity to colonize space — but really it should be seen as a tribute to our ingenuity. Humanity’s failure to exploit extraterrestrial ore reserves isn’t a sign that we lack imagination. If anything, it’s a sign of the adaptive genius that put us in orbit in the first place.

### 1AR --- No motive

#### No motive or interest

Dorminey 21 [Burce Dorminey, contributor to Astronomy and Sky & Telescope and a correspondent for Renewable Energy World. , 8-31-2021, “Does Commercial Asteroid Mining Still Have A Future? Forbes, Accessed 12-15-2021, <https://www.forbes.com/sites/brucedorminey/2021/08/31/does-commercial-asteroid-mining-still-have-a-future/?sh=4a6862871a93> ww

What happened to the space-mining industry? A decade ago, the mainstream media was full of articles about how mining asteroids for precious metals, metal composites and even rare earth metals would revolutionize the commercial space economy.¶ There were grandiose plans to reap untold fortunes from near-Earth asteroids (NEAs), either robotically or even by sending private commercial astronauts to act as space miners.¶ But there has been little action since. It’s precisely this kind of space hype that makes the mainstream public so cynical and weary of the best laid plans. How many times will we hear the mantra ‘it’s back to the Moon and then on to Mars,’ before anyone ever sets foot on the red planet? Much less thinks about mining Mars? Or reaping the riches from an accessible mineral-rich asteroid?¶ “I think we all overestimated what could be done,” Jeff Kargel, a former U.S. Geological Survey (USGS) geologist who is now a senior scientist at The Planetary Science Institute in Tucson, Arizona, told me.¶ There has yet to be any commercial mining reconnaissance and the idea of sending astronauts to reconnoiter near-Earth asteroids now seems antiquated. ¶ “I don’t think sending astronauts to an asteroid makes a whole lot of economic sense,” said Kargel, an expert on asteroid compositions. He argues that there’s not much that can’t be managed via robotics when it comes to mining water, iron and nickel, as well as platinum group metals (PGM)s from asteroids. ¶ The advent of small and very inexpensive cubesats are a potential major boon for the space mining industry, says Kargel. Most of these new-type spacecraft are spin-stabilized and don’t last long, he notes. But the basic idea of having very inexpensive spacecraft which can be mass produced are fortuitous for future asteroid mining efforts, he says.¶ Can we do that in situ or do they need to be lassoed and towed back into some sort of cis-lunar orbit?¶ Kargel has soured on the idea of moving asteroids for mining into low earth orbit or cis-lunar space simply because it would be extremely dangerous to tamper with such an object’s orbit. ¶ As for mining KREEPs (rocks containing potassium, rare-earth elements, and phosphorus) from the Moon?¶ Kargel says the KREEP soils from the Moon would seem to be the better source because it’s extremely enriched in Rare Earth Elements (REEs).¶ As for mining Helium-3 from the Moon?¶ There’s been talk about mining Helium-3 on the Moon for the past thirty years at least and it still hasn’t happened.

# 1AC

### 1AC --- Framing

#### I affirm Resolved: The Appropriation of outer space by private entities is unjust

#### I value justice --- defined as acting morally good

#### Prefer it on textuality as the resolution is a question of what is or isn’t just

#### The standard is maximizing expected wellbeing ---

#### What this means is that we ought to act as utilitarian’s, maximizing pleasure for the most amount of people.

#### Prefer this ---

#### [1] Bindingness --- pain and pleasure are the only things with intrinsic value or disvalue --- if I put my hand on a hot stove I will pull away, if ethics aren’t biding then it’s impossible to generate obligations

#### [2] Death is bad --- we can’t pursue pleasure if we are dead, which means that preventing mass death is of the upmost importance

#### [3] Equality --- Utilitarianism is the most equal as it doesn’t prioritize one person’s wellbeing over another, it aggregates and treats all people as equal meaning our Framework is the most fair.

### 1AC --- ADV --- Space Tourism

#### Contention 1 is Space Tourism ---

#### Space tourism is a new industry that is coming into being where private companies are selling trips into counterspace. This is horrible as it absolutely destroys the earth’s environment through the ejection of pollutants into the atmosphere

Pultarova 21 [Tereza Pultarova, Master's in Science from the International Space University, France, to her Bachelor's in Journalism and Master's in Cultural Anthropology from Prague's Charles University. 7-26-2021, “The rise of space tourism could affect Earth's climate in unforeseen ways, scientists worry” Space.com, Accessed 1-4-2021, <https://www.space.com/environmental-impact-space-tourism-flights> ww **\*brackets in original\***

Scientists worry that growing numbers of rocket flights and the rise of space tourism could harm Earth's atmosphere and contribute to climate change. ∂ When billionaires Richard Branson and Jeff Bezos soared into space this month aboard their companies' suborbital tourism vehicles, much of the world clapped in awe. ∂ But for some scientists, these milestones represented something other than just a technical accomplishment. Achieved after years of delays and despite significant setbacks, the flights marked the potential beginning of a long-awaited era that might see rockets fly through the so-far rather pristine upper layers of the atmosphere far more often than they do today. In the case of SpaceShipTwo, the vehicle operated by Branson's Virgin Galactic, these flights are powered by a hybrid engine that burns rubber and leaves behind a cloud of soot.∂ "Hybrid engines can use different types of fuels, but they always generate a lot of soot," said Filippo Maggi, associate professor of aerospace engineering at Politecnico di Milano, Italy, who researches rocket propulsion technologies and was part of a team that several years ago published an extensive analysis of hybrid rocket engine emissions. "These engines work like a candle, and their burning process creates conditions that are favorable for soot generation."∂ According to Dallas Kasaboski, principal analyst at the space consultancy Northern Sky Research, a single Virgin Galactic suborbital space tourism flight, lasting about an hour and a half, can generate as much pollution as a 10-hour trans-Atlantic flight. Some scientists consider that disconcerting, in light of Virgin Galactic’s ambitions to fly paying tourists to the edge of space several times a day.∂ "Even if the suborbital tourism market is launching at a fraction of the number of launches compared to the rest of the [tourism] industry, each of their flights has a much higher contribution, and that could be a problem," Kasaboski told Space.com.∂ Virgin Galactic's rockets are, of course, not the only culprits. All rocket motors burning hydrocarbon fuels generate soot, Maggi said. Solid rocket engines, such as those used in the past in the boosters of NASA's space shuttle, burn metallic compounds and emit aluminum oxide particles together with hydrochloric acid, both of which have a damaging effect on the atmosphere.∂ The BE-3 engine that powers Blue Origin's New Shepard suborbital vehicle, on the other hand, combines liquid hydrogen and liquid oxygen to create thrust. The BE-3 is not a big polluter compared to other rocket engines, emitting mainly water along with some minor combustion products, experts say.∂ This spectacular image of sunset on the Indian Ocean was taken by astronauts aboard the International Space Station (ISS). The image presents an edge-on, or limb view, of the Earth’s atmosphere as seen from orbit.∂ Too little is known∂ For Karen Rosenlof, senior scientist at the Chemical Sciences Laboratory at the U.S. National Oceanic and Atmospheric Administration (NOAA), the biggest problem is that rockets pollute the higher layers of the atmosphere — the stratosphere, which starts at an altitude of about 6.2 miles (10 kilometers), and the mesosphere, which goes upward from 31 miles (50 km). ∂ "You are emitting pollutants in places where you don't normally emit it," Rosenlof told Space.com. "We really need to understand. If we increase these things, what is the potential damage?"∂ So far, the impact of rocket launches on the atmosphere has been negligible, according to Martin Ross, an atmospheric scientist at the Aerospace Corporation who often works with Rosenlof. But that's simply because there have not been that many launches. ∂ "The amount of fuel currently burned by the space industry is less than 1% of the fuel burned by aviation," Ross told Space.com. "So there has not been a lot of research, and that makes sense. But things are changing in a way that suggests that we should learn about this in more detail."∂ Northern Sky Research predicts that the number of space tourism flights will skyrocket over the next decade, from maybe 10 a year in the near future to 360 a year by 2030, Kasaboski said. This estimate is still far below the growth rate that space tourism companies like Virgin Galactic and Blue Origin envision for themselves. ∂ "Demand for suborbital tourism is extremely high," Kasaboski said. "These companies virtually have customers waiting in a line, and therefore they want to scale up. Ultimately, they would want to fly multiple times a day, just like short-haul aircraft do."∂ The rate of rocket launches delivering satellites into orbit is expected to grow as well. But Kasaboski sees bigger potential for growth in space tourism. ∂ "It's like the difference between a cargo flight and a passenger flight," Kasaboski said. "There's a lot more passengers that are looking to fly."∂ The problem is, according to Ross, that the scientific community has no idea and not enough data to tell at what point rocket launches will start having a measurable effect on the planet's climate. At the same time, the stratosphere is already changing as the number of rocket launches sneakily grows.∂ "The impacts of these [rocket-generated] particles are not well understood even to an order of magnitude, the factor of 10," Ross said. "The uncertainty is large, and we need to narrow that down and predict how space might be impacting the atmosphere."∂ NASA's space shuttle Atlantis launches on July 8, 2011, kicking off STS-135, the final mission of the shuttle program.∂ Solid rocket boosters, such as those used in the past to launch NASA's space shuttle, generate ozone-damaging substances. (Image credit: NASA/Bill Ingalls)∂ Space shuttle's ozone holes ∂ So far, the only direct measurements of the effects of rocket launches on chemical processes in the atmosphere come from the space shuttle era. In the 1990s, as the world was coming together to salvage the damaged ozone layer, NASA, NOAA and the U.S. Air Force put together a campaign that looked at the effects of the emissions from the space shuttle's solid fuel boosters on ozone in the stratosphere. ∂ "In the 1990s, there were significant concerns about chlorine from solid rocket motors," Ross said. "Chlorine is the bad guy to ozone in the stratosphere, and there were some models which suggested that ozone depletion from solid rocket motors would be very significant."∂ The scientists used NASA's WB 57 high-altitude aircraft to fly through the plumes generated by the space shuttle rockets in Florida. Reaching altitudes of up to 60,000 feet (19 km), they were able to measure the chemical reactions in the lower stratosphere just after the rockets' passage. ∂ "One of the fundamental questions was how much chlorine is being made in these solid rocket motors and in what form," David Fahey, the director of the Chemical Sciences Laboratory at NOAA, who led the study, told Space.com. "We measured it several times and then analyzed the results. At that time, there were not enough space shuttle launches to make a difference globally, but locally one could deplete the ozone layer due to this diffuse plume [left behind by the rocket]."∂ The space shuttle retired 10 years ago, but rockets generating ozone-damaging substances continue launching humans and satellites to space today. ∂ In fact, in 2018, in its latest Scientific Assessment of Ozone Depletion, which comes out every four years, the World Meteorological Organization included rockets as a potential future concern. The organization called for more research to be done as the number of launches is expected to increase. ∂ VSS Unity powers its way to suborbital space on July 11, 2021.∂ Rocket planes inject pollutants into very high altitudes. (Image credit: Virgin Galactic)∂ Worse than geoengineering ∂ Rosenlof's team studies the broader effects of human-made substances in the higher layers of the atmosphere using powerful NOAA supercomputers. The work is akin to predicting the proverbial butterfly effect, the influence of minuscule changes in the chemistry of the air tens of miles above Earth on climate and weather patterns on the ground. For her, black carbon, or soot, emitted by rockets burning hydrocarbon fuels, is of particular concern.∂ "The problem with soot is that it absorbs ultraviolet light, and that means that it could heat the stratosphere," Rosenlof said. "When you start heating the stratosphere, the layer above the troposphere [closest to the ground], you start changing the motion in the stratosphere. You are changing the energy transfer, and that could actually affect what is happening on the ground."∂ Rosenlof points out that many of the particles generated by some rockets have been of interest to scientists due to the possible effects they could have on the global climate in a different context — that of geoengineering, the deliberate tampering with the atmosphere with the aim of stopping or mitigating global warming. ∂ Rosenlof recently co-authored a paper that used the same powerful NOAA supercomputers to model what the scientists call a climate intervention. The team was interested in the climate effects of dispersing sulfur dioxide particles, which are known to reflect light away from Earth, in combination with soot (which is also part of rocket emissions) in the lower stratosphere. Soot absorbs energy from sunlight and pushes the sulfur dioxide aerosol particles to a higher altitude by warming up the surrounding air. At that higher altitude, the sulfur dioxide can start its climate-cooling work. The experiment modeled what would happen when 1.1 million tons of sunlight-reflecting sulfur dioxide mixed with 11,000 tons of black carbon were released in the upper troposphere by aircraft over a 10-day period. ∂ The study didn't find any significant negative effects on weather on Earth. Yet, those results do not dispel Rosenlof's concerns about the possible risks associated with the growing number of rocket launches. ∂ Altering the jet stream∂ "Black carbon in the geoengineering experiment that we did isn't as high as the stuff from these rockets," she said. "The problem is that the higher you go, the longer something lasts. Neither of them is ideal, because either of them would produce heating in places where we don't have heating right now."∂ According to Maggi, the soot particles generated by hybrid rocket engines are extremely small and light-weight. In fact, when he and his colleagues tried to measure the soot output of hybrid rocket engines in a laboratory, they couldn't reliably do it with precision because of the particles' minuscule size. ∂ "We were able to measure the particle output from solid rocket motors," Maggi said. "These are about a micron in size, and there [are] a lot of them. But because they are large, they fall to the ground more quickly. In hybrid rocket engines, we were not able to collect the soot from the plume because it's extremely fine, a few nanometres in size."∂ Maggi fears these particles could, in fact, stay in the stratosphere forever.∂ "They have the same size as the carbon emitted by aircrafts," Maggi said. "And we know that there is a layer of carbon in the atmosphere at the flight level of aircrafts which is staying there. It's very likely that particles coming from rocket motors will do the same."∂ The accumulation of these particles over years and decades is what worries the scientists. Just as the current climate crisis started relatively slowly as the amount of carbon released into the atmosphere grew, the pollution in the stratosphere may only start causing harm some years down the road.∂ Rosenlof added that in the long term, injecting pollutants into the stratosphere could alter the polar jet stream, change winter storm patterns or affect average rainfall. ∂ "You might go from 25 inches [64 centimeters] a year to 20 inches [51 cm] a year in some places, which maybe doesn't sound like that big of a deal unless you are a farmer trying to grow your wheat right there," Rosenlof said. "Then a subtle change in rainfall can impact your crop yields."∂ Work to be done ∂ For this reason, Fahey says, it is critical that scientific work starts now to evaluate the future risks. ∂ "There is this fundamental gap where we just don't have the numbers, and that means that the science is limited because we have this lack of information," he said. "We feel it is part of our responsibility [at NOAA] to assess the impact of human activity on the stratosphere. Rockets are a principal and unique source [of stratospheric pollution], the launch frequencies are increasing and the effects are accumulating."∂ Fahey envisions a wider research program that would analyze the emissions and impacts of individual types of rocket engines and fuels on the stratosphere. The data could be used in Rosenlof's models to better predict the effects in accordance with the expected growth of the number of launches. Fahey, however, says that a political decision would have to come first to provide NOAA and its partners with funding that would enable them to take the high-altitude aircraft to the sky again and gather the data. The good news is, he added, that the U.S. Congress seems to be aware of the problem and things might soon start to move. ∂ "We would like to see a national program run by NOAA or the Air Force that would develop a database with basic emission characteristics of modern propulsion systems based on observations," he said. "We could gather some data in ground tests but also in the same way that we did with the space shuttle — by flying through the plumes just after launch."

#### Climate change causes huge negative impacts

Pachauri and Meyer 15 (Rajendra K. Pachauri Chairman of the IPCC, Leo Meyer Head, Technical Support Unit IPCC were the editors for this IPCC report, “Climate Change 2014 Synthesis Report” <http://epic.awi.de/37530/1/IPCC_AR5_SYR_Final.pdf> IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp)

SPM 2.3 Future risks and impacts caused by a changing climate Climate change will amplify existing risks and create new risks for natural and human systems. Risks are unevenly distributed and are generally greater for disadvantaged people and communities in countries at all levels of development. {2.3} Risk of climate-related impacts results from the interaction of climate-related hazards (including hazardous events and trends) with the vulnerability and exposure of human and natural systems, including their ability to adapt. Rising rates and magnitudes of warming and other changes in the climate system, accompanied by ocean acidification, increase the risk of severe, pervasive and in some cases irreversible detrimental impacts. Some risks are particularly relevant for individual regions (Figure SPM.8), while others are global. The overall risks of future climate change impacts can be reduced by limiting the rate and magnitude of climate change, including ocean acidification. The precise levels of climate change sufficient to trigger abrupt and irreversible change remain uncertain, but the risk associated with crossing such thresholds increases with rising temperature (medium confidence). For risk assessment, it is important to evaluate the widest possible range of impacts, including low-probability outcomes with large consequences. {1.5, 2.3, 2.4, 3.3, Box Introduction.1, Box 2.3, Box 2.4} A large fraction of species faces increased extinction risk due to climate change during and beyond the 21st century, especially as climate change interacts with other stressors (high confidence). Most plant species cannot naturally shift their geographical ranges sufficiently fast to keep up with current and high projected rates of climate change in most landscapes; most small mammals and freshwater molluscs will not be able to keep up at the rates projected under RCP4.5 and above in flat landscapes in this century (high confidence). Future risk is indicated to be high by the observation that natural global climate change at rates lower than current anthropogenic climate change caused significant ecosystem shifts and species extinctions during the past millions of years. Marine organisms will face progressively lower oxygen levels and high rates and magnitudes of ocean acidification (high confidence), with associated risks exacerbated by rising ocean temperature extremes (medium confidence). Coral reefs and polar ecosystems are highly vulnerable. Coastal systems and low-lying areas are at risk from sea level rise, which will continue for centuries even if the global mean temperature is stabilized (high confidence). {2.3, 2.4, Figure 2.5} Climate change is projected to undermine food security (Figure SPM.9). Due to projected climate change by the mid-21st century and beyond, global marine species redistribution and marine biodiversity reduction in sensitive regions will challenge the sustained provision of fisheries productivity and other ecosystem services (high confidence). For wheat, rice and maize in tropical and temperate regions, climate change without adaptation is projected to negatively impact production for local temperature increases of 2°C or more above late 20th century levels, although individual locations may benefit (medium confidence). Global temperature increases of ~4°C or more 13 above late 20th century levels, combined with increasing food demand, would pose large risks to food security globally(high confidence). Climate change is projected to reduce renewable surface water and groundwater resources in most dry subtropical regions (robust evidence, high agreement), intensifying competition for water among sectors (limited evidence, medium agreement). {2.3.1, 2.3.2} Until mid-century, projected climate change will impact human health mainly by exacerbating health problems that already exist (very high confidence). Throughout the 21st century, climate change is expected to lead to increases in ill-health in many regions and especially in developing countries with low income, as compared to a baseline without climate change (high confidence). By 2100 for RCP8.5, the combination of high temperature and humidity in some areas for parts of the year is expected to compromise common human activities, including growing food and working outdoors (high confidence). {2.3.2} In urban areas climate change is projected to increase risks for people, assets, economies and ecosystems, including risks from heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea level rise and storm surges (very high confidence). These risks are amplified for those lacking essential infrastructure and services or living in exposed areas. {2.3.2} Rural areas are expected to experience major impacts on water availability and supply, food security, infrastructure and agricultural incomes, including shifts in the production areas of food and non-food crops around the world (high confidence). {2.3.2} Aggregate economic losses accelerate with increasing temperature (limited evidence, high agreement), but global economic impacts from climate change are currently difficult to estimate. From a poverty perspective, climate change impacts are projected to slow down economic growth, make poverty reduction more difficult, further erode food security and prolong existing and create new poverty traps, the latter particularly in urban areas and emerging hotspots of hunger (medium confidence). International dimensions such as trade and relations among states are also important for understanding the risks of climate change at regional scales. {2.3.2} Climate change is projected to increase displacement of people (medium evidence, high agreement). Populations that lack the resources for planned migration experience higher exposure to extreme weather events, particularly in developing countries with low income. Climate change can indirectlyincrease risks of violent conflicts by amplifying well-documented drivers of these conflicts such as poverty and economic shocks (medium confidence). {2.3.2} 2010 )

#### This links back to our Framework, climate change would kill millions of people which doesn’t maximize well being

### 1AC --- ADV --- Debris

#### Contention 2 is Space Debris ---

#### Privatization of space leads to unchecked debris.

Muelhaupt et al. 19 – Theodore, Marlon Sorge, Jamie Morin, and Robert Wilson, 6/18/19, Center for Orbital and Reentry Debris Studies, Center for Space Policy and Strategy, The Aerospace Corporation, 30 year Space Systems Analyst and Operator, [“Space traffic management in the new space era,” Journal of Space Safety Engineering, <https://www.sciencedirect.com/science/article/pii/S246889671930045X?via%3Dihub>] Justin

The last decade has seen rapid growth and change in the space industry, and an explosion of commercial and private activity. Terms like NewSpace or democratized space are often used to describe this global trend to develop faster and cheaper access to space, distinct from more traditional government-driven activities focused on security, political, or scientific activities. The easier access to space has opened participation to many more participants than was historically possible. This new activity could profoundly worsen the space debris environment, particularly in low Earth orbit (LEO), but there are also signs of progress and the outlook is encouraging. Many NewSpace operators are actively working to mitigate their impact. Nevertheless, NewSpace represents a significant break with past experience and business as usual will not work in this changed environment. New standards, space policy, and licensing approaches are powerful levers that can shape the future of operations and the debris environment. 2. Characterizing NewSpace: a step change in the space environment In just the last few years, commercial companies have proposed, funded, and in a few cases begun deployment of very large constellations of small to medium-sized satellites. These constellations will add much more complexity to space operations. Table 1 shows some of the constellations that have been announced for launch in the next decade. Two dozen companies, when taken together, have proposed placing well over 20,000 satellites in orbit in the next 10 years. For perspective, fewer than 8100 payloads have been placed in Earth orbit in the entire history of the space age, only 4800 [1] remain in orbit and approximately 1950 [2] of those are still active. And it isn't simply numbers – the mass in orbit will increase substantially, and long-term debris generation is strongly correlated with mass. Table 1. Some announced NewSpace constellations. Operator Number of satellites Altitude (km) Country SpaceX V-band 7518 335–345 US Capella 48 350–650 US Planet Swift 6 350–650 US Black Sky 60 450 US Satellogic NuSat 300 500 Argentina Kepler 140 550 US SpaceX Starlink 1584 550 US Skybox 30 576 US Fleet 100 580 Australia Amazon Kuiper 3236 590–630 US Commsat 800 600 China Kineis 20 600 France Yalini 135 600 Canada Spire 100 651 US Planet Doves 150 675 US Orbcomm 31 750 US Iridium 72 780 US Theia 112 800 US Lucky Star 156 1000 China Telesat LEO 72 1000 Canada Hongyan 300 1100 China Xinwei 32 1100 China SpaceX Starlink 2825 1110–1325 US OneWeb 720 1200 ESA Telesat LEO 45 1248 Canada Astrome Tech 600 1400 India LeoSat 108 1400 US Globalstar 40 1412 US This table is in constant flux. It is based largely on U.S. filings with the Federal Communications Commission (FCC) and various press releases, but many of the companies here have already altered or abandoned their original plans, and new systems are no doubt in work. Although many of these large constellations may never be launched as listed, the traffic created if just half are successful would be more than double the number of payloads launched in the last 60 years and more than 6 times the number of currently active satellites. Current space safety, space surveillance, collision avoidance (COLA) and debris mitigation processes have been designed for and have evolved with the current population profile, launch rates and density of LEO space. By almost any metric used to measure activity in space, whether it is payloads in orbit, the size of constellations, the rate of launches, the economic stakes, the potential for debris creation, the number of conjunctions, NewSpace represents a fundamental change. 3. Compounding effects of better SSA, more satellites, and new operational concepts The changes in the space environment can be seen on this figurative map of low Earth orbit. Fig. 1 shows the LEO environment as a function of altitude. The number of objects found in each 10 km “bin” is plotted on the horizontal axis, while the altitude is plotted vertically. Objects in elliptical orbits are distributed between bins as partial objects proportional to the time spent in each bin. Some notable resident systems are indicated in blue text on the right to provide an altitude reference. The (dotted) red line shows the number of objects in the current catalog tracked by the U.S. Space Surveillance Network (SSN). All the COLA alerts and actions that must be taken by the residents are due to their neighbors in the nearby bins, so the currently visible risk is proportional to the red line.



Fig. 1. Objects in LEO orbit by altitude per 10 km altitude bin. Elliptical orbit objects distributed by portion spent in each bin. Some notable existing resident systems are listed on the right. New residents, including some replacement systems, are on the left. (For interpretation of the references to color in this figure, the reader is referred to the web version of this article.) The red line of the current catalog does not represent the complete risk; it indicates the risk we can track and perhaps avoid. A rule of thumb is that the current SSN LEO catalog contains objects about 10 cm or larger. It is generally accepted that an impact in LEO with an object 1 cm or larger will cause damage likely to be fatal to a satellite's mission. Therefore, there is a large latent risk from unobserved debris. While we cannot currently track and catalog much smaller than 10 cm, experiments have been performed to detect and sample much smaller objects and statistically model the population at this size [3]. The (solid) blue line represents the model of the 1 cm and larger debris that is likely mission-ending, usually called lethal but not trackable. If LEO operators avoid collisions with all the objects in the red line, they are nonetheless inherently accepting the risk from the blue line. This risk is already present. The (dashed) orange line is an estimate of the population at 5 cm and larger and is thus an estimate of what the catalog might conservatively be a few years after the Space Fence, a new radar system being built by the Air Force, comes on line (currently planned for 2019) [4]. Commercial companies offering space surveillance services, such as LeoLabs, ExoAnalytics, Analytic Graphics Inc., Lockheed, and Boeing, might also add to the number of objects currently tracked. Space Policy Directive 3 (SPD-3) [13] specifically seeks to expand the use of commercial SSA services. Existing operators can expect a sharp increase in the number of warnings and alerts they will receive because of the increase in the cataloged population. Almost all the increase will come from newly detected debris [5]. The pace of safety operations for each satellite on orbit will significantly change because of the increase in the catalog from the Space Fence. This effect is compounded because the NewSpace constellations described in Table 1 will drastically change the profile of satellites in LEO. The green bars in Fig. 1 represent the number of objects that will be added to the catalog (red or orange lines) from only the NewSpace large LEO constellations at their operational altitudes. This does not include the rocket stages that launch them, or satellites in the process of being phased into or removed from the operational orbits. Neighbors of one of these new constellations may face a radically different operations environment than their current practices were designed to address. Satellites in these large LEO constellations typically have planned operational lifetimes of 5–10 years. Some companies have proposed to dispose of their satellites using low thrust electric propulsion systems, which would spiral satellites down over a period of months or years from operating altitudes as high as 1500 km through lower orbits where the Hubble Space Telescope, the International Space Station, and other critical LEO satellites operate [6]. Similar propulsive techniques would raise replacement satellites from lower launch injection orbits to higher operational orbits. These disposal and replenishment activities will add thousands of satellites each year transiting through lower altitudes and posing a risk to all resident satellites in those lower orbits. More importantly, failures will occur both among transiting satellites and operational constellations, potentially leaving hundreds more stranded along the transit path. Aerospace studies [7–9] have shown that failed satellites, whether they fail during operations or fail during disposal, can pose as great or even greater risk than the many thousands of operational satellites (Fig. 2). Given the rapid flux in the proposed large LEO constellations (LLC), we created a Future Constellations Model (FCM) with elements that represented the characteristics of the different systems being proposed. In our models, almost all the collisions and the resulting debris from those collisions occur because of failed systems. Most large constellation operators intend to perform active collision avoidance for active systems, whether operational or in some stage of check-out or disposal, but failed satellites are assumed to be incapable of maneuver. Fig. 2 also shows that satellites in the disposal phase can contribute to collisions similarly to satellites in the operational phase. Fig 2 Download : Download full-size image Fig. 2. Collisions during operations and disposal over 10 years for various NewSpace Future Constellation Models (FCMs). 4. A notional illustration of workload The highest risk to operational satellites comes from the lethal but non-trackable debris that is depicted in the blue line in Fig. 2. However, operators perform collision avoidance only on the objects that can be tracked and cataloged. Advances in tracking and NewSpace launches will both act to increase this workload. A key element of the problem is that an increase in the LEO population will lead to an increase in close approaches to existing satellites [5], and the potential for accidental collisions. Conjunction prediction, collision probability (Pc), and maneuver planning for most existing satellite operators is a time- and personnel-intensive operation. Orbit analysts, and propulsion, navigation, and communications systems personnel are involved in evaluating and planning maneuvers over several days and must do so even if the ultimate decision is to “fly through” a close approach. Since most existing systems have small numbers of vehicles and the number of conjunctions any given operator experiences is relatively small, COLA remains a manual process. For systems not designed with automated maneuver planning, a COLA assessment that progresses all the way to a maneuver plan can consume considerable effort, whether or not the maneuver is executed. If a large constellation is deployed next to an existing resident system, the existing system may experience many conjunctions and alerts due to its close proximity of the dense new constellation. A sufficiently large constellation will, in effect, form a “shell” where frequent opportunities for conjunctions will be created. For example, Fig. 3 depicts a fictional scenario where 1225 “New” satellites are distributed in 35 planes in circular orbits at 1000 km altitude, at 98° inclination. These are placed near a hypothetical “Old” six-satellite constellation operating in a nearly circular orbit at the same altitude and 63° inclination. Following a common operations practice, we assume that the Old satellite operators flag a conjunction at Pc> 10−7, start COLA assessment with additional tracking at Pc> 10−6, and plan a COLA maneuver when the Pc> 10−5. A conjunction with Pc > 10−4 would typically be considered a significant risk leading most operators to maneuver. Fig 3 Download : Download full-size image Fig. 3. “New” large LEO constellation at same average altitude as “Old” existing constellation. Currently, the Old system in this example would typically see a warning (Pc > 10−6) a few times a month at this altitude, and of those, a few per year might cross the maneuver threshold. For the operations center, this would be multiplied by the number of satellites in the constellation. When the New system parks nearby, the number of COLA alerts jumps substantially. But the number of alerts depends entirely on the error bubble, (covariance) used. If the typical errors of the public external tracking data and the orbit propagation methods that are widely available (General Perturbations, or GP) are used for both constellations, over a 30-day period we see 129 conjunctions that cross the threshold for COLA assessment (Pc> 10−6), and 53 that cross the maneuver planning threshold (Pc> 10−5) (Fig. 4). This is nearly 2 per day. This could be an enormous workload for a manual process. If a high accuracy catalog (Special Perturbations, or “SP”) and a high-fidelity propagator with its typical covariances is used, the number of conjunctions goes from 129 to a more manageable 10. SP data is maintained by the Air Force, but it is not widely available. It is interesting to note that nine of those 10 crossed the maneuver-planning threshold, and of those, four crossed the Pc> 10−4 where many operators would choose to execute a maneuver. Compared to GP, the SP-quality data resulted in far fewer warnings and flagged four very close conjunctions. The operations center would have been able to concentrate on fewer “false alarms”. We also computed the case where GPS-quality owner-operator data was used for both systems, in which we assumed near-real-time owner-operator position data of very high quality was provided by both operators and used in the collision analysis. In this case, NONE of the conjunctions resulted in a warning and no COLA alerts were generated. The closest approach was 99 m, with a Pc of 3.7 × 10−7 using SP. But because of the quality of the GPS-based position data, this conjunction did not raise an alert because the fully-informed operators could be confident that a collision would not occur. Fig 4 Download : Download full-size image Fig. 4. Number of COLA alerts in 30 days for various qualities of position knowledge when a fictional new system is deployed near an existing one. In the example, an operations center for the Old constellation of six satellites could go from about one COLA assessment a week to nearly one per day per satellite, if only the published satellite catalog is available. If a new constellation operates too close to an existing system, the operator workload may become unreasonable using existing processes. But high accuracy data makes this manageable, and GPS-quality owner-operator data for both systems makes the problem vanish. Since these constellations are likely to be operated by different companies or governments, sharing high-quality position data would likely require an active space traffic management organization. Existing operators will not necessarily have large constellations parked nearby, but they will nonetheless be affected by the new activity. The new large constellations’ satellites typically will have relatively short lifetimes and will need frequent replenishment. The traffic transiting up and down will be substantial, and failures could leave stranded objects at intermediate altitudes, permanently increasing the collision risk. 5. Conjunction warning overload NewSpace operators will face a different challenge due to the vast increase in numbers of satellites. While there are likely as many operational plans as there are operators, a large constellation must consider close approaches with itself. Even if there are no neighboring systems, self-conjunctions can occur between two members of the same constellation. Depending on the configuration, a given operator could see hundreds to thousands of self-conjunctions that cross typical warning thresholds each day using current practices. This could be an issue for a space traffic management (STM) agency, even if it is not an issue for the operator. Aerospace models show that for one possible NewSpace constellation, more than 500,000 self-conjunctions each year could result that cross the typical Pc > 10−6 warning threshold. If no action were taken, we would expect 2–3 collisions per year. This is clearly unacceptable. Thus, current tracking accuracy and processes might produce millions of warnings per year for NewSpace operators to prevent half a dozen actual collisions. Under current practices operators would need to sort through an enormous haystack to find the needles, and because a handful of actual collisions will occur, the warnings cannot be ignored.

#### Debris triggers miscalculated war.

Peter Dockrill 16. Award-winning science & technology journalist. “Space Junk Accidents Could Trigger Armed Conflict, Study Finds.” <https://www.sciencealert.com/space-junk-accidents-could-trigger-armed-conflict-expert-warns>.

The increasingly crowded space in Earth's low orbit could set the stage for an international armed conflict, says a new study. Researchers from the Russian Academy of Sciences warn that accidents stemming from the steady rise in space junk floating around the planet could incite political rows and even warfare, with nations potentially mistaking debris-caused incidents as the results of intentional aggressive acts by others. In a paper published in Acta Astronautica, the team suggests that space debris in the form of spent rocket parts and other fragments of hardware hurtling at high speed pose a "special political danger" that could dangerously escalate tensions between nations. According to the study, destructive impacts caused by random space junk cannot easily be told apart from military attacks. "The owner of the impacted and destroyed satellite can hardly quickly determine the real cause of the accident," the authors write. The risks of such an event occurring are compounded by the sheer volume of debris now orbiting Earth. Recent figures from NASA indicate that there are more than 500,000 pieces of space junk currently being tracked in orbit, travelling at speeds up to 28,160 km/h (17,500 mph). The majority of those objects are small – around the size of a marble – but some 20,000 of them are bigger than a softball. In addition to these 500,000 or so fragments – which are big enough for scientists to know about them – NASA estimates that there are millions of undetectable pieces of debris in orbit that are too small to be monitored. But even extremely small fragments such as these pose a threat – in fact, they're considered a greater risk than trackable debris, as their invisible status means spacecraft and satellites can't do anything to avoid them until it's too late. As NASA observed in 2013: "Even tiny paint flecks can damage a spacecraft when travelling at these velocities. In fact a number of space shuttle windows have been replaced because of damage caused by material that was analysed and shown to be paint flecks… With so much orbital debris, there have been surprisingly few disastrous collisions." While we may have been lucky in the past, we can't rely on that to continue. The study by the Russian team cites the repeated sudden failures of defence satellites in past decades that were never explained. The researchers attribute two possible causes: either unrecorded collisions with space junk, or aggressive actions from adversaries. "This is a politically dangerous dilemma," the authors write.

#### Thus you should vote aff because a risk of miscalculated war has the ability to kill millions of people and thus does not maximize the pleasure.

### 1AC --- ADV --- SBSP

#### Contention 3 is Space based Solar Power ---

#### Space Based Solar power coming now --- privatization is driving its creation

Deign 6-11 [Jason Deign, reports on global trends in climatetech, energy storage and wind, 6-11-2021, “Is space-based solar ready for liftoff?” Canary Media, Accessed 12-13-2021, <https://www.canarymedia.com/articles/solar/space-based-solar-power-could-inch-closer-to-reality-this-year> ww

The main challenge for space-based solar is cost reduction¶ Most of the cost of space-based solar comes down to what it takes to get the panels into orbit.¶ “The cost of production, launch and assembly — which would most likely have to happen in space — currently make it commercially unviable,” said Alice Cordo Gallucci, a thematic analyst at GlobalData, in a written response to questions from Canary Media.¶ “Launching into low orbit costs about $2,720 per kilogram,” she added. ​“To compete with available sources of renewable energy, the cost would have to drop to around $400.”¶ There may be only one company on Earth that can achieve that kind of cost reduction at present. And coincidentally, it’s run by someone who is a fan of solar energy.¶ The Falcon Heavy from SpaceX, the rocket company helmed by Tesla CEO Elon Musk, is already more than 80 percent cheaper than any other low-Earth-orbit launcher and is aiming to achieve a launch cost of $1,100 per kilogram.¶ Jeremy Wainscott, executive vice president of the U.S.-based National Space Society, said former NASA physicist John Mankins had calculated that ​“using the Falcon Heavy, a cost of 5 to 7 cents per kilowatt-hour can be obtained for some concepts.”¶ These costs could come down further with the entry into service of a new SpaceX launch vehicle, the Starship, which underwent a test flight in May, Wainscott said in a written statement.¶ “The main issue holding back space-based solar power has been launch costs,” he said. ​“With the advent of the Falcon 9 and Falcon Heavy, space-based solar power becomes economical for niche applications, including islands, northern latitudes and military bases.¶ “A much broader economic feasibility for space-based solar power will grow out of the anticipated success of the SpaceX Starship rocket and other low-cost launchers.”

#### Oil prices will remain high and steady through 2035 – prefer long-term projections over random hot-takes

McKinsey 19 (Global market intelligence and analytics group focused on the energy sector, “Global Oil Supply and Demand Outlook”, 2019, McKinsey Solutions Sprl, https://www.mckinsey.com/solutions/energy-insights/global-oil-supply-demand-outlook-to-2035/~/media/231FB01E4937431B8BA070CC55AA572E.ashx)

Mid to Long term – Up to 2035

Summary

We expect growth in oil supply to come from (1) OPEC, (2) US shale oil and (3) selected offshore basins e.g. Brazil that are breaking-even below USD75/bb; ample resource base and cost discipline keeps long term average prices at USD65-75/bbl

• The outlook is combined with a peak in demand growth in the early 2030s - driven by slower chemicals growth and peak transport demand as fuel economy, electrification, & reduced car ownership decreases oil consumption

• By 2035, under our base case E&P companies need to add >40 MMb/d of new crude production from mainly offshore and shale unsanctioned projects to meet demand, and ~4- 5% of these new additions will come from YTF resources

#### SBSP decks global demand and ensures sustained low prices

Verbruggen 15 (Thijs Van de Graaf and Aviel Verbruggen, December 2015. \*\*Department of Political Science, Ghent University; \*\*University of Antwerp. “The oil endgame: Strategies of oil exporters in a carbon-constrained world,” Environmental Science & Policy, 54, 456–462)

It is well established that fossil fuel consumption must decrease strongly to achieve 450–550 parts per million (ppm) CO2- equivalent concentration stabilization targets, corresponding to acceptable likelihoods that the average surface temperature increase is limited to the 2–3 8C range, respectively (McCollum et al., 2014). Although there is no agreement on the individual contributions from coal, oil and gas to reduce overall fossil fuel consumption, it is clear that oil demand will be affected. Oil consumption currently accounts for 35% of total CO2 emissions (IEA, 2013a). A peak in oil demand by 2030, followed by a rapid decline, is a consistent feature of all the decarbonization scenarios developed in the Global Energy Assessment (Riahi et al., 2012). Van Vuuren et al. (2011) project that, in order to stabilize the climate at 2 8C (what they refer to as the ‘Representative Concentration Pathway 2.6’), oil consumption is to drop sharply before 2025. According to the IEA’s 450 Scenario (2014c: 96–97), world oil demand would need to shrink by at least 0.8 percent on average each year between 2013 and 2040 to keep global warming below 2 8C, implying a peak in oil demand already by around 2020. In theory, the use of carbon capture and storage (CCS) could expand the use of fossil fuels in filling the permitted ‘emission space’, including the amount of oil that can be consumed without jeopardizing the 2 8C target. Yet CCS is fraught with huge uncertainty, technically, economically and politically. Moreover, McGlade and Ekins (2014,2015) find that, even in a scenario with widespread and rapid adoption of CCS, nearly 500 Gb of oil must remain unused to have an even chance of limiting average global temperature change to 2 8C. This is not so very different from the 600 Gb of ‘un-burnable’ oil in a scenario where CCS is not available. The utilization of oil in a 2 8C world inches up by only two percentage points if CCS is massively deployed (from 65% to 67%). The upshot is that, even with CCS, one-third of available oil reserves must remain in situ from 2010 to 2050 (McGlade and Ekins, 2015). Over the longer term, Bauer et al. (2015) show that climate policies actually have very little impact on cumulative oil use. Climate policies primarily affect coal extraction and to a lesser extent gas extraction. Still, climate stabilization policies lead to a very large drop in crude oil revenues, much larger than the fall in coal and gas revenues. The loss in crude oil revenues is not caused by a change in the volume of crude oil production under climate policies but rather by changes in the price of oil.

#### Causes Russian economic collapse

Tikhonova 16 (Polina, Master's Degree in English Philology from the University of Oxford, journalist and a certified Russian translator, “Russia’s Economy Collapse: Demise Of Russia”, 1/25/16, <http://www.valuewalk.com/2016/01/russia-economy-collapse/>, ID)

Russia’s economy is approaching demise Russian bankers have recently signed a collective petition to the head of Russia’s Central Bank, in which they are literally begging the leadership to take emergency measures to save Russia’s bank system. Without such measures, they claim, by the end of this month, quarter of all Russian banks will collapse: they will not be able to fulfill the minimum requirements imposed by Central Bank. And Russian banks are only half of the much bigger problem. Another half is those banks’ clients. This week, several Russian banks were seized by Russians who had taken loans. Most of them took loans when Russia’s ruble was $30 against the dollar (now it’s over 80 rubles against the dollar). Meanwhile, not only have wages in Russia not been increased, an increasingly large number of Russian firms have started delaying payment of wages. In one of its measures, Central Bank has recently advised bankers to re-count mortgage loans for 40 rubles against the dollar. And while the idea is smart, its implementation will lead to huge losses suffered by banks and further collapse of Russia’s bank system. No matter what emergency measures Russia’s leadership is willing to take, the outcome does not look good for the country. Russia’s economy is approaching its demise. Experts predict chaos in Russia Russia is on the brink of chaos, with its economy suffering from extremely low oil prices and Western sanctions, a British expert has warned. William Browder, CEO of Hermitage Capital – a Russian-focused investment machine, warned that Russia is approaching ‘chaos’ due to global oil prices, according to the Daily Express. And while Moscow is hanging on for now, Mr. Browder – a long-time critic of Russian President Vladimir Putin’s regime – warned that Russia is about to fall into a huge and deep hole of economic collapse. The investment manager explained that Russia’s aggressive actions in Ukraine and Syria are to blame for Russia’s current economic crisis, since the West imposed economic sanction on Putin’s nation, destroying any hopes for economic growth. And that’s while oil prices worldwide have plummeted, hitting hard Russia’s biggest export. “I don’t think you can underestimate how bad the situation in Russia is right now, you’ve got oil below any measure where the budget can survive and you’ve got sanctions from the West. Russia is in what I’d call a real serious economic crisis,” Mr. Browder told CNBC, according to the Daily Express. Russia is soon going to run out of money Russia’s Central Bank is keeping the country’s economy together for now largely thanks to burning through cash reserves. “Eventually they’re [Russia] going to run out of that money and when they do, that’s when the real trouble begins,” the expert said. Mr. Browder also suggested that economic sufferings of Russia have led Putin to become a more nationalistic leader with a strong geopolitical position. As a result, the Russian President has oppressed his own people and made a scapegoat of Western civilization. Mr. Browder claims that he feels he has been under threat because of his criticism of the Kremlin and Vladimir Putin. One of his friends died in Russian police custody after trying to investigate into chaotic corruption in Russia. Mr. Browder was kicked out of Russia in 2005 after criticizing Putin’s corrupt regime. Days of Putin’s regime are numbered Russia’s ruble has depreciated by 12% since the beginning of 2016, while it depreciated by as many as 5% on Tuesday – reaching over 83 rubles against the dollar. On Friday, the ruble has strengthened its stance a little bit, as the day was rather successful for oil on the global market. Russia has virtually no economy except its oil exports, which means that the country has no economy now at all. Given the economic decline in China, the demand for oil has significantly decreased, but more importantly – there are much more oil producers around the world nowadays. In the period between the shale revolution, Saudi Arabia’s refusal to cut down on oil production and lifting sanctions against Iran for its nuclear program, the production of oil on the global oil market reached 1.5 million barrels a day, according to estimations made by the International Energy Agency. As a result – oil prices have decreased by 75% to as low as $30 per barrel. If oil prices continue to fall, ruble continues depreciating and Russian leadership takes no immediate emergency measures, Russia’s days will be numbered. And that’s a bad sign for the future of Putin’s crumbling regime.

#### Russian oil shortages cause state collapse which causes loose nukes ---releases the largest nuclear stockpile in the world

Rosen 15 (writer @ Business Insider, Citing Strategic Forecasting, or “Stratfor,” a private intelligence firm. “Stratfor predicts loose nukes in Russia will be 'the greatest crisis of the next decade’” www.businessinsider.com/russia-nukes-could-be-a-huge-crisis-2015-3)

The most alarming prediction in the Decade Forecast from private intelligence firm Strategic Forecasting, or Stratfor, involves a Russian collapse leading to a nuclear crisis. The firm believes the Russian Federation will not survive the decade in its present form, after a combination of international sanctions, plunging oil prices, and a suffering ruble trigger a political and social crisis. Russia will then devolve into an archipelago of often-impoverished and confrontational local governments under the Kremlin's very loose control. "We expect Moscow's authority to weaken substantially, leading to the formal and informal fragmentation of Russia" the report states, adding, "It is unlikely that the Russian Federation will survive in its current form." If that upheaval happened, it could lead to what Stratfor calls "the greatest crisis of the next decade": Moscow's loss of control over the world's biggest nuclear weapons stockpile. Russia is the world's largest country and its 8,000 weapons are fairly spread out over its 6.6 million square miles. According to a Bulletin of the Atomic Scientists study, Russia has 40 nuclear sites, which is twice as many as the US uses to house a comparable number of warheads. This policy of dispersal makes it difficult for an enemy to disable the Russian nuclear arsenal in a single attack, but it also makes the Russian stockpile difficult to control. The Bulletin report also found that the Russia was uncertain exactly how many short-range "tactical" or city-busting "strategic" nukes it has, nor what the weapons' state of assembly or alert status may be. Stratfor fears that the dissolution of the Russian Federation could cause an unprecedented nuclear security crisis. Not only could the command-and-control mechanisms for Russia's massive and highly opaque nuclear arsenal completely break down. Moscow might lose its physical control over weapons and launch platforms as well. "Russia is the site of a massive nuclear strike force distributed throughout the hinterlands," the Decade Forecast explains. "The decline of Moscow's power will open the question of who controls those missiles and how their non-use can be guaranteed."

#### Thus you should vote aff to ensure stable oil prices and ensure we don’t allow for russias economy to collapse