## AT: Solvency – SQ Solves/Lower Costs Now

Private market advances are lowering launch costs now

Smith, ’11

[Zdenek Smith, “Will lower cost rocket launches, announced by SpaceX, accelerate space exploration and development?” TED Ideas Worth Spreading, 4/7/11, http://www.ted.com/conversations/1802/will\_lower\_cost\_rocket\_launche.html]

Today, Elon Musk, CEO of SpaceX unveiled final specifications and launch date for the Falcon Heave, the world's largest rocket. When answering questions to reporters, he described his vision of producing rockets in a car-manufacturing like manner. Basically SpaceX is setting up a repeatable and efficient assembly of rockets. Elon believes that in the near future his company will produce and launch more rockets than the rest of the world combined. The price of each rocket launch will be several times lower than existing launches from other organizations. His estimates are based on SpaceX extensive experience and production cost of existing Falcon 9 rocket. According to SpaceX, "Falcon Heavy at approximately $1,000 per pound to orbit, sets a new world record in affordable spaceflight." Elon invisions that substantially lowering cost of sending equipment/people into space will lead to a new era of mankind in space exploration and space development.

AT: Solvency – Alt causes to high launch costs:

Can’t solve all the alt causes to high launch costs—buying practice, market

Atlas, ’11 [Atlas Aerospace, Industry news, Rising launch costs may hinder NASA missions, 4/06/11, http://www.atlasaerospace.net/eng/newsi-r.htm?id=5411&printversion=1]

With the federal government's spotlight on spending cuts, it isn't likely NASA will get a budget boost to offset the launch costs, which experts say are triggered by inefficient rocket buying practices, an eroding commercial market, and uncertainty about the future of the space program.

Lack of a market and government as primary buyer keep costs high

Atlas, ’11 [Atlas Aerospace, Industry news, Rising launch costs may hinder NASA missions, 4/06/11, http://www.atlasaerospace.net/eng/newsi-r.htm?id=5411&printversion=1]

The skyrocketing launch costs are part of the NASA Launch Services contract signed last year. The NLS agreement with four companies, which follows up a similar expiring contract, covers rocket flight opportunities for NASA spacecraft over the next 10 years. A previous NLS contract expired last year and held provisions for heavily discounted rocket costs due to projections of a more robust U.S. commercial launch services market when it was signed in 2000. "The expectation at that time was there was a large commercial market," Cline said. "That did not materialize. As opposed to government being a secondary customer buying on the margin, government became the primary customer." With government as the anchor customer, marginal launch costs for NASA and the Air Force are on the rise. "Rocket costs are going crazy and mostly up," said Steve Squyres, a respected planetary scientist and chair of a panel of researchers that issued recommendations in March for NASA to address the possibility of a declining budget matched against rising launch prices. Squyres led the National Research Council's planetary science decadal survey, an independent report ranking a slate of robotic solar system missions for the next 10 years.

Overlapping responsibility in US space program means high launch costs are inevitable

Dillingham, ’11- Dir. Of Physical Infrastructures Issues

[Gerald L. Dillingham, Ph. D., Director of Physical Infrastructure Issues, “COMMERCIAL SPACE TRANSPORTATION Industry Trends and Key Issues Affecting Federal Oversight and International Competitiveness”, 5/5/2011, http://www.gao.gov/new.items/d11629t.pdf]

Finally, an overarching issue that has implications for the U.S. commercial space launch industry is the lack of a comprehensive national space launch strategy, which includes issues such as development, procurement, certification, licensing, and regulation of launch vehicles and other aspects of the industry. Numerous federal agencies have responsibility for space activities, including FAA’s oversight of commercial space launches, NASA’s scientific space activities, the Department of Defense’s national security space launches, the State Department’s involvement in international trade issues, and the Department of Commerce’s advocacy and promotion of the industry. According to the National Academy of Sciences, aligning the strategies of the various civil and national security space agencies will address many current issues arising from or exacerbated by the current uncoordinated, overlapping, and unilateral strategies. A process of alignment offers the opportunity to leverage resources from various agencies to address such shared challenges as the diminished space industrial base, the dwindling technical workforce, and reduced funding levels, according to the Academy report. A national space launch strategy could identify and fill gaps in federal policy concerning the commercial space launch industry, according to senior FAA and Department of Commerce officials.

AT: Gov’t Subsidy Lowers Cost

Even with governmental subsidy, the cost remains too high

Woodcock, 1 [Gordon Woodcock, Technological Barriers to Space Settlement National Space Society, Jan/Feb, 2001, http://www.nss.org/settlement/roadmap/technological.html#affordable]

Without high demand, the RLV business case does not close no matter how good the RLV's other attributes. Clearly, if space settlement were undertaken, traffic demand would be very large. However, without significant reduction in costs, a settlement program is seen as economically impossible. It's a "Catch-22." Government-funded human exploration supported by RLVs would improve the business case, but probably not enough for private investment: A modest lunar base needs about 25 launches/year to support four lunar trips per year. Mars exploration, assuming one trip per Mars opportunity, needs about 50 per year to put up enough equipment and propellant, and support orbital assembly operations. Other NASA demands are about 10 per year, and commercial communications, up to 20 per year. The projected total demand is about 100 launches/year, and the industry's revenue at NASA's target cost of $1,000/lb would be about $4 billion annually. That's actually a little less revenue than today. Investors and company boards will ask, "Why take high business risk if revenue doesn't grow even with success?"

The government can’t do Zubrin’s plan—block buying is illegal

Hopkins, ‘1 [Mark Hopkins, Economic Barriers to Space SettlementNational Space Society, Jan/Feb 2001, http://www.nss.org/settlement/roadmap/economic.html]

Under current law Congress is not allowed to make financial commitments for more than one year. This is a major economic barrier. It forces the management of space projects to worry about next year's funding in every year of a project. This is true even if the project is on schedule and under budget. Companies can sign contracts that commit them to purchase a large number of items over a long period of time. This approach is frequently used when airlines purchase aircraft or communications satellite companies purchase launch vehicles. Block buying, as it is called, is a win-win way of doing business. It creates economies of scale and reduces the risk for both the supplier of the items (i.e., airplanes or launch vehicles) and for the company that purchases these items. It is also something the U.S. government is currently not allowed to do.

AT: Aff uses Falcon 9 Tech

Falcon 9 hasn’t been certified—NASA can’t use it

Atlas, ’11 [Atlas Aerospace, Industry news, Rising launch costs may hinder NASA missions, 4/06/11, http://www.atlasaerospace.net/eng/newsi-r.htm?id=5411&printversion=1]

"Launch vehicle costs are high," Squyres said. "They're growing. They're growing in a somewhat volatile and unpreditable fashion. They're becoming an increasingly large fraction of the cost of planetary missions, which is a trend we view with some alarm." The NASA Launch Services contract includes the Atlas 5 rocket from ULA, Falcon launchers from SpaceX, the Orbital Sciences Corp. Pegasus XL and Taurus XL boosters, and the Athena rocket family from Lockheed Martin. Cline said the Falcon 9 rocket, while not as capable as the Atlas 5, is considerably less costly. But the Falcon 9 rocket, privately designed and tested by SpaceX, does not yet meet NASA's stringent certification standards for its most precious science missions.

Won’t be certified until at least 2014

Atlas, ’11 [Atlas Aerospace, Industry news, Rising launch costs may hinder NASA missions, 4/06/11, http://www.atlasaerospace.net/eng/newsi-r.htm?id=5411&printversion=1]

The current certification standard calls for a launch vehicle to accumulate three successful flights in a common configuration, including at least two consecutive successful missions. The Falcon 9 rocket reached orbit in its first two test flights in 2010. The next Falcon 9 mission is scheduled for this summer, and it's improbable the SpaceX rocket could be certified before then. In a report released in February, NASA's inspector general concluded the Falcon 9 rocket is not likely to be ready to launch the agency's unmanned science missions until late 2013 or 2014.

AT: NASA Adv.—NASA Tech Bad

Won’t solve warming—Satellites outdated—no replacements exist

Huetteman, ’11 [Emmarie Huetteman, Washington Post, 1/24/11, http://www.washingtonpost.com/wp-dyn/content/article/2011/01/24/AR2011012405139.html]

Shortly after it lifted off in February 2009, NASA's Orbiting Carbon Observatory crashed into the Pacific Ocean near Antarctica. With that, a $250 million investment became scrap metal on the ocean floor and an effort to begin using satellites to measure atmospheric carbon dioxide and trace emission-reduction actions was dealt a huge setback. Scientists say the information the OCO was intended to collect is a crucial piece of the data needed not only by those monitoring the Earth's environment but also by federal officials struggling to understand possible national security implications of those climate changes. But the OCO's failure highlighted an even broader problem: Understanding climate change requires a breadth of information on variables from atmospheric carbon dioxide to the condition of Arctic ice, and scientists say that satellites are vital for this. Yet at a time where the massive Larsen B Ice Shelf in Antarctica seems intact one day and then collapses into the sea the next, the system of continuous, reliable satellite observation of Earth is at risk, with some aging satellites in dire need of replacement. The OCO was "the only satellite in the world that will do the kind of global collection we need," said James Lewis, a senior fellow at the Center for Strategic and International Studies and one of the authors of a 2010 report on satellite monitoring of climate change. "And we haven't thought about how to replace it."

NASA lacks funding and tech too old to solve

Huetteman, ’11 [Emmarie Huetteman, Washington Post, 1/24/11, http://www.washingtonpost.com/wp-dyn/content/article/2011/01/24/AR2011012405139.html]

A 2005 report by the National Research Council sounded the alarm about the climate satellite system, declaring it was "at risk of collapse," largely because of weakening of U.S. financial support for such programs. The 2010 report by Lewis and others asserted that half of all climate satellites will have outlived their design life within the next eight years. NASA's earth science budget shrank from about $2 billion to $1.4 billion between 2000 and 2006, when the Bush administration's greater funding priority was space exploration. Several environment-related satellite missions were either cut or shelved: l The Global Precipitation Measurement mission, designed to replace the 13-year-old Tropical Rainfall Measuring Mission, was delayed from 2010 until at least 2012 during the Bush administration. President Obama's 2011 budget proposes a mid-2013 launch. l The Landsat series of Earth observation satellites, a nearly 40-year-old mission run by the U.S. Geological Survey, had its next satellite delayed from this year, with the latest plans estimating a 2012 launch. This mission watches rising sea levels, glacial movement and coral reef decline, and it charts environmental conditions for military and intelligence uses. But one of its two satellites is experiencing degraded image quality and the other has been up since 1984, far past its life expectancy.

AT: NASA Adv.—NASA Tech Bad

Logistical and funding errors doom NASA’s data collection

Huetteman, ’11 [Emmarie Huetteman, Washington Post, 1/24/11, http://www.washingtonpost.com/wp-dyn/content/article/2011/01/24/AR2011012405139.html]

But scientists say the problems for the satellite system started even earlier. In 1994, President Bill Clinton merged the National Oceanic and Atmospheric Administration's polar-orbiting satellite system with a Defense Department meteorological system. Known as the National Polar-orbiting Operational Environmental Satellite System, or NPOESS, the joint program was to monitor the global climate and Earth and space weather, and was supposed to launch before aging satellites run by NOAA and the Defense Department died. The idea was to maintain continuity of data, eliminate redundancy and save taxpayer money. More than a decade later, though, the joint program was hemorrhaging money without having left the ground, forcing the Defense Department to reexamine the program. Originally estimated to cost about $6.5 billion through its 24-year life, by 2006 NPOESS's cost estimate was about $12.5 billion, even after critical climate monitoring instruments were cut. Last April, the Government Accountability Office issued a report that criticized NOAA and the Defense Department for failing to come up with plans to restore the climate-monitoring instruments and warned that there could be major gaps in data as a result.

NASA tech fails—can’t reach orbit to monitor effectively

Christopher, ‘11 (Andrew, ‘NASA’s climate monitoring satellite failed to reach the orbit, Taurus XL Rocket and the satellite fell on Friday, March 4, 2011’ Newstodaynews, March 7, http://newstodaynews.com/nasas-climate-monitoring-satellite-failed-to-reach-the-orbit-taurus-xl-rocket-and-the-satellite-fell-on-friday-march-4-2011/16883)

Rocket carries NASA’s climate monitoring satellite failed to reach the orbit. Rocket and the satellite fell back to Earth, probably in the around the Pacific Ocean. The reason, the rocket nose cone that protects the satellite – called the fairing – failed to separate themselves in time. The Rocket, Taurus XL booster with four levels, was launched from launch pad of Vandenberg Air Force Base in California, USA, Friday, March 4, 2011, at 02.09 AM local time. It carries NASA’s Glory satellite for U.S. $ 424 million, which is used to study the climate of earth. “We are devastated. However, we will again try to launch the satellite into orbit, “said Ron Grabe, Orbital Sciences Manager of NASA’s Launch Systems Group, as quoted from Space, Saturday, March 5, 2011. Taurus XL is a rocket that has four-layer booster with a height 27 meters and can carry an object weighing 1590 kilograms into orbit under the Earth. The rocket is a base version of the Pegasus booster, a rocket that launched from the aircraft. This failure has happened before, at the Taurus rocket in 2009 and led to the failure of the delivery mission of NASA’s climate monitoring satellite. The rocket made by Orbital Sciences Corp., a company based in Virginia, USA. Due to the failure of separation of the fairing, Taurus XL rocket was unable to carry loads too heavy up to the intended orbit, 705 miles above the sea level. Because It could not take the speed it takes to reach orbit, It fell back to Earth.

AT: NASA Adv.—No Scientific Support for GW

No scientific support for global warming hypothesis

Armstong 11 – Professor @ U Wharton School

J. Scott Armstrong, Professor of Marketing specializing in forecasting technology, 3-31-2011, “Climate Change Policy Issues,” CQ Congressional Testimony, Lexis

Global warming alarmists have used improper procedures and, most importantly, have violated the general scientific principles of objectivity and full disclosure. They also fail to correct errors or to cite relevant literature that reaches conclusion that are unfavorable. They also have been deleting information from Wikipedia that is unfavorable to the alarmists' viewpoint (e.g., my entry has been frequently revised by them). These departures from the scientific method are apparently intentional. Some alarmists claim that there is no need for them to follow scientific principles. For example, the late Stanford University biology professor Stephen Schneider said, "each of us has to decide what is the right balance between being effective and being honest." He also said "we have to offer up scary scenarios" (October 1989, Discover Magazine interview). Interestingly, Schneider had been a leader in the 1970s movement to get the government to take action to prevent global cooling. ClimateGate also documented many violations of objectivity and full disclosure committed by some of the climate experts that were in one way or another associated with the IPCC. The alarmists' lack of interest in scientific forecasting procedures and the evidence from opinion polls (Pew Research Center 2008) have led us to conclude that global warming is a political movement in the U.S. and elsewhere (Klaus 2009). It is a product of advocacy, rather than of the scientific testing of multiple hypotheses.

AT: NASA Adv.—No “Scientific Consensus” for Warming

Consensus is non-existent

Armstong 11 – Professor @ U Wharton School

J. Scott Armstrong, Professor of Marketing specializing in forecasting technology, 3-31-2011, “Climate Change Policy Issues,” CQ Congressional Testimony, Lexis

The claim by alarmists that nearly all scientists agree with the dangerous manmade global warming forecasts is not a scientific way to validate forecasts. In addition, the alarmists are either misrepresenting the facts or they are unaware of the literature. International surveys of climate scientists from 27 countries, obtained by Bray and von Storch in 1996 and 2003, summarized by Bast and Taylor (2007), found that many scientists were skeptical about the predictive validity of climate models. Of more than 1,060 respondents, 35% agreed with the statement "Climate models can accurately predict future climates," while 47% percent disagreed. More recently, nearly 32,000 scientists have disputed the claim of "scientific consensus" by signing the "Oregon Petition"3.

IPCC doesn’t prove consensus

Christy 11 – Professor of Climate Science @ Alabama

John Christy, climate scientist at the University of Alabama in Huntsville whose chief interests are satellite remote sensing of global climate and global climate change, best known, for the first successful development of a satellite temperature record, 3-8-2011, “CLIMATE SCIENCE AND EPA'S GREENHOUSE GAS REGULATIONS,” CQ Congressional Testimony, Lexis

The term "consensus science" will often be appealed to in arguments about climate change. This is a form of "argument from authority." Consensus, however, is a political notion, not a scientific notion. As I testified to the Inter-Academy Council last June, the IPCC and other similar Assessments do not represent for me a consensus of much more than the consensus of those who already agree with a particular consensus. The content of these reports is actually under the control of a relatively small number of individuals - I often refer to them as the "climate establishment" - who through the years, in my opinion, came to act as gatekeepers of scientific opinion and information, rather than brokers**.** The voices of those of us who object to various statements and emphases in these assessments are by-in- large dismissed rather than acknowledged. I've often stated that climate science is a "murky science." We do not have laboratory methods of testing our hypotheses as many other sciences do. As a result, opinion, arguments from authority, dramatic press releases, and notions of consensus tend to pass for science in our field when they should not.

AT: NASA Adv.—GW Doesn’t Lead to Extinction

Warming doesn’t lead to extinction

Barrett 6 – Professor of International Policy @ Johns Hopkins

Scott, Professor and Director of International Policy, School of Advanced International Studies, Johns Hopkins University, 2006, “CATASTROPHE: The Problem of Averting Global Catastrophe,” Chicago Journal of International Law, Lexis

Less dramatic changes are more likely. Abrupt transformations in climate would probably cause few deaths. Many scientists have remarked that climate change would increase the spread of disease, 74 and seasonal weather changes are associated with outbreaks of many diseases, including meningococcal meningitis in sub-Saharan Africa and rotavirus in the US. Moreover, stronger El Nino events have been linked to the prevalence of cholera in Bangladesh, the spread of Rift Valley fever in East Africa, and malaria incidences on the Indian subcontinent. However, while the spread of disease is influenced by the weather, the connection between global climate change and the spread of disease has not yet been established. 75 One point is clear: as Rees notes, "Not even the most drastic conceivable climate shifts could directly destroy all humanity." 76

Not an existential threat

Curry 10 – Professor of Earth Sciences

Judith Curry, Professor of Earth Sciences @ Georgia Institute of Technology, Committee on House Science and Technology Subcommittee on Energy and Environment, CQ Congressional Testimony, Lexis

Climate scientists have made a forceful argument for a looming future threat from anthropogenic climate change. Based upon the background knowledge that we have, the threat does not seem to be an existential one on the time scale of the 21st century, even in its most alarming incarnation. It is now up to the political process (international, national, and local) to decide how to contend with the climate problem. It seems more important that robust responses be formulated than to respond urgently with a policy that may fail to address the problem and whose unintended consequences have not been adequately explored.

AT: NASA Adv.—Can’t Solve Warming

Can’t solve warming

Hamilton 10 – Professor of Public Ethics @ ANU

Clive Hamilton, Professor of Public Ethics in Australia, 2010, “Requiem for a Species: Why We Resist the Truth About Climate Change,” pg 27-28

The conclusion that, even if we act promptly and resolutely, the world is on a path to reach 650 ppm is almost too frightening to accept. That level of greenhouse gases in the atmosphere will be associated with warming of about 4°C by the end of the century, well above the temperature associated with tipping points that would trigger further warming.58 So it seems that even with the most optimistic set of assumptions—the ending of deforestation, a halving of emissions associated with food production, global emissions peaking in 2020 and then falling by 3 per cent a year for a few decades—we have no chance of preventing emissions rising well above a number of critical tipping points that will spark uncontrollable climate change. The Earth's climate would enter a chaotic era lasting thousands of years before natural processes eventually establish some sort of equilibrium. Whether human beings would still be a force on the planet, or even survive, is a moot point. One thing seems certain: there will be far fewer of us. These conclusions arc alarming, co say the least, but they are not alarmist. Rather than choosing or interpreting numbers to make the situation appear worse than it could be, following Kevin Anderson and Alice Bows 1 have chosen numbers that err on the conservative side, which is to say numbers that reflect a more buoyant assessment of the possibilities. A more neutral assessment of how the global community is likely to respond would give an even bleaker assessment of our future. For example, the analysis excludes non-CO2, emissions from aviation and shipping. Including them makes the task significantly harder, particularly as aviation emissions have been growing rapidly and are expected to continue to do so as there is no foreseeable alternative to severely restricting the number of flights.v' And any realistic assessment of the prospects for international agreement would have global emissions peaking closer to 2030 rather than 2020. The last chance to reverse the trajectory of global emissions by 2020 was forfeited at the Copenhagen climate conference in December 2009. As a consequence, a global response proportionate to the problem was deferred for several years.

AT: SPS Adv.—Tech Not Ready

SPS not feasible

Fan, et. al, ’11 --

William Fan (Chancellor at NC A&T State) Harold Martin (Curator of Search for the Obvious and a Senior Associate in Business Development at Acumen Fund), James Wu (senior mining analyst at Union Securities), Brian Mok, Executive Summary, Space Based Solar Power, Industy and Technology Assessment, 6/2/11, http://www.pickar.caltech.edu/e103/Final%20Exams/Space%20Based%20Solar%20Power.pdf.)

In this report, we introduce some of the technological aspects of SBSP. However, we will be focusing on laying down the economic groundwork for SBSP. We obtain linearized trend data for various factors that affect the marginal cost of SBSP (primarily solar panel efficiency, orbital transport costs, and energy demand and cost). We determined that it is actually infeasible to begin work on SBSP, as the marginal costs do not provide an adequate annual return for us to recommend SBSP. Unfortunately, we determined that large capital and R&D costs are required for SBSP to occur, further decreasing the likelihood of SBSP from being large scale feasible. Without dramatic disruptive technology or large, governmental investments, SBSP will not be feasible as a mainstream source of energy until at least 2040.

Costs aren’t the only barrier—too many problems to overcome

National Space Society, 2007

[“Space Solar Power: An Investment for Today – An Energy Solution for Tomorrow”, October 2007]

SSP development costs will be large, although significantly smaller than that of the American military presence in the Persian Gulf or those associated with the impacts of substantial global warming. Technologies and infrastructure expected to enhance the feasibility of SSP include: • Lower-cost, environment-friendly launch vehicles. Even if lunar materials are used to construct the space segment of the SSP infrastructure, a great deal of hardware will need to be launched from Earth. For example, the first demonstration plants will almost certainly be ground launched. Current launch vehicles are too expensive, and at high launch rates may pose atmospheric pollution problems. Cheaper, cleaner launch vehicles are needed. • Large scale in-orbit construction and operations. To gather massive quantities of energy, solar power satellites must be large, far larger than the International Space Station (ISS), the largest spacecraft built to date. Fortunately, solar power satellites will be simpler than the ISS, as they will consist of many identical parts, and need not support human crews. • Asteroidal/lunar materials extraction and space-based manufacture of components (either in Earth orbit or on the lunar surface). The optimum environmental benefits of SSP could derive from doing most of the work outside of Earth's biosphere. This could be accomplished using asteroid-based or lunar materials that we cannot access today. • Power transmission. A relatively small effort is also necessary to assess how to best transmit power from satellites to the Earth’s surface with minimal environmental impact.

 \*\*\* See SPS case negs for other advantage answers\*\*\*

AT: Comp. Adv.—Decreases Innovation

The transorbital railroad will undercut costs—decreases incentives for innovation

Hobby Space, ’10 [Hobby Space, 10/13/10, http://hobbyspace.com/nucleus/?itemid=24325]

The Mars Society has posted Robert Zubrin's op-ed in Space News this week in which he lays out his Transorbital Railroad to space concept: "Transorbital Railroad" Proposed - The Mars Society. Basically he takes the commercial launch services approach to the max. NASA would buy medium and heavy launch vehicle services in bulk from commercial companies and provide the payload space to private and public users at heavily discounted prices. He suggests rates that work out to $100/kg to LEO. The annual cost of 6 MLV and 6 HLV launches would actually be less than what the annual Shuttle budget has been. Launched on a fixed schedule, routine low cost access to space would encourage a wide range of new users and applications. It sounds like a pretty good idea to me, though there would need to be some tweaking of the details. For example, say one of the suborbital space transport companies develops a second generation two stage orbital system that can profitably place a small payload, e.g. a ton, into orbit at $500/kg. That is, "profitably" if it has a sufficient market. If the Transorbital Railroad is undercutting that price and taking away all the customers, it would stifle such technical innovation. So there should be some modification of the plan so that small launch vehicles and, in general, new technical approaches are not inadvertently discouraged.

AT: Comp. Adv.—Alt Causes

Alternative cause to collapse—US lacks aerospace workers

IFPA ‘9, Institute for Foreign Policy Analysis (A Space and Security, A Net Assessment, January, <http://www.ifpa.org/pdf/Space_and_U_S_Security_Net_Assessment_Final_Dec15_08.pdf>)

If current trends continue, the United States will not have the specialized workforce necessary to support future U.S. primacy in space. Indeed, there is a major crisis in the aerospace industry, both in terms of sustaining the current workforce and developing the workforce of the future. With the reductions in defense spending that followed the end of the Cold War, the United States lost over 600,000 scientific and technical aerospace jobs.68 According to the Aerospace Industries Association, total industry employment went from 1,120,800 in 1990 down to 637,300 in 2007. In the space sector alone, employment slipped from 168,500 to 75,200 over the same period of time. Of the employees that remained following the initial post-Cold War cuts, it is suggested that 27 percent of America’s aerospace technical workforce is now eligible for retirement. This is simply the continuation of a wave of retirements that began some time ago70 The Aerospace Industries Association contends that nearly 60 percent of the U.S.-aerospace workforce was at least 45 years old in 2007. What is significant is that because many began their careers relatively young, a large number will be eligible for retirement in the next decade. Clearly, the workforce that supported U.S. space primacyduring and immediately following the Cold War will need to be replenished with the infusion of new talent. The ability of the United States to fill the void left by retirements is in question. Currently, the portion of those workers 34 or younger has declined from 32 percent in 1992 to 16 percent in 2003. About 70,000 students each year receive undergraduate degrees in engineering in the United States. Subtracting the 15,000 degrees in non-space related engineering fields (civil, automotive, mining and transportation engineers) about 55,000 graduates are qualified for aerospace work. Of those, approximately 20 percent are international students who are expected to return home upon graduation. That leaves about 44,000 graduates per year for all American companies, not only aerospace firms. Given that a single leading aerospace company expects to hire 50,000 engineers in the next five years, the challenge of replenishing the aerospace workforce becomes a challenge. It is compounded by the fact that fewer students are earning degrees in math and science—from undergraduate to doctorate—while at the same time, there is an ongoing shortage of math and science teachers.

AT: Comp. Adv.—Comp. Resilient

Competitiveness is resilient and collapse would be slow.

Engardio 8 – International senior writer for BusinessWeek, Paul, “Is U.S. Innovation Headed Offshore?”, Business Week, 5-7, http://www.businessweek.com/innovate/content/may2008/id2008057\_518979.htm

Apparently not, according to a new study published by the National Academies, the Washington organization that advises the U.S. government on science and technology policy. The 371-page report titled Innovation in Global Industries argues that, in sectors from software and semiconductors to biotech and logistics, America's lead in creating new products and services has remained remarkably resilient over the past decade—even as more research and development by U.S. companies is done offshore. "This is a good sign," says Georgetown University Associate Strategy Professor Jeffrey T. Macher, who co-edited the study with David C. Mowery of the University of California at Berkeley. "It means most of the value added is going to U.S. firms, and they are able to reinvest those profits in innovation." The report, a collection of papers by leading academics assessing the impact of globalization on inventive activity in 10 industries, won't reassure all skeptics that the globalization of production and R&D is good for the U.S. One drawback is that most of the conclusions are based on old data: In some cases the most recent numbers are from 2002. Exporting the Benefits? And while the authors of the report make compelling cases that U.S. companies are doing just fine, thank you, none of the writers addresses today's burning question: Is American tech supremacy thanks to heavy investments in R&D also benefiting U.S. workers? Or are U.S. inventions mainly creating jobs overseas? A few years ago, most people took it for granted that what was good for companies was good for the greater economy. But the flat growth in living standards for most Americans during the last boom has raised doubts over the benefits of globalization. "Innovation shouldn't be an end in itself for U.S. policy," says trade theorist Ralph E. Gomory, a research professor at New York University's Stern School of Business. "I think we have to address whether a country can run on innovation. If you just do R&D to enhance economic activity in other countries, you are getting very little out of it." Gomory, a former top IBM (IBM) executive, retired in 2007 as president of the Alfred P. Sloan Foundation, which funded the National Academies study. Still, given all the debate over offshoring, the report's central findings are interesting. The authors marshal a wealth of evidence to show that, thanks to innovation, globalization hasn't eroded U.S. leadership even in some industries where there has been a substantial offshore shift in engineering and design. Despite an explosion of outsourcing to India and Ireland, for example, America's software industry still trumps the rest of the world in exports of packaged software and services, patent activity, and venture capital investment. The U.S. also accounts for 90% of chip-design patents—the same level as 1991—although Asian companies now do most of manufacturing. And when it comes to biotechnology, the U.S. is way ahead, luring more venture capital than all other countries combined. America First The U.S. even remains a heavyweight in personal computers, the study says, though China and Taiwan manufacture most of the hardware. That's because the real innovation and profits still belong to companies like Microsoft (MSFT) and Intel (INTC), makers of the operating system and central processors, while U.S. brands command 40% of the global market and still define breakthrough design. There are cases where the U.S. can lose a commanding lead when domestic manufacturing disappears—namely in flat-panel displays and lighting. Macher also concedes "there are problems on the horizon" regarding America's future competitiveness. Other nations are starting to mimic many of the strategies that give the U.S. an innovation edge, for example. And as Asians grow richer "they are becoming more sophisticated and demanding than Americans as users of many tech products." But for now, "all evidence is that our position in many of these industries will continue," says Macher. Why is the U.S. so entrenched? One reason, he says, is simply that U.S. corporations are proving very adept at managing global R&D networks while keeping core innovation at home. While innovative activity in chips and software is growing fast elsewhere, it has not yet been enough to close the gap with the U.S. The fact that the U.S. remains by far the world's most lucrative market for pharmaceuticals and business software helps explain its continued strength in those industries. What's more, industry clusters involving companies, universities, and venture capital are so well-established—such as San Diego and Cambridge, Mass., in biotech—that it will take many years for other nations to replicate them.

AT: Comp. Adv.—Heg d/n Solve War

Hegemony doesn’t prevent war.

Press et al 97 – Eugene Gholz and Daryl G. Press are doctoral candidates in the Department of Political Science at the Massachusetts Institute of Technology. Harvey M. Sapolsky is Professor of Public Policy and Organization in the Department of Political Science at M.I.T. and Director of the M.I.T. Defense and Arms Control Studies (DACS) Program. This paper began as a project for the DACS Working Group on Defense Politics, “Come home, America”, International Security, Spring97, Vol. 21, Issue 4

The selective engagers' strategy is wrong for two reasons. First, selective engagers overstate the effect of U.S. military presence as a positive force for great power peace. In today's world, disengagement will not cause great power war, and continued engagement will not reliably prevent it. In some circumstances, engagement may actually increase the likelihood of conflict. Second, selective engagers overstate the costs of distant wars and seriously understate the costs and risks of their strategies. Overseas deployments require a large force structure. Even worse, selective engagement will ensure that when a future great power war erupts, the United States will be in the thick of things. Although distant great power wars are bad for America, the only sure path to ruin is to step in the middle of a faraway fight. Selective engagers overstate America's effect on the likelihood of future great power wars. There is little reason to believe that withdrawal from Europe or Asia would lead to deterrence failures. With or without a forward U.S. presence, America's major allies have sufficient military strength to deter any potential aggressors. Conflict is far more likely to erupt from a sequence described in the spiral model. The danger of spirals leading to war in East Asia is remote. Spirals happen when states, seeking security; frighten their neighbors. The risk of spirals is great when offense is easier than defense, because any country's attempt to achieve security will give it an offensive capability against its neighbors. The neighbors' attempts to eliminate the vulnerability give them fleeting offensive capabilities and tempt them to launch preventive war.[71] But Asia, as discussed earlier, is blessed with inherent defensive advantages. Japan and Taiwan are islands, which makes them very difficult to invade. China has a long land border with Russia, but enjoys the protection of the East China Sea, which stands between it and Japan. The expanse of Siberia gives Russia, its ever-trusted ally, strategic depth. South Korea benefits from mountainous terrain which would channel an attacking force from the north. Offense is difficult in East Asia, so spirals should not be acute. In fact, no other region in which great powers interact offers more defensive advantage than East Asia. The prospect for spirals is greater in Europe, but continued U.S. engagement does not reduce that danger; rather, it exacerbates the risk. A West European military union, controlling more than 21 percent of the world's GDP, may worry Russia. But NATO, with 44 percent of the world's GDP, is far more threatening, especially if it expands eastward. The more NATO frightens Russia, the more likely it is that Russia will turn dangerously nationalist, redirect its economy toward the military, and try to re-absorb its old buffer states.[72] But if the U.S. military were to withdraw from Europe, even Germany, Europe's strongest advocate for NATO expansion, might become less enthusiastic, because it would be German rather than American troops standing guard on the new borders. Some advocates of selective engagement point to the past fifty years as evidence that America's forward military presence reduces the chance of war. The Cold War's great power peace, however, was over determined. Nuclear weapons brought a powerful restraining influence.[73] Furthermore, throughout the Cold War, European and Asian powers had a common foe which encouraged them to cooperate. After an American withdrawal, the Japanese, Koreans, and Russians would still have to worry about China; the Europeans would still need to keep an eye on Russia. These threats can be managed without U.S. assistance, and the challenge will encourage European and Asian regional cooperation. In fact, some evidence suggests that America's overseas presence was not the principal cause of great power peace during the Cold War; nuclear weapons and the presence of a unifying threat played a greater role. The Sino-Soviet dispute has been one of the bitterest in the world since the 1960s. The Soviets and Chinese have had all the ingredients for a great power war--border disputes, hostile ideologies, and occasional military clashes along their frontier-yet they managed to keep things from getting out of hand. Maybe the presence of nuclear weapons damped the conflict; maybe having a common foe (the United States) tempered their hostility toward each other. But it is clear that U.S. engagement was not necessary for peaceful great power relations during the Cold War. Some analysts agree that the probability of great power wars stemming from American withdrawal is very low**,** but they still advocate engagement because they fear low-probability, high-cost events. A war would be a human tragedy, the environment would suffer, and international trade would be disrupted. But the costs of distant great power wars must be compared to the costs of the strategy intended to prevent them. Advocates of selective engagement argue that their policy's costs are small.[74] We disagree with this assessment. Two costs are associated with selective engagement and both are high: the cost of maintaining forces in Europe and Asia and the risk that, with engagement, the United States will have to fight a war. Maintaining substantial military power in Europe and Asia and the capability to surge forces to the Persian Gulf will require most of America's current military assets, a two-MRC force. Any savings from force cuts will be marginal.[75] The larger ´long-term cost of selective engagement is the risk of involvement in faraway great power wars. Great power conflicts will continue to be a rare occurrence, but when they happen, the United States is much better off staying as far away from the combatants as possible. World War II resulted in the deaths of 400,000 Americans, many times that number wounded, and nearly 40 percent of GDP devoted to defense (compared to 4 percent today).[76] A new great power conflict, with the possibility of nuclear use, might exact even higher costs from the participants. World War II was fought to prevent the consolidation of Europe and Asia by hostile, fanatical adversaries, but a new great power war would not raise that specter. The biggest cost of selective engagement is the risk of being drawn into someone else's faraway great power war.

AT: Comp. Adv.—Heg Inevitable

Hegemony inevitable.

Brooks and Wohlforth 9 – Stephen and William, Professors of Govt. @ Dartmouth, World Out of Balance, p 27-9

"Nothing has ever existed like this disparity of power; nothing," histo­rian Paul Kennedy observes: "I have returned to all of the comparative defense spending and military personnel statistics over the past 500 years that I compiled in The Rise and Fall of the Great Powers, and no other nation comes close."13 Though assessments of U.S. power have changed since those words were written in 2002, they remain true. Even when capabilities are understood broadly to include economic, technological, and other wellsprings of national power, they are con­centrated in the United States to a degree never before experienced in the history of the modern system of states and thus never contemplated by balance-of-power theorists. The United States spends more on defense than all the other major military powers combined, and most of those powers are its allies. Its massive investments in the human, institutional, and technological requisites of military power, cumulated over many decades, make any effort to match U.S. capabilities even more daunting than the gross spending numbers imply. Military research and development (R&D) may best capture the scale of the long-term investments that give the United States a dramatic qualitative edge in military capabilities. As table 2.1 shows, in 2004 U.S. military R&D expenditures were more than six times greater than those of Germany, Japan, France, and Britain combined. By some estimates over half the military R&D expenditures in the world are American.' And this disparity has been sustained for decades: over the past 30 years, for example, the United States has invested over three times more than the entire European Union on military R&D.15 These vast commitments have created a preeminence in military capabilities vis-à-vis all the other major powers that is unique after the seventeenth century. While other powers could contest U.S. forces near their homelands, especially over issues on which nuclear deterrence is credible, the United States is and will long remain the only state capable of projecting major military power globally**.16** This capacity arises from "command of the commons"-that is, unassailable military dominance over the sea, air, and space. As Barry Posen puts it, Command of the commons is the key military enabler of the U.S. global power position. It allows the United States to exploit more fully other sources of power, including its own economic and military might as well as the economic and military might of its allies. Command of the com­mons also helps the United States to weaken its adversaries, by re­stricting their access to economic, military and political assistance. . . . Command of the commons provides the United States with more useful military potential for a hegemonic foreign policy than any other offshore power has ever had.17

AT: Comp. Adv.—Heg Inevitable

Hegemony is inevitable, doesn’t solve anything, and competitiveness isn’t key.

Salam 9 – Policy advisor at e21: Economic Policies for the 21st Century, and is a fellow at the New America Foundation, Reihan, “Robert Pape Is Overheated”, The American Scene, 1/21, http://theamericanscene.com/2009/01/21/robert-pape-is-overheated

Consider the extraordinary and unprecedented steps the Bush administration took over the last eight years in the international arena, and then consider how weak the “soft balancing” has been in response, not least from the Chinese. This is hardly an endorsement of a hyperactive foreign policy, but it is at least worthy of note. Wohlforth and Brooks have found Pape’s “soft balancing” thesis wanting, which could account for the fact that Pape dismisses them so readily, but they are hardly alone in this regard. Some will point to Russia’s conflict with Georgia to suggest that the kind of structural unipolarity Wohlforth and Brooks describe is a dead letter, which is a little strange: unipolarity and omnipotence aren’t the same thing, a point both have emphasized. In an essay for Foreign Affairs, Samuel Huntington introduced the slightly confusing idea of “uni-multipolarity” to account for “soft balancing.” In my view, this introduced unnecessary conceptual confusion, but it is worth keeping in mind that “unipolarity” does not mean that if America wills it, it shall be done. Pape spends a lot of time demonstrating that U.S. economic output represents a declining share of global output, which is hardly a surprise. Yet as Pape surely understands, the more relevant question is how much and how readily can economic output be translated into military power? The European Union, for example, has many state-like features, yet it doesn’t have the advantages of a traditional state when it comes to raising an army. The Indian economy is taxed in a highly uneven manner, and much of the economy is black — the same is true across the developing world. As for China, both the shape of the economy, as Yasheng Huang suggests, and its long frontiers, as Andrew Nathan has long argued, pose serious barriers to translating potential power into effective power. (Wohlforth and Brooks give Stephen Walt’s balance-of-threat its due.) So while this hardly obviates the broader point that relative American economic power is eroding — that was the whole idea of America’s postwar grand strategy — it is worth keeping in mind. This is part of the reason why sclerotic, statist economies can punch above their weight militarily, at least for a time — they are “better” at marshaling resources. Over the long run, the Singapores will beat the Soviets. But in the long run, we’re all dead. And given that this literature is rooted in the bogey of long-term coalition warfare, you can see why the unipolarity argument holds water. At the risk of sounding overly harsh, Pape’s understanding of “innovativeness” — based on the number of patents filed, it seems — is crude to say the least. I recommend Amar Bhidé‘s brilliant critique of Richard Freeman, which I’ll be talking about a lot. Pape cites Zakaria, who was relying on slightly shopworn ideas that Bhidé demolishes in The Venturesome Economy. The “global diffusion of technology” is real, and if anything it magnifies U.S. economic power. “Ah, but we’re talking about the prospect of coalition warfare!” The global diffusion of technology is indeed sharply raising the costs of military conquest, as the United States discovered in Iraq. The declining utility of military power means that a unipolar distribution of military power is more likely to persist. And yes, it also means that unipolar military power is less valuable than it was in 1945.

Ozone DA—UQ

The ozone hole is closing now

Columbia Engineering 11

Columbia Engineering, 4-21-2011, “Study Links Ozone Hole to Broader Climate Change,” Columbia University School of Engineering and Applied Science, http://www.engineering.columbia.edu/study-links-ozone-hole-broader-climate-change

Located in the Earth's stratosphere, just above the troposphere (which begins on Earth's surface), the ozone layer absorbs most of the Sun's harmful ultraviolet rays. Over the last half-century, widespread use of manmade compounds, especially household and commercial aerosols containing chlorofluorocarbons (CFCs), has significantly and rapidly broken down the ozone layer, to a point where a hole in the Antarctic ozone layer was discovered in the mid 1980s. Thanks to the 1989 Montreal Protocol, now signed by 196 countries, global CFC production has been phased out. As a result, scientists have observed over the past decade that ozone depletion has largely halted and they now expect it to fully reverse, and the ozone hole to close by midcentury.

International efforts are successfully limiting ozone depletion now

Woollacott 10

Emma Woollacott, Science analyst, 9-20-2010, “Ozone layer is recovering, says UN,” TG Daily, http://www.tgdaily.com/sustainability-features/51619-ozone-layer-is-recovering-says-un

The ozone layer is regenerating, and could be back up to strength by the middle of the century, according to a UN report. It concludes that international efforts such as the Montreal Protocol are successfully protecting the ozone layer, which protects life on Earth from harmful levels of ultraviolet rays. The report, titled Scientific Assessment of Ozone Depletion 2010, was written and reviewed by around 300 scientists and is the first comprehensive update in four years.

Human-induced ozone depletion is decreasing now

Woollacott 10

Emma Woollacott, Science analyst, 9-20-2010, “Ozone layer is recovering, says UN,” TG Daily, http://www.tgdaily.com/sustainability-features/51619-ozone-layer-is-recovering-says-un

The Montreal Protocol, it says, is working. "It has protected the stratospheric ozone layer from much higher levels of depletion by phasing out production and consumption of ozone depleting substances," says the report. Almost 100 substances once used in refrigerators, aerosols and other products have been phased out.

Ozone DA—UQ

Current number of launches sufficiently low to protect ozone

Ross and Zittel, ’00 – Environmental Systems Directorate, leads research on the stratospheric impact of Air Force launch vehicles; and Remote Sensing Department, leads research on the radiative and chemical properties of rocket plumes

[Martin N. Ross and Paul F. Zittel, Rockets and the Ozone Layer

Crosslink Aerospace, Summer 2000, http://www.aero.org/publications/crosslink/summer2000/01.html]

The data and conclusions from the RISO program reinforce a presumption that rocket emissions do not seriously threaten the ozone layer at the present time. However, as the space transportation industry grows, as new launch systems are introduced, and as the ozone layer recovers from past damage caused by now-banned substances, the effect of rocket emissions on stratospheric ozone is likely to become a more visible issue. The space transportation community should continue to support scientific research efforts to fully understand the impact of rocket-propulsion systems on the composition of Earth's natural umbrella, the ozone layer.

Ozone DA—UQ/Link

CFC emissions down now—Launches “skyrocket” CFC rates (pun, intended) ☺

Minard, ‘9

[Anne Minard, Rocket Launches Damage Ozone Layer, Study Says, National Geographic News

April 14, 2009, http://news.nationalgeographic.com/news/2009/04/090414-rockets-ozone.html]

Plumes from rocket launches could be the world's next worrisome emissions, according to a new study that says solid-fuel rockets damage the ozone layer, allowing more harmful solar rays to reach Earth. Thanks to international laws, ozone-depleting chemicals such as chlorofluorocarbons (CFCs) and methyl bromide have been slowly fading from the atmosphere. But when solid-fuel rockets launch, they release chlorine gas directly into the stratosphere, where the chlorine reacts with oxygen to form ozone-destroying chlorine oxides. Increased international space launches and the potential commercial space travel boom could mean that rockets will soon emerge as the worst offenders in terms of ozone depletion, according to the study, published in the March issue of the journal Astropolitics. If the space tourism industry alone follows market projections, rocket launches are "going to run up against Montreal Protocol," said study co-author Darin Toohey of the University of Colorado at Boulder. The Montreal Protocol on Substances that Deplete the Ozone Layer, an international treaty, prescribes measures intended to hasten the recovery of Earth's depleted ozone layer.

Launches change the ozone in the short and long term

Ross and Zittel, ’00 – Environmental Systems Directorate, leads research on the stratospheric impact of Air Force launch vehicles; and Remote Sensing Department, leads research on the radiative and chemical properties of rocket plumes

[Martin N. Ross and Paul F. Zittel, Rockets and the Ozone Layer

Crosslink Aerospace, Summer 2000, http://www.aero.org/publications/crosslink/summer2000/01.html]

Both solid and liquid rocket-propulsion systems emit a variety of gases and particles directly into the stratosphere. A large percentage of these emissions are inert chemicals such as carbon dioxide that do not directly affect ozone levels. Emissions of other gases, such as hydrogen chloride and water vapor, though not highly reactive, indirectly affect ozone levels by participating in chemical reactions that determine the concentrations of the ozone-destroying radicals in the global stratosphere. A small percentage of rocket- engine emissions, however, are highly reactive radical compounds that immediately attack and deplete ozone in the plume wake following launch. Aerosol emissions, such as alumina particles, carbon (soot) particles, and water droplets, can also act as reactive compounds when heterogeneous chemical reactions take place on the surface of these particles. Rocket emissions have two distinct effects on ozone: short-term and long-term. Following launch, rapid chemical reactions between plume gases and particles and ambient air that has been drawn into the plume wake cause immediate changes in the composition of the local atmosphere. During this phase, which lasts for several hours, the concentrations of radicals in the plume can be thousands of times greater than the concentrations found in the undisturbed stratosphere, and the ozone loss is dramatic. Long-term effects occur as gas and particulate emissions from individual launches become dispersed throughout the global stratosphere and accumulate over time. The concentrations of emitted compounds reach an approximate global steady state as exhaust from recent launches replaces exhaust removed from the stratosphere by natural atmospheric circulation.

Ozone DA—Impact (Extinction)

Extinction

Thomas 6

[William Thomas, Investigative Journalist, 8-7-2006, “Scientist Says Chemtrails, Shuttle Launches Endangering Earth,” Chem Trails, http://www.chemtrails911.com/docs/Space%20Shuttle%20Launch-Ozone%20Layer.htm]

A Canadian atmospheric scientist warns that chemtrails, airliners and shuttle launches are weakening the stratosphere and destroying Earth’s ozone layer—threatening all life on Earth. It was one of those messages that phones are notorious for delivering—the kind of call that cancels the sleep and makes flu symptoms worse. But this time, the health of the entire planet was at stake. A concerned Canadian scientist named Neil Finley was on the line to inform me that high-altitude jet traffic, space launches and chemtrails are threatening to destroy not only Earth’s protective radiation shielding—but the stratosphere itself.

Ozone DA—Impacts (Turns Case)

Mass ozone depletion turns the case – leads to a ban on space travel

Foust 9 – Editor of Space Review

Jeff Foust, editor and publisher of The Space Review, 6-15-2009, “Space and (or versus) the environment,” The Space Review, http://www.thespacereview.com/article/1395/1

In an op-ed in last week’s issue of Space News, Ross urged the space industry to address this issue head-on rather than avoid it in the hopes it might go away on its own. “It is clear that the risk of regulation that would cap or even tax space systems according to the amount of ozone depletion they cause is small, but it is real,” he wrote. He added: “Historically, technical activities with high visibility—such as space operations—often excite unpredictable public and regulatory attention. Combined with a lack of scientifically reliable environmental effects data, the risk of idiosyncratic and overly restrictive regulation is high.”

Ozone depletion leads to regulations that collapse the space industry – turn the affirmative

Page 9

Lewis Page, Register Space Staff, 4-1-2009, “Space launches could be capped to save ozone layer,” The Register, pg. A6

Toohey's co-authors include Martin Ross of US government-funded R&D outfit The Aerospace Corporation. He, Toohey and the rest believe that more research is needed into the amount of ozone damage caused by different types of rockets. They argue that, should the ozone layer continue to deplete - or even fail to regenerate as expected - tough new regulations might outlaw the space industry. "Space system development often takes a decade or longer and involves large capital investments," says Ross. "We want to reduce the risk that unpredictable and more strict ozone regulations would be a hindrance to space access by measuring and modelling exactly how different rocket types affect the ozone layer."

Ozone DA – Impacts (Food0

Ozone depletion tanks food production

Thomas 6

William Thomas, Investigative Journalist, 8-7-2006, “Scientist Says Chemtrails, Shuttle Launches Endangering Earth,” Chem Trails, http://www.chemtrails911.com/docs/Space%20Shuttle%20Launch-Ozone%20Layer.htm

The UN environment program estimates that for every 1% thinning of the ozone layer there is a 2% to 3% rise in skin cancer. It can also cause cataracts--even if dark glasses are worn. Since some species are more vulnerable than others, an increase in UV exposure has the potential to cause a shift in species composition and reduce diversity in ecosystems. Excess UV radiation cuts photosynthesis in plants, reducing the size and yield of winter wheat and other crops. Over half of all new cancers are skin cancers. One person dies of melanoma every hour. More than 1 million new cases of skin cancer were diagnosed in the United States in 2004. The incidence of melanoma more than tripled among Caucasians between 1980 and 2003. [Rachel’s Jan 5/87]

Ozone depletion effects all areas of the food chain – drastically changes biodiversity

Bora 10 – MA in Economics

Chandramita Bora, MA in Economics, 2010, “Ozone Layer Depletion: Effects and Causes of Ozone Depletion,” Buzzle, http://www.buzzle.com/articles/ozone-layer-depletion-effects-and-causes-of-ozone-depletion.html

The effects of ozone depletion are not limited to humans only, as it can affect animals and plants as well. It can affect important food crops like rice by adversely affecting cyanobacteria, which helps them absorb and utilize nitrogen properly. Phytoplankton, an important component of the marine food chain, can also be affected by ozone depletion. Studies in this regard have shown that ultraviolet rays can influence the survival rates of these microscopic organisms by affecting their orientation and mobility.

Food shortages lead to war

Xenakis 10

John J, Degree in Math Logic from MIT, mathematician and historian who developed Generational Dynamics, former Technology Editor for InformationWeek magazine and CFO magazine, Food Prices Soar Around the World, Creating Instability, September http://bigpeace.com/jxenakis/2010/09/13/food-prices-soar-around-the-world-creating-instability/

From the point of view of Generational Dynamics, this food crisis is entirely predictable, and will only grow worse. I first started writing about rising food prices in 2004, with “Food: Green revolution v Malthus effect.” In 2005, I wrote “Food prices continue to increase dramatically around the world,” that showed that food prices had been falling for decades, but had started to rise much faster than inflation in the year 2000. The “Malthus effect” is my name for the fact that the population grows faster than the food supply. In a book called An Essay on the Principle of Population published in England in 1798, Thomas Roberts Malthus reached exactly that conclusion. Malthus made some math errors, but his conclusion is basically correct. Malthus also made some social errors. He said that the inevitable result of food shortages would be famines and deaths from starvation. That might be true for “dumb” animals, but societies of “intelligent” human beings do not simply starve to death. Instead, they have food riots, and eventually resort to war to exterminate their neighbors and get their resources, including farmland. That’s built in to the human DNA.

Ozone DA—Impacts (Climate)

Ozone hole drastically increases climate change

Kang 11 – Research Scientist @ Columbia

Sarah Kang, et al, 4-21-2011, “Study Links Ozone Hole to Broader Climate Change,” Columbia University School of Engineering and Applied Science, http://www.engineering.columbia.edu/study-links-ozone-hole-broader-climate-change

But, as Polvani has said, "While the ozone hole has been considered as a solved problem, we're now finding it has caused a great deal of the climate change that's been observed." So, even though CFCs are no longer being added to the atmosphere, and the ozone layer will recover in the coming decades, the closing of the ozone hole will have a considerable impact on climate. This shows that through international treaties such as the Montreal Protocol, which has been called the single most successful international agreement to date, human beings are able to make changes to the climate system.

Ozone DA – AT: Rockets Small Part of Emissions

Even a small amount of rocket pollution can change the ozone

Ross and Zittel, ’00 – Environmental Systems Directorate, leads research on the stratospheric impact of Air Force launch vehicles; and Remote Sensing Department, leads research on the radiative and chemical properties of rocket plumes

[Martin N. Ross and Paul F. Zittel, Rockets and the Ozone Layer

Crosslink Aerospace, Summer 2000, http://www.aero.org/publications/crosslink/summer2000/01.html]

Compared with the mass of all the gas in the stratosphere, the mass of combustion emissions from even the largest rocket is miniscule, so it's easy to conclude that the effect of all rocket launches on the ozone layer must be inconsequential. The ozone layer, however, is maintained by a delicate balance of the production, transport, and destruction of ozone molecules. Relatively small amounts of sufficiently active chemical compounds can upset this balance and cause important changes in the amount and distribution of ozone. Rocket engines produce small amounts of such active compounds.

Small changes in air composition can greatly change the ozone layer

Ross and Zittel, ’00 – Environmental Systems Directorate, leads research on the stratospheric impact of Air Force launch vehicles; and Remote Sensing Department, leads research on the radiative and chemical properties of rocket plumes

[Martin N. Ross and Paul F. Zittel, Rockets and the Ozone Layer

Crosslink Aerospace, Summer 2000, http://www.aero.org/publications/crosslink/summer2000/01.html]

Complicated chemical and physical processes, only partially understood by atmospheric scientists, affect both the amount and distribution of ozone in the stratosphere. In general, ozone is formed in the equatorial stratosphere at altitudes above 30 kilometers. Large-scale winds continuously transport the ozone to lower altitudes and toward Earth's poles to form a layer about 10 kilometers thick, centered at about 22 kilometers altitude. The concentration of ozone is determined by the rate of ozone transport into the layer versus the rate of ozone loss by reaction with ozone-destroying radicals such as the chlorine atom (Cl), nitric oxide (NO), and the hydroxyl radical (OH). Because each radical is able to regenerate after destroying an ozone molecule (called a catalytic cycle), radical molecules exert a major influence on ozone even at the small quantities found in the stratosphere. This means that small changes in stratospheric composition caused by industrial activity, including rocket exhaust, might cause relatively large changes in the ozone layer.

Status quo launches don’t trigger ozone loss – an increase risks mass destruction

UCS 2

The Science of Ozone Depletion, “Union of Concerned Scientists, http://www.ucsusa.org/global\_environment/archive/page.cfm?pageID=551

The solid rocket strap-on motors used in the most powerful space launch systems -- the US space shuttle and the Titan IV, as well as the European Ariane V -- produce copious amounts of HCl and possibly other reactive chlorine-containing exhaust products. Since these strap-on motors burn well into the stratosphere, a significant fraction of their exhaust gases is deposited there. The plume from each launch causes a temporary "mini" ozone hole, although since space launch trajectories are slant paths, the ozone depletion is not stacked up over a single surface point. Current launch levels are so low that the stratospheric chlorine injected by space launches is only a few tenths of a percent of that due to halocarbon decomposition. But if more frequent space launches occur in the future, care should be taken to design more stratospherically benign rocket propulsion systems for both US and foreign launch systems.

Prizes CP 1NC

Text: The United States federal government should offer prizes to private industry to development wireless communications subsystems for launch vehicles.

Moving to wireless communication systems significantly lowers launch costs

Reynolds, ’11

[Jackie DeWayne Reynolds, NASA and Alumni Workers Assoc., Thesis Presented at the 29th International Space Development Conference sponsored by the NSS, May 2011, http://www.linkedin.com/groups/How-Free-Market-Principles-Can-123646.S.54484302?qid=821aa0f2-eaa7-41a4-9bed-3e9670e4afaa&goback=.gmp\_123646]

The holy grail of large-scale commercial space development has long been the reduction of launch costs. Such reduction, it is presumed, would enable cheaper access to space and make private space ventures more attractive to venture capitalists. Unfortunately for advocates of commercial space development, however, the market for access to space is being met at the current price of launch. In a mixed/free market economy like ours, price is determined by the market (oligopolies and monopolies excepted, of course). Without greater demand for access to space, there is no impetus for the market to lower launch costs. But what if launch costs could be lowered indirectly? Power and communication subsystems on average account for about 30% of a payload's total dry weight. A significant launch cost driver is payload weight. By lessening the weight of your payload, you lower the cost of launching your payload. Separating power and communication subsystems from the end-use system will lower the cost of accessing space by reducing the mass and weight of the end-use system. Wireless communication systems are commonplace today and hardly need further explanation in this context. Wireless power transmission, however, is a little different. While the idea and technology has been around for decades, it is only within the last few years that near-field induction has entered the commercial terrestrial markets (see www.witricity.com and www.ecoupled.com). In essense, near-field induction transmits power across induced magnetic fields. By definition near-field induction requires the receiver to be near the power transmitter. In terms of a commercial space venture, this would require the transmitter and receiver to occupy the same orbit. Each transmitter can service multiple ventures in a single orbit, achieving additional savings through economies of scale, as well as by eliminating the expensive and politically arduous task of orbit acquisition for each individual venture. Separating power and communication subsystems from the end-use system, lessening the weight of the payload, and lowering the cost of accessing space by 30% or more, can enable some commercial space ventures. Some commercial space ventures will meet with some success. An immutable law of free-market economics is that success in undeveloped and underdeveloped markets always leads to competition. Competition in a free market translates into greater market demand, which is the force behind greater innovations and lower costs. As costs fall so go barriers to market entry, and the space frontier is, at last, wide open.

Prizes CP 1NC Cont.

Incentives sparks involvement – leads to long term sustainability and reduces launch costs

SEA, ‘11

[The Space Exploration Alliance is a partnership of the nation’s premier non-profit space advocacy organizations, which collectively represent the voices of thousands of people throughout the United States

and from all walks of life, “Space Exploration Project,” 2/27/11, <http://www.google.com/url?sa=t&source=web&cd=9&ved=0CE4QFjAI&url=http%3A%2F%2Fwww.nss.org%2FSEAtalkingpoints-Final-2-27-2011.pdf&ei=z-EATqPHI4jTsgal09y9DQ&usg=AFQjCNGvkr7QPUDphOOwnls-ezBI7ED7Rg&sig2=Ol8P-8GsArvad_C9zFtA3Q>

2. Private Sector: With the impending retirement of the Space Shuttle, and until new American capabilities come on line, the United States will have to rely on the Russian Soyuz for access to the International Space Station (the “ISS”). During this time, we will be paying millions of dollars to the Russian government to launch American astronauts into space. The commercial launch industry must be supported in its efforts to provide American access to the ISS and our national laboratory in space. In addition to sending supplies to ISS, these commercial entities must also be allowed to demonstrate whether they will be capable of sending crews safely to Low Earth orbit as well. Commercial cargo/crew access to Low Earth Orbit would not only provide for full utilization of the Space Station, but it also could lead to dramatic reductions in the price of launches. It would also allow NASA to concentrate on exploration beyond Low Earth Orbit and provide NASA with a higher return on its science/exploration budget. 3. Timelines and Destinations: SEA calls for Congress and the Administration to establish firm timelines and destinations for future human space exploration activities. SEA believes that we should set a goal to send humans to at least one intermediate destination beyond low Earth orbit, such as an asteroid or the Moon, within the next ten years, and for NASA to develop a plan to land It is a vital national imperative for the United States to set our nation’s space program on an ambitious, yet sustainable, path. Only by reaching consensus on our long-term goals in space and the short-term steps needed to achieve those goals can our nation reap the enormous technological and economic benefits of space and maintain our competitiveness as a nation. humans on Mars by no later than 2030. By doing so, the United States will continue to maintain its technological lead in space, rather than abrogating that role to other countries that today have active human spaceflight programs that seek to supplant us. 4. Technology and Applications: SEA supports the focus on research and development of innovative, and enabling technologies, including advanced propulsion, in-space refueling, energy production, and In Situ Resource Utilization (the utilization of indigenous resources on the Moon, asteroids or Mars). These technologies will not only provide the means to explore space, but will also lead to numerous and groundbreaking applications which will improve life on Earth and will also benefit our national competitiveness. SEA calls on NASA to define and prioritize the most promising technology concepts to advance human space exploration. 5. Sustainability: Our future path in space, if it is to succeed, requires a sustained, generational commitment to NASA's long-term mission. It also requires incentives for private sector and international participation. SEA acknowledges the financial constraints under which the U.S. government will be operating over the next few years. Tax dollars should be spent wisely, which is why we are making these requests. The Space Exploration Alliance looks forward to continuing to work with Congress and the Administration to guarantee that the United States remains the leader in space exploration and development. As we lead the way into the solar system, new American growth industries will be spawned, our nation’s youth will be inspired to pursue careers in math, science, and engineering, and our country will enjoy a re-invigoration of its economy. The United States must not allow itself to be left behind.

Prizes CP 1NC Cont.

NASA funding is a Zero-Sum game—Turns the case

Robinson 8 - assistant professor of history at Hillyer College

(Michael Robinson, 7/27/08, http://hnn.us/node/51386]

But Wellman’s story is worth taking seriously, especially as the United States gears up to replace the aging shuttle fleet. NASA’s course, like Wellman’s, has been shaped by tragic events. The destruction of Challenger in 1986 and Columbia in 2003 brought about much soul searching, and strengthened the agency’s commitment to safety. Yet NASA has focused most of its attention on improving the methods of exploration, rather than assessing its merits. Like Wellman, they have chosen to honor their fallen comrades by focusing on the construction of better machines, not the development of better missions. Consider President Bush’s 2004 speech “A Renewed Spirit of Discovery,” in which he lays out his vision for the U.S. space program. The document runs a little over 1400 words. Boiled down, it says this: send Americans back into space, first to the moon, then Mars. NASA now proceeds accordingly, gearing up, as Americans did a century ago, to send very brave people to very distant places. But space exploration is a **zero-sum game**. Sending astronauts to Mars (a planet now studied quite efficiently by rovers, orbiters, and, as of late May, the Phoenix Lander) requires an enormous investment that will come at the expense of smaller, **more useful, scientific projects**. Already NASA plans to cut millions of dollars from the space science budget over the next five years. The savings will help **cover a portion** of the staggering costs of the “Constellation Program,” an initiative to design and produce a new generation of launch vehicles (Ares) and crew exploration vehicles (Orion). A manned mission to Mars, if it happens, will be a dazzling event guaranteed to keep us glued to our televisions. But symbolism alone cannot carry the U.S. space program forward. One hundred years ago, Americans faced the same dilemma on the Arctic frontier. In their relentless pursuit of the North Pole, explorers had abandoned science. After Robert Peary claimed the discovery of the North Pole in 1909, American scientists breathed a sigh of relief. Finally, scientific exploration of the Arctic could begin in earnest. Franz Boas, professor of anthropology at Columbia University, expressed the mood of scientists then, but he could have been expressing the opinion of many scientists now. “We must not forget that the explorer is not expected merely to travel from one point to another, but that we must expect him also to see and to observe things worth seeing.”

Prizes CP 1NC Cont.

Avoids Politics—Political support for NASA is in decline --

Thompson, ‘11

[Loren, Chief Financial Officer – Lexington Institute, “Human Spaceflight”, 4/2011, <http://www.lexingtoninstitute.org/library/resources/documents/Defense/HumanSpaceflight-Mars.pdf>]

The National Aeronautics and Space Administration’s human spaceflight program is one of the greatest scientific achievements in history. However, the program has been slowly dying since the Challenger Space Shuttle disaster 25 years ago. Faltering political support, failed technologies and competing claims on an under-funded federal budget have made it difficult to sustain a coherent program from administration to administration. The Obama Administration has offered a bold plan for nudging human spaceflight out of its decaying orbit, but the plan received only mixed support in Congress and looks unlikely to sustain political momentum over the long term. Although NASA consumes less than one-percent of the federal budget, it does not connect well with the current economic or social agendas of either major political party. The broad support for the human spaceflight program early in its history was traceable largely to the ideological rivalry between America and Russia that produced the Moon race. Today, no such external driver exists to sustain support of human spaceflight across the political spectrum. The program therefore must generate some intrinsic rationale -- some combination of high purpose and tangible benefit -- to secure funding. Recent efforts at generating a compelling rationale, such as the “flexible path” and “capabilitiesdriven” approaches currently favored by the space agency, are inadequate. They do not resonate with the political culture. In the current fiscal and cultural environment, there is only one goal for the human spaceflight program that has a chance of capturing the popular imagination: Mars. The Red Planet is by far the most Earth-like object in the known universe beyond the Earth itself, with water, seasons, atmosphere and other features that potentially make it habitable one day by humans. In addition, its geological characteristics make it a potential treasure trove of insights into the nature of the solar system -- insights directly relevant to what the future may hold for our own world. And Mars has one other key attraction: it is reachable. Unlike the hundreds of planets now being discovered orbiting distant stars, astronauts could actually reach Mars within the lifetime of a person living today, perhaps as soon as 20 years from now. This report makes the case for reorienting NASA’s human spaceflight program to focus on an early manned mission to Mars. It begins by briefly reviewing the history of the human spaceflight program and explaining why current visions of the program’s future are unlikely to attract sustained political support. It then describes the appeal of Mars as an ultimate destination, and the range of tangible benefits that human missions there could produce. It concludes by describing the budgetary resources and scientific tools needed to carry out such missions. The basic thesis of the report is that human missions to Mars can be accomplished within NASA’s currently projected budgets; that proposed missions to other destinations such as near-Earth asteroids should be reconfigured as stepping-stones to the ultimate goal of the Red Planet; and that if Mars does not become the official goal of the human spaceflight program, then the program will effectively be dead by the end of the current decade.

Prizes CP—Wireless Decreases Launch Costs

Wireless tech dramatically lowers costs

Reynolds, ‘11

[Jackie DeWayne Reynolds, NASA and Alumni Workers Assoc., Renewing the Dream, Thesis Presented at the 29th International Space Development Conference sponsored by the NSS, May 2011,

http://www.linkedin.com/news?viewArticle=&articleID=531236906&gid=123646&type=member&item=54484302&articleURL=http://renewingthedream.com&urlhash=U64g&goback=.gmp\_123646.gde\_123646\_member\_54484302

Another way to lower launch cost is to separate the power and communication subsystems from the end-use system. Power and communication subsystems are major components of a space system‘s size, mass, technical complexity, and cost. In fact, those two subsystems account for almost 40 percent of a space system‘s total dry weight on average (Appendix B). The total weight of the ACT Satellite, for example, is 1,270 kilograms. It would cost more than $15 million to launch the satellite using a Delta II rocket (12,000/kg; Appendix A). Removing the weight of the power and communication subsystems (almost 500 kilograms) saves $6 million from launch cost alone. In a beam-power system, the central power system is coupled with a power transmitter to send the power to a remote user, who has replaced the onboard power source with a receiver (Bamberger 1989). A system of outsourced (or orbit-sourced) power and communication infrastructure can scale its capacity to support growing load requirements, while extending its ability to meet the increasingly complex needs of a maturing customer base. Separating the power and communication subsystems from the end-use system can lead to other savings, too. For example, in the early stages of commercial space development, it can eliminate the often expensive and always politically difficult task of orbit allocation, as each end-user will co-occupy the same orbit as the power and communication transmitter. Ground support costs are also reduced because the cost of power and communication subsystem upkeep is already factored into the price of accessing those subsystems, leaving each end-user time to focus on its specific mission.

Prizes CP—Avoids Politics

New GOP Congress shifts the political wind against NASA.

Logsdon, 11 - Space Policy Institute, Elliott School of International Affairs, George Washington University

[John Logsdon, “A new US approach to human spaceﬂight?,” Space Policy, February 2011, Science Direct Database]

To complicate matters even further, the November elections resulted in a shift of party control to Republican leadership in the House of Representatives and a reduced Democrat majority in the Senate. Many Republicans are making reduction in government spending a top priority issue. If the NASA appropriation is not approved until the new Congress convenes in January 2011, NASA could face budget reductions below what the Congress has authorized, making it even more difﬁcult to move forward with what remains of the new human spaceﬂight strategy.

Politics Links—Plan Unpop

Congress wants NASA to build its own rocket

Moskowitz ‘11 – senior writer for Live Science and Space.com (Clara, “55 Space Leaders to Congress: Support Private Spaceflight Now”, 3/3/11, http://www.space.com/11021-nasa-budget-congress-commercial-spaceflight.html]

A group of more than 55 space leaders is petitioning Congress to support commercial spaceflight in an open letter this week. The plea comes as lawmakers are debating a new federal budget, including the question of how much money to devote to NASA. President Obama and NASA chief Charlie Bolden are advocating for more funds to spur the development of private spaceships to replace the iconic space shuttle as the flagship of U.S. astronaut transportation to the International Space Station. That plan, they say, would allow NASA to invest in a longer-term project to build a rocket that can carry astronauts beyond low-Earth orbit to asteroids and Mars. But some members of Congress want NASA to spend less on commercial spaceflight and divert those funds to building its own next-generation spacecraft. [What Obama and Congress Should Do for Spaceflight] The signatories of the new letter, which is dated March 1, come out firmly for the former plan. "By creating competition, and using fixed price contracts, NASA’s commercial crew program offers a much less expensive way of transporting NASA astronauts to the station than any other domestic means," they wrote. "Funding NASA’s Commercial Crew program would lower the cost of access to low Earth orbit, thus enabling more of NASA’s budget to be applied to its focus on exploration beyond low Earth orbit."

Plan unpopular—diverts from NASA heavy-rocket development

MSNBC, ‘11

[MSNBC, 1/13/11, http://www.msnbc.msn.com/id/41065824/ns/technology\_and\_science/t/nasa-congress-spar-over-heavy-lift-rocket/]

The NASA report, mandated by an authorization bill that became law last October, drew a tart response on Thursday from two leading senators who helped push the bill through Congress. Sen. Bill Nelson, D-Fla., and Sen. Kay Bailey Hutchinson, R-Texas, told NASA Administrator Charles Bolden in a letter that the law "is not an optional, advisory document." They told NASA that plans to build a heavy-lift rocket and a new space capsule to carry astronauts by the end of 2016 "should be carried out, unless the agency can demonstrate why they are infeasible or impossible to perform." The NASA Authorization Act of 2010 directed the space agency to get started this year on a multipurpose crew exploration vehicle and a heavy-lift rocket initially capable of hauling 70 to 100 metric tons of payload to orbit. The law gave NASA 90 days to produce a heavy-lift launch vehicle study.