### Cold Fusion PIC

#### Production of cold fusion has begun – NASA is developing commercial tech for widespread usage.

Anthony 13 Sebastian “NASA’s cold fusion tech could put a nuclear reactor in every home, car, and plane” ExtremeTech February 22nd 2013 <http://www.extremetech.com/extreme/149090-nasas-cold-fusion-tech-could-put-a-nuclear-reactor-in-every-home-car-and-plane> JW

The cold fusion dream lives on: NASA is developing cheap, clean, low-energy nuclear reaction (LENR) technology that could eventually see cars, planes, and homes powered by small, safe nuclear reactors. When we think of nuclear power, there are usually just two options: fission and fusion. Fission, which creates huge amounts of heat by splitting larger atoms into smaller atoms, is what currently powers every nuclear reactor on Earth. Fusion is the opposite, creating vast amounts of energy by fusing atoms of hydrogen together, but we’re still many years away from large-scale, commercial fusion reactors. (See: 500MW from half a gram of hydrogen: The hunt for fusion power heats up.) A nickel lattice soaking up hydrogen ions in a LENR reactorLENR is absolutely nothing like either fission or fusion. Where fission and fusion are underpinned by strong nuclear force, LENR harnesses power from weak nuclear force — but capturing this energy is difficult. So far, NASA’s best effort involves a nickel lattice and hydrogen ions. The hydrogen ions are sucked into the nickel lattice, and then the lattice is oscillated at a very high frequency (between 5 and 30 terahertz). This oscillation excites the nickel’s electrons, which are forced into the hydrogen ions (protons), forming slow-moving neutrons. The nickel immediately absorbs these neutrons, making it unstable. To regain its stability, the nickel strips a neutron of its electron so that it becomes a proton — a reaction that turns the nickel into copper and creates a lot of energy in the process. The key to LENR’s cleanliness and safety seems to be the slow-moving neutrons. Whereas fission creates fast neutrons (neutrons with energies over 1 megaelectron volt), LENR utilizes neutrons with an energy below 1eV — less than a millionth of the energy of a fast neutron. Whereas fast neutrons create one hell of a mess when they collide with the nuclei of other atoms, LENR’s slow neutrons don’t generate ionizing radiation or radioactive waste. It is because of this sedate gentility that LENR lends itself very well to vehicular and at-home nuclear reactors that provide both heat and electricity. According to NASA, 1% of the world’s nickel production could meet the world’s energy needs, at a quarter of the cost of coal. NASA also mentions, almost as an aside, that the lattice could be formed of carbon instead of nickel, with the nuclear reaction turning carbon into nitrogen. “You’re not sequestering carbon, you’re totally removing carbon from the system,” says Joseph Zawodny, a NASA scientist involved with the work on LENR. So why don’t we have LENR reactors yet? Just like fusion, it is proving hard to build a LENR system that produces more energy than the energy required to begin the reaction. In this case, NASA says that the 5-30THz frequency required to oscillate the nickel lattice is hard to efficiently produce. As we’ve reported over the last couple of years, though, strong advances are being made in the generation and control of terahertz radiation. Other labs outside of NASA are working on cold fusion and LENR, too: “Several labs have blown up studying LENR and windows have melted,” says NASA scientist Dennis Bushnell, proving that “when the conditions are ‘right’ prodigious amounts of energy can be produced and released.” I think it’s still fairly safe to say that the immediate future of power generation, and meeting humanity’s burgeoning energy needs, lies in fission and fusion (See: Nuclear power is our only hope.) But who knows: With LENR, maybe there’s hope for cold fusion yet.

#### Cold fusion technology is advancing rapidly.

NET 3/28 (New Energy Treasure) “Race to Commercialize Cold Fusion Is Afoot” March 18th 2016 <https://newenergytreasure.com/2016/03/18/race-to-commercialize-cold-fusion-is-afoot/> JW

There’s a tight race going on to commercialize Cold Fusion / LENR (Low Energy Nuclear Reactions) technologies. The two most prominent people involved are Randell Mills and Andrea Rossi, and it seems Rossi is the man in the lead. He’s made the most progress so far. He developed a device called an E-Cat (Energy Catalyzer), which converts electricity to heat at a minimum efficiency of 500%, or a COP (Coefficient of Performance) of 6. That is, 6 times more energy out than in. The first version of the E-Cat operated at low temperatures enough to turn water into steam, was made of stainless steel, had an external tank supplying hydrogen, and was surrounded by Lead. As the temperature rose, the lead would melt and reflect the X-radiation back, creating terahertz radiation which would in turn increase the efficiency of the system. The next version, the E-Cat HT (high temperature), operated at much higher temperatures of above 1 400°C. Enough to melt steel, so it was instead made of Alumina (a type of clay). It had a permanently sealed reaction chamber with powder fuel and therefore no external hydrogen feed. A 3rd party independent test of this unit was performed in 2014 by Professors from the University of Bologna in Italy. This test lasted a full 32 days. The entire test ran on only 1 gram of fuel and produced over 1.5 MWh of energy throughout the duration of the test, in a volume of only 0.063 liters. This represents an amazing power density of 1.6 GWh/kg. Even more amazing, the test was shut down before the 1 gram of fuel was even consumed. Theoretically, the fuel could last a year. A 1 MW plant was then created, comprised of numerous E-Cat HTs and was installed at a client’s premises for testing purposes. An independent ERV (Expert Responsible for Validation) monitored the system performance, power output vs input, and so forth. This ran for an entire year (350 days) without incident and ended on 17 February 2016. The ERV’s report is now being prepared and should be revealed in a month’s time. Progress did not end there, however. After the E-Cat HT, Andrea Rossi developed a more advanced version of the E-Cat, called the E-Cat X, that can directly produce light and electricity. Including ultraviolet radiation for purposes such as water purification. These units have the ability to output only electricity but with a slight trade off on efficiency. This is much like Fuel Cells, where a combination of heat and electricity in SOFCs (Solid Oxide Fuel Cells) has the highest efficiency. Rossi has managed to miniaturize the E-Cat X and called the small module an E-Cat Quark X. This small unit has only a 100 watt rating. However, 10 of these can be combined to form a 1 KW unit, and these 1 KW units can then be combined to form larger units up to GWs in capacity. Much the same as Lithium Ion batteries and Fuel Cells. He has said he’s about to announce some big news about the E-Cat Quark X. Big news arriving soon. There’s also the possibility of a low power E-Cat lamp made using metals like cesium or rubidium that melt at the temperature of the human body. The device would be switched on by simply grasping it in one hand for a few seconds until the nuclear reaction starts. Then you release it and the reaction will self-sustain, producing light for a few hours before needing another re-ignition by the same principle of holding it in your hand. To switch it off, just dip it in water. Cost of the cesium and rubidium might prove prohibitive but we shall see.

#### Thus, the counterplan text:

#### Countries will prohibit the production of nuclear power except for Low Energy Nuclear Reaction technologies.

#### First net benefit is global warming.

#### Cold fusion technology is rapidly advancing and will be commercially viable soon. It has no radiation or waste and will solve global warming.

Bailey and Borwein 15 David H. Bailey (Lawrence Berkeley National Lab (retired) and University of California, Davis) and Jonathan Borwein (Laureate Professor of Mathematics, University of Newcastle, Australia) “Cold Fusion Heats Up: Fusion Energy and LENR Update” The Huffington Post August 28th 2015 <http://www.huffingtonpost.com/david-h-bailey/post_10010_b_8052326.html> JW

The world faces a grim future if we do not immediately rein in consumption of fossil fuels. Risks include rising sea levels, more frequent extreme temperatures, flooding, drought and conflicts among human societies. An eventual sea level rise of 6 meters now seems pretty much assured. Additionally, July 2015 is now officially the hottest single month in recorded history. In spite of these truly sobering developments, some are seeing rays of hope. Prices of solar photovoltaic panels have dropped considerably. Observers predicted in 2000 that wind-generated power worldwide would reach 30 GWatts by 2010; it exceeded 200 GWatts, and by 2014 it was 370 GWatts. These developments have led some, such as former U.S. Vice President Al Gore, to be cautiously optimistic. Nonetheless, there is still an enormous gap between current carbon consumption and where we need to be (some argue that we must zero out carbon emissions altogether, and soon). While solar photovoltaic and wind systems are a great boon for green energy, nonetheless they still are reliant on the whims of weather and geography. And as for battery systems, in spite of advances such as those reported by Elon Musk, they are far from being a practical means for utility-scale storage of electrical energy. Fusion energy? Against this backdrop, some have been taking another look at fusion energy, the energy that powers the sun. Fusion, unlike fission reactions used in conventional nuclear reactors, need not emit dangerous radiation, nor do they produce radioactive byproducts. Scientists have been feverishly working for decades to develop a practical way to contain this energy, which traditionally is thought to mean that we must confine some hydrogen (or deuterium) fuel, either in a “magnetic bottle” or by inertial confinement, then heat it to millions of degrees Celsius. Despite the expenditure, over sixty years, of billions of dollars and euros by large government-funded laboratories, this goal has proved highly elusive. Yet lately a few research teams at universities, national laboratories and private corporations are reporting notable progress, as we briefly reported in two earlier HuffPost articles (#1 and #2). Here is an update on these projects, plus another report that just appeared in the last few days. The U.S. aerospace firm Lockheed Martin plans to build a 100-megawatt nuclear fusion reactor only about 2 meters by 3 meters (seven feet by 10 feet) in size, i.e., small enough to fit on the back of a large truck. They claim that the first reactors of this design could be ready for commercial use in just ten years. Sadly, no technical details are yet available, and so the scientific community has no way of assessing the merits of their approach. The “new kid on the block” is Tri Alpha Energy, which has been pursuing a hot fusion reactor at a secretive facility in California. They have now reported constructing a prototype machine that can heat a plasma of hydrogen fuel to 10 million degrees Celsius, then confine it for 5 milliseconds. They employ what they call a “field-reversed configuration,” which has been known since the 1960s, but until now has never been able to confine the plasma more than a fraction of a millisecond. Another firm pursuing hot fusion is Energy/Matter Conversion Corporation in San Diego, California. Low Energy Nuclear Reaction (LENR) projects Most scientists believe that “cold fusion” died in 1989, when researchers were unable to reproduce the claims of Fleischmann and Pons of the University of Utah. At least one observer referred to cold fusion as the scientific fiasco of the [20th] century. Yet in spite of this criticism, a few researchers have pressed forward, and in the past year or two have attracted significant positive attention, referring to their work as “Low Energy Nuclear Reaction” (LENR) technology. One private firm in the area is Brillouin Energy Corp. of Berkeley, California, where researchers are developing what they term a controlled electron capture reaction (CECR) process. In their experiments, ordinary hydrogen is loaded into a nickel lattice, and then an electronic pulse is passed through the system, using a proprietary control system. They claim that their device converts H-1 (ordinary hydrogen) to H-2 (deuterium), then to H-3 (tritium) and H-4 (quatrium), which then decays to He-4 and releases energy. They report that they have confirmed H-3 production in their process. Additional technical details are given at the Brillouin Energy website, and in a patent application. Their patent application reads, in part, “Embodiments generate thermal energy by neutron generation, neutron capture, and subsequent transport of excess binding energy as useful heat for any application.” Rossi and Industrial Heat, LLC Perhaps the most startling (and most controversial) report is by an Italian-American engineer-entrepreneur named Andrea Rossi. Rossi claims that he has developed a tabletop reactor that produces heat by an as-yet-not-fully-understood LENR process. Rossi has gone well beyond laboratory demonstration; he claims that he and the private firm Industrial Heat, LLC of Raleigh, North Carolina, USA, have actually installed a working system at an (undisclosed) commercial customer’s site. According to Rossi and a handful of others who have observed the system in operation, it is producing 1 MWatt continuous net output power, in the form of heat, from a few grams of “fuel” in each of a set of modest-sized reactors in a network. The system has now been operating for approximately six months, as part of a one-year acceptance test. Rossi and IH LLC are in talks with Chinese firms for large-scale commercial manufacture. Several “reliable sources” have visited Rossi’s commercial site, and have verified that the system is working as claimed, as evidenced, for example, by the customer’s significantly reduced electric bills. On the downside, from a scientific point view, Rossi’s work leaves much to be desired, to say the least. Rossi remains tight-lipped as to technical details, preferring to protect his company’s intellectual property through silence. However, a few details have now come to light. For example, Rossi was just granted a patent by the U.S. Patent Office. The patent includes some heretofore unknown details, such as the contents of the “fuel” in Rossi’s reactors: it is a powder of 50% nickel, 20% lithium and 30% lithium aluminum hydride. Replications of Rossi’s work Given that Rossi has been unwilling to divulge many details, several other research teams have been working largely independently with similar experimental designs. In October 2014, a team of Italian and Swedish researchers released a paper entitled Observation of abundant heat production from a reactor device and of isotopic changes in the fuel. This paper claimed substantial power output, with a “coefficient of performance” (ratio of output heat to input power) of up to 3.6. The experiment was performed at an independent laboratory in Lugano, Switzerland. The most intriguing results in the 2014 Lugano paper are the before-and-after analyses of the “fuel,” which found an “isotopic shift” had occurred in this material. In particular, the team found that lithium-7 had changed into lithium-6, and that nickel-58 and nickel-60 had changed to nickel-62. This is based on two different types of mass spectrometry measurements, using state-of-the-art equipment. These changes can only be due to nuclear reactions of some sort — not conventional chemistry. The Lugano team is reportedly working on a new experiment, independent of Rossi, but as yet no details are known. Another research team performing Rossi-type experiments is headed by the Russian physicist Alexander Parkhomov. He and others working with him report observing excess heat with a Rossi-type reactor running at 1347 degrees Celsius, with a coefficient of performance of 3.0. They also report observing excess heat in at least ten other experiments of this type to date. Implications The present authors are as perplexed as anyone by these developments. As we observed in an earlier HuffPost article, Rossi’s work in particular leaves us with three stark choices: (a) Rossi and those working with him or independently have made some fundamental and far-reaching blunder in their experimental work; (b) Rossi is leading a conspiracy of sorts to cover dishonest scientific behavior; or (c) Rossi has made an important discovery with sweeping potential impact. With each passing month, and with more researchers finding similar results, (a) and (b) look less likely. On the other hand, skepticism is certainly still in order until Rossi comes forward with more details on the designs and control techniques used in his system. Needless to say, the stakes are very high, for any or all of these projects. Among the potential impacts are: An environmental windfall — enabling a dramatic and rapid conversion of existing coal- and gas-burning electric power plants to a “green” source with minimal fuel costs. Potential applications even in transportation, water purification, small businesses and homes. Most likely, a further dramatic drop in oil prices worldwide. Financial repercussions; according to a new recent report, at least one-half trillion dollars of bonds are at risk if oil prices drop further. Political repercussions; already Saudi Arabia is having great difficulty keeping its economy afloat with the current drop in oil prices and its own longer term goals. One way or the other, whether these effects are confirmed (and large commercial enterprises engage) or refuted, the next few months promise to make a very interesting chapter in the history of science. Hold on to your hats!

#### Coal emissions are driving global warming.

ASLJ 9 Arizona State Law Journal 9. Copyright (c) 2009 Arizona State Law Journal Arizona State Law Journal Spring, 2009 ARIZONA STATE LAW JOURNAL 41 Ariz. St. L.J. 315. NP 8/18/16.

Each fossil fuel energy source also has its individual harms. Coal is the most popular electricity source in the United States, accounting for over fifty percent of the country's electricity. n26 Unfortunately, coal is also the dirtiest and most environmentally harmful energy source. Coal plants produce carbon dioxide, sulfur dioxide, and other emission**s** that accumulate [\*322] in the upper atmosphere, breathing air, water, and soil. n27 Specifically, coal plants produce approximately **t**hree-fifths of U.S. sulfur dioxide emissions, one-third of mercury emissions, one-quarter of nitrogen oxide emissions, and one-third of carbon dioxide air emissions. n28 Of all energy sources, therefore, coal contributes to global warming and pollution's environmental and health concerns to the greatest degree.

#### Warming is real, anthropogenic, and causes extinction.

Jamail 15 Dahr “Mass Extinction: It's the End of the World as We Know It” July 6 2015 Truthout <http://www.truth-out.org/news/item/31661-mass-extinction-it-s-the-end-of-the-world-as-we-know-it> JW

Guy McPherson is a professor emeritus of evolutionary biology, natural resources and ecology at the University of Arizona, and has been a climate change expert for 30 years. He has also become a controversial figure, due to the fact that he does not shy away from talking about the possibility of near-term human extinction. While McPherson's perspective might sound like the stuff of science fiction, there is historical precedent for his predictions. Fifty-five million years ago, a 5-degree Celsius rise in average global temperatures seems to have occurred in just 13 years, according to a study published in the October 2013 issue of the Proceedings of the National Academy of Sciences. A report in the August 2013 issue of Science revealed that in the near term, earth's climate will change 10 times faster than during any other moment in the last 65 million years. McPherson fears that we are well along in the process of causing our own extinction. Prior to that, the Permian mass extinction that occurred 250 million years ago, also known as the "Great Dying," was triggered by a massive lava flow in an area of Siberia that led to an increase in global temperatures of 6 degrees Celsius. That, in turn, caused the melting of frozen methane deposits under the seas. Released into the atmosphere, those gases caused temperatures to skyrocket further. All of this occurred over a period of approximately 80,000 years. The change in climate is thought to be the key to what caused the extinction of most species on the planet. In that extinction episode, it is estimated that 95 percent of all species were wiped out. Today's current scientific and observable evidence strongly suggests we are in the midst of the same process - only this time it is anthropogenic, and happening exponentially faster than even the Permian mass extinction did. In fact, a recently published study in Science Advances states, unequivocally, that the planet has officially entered its sixth mass extinction event. The study shows that species are already being killed off at rates much faster than they were during the other five extinction events, and warns ominously that humans could very likely be among the first wave of species to go extinct. So if some feel that McPherson's thinking is extreme, when the myriad scientific reports he cites to back his claims are looked at squarely and the dots are connected, the perceived extremism begins to dissolve into a possible, or even likely, reality. The idea of possible human extinction, coming not just from McPherson but a growing number of scientists (as well as the aforementioned recently published report in Science), is now beginning to occasionally find its way into mainstream consciousness. "A Child Born Today May Live to See Humanity's End, Unless ..." reads a recent blog post title from Reuters. It reads: Humans will be extinct in 100 years because the planet will be uninhabitable, according to Australian microbiologist Frank Fenner, one of the leaders of the effort to eradicate smallpox in the 1970s. He blames overcrowding, denuded resources and climate change. Fenner's prediction is not a sure bet, but he is correct that there is no way emissions reductions will be enough to save us from our trend toward doom. And there doesn't seem to be any big global rush to reduce emissions, anyway. McPherson, who maintains the blog "Nature Bats Last," told Truthout, "We've never been here as a species and the implications are truly dire and profound for our species and the rest of the living planet." Truthout first interviewed McPherson in early 2014, at which time he had identified 24 self-reinforcing positive feedback loops triggered by human-caused climate disruption. Today that number has grown to more than 50, and continues to increase. A self-reinforcing positive feedback loop is akin to a "vicious circle": It accelerates the impacts of anthropogenic climate disruption (ACD). An example would be methane releases in the Arctic. Massive amounts of methane [is] are currently locked in the permafrost, which is now melting rapidly. As the permafrost melts, methane - a greenhouse gas 100 times more potent than carbon dioxide on a short timescale - is released into the atmosphere, warming it further, which in turn causes more permafrost to melt, and so on. As soon as this summer, we are likely to begin seeing periods of an ice-free Arctic. (Those periods will arrive by the summer of 2016 at the latest, according to a Naval Postgraduate School report.) Once the summer ice begins melting away completely, even for short periods, methane releases will worsen dramatically. Is it possible that, on top of the vast quantities of carbon dioxide from fossil fuels that continue to enter the atmosphere in record amounts yearly, an increased release of methane could signal the beginning of the sort of process that led to the Great Dying? McPherson, like the scientists involved in the recent study that confirms the arrival of the sixth great extinction, fears that the situation is already so serious and so many self-reinforcing feedback loops are already in play that we are well along in the process of causing our own extinction. Furthermore, McPherson remains convinced that it could happen far more quickly than generally believed possible - in the course of just the next few decades, or even sooner.

#### Second net benefit is economy. Chinese economic slowdown will threaten the global economy.

Ahmed 9/26 Kamal “China slowdown is global economy's biggest threat, Rogoff says” September 26th 2016 BBC <http://www.bbc.com/news/business-37468566> JW

The former chief economist of the International Monetary Fund has told the BBC a slowdown in China is the greatest threat to the global economy. Ken Rogoff said a calamitous "hard landing" for one of the main engines of global growth could not be ruled out. "China is going through a big political revolution," he said. "And I think the economy is slowing down much more than the official figures show," Mr Rogoff added: "If you want to look at a part of the world that has a debt problem look at China. They've seen credit fuelled growth and these things don't go on forever." British exposure Last week, the Bank of International Settlements, the global think tank for central banks, said that China's credit to GDP "gap" - which analyses the amount of debt in an economy relative to annual growth - stood at 30.1%, increasing fears that China's economic boom was based on an unstable credit bubble. The figure was described as "very high by international standards" by the Financial Policy Committee of the Bank of England, which will now test British banks' exposure to a Chinese slowdown. British banks have $530bn worth of lending and business in China, including Hong Kong. That is about 16% of all foreign assets held by UK banks. 'A worry' "Everyone says China's different, the state owns everything they can control it," Mr Rogoff, now Professor of Economics at Harvard, said. "Only to a point. It's definitely a worry, a hard landing in China. 100 YuanImage copyrightGETTY IMAGES "We're having a pretty sharp landing already and I worry about China becoming more of a problem. "We've taken it for granted that whatever Europe's doing, Japan's doing - at least China's moving along and there isn't really a substitute for China. "I think India may come along some day but it's fallen so far behind in size it's not going to compensate." 'Nervous' Mr Rogoff said that European economies and the US had to ensure they were "on their feet" before any slowdown started to bite. "The IMF has marked down its forecasts of global growth nine years in a row and certainly the rumour is they're about to do it again," he said. Beyond China, Mr Rogoff said there was a good deal of uncertainty in the world over issues such as whether Donald Trump or Hillary Clinton will win the US presidential election.

#### Cold fusion will create a global economic boom.

ECRCF 12 (cold fusion blog) “How Cold Fusion Could Create the Next Great Economic Boom” E-Cat = Rossi Cold Fusion October 13th 2012 <http://energycatalyzer3.com/news/how-cold-fusion-could-create-the-next-great-economic-boom> JW

New technologies often lead to economic booms, sometimes to great economic booms. Most of us can remember the technology or internet boom of the 1990s which transformed our lives and made vast fortunes for those who understood the new technology. Yet that is only one of several economic booms that have transformed the world over the past few centuries. There is a strong possibility that the next great economic boom will be touched off by low energy nuclear reaction (LENR) or cold fusion. By greatly reducing the cost of energy and eliminating the need to haul and store fuel LENR will reduce the costs of manufacturing and transportation. That will reduce costs and give people more money to spend elsewhere. Just as computers made companies more efficient and increased their profitability. Those companies that successfully commercialize LENR will generate vast profits just as those companies that successfully commercialized computers, smartphones, the internet and software generated vast fortunes. Such fortunes are among the most notable features of economic booms. So what will the cold fusion boom look like and what will its effects be? The best way to determine that is to take a look at some of the economic booms of the past. There have been several identifiable economic booms over the past three hundred years. Some of the most notable are: The first Industrial Revolution which was created by the invention of weaving technology and the steam engine. This created a huge economic boom in North America by increasing the demand for cotton and other commodities such as grain. The transportation revolution of the mid-19th Century created by the invention of the steamship and the railroad. This created a notable economic boom in Great Britain and the United States which spawned the first corporations and the modern stock market. This boom also created a massive demand for minerals and other raw materials and fueled colonial and commercial expansion around the world. The automobile revolution of the early 20th Century which spawned a massive increase in industrial production. Among other things this boom gave us the oil industry and consumer finance. It greatly accelerated the development of construction by increasing the need for roads. The electronics and consumer products boom which started in the 1920s stalled in the Depression and World War II and exploded again in the 1950s. These booms essentially brought modern technology into everyday life and transformed average people into consumers. One byproduct of these booms was popular entertainment. Another greatly increased demand for electricity to power all the gadgets people put in their homes. The technology boom of the 1980s and 90s which was created by the widespread adoption of computers and the internet. One side effect of this is the democratization of information which can no longer be monopolized by big business and big government. Another is the shift in finance that occurred when stock and commodities markets moved onto electronic trading platforms. 1920s Assembly Line The LENR boom is liable to share the characteristics of these earlier booms. One characteristic these booms share is to create big new fortunes in the hands of those who understand the new technology. Examples of this include Bill Gates who understood the importance of computer software and Henry Ford who figured out how to mass produce automobiles. Another example would be Andrew Carnegie who became a billionaire by manufacturing steel a raw material the railroads needed vast amounts of. Before he went into the steel business Carnegie was a railroad executive. Another characteristic of technology based booms is to democratize or widely disperse what was formerly in the hands of the few or the wealthy. Before trains and steam ships only the very rich could afford to travel most people rarely left home. Before the automobile only those rich enough to feed a horse or team could afford personal transportation. Before e-books only the very rich could afford a large library, today anybody can have one. Before the internet only the wealthy or those who lived in certain cities could trade stocks now anybody with a bank account and an internet connection can trade stocks. This democratization is one of the things that drive the boom and economic expansion. The appearance of trains and steamships created a massive demand for coal and steel. The use of automobiles increased the demand for oil which increased oil production. It also increased the demand for steel and the raw materials that metal is made from. The technology revolution increased the demand for electricity to run the internet and raw materials such as copper. Based on these conclusions the LENR boom will create massive new fortunes probably among those who figure out how to commercialize cold fusion. It will also democratize energy production. Everybody will have the capacity to be his or her own power company. No longer will large generators or power grid connections be needed to run large scale industrial operations or mines. Average people might be able to generate vast amounts of electricity or heat. There is of course a dark side to an economic boom they inevitably lead to economic busts. For every person who gets rich there are several failed entrepreneurs. Only a few enterprises will survive. There were dozens of auto manufacturers in the United States in the early 1900s only a handful survived. Such busts often cause terrible hardship to investors and average people. Just look at the havoc wrecked in the United States by the collage of the mortgage bubble in 2008. Like earlier booms the LENR boom will create booms in other areas. The railroad and automobile booms led to real estate booms and a massive amount of real estate speculation. There were huge real estate booms in Florida, California and the Chicago area during the 1920s. The automobile boom also led to a massive boom in oil exploration and production in the United States especially in California and Texas. The consumer products boom of the 1920s fueled a massive stock market boom. A similar boom occurred in the 1960s because of the effects of new technologies such as television and plastics. Suburban Sprawl created by the Post World War II economic boom. More recently the tech and internet booms fueled the early 21st Century mortgage bubble in the United States and a stock market bubble. The technology boom has also fueled an increased demand for energy particularly oil and natural gas and minerals such as copper. LENR will probably increase the demand for raw materials because it will give people more money to buy with. If it cuts manufacturing costs, manufacturing will increase and with it demand for raw materials. Since people would presumably have more disposable income because of reduced energy costs they would presumably have extra cash to buy consumer goods with. Another side effect from LENR would be decreased materials costs so producers would have to produce more to make money. Freeport McMoRan would have to mine more copper to make money. Exxon-Mobil will have to pump more oil (if there is a demand for it). Obviously all this will lead to a bull market in stocks that will dwarf that in the 1990s. Shares especially of LENR companies and consumer products firms will go through the roof. Prices of some commodities such as wheat may increase because of increased demand. Eventually the boom will collapse but that is the nature of capitalism. Cold fusion has the potential to create one of the greatest economic booms in history and change the life of everybody on the planet in the process. So the US Defense Intelligence Agency is right, LENR is a disruptive technology, one that could disrupt the entire global economy for better or worse.

#### Economic decline and volatility heightens the risk of nuclear global conflict—multiple scenarios.

Burrows and Harris 9 Counselor in the National Intelligence Council, Member at the National Intelligence Council - 2009 (Mathew J. Burrows, Global Trends 2025: A Transformed World—an unclassified report by the NIC published every four years

Of course, the report encompasses more than economics and indeed believes the future is likely to be the result of a number of intersecting and interlocking forces. With so many possible permutations of outcomes, each with ample [end page 35] opportunity for unintended consequences, there is a growing sense of insecurity.Even so, history may be more instructive than ever.While we continue to believe that the Great Depression is not likely to be repeated, the lessons to be drawn from that period include the harmful effects on fledgling democracies and multiethnic societies (think Central Europe in 1920s and 1930s) and on the sustainability of multilateral institutions (think League of Nations in the same period). There is no reason to think that this would not be true in the twenty-first as much as in the twentieth century. For that reason, the ways in which the potential for greater conflict could grow would seem to be even more apt in a constantly volatile economic environment as they would be if change would be steadier. In surveying those risks, the report stressed the likelihood that terrorism and nonproliferation will remain priorities even as resource issues move up on the international agenda. Terrorism’s appeal will decline if economic growth continues in the Middle East and youth unemployment is reduced. For those terrorist groups that remain active in 2025, however, the diffusion of technologies and scientific knowledge will place some of the world’s most dangerous capabilities within their reach. Terrorist groups in 2025 will likely be a combination of descendants of long established groups—inheriting organizational structures, command and control processes, and training procedures necessary to conduct sophisticated attacks—and newly emergent collections of the angry and disenfranchised that become self-radicalized, particularly in the absence of economic outlets that would become narrower in an economic downturn. The most dangerous casualty of any economically-induced drawdown of U.S. military presence would almost certainly be the Middle East. Although Iran’s acquisition of nuclear weapons is not inevitable, worries about a nuclear-armed Iran could lead states in the region to develop new security arrangements with external powers, acquire additional weapons, and consider pursuing their own nuclear ambitions. It is not clear that the type of stable deterrent relationship that existed between the great powers for most of the Cold War would emerge naturally in the Middle East with a nuclear Iran. Episodes of low intensity conflict and terrorism taking place under a nuclear umbrella could lead to an unintended escalation and broader conflict if clear red lines between those states involved are not well established. The close proximity of potential nuclear rivals combined with underdeveloped surveillance capabilities and mobile dual-capable Iranian missile systems also will produce inherent difficulties in achieving reliable indications and warning of an impending nuclear attack. The lack of strategic depth in neighboring states like Israel, short warning and missile flight times, and uncertainty of Iranian intentions may place more focus on preemption rather than defense, potentially leading to escalating crises. [end page 36] Types of conflict that the world continues to experience, such as over resources, could reemerge, particularly if protectionism grows and there is a resort to neo-mercantilist practices. Perceptions of renewed energy scarcity will drive countries to take actions to assure their future access to energy supplies. In the worst case, this could result in interstate conflicts if government leaders deem assured access to energy resources, for example, to be essential for maintaining domestic stability and the survival of their regime. Even actions short of war, however, will have important geopolitical implications. Maritime security concerns are providing a rationale for naval buildups and modernization efforts, such as China’s and India’s development of blue water naval capabilities. If the fiscal stimulus focus for these countries indeed turns inward, one of the most obvious funding targets may be military. Buildup of regional naval capabilities could lead to increased tensions, rivalries, and counterbalancing moves, but it also will create opportunities for multinational cooperation in protecting critical sea lanes. With water also becoming scarcer in Asia and the Middle East, cooperation to manage changing water resources is likely to be increasingly difficult both within and between states in a more dog-eat-dog world.

### AT: Fusion not Fission

#### Dictionary.com defines “nuclear power” as

<http://www.dictionary.com/browse/nuclear-power>

power derived from nuclear energy.

#### American heritage dictionary defines “nuclear energy” as

http://www.thefreedictionary.com/nuclear+energy

The energy released by a nuclear reaction, especially by fission or fusion.

#### That means both fusion AND fission are topical.

#### Fission and fusion are distinct but both are under the bracket of nuclear energy.

Duke Energy 13 “Fission vs. Fusion – What’s the Difference?” January 30th 2013 <https://nuclear.duke-energy.com/2013/01/30/fission-vs-fusion-whats-the-difference> JW

The foundation of nuclear energy is harnessing the power of atoms. Both fission and fusion are nuclear processes by which atoms are altered to create energy, but what is the difference between the two? Simply put, fission is the division of one atom into two, and fusion is the combination of two lighter atoms into a larger one. They are opposing processes, and therefore very different.

#### Nuclear power and nuclear energy mean the same thing.

What is Nuclear 16 “Power and Energy” <https://whatisnuclear.com/physics/power_basics.html> JW

Nuclear power vs. nuclear energy? When discussing electricity provided by nuclear reactors, the terms "nuclear power" and "nuclear energy" are used completely interchangeably. The preferred term is nuclear energy, as nuclear power brings to mind things like the USSR, the USA, and bombs.

#### Their evidence says that nuclear power is typically done through fission, not that it only happens through fission- fusion is just much less common.

#### Err on the side of including more ground in the topic lit- key to education.

## AT: PICs Bad

### C/I

Counter interp: the neg may read an unconditional PIC out of a type of nuclear power production if they have evidence that says that that type of power production is beneficial. I meet- my evidence says cold fusion is good. Standards:

1. Depth. PICs focus the debate on a single type of nuclear power instead of spreading ourselves thin on every single type. That’s the strongest link to education: nobody in the lit discusses international energy policy, it goes on a country-by-country basis. Depth outweighs breadth:

a) mirrors real world- real policy discussions are about whether one policy proposal would be good or bad, not on the net whether a hundred are good or bad. Cursory overviews can be attained by reading articles.

b) Depth leads to breadth- by focusing on new issues each round, we get a breadth of information anyways.

Education is a voter; it’s the end goal of debate and provides portable skills for the real world. This outweighs fairness. A. Longevity-education affects us when we’re older but fairness matters in one round. B. Schools fund debate- without education we wouldn’t be able to afford tournaments which is a pre-requisite. C. Fairness violations inevitable- resource inequities and side bias mean some people have advantages. D. Value of debate-flipping a coin would be maximally fair but no one would participate.

2. Real-world decision-making. PICs are key.

Branson 7 Josh Branson, CSIS and just graduated from Harvard Law, 2007 (“[eDebate] Reflections about debate and policymaking”, http://www.mail-archive.com/edebate@www.ndtceda.com/msg01593.html)

Well, thats not the way it worked at all, at least for me. No doubt in a collegiate debate judged by one of ya’ll I could have killed them all on the Pan K, probably even if we talked slow, but in the real world, I was kind of surprised to find that the **knowledge generated by debate proved to be** fairly damn cursory and **artificial.** I could rattle off a list of most of the arguments for/against most of the general nonproliferation doctrines, but a lot of the empirical and factual basis for these arguments was completely missing in my brain. **I could make the basic claim for almost anything** in the field, **but the technical issues that underline**s **a lot of them** (the names and locations of the Russian CW destruction plants, an understanding of how the fine points of the budget process works, how a capital market sanction would actually be implemented, where did we get our intelligence that revealed Chinese serial proliferators selling bombs to AQ Khan, how does a centrifuge cascade work and why exactly would multilateral sanctions undermine Irans ability to get uranium gas piping technology, the names of the key players in the various foreign governments that make nonproliferation policy etc) **was** all **missing**. Maybe this stuff sounds pretty boring, and some of it is, but **this is the type of stuff that really determines whether or not policies are successful** and whether or not they are effectively promulgated. But the **details** pretty much **get left out in debates**, replaced by a simplistic and power-worded DA that culminates in nuclear winter.’ To my surprise, when setting out in the nonproliferation world, you dont get to make grand pronouncements about the impact of funding Nunn-Lugar on US soft power or whether funding it would cause a budget deficit which would collapse the global economy and cause multiple scenarios for nuclear war. Instead, most of the work that is done is deciding which and what type of Russian facilities to allocate the money to, knowing the specific people within the Russian government we can trust, which types of nuclear disposition is safest and what types of transportation we should use when moving spent fuel back to storage, etc. When dealing with these discussions repeatedly, I found that debate had provided me a very sound abstract conceptual frame through which to analyze the general issues being raised, but little in a way of meaningfully engaging the policy process. Of course, debaters can learn this language. There are plenty who have. But I’d wonder whether or not people who claim that debate has trained people for this life are mistaking correlation with causation. Two other interesting conclusions: A) To all the people who attack debate for propounding an overly elitist and undemocratic discourse and undermines good broadly appealing public speaking skills: I think you’ve got it backwards. Yes, a lot of debates involve jargon, no question. But at least in my experience, I found that debate provided me the opposite. The times I was most confident at CSIS were when we were doing public debates or discussions in front of unqualified audiences. I could take on even the most senior experts; in these types of forums, I could out debate them and rhetorically counteract their vast experience/knowledge advantage. On the flip side, when I was in conferences with only experts in the field, I often felt at a severe disadvantage. In forums like this, bad arguments get called out, and rhetorically powerful but intellectually flimsy claims are pretty much non-starters. Debate experience wasn’t a ton of help. In terms of research, I did feel that all the debate research I’ve done provided some advantages and gave me a marginal edge over a lot of other people at CSIS, but nothing enormous. Most of the people there, even though they’d never done debate, can research just as well as the average college debater (ESPECIALLY on technical issues). I realize there are problems with the sample size etc, but it made me think twice about the infallible research advantages supposedly generated by policy debate. B) **How to make debate more like the technical policy world**? Narrower debates. **PICs are vital** to this (sorry, Duck). Thinking back on my 8 years in debate, **the topic about which I can best converse with experts about is the design of emissions trading schemes**. That was **because** the literature was deep and the **prevalence of** upstream/downstream/auctioned/timetable **PICs narrowed the debates and forced** a **real in-depth discussion**. I just don’t think we get that in a ton of debates, because most PICs are either wanky rhetoric PICs (and yes I was an extreme culprit) or something even worse like Consultation. Thinking back on it, I don’t think that the legal topic was worded particularly poorly, I just think that our strategic norms of judging/debating create a lot of problems in generating the type of education a lot of us want. But one of the most striking thing for me about last year’s topic was that I learned more from Repko’s post about his day at the Supreme Court than I did from all the debates I judged combined. In any event, how to create the types of narrow debates that will general real sustainable expertise on topics is tough. I think that we’ve got to learn how to become accepting as a community of analytical smart arguments to answer carded-yet-stupid arguments, maybe start accepting intrinsicness (something that I might post on some other day) as a way to eliminate politics DAs and consultation CPs, and start modifying our theory dispositions to be willing to call out bullshit CPs (see DHeidts new judge philosophy), and finally moving away from the cult of new and surprise arguments (see below). This will also involve changing the way we teach kids as they enter debate; I know I, for one, am going to change the way I teach camp this summer to include at least a little of these thoughts. Of course, the focus must remain on winning above all else, but I think that that pursuit can be synthesized with a change in some of our debate practices. 2. Why an elite or technical discourse is important My second conclusion is directed at people who decry the topic process because it’s too technical, too narrow, drown out the personal or the things that people want to talk about. Again, my opinion is that this is backwards. I think it’s a major problem that more of the people who conduct policy and who are influential in the process are not well-schooled in the actual empirical pragmatic details of the policies that they are advocating. I’ve read a significant amount about Iraq lately, and got to talk to a bunch of people who were intimately involved in the process, and one of the primary problems was that too much of our policy was executed in a cavalier and emotion-laden fashion. The dangerous pursuit of the “liberation of the oppressed” Iraqis at the expense of all the obvious problems entailed with that pursuit, the complete “lack of a plan,” for how to stabilize the country, and an utter ignorance of the technical or real policy issues facing a peacebuilding operation of that magnitude---these are all issues that come up REPEATEDLY when discussing the reason we went into Iraq in such a cavalier and short-sighted manner. A bunch of the more scathing indicts of the topic committee’s work---that the topic is too technical, that it undermines creativity etc…these are traits that for me are reflected in some of the most loathsome policymakers we have. Bush is by all accounts an idiot when it comes to policy expertise, but he’s the president that most people would love to have a beer with, and one who has let his personal conviction guide his policymaking more than any I can remember. His administration appears to conceive of the world in relatively simple generic conceptual dichotomies (stay the course vs. cut and run, terrorists are good or evil, our intelligence is either 100% accurate or its not). Is that really what we want our topics to boil down to? A be nice to the Middle East topic? Because **its in the extra 60 words that the real problems with policy are revealed**, and its there that we find the difference between an effective invasion that removes a horrible dictator from power and one which kills thousands of people and causes the region to implode.

Outweighs: A. Prefer carded evidence on the theory debate- it’s most objective whereas their analytics are slanted by competitive bias. B. Affects our lives out of round- no one in 7 years will care about fairness losses but education lasts much later.

3. Ground. PICs check back against infinite aff prep for whatever they’ve decided to make the debate about. Ability to pick a plan, framework, and frontline extensively means I need some way to give the neg an advantage, otherwise I lose every round; I can’t read the coal DA every single round. That’s the strongest link to fairness because your interp means affs win 100% of the time.

### AT: moots aff

1. TURN- The aff advocacy text is the best and ONLY determiner of what CPs I get. Key to strategy- the text of the aff is the only stable basis of neg ground. Placing ad hoc restrictions in the 1AR prevents me from forming an effective strategy because you’ll always exclude what I do.

2. TURN-Their interp guts neg ground- under their interp, the aff can make its advocacy as broad as possible to include all good aspects of energy policy. Then the neg has to advocate for something that includes none of these good policy options so the negative will never be able to win the comparative desirability of a policy option.

3. TURN-my solvency advocate proves they are destroying core neg ground. Many experts agree cold fusion is good so my ground is terrible if I have to defend nuclear power everywhere.

4. TURN-the PIC is better for your ground. Before, you had to prove that *every single part* of the aff advocacy is good, but now you only need to win that *one specific* part is good.

5. Ability to pick a plan makes it reciprocal. The aff gets to pick a subset of the resolution, the neg should be allowed to pick a subset of the plan. That’s the only reciprocal way to divide ground.

6. The PIC is just less of the aff which means the entirety of the aff is already a solvency deficit because I do less than you.

7. Not my fault you read a bad aff. You should design the aff to be multifunctional based on neg strategies so that your offense still works in the 1AR. Also, you can just write a better plan text that excludes PICs like this by specifying what type of nuclear power you’re talking about.

### AT: Predictability

1. Counter interp solves- there are only 40 countries currently with nuclear power. Of those, only a fraction will have viable disad ground.

2. Plans solve- no reason why you need to defend whole res and open yourself up for PICs.

3. Topic lit proves the PIC is most predictable- no one advocates for every single country having nuclear power, they say it should change on the basis of each country.

4. Predictability claims are unverifiable- they could have blocks on the issue but just don’t want to read them- don’t vote off unverifiable arguments- if you accuse somebody of abusing you the onus is on you to show that you were abused- impossible for you to do

5. T-Checks back against unpredictable affs- without PICs the aff can choose any advantage area and win because the neg won’t have a way to compete with their nuanced prep.