Resolved: The United States should increase its use of nuclear energy for commercial energy production.

A/2: AFF

OV: Sustainability

Even if you buy all of their benefits stemming from nuclear energy, there are three reasons as to why the industry will never be sustainable in the long term:

a. Uranium shortage. Caldicott of WP in 2005 explains that if we replaced fossil fuel electricity with nuclear, there is only enough economically viable uranium for three to four years
b. Cost. Dr. Rosen of IPP explains that nuclear energy only seems financially viable because costs are kept artificially low by criminally negligent safety and health standards in uranium mines and freeing the nuclear industry from adequate insurance responsibilities. He furthers that the back-end costs also aren't considered.
    i. Indeed, Sullivan of the New York Magazine finds that the US would have to pay around 14 trillion dollars to get just half of its energy from nuclear sources.
c. Lack of investment. An MIT study finds that nuclear plants would never get off the ground unless Congress put some sort of tax on carbon pollution because investors wouldn't suddenly start pouring investments into nuclear energy if you just affirm. They cannot prove this will happen, and MIT concludes that even with subsidies, it's not enough to attract investors due to uncertainty around meltdowns.

A/2: Energy

A/2: Electricity Demand

1. Delink. Larsen of Green America 06'- The net energy created by nuclear power would be offset by the energy needed to decommission plants and process the ore. The implication is that energy would not increase, and it is not filling electricity demands.
2. Delink. Sovacool of The Energy Governance Program 08'- Half of all energy is taken up by the reactor itself in order to mill and enrich the fuel inside the reactor. As a result, he concludes the energy is taken up before consumers can even use it.
3. Turn. Increased energy costs hurt demand, and other types of energy are cheaper. Romm of The Center for American Progress 08'- Because of high upfront costs, building delays, and risky investment, nuclear power is triple the cost of other US electricity rates and 10 times higher than other energy-efficient sources. The implication of this is two-fold:
    a. One, Romm's conclusion- High electric rates impact utility customers and make nuclear utilities' service areas noncompetitive with other regions of the US. This means that nuclear power just collapses in these regions, becomes replaced with natural gas, and doesn't help anyone make money.
    b. Two, Blumsack of Penn State Economics 18'- Nuclear power plants make prices rise by up to 10 percent directly on consumers, causing people to lose more money and be able to afford less clean energy even if the capacity exists.

A/2: Efficiency

1. Delink. James Lake of Scientific American 09'- only about 1 percent of the energy content of the uranium in nuclear power is being converted to electricity; not efficient in the slightest, especially if you do the comparative.
2. Delink. Umar Ali of Power Technology 19'- Nuclear power is inefficient in the process of creating it and spending on it, which makes it worse than other forms of energy. This is why 10 countries across the globe attempting to meet climate goals have been more efficient in developing energy with renewables as compared to nuclear.
3. Turn. Not sustainable energy. Christina Chen of the NRDC 19'- nuclear reactors are always located near a river or ocean, and constantly pull in water to cool the system and prevent it from melting but climate change is causing droughts and temperature increases in water, which is why many nuclear reactors are already shutting down or scaling back in the United States. Indeed, Chen quantifies that by 2040, 50% of US nuclear reactors will not be able to keep up with the rising heat of the water.
4. No impact on efficiency. Why does a slightly more efficient form of energy-matter in the context of something like climate change, especially if other types of energy literally are borderline to it.

5. Indict to 92 Percent Efficient- that number is a capacity factor, not efficiency. However, capacity does not equate to use and while global nuclear capacity has expanded, use has gone down because of adverse costs. In reality, the efficiency is reported as 33 percent, equal to coal.

A/2: Reduce Costs

1. Delink nuclear cannot make costs cheaper. Erneuerbare '16 writes that nuclear energy costs are above $97 per megawatt while renewable energy is around 77$/Megawatt. In the UK for example, the electricity costs will triple after implementing Hinkley C, the nuclear reactor. This occurs because of capital costs. Moore writes that the renewable has barely any capital costs since the operation is cheap, however nuclear energy runs on expensive uranium and has to be closely monitored for safety reasons. Which is why PV Magazine finds that in all cases, nuclear investment would generate significant financial losses of 1.5 to 8.9 billion.

https://www.americanprogress.org/issues/green/news/2008/07/08/4735/10-reasons-not-to-invest-in-nuclear-energy/

The world needs thousands of gigawatts of zero-carbon electricity by 2050—and this country needs several hundred gigawatts—to avert catastrophic climate outcomes. Such increased demand would probably drive up nuclear costs even higher, while either having a much smaller cost effect on alternatives or actually reducing their co

Moore's answer states **a common misconception—that you can ignore capital cost when calculating the cost of energy.** His statement would be like saying, "My house is incredibly cheap to live in, if I don't include the mortgage." **If you don't include the capital costs, then wind and solar are essentially free—nobody charges for the fuel, and operation is cheap.** Compare this to **nuclear plants,** which **are probably the most capital-intensive form of energy** there is; also, **they run on expensive uranium and must be closely monitored minute by minute for safety reasons.**

A/2: Export to Developing World

1. Non-unique - Freeman of Defense One writes that China and Russia are already filling the gap; For example, China is scoping out projects in 41 countries; no reason why US has to fill in.
2. But Freeman continues that exports are super mitigated anyway, multiple warrants:
    a. Russia and China sell nuclear plants for super subsidized costs to other countries for political influence, not profit, which is why "U.S. nuclear companies find it nearly impossible to compete"
    b. U.S. nuclear exports are severely limited by restrictive export laws because of strict nonproliferation standards, which make U.S. technology far less appealing to other

countries than technology from Russia or China, which comes with fewer strings attached.

3. The economics of the issue don't make sense: The LSESU finds that for the majority of countries interested in nuclear power, a) upfront costs are too high, b) they don't have the grid capacity or interconnectedness to make the power useful, c) other energy sources like fossil fuels are cheaper and more accessible, so they won't choose nuclear in the long-term
4. **No Link -** The EIA finds that in the status quo, the United States is the largest coal exporter in the entire world. This delinks their argument because as the domestic coal industry is dying in the United States we see them export more coal, meaning that increasing nuclear means is going to perpetuate the same trend.

A/2: Reliability

1. Nuclear operators are unreliable. The World Nuclear Organization '16 writes that operators only work at the beginning of their operating cycle with fresh fuel and high reserve reactivity, but lose efficiency later.

A/2: SMRs

1. Delink. Clear News 17'- SMRs are not going to see investment because they don't yield competitive electricity costs in the consumer market against things like natural gas. Prefer on probability, because American companies like Westinghouse and B&W have already pulled out because of competition. South Korea and China decided on SMRs and pulled right back out.
    a. Mignacca of Sustainable Energy Reviews 20' thus concludes- there has not been a single SMR ever been built.
2. Delink. David Roberts of Vox News 18'- No commercial viability for SMRs even after government spending. After 2 billion in spending over 20 years, there have been no results in advanced designs because niche markets are too small to justify commercial expansion and political and ethical regarding militarization reasons limit expansion.
3. Delink. Aaron Larson of Power Magazine 19'- Regulatory burdens and up front cost stop people from investing in SMRs to begin with. For example, you need 12 discrete pieces to build an SMR which no company can do at once.
4. Turn. Three reasons why SMRs make nuclear power comparatively worse. Noel Wauchope of The Independent 17-
    a. Greater risk of accidents because of a weaker containment system and are more prone to disasters, meaning that they risk explosions.
    b. Dual use facilities meaning that they're used for power and proliferation. For example, Russia used an SMR for a missle test.
    c. Less waste but more sites for the waste, meaning that it'd be harder to actually contain the waste and creates more problems.

A/2: Fusion Reactors

1. Daniel Jasby of the Bulletin 17- not feasible to be competitive in the market.
    a. Not an electrical source that creates energy because it uses neutrons.
    b. Tritum has to be replenished in the reactor, and can't be mined
    c. Tritium as a fuel is scarce
    d. Consume all the energy they create
    e. Thus they conclude: "any fusion reactor will face outsized operating costs."; ending concludes its almost imposible to build.
2. Delink. Lierop of Forbes 19'- Fusion projects in the private and public sector are controversial because they risk ruining the industry and thus are underfunded.
3. Wired- Not a single fission reactor ever built

A/2: Energy Supremacy

1. According to a recent World Nuclear Industry Status Report finds that "industry has not broken ground on a new plant in China since late 2016." because of high capital costs. China is no longer trying to become the hegemon.
2. Russia- russia is badhttps://time.com/5649826/russia-nuclear-accident/

A/2: Carbon Bubble

A/2: Economy

A/2: Global Competitiveness

1. Not uniuqe.

France cannot afford to fix or replace its troubled nuclear fleet; Belgium's capped nuclear capacity is unreliable and safety-challenged; Slovakia's newbuild project is hobbled by delay, cost, and corruption; Taiwan, South Korea, and Germany have nuclear phase-out policies; and in Japan, most reactors remain shut down eight years after Fukushima, and their lost output plus energy to support Japan's 11% GDP growth has already been 97% offset by savings and renewable

If we were to decide to replace all electricity generated by burning fossil fuel with electricity from nuclear power today, **there would be enough economically viable uranium to fuel the reactors for**

between 3 and 4 years. With the use of fast breeder reactors a closed cycle could be reached that would end the dependency on limited uranium resources. **But despite huge investments and research over the last decades, breeder reactors have been a technological and economic failure**

A/2: Reduce Oil Dependence

1. You just shift the dependence, you don't end it because we have to import uraniumhttps://www.americanprogress.org/issues/green/news/2008/07/08/4735/10-reasons-not-to-invest-in-nuclear-energy/, find better evi

Besides, because the United States imports nearly all its uranium, pursuing nuclear power continues the dangerous pattern of dependency on foreign sources to meet domestic energy needs.
This is prob worse

A/2: Oil Recession

1. Economy has become more resilient. Montgomery 19 of the Conversation finds even the world's worst sudden supply oil disruption in history in September only had a short-term effect because a) Saudi just rediverted to other sources b) US now produces more than Saudi Arabia and imports from OPEC have dramatically declined, giving stability - thats why Forsyth of Barrons finds historically prices have dramatically spiked without triggering downturns.

More important, oil producers previously have only managed to put a floor under the price by cutting production, an indication that the market has been well supplied. **To put things in perspective, the jump in benchmark U.S. crude prices Sunday evening only brought the active U.S. futures contract over the $60 a barrel mark, below where it traded last May and well below the $75 recent peak last October.** The U.S. economy also is in a markedly different place now from previous price spikes. Cornerstone Macro notes **the 1990 recession already was likely when the oil spike worsened that downturn. During the 2002-2007 expansion, energy prices often jumped more than 20% year-over-year, including in Gulf War 2, without triggering downturns.**

A/2: Ships

1. Robert Ross of Boston College 18'- 4 reasons why the argument is not
    a. Reallocation of the federal budget to support ship construction is not likely. The United States will not raise taxes to increase funding for the Navy; instead, it reduced taxes earlier this year. Nor can the United States print more money and increase the federal deficit to increase naval spending; the harm to the economy would offset any benefit that a larger navy might contribute to U.S. security.

2. Cancian of the CSIS this past October- already expanding the Navy to increase the amount of ships, increasing innovation, and has a modernization process.

3. Other ways we solve. CNN- build subs

A/2: Jobs

1. Turn. There will actually be less energy sector jobs.Gardener of American Progress explains that most likely, new nuclear plants won't be designed by American companies because no new nuclear power plants have been built in the United States in over 30 years, and foreign companies have more experience building such plants. Relying on foreign companies to build nuclear plants means fewer jobs for Americans in the energy sector.
2. Negating Solves by spurring the Green Tech Transition. According to Fortune, renewable energy creates new jobs 12 times faster than any other segment of the economy. That's 20 percent annual growth, and a total of 4.5 million jobs in the United States alone.

3. Turn it again. According to WebMD workers in nuclear power plants have higher risks of developing cancer a 10% higher risk of death due to most cancers and a 19% higher risk of death due to Leukemia.

A2- Carbon Bubble

1. Investors never just flee carbon out of nowhere because they know they are investing in a stable industry, investors going to nuclear industry don't just flee
2. Not all bubbles popping lead to recession, for example, the sub prime auto industry in the status quo is seeing their bubble pop because they are so disconnected to the economy
3. Government is promoting green tech in the status quo
4. Fossil fuels don't become obsolete overnight because its still such a strong industry in the short term
5. **Cleef '18** finds that this bubble doesn't exist because energy demand is still rising in the status quo across the globe
6. Just because the government endorses one doesn't mean that its a dramatic shift
7. Evidence probably talks about bubble in the global economy

A/2: Climate Change

A/2: Less Emissions

1. While nuclear energy does not directly produce any CO2, that overlooks the indirect cost of nuclear energy. **Kivi of Sciencing in 2019** finds that extremely high amounts of carbon dioxide are emitted in activities related to building and running the nuclear power plants. Indeed, **Peirce**

08 of the International Nuclear Journal finds that the potential reduction in greenhouse gasses through nuclear energy would immediately be offset by

   a. the massive amounts CO2 indirectly produced by mining for uranium ores.
   b. building nuclear reactor and cooling towers
   c. transportation and long-term storage of massive quantities of radioactive waste

Barnham '15 finds that nuclear reactors will have a carbon footprint larger than a natural gas electricity generator. Also, it is unlikely to produce any net electricity over its lifecycle.

2. LD Foundation finds that In fact, China's length of the planning and construction of nuclear plants versus wind or solar resulted in China's CO2 emissions increasing 1.3 percent rather than declining by an estimated average of 3 percent.
3. In Fact, **Lovins 17 of the RMI** takes the indirect cost of nuclear power on the environment into account and concludes that as long as the money is reinvested into renewables, closing inefficient nuclear plants can reduce pollution more than closing average coal plants.

California met its climate goal of reducing greenhouse gas emissions to 1990 levels by 2020 four years early by turning off its nuclear plants and setting policies that prioritize renewables, energy efficiency and energy storage investments over natural gas plant additiion

neither nuclear energy nor most renewable technologies emit CO2 during operation. However, meaningful comparisons must compare whole life-cycles from mining the raw materials to managing the wastes. Nuclear physicist and nuclear supporter Manfred Lenzen found average life-cycle emissions for nuclear energy, based on mining high-grade uranium ore, of 60 grams of CO2 per kilowatt-hour (g/kWh), for wind of 10–20 g/kWh and for natural gas 500–600 g/kWh. Now comes the part that most nuclear proponents try to ignore or misrepresent. The world has only a few decades of high-grade uranium ore reserves left. As the ore-grade inevitably declines, the fossil fuel used to mine (with diesel fuel) and mill uranium increases and so do the resulting greenhouse gas (GHG) emissions. Lenzen calculates that, when low-grade uranium ore is used, the life-cycle GHG emissions will increase to 131 g/kWh. Others have obtained higher levels. This is unacceptable in terms of climate science. Only if mining low-grade ore were done with renewable fuel, or if fast breeder reactors replaced burner reactors, could nuclear GHG emissions be kept to an acceptable level, but neither of these conditions is likely to be met for decades at least.

It is true that the actual fission process whereby electricity is generated does not release greenhouse gases. However, **in various stages of the nuclear process (e.g. mining, uranium enrichment, building and decommissioning of power plants, processing and storing radioactive waste) huge amounts of energy are neede**d, much more than for less complex forms of electricity production. **Most of this energy comes in the form of fossil fuels, and therefore nuclear power indirectly generates a relatively high amount of greenhouse gas emissions.**

https://arstechnica.com/science/2019/05/iea-nuke-retirements-could-lead-to-4-billion-metric-tons-of-extra-co2-emissions/turn retire and repeat = emissions

No more emissions- cut us spec evi to beat back global climas

hJps://www.wagingpeace.org/nuclear-power-is-the-problem-not-a-solution
Better evi about CDC

1. Ok then- https://progressive.org/dispatches/nuclearpower-causes-global-warming
2. LD Foundation "China's investment in nuclear plants that take so long between planning and operation instead of wind or solar resulted in China's CO2 emissions increasing 1.3 percent from 2016 to 2017 rather than declining by an estimated average of 3 percent. The resulting difference in air pollution emissions may have caused 69,000 additional air pollution deaths in China in 2016 alone, with additional deaths in years prior and since. "

A/2: Climate Change

1. Because committing to nuclear energy entrenches these countries into climate change. EcoWatch '16 writes that the researchers found that "progress in both carbon emissions reduction is inversely related to the strength of continuing nuclear commitments." Countries without nuclear energy experienced a 6% reduction in emissions while those with nuclear energy experienced a 3% increase in emissions.
2. Even if CO2 emissions are reduced, Caldicott reports that the nuclear enrichment facility in Ohio releases 93% of chlorofluorocarbon gas which is 10,000 to 20,000 times more potent than carbon dioxide for climate change.
3. Ramana of Princeton '16 writes that the delay in building the reactor prevents them from competing in the market which is why Grist finds that nuclear power will be less than 10 percent of the solution to solving climate change.

hJps://www.bloomberg.com/graphics/2019-nuclear-power-plants-climate-change
Ig they suck

1. hJps://www.theatlantic.com/science/archive/2019/03/why-nuclear-powercannot-solve-climate-change-alone/584059
2. Nuclear power creates reliance that stops long term climate change efforts. (perception)

Turn- uranium mining bad for the climate, offsets

3. Time- hJp://www.wired.com/2016/04/nuclearpower-safe-save-world-climate-change

Here is the executive summary of the report:

Nuclear power generates approximately 20 percent of all U.S. electricity. And because it is a low-carbon source of around-the-clock power, it has received renewed interest as concern grows over the effect of greenhouse-gas emissions on our climate.

The carbon-free power technologies that the nation and the world should focus on deploying right now at large scale are efficiency, wind power, and solar power. They are the lower-cost carbon-free strategies with minimal societal effects and the fewest production bottlenecks. They could easily meet all of U.S. demand for the next quarter-century, while substituting for some existing fossil fuel plants. In the medium term (post-2020), other technologies, such as coal with carbon capture and storage or advanced geothermal, could be significant players, but only with a far greater development effort over the next decad

Every dollar spent on nuclear results in one-fifth the energy one would gain with wind or solar [at the same cost], and nuclear energy takes five to 17 years longer before it becomes available. As such, it is impossible for nuclear power to help with climate goals of reducing 80 percent of emissions by 2030

A/2: Less Transmission

1. Turn. Larsen of Green America 06'- There's a limitation of feasible sites in nuclear plants, because they need water and need to be safe. Implication is that you need more transmission because you can't build in flexible and excessive areas.

A/2: Fossil Fuels Fill In

1. Even if fossil fuels fill in, later renewables will replace them. Towers of Forbes 2019 finds that currently fossil fuel plants are being replaced by renewable energy alternatives due to cost declines.
2. After cali replaced their nuclear plant with renewables, an official from the Nuclear Energy Institute has put pressure on state efforts to comply with the Clean Power Plan like California..
3. Nuclear power cannot be implemented to the capacity we need to replace fossil fuels from filling in. Romm of the Center for American Progress writes in 2019 that because of limitations *such as* cost, it will be impossible to increase it enough to prevent global temperatures from increasing. Two implications:

    a. A there is a marginal impact coming off it if temperatures will continue to increase
    b. Also means we won't build enough nuclear energy to prevent fossil fuels from filling in.
4. Per the evidence in our case, green tech is rapidly increasing with capital flowing in from both the public and private sector. Absent nuclear energy, green tech would remain a popular investment for investors looking to break into the sustainable energy sector.
5. Turn: In his book *The Failing States*, Nafeez Ahmed writes that nuclear power requires significant investments in mining, mining, refining, disposal, and countless other areas, which are all heavily dependent on fossil fuels.
6. Science Daily writes unless nuclear power increases at the unsustainable rate of 10% *every single year,* fossil fuels will continue to play a significant role in the energy market.

A/2: Natural Gas Takeover

1. Green revolution will prevent this. Fast Company '19 that building renewable energy is now cheaper than building new natural gas plants, and that it can save people 29 billion dollars on their electricity bill.

A/2: SMRs Exports

1. Goldemberg '09 writes that while there have been incentives to build reactors, none have been constructed.

A/2: Bridge Fuel

1. Terminal defense. The ERN Institute gives four reasons as to why nuclear energy is not a suitable partner for green technology:
    a. Reactors are inflexible in operation
    b. When a power station breaks down, it's usually offline for months
    c. Green tech can bid lower prices into electricity markets and displace nuclear from base-load operation, which it needs to pay off its huge capital costs
    d. Renewables compete with nuclear energy for support policies from the government including scarce finance and subsidies

   Which is why Sommer finds that most green technology is backed by natural gas power plants just because of the way they function. Nuclear energy can never solve.
2. If the majority of investment is going into natural gas as the main bridgefuel in the status quo because it's considerably cheaper than nuclear power. There is no reason everyone's just going to take out all investment and put it into nuclear power just because it's a bit cleaner.
3. Dr. Rosen of the INW explains that no one ever accounts for the back-end costs of nuclear reactors, including the decommissioning of the plants. He concludes that because of this, there is no credible long term solution. A tedious decommission process means we can't shift over to green technology. Their arguments are only good in theory.

4. Empirically untrue. It's disproved by the fact that as nuclear energy is declining, the green technology industry is growing in the status quo. We clearly don't need nuclear power to bolster green tech.
5. Carbon Tracker in 2018 explains that the technology already exists to shift to green technology, as our electricity grids can handle the variability. They continue that we can get to way more solar and wind power very easily just with a few simple changes.
6. EcoWatch in 2019 finds that it's much cheaper and more feasible to just invest in renewables instead of keeping existing or building new nuclear plants. He concludes that instead of commercially increasing investments on a dead industry, we should just divert resources into directly improving green tech.

A/2: Desalination

1. Roberts of Vox News 18'- two reasons why desalination won't happen
    a. Only perceived as a few niche markets where desalination is needed.
    b. Desalinating is much cheaper with natural gas so it's a dead end.
2. Turn. Nuclear power plants decrease water. Wareham of Science Alert 07'- Water requirements are up to 83 percent higher for nuclear power plants. USUCA- Uranium mining, processing, milling, enrichment
3. Turn. Nuclear power plants contaminate water. Two warrants.
    a. Metals. ScienceAlert 07'- Heavy metals and salts from nuclear power plants build up in the water. UCUSA- killed 3.5 million fish.
    b. Accidents. MPI 12'- Expanding nuclear power has a risk of an accident every 10-12 years because of climate issues and bad reliability. Environment America 12'- Accidents risk clean water for 49 million Americans, 75% of plants have leaked chemicals already
4. Flannery 07'- Renewables can also solve the water crisis because they use less types of water than all other types of energy.
5.

Turn- dec water to begin with
Large areas of the United States already face water shortages, and the effects of global warming are expected to exacerbate this problem. "Electricity generation accounts for nearly half of all water withdrawals in the nation," and nuclear power stations require more water than fossil fuel use does. **The only alternative to the water usage associated with nuclear energy is less efficient** (and more expensive) dry cooling systems.

1. Styles -Nuclear Energy consuming roughly 400 gallons of water per megawatt-hour,which is enough water freshwater to fill over 480,000 Olympic pools, they contaminate as well, especialyl with radioactive waste.

Turns

http://www.commondreams.org/newswire/2009/02/04/oceandesalination-no-solution-water-shortages

A/2: Carbon Capture

1. It's better to invest in green tech - multiple warrants
    a. Carbon capture isn't effective enough - Davis of BT '19 finds that carbon capture at most solves for around 10% of carbon because ti's far too costly and complex to do on a big level, meanwhile UCS ev in case says renewables can reduce emissions by 85% - "so long as dirty fuels provide power, no CCS technology could put these power plants on par with clean energy."
    b. Davis continues that CCS only solves for CO2, not the nitrous oxides, carbon monoxides, etc. that renewable tech would solve for
    c. Science Daily finds that carbon capture also produces more emissions by building and running, which is why it resources are better spend on renewables.
2. Turn - Davis of BT continues extracted CO2 is often sold to oil and gas companies who can use it to coax more crude oil out of depleted wells, so the CO2 captured is just used to produce even more CO2
3. Melvin finds that Carbon capturing technology is not cheap enough because the technology is so new which is why investors won't put money in it. Even if nuclear energy revitalizes, it doesn't change carbon capturing. Which is why "There are 22 operations in the world. "We need to have over 1,000 to reach tangible impacts.
4. General nuclear not good for climate change: While nuclear energy does not directly produce any CO2, that overlooks the indirect cost of nuclear energy. Kivi of Sciencing in 2019 finds that extremely high amounts of carbon dioxide are emitted in activities related to building and running the nuclear power plants. Indeed, Peirce 08 of the International Nuclear Journal finds that the potential reduction in greenhouse gasses through nuclear energy would immediately be offset by
    a. the massive amounts CO2 indirectly produced by mining for uranium ores.
    b. building nuclear reactor and cooling towers
    c. transportation and long-term storage of massive quantities of radioactive waste

YALL R SO FIRE

https://phys.org/news/2019-10-carbon-capture.html

https://www.vox.com/energy-and-environment/2018/6/14/17445622/direct-air-capture-air-to-fuels-carbon-dioxide-engineering

https://www.fastcompany.com/1704105/problem-carbon-capture-co2-doesnt-always-stay-captured

A/2: NEG

A/2: Nuclear Power bad

A/2: Cost

1. Just because something is a bit more costly is not a reason we should just sit back and give up on the prospect of fighting back climate change. No progress will be made at this rate.
2. The SPG explains that after the initial upfront costs, nuclear energy is one of the most cost-effective energy solutions available--much lower than gas, coal, and oil. Everything has expensive upfront costs, but we shouldn't keep using that as justification to not make improvements in our system. For example, Bader of CSN writes that the initial cost for an iPhone was $150 million, but tafter standardization and repetition, it is now drastically cheaper. Coal was also very expensive when it first started off.
3. [If they read green tech trade-off]
    a. Shellenberger of Forbes in 2018 finds that even if nuclear power is seemingly costly, their advocacy of green tech is way more expensive. He writes that transmission for renewables is much more expensive than any other type of plants due to physical costs, because each plant generates much less energy when you rely on solar and wind power.
4. Good of GF in 2014 finds that even if nuclear power plants used to be costly, modern nuclear plants can produce electricity for just four cents per kilowatt hour accounting for capital construction costs, which is a fourth of solar energy's costs.
5. Turn. The National Academy of Science in 2019 explains that other energy sources only seem cheaper because they're subsidized in the status quo. They conclude if we subsidized nuclear energy and began a large scale manufacturing process, the cost would be comparatively cheaper to produce than every other type of energy. Nuclear power becomes cheaper with time and investment.

    a. Prefer this on probability because it's empirically proven. Kevin Wang of Stanford University in 2018 finds that countries that have large nuclear programs have less costs compared to the US; China has 30 percent lower costs and nuclear power is the cheapest source in South Korea right now.
6. Turn. There will be even more costs all around if we don't take steps to fight back climate change. Plumer of Vox finds that the task of cutting emissions becomes over 7% more expensive if we shuttered all our nuclear plants in their world.

The fact that future nuclear power plants will produce electricity at a substantially lower price than coal-burning plants is confirmed by a more elaborate study by industry analysts.13 Their study also concludes that the cost of electricity from future nuclear plants will be about 20% cheaper than from coal-burning plants. It explores the sensitivity of this conclusion to a wide range of uncertain parameters used in the calculations, but always finds nuclear power to be less expensive

A/2: Closures

1. Keeping plants open- Johnston of Grist in September describes that there is already bipartisan Congressional support for a tax reduction on zero-emission energy. This is historically successful. Shea of the NCSL in 2016 corroborates that tax credits in New York and Illinois have kept 4 plants open. Energy Information Administration describes that plants across the US have added reactors and increased capacity. For example, the Tennessee Valley Authority, a government agency, upgraded an Alabama plant to power 300 thousand homes.

    a. Opening new plants- Pref on historical precedent. Goldstein of the Wall Street Journal in 2019 reminds that when Sweden and France built nuclear reactors in the 70s and 80s, electric production increased at five times the rate of other countries, enabling them to massively decrease their reliance on fossil fuels.
    b. Brook of Uppsala University 15' - replace fossil fuels in a decade.

2. You can just keep building and keep subsidizing- we have durable fiat based on historical precendent of places like France who increased nuclear output to 80 percent which proves viability

Sustainability turn

ZME science- molten salt reactors solve because they're cheaper with less parts and less maintance

    a. Aff inc technology which means we solve back

Weighing

Either a. You sit back and let fill in happen in the short term or b. You have a risk of offense to some solvency

A/2: Time Delay

1. There's no reason why we have to build a ton of new power plants; we can just revitalize the current deteriorating plants by increasing public and private support for them.
2. Mai in 2019 of the UD writes that the US is currently shifting towards smaller, more efficient reactors. The unique advantage comes from LaMonica '15 who indicates by building smaller reactors, at one third or less of today's unit makes it faster to build and additional units can be built. Parsons of MIT writes in 2018 that the main reason US nuclear energy takes a long time is because of poor on-sight construction practices. But startups are changing this trend as they are building the reactors on the factory, and then move it to the site, speeding up the process.
3. The Wall Street Journal in 2019 explains that the reason as to why building plants is so tedious and cost-prohibitive is because investment into the industry is decreasing right now. He concludes that subsidizing nuclear energy by voting for the affirmative changes this trend and decreases the building obstacles, decreasing the delays.
4. Turn. Schnieder of the WNA- nuclear power provides energy generation faster than all low carbon options and provides reactor energy faster.
    a. Turns the argument because it means that we build first, they push the issue down the line or do nothing- there's a risk of offense on the aff
    b. Even if the process is slow, the energy itself comes much faster- that's also what stops fill in.

owever, since 2000, while no new construction permits have been issued, the United States Nuclear Regulatory Commission has issued renewal licenses for 71 reactors and is considering 19 more.

To protect the climate, we must abate the most carbon at the least cost and in the least time," Schneider said. The WNA said in an emailed statement that studies have shown that nuclear energy has a proven track record in providing new generation faster than other low-carbon options, and added that in many countries nuclear generation provides on average more low-carbon power per year than solar or wind. It said that reactor construction times can be as short as four years when several reactors are built in sequence.

LMAOOO HOW DOE- The French nuclear industry managed to start building 150 nuclear reactors within a decade of inception

A/2: Limited Fuel

1. Their evi is about availability, but "North America has vast deposits of uranium ore, and scooping it up is no real challenge."
2. U can just import it bruh

5.5 millon tons of uranium so we good
80 years worth of fuel for the globe

If we continue consuming fossil fuels and keep increasing our consumption as the world population grows, we are estimated to run out of oil by 2052, gas in 2060, and coal by 2088.

With modern technology the global resources of uranium and thorium could fuel thousands of years of expanded use of nuclear power. Is it not enough that they are sustainable?

A/2: Construction

1. Again, u can just import bruh why this matter doe

A/2: Increase Energy Prices

1. Nah

e're cooked." But we actually have proven models for rapid decarbonization with economic and energy growth: France and Sweden. They decarbonized their grids decades ago and now emit less than a tenth of the world average of carbon dioxide per kilowatt-hour. They remain among the world's most pleasant places to live and enjoy much cheaper electricity than Germany to boot.

A/2: Meltdowns/Accidents

A/2: General

1. OV: Innovation is occurring right now. By affirming you increase investment which allows projects to fully blossom. Nathaniel Johnson of Wired Magazine finds that dozens of nuclear startups are popping up around the country, aiming to solve the well-known problems with nuclear power — radioactive waste, meltdowns, weapons proliferation, and high costs. All of the advanced nuke projects across the country. There were 48 dots on the first map, and now there are 75, spreading But, if we shut down all plants now, we're going to see more long term radiation. Musil of the Executive Director, Physicians for Social Responsibility finds that lack of planning with respect to our disposal of spent nuclear fuel rods which is why they ineffective shutdowns har community health. Which is why When Connecticut's Haddam Neck plant was dismantled in 1996, for instance, some contaminated materials were mistakenly sent to municipal landfills.

Geuss of ARctechna ‘18 finds that in the status quo there is no political will to keep building power plants with existing technology because of said problems with wastes and accidents As a result, they are building new technologies. There are four types of reactors that are being developed that circumvent all of their outdated evidence about nuclear reactors

1. SMR’s.There are newer and more developed types of reactors called Small Modular Reactors that are more probable of being implemented, and Temple of TR in 2017 explains they are much safer and have much less risks.
    a. Forbes of 2018 finds that the reactor doesn’t need the complex back-up power systems that traditional reactors require and which traditionally add a lot of cost as well as some uncertainty. This is a big deal. It means the reactor just won’t melt down or otherwise cause any of the nightmares people think about when imagining the worse for nuclear power.
2. Thorium Reactors. Gent 18 explains Thorium gives carbon-free power, with non-toxic waste, lower risk of meltdowns, and a much harder route to weaponization than conventional nuclear.
3. Molten Salt Reactors. Martin of the MIT Review Molten-salt reactors also offer inherent safety advantages: because the fuel is liquid, it expands when heated, thus slowing the rate of nuclear reactions and making the reactor self-governing.
    a. Thus, Waldrop of Discover Magazine concludes that under these reactors Fukushima-style meltdowns would be physically impossible
4. Fusion Reactors. ITER, an Energy Think Tank explains a Fukushima-type nuclear accident is not possible in a tokamak fusion device. It is difficult enough to reach and maintain the precise conditions necessary for fusion—if any disturbance occurs, the plasma cools within seconds and the reaction stops. The quantity of fuel present in the vessel at any one time is enough for a few seconds only and there is no risk of a chain reaction.

All in all - Morgart of Harvard who finds “Newer generations of nuclear reactors are designed so that the nuclear chain reaction cannot run away and cause a meltdown – **even in the event of complete failure of the reactor’s machinery.”**

https://arstechnica.com/science/2018/09/mapping-what-it-would-take-for-a-renaissance-for-nuclear-energy/ - talks about political will to put better reactors - warrant as to why the overview is more likely to happen

A/2: Old Plants Bad

1. CNN- wont revitalize old plants bc theyre aging andneed to be decomissioned
    a. FT- the US has the oldest in the world
2. This is exactly our point. Tthe abdulla evid from our case finds that bc of decreased investment, the nuclear industtry is dying off which explains why theyre wearing down.

Tthattt's why you need to affirm to increase gov support and private support to revitalize the industry.

3. Links into the OVERVIEW BABY

A/2: New Designs

1. Huber of City Journal explains that the nuclear industry has dramatically improved its procedures and safety-related hardware since 1979. He cites multiple studies and concludes that power plants are now extraordinarily reliable in normal operation since the last major accident.
2. Advocacy isnt necessarily building new plants, just prev the fossil fuel fill in by revitalizing current plants

A/2: Deregulation

1. Private investors have an incentive to keep the nuclear industry safe because they would lose all their money if there was a mess up.
2. You can't just fiat into dereg- its international and domestic laws. Rather, the bulletin wrties that the biggest issue is costs so u just subsidize the upfront capital costs
3. Just because deregulation would make it cheaper doesn't prove the probability of them doing it. There are so many other ways you can make expansion cheaper. For example government subsidization and private investment influx
    a. Thats what they did in other countries - didnt need to dereg

A/2: Floods

1. **Stockton of Wired in 2016** explains because of changed designs [elevating the reactors] in reactors the rate of nuclear meltdowns has dropped to around .1%.
2. Nuclear Regulatory Comission- already have plans on how to do flooding disasters which means they can escape
3. Nattural disasters are NU. coal and oil plants are just as susceptible to floods.
4. We prereq. Root cause of floods are CC, we solve

A/2: Personnel

1. Bureau of Labor Statsitcs- no decrease

2. the reason why there are less people going into the workforce is becasue the industry is declining when you vote aff you increase investment into the industry so more people are incentivized to work in the field
3. People arent just dumb they get trained either way
4. Ppl more incentivized to study and work towards the workforce if you affirm and revitalize that hoe
5. Theres never been an accident in past caused by an old and near retired person. They cant just nitpick every possible reason for an accident. Human error is NU. ppl always make mistakes. However, human error is way more common w coal plants

A/2: Meltdowns Impacts

1. Conca of Forbes finds that in the US Nuclear kills only one person every decade while since 2000, there have been over 200 natural gas pipeline and facility explosions, ruptures or leaks that have killed dozens of people, destroyed many facilities and home and led to serious population evacuations.
1. Even if they are right that nuclear plants might sometimes have accidents, nothing is perfect. However, Rhodes of Yale Environment reports in 2018 that nowadays, even the worst possible accident at a nuclear plant is less destructive than other major industrial accidents. They are not doing the comparative; just because something isn't that great doesn't mean it couldn't be much worse. Indeed, Goldstein of New York Times reports that nuclear energy is the safest form of energy humanity has ever used.
2. Kramer of Business Insider 16'- diferent types of technology, different types of energy creation, won't have meltdowns- means their evi about every 10 years doesn't apply. The warrant comes from Morgart of Harvard who finds "Newer generations of nuclear reactors are designed so that the nuclear chain reaction cannot run away and cause a meltdown – **even in the event of complete failure of the reactor's machinery."**
3. Rhodes of Yale Environment writes that in spite of serious damage to the reactor in Pennsylvania, the actual release had negligible effects on the physical health of individuals or the environment. The effects were just overblown due to stigma around nuclear energy. Indeed, Goldstein of New York Times reports that nuclear energy is the safest form of energy humanity has ever used.
4. Weighing- we impact 7 million versus very few, which is why Schrope of CEN in 2013 concludes that nuclear power will prevent way more deaths than it causes.
5. Forbes- 19, 160 deaths
    a. Assumes everyone wa touched by unfsafe radition
6. WE- shutting down Fukushima caused more deaths because people lost access to electricity (lol)

A/2: Specific Accidents

1. A/2 Fukushima
    a. It was a tsunami. Grimes of the Guardian in 2016 explains that the Fukushima accident happened because of a tsunami, not because of any fault of the nuclear plant. Coal plants are also damaged by natural disasters.
    b. No one died from Fukushima. People died from the tsunami itself.
2. A/2 Chernobyl
    a. Grimes of the Guardian in 2016 explains that the accident was caused by human error. This means that their argument is inherently nonunique, because human error is always probable in every single situation, including at fossil fuel plants.
    b. [If cancer impacts] Goldstein of New York Times reports that about the same number of people are killed by coal emissions *every single day.*
3. A/2 3 Mile Island
    a. Rhodes of Yale Environment writes that in spite of serious damage to the reactor in Pennsylvania, the actual release had negligible effects on the physical health of individuals or the environment. The effects were just overblown due to stigma around nuclear energy.
4. A/2 50%- admits they don't factor in tech advances and stuff https://thehill.com/special-reports/energy-a-environment-september-2010/120419-top-10-reasons-nuclear-power-will-be-the-key-to-americas-energy-future

A/2: Reactors Bad

A/2: Radiation

1. Delink. Bovee of The Stone Lake School in 2009 explains that nuclear power plants give almost no radiation as a result of technological advances, and he concludes that the radiation from plants is less than we are exposed to daily from our environment. He concludes that building more has no impact given that nuclear power is one percent of all radiation.
2. Specter of OEP reports that even if radioactive material is released, it poses no threat to public safety because it enters the environment much gradually than thought before.
3. Turn. Good of GF in 2014 reports that nuclear facilities replacing fossil fuels have saved 1.84 million lives since their inception by preventing the release of countless amounts of harmful pollutants/emissions.
4. Turn. Brown of Oak Ridge reports that the fly ash from coal plants release up to 100x more radiation than nuclear plants because there are more concentrated radioactive constituents in coal after you burn them.
5. A/2 Uranium miners. A study from the UN found that individual uranium miners are only exposed to roughly 4% of the federal limit for workers who deal with radiation.

A/2: Nuclear Waste

1. Delink. Trembath 19' writes that, we have been storing nuclear spent fuel, the total volume of which would fit in shipping containers on just two cargo ships, in dry cement casks and cooling pools for decades. There has never been a leak or an accident with spent nuclear fuel in the U.S. There are multiple options for long-term storage and use of nuclear spent fuel.
2. Delink. Goldstien of the New York Times explains that, America's total nuclear waste from 60 years would fit in a Walmart — and is safely stored in concrete casks and pools, becoming less radioactive over time.
1. Delink. Bruno Comby in his book 'Environmentalists For Nuclear Energy' The remaining 97% is recovered and recycled into new fuel elements to produce more energy.
2. Turn. The current waste produced by fossil fuels is worse. Lauren Stanford of Clean Energy Action finds that fly ash, a byproduct from burning coal, produces 100 times more radiation than a nuclear power plant producing the same amount of energy.
3. Rhodes of Yale in '16 writes that "Nuclear power releases less radiation into the environment than any other major energy source" because nuclear waste has historically never caused their impacts
    a. Shellenberger of Forbes in 2018 continues that nuclear waste is less than harmful than waste from other energy sources, and the only reason people believe differently stems from fear mongering by anti-nuclear leaders.
4. Turn. Nuclear investment decreases waste. As investment is poured into the nuclear energy industry new technologies will develop that reduce waste. Johnson of Wired Magazine in 2018 reports that Dozens of nuclear startups are popping up around the country, aiming to solve the well-known problems with nuclear power such as radioactive waste. Investing more would only streamline the process.
    a. For Example, Goldstien of the New York Times explains that new technology has arisen we can either burn the waste as fuel in new types of reactors or bury it deep underground
5. Delink.The World Nuclear Association
   Most other countries with large nuclear power programs—including France, Japan and the U.K.—employ a closed nuclear fuel cycle Where used fuel is recycled to recover uranium reprocessed into new fuel. This effort doubles the amount of energy recovered from the fuel and removes most of the long-lived radioactive elements from the waste that must be permanently stored. Turn. Particulate matter from coal power plants kills about 7,500 people in the US every year. France reprocessing spent nuclear fuel,[81] which creates additional usable fuel, and puts the remaining nuclear waste in temporary storage facilities.[82]

A/2: Proliferation

1. Delink. Goldstein 19' of the New York Times- because of international controls on the use of nuclear powers and reactors, they don't contribute to weapons proliferation. This is proven by the 24 countries that have nuclear power but no nuclear weapons.
2. Delink.
3. Turn because increasing nuclear power will increase sanctions and create more political barriers to nuclear proliferation. Miller of Dartmouth College continues that more nuclear energy facilities produce more political obstacles like sanctions, decreasing the probability of nuclear proliferation.
4. Turn.
5.

when the private sector is incentivized, the gain in nuclear knowledge by the United States allows us to set nuclear safety and security standards

hϽps://thehill.com/blogs/pundits-blog/energy-environment/333329-time-to-stopconfusing-nuclear-weapons-with-nuclear

Neither the physics nor the technologies are the same, nor are the institutions that manage the two technologies. Nuclear weapons today involve fusing two atoms together in an uncontrolled explosion. Nuclear energy involves harnessing the decay of naturally occurring radioactive elements in a slow and controlled reaction, creating heat that turns steam turbines.

, America's **technical expertise in building, operating and fueling reactors informs and strengthens our ability to design enforceable nonproliferation agreements and effective verification measures to detect and respond to violations.**

Turn- reduce nuke war lmao

When the Atlantic Navigator docked in Baltimore harbor earlier this month, the freighter carried the last remnants of some of the nuclear weapons that the Soviet Union had brandished in the cold war. During the past 20 years more than 19,000 Russian warheads have been dismantled and processed to make fuel for U.S. nuclear reactors. In fact, during that period more than half the uranium fuel that powered the more than 100 reactors in the U.S. came from such reprocessed nuclear weapons.

Moreover, countries that pursued nuclear weapons under the cover of an energy program have not been significantly more likely to acquire nuclear weapons, when compared to countries that seek nuclear weapons without an energy program

A/2: Nuclear Terrorism

1. Literally hasn't happened in countries like Germany, Sweden, France, and China who already structure around nuclear energy. There's no reason it'll suddenly happen in America.
2. Terminal defense. Shellenberger of Forbes explains that there is heavy fortification of nuclear reactors by containment domes, and that even F4 Phantom jets traveling at 500 MPH into the walls of a nuclear plant would leave the wall undamaged.
3. Ward of RAND in 2018 explains that you need refineries to process uranium ores. The implication here is even if terrorists gain access to the uranium material, they don't have the

refineries back at home to process them back at home. Or even if they did, they don't have the management and expertise to make it cost-efficient.

4. Shellenberger of Forbes explains that a nuclear plant might be the worst place imaginable to get the materials to make a bomb because the fuel isn't enriched enough to make a weapon. Neither the fuel used by nuclear plants nor the nuclear waste are enriched enough to be used to make weapons.
    a. That's why whenever terrorists try to make a nuclear bomb they instead look elsewhere for the materials.
5. Turn. Huber of City Journal writes that uranium's combination of power and super-density makes the fuel less of a terror risk compared to their advocacy.

A/2: Attack Plants

1. Too hard to attack- http://xn--hps-zua//borealisthreatandrisk.com/so-why-dont-terrorists-a%C4%B4ack-nuclear-powerplants/
2. U can just build walls and securitize lol- initial research. **It's easy to "overbuild" the protective walls and containment systems of nuclear facilities, since—like the pyramids—the payload they're built to shield is so small.** Protecting skyscrapers is hard; no builder can afford to erect a hundred times more wall than usable space. Guaranteeing the integrity of a jumbo jet's fuel tanks is impossible; the tanks have to fly. Shielding a nuclear plant's tiny payload is easy—just erect more steel, pour more concrete, and build tougher perimeters. In fact, it's a safety challenge that we have already met. **Today's plants split atoms behind super-thick layers of steel and concrete; future plants would boast thicker protection still.**
3. How many aJacks were there on nuclear plants during that time? Zero. What about foiled plots? Also, zero. In fact, there is zero evidence that any terrorist anywhere has planned an aJack on a nuclear plant, much less tried to carry one out, since 9/11. But didn't the 9/11 hijackers consider flying a jet plane into a nuclear plant?
4. AT bunn- While none of these incidents involved quantities large enough to make a nuclear weapon

https://energypost.eu/protect-nuclear-plants-terrorists

- safe

American nuclear leadership has always been critical to guiding the safe, responsible use of civilian nuclear energy around the world. For example, a number of American companies are developing advanced generation-reactor technologies that offer a host of safety and nonproliferation advantages. These advanced designs would have "walk away" safety, meaning they do not need any backup power or external cooling systems in the event of an accident. And since many of the new reactor designs would rarely if ever need to be refueled, the risk of diversion of fuel from uranium-enrichment or plutonium-reprocessing plants to a bomb program would be greatly diminished.The U.S. should lead the way in the development of these reactors so they can be deployed at home and abroad over the next decade. As a growing number of countries around the world turn to nuclear power as a source of carbon-free electricity**, it is strongly**

in our interest that they do so with safe, American-made technology. Countries that adopt the new U.S. reactor designs will also be subject to U.S. nonproliferation

A/2: Water Shortages

1. Jio 19 of the WRI- Other types of energy, which are already widely in use, also use significant amounts of water such as thermoelectric.
    a. Turn. Yiwei of Greenpeace explains that coal is one of the biggest reasons for the global water crisis because it contaminates groundwater, pollutes streams and rivers, and is thus the single-biggest driver behind water-related climate change.
2. Turn. Nuclear energy increases water desalination. Foro Nuclear explains that nuclear energy has enormous potential, holding the ability to generate much more freshwater than what is currently being produced while being affordable and nott releasing any greenhouse gases.
    a. Indeed, White of The Telegraph in 2009 writes that a single nuclear reactor at Aktau on the shore of the Caspian Sea successfully produced up to 135 megawatts of electricity and 80,000 cubic metres of potable water a day.
    b. History proves again as Darwish of NYU writes that in ten main projects around the world ; nuclear desal minimized costs and obtained higher quality water which was seen in India, Kazakhstan, and Southern Europe ; nuclear desal allows optimum performance, a lower demand in energy, lower costs, enhanced water quality, and more efficient performance.
    c. If anything, desalination is more important than small-scale shortages because we can export water to areas that have extensive, l/t shortages and solve for areas that need it more

A/2: Indigenous People

1. Turn. Valerie Volcovici '17 explains that while Native American reservations cover just 2 percent of the nation's surface, a fifth of all U.S. oil and gas reserves. This is bad because columbia finds that natural gas is 40x more deadly, harming indigenous people more.
2. Turn. The UN in 2007 explains that climate change always disproportionately hurts indigenous populations the most because of underdeveloped infrastructure and their lifestyles that're heavily dependent on the environments and agriculture around them.
    a. We outweigh the scope because it affects everyone, including every single indigenous tribe.
3. The root cause of this racism stems from the government's policies. Thus, any and everything will always have strings attached because the government is structurally racist towards these Native Americans. It's not like if we didn't increase nuclear plants, their lands would be left untouched.
    a. In fact, they also perpetuate racism in their world. Macmillan of the New York Times in 2016 writes that there are long standing conflicts between Native Americans and the federal government in regards to fossil fuel mining companies. The reason is because their advocacy also includes coal plants that are built on ancestral lands and produce radiation.

A/2: Climate Change

A/2: Uranium Mining

1. Johnson of Grist just one week ago explains that there is new tech was revealed that would allow future power plants to run on recycled nuclear waste rather than uranium which is a frontline to ppl being like "bad for the environment"
2. Senator Lamar Alexander in 2010 explains that other countries already have a huge stock of uranium and we can just import it from other countries. In fact, Zyga in 2011 explains that we already have enough uranium to power global consumption for the next 80 years. Slightly increasing commercial usage in the US won't suddenly prompt everyone to start mining.
    a. Even if you do believe that the brink will eventually be reached, that makes this argument inherently non-unique. Even if you prevent the US from increasing demand for uranium, other nuclear-based countries will always want to mine, which means this threshold of mining all of our uranium is going to be reached regardless

An expanding focus on Nuclear Energy in the United States results in an expansion of the use of the fuel "thorium" as opposed to uranium, in nuclear power plants for three reasons.

1. Interaction Transition- World Nuclear Association explains 12 countries have already switched
2. Political Attention- Oberhaus of Wired explains Presidential candidates invested $50 Billion in nuclear reactors
3. Abundance- World Nuclear Association explains Thorium is 3x as abundant as uranium
    a. This is important as Gent 18 explains Thorium gives carbon-free power, with non-toxic waste, lower risk of meltdowns, and a much harder route to weaponization than conventional nuclear.

A/2: Increase Emissions

1. Not true

Likewise, we calculated that nuclear power prevented an average of 64 gigatonnes of CO2-equivalent (GtCO2-eq) net GHG emissions globally between 1971-2009 (see Fig. 3). This is about 15 times more emissions than it caused

The results indicate that a long-term 1% increase in nuclear power led to a 0.26–0.32% decrease in CO2 emissions per capita

https://www.eia.gov/todayinenergy/detail.php?id=16031
This does the holistic analysis, saying that accounting for literally everything emissions woud

A/2: Green Tech Revolution

1. Mark Mills of the Manhattan Institute 19'- renewables are 3% of the energy in America right now, IT WILL NEVER BE MORE
    a. Reilly of UtilityDive finds that even if the current costs of individual renewable plants are low, the costs are drastically driven up as you expand the program because it floods the system and makes it unproductive.
    b. Even if renewables are cheap to build, the output from them is too expensive to maintain.
    c. Reached the physics boundary to expand green technology capabilities anymore.

people not going to green tech

A/2: Green Tech Trade Off

1. Environmental Research Letters finds that "when natural gas production is abundant, it crowds out both coal and renewables." If natural gas spikes by this much, US energy will be completely entrenched in fossil fuel, causing
2. Our advocacy is not a full on shift to nuclear energy, just the prevention of fossil fuel fill-in. Green tech is always going to exist in either world, but it comes down to how clean the energy we use to supplement that technology is. [cross apply case evidence]
3. Reilly of UtilityDive finds that even if the current costs of individual renewable plants are low, the costs are drastically driven up as you expand the program because it floods the system and makes it unproductive. He concludes that decarbonization is impossible unless you nuclear plants to supplement renewables in order to have sustainable and affordable decarbonization. Two implications:
    a. You always need nuclear energy even if it trades off a little bit with green tech
    b. The green tech revolution that they advocate for isn't sustainable, so it's terminal defense
4. Conca of Forbes in 2016 explains that nuclear plants can never be replaced by renewables because they can't keep up with the pace of demand. He furthers that natural gas is what replaces nuclear power, not renewables.
    a. Green tech will always be offset, but it comes down to whether it's by fossil fuels or cleaner nuclear energy.
5. Plumer of Vox in 2016 finds that New York was able to do both nuclear and renewable energy at the same time, and no trade off occurred.
    a. Varseev of The Bulletin in 2019 gives the warrant. He explains that nuclear energy should always be used at the same time as renewables, as the strengths and weaknesses of the two complement each other through the online activity and storage technologies.

A/2: Green Tech Better

1. Turn. Nuclear energy is better. Shellenberger of Forbes in 2019 reports that nuclear energy, not renewables, is the only source of energy that has radically decarbonized our globe. He furthers that ignorance and subconscious stigma attached to nuclear power is the reason nobody wants to expand nuclear energy. He concludes that in actuality, solar farms require hundreds of times more land, an order of magnitude more for mining materials, and create hundreds of times more waste than do nuclear plants.
    a. In another article, Shellenberger concludes that had Germany spent just $580 billion on nuclear instead of renewables, it would've had enough energy to replace all fossil fuels usage.
2. Turn. Abdulla of the Conversation writes that the nuclear industry avoided 547.5 million metric tons of carbon dioxide emissions, which provided more low-carbon electricity than solar and wind power combined. Indeed, the NEI concludes that nuclear energy's carbon emissions were way lower than solar, geothermal and hydropower combined.
3. Turn. A revolution taking out nuclear power would result in higher electricity prices for consumers. The IEA in 2019 writes that around $1.6 trillion in additional investment would be required in the electricity sector in advanced economies in the next two decades due to high maintenance and operation costs. They conclude that costs would be $80 billion higher per year in their world.
4. Turn. As our second warrant explains, currently renewables are heavily dependent on fossil fuels to operate. Unfortunately, Shellenberger of Forbes writes that this overellaince
5.

A/2: Subsidies

1. Delink. An analysis by Bioenergy International explains in 2018: massive flows of finance are needed to accelerate renewable energy investments and...reduce energy-related carbon emissions,
    a. Implication is that you don't need subsidies
2. Delink. Renewable subsidies are decreasing. Forbes writes that between 2013 and 2016, renewable subsidies fell in half, yet the green tech revolution is still happening.
3. Chediak '19 that subsidies have already accomplished their goal, as wind and solar have already been deployed widely enough to become increasingly efficient and drive down costs. He furthers that wind and solar can compete on their own against coal and natural gas plants now.

"Solar got cheap," said Jenny Chase, an analyst at BNEF. "It's really that simple."

A/2: Lobbying

1. The uniqueness proves it wrong, there's investment into green technology and nuclear power subsidies right now but if they are right that green tech is expanding, then lobbying doesn't work.
2. No reason as to why increasing nuclear power increases lobbying. If anything, it satisfies lobbyists because the government is investing in them and there's less of an incentive to lobby because they have achieved.
3. There are mutual benefits to lobbying to keep green technology because of our second link. If nuclear power is being expanded with green technology, then it means that the lobbyists have an incentive to not crowd out.
4. Turn. Two examples of how the nuclear lobby promotes green technology.
    a. New York, where nuclear power is used to build a bridge fuel for long term green technology
    b. Illinois, where they passed a zero-emission policy to encourage both in tandem.

A/2: Jobs

1. Solving back for climate change is more important than jobs.
2. There's a tradeoff. The green tech industry might go down, which does create a loss in jobs. But they are not accounting for the creation of jobs driven by the nuclear power industry.
    a. In fact, the NEI turns this by explaining that a single nuclear power plant creates more jobs than any other type of energy generation facility. The reason is because people don't account for the hundreds of thousands of secondary jobs that get created to sustain the industry. If jobs are the most important impact, vote for us.

A/2: Battery Technology

hJps://www.technologyreview.com/s/611683/the-25-trillion-reason-we-cant-rely-onbaJeries-to-clean-up-the-grid/
hJps://www.wired.com/story/beJer-baJery-renewable-energy-jason-pontin/, accessed 2-22-2020

A/2: Global Precedent

1. Reliant on the idea that nuclear power is generally bad; winning the internal link into nuclear power good means that you win the argument.
2. Impact disproves the link; if nuclear power is a bad way for countries to industrialize and even the most corrupt countries always have an incentive to become as powerful as fast as possible, there's no reason they'll use a bad form of energy that wouldn't favor them.

A/2 Renewable Spillover/Exports

1. **Bloomberg New Energy Finance** reported last year that developing countries especially are abandoning coal to pursue renewable energy - 54 countries have invested in wind, and 76 in solar.
2. There is literally no industry in the US for green technology right now, and they're just assuming that the US is going to plunge into an all-out green tech-based future that exports to all countries.
2. Dudley of Forbes in 2019 explains that China is already on track to become the world's renewable energy superpower, exporting to developing countries that have the demand. The implication here is even if the US can't export GT in the future, these countries can just turn to countries like China instead.