We affirm.

Interpretation

Debaters must disclose all broken non-identity based topical constructive positions at the tournament at which they are competing open source twenty minutes before the round on the 2024-2025 NCDA PF Wiki

Violation

They didn't disclose. Screenshots prove


Potomac Debate Academy
Last updated by Anthony Lee on 7/4/2024

Team
Potomac Debate Academy All Teams
Potomac Debate Academy Novices
Potomac Debate Academy DaZh (Andrew Dai - Kaitlyn Zhang)
Potomac Debate Academy GaWa (Yusuf Gabr - Angela Wang)
Potomac Debate Academy GoDa (Ronav Gopal - Ava Datta)
Potomac Debate Academy GoKh (Sahasra Godlaveti - Anya Khanna)
Potomac Debate Academy JiLa (Gaurang Jinka - Paige Lawlor)
Potomac Debate Academy KeUp (Daven Kella - Karthik Uppalapati)
Potomac Debate Academy KoKe (Jonah Koo - Daven Kella)
Potomac Debate Academy LePa (Anthony Lee - Veer Parmar)
Potomac Debate Academy LiPa (Preston Lieu - Zayd Patel)
Potomac Debate Academy LiXu (Grace Li - Katherine Xue)
Potomac Debate Academy QiPe (Kaitlyn Qin - Nikhil Peddibhotla)
Potomac Debate Academy RaKa (Arya Rathi - Josh Kanodia)
Potomac Debate Academy RaZh (Arya Rathi - Ellin Zhou)
Potomac Debate Academy VeXi (Malavika Venkatesh - Jeffrey Xiong)
Potomac Debate Academy ViVi (Arjun Virmani - Sarina Virmani)
Potomac Debate Academy WaSh (Angela Wang - Rishik Shenolikar)
Potomac Debate Academy YaSh (Alex Yang - Rishik Shenolikar)
Potomac Debate Academy ZhZa (Colin Zhang - Aaron Zacharia)

Add a Team

Standards

1. Evidence Ethics: Disclosure is the only way to verify that cards aren't miscut or highlighted or bracketed unethically b/c prep time isn't enough. Ethics controls fairness, we can't have a fair debate against falsified evidence. Ethics is also key to education, more peer review means debaters will cut higher quality evidence and research more.

2. **Reciprocity**: They are able to prep me out which creates a massive in round skew in ability to engage and readiness which is a comparative advantage. The judge can resolve 100% of out of round abuse but has the UNIQUE scope of solvency to rectify the abuse in this round.

3. Cross-pollination — Debaters can use and modify the best ideas from each other's disclosed cases, leading to development of the best version of the argument. Yes, people will steal cards, but that's good because it already happens within large schools but by allowing small schools to steal from big schools we level the playing field.

D. Voters

A) **Education** – it's the value we get out of rounds. Killing education kills the point of the activity.

B) **Fairness -** Unfair arguments arbitrarily skew your evaluation of the round towards the unfair debater, and all arguments presume fair evaluation of those arguments

Vote for us to

a. Set a precedence of better norm
b. Deter future abuse
c. Rectify the time skew for reading theory and being skewed out of substance.

Default to competing interps. 2 warrants

1. **Intervention** – Reasonability is arbitrary and forces judges to insert their own opinions instead of evaluating who did the better debating.
2. **Consistency -** Every judge has extremely different views on what is "reasonable".

NO RVIS; 4 warrants:

1. Debaters bait and prep out theory creating infinite abuse and stopping clash.
2. People won't call out abuse in front of good theory debaters due to fear of losing.
3. You can't win for being abusive.
4. Theory is reciprocal, they can run theory on us too, no point in RVIs.

The must respond to all of this in the next speech or its conceded because then we can't frontline until summary and we're skewed 9:5.

C1 is Space Disaster

Trump's going to Mars

Greenfieldboyce 25 [Nell Greenfieldboyce, NPR science correspondent & Masters of Arts degree in science writing, 2-12-2025, Is Trump the president who will truly set a course for Mars?, NPR, https://www.npr.org/2025/02/13/nx-s1-5294575/president-trump-elon-musk-mars-moon, Willie T.]

Back in 1969, Robert Zubrin remembers watching the first moon landing when he was a teenager. He says if someone back then had asked him to predict when astronauts would walk on Mars, "my guess would have been the early 1980's." "And, in fact, NASA had plans to do that at that time, which were aborted by the Nixon administration," says Zubrin, an aerospace engineer who is president of the Mars Society and author of The Case for Mars. Over the decades, as administrations have come and gone, presidents have repeatedly promised future missions to Mars, holding this up as a key goal for human space exploration. **Never before**, though, **has a president had** such **a** close **relationship with a** would-be **Mars colonizer**, one who has transformed the world of rocketry. Elon Musk, President Trump's ally who is shaking up government agencies, founded the company SpaceX with the goal of making humans a multiplanetary species. In addition to ferrying astronauts to orbit for NASA, this company is currently building and test flying a new space vehicle, Starship, that's designed to transport massive amounts of cargo—including people—and land on Mars. "This is quite a singular moment for the prospects of getting to Mars," says Zubrin, who sees this as a time filled with both opportunity and peril. "I think it actually is pretty clear right now that we're going to get a humans-to-Mars program started," he says. But to succeed, any such plan would need broad political support, and he worries about Mars suddenly becoming a divisive, partisan issue. "This is not going to work," says Zubrin, "if this is understood to be an Elon Musk hobbyhorse." The presidents and Mars In his inaugural address in January, President Trump got the attention of the space community when he said the United States would "pursue our manifest destiny into the stars, launching American astronauts to plant the Stars and Stripes on the planet Mars." In some ways, a president inspirationally referring to Mars is nothing new. Back in 1989, for example, President George H. W. Bush called for a return to the moon, to be followed by "a journey into tomorrow, a journey to another planet: a manned mission to Mars." He envisioned footprints in the Martian dirt by 2019, the 50th anniversary of the moon landing. "Within a few short years after President Bush's Kennedy-esque announcement, however, the initiative had faded into history," one policy analyst wrote. A decade and a half later, President George W. Bush refocused NASA on a return to the moon by 2020, adding that "with the experience and knowledge gained on the moon, we will then be ready to take the next steps of space exploration: human missions to Mars and to worlds beyond." President Obama told NASA to forgo the moon, but did maintain Mars as a goal: "By the mid-2030s, I believe we can send humans to orbit Mars and return them safely to Earth," he said in a speech at NASA's Kennedy Space Center. "And a landing on Mars will follow." First, the moon? During President Trump's first administration, he issued a space policy directive that refocused NASA on a human moon landing, with missions to Mars added as a future goal. That program, called Artemis, is what NASA has pursued ever since. It continued under President Biden, although it's been criticized as relying on a super-expensive rocket that rarely flies. Despite delays and cost overruns, NASA says it is poised to send humans to orbit the moon next year. A landing is planned for the year after that. Trump's reference to Mars, but not the moon, in his inaugural speech had some in the space community wondering if this was a result of Musk's influence. The new Trump administration could kill Artemis and its lunar plans, but Casey Dreier, chief of space policy for the Planetary Society, says that would be "strange in the historical sweep of things" given that the first Trump administration basically created this program "There's a lot of good reasons to still go to the moon, one of which is that the U.S. has made a commitment to not just its allies, but to the broader commercial space and business community here in the country," notes Dreier. Still, he thinks that the current administration might challenge NASA to really nail down how the space agency will move from lunar exploration to a Mars mission. More difficult than the moon NASA has a "Moon to Mars Program Office," notes Dreier. He thinks, however, "there's no 'to Mars' part of it. It's all 'to moon.' " He says NASA has constrained budgets, and there's always been concerns that the agency hasn't had enough resources to pursue both the moon and Mars. "It's hard to express verbally, I think, how much harder Mars is than the moon and how different it is," says Dreier. A trip to the moon takes just three days. Going to Mars, in contrast, takes months—one way. Recently, a NASA program aimed at retrieving pristine rocks from the surface of Mars and bringing them back to Earth ran into real trouble, as costs ballooned by billions and the mission timeline slipped. One decision the Trump administration will have to make is whether, and how, to pursue this science mission. Dreier says in terms of human exploration, NASA needs to lay out how its lunar activities will actually help get the agency closer to going to Mars. "That is the key reframing that could help the long-term exploration program be more efficient and effective," he says. President Trump's pick to lead NASA is Jared Isaacman, a private astronaut who flew to orbit twice in SpaceX vehicles and completed the first commercial extravehicular activity, or spacewalk. He has yet to be confirmed. A NASA spokesperson told NPR in an email that the agency is "looking forward to hearing more about the Trump Administration's plans for our agency and expanding exploration for the benefit of all, including sending American astronauts on the first human mission to the Red Planet." A non-partisan planet **Because of the way** the **planets align**, potential launch **windows to Mars open up in 2026** and 2028. **Musk** has publicly stated that he's **aiming to send Starship** to Mars as soon as **next year.** Starship has yet to reach orbit, but Zubrin thinks it's possible that an uncrewed Starship might land on Mars by 2028.

Nuclear is key but investment is needed.

Nguyen 20 [Tien Nguyen, Ph.D. in Organic Chemistry & B.S in Chemistry with Minor in Physics, 5-15-2020, Why NASA thinks nuclear reactors could supply power for human colonies in space, Chemical & Engineering News, https://cen.acs.org/energy/nuclear-power/NASA-thinks-nuclear-reactors-supply/98/i19, Willie T.] **brackets in original**

The astronauts pass their days in darkness. After several months of living on the moon, they're still adjusting to the endless night. The crew's habitat at the lunar south pole sits in a shadowed crater—chosen for its promise of ice—that has not been touched by a single ray of sun for billions of years. Fortunately, the nearby **nuclear** reactor is unfazed by the lack of light. Connected to the astronauts' base camp by a kilometer of cables cautiously tracing the lunar surface, the reactor **provides** an **uninterrupted** supply of **electricity** for recharging rovers, running scientific instruments, and most importantly, powering the air and heating systems **that keep** the **astronauts alive.** This is one vision of what human exploration could look like on the moon. In fact, NASA has plans to make some versions of this scene a reality—and soon. The agency aims to send a human mission to the moon by 2024 in an effort named the Artemis project. Congress has allocated more than $6 billion of NASA's 2020 fiscal budget for space exploration programs including the Space Launch System rocket, the Orion spacecraft, exploration ground systems, and research and development. The agency estimates that it will cost $35 billion to land a crew on the lunar surface, including the first woman to step foot on the moon. After 2024, NASA hopes to move to launching one human mission each year and reach sustainable operations on the moon by 2028. The lessons learned in that phase will be crucial in preparing for future trips to Mars. One major effort will involve figuring out which power systems—including ones that have never been tested on the lunar surface, such as nuclear power—would best support future settlements. Whether the necessary materials can be brought safely to the moon and whether systems such as nuclear fission can run reliably under such harsh conditions are central questions that must be answered as engineers weigh their options. Going nuclear Choosing a power source depends on the particular mission's needs, says Michelle A. Rucker, an engineer at NASA's Lyndon B. Johnson Space Center who has researched possible architectures for space settlements. Electricity may come from nuclear reactors, solar panels, batteries, fuel cells, or some combination of these technologies connected in a power grid, she says. "I'm a big fan of all the types of power." But each power source has distinct pros and cons to consider. Solar arrays have reliably delivered renewable power in space for decades but are useless in places that never get any light, like the potentially resource-rich craters on the moon. And on the windy, dusty surface of Mars, solar panels may struggle to collect enough light, making them a risky option for powering life support systems, Rucker says. Batteries and fuel cells have limited lifetimes for now, relegating them to supplementary power sources at best. One type of nuclear device that has been used to power spacecraft is a radioisotope thermoelectric generator, which runs on the heat produced by the decay of plutonium-238. These generators have been used since the 1960s in Mars rovers and space probes sent to the outer edges of the solar system, such as the Voyager spacecraft and Cassini. Despite being the workhorses of scientific missions, the generators provide only several hundred watts of power, just enough to send radio signals back to Earth or power a camera. On Earth, the nuclear technology used by power plants is nuclear fission, which splits uranium-235 atoms via bombardment with neutrons to generate heat that's captured to produce electricity. Nuclear fission holds the potential to provide a continuous, reliable source of power for a small space settlement designed to last for several years. In the 1960s, many scientists thought fission reactors for space would follow on the heels of radioisotope generators. In 1965, the US launched a small nuclear fission–powered satellite named SNAP-10A, but electrical issues caused it to fail a mere 43 days after launch; it's still in orbit, now just another piece of space junk. The Soviet Union launched 31 nuclear fission–powered satellites over the next 2 decades. But the development of new nuclear fission reactors for space stalled during that time because of design problems and ballooning budgets. Engineers wanted advanced performance from these systems right away, which led to complicated and expensive designs, says David Poston, a nuclear engineer at Los Alamos National Laboratory. He and Patrick McClure, who specializes in reactor safety at Los Alamos, have worked at the lab for the past 25 years and recall the days when nuclear fission had fallen out of favor. "Pat and I were sitting around just kind of demoralized," Poston says, "because we had gotten to the point where NASA wasn't really interested anymore because the impression was that it was going to be too expensive and too hard to develop a fission reactor." But the pair were convinced their team could come up with a design to dispel the funk that had settled around fission power for space. In the early 2010s, they got their chance: researchers at Los Alamos and later the **NASA** Glenn Research Center and the US Department of Energy began work on a joint project called Kilopower, now renamed the Nuclear Fission Power Project. The goal **is to develop a** new **nuclear** fission **power system** for space that would be **capable** of producing 10 kW of electrical energy. Designing the reactor Four of these reactors could easily provide the 40 kW of power that Rucker estimates a six-member crew would need **to live on Mars**. The team's modular, compact design is lightweight enough for space exploration, in which every kilogram counts. Previous hypothetical fission-power concepts required a payload of 12–14 metric tons (a 6–7 t reactor plus a backup), whereas a single Kilopower reactor would weigh an estimated 1.5 t, she says. The team decided to approach the reactor design anew, putting one priority above all: simplicity. This meant not only maintaining a simple mechanical design but also looking for opportunities to simplify safety approvals and project management. As an example, McClure says, the team made a conscious choice to limit the size of the nuclear core to a container already being used to test nuclear materials instead of fabricating a new one. "I hate to call it an innovation because it's not that complicated.

Testing nuclear-carrying spacecraft sparks nuclear accidents and global prolif

Feldscher 19 [Jacqueline Feldscher, "Push for nuclear power in space sets off proliferation debate", 09/27/2019, POLITICO, https://www.politico.com/story/2019/09/27/nuclear-power-nasa-mars-alan-kuperman-q-and-a-1510896] //ZL

This appeared to be NASA heading in a direction that is contrary to longstanding U.S. policy … so it seemed like a good time to convene the stakeholders, including NASA, Congress, and the companies seeking to build these types of reactors but using low enriched uranium. MOST READ cbo-budget-69850.jpg Bessent flew to Florida to lobby Trump on tariff message John Roberts lifts midnight deadline for US to bring back man who was wrongly deported to El Salvador 'How Ugly Is This Going to Be?' 'The opposite of what Americans voted for': Market turmoil causes Trump backlash Supreme Court, in a win for Trump, lets admin cancel $65M in teaching grants What do you hope to achieve? We want to look at … what are the potential risks of using this type of fuel in a space reactor. Those risks include … **a launch failure.** That would send the thing up but it **would come down in somebody else's country.** What would be **coming down is** 40 kilograms of highly-enriched **uranium,** which is **enough for several nuclear weapons**. … About **20 percent of launches** have **fail**ures. … The government is well aware of the risk. I believe, but I can't be sure, that it's the reason President Trump's presidential memorandum last month said any launch with highly-enriched uranium would require presidential approval before the launch. Another risk of highly-enriched uranium is the security costs for NASA would go through the roof. A study from a few years ago says extra costs would be $40 million per launch and a one-time infrastructure update at the launch site of $30 million, so the first launch would cost $70 million extra for security. The third risk is that this would create a precedent for other countries. They might say, "The U.S. now thinks it's ok to use highly-enriched uranium, so we're going to enrich uranium to weapons grade." Maybe they are really using it for a [power-generating] reactor, or maybe they'll divert it for a bomb. The fourth big concern is that the commercial reactor builders are not licensed to handle highly-enriched uranium. so that means they could not partner with NASA to develop less expensive reactors.

Accidents cause nuke war

Starr '15 Steven Starr, Robin Collins, etc. September, 29th, 2015, Bulletin of the Atomic Scientists, New terminology to help prevent accidental nuclear war, https://thebulletin.org/2015/09/new-terminology-to-help-prevent-accidental-nuclear-war/ // HZN Since the advent of US and Russian nuclear-armed ballistic missiles and early warning systems, the danger has always existed that a false warning of attack—believed to be true—could cause either nation to inadvertently launch a responsive "retaliatory" strike with its own nuclear forces. Fear of a disarming nuclear strike, especially during a crisis, creates immense pressure to use-or-lose nuclear forces if an attack is detected. Because **launch-ready** ballistic **missiles allow** either side to launch **a counter-strike before** nuclear **detonations confirm whether** or not **the** perceived "nuclear **attack**" **is real,** the launch of a retaliatory strike would in reality be a preemptive nuclear first-strike, should the warning prove to be false—**resulting in accidental nuclear war**. This pressure applies to any nation that might develop the ability to launch before detonation; as a result, what the United States and Russia decide to do could conceivably act as a role model for others—depending, of course, on the unique circumstances of each country. Consequently, there have been many calls to eliminate, or at least "de-alert," these launch-ready forces—that is, to institute changes to the weapons systems that will prevent an overly hasty launch. This approach would make it physically impossible to start a nuclear war by accident, in response to a false warning of attack. Unfortunately, there has not been much enthusiasm in either the United States or Russia for de-alerting or eliminating high-alert nuclear forces. Yet the recent, escalating tensions between the United States and Russia have increased the need for both nations to address the dangers posed by their launch-ready strategic nuclear weapons. Almost all US and most Russian silo-based intercontinental ballistic missiles (ICBMs)—as well as some of their submarine-launched ballistic missiles—remain at launch-ready status, capable of rapid launch within a maximum of 15 minutes after receiving a warning. These weapons are armed with strategic nuclear warheads, and the detonation of even one such warhead could kill hundreds of thousands of people. There is another way to reduce the risk of accidental nuclear war: Russia and the United States could each independently adopt a policy of not launching their nuclear-armed missiles before confirmation of a nuclear detonation on their respective territories. Such a policy would make it impossible to launch a responsive or reflexive nuclear strike based upon a false warning of attack. To help them reach such commitments, the diplomatic world should address a factor that has spawned confusion and controversy: nuclear terminology.

C3 is Tradeoff

Clean energy is rapidly advancing and solves energy needs by 2035 – Trump is toothless

Beinhocker 25 Eric Beinhocker, 2-28-2025, "The Clean Energy Revolution Is Unstoppable", [Eric Beinhocker is a Professor of Public Policy Practice at the Blavatnik School of Government, University of Oxford. He is also the founder and Executive Director of the Institute for New Economic Thinking at the University's Oxford Martin School. INET Oxford is an interdisciplinary research center dedicated to the goals of creating a more inclusive, just, sustainable, and prosperous economy. Beinhocker is also a Supernumerary Fellow in Economics at Oriel College and an External Professor at the Santa Fe Institute.], https://www.wsj.com/business/energy-oil/thecleanenergyrevolution-is-unstoppable-88af7ed5, DOA 3-25-2025 //Wenzhuo recut //cy

Since Donald Trump's election, clean energy stocks have plummeted, major banks have pulled out of a U.N.-sponsored "net zero" climate alliance, and BP announced it is spinning off its offshore wind business to refocus on oil and gas. Markets and companies seem to be betting that Trump's promises to stop or reverse the clean energy transition and "drill, baby, drill" will be successful. But this bet is wrong. The clean energy **revolution** is being driven by fundamental technological and economic forces that are too strong to stop. Trump's policies can **marginally slow progress** in the U.S. and harm the competitiveness of American companies, but they cannot halt the fundamental dynamics of technological change or save a fossil fuel industry **that will** inevitably **shrink** dramatically in the next two decades. Our research shows that once new technologies become established their patterns in terms of cost are surprisingly predictable. They generally follow one of three patterns. The first is a pattern where costs are volatile over days, months and years but relatively flat over longer time frames. It applies to resources extracted from the earth, like minerals and fossil fuels. The price of oil, for instance, fluctuates in response to economic and political events such as recessions, OPEC actions or Russia's invasion of Ukraine. But coal, oil and natural gas cost roughly the same today as they did a century ago, adjusted for inflation. One reason is that even though the technology for extracting fossil fuels improves over time, the resources get harder and harder to extract as the quality of deposits declines. here is a second group of technologies whose costs are also largely flat over time. For example, hydropower, whose technology can't be mass produced because each dam is different, now costs about the same as it did 50 years ago. Nuclear power costs have also been relatively flat globally since its first commercial use in 1956, although in the U.S. nuclear costs have increased by about a factor of three. The reasons for U.S. cost increases include a lack of standardized designs, growing construction costs, increased regulatory burdens, supply-chain constraints and worker shortages. A third group of technologies experience predictable long-term declines in cost and increases in performance. Computer processors are the classic example. In 1965, Gordon Moore, then the head of Intel, noticed that the density of electrical components in integrated circuits was growing at a rate of about 40% a year. He predicted this trend would continue, and Moore's Law has held true for 60 years, enabling companies and investors to accurately forecast the cost and speed of computers many decades ahead. Clean energy technologies such as **solar, wind and batteries** all follow this pattern but at different rates. Since 1990, the cost of wind power has dropped by about 4% a year, solar energy by 12% a year and lithium-ion batteries by about 12% a year. Like semiconductors, each of these technologies can be mass produced. They also benefit from advances and economies of scale in related sectors: solar photovoltaic systems from semiconductor manufacturing, wind from aerospace and batteries from consumer electronics. Solar energy is **10,000 times cheaper** today than when it was first used in the U.S.'s Vanguard satellite in 1958. Using a measure of cost that accounts for reliability and flexibility on the grid, the International Energy Agency (IEA) calculates that electricity from solar power with battery storage is less expensive today than electricity from new coal-fired plants in India and new gas-fired plants in the U.S. We project that by 2050 solar energy will **cost a tenth** of what it does today, making it far cheaper than any other source of energy. At the same time, barriers to large-scale clean energy use **keep tumbling**, thanks to advances in energy storage and better grid and demand management. And **innovations** are enabling the electrification of industrial processes with enormous efficiency gains. The falling price of clean energy has **accelerated** its adoption. The growth of new technologies, from railroads to mobile phones, follows what is called an S-curve. When a technology is new, it grows exponentially, but its share is tiny, so in absolute terms its growth looks almost flat. As exponential growth continues, however, its share suddenly becomes large, making its absolute growth large too, until the market eventually becomes saturated and growth starts to flatten. The result is an S-shaped adoption curve. The energy provided by solar has been growing by about 30% a year for several decades. In theory, if this rate continues for just one more decade, solar power with battery storage could **supply all the world's energy needs by** about **2035**. In reality, growth will probably slow down as the technology reaches the saturation phase in its S-curve. Still, based on historical growth and its likely S-curve pattern, we can predict that renewables, along with pre-existing hydropower and nuclear power, will largely displace fossil fuels by about 2050. For decades the IEA and others have consistently overestimated the future costs of renewable energy and underestimated future rates of deployment, often by orders of magnitude. The underlying problem is a lack of awareness that technological change is not linear but exponential: A new technology is small for a long time, and then it suddenly takes over. In 2000, about 95% of American households had a landline telephone. Few would have forecast that by 2023, 75% of U.S. adults would have no landline, only a mobile phone. In just two decades, a massive, century-old industry virtually disappeared. If all of this is true, is there any need for government support for clean energy? Many believe that we should just let the free market alone sort out which energy sources are best. But that would be a mistake. History shows that technology transitions often **need** a kick-start from **government**. This can take the form of support for basic and high-risk research, purchases that help new technologies reach scale, investment in infrastructure and **policies that create stability** for private capital. Such government actions have played a critical role in virtually every technological transition, from railroads to automobiles to the internet. In 2021-22, Congress passed the bipartisan CHIPS Act and Infrastructure Act, plus the Biden administration's Inflation Reduction Act (IRA), all of which provided significant funding to accelerate the development of the America's clean energy industry. Trump has pledged to end that support. The new administration has halted disbursements of $50 billion in already approved clean energy loans and put $280 billion in loan requests under review. The legality of halting a congressionally mandated program will be challenged in court, but in any case, the IRA horse is well on its way out of the barn. About $61 billion of direct IRA funding has already been spent. IRA tax credits have already attracted $215 billion in new clean energy investment and could be worth $350 billion over the next three years. Ending the tax credits would be **politically difficult,** since the top 10 states for clean energy jobs include Texas, Florida, Michigan, Ohio, North Carolina and Pennsylvania—all critical states for Republicans. Trump may find himself fighting Republican governors and members of Congress to make those cuts. It is **more likely that Trump** and Congress **will take actions that are politically easier,** such as ending consumer subsidies for electric vehicles or refusing to issue permits for offshore wind projects. The impact of these policy changes would be mainly to harm U.S. competitiveness. By reducing support for private investment and public infrastructure, raising hurdles for permits and slapping on tariffs, the U.S. will simply drive clean-energy investment to competitors in Europe and China. Meanwhile, Trump's promises of a fossil fuel renaissance ring hollow. U.S. oil and gas production is already at record levels, and with softening global prices, producers and investors are increasingly cautious about committing capital to expand U.S. production. The energy transition is a one-way ticket. As the asset base shifts to clean energy technologies, large segments of fossil fuel demand **will permanently disappear**. Very few consumers who buy an electric vehicle will go back to fossil-fuel cars. Once utilities build cheap renewables and storage, they won't go back to expensive coal plants. If the S-curves of clean energy continue on their paths, the fossil fuel sector will likely shrink to a niche industry supplying petrochemicals for plastics by around 2050.¶ For U.S. policymakers, supporting clean energy isn't about climate change. It is about maintaining American economic leadership. The U.S. invented most clean-energy technologies and has world-beating capabilities in them. Thanks to smart policies and a risk-taking private sector, it has led every major technological transition of the 20th century. It should lead this one too.

Nuclear energy kills renewables – diverts attention, resources, and monopolizes grids – make them answer every disad

CAN 24 Climate Action Network, 3-18-2024, "POSITION PAPER: The nuclear hurdle to a renewable future and fossil fuel phase-out," [Climate Action Network (CAN) Europe is Europe's leading NGO coalition fighting dangerous climate change. We are a unique network, in which environmental and development organisations work together to issue joint lobby campaigns and maximise their impact], https://caneurope.org/position-paper-nuclear-energy/, DOA 3-25-2025 //Wenzhuo recut //cy

More than three-quarters of the EU's greenhouse gas emissions stem from our energy consumption, therefore it is vital to stop burning fossil fuels to limit temperature rise to 1.5°C, the Paris Agreement target. Together with members, and external experts, we developed our Paris Agreement compatible (PAC) energy scenario, which provides a robust, science-based pathway for Europe's energy landscape. On the basis of this work, CAN Europe advocates for a phase-out of coal by 2030, gas by 2035, and a 100% renewables-based energy system by 2040, which requires the phase-out of nuclear power by then. The disruption of nuclear power can be observed in many countries, not only in Europe. In Dubai, at COP28, CAN was strongly opposed to and called out countries, supporting and signing the pledge led by the USA, UK, France and 18 other countries to globally triple nuclear power in the next 25 years. This goal is much higher than the high bracket of International Energy Agency (IEA) scenarios, already based on improbable hypotheses and risks to distract from the tripling of Renewable Energy capacities that was agreed by a much larger group of countries at COP28. In 2023, there was an **alarming push** and a surge in support **for nuclear power** within the EU political space. This development is creating significant tension with proponents of energy sufficiency and a fully renewable energy system and marks a regressive step in efforts towards a sustainable and just energy transition. While nuclear champions claim that nuclear energy can work hand-in-hand with renewables, it is becoming increasingly clear that nuclear power acts as a significant hurdle to energy efficiency investments, the roll-out of renewables and fossil fuel phase-out in three spheres: the EU political debate, energy system planning, and decentralisation. Climate Action Network International, the global umbrella under which CAN Europe participates, with a community of almost 2000 members from civil society, in more than 130 countries, stands united in opposing new and existing nuclear power stations. In 2020, we reviewed and agreed the CAN Charta, the 'highest' document for all CAN members, the international secretariat and the regional nodes, and we listed under strategies "Promoting a nuclear-free future". A hurdle in the policy debate The starting gun for a renewed attempt at a nuclear renaissance was the inclusion of nuclear in the EU Taxonomy in 2022, and can be seen as the nuclear lobby's blueprint for its future ambitions – creating a large political debate using arguments of "technology neutrality" and a "level playing field" and forming alliances with fossil fuel advocates (in this case, fossil gas) in order to reduce ambition to sustainable solutions. Since then, a French-led campaign, manifested through the 14 Member State "Nuclear Alliance", coupled alongside the lobbying activities of the nuclear industry, has run roughshod through EU energy and climate policy over the last two years. Continuing the narrative of "technology neutrality" and a "level playing field", this mission has aimed at promoting nuclear energy at the direct expense of a transition to a 100% renewable-based energy system, in legislation such as the Renewable Energy Directive, Electricity Market Design and Net Zero Industry Act. Attempting to lower renewable ambition In the context of the Renewable Energy Directive (RED III) revision, France tested the waters in 2023 by calling for a low-carbon 'weighting' in EU renewables target in order to support a higher EU 2030 renewable energy target of 45%, where so-called 'low carbon' energy sources are taken into account when establishing national renewable energy targets. Though this did not see the light, a concession was won on renewable hydrogen and gained provisions to facilitate nuclear-produced hydrogen – risking further watering down a renewables-based technology pathway. The EU Commission launched its proposal for the Net Zero Industry Act (NZIA) in March 2023 as a response to the Inflation Reduction Act (IRA) of the United States. While nuclear was included as a list of technologies that were seen as making a contribution to decarbonisation, the EU Commission President, Ursula von der Leyen, refused to include it in the list of "strategic technologies", which could receive additional support. The list was limited, as to be better targeted, at technologies such as solar, wind, energy storage, heat pumps and grid technologies. The final political agreement has led to the inclusion of "nuclear fission energy technologies" as strategic, while this debate allowed the list to become so extensive it practically loses any strategic element. Delaying fossil phase out via dirty trade-offs During the Electricity Market Design reform, nuclear and fossil fuel promoters in the Parliament attempted to **derail** a deal supporting renewables and flexibility. In the Council, due to the focus of the Nuclear Alliance on the Contracts for Difference (supported by some coal dependent countries) the negotiations were delayed by several months and conversations redirected away from renewables, leading to a deal supporting subsidies for existing and new nuclear reactors and a prolongation of subsidies to coal power plants via capacity mechanisms. Wasting time and diverting attention As the nuclear debate **aggressively** dominates political negotiations, media, and public discourse, it **blatantly diverts critical attention from** advancing the **existing,** affordable, sustainable solutions to the energy transition. This overwhelming focus on nuclear power not only overshadows but also poses a risk of **derailing** the European **energy transition**, hindering progress towards aligning with the ambitious yet achievable goal of a **100% renewable energy** system by 2040. A hurdle to a fully renewables based power system CAN Europe's assessment of the draft National Energy and Climate Plans highlights that not a single Member State plan is aligned to a 1.5ºC compatible trajectory, nor minimum EU climate and energy requirements for 2030. **Increased ambition is required** on energy efficiency, energy savings, renewables and fossil fuels phase-out, while Member States are **betting on false solutions** to the challenge at hand, such as nuclear energy. As highlighted in our NECP analysis, the EU has inadequate renewables expansion, grossly insufficient investment in energy efficiency, late coal phase-out deadlines and gas dependence, while countries such as Bulgaria, Czechia, Estonia, France, Hungary, the Netherlands, Poland, Romania and Slovenia, are considering new nuclear that might never materialise. In 2023, Sweden has revised its 2040 target for 100% renewable electricity to 100% decarbonised electricity, to allow for continued and new nuclear power, and it is now clear that it can only happen with direct state aid. Italy, which voted against nuclear power in a referendum, is now investigating future nuclear power, while delaying quitting coal by 4 years. The largest nuclear power plant in Europe, the Zaporizhzhia Nuclear Power Plant in Ukraine, is currently occupied by the Russian military and Rosatom in an active warzone, but has not prevented Ukraine from including new nuclear power in its reconstruction. The Paris Agreement Compatible (PAC) scenario, on the other hand, emphasises renewables-based electrification, calling for determined and heightened attention to enable a 100% renewable-based EU energy system by 2040, and foresees no need for nuclear power in Europe. Nuclear power is too expensive When compared to renewables, the latest analysis from World Nuclear Industry Status Report, using the data from Lazard, determines that the levelized cost of energy (LCOE) for new nuclear plants makes it the most expensive generator, estimated to be nearly **four times more expensive** than onshore wind, while unsubsidized solar and wind combined with energy storage (to ensure grid balancing) is always cheaper than new nuclear. When compared against energy savings, analysis by Hungarian NGO Clean Air Action Group highlights that it is more economically efficient to invest in the renovation of households to save energy than in the construction, operation, and decommissioning of a new nuclear reactor. These findings were confirmed by a separate study by Greenpeace France, that showed that by investing 52 billion euros in a mix of onshore wind infrastructure/photovoltaic panels on large roofs, it would be possible to avoid **four times** more CO2 emissions than by investing the same amount in the construction of six EPR2 nuclear reactors by 2050, while electricity production triples. By investing 85 billion euros of government subsidies in energy savings by 2033, it would be possible to avoid six times more cumulative CO2 emissions by 2050 than with the construction program of six EPR 2 reactors. This would also make it possible to lift almost 12 million people out of energy poverty in a decade. Recent European projects in Slovakia, the UK, France, and Finland demonstrate the dramatic rising costs. EDF admitted that the costs for the British nuclear facility Hinkley Point C will skyrocket to 53.8 billion euros for the scheduled 3.2 GW power plant, more than twice as much as scheduled in 2015 when the plant was approved. The French project in Flamanville was originally projected to cost 3.3 billion euros when it began construction in 2007, but has since risen to 13.2 billion euros (16.87 billion euros in today's money). The Finnish Olkiluoto-3 project 1.6GW reactor cost 3 times more than the original forecast price, reaching 11 billion euros. Slovakia's second generation reactors Mochovce 3 and 4 ballooned costs to 6.4 billion euros from an initially estimated 2.8 billion. Slovenia's president announced that a new 1.6GW reactor would cost 11 billion euros, following the Finnish example, demonstrating that these high prices are here to stay. In order to finance new and ongoing projects, the EU has approved State Aid for nuclear, in the case of Hungary, Belgium, and the United Kingdom, while national governments seek support schemes. Despite making references to technology-neutrality, this creates an unlevel playing field slanted against renewable energy. Given the significant investment gap to achieve 2030 climate targets, and the limited fiscal space of many Member States, investments in nuclear risk **diverting precious public resources** into projects of poor value-for-money compared to alternatives in a renewables-based system, while reducing the availability of public resources for all other components of the energy transition. Such a choice would equally fail to reduce prices for consumers in the context of the current fossil fuel energy crisis. Finally, the costs would be even larger if accounting for "unpaid externalities" borne by taxpayers and the public at large, from nuclear accident risks that are impossible to insure against by private actors. The costs of decommissioning of a nuclear power plant, which can cost 1-1.5 billion euros per 1000 MW, are often borne by the public as these costs are poorly taken into account when planning a new nuclear installation. The cost associated with storing radioactive waste for hundreds of thousands of years is also often undervalued, alongside costs associated with radioactive leaks from plants or storage facilities, as demonstrated by the radioactive leaks in the UK Sellafield site, causing tension with Ireland and Norway. To lower costs, attempted lowering of safety and environmental standards can be expected, posing risks to communities, nature, and society at large, also as a burden to future generations. New nuclear construction is too slow A rapid transition requires the use of existing technologies and solutions which can most quickly be rolled-out such as renewables, primarily solar and wind, energy efficiency, and system flexibility. For years, new nuclear energy projects in Europe have been plagued with delays and, coupled with an untrained workforce, are unable to support the speed of decarbonisation necessary. New nuclear plants typically take 15-20 years for construction, hence failing to address immediate decarbonisation needs to 2030. Indicatively, France's six new reactors are estimated by its network operator to enter into use in 2040-2049, much too late to have any meaningful impact on emissions reduction needed already now, with a view to pathways to 2050, and beyond, for a sustainable future. The decision to build the UK's Hinkley Point C nuclear reactor was announced in 2007 with an operational start date of 2017, however it has been delayed several times over, and is now estimated to start in 2031. In France, the Flamanville project is 16 years into construction and hitting new delays, while Finland's Olkiluoto took a full 18 years to come online. Nuclear does not support energy autonomy Nuclear power units equally fail to pass an "energy security" test, and run counter to the RepowerEU target of enhancing Europe's autonomy, given that more than 40% of the EU's Uranium is imported from Russia and no EU country is currently mining uranium within its own borders . Though Kazakhstan is seen as an alternative, its uranium industry is directly tied to Rosatom. While import bans have been placed on Russian coal and liquified natural gas, and Russian oil and natural gas have been targeted, this has not been the case for uranium. A hurdle to a decentralised future The declaration to triple nuclear power by 2050 signed by only 22 countries, 5 of which do not have nuclear reactors, on the sidelines of COP28 describes nuclear power as "source of clean dispatchable baseload power", a common message of the nuclear industry used to argue against a 100% renewable system and nuclear's use as a substitute for traditional fossil fuel generation. This claim, however, is misleading and outdated. Europe is moving beyond a highly centralised energy system, towards one which is decentralised, digitalised, and able to flexibly adjust to changing patterns of generation and consumption. In a 100% renewable energy system, the need for traditional "baseload" power is obsolete and with distributed energy production, in a far more interconnected European Union, security of supply is better managed. Nuclear power production is not reliable Nuclear power units across Europe have been proven as **unreliable** in providing power when needed. Future climatic conditions, such as **heatwaves, droughts, flooding** and rising sea-levels only increase the likelihood of future nuclear power plant disconnections and pose further security risks. In 2022, on average French nuclear reactors had 152 days with zero-production. Over half of the French nuclear reactor fleet was not available during at least one-third of the year, one-third was not available for more than half of the year, and 98% of the year 10 reactors or more did not provide any power for at least part of the day. The myth of the need for nuclear baseload has been debunked for years. The energy system can be reliably and safely managed with 100% renewables and system flexibility. Blocking renewables integration into the electricity grid The inflexibility of nuclear, caused by technical limitations, safety requirements and economic factors, **prevents the feed-in of renewable electricity** into the grid, causing grid congestion and curtailment. Nuclear's dominance over grid capacity can **block the connection of new renewable energy projects**, where even announced and then abandoned plans for a new nuclear unit can delay renewable projects connection, allowing for continued fossil fuel usage. Grid structures designed for large-scale, centralised nuclear power, make it more challenging, time-consuming and costly to introduce small-scale distributed renewable power. An example can be found in Romania where Cernavodă 3 and 4 reactors have reserved grid capacity for years, blocking new renewable energy projects in the Dobrogea region, the most wind-intensive region in the country. Delayed grid investments, due to uncertainty of new nuclear units, have also meant that capacity bottlenecks exist today for renewables online. In the Netherlands, the only current nuclear power station, Borssele is competing for landing space for off-shore electricity. Post-Fukushima, renewables were blocked from connecting to the grid in Japan as the government considered restarting the reactors, despite public opposition to nuclear restarts and support for renewables. Rather than taking the opportunity to invest in grids and integrate renewables twenty years ago, Japan still heavily relies on fossil fuels today. Prolonging the inevitable with nuclear extensions While European governments may be tempted to prolong existing nuclear reactors beyond their original foreseen lifespans, in the context of phasing out Russian gas, costly upgrades to the ageing nuclear fleet, just like investing in new ones, risks diverting investment away from more cost-effective solutions such as renewables, energy efficiency, and system flexibility, in addition to risking lowered safety standards and security of supply as ageing increases unplanned outages. Any prolongation of existing nuclear power plant units risks the continued crowding out of renewable energy sources from the electricity grid, preventing their price-dampening effects on the market. So-called "Small Modular Reactors" European lawmakers are increasingly persuaded by the empty promises of Small Modular Reactors (SMRs). Argued to be more flexible, decentralised, smaller, and cheaper than existing nuclear designs, countries are wasting public resources in favour of a non-existent product, riddled with the same limitations as their predecessors, and presenting poor value-for-money compared to existing alternatives. The focus on SMRs risks delaying the development of renewable energy technologies already available at the moment, and thereby prolonging the usage of fossil fuels., , Burdened by the same high capital costs, SMRs would have to run near constantly to reduce losses, thereby further congesting the grid and making them useless in providing back-up power needed for peak hours against renewables and energy storage. Nuclear energy is too risky and unsafe Nuclear technology inherently carries the risk of severe nuclear accidents with the release of large amounts of radioactivity as shown by catastrophic accidents in Fukushima or Chornobyl. **Extreme** and more frequent **weather** events due to climate change create **unprecedented** risks through storms or flooding that are not captured in planning standards for nuclear plants based on historic frequencies and severeness. Extreme weather events may also indirectly affect nuclear plants, such as breaking dams above nuclear plants or longer disconnection from electricity grids after storms. **Cyber attacks, military aggression** e.g. Russia's occupation of the Zaporizhzhia Nuclear Power Plant, and terrorist attacks, e.g. via drone attacks, could also lead to severe accidents of nuclear plants. Nuclear waste remains a risk worldwide to the health of all living creatures, including humans, for thousands of years after its use in energy production. Management of any future storage facility would still be at risk of natural disasters and decisions of future generations, whereas currently without any long-term solutions risks are increasingly shifting to interim storage which were not planned for the current supply and length of storage. Beyond decarbonisation For heightened climate ambition, renewables, energy efficiency, storage, interconnection and flexibility are best suited to make up this gap in generation and support increased renewables-based electrification, while phasing out fossil fuels in parallel. Given the poor speed and high costs of future nuclear projects, the difficulty to build several units at the same time, and the realities of SMRs, it is unlikely nuclear will be able to cover any significant part of Europe's energy needs by 2040. The future energy system will be far more decentralised, and active consumer and flexibility oriented, which are not the ideal conditions for new nuclear plants. For these reasons stated above, it is in the nuclear industry's interest to delay Europe's progress and keep in place the current centralised, fossil-based energy system, jeopardising climate goals, in the hope that projects are able to materialise in the future, and to lower safety standards to reduce costs. Nuclear energy is also at odds with an energy system based on democratic ownership of energy production, as opposed to renewables. A true democratic debate on nuclear has not been underway, but rather a capture by geopolitical interests and corporations. Problems in three identified spheres, the political debate, energy system planning, and decentralisation have been mapped as current and possible future areas where nuclear advocates may be actively hostile towards renewables and fossil fuel phase out. Though we must look beyond energy and decarbonisation, and have a holistic vision of nuclear power, incorporating drawbacks such as safety, waste, weapon proliferation, uranium dependency, operation in warzones and biodiversity.

Else – climate change escalates – key inflection points

Borenstein 23 Seth Borenstein, 3-20-2023, "Humanity can still stop worst consequences of climate change, but time is running out, IPCC warns," [Borenstein is an Associated Press science writer, covering climate change, disasters, physics and other science topics. He is based in Washington, D.C.], https://www.pbs.org/newshour/science/humanity-can-still-stop-worst-consequences-of-climate-change-but-time-is-running-out-ipcc-warns, DOA 3-26-2025 //wenzhuo

BERLIN (AP) — Humanity still has a chance, close to the last one, to prevent the **worst of climate change's** future **harms**, a top United Nations panel of scientists said Monday. But doing so requires **quickly slashing carbon pollution and fossil fuel use** by nearly two-thirds by 2035, the Intergovernmental Panel on Climate Change said. The United Nations chief said it more bluntly, calling for an end to new fossil fuel exploration and rich countries quitting coal, oil and gas by 2040. "Humanity is on thin ice — and that ice is melting fast," United Nations Secretary-General Antonio Guterres said. "Our world **needs climate action** on all fronts — everything, everywhere, all at once." Stepping up his pleas for action on fossil fuels, Guterres not only called for "no new coal" but also for eliminating its use in rich countries by 2030 and poor countries by 2040. He urged **carbon-free electricity generation** in the developed world by 2035, meaning no gas-fired power plants too. That date is key because nations soon have to come up with goals for pollution reduction by 2035, according to the Paris climate agreement. After contentious debate, the U.N. science panel calculated and reported that to stay under the warming limit set in Paris the world needs to cut 60% of its greenhouse gas emissions by 2035, compared with 2019, adding a new target not previously mentioned in the six reports issued since 2018. "The choices and actions implemented in this **decade** will have impacts for **thousands of years**," the report, said calling climate change "a threat to **human well-being** and planetary health." "We are not on the right track but it's not too late,'' said report co-author and water scientist Aditi Mukherji. "Our intention is really a message of hope, and not that of doomsday.'' With the world only a few tenths of a degree away from the globally accepted goal of limiting warming to 1.5 degrees Celsius (2.7 degrees Fahrenheit) since pre-industrial times, scientists stressed a sense of urgency. The goal was adopted as part of the 2015 Paris climate agreement and the world has already warmed 1.1 degrees Celsius (2 degrees Fahrenheit). This is likely the last warning the Nobel Peace Prize-winning collection of scientists will be able to make about the 1.5 mark because their next set of reports will likely come after Earth has either breached the mark or locked into exceeding it soon, several scientists, including report authors, told The Associated Press. After 1.5 degrees "the **risks are starting to pile on,"** said report co-author Francis X. Johnson, a climate, land and policy scientist at the Stockholm Environment Institute. The report mentions "https://apnews.com/article/science-climate-and-environment-10b36a73b486ed5c0bde05db4151ccb0″>tipping points" around that temperature of species extinction, including coral reefs, irreversible melting of ice sheets and sea level rise on the order of several meters (several yards). "The window is closing if emissions are not reduced as quickly as possible," Johnson said in an interview. "Scientists are rather alarmed." "1.5 is a critical **critical limit**, particularly for small islands and mountain (communities) which depend on glaciers," said Mukherji, who's also the climate change impact platform director at the research institute CGIAR. Many scientists, including at least three co-authors, said hitting 1.5 degrees is inevitable. "We are pretty much locked into 1.5," said report co-author Malte Meinshausen, a climate scientist at the University of Melbourne in Australia. "There's very little way we will be able to avoid crossing 1.5 C sometime in the 2030s " but the big issue is whether the temperature keeps rising from there or stabilizes. Guterres insisted "the 1.5-degree limit is achievable." Science panel chief Hoesung Lee said so far the world is far off course. "This report confirms that if the current trends, current patterns of consumption and production continues, then … the global average 1.5 degrees temperature increase will be seen sometime in this decade," Lee said. Scientists emphasize that the world, civilization or humanity won't end if and when Earth hits and passes the 1.5 degree mark. Mukherji said "it's not as if it's a cliff that we all fall off." But an earlier IPCC report detailed how the harms – from coral reef extinction to Arctic sea ice absent summers to even nastier extreme weather – are much worse beyond 1.5 degrees of warming. "It is certainly prudent to be planning for a future that's warmer than 1.5 degrees," said IPCC report review editor Steven Rose, an economist at the Electric Power Research Institute in the United States. If the world continues to use all the **fossil fuel**-powered infrastructure either existing now or proposed Earth will warm **at least 2 degrees Celsius** since pre-industrial times, blowing past the 1.5 mark, the report said. Because the report is based on data from a few years ago, the calculations about fossil fuel projects already in the pipeline do not include the increase in coal and natural gas use after Russia's invasion of Ukraine, said report co-author Dipak Dasgupta, a climate economist at The Energy and Resources Institute in India. The report comes a week after the Biden Administration in the United States approved the huge Willow oil-drilling project in Alaska, which could produce up to 180,000 barrels of oil a day. The report and the underlying discussions also touch on the disparity between rich nations, which caused much of the problem because carbon dioxide emissions from industrialization stay in the air for more than a century, and poorer countries that get hit harder by extreme weather. If the world is to achieve its climate goals, poorer countries need a "many-fold" increase in financial help to adapt to a warmer world and switch to non-polluting energy. Countries have made financial pledges and promises of a damage compensation fund. If rich countries don't cut emissions quicker and better help victim nations adapt to future harms, "the world is relegating the least developed countries to poverty," said Madeline Diouf Sarr, chair of a coalition of the poorest nations. The report offers hope if action is taken, using the word "opportunity" nine times in a 27-page summary. Though opportunity is overshadowed by 94 uses of the word "risk." The head of the IPCC said the report contains "a message of hope in addition to those various scientific findings about the tremendous damages and also the losses that climate change has imposed on us and on the planet." "There is a pathway that we can resolve these problems, and this report provides a comprehensive overview of what actions we can take to lead us into a much better, livable future," Lee told The Associated Press. Lee was at pains to stress that it's not the panel's job to tell countries what they should or shouldn't do to cap global temperature rise at 1.5 Celsius. "It's up to each government to find the best solution," he said, adding that scientists hope those solutions will stabilize the globe's temperature around 1.5 degrees. Asked whether this would be the last report to describe ways in which 1.5 C can be achieved, Lee said it was impossible to predict what advances might be made that could keep that target alive. "The possibility is still there," he said. "It depends upon, again I want to emphasize that, the political will to achieve that goal." Activists also found grains of hope in the reports.

Every degree matters: warming is anthropogenic, fast, underestimated, and carbon alone triggers acidification.

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Every degree of warming up to 2°C will **add** at least 1.3 meters to sea levels from accelerated ice flow into the ocean and melting from the Antarctic Ice Sheet, while **warming** between 2°C and 6°C is predicted to add 2.4 meters per degree (Garbe, Albrecht, Levermann, Donges and Winkelmann, 2020). While the IPCC Working Group III reports frequently refer to 'cost-effectiveness', the cost against which the effectiveness is being assessed never includes the cost that would arise from exceeding a climate tipping point. It should also be noted that there are no credible technological solutions for many climate change impacts: for example, the Arctic and boreal permafrost contain 1460 to 1600 Gt of organic carbon, almost twice the carbon in the atmosphere (WMO, 2020), and if gigatonnes of methane are released from melting permafrost and warming oceans, the process cannot be reversed. Fact 3.2: The deadly impacts and costs of increasingly acidifying oceans are also greatly underestimated. When **carbon** dioxide combines with seawater it forms carbonic acid, which **makes the ocean more acidic**. Since around 1850, the oceans have absorbed between a third and a half of the CO_2 emitted to the atmosphere. As a result, the average pH of ocean surface waters has fallen from 8.2 to 8.1 units. This corresponds to a 30% increase in ocean acidity, a rate of change roughly 10 times faster than any time in the last 55 million years (CoastAdapt, 2017; Jiang et al., 2023). If GHG emissions continue at the current rate (the RCP8.5 trajectory), by the end of the century average pH is projected to decrease by 0.3–0.4 units (∼100%–150% increase in acidity) (Kwiatkowski et al., 2020). Increasing acidity will make it difficult for marine organisms such as corals, clams, mussels, crabs, and some plankton, to form calcium carbonate, the material used to build shells and skeletal material. The **survival** of many microscopic **marine species** will also be **threatened** (Bird, 2023). In addition, ocean acidification will disrupt pelagic **food webs** via the proliferation of toxic algal blooms (Doney et al., 2020). The increasing degradation of marine food chains will seriously damage fishing industries and tourism. **Ocean systems are not able to adapt** to these **rapid** changes in **acidity**—a process that **naturally** occurs over **millennia**. Declining ocean pH levels will persist as long as concentrations of atmospheric CO_2 continue to rise. The stress on marine organisms will be exacerbated by rising temperatures and exposure to multiple biogeochemical changes. To avoid significant harm to critical marine ecosystems and the food security of **billions** of people, atmospheric concentrations of atmospheric **CO_2** must be rapidly **reduced** to at least 320-350 ppm or less (IUCN, 2017). Fact 3.3: Virtually irreversible tipping points are already being passed. Acceleration of the rate of **climate** change is a real and **existential** risk. Climate tipping points (CTPs) are irrevocable changes in the climate, such as the melting of ice sheets, or the dieback of rainforests. These are points of **no return**: once glaciers and ecosystems like coral reefs have disappeared, they cannot be restored. For example, warming oceans make the collapse of the West Antarctic Ice Sheet unavoidable (Naughten, Holland and De Rydt, 2023). Evidence is all around us that we are nearing or have already crossed CTPs associated with critical parts of the Earth system—we see catastrophic fires in rainforests, spreading deserts, degrading ecosystems, and shrinking sea ice (e.g., Walsh, 2016; Bochow and Boers, 2023; Kim et al., 2023). Another example is rainfall in Greenland, which has increased by 33% since 1991, with flooding rain darkening and melting the ice sheet and baring rocks (Box et al., 2023). However, the accelerating rate of melt and the positive feedbacks of increasing rainfall and reducing albedo are not represented in IPCC models. Armstrong McKay and colleagues (2022) identify six **tipping points** that are **likely** to be crossed within the Paris Agreement targets of 1.5°C - 2°C of warming. **These are:** Greenland Ice Sheet collapse West Antarctic Ice Sheet collapse **Coral** reef die off at low latitudes Sudden **thawing** of permafrost in northern regions Abrupt sea **ice loss** in the Barents Sea Collapse of ocean **circulation** in the high-latitude North **Atlantic** They point out that crossing these climate tipping points can generate positive feedbacks that will increase the likelihood of crossing other CTPs. For example, Arctic permafrost may permanently thaw even if warming stays between 1.1 °C and 1.5°C. Above 1.5°C of warming, losing the permafrost becomes “likely,” and we are currently on track for 2.7°C of warming in this century. If all the permafrost thawed, emissions would be equivalent to **51 times** all GHG **emissions** in 2019. Alarmingly, the ESCIMO climate model indicates that a self-sustaining process of permafrost thaw has already begun, which suggests that the world is already past a point-of-no-return for global warming. This cycle consists of decreasing surface albedo, increasing water vapour feedback and increasing thawing of the permafrost, which releases both methane and carbon dioxide, resulting in even further temperature rises, and so on. Even after no more man-made GHG are emitted, this cycle will continue on its own until all carbon is released from permafrost and all ice is melted (Randers and Goluke, 2020). The likelihood of passing additional CTPs becomes non-negligible at ~2°C and increases greatly at ~3°C. Above 2°C the Arctic would very likely become summer ice-free, and land carbon sink-tosource transitions would become widespread. Scientists are detecting warning signs for many CTPs. For example, researchers have found an almost complete loss of stability of the Atlantic meridional overturning circulation (AMOC). These currents are already at their slowest point in at least 1,600 years, and new analysis indicates that the AMOC could collapse between 2025 and 2095, with a central estimate of 2050, if global carbon emissions are not reduced (Ditlevsen and Ditlevsen, 2023). This would have catastrophic consequences, severely disrupting the rains that billions of people depend on for food in India, South America and West Africa; increasing storms and lowering temperatures in Europe; and raising sea levels in the eastern North America (Boers, 2021) The IPCC’s highest-end GHG concentration pathway, RCP 8.5, remains close to observations in many regions and may eventuate if negative feedback loops are activated, such as emissions from melting permafrost and forest die-backs (Schwalm, Glendon and Duffy, 2020). Both of the high-emission pathways considered in the IPCC’s most recent Working Group I report contain 4°C increases in the “very likely” range for 2081 through 2100, temperatures that many scientists believe would pose a significant threat to civilization (Steel, DesRoches, Mintz-Woo, 2022). Tipping elements have been identified in all earth systems including cryosphere, ocean circulation systems and the biosphere, and a growing risk is that even if the Paris Agreement targets are met, a **cascade** of positive feedbacks could **push** the Earth System irreversibly onto a “**Hothouse** **Earth**” pathway (Steffen et al. 2018; Klose, Karle, Winkelmann and Donges, 2020). During the last glacial period abrupt climate changes sometimes occurred within decades, with temperatures over the Greenland ice-sheet warming by 8°C to 16°C at each event (Corrick et al., 2020). The IPCC has been cautious in its evaluation of climate tipping points. For example, its latest report stated that there was a chance of a tipping point in the Amazon by the year 2100. However, while most studies only focus on one driver of destruction, such as climate change or deforestation, in reality ecosystems are simultaneously impacted by multiple interacting threats, e.g., water stress, degradation and pollution. Because tipping points can amplify and **accelerate** one **another**, more than a fifth of ecosystems worldwide, including the Amazon rainforest, are at **risk** of a catastrophic **breakdown** within a single **human life**time (Willcock et al., 2023). Record drought in Amazonia in 2023 suggests we are **much closer** to these thresholds than models **predict**. Fact 3.4: It is **impossible** to adapt to irreversible, catastrophic impacts like species extinction, the loss of glaciers, rising sea levels, and the release of methane from permafrost and oceans.