## **1NC – Court Clog**

### **Contention One is Court Clog**

#### **Courts fine now**

**Reuters ’23** [Thomson Reuters; February 3; News and information services company, citing the second annual State of the Courts report, which included a survey of over 200 judges; Thomson Reuters, “Court efficiency: Using legal technology to alleviate delays,” <https://legal.thomsonreuters.com/blog/using-legal-technology-to-alleviate-delays/>] recut //cy

**Courts** are investing in **tech**nology: Almost **two-fifths** reported an introduction of new/**improved methods**/processes or **service innovations** in the past **12 months**. The top improvements are **E-filing**, Zoom/Web-Ex/Teams, etc., and **virtual**/**remote hearings**. Although these are critical **tech**nology **investments** for a court’s **digital infrastructure**, more can be done to ensure the judge has access to all relevant information and legal analysis to make **faster decisions** with confidence. **Virtual** courts are here to stay: Naturally, the pandemic also seems to have spawned a broader adoption of virtual hearings to help with these delays. That trend has continued, as the majority of respondents said they regularly attend virtual hearings, and 40% of those asked said they actually outnumber traditional ones now. Further, video conferencing has been adopted by 90% of respondents. Opportunity to **reduce delays** by addressing **root causes**: One of the major factors that slows a case down is hearing delays. The TR survey showed that the average Judge has 58 hearings per week. And, on average 10 of those hearings (18%) were delayed. Moreover, a hearing delay has a domino effect on other cases. 77% of the judges surveyed said that the impact of a single delay impacts other cases on the docket. Implementing solutions to reduce the number of hearing delays is key to any modernization strategy. The survey further asked courts to identify the top causes for delays. The number one cause for delays was failure to appear, the number two cause was for evidentiary delays, the number three cause was clerical error, and the number four cause was legal issue. Strategies to reduce delays Offer **remote** participation **options** – In Arizona, judges and other court officials reported a notable boost in participation rates in 2020, largely due to remote access. There was an 8% year-over-year drop in automatic judgments in June of 2020 and the failure-to-appear rate for eviction proceedings in Arizona’s largest county, Maricopa, dropped from close to 40% in 2019 to just around 13% in February of 2021. **Organize evidence** and legal **analysis** – A judge’s time is the court’s most valuable resource. It is **critical** that any **modernization** strategy includes **solutions** that shorten the **time** it takes for the judge to gain all the **requisite information** needed to confidently make a decision.

#### **The aff opens the floodgates---wrecks climate legislation**

**MacNeil ’13** [Robert; September 10; Senior Lecturer at the University of Sydney; Climate Policy, “Alternative Climate Policy Pathways in the US,” vol. 13] <https://ideas.repec.org/a/taf/tcpoxx/v13y2013i2p259-276.html> recut //cy

Title: Alternative Climate **Policy** Pathway**s** in the US The implementation of these schemes, however, should not lead one to underestimate the immense political will that will be required to undertake such a task. Indeed, **any** administration that **attempt**ed to implement such a programme would be required to spend vast quantities of political capital on the endeavour, and would **undoubtedly** face **considerable** political and legal challenges. From the Right, the programme would be **attacked** not only for the supposed **regulatory** and **cost burdens** placed on **businesses** and **households**, but also for the nature of the strategy itself and the potentially **antidemocratic** optics of ‘**legislating** through the **backdoor**’. Moreover, the EPA would have to contend seriously with the **very real possibility** that Congress will attempt to **strip** the **agency** of its **authority** to regulate GHG emissions. This has occurred in the **past** in the form of **bills** and **riders** proposed by Republicans and Democrats **alike**. For example, in 2009, the Republican Senator of Alaska, Lisa Murkowski, put forth a rider on the EPA's appropriations bill for that year that would have achieved this end, and in 2010, the Democratic Senator of West Virginia, Jay Rockefeller, proposed a bill that would have suspended GHG emissions regulation for all stationary sources (Monast et al., 2010). Indeed, a **series** of **legal challenges** regarding the agency's initial **endangerment finding** and **tailoring rule** would be all but **inevitable**. Although most of these problems could be dealt with through presidential vetoes – as indeed President Obama has done by signalling his intention to veto any attempts to remove the EPA's capacity to regulate GHGs30 – the continuity of such a rule is at risk given that the Executive Branch will eventually change hands. Still, short of a future Republican administration completely abolishing the CAA – a near-impossibility given that congressional gridlock on the environment cuts both ways, with the Democratic Party scuttling most major roll-backs proposed by the Republicans since the 1980s – such an incoming administration would find itself in a difficult position if it attempted to get rid of the programme. Indeed, if a GOP administration attempted to shirk the obligations that stem from Massachusetts v. EPA, the **f**ederal **g**overnment should expect an **endless stream** of **lawsuits** from **states** and **interest groups**. At best, it could attempt to change the EPA's endangerment finding and assert that GHGs do not, in fact, contribute to climate change. However, it would once again be sued for this and would risk a great deal of international embarrassment and derision, as it would have to cite extremely marginal ‘scientific’ evidence to support such a claim.

#### **Empirics – nuclear litigation is common – increasing reactors leads to further disagreements**

Nuclear News, 01-13-2025, [Website Dedicated to updates on nuclear industry], "Last Energy, Texas, Utah allege NRC overstepping in SMR regulation," ANS, https://www.ans.org/news/2025-01-13/article-6680/last-energy-texas-utah-allege-nrc-overstepping-in-smr-regulation/, accessed 3-30-2025 //cy

Advanced nuclear reactor company Last Energy joined with two Republican state attorneys general in a **lawsuit** against the Nuclear Regulatory Commission, arguing that some microreactors should not require the commission’s approval.¶ **Utah and Texas** are the states involved in the lawsuit, which was filed December 30 in federal court in Texas. The parties’ goal is to **accelerate the pace** of micro- and small modular reactor deployment in the United States by exempting some new technologies from the traditional licensing process.¶ According to a Last Energy spokesperson, “This case will determine the threshold at which a nuclear reactor is so safe that it is below concern for federal licensing. There’s no doubt that robust shielding can eliminate exposure to, and the hazards from, nuclear radiation. Congress and former NRC executive director Victor Stello Jr. have both argued for a de minimus standard, and our intent is for the courts to enforce that recommendation.”¶ An NRC spokesperson said the agency will respond through its filings with the district court.¶ Background: The nuclear power industry is experiencing a surge of support as Americans are using more energy through the electrification of the economy. The biggest customers in the playing field are large tech companies trying to build additional data centers and support artificial intelligence growth, both power-hungry endeavors.¶ Recent federal legislation like the ADVANCE Act won bipartisan approval in 2024 and aims to make sweeping changes in the approval process for new nuclear technology. Unlike Last Energy’s lawsuit, the new policy isn’t trying to cut the NRC out of the licensing process—it’s trying to streamline the commission’s workflow and make the review process more efficient.¶ But some say the NRC review **should not be necessary** in all cases, pointing to an example of microreactors too small to power evan an LED lightbulb that under current rules still require complicated and costly NRC licensing, the lawsuit states.¶ Last Energy’s microreactor is designed to produce 20 MW, which is about as large as a unit can be while still categorized as “micro.” The units can be scaled to meet customer demand, and Last Energy promises deployment in under 24 months. The company has issued news releases about deployment progress globally—with agreements for more than 80 units across Europe—but has yet been able to secure licensing to deploy units domestically.¶ The states argue: “SMRs are not being constructed or operated in Texas because of prohibitive NRC regulations. . . . The NRC’s unlawful and overburdensome regulations have effectively precluded Last Energy from placing SMRs in Texas and continue to stymie Last Energy’s efforts,” the lawsuit spells out.¶ Utah is involved “for many of the same reasons Texas is harmed,” according to the lawsuit, with the state seeing rapid population growth, increasing energy demand, and retiring baseload power sources. In October, Gov. Cox launched Operation Gigawatt, with the goal of doubling Utah’s power production over the next 10 years and specifically calling out nuclear as a source to help meet the state’s clean, reliable energy needs.

#### **Mere risk of litigation decimates innovation.**

**Lee ’21** [Jongsub; February 24; Associate Professor of Finance at Seoul National University, PhD, Finance, NYU Stern; Texas A&M University Department of Finance, “Inter-firm Patent Litigation and Innovation Competition,” https://mays.tamu.edu/department-of-finance/wp-content/uploads/sites/2/2021/03/Oh.pdf]

The importance of **i**ntellectual **p**roperty to firms has **increased** over time, and conse- quently, patent litigation has become an important means of actively protecting valuable patent intellectual properties. As these intellectual properties are essential for defining firms’ product market boundaries, it is important to elucidate the potential broader **impact** of **patent litigation** on various corporate policies. For example, **costly patent litigation** could hurt firms’ **financial health**, which, in turn, may **deter** their **investment** activity through financial frictions (Zingales (2002)). More indirect evidence could also include **change**s in firms’ **innovation** landscape, such as expanding or **narrowing** the current technological scope given rising **i**ntellectual **p**roperty **r**ights disputes. In growing technological sectors, patents have become an **essential** input for producing goods that are competitively sold in end- product markets. Therefore, **patent litigation** could have a **significant impact** on product market dynamics through its effect on both the level and scope of subsequent **innovation** activities. Using novel hand-collected inter-firm patent litigation data, we examine the effects of patent litigation on firms’ innovation strategies in product markets. Rather than focusing on non-practicing entity (NPE)-driven patent litigation known as “patent trolls” (e.g., Cohen, Gurun, and Kominers (2019)), we examine inter-firm patent litigation in which both the plaintiffs and defendants are practicing entities (PEs) that compete in similar (or different) product markets. In many respects, the motives of NPE patent litigation differ from those of inter-firm patent litigation. For example, NPE litigation is less likely to result in back-to-back litigation,1 while inter-firm litigation is frequently followed by subsequent lawsuits, such as the recent Samsung vs. Apple cases. Unlike patents in NPE litigation that have increasingly become unrelated to firms’ core technology and products (Government Accountability Office (2013)),2 patents in inter-firm litigation tend to embed firms’ key technology and **amplify** litigation consequences through **loss of sales**, disruption of product **lines** and subsequent product market strategy, and even corporate **bankruptcy**. A case in point is a series of patent disputes between Johnson & Johnson and Boston Scientific around a key technology in coronary artery stents. After a series of disputes, Boston Scientific eventually settled the cases by paying Johnson & Johnson of $1.7 billion. This was the largest sum ever paid to resolve patent litigation over a medical device and subsequently halved Boston Scientific’s cash holding, **curtailed** the **acquisition** opportunitie**s**, and led to a **layoff** of about 1,300 em- ployees worldwide.3 Such strategic interactions between practicing entities would eventually impact industrial-organizational dynamics, which is the main focus of our paper. Using inter-firm patent litigation data between 2005 and 2011, we uncover a significant interplay between intellectual property rights’ boundaries and product market dynamics. We demonstrate how innovation competition interacts with product market competition in the presence of significant litigation risk, which we instrument using China’s passage of National Intellectual Property Strategy (NIPS) reform in 2008. By its nature, our study significantly differs from the studies that focus on other types of corporate litigations such as security lawsuits (Bhagat, Brickley, and Coles (1994), Bhagat, Bizjak, and Coles (1998)) that focus on the debate between a firm and its investors regarding corporate governance, managerial misconduct, and disclosure-related issues. Our sample period also differs from that of the studies in that we focus on the post-2000 time period when corporate innovation serves as a central driver of entrepreneurial growth and product market dynamics in the U.S. private sector. This differentiates our study from the literature that primarily focuses on the early period like 80’s (e.g., Bhagat et al. (1994)). Building upon the theoretical notions introduced by Lanjouw and Lerner (1997), we identify legal expenses, damages awards, and the probability of winning a case as important determinants of patent litigation. Using this framework, we derive several testable impli- cations for the economics of inter-firm patent litigation. We first hypothesize that patent litigation reduces patenting activity of defendant firms as the expected cost incurred by lit- igation increases a firm’s hurdle rate for innovation investments. We further predict that defendant firms are more likely to narrow down the scope of their innovation activities after litigation (i.e., more exploitative innovations rather than exploratory innovations) to reduce future litigation risk. Lastly, we expect the **decrease** in **innovation** activities and the pursuit of **exploitative innovations** to be more **pronounced** among firms with greater product market overlap due to the larger **expected** damages awards upon **litigation**. A key challenge in estimating the patent litigation effect on firms’ innovation activity is that patent litigation is likely endogenous to a number of observable and unobservable factors. For example, financially weaker firms may be targeted more easily in patent lit- igation and these firms could also reduce innovation activity. To alleviate these potential endogeneity concerns, we use an instrumental variable approach. We use China’s passage of NIPS in 2008 as a quasi-natural experiment that exogenously increases the U.S. firms’ patent litigation risk. The strengthening intellectual property (IP) rights in China around NIPS increases sales, royalties, and licensing fees received by the U.S. firms that have already established strong operational exposure in China. The incentives to protect their IP-related profits from China imply that these firms could preemptively stop potential domestic rivals who could prey on new business opportunities that arise in China post-NIPS reform. The U.S. firms with strong presence in the Chinese product market would attempt to secure their IP boundaries against new entrants through active IP-related litigation strategies, which is the main channel through which we identify arguably more exogenously increasing litigation risk among the U.S. firms. Using this instrumental variable approach, we find that firms in the industries with Chinese market exposure prior to NIPS are more likely to be defendants in inter-firm patent litigation. We further find that such increasing **patent litigation** risk **significantly reduces** defendant firms’ innovation activity by **7.5%** based on the number of new patent applications by these firms. The effect is statistically **significant** at the 1% to 5% levels, and is **consistent** with our theoretical **prediction** that patent litigation increases the **cost of innovation** and **discourages** corporate **innovation** activities. These defendant firms also seem to attempt to **offset** the adverse **litigation shock** by shifting innovation strategy toward more **narrow**-scoped ones in order to keep the **future** litigation risk **lower**. We empirically gauge at firms’ innovation strategy using exploitative and exploratory measures developed by Gao, Hsu, and Li (2018). We find that defendant firms’ innovation becomes more exploitative and **less exploratory** to avoid inter-firm **IP disputes**. Firms **increasingly** depend on the **existing patents** and technologies, while they explore less on **new knowledge** outside the firm’s existing **IP** boundary. Firms’ innovation activities become **significantly narrower** in scope when they face rising innovation competition. Next, we go one step further and examine whether the patent litigation effect inter- acts with product market dynamics. We decompose our litigation cases into intra- versus inter-industry cases. Based on the firms’ product markets in place, we define a case as an intra-industry case if the IP dispute occurs between plaintiffs and defendants in the same three-digit standard industrial classification (SIC) code. Other cases are defined as inter-industry cases accordingly. Consistent with our theoretical prediction, we find that the negative litigation effects on corporate innovation activities strengthens in the intra-industry cases, in which greater product market overlap amplifies the damages award of inter-firm lit- igation. The litigation effects in intra-industry cases are almost four times larger than those in the inter-industry cases. We further show the robustness of our findings to the use of an alternative product market classification measure, product market fluidity, developed by Hoberg, Phillips, and Prabhala (2014). This alternative measure defines the product market rivals based on the product description overlap as reported in the firms’ annual reports. Finally, we analyze broader product market implications of inter-firm patent litigation. Patents are inherently linked to product market competition as they provide monopoly rights to use, make, and sell the pertinent invention. Patent policies and patent litigation courts often consider the extended impact on market competition. Hence, we first investigate how patent litigation affects industry competition between market rivals. We use Hoberg and Phillips (2010) text-based network industry classification (TNIC) data and obtain TNIC score that measures the competitiveness of rivals based on the similarity of product descrip- tions. We find that patent litigation intensifies the competition among rivals of a defendant because patent litigation shrinks the sphere of product market competition as innovation becomes more exploitative. While rivals become more similar and competitive, the overall firm distribution in industries becomes more dispersed in size and patenting activities. In summary, we find that patent litigation appears to locally intensify the product market com- petition among “close” rivals, yet it makes firms in the industry more dispersed in innovation outcomes. Given that patent litigation reduces the overall level of innovation activity, our results suggest that increasing patent risk among practicing firms could lead to an industry structure in which Schumpeterian effect of competition could prevail (Aghion, Bloom, Blun- dell, Griffith, and Howitt, 2005). We make several important contributions to the literature on corporate innovation and product market dynamics. We expand the Non-PE patent litigation literature (Cohen et al. (2019), Mezzanotti (2019), Appel, Farre-Mensa, and Simintzi (2018)) by showing important PE dynamics within product markets as well as their change in innovation strategies. We show that inter-firm patent litigation could have motivations beyond the cash-driven incen- tives that are primarily identified for NPE trolls. In contrast to NPE trolls, PEs strategically alter their innovation strategies rather than simply reducing R&D expenditure post-litigation to stay competitive in the technological race. Our paper also extends the broader corporate litigation literature. Existing corporate litigation literature focuses on corporate fraud (e.g., Karpoff and Lott Jr. (1993), Dyck, Morse, and Zingales (2010)), shareholder litigation (e.g., Lin, Liu, and Manso (2020), Field, Lowry, and Shu (2005)), environment-related litigation (Karpoff, Lott, and Rankine (1999)), antitrust litigation (Bizjak and Coles (1995)) and general inter-firm litigation (Bhagat et al. (1994)). In contrast to corporate fraud and shareholder litigation that stems from a manage- rial agency problem, inter-firm patent litigation highlights the operating risk of firms with substantial intellectual properties. Our findings are **consistent** with those reported in Bha- gat et al. (1994) who document the **negative stock** market reaction to defendant firms after general inter-firm **litigations**. By focusing on patent litigation, we add substantial details of how firms change their innovation strategy under the fierce technological competition.4 We also show that product market overlap is key to understanding how patent litigation, especially those between practicing entities, affects their product market strategies through post-litigationinnovationstrategyshift.5 **All** these findings are **novel** additions to the general corporate litigation **literature**.

#### **Innovation solves existential risks**

**HÉigeartaigh ‘17** – [Hay-ger-dee] Professor @ Cambridge, PhD in Genomics from Trinity College Dublin (Sean, “Technological Wild Cards: Existential Risk and a Changing Humanity”, <https://www.bbvaopenmind.com/en/articles/technological-wild-cards-existential-risk-and-a-changing-humanity/>, Accessed 3-7-2019)

Technological progress now offers us a vision of a remarkable future. The advances that have brought us onto an unsustainable pathway have also raised the quality of life dramatically for many, and have unlocked scientific directions that can lead us to a safer, cleaner, more sustainable world. With the right developments and applications of technology, in concert with advances in social, democratic, and distributional processes globally, progress can be made on all of the challenges discussed here. Advances in **renewable energy** and **related tech**nologies, and more **efficient energy use**—advances that are likely to be accelerated by progress in technologies such as **a**rtificial **i**ntelligence—can bring us to a point of **zero-carbon emissions**. New **manufacturing capabilities** provided by synthetic biology may provide cleaner ways of producing products and degrading waste. A greater scientific understanding of our natural world and the ecosystem services on which we rely will aid us in plotting a trajectory whereby **critical environmental systems are maintained** while allowing human flourishing. Even advances in education and women’s rights globally, which will play a role in achieving a stable global population, can be aided specifically by the information, coordination, and education tools that technology provides, and more generally by growing prosperity in the relevant parts of the world. There are **catastrophic** and **existential** risks that we will simply **not be able to overcome** **without advances in science and technology**. These include possible **pandemic outbreaks**, whether natural or engineered. The early **identification of incoming asteroids**, and approaches to shift their path, is a topic of active research at NASA and elsewhere. While currently there are no known techniques to prevent or mitigate a **supervolcanic** eruption, this may not be the case with the tools at our disposal a century from now. And in the longer run, a civilization that has **spread permanently beyond the earth**, enabled by advances in **spaceflight**, manufacturing, robotics, and terraforming, is one that is **much more likely to endure**. However, the breathtaking power of the tools we are developing is **not to be taken lightly**. We have been very lucky to muddle through the advent of nuclear weapons without a global catastrophe. And within this century, it is realistic to expect that we will be able to rewrite much of biology to our purposes, intervene deliberately and in a large-scale way in the workings of our global climate, and even develop agents with intelligence that is fundamentally alien to ours, and may vastly surpass our own in some or even most domains—a development that would have uniquely unpredictable consequences.

## **1NC – Tradeoff**

### **Contention Two 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 self-perpetuation AND acidification.**

**Taylor et al. 24**, \*PhD, Coordinator of BEST Futures, a Research Group on Climate Science, also an Adjunct Research Fellow at the Environmental Futures Lab at Griffith University. \*\*PhD, Professor of Open Physics at the University of Cambridge, Head of the Polar Ocean Physics Group in the Department of Applied Mathematics and Theoretical Physics at the University of Cambridge. \*\*\*PhD, Assistant Professor of Agriculture and Life Sciences at Cornell University. †PhD, President of the Global Coral Reef Alliance and former Senior Scientific Affairs Officer at the United Nations Center for Science and Technology for Development. †\*PhD, Consulting Professor of Electrical Engineering at Stanford University. †\*\*PhD, Associate Professor in the Department of Statistics at the Sepuluh Institute of Technology (\*Graeme Taylor, \*\*Peter Wadhams, \*\*\*Daniele Visioni, †Tom Goreau, †\*Leslie Field, †\*\*Heri Kuswanto, 2024, “Bad Science and Good Intentions Prevent Effective Climate Action,” Earth ArXIV, https://eartharxiv.org/repository/object/6730/download/12962/)

**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 CO2 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** system**s** 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 CO2 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 **CO2** 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.

## **1NC – Accidents**

### **Contention Three is Accidents**

#### **Trump tying regulation and politics ensures nuclear accidents and decks public perception – vast empirics prove – new investments are unsafe**

Katy **Huff**, Paul Wilson, Michael Corradini, **3-6**-2025, [Katy Huff is a former Department of Energy assistant secretary for nuclear energy and is currently an associate professor at the University of Illinois in Urbana-Champaign; Paul Wilson is the Grainger Professor of Nuclear Engineering and the chair of the University of Wisconsin–Madison’s department of nuclear engineering and engineering physics; Michael Corradini a former member of the U.S. Advisory Committee on Reactor Safeguards, a former president of the American Nuclear Society and a professor emeritus at the University of Wisconsin–Madison.] "Killing a Nuclear Watchdog’s Independence Threatens Disaster," Scientific American, https://www.scientificamerican.com/article/killing-a-nuclear-watchdogs-independence-threatens-disaster/, accessed 3-23-2025 //cy

A Trump administration executive order is setting the U.S. on the **fastest path to a nuclear accident**.

Announced on February 18, the “Ensuring Accountability for All Agencies” executive order aims to bring independent regulatory agencies under the “supervision and **control” of the president**. Among them, the Nuclear Regulatory Commission is the watchdog that Americans rely on to hold nuclear energy companies accountable for avoiding reactor accidents and releases of radioactive material into the environment.

By demanding that the NRC cease to issue regulations and guidance without written permission from the president or the attorney general, the order effectively demands that nuclear safety take a back seat to politics.

As nuclear engineers, as well as former government and industry officials, we foresee that this proposed regulatory capture by the Executive Office of the President—where decisions are made for political reasons and not for the benefit of people served—**will severely increase the risk of expensive, unexpected nuclear accidents** in the U.S.

This is neither hypothetical nor hyperbole.

History provides **too much frightening evidence** to ignore. When Soviet leadership and its captured regulator prioritized national pride over safety, a known flaw in nuclear reactor control rods (which slow the rate of atomic fission in a reactor) went unchecked, safety protocols at the Chernobyl Nuclear Power Plant went unheeded, and in 1986 the **worst nuclear power accident in history** resulted.

So too when “regulation was entrusted to the same government **bureaucracy responsible for its promotion**,” the operators of Japan’s Fukushima Daiichi Nuclear Power Plant **failed to deploy countermeasures** demanded by known seismic risks; they failed to plan appropriately for evacuation; and in 2011, they failed to avoid the second worst nuclear power accident in human history.

In 1974 Congress recognized the importance of independent nuclear oversight, reorganizing the Atomic Energy Commission into two distinct agencies: the Department of Energy, responsible for research, development and promotion of nuclear energy; and the NRC, to regulate and oversee the then-booming nuclear energy industry. Five NRC commissioners, each appointed by the president and confirmed by the Senate, work together to “formulate policies and regulations governing nuclear reactor and materials safety, issue orders to licensees, and adjudicate legal matters brought before [them].” The president has the authority to designate one of these commissioners as the chair, acting as the chief executive officer of the agency.

**International** consensus is clear about what works and what doesn’t in nuclear safety regulation. Most fundamentally, the regulator’s ability to ensure safe nuclear power operation requires independence, especially from entities with a conflict of interest. The International Atomic Energy Agency, humanity’s foremost authority on nuclear energy safety and security, is clear that governments must ensure that the regulatory body is not influenced by “entities having responsibilities or interests that could unduly influence its decision making.” Failure to maintain regulatory independence from commercial, political and ideological influence is not accountability. It is instead regulatory capture.

Both President Trump and Secretary of Energy Chris Wright, by virtue of their offices, have responsibilities and interests that demand efforts to expand nuclear power. The country’s continued prosperity relies heavily on secure access to reliable energy, and nuclear energy has a unique role in meeting our energy demands. Nuclear energy is one of the nine pillars of Wright’s secretarial order calling for action to “unleash American Energy.” In a recent CNBC interview, when describing his optimism for growth in nuclear energy, Wright recently declared, “Do we need some government out of the way to make it work economically? Absolutely, but that’s what America is about.”

That’s true only if industrial accidents are also what America is about. In reality an independent regulator plays a **fundamental role** in generating public confidence in the safe and secure deployment of nuclear technology. While discussions about the effectiveness of the agency are appropriate, such discussions never question the importance of its continued independence. Even for officials in the Office of Nuclear Energy at DOE, the independence of the NRC is a red line no one would ever consider crossing, precisely because DOE’s role involves the enthusiastic promotion of nuclear energy.

Nuclear energy relies on precision technology and an unwavering dedication to safety, so regulating it is a serious technical undertaking meant to shield us from unwanted radiological consequences. The U.S. has historically been a **global leader** in nuclear regulatory practices and principles that **uphold the highest standards of safety globally**. A critical component of their operation is independence from conflicting motives. Nuclear safety is too important to undermine through uninformed political actions. Regulatory capture by industry, politics or the whims of an individual is not merely dangerous—it is the primary cause of the two worst nuclear reactor accidents the world has known. We cannot allow this to occur in the U.S.

The NRC must remain independent to provide the public confidence in the safe implementation of this important technology.

**Political influence causes accidents and industry shutdown – their defense relies on faulty models**

Allison Macfarlane, 2-21-2025, [professor and director of the School of Public Policy and Global Affairs @ the University of British Columbia, chaired US Nuclear Regulatory Commission from 2012-2014, doctorate in geology from MIT, served on the White House Blue Ribbon Commission on America’s Nuclear Future] "Trump just assaulted the independence of the nuclear regulator. What could go wrong?," Bulletin of the Atomic Scientists, https://thebulletin.org/2025/02/trump-just-assaulted-the-independence-of-the-nuclear-regulator-what-could-go-wrong/, accessed 3-10-2025 //cy

\*\*SMR = small modular reactor, NRC = nuclear regulatory commission

What could go wrong? Several possible outcomes could occur because of Trump’s new executive order assaulting the independence of the Nuclear Regulatory Commission (NRC).

Proponents of small modular reactors, for instance, have pressured **Congress and the executive branch** to **reduce regulation** and hurry the NRC’s approval of their novel—and **unproven**—reactor designs. They wish their reactors could be exempted from the requirements that all other designs before them have had to meet: detailed evidence that the reactors will operate safely under accident conditions. Instead, these proponents—some with **no experience in operating reactors**—want the NRC to trust their **simplistic computer models** of reactor performance and essentially give them a free pass to deploy their **untested technology** across the country.

An accident with a new small modular reactor (SMR) would perhaps not make such a big mess: After all, the source term of radiation would be smaller than with large reactors, like those currently operating in the United States. But the **accident in Japan** demonstrated that countries should expect that **more than one** reactor at a given site can fail at the same time, and these multiple failures can create even more **dire circumstances,** impeding the authorities’ ability to respond to such a **complex radiological emergency**. At Fukushima, the first explosion at Unit 1 generated radioactive debris that prevented emergency responders from getting close to other damaged reactors nearby. Since designers plan to deploy multiple SMR units to individual sites, such an accidental scenario appears feasible with SMRs.

Since its creation in 1975, the Nuclear Regulatory Commission has had an excellent and essential mission: to ensure the safety and security of nuclear facilities and nuclear materials so that humans and the environment are not harmed. Trump’s incursion means the agency will no longer be able to fully follow through with this mission **independently**—and Americans will be more at risk as a result. If any US reactor suffers a major accident, the **entire industry will be impacted**—and perhaps its **94 reactors in operation** will even be temporarily **shut down**. Can the industry and the American people afford the cost of losing the independence of the nuclear regulator?

#### **Extinction – food, ecosystems, poison**

Christopher Allen **Slocum 15**, VP @ AO&G, “A Theory for Human Extinction: Mass Coronal Ejection and Hemispherical Nuclear Meltdown,” 07/21/15, The Hidden Costs of Alternative Energy Series, http://azoilgas.com/wp-content/uploads/2018/03/Theory-for-Human-Extinction-Slocum-20151003.pdf

With our intelligence we have littered the planet with massive spent nuclear fuel pools, emitting **lethal radiation** in over-crowded conditions, with circulation requirements of **electricity**, **water**-supply, and neutron **absorbent chemicals**. The failure of **any** of these conditions for any calculable or incalculable reason, will release all of a pool’s **cesium** in**to** the **atmosphere**, causing 188 square miles to be contaminated, 28,000 cancer deaths and $59 billion in damage. As of 2003, 49,000 tons of SNF was stored at 131 sites with an additional 2,000-2,400 metric tons produced annually. The NRC has issued permits, and the nuclear industry has amassed unfathomable waste on the premise that a deep geological storage facility would be available to remediate the waste. The current chances for a deep geological storage facility look grim. The NAS has required geologic stability for 1,000,000 years. It is impossible to calculate any certainty 1,000,000 years into the future. Humanity could not even predict the mechanical failures at Three Mile Island or Chernobyl, nor could it predict the size of the tsunami that triggered three **criticality** events at Fukushima Daiichi. These irremediable crises span just over 70 years of human history.

How can the continued production and maintenance of SNF in pools be anything but a **precedent** to an **unprecedented human cataclysm**? The Department of Energy’s outreach website explains nuclear fission for power production, providing a timeline of the industry. The timeline ends, as does most of the world’s reactor construction projects in the 1990s, with the removal of the FCMs from Three Mile Island. One would think the timeline would press into the current decade, however the timeline terminates with the question, “How can we minimize the risk? What do we do with the waste?” (The History of Nuclear Energy 12). Nearly fifteen years into the future, these questions are no closer to an answer. The reactors at Fukushima Daiichi are still emitting radioisotopes into the atmosphere, and their condition is unstable. TEPCO has estimated it could take forty years to recover all of the fuel material, and there are doubts as to whether the decontamination effort can withstand that much time (Schneider 72). A detailed analysis of Chernobyl has demonstrated that nuclear fall-out, whether from thermonuclear explosions, spent fuel pool fires, or reactor core criticality events are deleterious to the **food-chain**. **Cesium** and strontium are taken into the **roots** of **plants** and **food** crops, causing direct **human** and **animal** contamination from ingestion, causing cancer, teratogenicity, mutagenesis and death. Vegetation suffers mutagenesis, reproductive loss, and death. Radioactive fields and **forest** floor**s** **decimate** **invertebrate** and **rodent variability** and number necessary to supply nature’s **food-chain** and **life** **cycles**. The **flesh and bones** of freshwater and oceanic biota contribute significantly to the total radiation dose in the food-chain. Fresh **water** **lakes**, **rivers** and **streams** become radioactive. Potable **aquafers** directly underlying SNFs and FCMs are penetrated by downward migration of radioisotopes. **Humans must eat to live. Humans must have water.** **No human can survive** **5** **Sv** **of exposure** to ionizing radiation, many cannot survive exposure to 1 Sv.

# 2NC

#### **Leadership**

1. We can buy uranium from our allies AND no uranium domestically

**WNA 24** [World Nuclear Association, 20 NOVEMBER 2024, "US Nuclear Fuel Cycle", World Nuclear Association, <https://world-nuclear.org/information-library/country-profiles/countries-t-z/usa-nuclear-fuel-cycle>] //bid daddy yerg

**The USA ranks 14th in the world for known uranium resources in the category up to $130/kgU ($50/lb U3O8), with 59,400 tU** (reasonably assured resources, 2021), **about 1% of world total. In the 1950s, the USA had a great deal of uranium mining, promoted by federal subsidies. Peak production since 1970 was 16,800 tU in 1980, when there were over 250 mines in operation.** This abruptly dropped to 50 in 1984 when 5,700 tU was produced, and then there was a steady decline to 2003, by which time there were only two small operations producing a total of under 1000 tU/yr, or about 5% of the uranium consumed by US nuclear plants. **So, for the first step in the nuclear fuel cycle, the US must rely on imports of uranium from countries such as Canada and Australia.** For some time the country's reactors also used downblended weapons-grade uranium from Russia (see section on Military surplus and other government stocks below). As the price of uranium increased from historic lows, there was a revival in exploration and plans to reopen old mines. Exploration expenditure increased over 2007-08 to $50.3 million, but then dropped again with uranium prices. Since 2022, exploration activity has increased again, and decisions have been made to restart many mines. Most US production has been from New Mexico and Wyoming. Some 40% of resources are in New Mexico and amenable to in-situ leaching (ISL). Resources on the western Colorado Plateau require conventional mining and milling, as does high-grade breccia pipe mineralization in northwest Arizona. Smaller resources are in Utah, Nebraska and Texas. Production potential is about 50% underground mining, 26% open pit and 24% ISL.

#### **Space col --**

#### **It won’t work.**

**Levchenko et al. 19**. Professors in the Plasma Sources and Applications Centre/Space Propulsion Centre, NIE, Nanyang Technological University. 2019. “Mars Colonization: Beyond Getting There.” Global Challenges, vol. 3, no. 1.

Settlement of Mars—is it a dream or a necessity? From scientific publications to public forms, there is certainly little consensus on whether colonization of Mars is **necessary** or even **possible**, with a rich diversity of opinions that range from categorical It is a necessity!20 to equally categorical Should Humans Colonize Other Planets? No.21 A strong proponent of the idea, Orwig puts forward five reasons for Mars colonization, implicitly stating that establishing a permanent colony of humans on Mars is no longer an option but a real necessity.20 Specifically, these arguments are: **Survival of humans as a species**; Exploring the potential of life on Mars to sustain humans; Using space technology to positively contribute to our quality of life, from health to minimizing and reversing negative aspects of anthropogenic activity of humans on Earth; Developing as a species; Gaining political and economic leadership. The first argument captures the essence of what most space colonization proponents feel—our ever growing environmental footprint threatens the survival of human race on Earth. Indeed, a large body of evidence points to human activity as the main cause of extinction of many species, with shrinking biodiversity and depleting resources threatening the very survival of humans on this planet. Colonization of other planets could potentially increase the probability of our survival. While being at the core of such ambitious projects as Mars One, a **self‐sustained colony of any size** on Mars **is hardly feasible in the foreseeable future**. Indeed, sustaining even a **small number** of colonists would require a **continuous supply of food, oxygen, water and basic materials**. At this stage, it is not clear whether it would be possible to establish a system that would generate these resources **locally**, or whether it would at least in part rely on the **delivery** of these resources (or **essential components** necessary for their local production) from **Earth**. Beyond the supply of these very basic resources, it would be quite challenging if not impossible for the colonists to independently produce **hi‐tech but vitally important assets** such as medicines, electronics and robotics systems, or advanced materials that provide us with a decent **quality of life**. In this case, would their existence become little more than the **jogtrot of life**, as compared with the standards expected at the Earth?22

#### **Laws of physics preclude travel.**

**Robinson 16** [Kim Robinson, Scientific American.] “What Will It Take for Humans to Colonize the Milky Way?” 13 January 2016 (<https://www.scientificamerican.com/article/what-will-it-take-for-humans-to-colonize-the-milky-way1/>)

The idea that humans will eventually travel to and inhabit other parts of our galaxy was well expressed by the early Russian rocket scientist Konstantin Tsiolkovsky, who wrote, “Earth is humanity’s cradle, but you’re not meant to stay in your cradle forever.” Since then the idea has been a staple of science fiction, and thus become part of a consensus image of humanity’s future. Going to the stars is often regarded as humanity’s destiny, even a measure of its success as a species. But in the century since this vision was proposed, things we have learned about the universe and ourselves combine to suggest that moving out into the galaxy **may not be humanity’s destiny after all.** The problem that tends to underlie all the other problems with the idea is the sheer size of the universe, which was not known when people first imagined we would go to the stars. Tau Ceti, one of the closest stars to us at around **12 light-years** away, is 100 billion times farther from Earth than our moon. A quantitative difference that large turns into a qualitative difference; we can’t simply send people over such immense distances in a spaceship, **because a spaceship is too impoverished an environment to support humans for the time it would take**, which is on the order of centuries. Instead of a spaceship, we would have to create some kind of space-traveling **ark**, big enough to support a community of humans and other plants and animals in a fully recycling ecological system. On the other hand it would have to be **small** enough to **accelerate to a fairly high speed**, to shorten the voyagers’ time of **exposure to cosmic radiation**, and to **breakdowns** in the ark. Regarded from som e angles bigger is better, but the bigger the ark is, the proportionally more **fuel** it would have to carry along to slow itself down on reaching its destination; this is a vicious circle that **can’t be squared**. For that reason and others, smaller is better, but smallness creates problems for resource metabolic flow and ecologic balance. Island biogeography suggests the kinds of problems that would result from this miniaturization, but a space ark’s isolation would be far more complete than that of any island on Earth. The design imperatives for bigness and smallness may cross each other, leaving any viable craft in a non-existent middle. The biological problems that could result from the radical miniaturization, simplification and isolation of an ark, no matter what size it is, now must include possible impacts on our microbiomes. We are not autonomous units; about eighty percent of the DNA in our bodies is not human DNA, but the DNA of a vast array of smaller creatures. That array of living beings has to function in a dynamic balance for us to be healthy, and the entire complex system co-evolved on this planet’s surface in a particular set of physical influences, including Earth’s gravity, magnetic field, chemical make-up, atmosphere, insolation, and bacterial load. Traveling to the stars means leaving all these influences, and trying to replace them artificially. What the viable parameters are on the replacements would be **impossible** to be sure of in advance, as the situation is **too complex to model**. Any starfaring ark would therefore be an **experiment**, its inhabitants lab animals. The first generation of the humans aboard might have volunteered to be experimental subjects, but their descendants would not have. These generations of descendants would be born into a set of rooms a trillion times smaller than Earth, with no chance of escape. In this radically diminished enviroment, rules would have to be enforced to keep all aspects of the experiment functioning. Reproduction would not be a matter of free choice, as the population in the ark would have to maintain minimum and maximum numbers. Many jobs would be mandatory to keep the ark functioning, so work too would not be a matter of choices freely made. In the end, sharp constraints would force the social structure in the ark to enforce various norms and behaviors. The situation itself would require the establishment of something like a totalitarian state. Of course sociology and psychology are harder fields to make predictions in, as humans are highly adaptable. But history has shown that people tend to react poorly in rigid states and social systems. Add to these social constraints permanent enclosure, exile from the planetary surface we evolved on, and the probability of health problems, and the possibility for psychological difficulties and mental illnesses seems quite high. Over several generations, it’s hard to imagine any such society staying stable.

#### Space col bad.

Ryan **Gunderson et al.** September 20**21**, [Ryan Gunderson, Diana Stuart, and Brian Petersen, \* Assistant Professor of Sociology and Social Justice Studies in the Department of Sociology and Gerontology at Miami University, \*\* Assistant Professor in the Sustainable Communities Program and in the School of Earth Sciences and Environmental Sustainability at Northern Arizona University, \*\*\* Assistant Professor in the Department of Geography, Planning, and Recreation at Northern Arizona University, “In search of plan(et) B: Irrational rationality, capitalist realism, and space colonization,” 2021, Future, Vol. 134, https://doi.org/10.1016/j.futures.2021.102857, EA & -zc-] -

4.1. The irrational rationality of space colonization

While there are incredible challenges that could potentially limit visions of space colonization, our focus is to examine if space colonization is rational in terms of preserving the human species from the escalating existential threats on Earth. From what we know, does space colonization represent an effective and efficient way to protect the human species? How rational are the justifications for space colonization to save the human species on their own instrumental grounds? We argue the following: (1) that **alternatives** to Earth are obviously **far more inhospitable** for human life than Earth and, thus, preserving Earth is more instrumentally rational; (2) if the goal of space colonization is to preserve the human species, then it is **more** instrumentally **rational to** save many **more lives on Earth** than create space colonies for a small population who can afford the ticket; and, most importantly, (3) there is reason to predict that **humans** would **take** an **irrational** rational **logic with them** to space, the same rationality **that oversaw the destruction** of Earth and brought them off-planet in the first place. The point is to develop an immanent critique of the instrumental case for space colonization to show the extent to which this form of logic is still unreasonable, even judged by its own means-oriented criteria.

While space colonization is justified to avoid risks and threats on Earth, **there will be new risks** and threats in space – some that areeven **more severe.** Kovic (2020) discusses some of these risks and in certain scenarios the **risks** of space travel and colonization **greatly outweigh the risks of staying on Earth and the benefits of colonizing space**. Kovic (2020): 3) explains,

[i]n general, there are two ways in which space colonization-related risks might affect the long-term future of humankind. First, humankind might become more susceptible to existing (existential) risks**.** Second, space colonization itself might create new (existential) risks that could result in highly undesirable or even catastrophic outcomes.

Kovic (2020) in the end argues that prioritizing space colonization as a survival strategy overlooks or ignores the high probability of existential threats and risks in space. The **rapid creation of new technologies for space living may also create unexpected consequences and risks that could undermine or threaten space colonization.** For example, on Mars, hostile conditions including dust storms, sub-freezing night time temperatures, and lack of water or carbon-dioxide to grow plants (Szocik, Wójtowicz, Rappaport, & Corbally, 2020) could result in death, starvation, cannibalism and extremely stressful survival decisions causing “astronomical amounts” of suffering (Torres, 2018: 75).

In addition, the space colonies currently proposed still would not protect humans from large-scale stellular events like supernovae or an expansion of the sun. As explained by Stoner (2017) in the context of a Mars colony, the same risks as well as new risks make the colony very dangerous and protective measures would be immensely expensive in a cost-benefit analysis:

[i]f the goal is species survival, and given that the Martian environment is much less survivable than even a post-strike Earth would be, then there is no remotely realistic budget point at which the marginal dollar would be more effectively spent on Mars colonization than on protecting Earth and the creatures and civilizations that evolved to live within its shelters.

Stoner (2017) goes on to argue that the analysis for the operations of projects like those of SpaceX, “only appears rational because they have carefully loaded the comparison scenarios in a way that guarantees a pro-colonization conclusion.” While space colonization may be a better preservation strategy than doing nothing, **there are many more options that are less risky and more likely to preserve a greater number of human lives.**

Another commonly overlooked aspect of space colonization as a species survival strategy is the fact that **not everyone will be able to go**, and many of Earth’s commoners and poor will likely be left on Earth. Only a portion of the human population would be able to live off-planet, perhaps only the economic elite. It is not unreasonable to assume that,. if there are large inequalities in power and wealth, that the most wealthy will be in power and that these elites will decide to be the “lucky” few space settlers. It is not possible for Mars, for example, to provide a safe habitat for all humans on Earth. Thus, a possible scenario is economic elites leaving behind the vast majority of humans on an inhospitable Earth. As Billings (2019: 45) questions,

“how many poverty-stricken Bangladeshis, how many sub-Saharan Africans, how many permanently displaced Syrian refugees, how many disabled and unemployable workers could come up with $200,000 – or $2,000,000 for that matter – to move to another planet and start a new life. What are the ethics of giving the rich yet another advantage over the poor? What are the ethics of ignoring the need to check the rapid pace of climate change on our own planet?”

**Under capitalism, any solution to crises on Earth focused on moving off-planet will likely exclude the masses and the poor.** Are these lives not worth saving? Are there **other strategies** that **would save more lives**?

**Saving the most present and future human lives would require addressing the threats on Earth, including climate change, biodiversity loss, poverty, disease, and famine.** As stated by Kovic (2020: 6), “[g]iven these acute problems, pursuing space colonization today could be a misguided use of limited resources.” He poses the following question: If the goal is to save as many lives and to maximize overall wellbeing, then why focus on an alternative that only benefits a very small population, while the vast majority struggle to survive or perish? Others argue that much more than human lives need to be saved to live successfully off-planet; we need a diversity of other organisms and a measurable portion of the Earth’s biodiversity (Johnson, 2019). Given the **rate of existential threats** like climate change, **how much time is there** to develop this technology and transport all people and enough other organisms off-planet? If the goal is species survival, the **time** (**and** the immense **resources** required) **could be spent in more effective ways** to benefit all people and species. However, these alternatives are unseen or considered impossible in the context of capitalist realism (see proceeding section).

Lastly, the current social order dominating human-human and human-material relations (**capitalism**) is **likely to result in negative outcomes and problems even off-planet.** For example, mining and development on Mars would very likely be environmentally destructive as colonization is unlikely to have a light impact on the planet (Stoner, 2017). We would bring these relations and the associated problems with us. As Marino (2019: 15) explains,

[i]n Musk’s view we need a back-up planet. But he doesn’t acknowledge that **we** ourselves **are the cause** of this dire situation. And therein lies the problem and the reason we, as a species, have no business trying to colonize another planet. Musk’s reason for wanting to colonize Mars is to save ourselves from ourselves and it is self-evident that this alone recommends we should not be going anywhere.

There is no reason to assume that we have learned our lesson on Earth and will create a new civilization with better outcomes, when the same system and drivers (namely, capital accumulation) continue to dominate the social order.

Billings (2019) reminds us that while one may wish to “start fresh” in a new colony, **humans will take the drive**rs **of crises and collapse with them.** These drivers and forms of logic are precisely why humans find themselves discussing the possibility of moving off-planet in the first place.This fact should inspire collective reflection and deliberative discussions on the purpose of life and **alternative** ways of organizing social relations to achieve this purpose. However, for irrational rationality, the latter substantive questions answered through communicative action are an irrelevant waste of time - at best, “mere opinion.” In contrast, the ostensibly “practical” and “realistic” technological rationality responds by designing ever-more sophisticated technics for the irrationally rational purpose of rushing off to space to continue the instrumental crusade of blind domination. This is the elevation of means to ends, the irony of contemporary instrumental reason diagnosed by the Frankfurt School. Rather than serving a better world, technological development and production today are ends to be pursued for their own sake. That is, because we can no longer set aims through reasonable criteria, we pursue aims, such as economic growth and technological development, that are set by a semi-autonomous economic system. For the Frankfurt School, these are irrational conditions because **technology and economic activity should be instruments to serve humanity, rather than humanity serving technology and economic activity.**

In summary, the **associated risks, inequities, and costs do not support the argument that space colonization is an effective and efficient strategy to preserve the species from existential threats on Earth.** The polemical point here is to highlight how the heights of instrumental rationality—hi-tech plans to colonize space to ensure species survival—are irrational because the case for space colonization: (1) fails to make a convincing instrumental case on its own grounds (i.e., space colonization is not an efficient and effective means to safeguard the species) and, (2) by elevating means (namely economic activity) to ends, exhibits the same kind of logic that caused the Earth-bound problems that space colonization is responding to. The inversion of means and ends is examined further in the context of capitalist realism.

**Energy**

**Climate --**

#### **No climate solvency – technical obstacles and uranium shortages mean the aff is too slow**

Nikolaus Muellner et al, August 2021, [Institute of Safety and Risk Sciences, University of Natural Resources and Life Sciences, Vienna, Austria], "Nuclear energy – The solution to climate change?," Energy Policy Journal, https://www.sciencedirect.com/science/article/pii/S0301421521002330, accessed 3-29-2025 //cy

With increased awareness of [climate change](https://www.sciencedirect.com/topics/engineering/climate-change) in recent years nuclear energy has received renewed attention. Positions that attribute nuclear energy an important role in [climate change mitigation](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/climate-change-mitigation) emerge.

We estimate an upper bound of the CO2 saving potential of various nuclear energy growth scenarios, starting from our projection of nuclear generating capacity based on current national energy plans to scenarios that introduce nuclear energy as substantial instrument for climate protection. We then look at needed uranium resources.

The most important result of the present work is that the contribution of nuclear power to mitigate [climate change](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/climate-change) is, and will be, **very limited**. At present nuclear power avoids annually 2–3% of total global [GHG emissions](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/greenhouse-gas-emission). Looking at announced plans for new nuclear builds and lifetime extensions this value would decrease even further until 2040. Furthermore, a substantial expansion of nuclear power will not be possible because **of technical obstacles and limited resources**. Limited uranium-235 supply inhibits substantial expansion scenarios with the current nuclear technology. New nuclear technologies, making use of uranium-238, **will not be available in time**. Even if such expansion scenarios were possible, their climate change mitigation potential **would not be sufficient** as single action.

#### **Nuclear is on net bad – deforestation, air quality, and resource extraction – prefer – our study spans 30 years and covers more environmental factors**

**Soto 24** [Gonzalo Soto, Xavier Martinez-Cobas, 10-1-2024, PhD researcher specializing in economic development + environmental economics, Professor of Economics @ Universidade de Vigo] "Nuclear energy generation's impact on the CO2 emissions and ecological footprint among European Union countries," Science of the Total Environment, https://www.sciencedirect.com/science/article/pii/S0048969724039913, accessed 3-13-2025 //cy

In the preceding sections, we employed FMOLS and CCR estimation techniques to assess the environmental impacts of nuclear energy generation in European Union countries from **1990 to 2022**. While previous studies have predominantly focused on the role of nuclear energy consumption in reducing carbon dependency and greenhouse gas emissions (Ozturk, 2017; Saidi and Ben Mbarek, 2016; Shahbaz et al., 2015), our analysis **focuses on nuclear energy generation**, in contrast to that of previous literature (Bandyopadhyay et al., 2022; Pata and Kartal, 2023), and covers a **broader set of environmental variables**, specifically the ecological footprint, thus adding **further depth** to the existing body of knowledge, in contrast to the main body of former literature (Arshad Ansari et al., 2020).

Our findings indicate that the consumption of nuclear energy in European Union member societies tends to **increase the ecological footprint**. However, this environmental degradation is not caused by CO2 emissions. Instead, the impact of nuclear energy consumption is manifested in other aspects of **environmental quality, such as deforestation and air quality**. Our study considers the ecological footprint as a holistic measure that goes beyond carbon dioxide emissions, encompassing a comprehensive dimension of environmental quality that includes the impact on local biodiversity.

One significant aspect of these relationships is the causality between nuclear energy generation and the reduction of CO2 emissions. We have observed that the causality operates from the latter variable (CO2 emissions) to the former (nuclear energy generation). This suggests that European countries turn to nuclear energy as a less carbon-intensive alternative to mitigate carbon dependency and reduce air pollution, particularly in the form of CO2 emissions. This trend aligns with the transition to green economies and the goal of reducing carbon dependency, which is part of the European Green Deal ([Crowley-Vigneau et al., 2023](https://www.sciencedirect.com/science/article/pii/S0048969724039913#bb0050); [Dunlap and Laratte, 2022](https://www.sciencedirect.com/science/article/pii/S0048969724039913#bb0085); [European Commission, 2023](https://www.sciencedirect.com/science/article/pii/S0048969724039913#bb0100)). More concerningly, this situation could be aggravated by political tensions and the role of Russia as an energy supplier to the European Union since the beginning of the war in Ukraine ([Zhang et al., 2023a](https://www.sciencedirect.com/science/article/pii/S0048969724039913#bb0340)). Consequently, future research should elucidate on these relationships. Previous studies have also highlighted the substitution or reorientation of the energy system toward alternative sources, including renewables and nuclear power, and our conclusions show similar findings.

However, it is important to note that not all European countries support reliance on nuclear energy sources, such as Germany, while others, like France, heavily utilize nuclear energy in their ecological transition process. These trends have further solidified since the early 2020s ([EU., 2024](https://www.sciencedirect.com/science/article/pii/S0048969724039913#bb0095)). Therefore, considering both the generation and consumption of nuclear energy, as we have done in this study, provides a more comprehensive understanding of its ecological impact compared to previous research.