# NDCA: Marist MM AFF

### Contention 1 – Grid

**US electricity is reliant on gas power plants---it’s bound to collapse due to extreme weather. Diversifying resources that power the grid is key to resilience and reliability.**

Paul Arbaje 24. Energy analyst in the UCS Climate & Energy program. Mark Specht is a Western states energy manager/senior analyst in the program. Gas Malfunction. UCS, 02 January 2024. https://www.ucsusa.org/sites/default/files/2024-01/Gas%20Malfunction\_brief\_1.8.pdf. Accessed 10 September 2024

While the scale of the five **storms** and their impacts **varied** widely, the energy system **failures** were **very similar** across them. A key commonality among all five was that gas plants accounted, by far, for the largest source of generating capacity knocked offline. The cumulative **gas** plant capacity that **failed** during each event was **more than twice** that of the **second**-most-impacted category of capacity (Figure 1). Each storm exposed vulnerabilities of both the gas plant fleet within affected regions and the gas infrastructure that delivered fuel to those plants. The US gas infrastructure system can be grouped into three primary components: production, transportation and storage, and end use, with power plants being the largest group of end users in terms of gas consumed (EIA 2023c). Extreme winter storms can affect all three components, potentially **compound**ing the strain on **gas plants** and forcing many of them to **fail** at the same time. The power and gas systems’ mutual dependence on each other has exacerbated these so-called correlated outages, but these plant failures can also be attributed to the sheer amount of area affected by the weather events in question. The **events** have exposed gas plants and gas infrastructure across large geographic areas to extremely **low temperatures**. Many facilities were unprepared and ill-designed for the low temperatures (Hilbert and Hallai 2021; FERC 2019). Even facilities that were prepared on paper often failed when an extreme storm hit (FERC 2021; FERC 2023). SEVERE WEATHER DIRECTLY IMPACTS GAS PLANTS A primary **cause** of gas plant **failures** is the direct impact of **extreme cold** weather on plant operations and equipment. Across all generator types, the top direct causes of plant outages in each of the major winter storm events related to equipment freezing, as well as to a second category labeled “mechanical/electrical” (FERC 2023). Equipment freezing is often caused by the freezing of particular components, including valves, water lines, inlet air systems, and sensing lines. Mechanical/electrical are non-freezing issues that occur when cold temperatures affect certain plant components. These issues include wiring failure, mechanical wear of valves, and embrittlement of flexible seal materials like rubber and silicone. A troubling pattern in the more **recent failures**, which were largely of gas plants, is that they generally took place when temperatures were **above** the plants’ minimum ambient **temperature** ratings.4 Across fuel types, 81 percent of the freeze-related outages during Winter Storm Uri in 2021 occurred when the temperature was above the generating unit’s minimum ambient temperature rating; that figure was more than 75 percent for Winter Storm Elliott in 2022 (FERC 2021; FERC 2023). SEVERE WEATHER JEOPARDIZES FUEL SUPPLIES Issues related to fuel supply are the second significant cause of lost gas capacity during extremely cold weather. Unlike other thermal power plant types, such as coal or nuclear plants, gas plants generally do **not store** their fuel **on site**. Instead, they **depend** on the real-time **delivery** of gas via pipeline, burning it upon delivery to produce electricity. This distinct characteristic leaves gas plants vulnerable to running out of fuel, since extreme cold weather can **interrupt** both the **production** and the **transportation** of gas. All five storm events involved gas-supply issues (FERC 2021; FERC 2023). The significant drops in gas production during the 2011, 2021, and 2022 storms arose largely due to such issues as “freeze-offs” as liquids in the gas wells, wellheads, and ancillary equipment froze up and blocked the flow of gas.5 During the 2022 event, gas production in the Marcellus and Utica shale formations in the Appalachian Basin dropped by 23 and 54 percent, respectively (FERC 2023). Production dropped even more during Winter Storm Uri in 2021: Texas experienced a 70 percent decrease and the lower 48 states saw an overall 28 percent decrease (FERC 2021). Gas supply issues can also arise even if production does not decrease. The 2014 and 2018 events did not cause significant drops in production even though fuel supply issues arose. In part, these occurred due to pressure drops and other physical issues affecting gas pipelines, but they also resulted from high coincident gas demand from non-power plant end users, such as homes and businesses trying to keep temperatures up. To save money, many gas plant owners choose to sign only “non-firm” or “interruptible” contracts for at least some of their fuel supply and transportation. The contracts of “firm” or “non-interruptible” customers, such as those in the residential sector, are fulfilled before non-firm customers, leaving less gas available to power plants during cold snaps as demand soars for residential heating. Even firm contracts to supply or transport fuel do not give a gas plant a guarantee that it can get fuel if a winter storm is severe enough. During Winter Storm Elliott in 2022, failed gas deliveries under firm fuel supply and/or transportation contracts led to 16.5 GW of cumulative losses of gas plant capacity. This was even more than the 14 GW of capacity lost due to failures to fulfill gas deliveries under non-firm transportation contracts (FERC 2023).6 The mutual **dependence** of the power and gas systems also presents a **vulnerability** with its potential to create a **feedback loop** of failures. Gas plants need fuel to produce electricity, and the gas system needs electricity to supply the fuel. Rolling blackouts can hit **gas production** and processing facilities, **constraining** the amount of fuel supplied to the country’s primary source of electricity, causing **more** rolling blackouts, and so on. FERC estimated that power losses caused 23.5 percent of the gas production drop during Winter Storm Uri (FERC 2021).7 Summer Also Threatens Gas Reliability Extreme summer weather can also pose significant threats to gas plants, even if these are typically less severe than those posed by extreme winter weather. **Heat** waves, droughts, hurricanes, and **floods** can all **affect gas** plants, with heat waves and droughts having the most significant impact. HEAT CAN FORCE POWER PLANT DERATES AND OUTAGES High temperatures can reduce both the efficiency and the maximum generating capacity of gas plants. High ambient air temperatures decrease the maximum generating capacity of gas plants by reducing the amount of fuel they can burn. In addition, gas plants require cooling; as the coolant (water or air) gets hotter, plants are less able to dissipate waste heat. As a result, they operate at lower power (Dumas, KC, and Cunliff 2019). Across all types of generation, extreme heat increases the likelihood of power plant output reductions (or “derates”) and forced outages (NERC 2023). In summer, high temperatures and prolonged operations often occur simultaneously as heatwaves lead to higher electricity demand; the combination can cause unexpected plant breakdowns. For example, many California gas plants were forced offline or significantly derated over the course of a 10-day heatwave in September 2022 (Regenerate California 2023). DROUGHT CAN HAMSTRING WATER-DEPENDENT POWER PLANTS Because many plants use water for cooling, a shortage of cooling water during extreme summer weather can also affect the gas fleet (EIA 2018). In fact, water shortages can force water-dependent plants to shut down entirely. For example, Texas experienced its second-worst drought in the state’s history between 2010 and 2015. As a result, one plant operator took three gas plant units, totaling 403 MW, offline for almost a year until rain replenished the reservoir from which they pulled cooling water (ERCOT 2016). Since then, Texas’s grid operator, ERCOT, has published drought risk analyses that have repeatedly classified more than 10,000 MW of gas plant capacity as at risk over the following 18 months (ERCOT 2023). As the impacts of climate change intensify and lead to more frequent and more severe weather events, the risks that drought poses to the gas fleet may increase significantly. For example, a recent analysis found that under a high-emissions climate scenario, the most severe drought could disrupt 20 percent of ERCOT’s thermal generation in Texas. The results were mixed when the same study looked at whether climate change could lead to an increase in thermal-generation disruptions in the state due to drought (Turner et al. 2021). A Reassessment of Gas Plants’ Contributions to Grid Reliability Is Overdue **Extreme weather** events, in both winter and summer, illustrate the **fragility** of **gas** plants. They also highlight the clear need to **reevaluate** the **assumed** contributions of these resources to **grid reliability**. For far too long, programs to ensure the ability of electricity supplies to meet customer demand (often referred to as “resource adequacy”) have overvalued the reliability contributions of gas plants. The methods used to evaluate resource adequacy can have multiple implications. First, the chosen method directly determines the contribution of existing resources, using the result to inform how much the owner of the resource gets compensated for that contribution. Second, when utilities and regulators make decisions about new resource investments, resource adequacy can be a major factor tipping the scales in favor of certain resource types. Finally, and most important, overestimating the contributions of certain resource types can ultimately lead to power outages. This has been the case especially for gas plants, which **failed** at an **unprecedented scale** during recent extreme winter storms.

#### And, commercial investment in nuclear energy increases opportunity to meet increasing demand

Ferrechio 4/2 [Susan, 4-2-25, Next-gen nuclear reactors poised for surge in U.S. power grid, https://www.washingtontimes.com/news/2025/apr/2/next-gen-nuclear-reactors-poised-surge-us-power-grid/]

A manufacturing plant in Texas plans to power its production with an advanced nuclear reactor instead of natural gas, advancing the Trump administration’s push to unleash commercial nuclear power in the U.S. When completed, the nation’s first grid-scale advanced nuclear reactor will power a 4,700-acre facility that produces plastics and other materials used in dozens of products. Dow Chemical and the nuclear energy engineering firm X-energy submitted a construction permit this week to the federal government for a small modular reactor, or SMR, at Dow’s Seadrift, Texas, manufacturing site. The reactor will replace an aging natural gas plant and eliminate nearly all greenhouse gas emissions. The permit is the first step in an anticipated resurgence in nuclear power. Mr. Trump initiated the nuclear power comeback during his first administration, and nuclear power is now set to skyrocket as the president seeks to rebuild the U.S. manufacturing base and establish the nation as a global leader in artificial intelligence. X-energy CEO J. Clay Sell said the Dow project “will demonstrate how the technology deployed at Seadrift, Texas, can be quickly and efficiently replicated to meet incredible power demand growth across America.” Enabling commercial nuclear power projects is a top priority of the Energy Department. Secretary Chris Wright announced in February that the department would “work diligently and creatively to enable the rapid deployment and export of next-generation nuclear technology.” He is following orders from Mr. Trump, who, just days into his second administration, said he would use an emergency declaration to expedite the building of plants needed to provide energy to artificial intelligence data centers. The president said the plants can use any source of power, including coal, but SMRs are poised to play a pivotal role. The technology has been in development for years but has never been deployed in the U.S. A handful of SMR plants are running in Russia and China. Under the Trump administration’s pro-nuclear energy policies, SMR plants are poised to advance rapidly. SMR plants are smaller than traditional water-cooled nuclear power plants and can be built quicker and cheaper. SMRs can use a variety of coolants, so they do not need to be positioned near large water sources. They produce about a third of the energy of a traditional nuclear reactor. The multiple modules SMRs allow the plants to conduct maintenance without shutting down entirely, as is required with large-scale nuclear power facilities. Mr. Trump has been promoting SMR technology since his first term and promised during his 2024 campaign to get SMR plants up and running. “These can be built ultra-safe. They are ultra-clean, and they’re very low-cost. But they are absolutely safe,” he told voters in York, Pennsylvania, in August. Big Tech companies have started investing significantly in the plants, hoping they will provide clean energy to power AI technology. In October, Google touted “the world’s first corporate agreement” with Kairos Power to deploy multiple SMRs in the U.S. beginning in 2030 to provide electricity to Google data centers. The tech giant said the deal accelerates the advancement of clean, round-the-clock energy needed for power-hungry AI. Days after Google’s announcement, Amazon said it would invest $500 million in three SMR projects that will power its data centers and provide electricity for homes and businesses. Amazon’s investments include support for a 320-megawatt X-energy project with the regional utility Energy Northwest in Washington state. Amazon’s agreement with X-energy pledges to bring 5 gigawatts into the power grid by 2039, which would become the largest commercial deployment of SMR technology. Other investors include Citadel CEO Kenneth C. Griffin. Construction of the Dow Seadrift project is expected to begin next year and be completed by the end of the decade. The energy-intensive plant manufactures plastic products such as food containers and drip irrigation tubing. It also manufactures glycols used in antifreeze, polyester fabrics and bottles. “What attracted them to X-energy was that our plant configuration is four modules that produce about 320 megawatts,” said Carol Lane, X-energy’s vice president of government affairs. “It gives very, very high reliability, which is something that the data centers and AI centers really care about.” Energy demand in the U.S. is forecast to increase by nearly 16% by 2029, according to GridStrategies, a clean-power consulting firm. “We are looking at the highest growth in electricity in maybe 30 or 40 years or longer,” Ms. Lane said. “We think these small reactors have a smaller footprint and have a much higher energy density you’ll be able to deploy many of them around the country.” The Seadrift project is set to become one of the nation’s first operational small modular reactors. The X-energy project planned for Dow’s Seadrift facility will use helium gas in the reactor core to cool billions of uranium-filled pebbles. The gas flows over the pebbles, heats up to nearly 1,000 degrees Fahrenheit and flows to a steam generator that will power the manufacturing plant. Kairos Power’s technology, which will provide electricity to Google data centers, will use a molten-salt cooling system to heat a steam turbine that generates power. The uptick in SMR projects follows the spectacular failure of Oregon-based NuScale Power’s six-reactor project at the Idaho National Laboratory. Mr. Trump’s first administration agreed to fund up to $1.4 billion for the project, which by 2029 was supposed to be generating enough electricity to power 300,000 homes. The Biden administration also funded the development of the plant. It was canceled in late 2023 because of cost overruns and too few subscriptions from area power providers who were wary of the untested SMR technology. Big Tech, with its need for reliable energy and desire to cut carbon emissions, is backing the technology. Mr. Trump plans to clear a regulatory path for its advancement. “If you can get the first ones built and demonstrated, we think the confidence level is just going to continue to increase in terms of where you could put these plants,” Ms. Lane said.

#### And it’s key to grid stability

Latief 23 [Yusuf, 11-13-23, Grid reliability: Is nuclear the stabiliser we’ve been looking for?, https://www.smart-energy.com/industry-sectors/energy-grid-management/grid-reliability-is-nuclear-the-stabiliser-weve-been-looking-for/]

Grid stability is consistently brought up as a key puzzle that needs to be solved to reach our net zero targets. One often overlooked piece, states Bernard Salha, group technical director and R&D director for French energy giant EDF, might be found in nuclear power. Although the volume of renewable energy sources coming online is an accolade worth touting, the issue behind intermittency persists. However, an answer might just be found in the role of nuclear and Salha, in an Energy Transitions Podcast episode, stated his confidence in this being the case: “Nuclear is clearly an asset to cope with the question of overall intermittency and, let me also say, the question of global stability of the grid. “The big question with renewables is that you have electricity (only) when you have wind or when you have sun…” The go-to answer for this intermittency conundrum is the use of storage systems, whether battery or long-duration, which can be co-located with renewable power plants to store energy when generated and discharge back to the grid during peak hours of demand. owever, states Salha, storage technology is not yet at a level where it can be fully relied on to keep our grid in check for the foreseeable future: “…the development of storage, at least of big (enough) volumes of storage, is not yet here, and is probably not going to be here for a very long time. “There are technical devices, which allow us to have stability on the grid – grid forming systems for example – but nuclear could help also in that respect by its natural inertia. And nuclear is flexible – that’s a key element I really want to stress; nuclear is flexible. “On our French fleet, we have reactors, which can increase (…) or decrease power very fast; the technical spec, with grey rods to which the reactors are equipped, is of 3% full power per minute. “Nuclear power plants can follow the load, and consequently, they can help to bring stability on the grid.” According to Salha, ensuring the stability of our grid systems needs to be recognised as a crucial element for the success of the energy transition as, with increasing shares of electricity and renewable energy coming online, its functioning will need to be maintained throughout. “As each share (of energy) is going to be larger and larger; we need a strong grid and a stable grid. “And in that respect, a nuclear power plant with the flexibility and capacity to follow the load is clearly an asset in this global, complex landscape.” According to Salha, a way in which the integration of nuclear, as a decentralised flexible load, can be efficiently coordinated is through the use of smart grid technologies. In fact, it is not a way, but rather the way: “The question of this very big increase in electricity means that we are going to have a lot of different demands – (from) EV charging stations, heat pumps, industrial customers – and we will have to manage the global stability, the global frequency, of the grid… “It means that all these global systems have to use digital tools. Digital tools in that respect are mandatory if we want the system to be able to operate. All the AI techniques, all the tools which may help the global operators in charge of the management of the grid to work are going to have a great effect and are completely necessary.

**Gas dependence itself underscores grid failure, amplifying energy inequality.**

Vivian Yang 24. Western states energy analyst for the Climate & Energy program at the Union of Concerned Scientists. Reliance on Gas Power Plants Fuels Inequity. The Equation, 10 January 2024. https://blog.ucsusa.org/vivian-yang/reliance-on-gas-power-plants-fuels-inequity/. Accessed 10 September 2024

An electric system that is over-reliant on **gas** can contribute to **higher** and more **volatile** electricity **bills**. Furthermore, thermal resources (gas, coal, and oil) are often overvalued for their contribution to maintaining grid reliability. Not only is this bad for keeping the lights on, but it means that gas power plant **owners** are being **overpaid** and those extra payments are coming from customers. During Winter Storm **Uri** in 2021, a devastating storm where power outages contributed to **hundreds of deaths**, Texans saw the extreme of price volatility from over-dependence on the gas system in a competitive power market. Wholesale electricity prices rose **7,400%**, in part because gas plants disproportionately **failed** in the **cold weather** causing electricity supply shortages. Higher and more volatile electricity bills are particularly difficult for households with a higher energy burden. Studies show that **low-income** households spend almost **9%** of their **income** on **energy**, on average, compared to 3% for non-low-income households. And compared to **white** households, **Black**, **Latinx**, and **Native** households spend between **20** and **45% more** of their income on electricity bills. Compounding effects on other vulnerable populations The disproportionate effects that all these harms have on communities of color and low-income communities is well documented, but it doesn’t end there. These harms **intersect** across social segments, particularly affecting other **vulnerable populations**. For example, older adults are more vulnerable to heat waves due to aging immune systems, higher likelihood of dehydration, and more limited mobility. In the 2022 summer heat wave in Europe, 90% of heat-related deaths were people aged 65 and older. Exposure to air pollutants emitted from gas production aggravates existing respiratory illnesses and has been linked to increased childhood asthma rates. Gas plants are more likely to be in communities with limited English proficiency, making it more difficult for these communities to advocate for stronger pollution standards or plant retirements. Farmers must deal with increasingly extreme weather events and land degradation from gas infrastructure that put their livelihoods at risk. Wells drilled for fracking near drinking water sources have been linked to higher incidences of pre-term births and low birth weight. This is a small snapshot of how the power grid’s **reliance** on **gas** harms **vulnerable populations**. When intersected with low-income communities and communities of color, these compounding burdens breed more extreme inequality. So, why is the grid still so reliant on a resource with such known inequitable harms? Steps towards a more equitable grid Gas is often touted by its champions as the key to grid reliability. It indeed accounts for 40% of the electricity currently generated for the grid. But studies show that at least 80 to 90% of the US grid could be reliably served with renewable energy and there is limited to zero need for new gas plants for reliability. On top of that, the gas-for-reliability **narrative** is increasingly **under scrutiny** as gas plants and the associated infrastructure disproportionately **fail** in extreme weather conditions. Gas doesn’t need to be the crux of a reliable electric grid. And based on the challenges gas faces in extreme summer weather in addition to its alarmingly poor track record in extreme winter weather, it shouldn’t be. As the country moves to phase out its reliance on gas and other fossil fuel resources, equity needs to be a much bigger part of the discussion. Grid planners should prioritize the retirement of gas plants and related infrastructure in low-income communities and communities of color. In parallel, there should be more concerted efforts to break down the barriers to the clean energy buildout. These reforms will be a much bigger boon to grid reliability and grid equity. Unfortunately, we can’t undo the long history of harm that the energy system has disproportionately placed on communities of color, low-income communities, and vulnerable populations. But we can plan to transition to an electric grid where equity is underscored in the design and decision-making processes. **Clean energy**, done right, **avoids** many of the very **harmful** impacts of **gas**-fueled power plants. The work we do now to create an equitable grid can have transformative benefits for communities and ultimately contribute to a fairer and healthier society and planet.

**Nation-wide grid collapse is likely and causes existential nuclear meltdowns.**

Mark Leyse 24. Former Nuclear Engineer, University of Wisconsin; Nuclear Safety Analyst and Consultant. Spent nuclear fuel mismanagement poses a major threat to the United States. Here's how. Bulletin of the Atomic Scientists, 4-2-2024. https://thebulletin.org/2024/04/spent-nuclear-fuel-mismanagement-poses-a-major-threat-to-the-united-states-heres-how/. Accessed 10-9-2024

The relatively **high probability** of a nationwide grid collapse, which would lead to multiple **nuclear disasters**, emphasizes the need to expedite the transfer of spent fuel to dry cask storage. According to Frank von Hippel, a professor of public and international affairs emeritus at Princeton University, the impact of a **single accident** at an overstocked spent fuel pool has the potential to be **two orders of magnitude** more devastating in terms of radiological releases than the three **Fukushima** Daiichi meltdowns combined. If the US grid collapses for a lengthy period of time, society would likely descend into **chaos**, as uncooled nuclear fuel burned at multiple sites and spewed **radioactive** plumes into the **environment**. The **value** of preventing the destruction of US society and untold human suffering is **incalculable**. So, on the issue of protecting people and the environment from spent fuel pool fires, it is surprising when one learns that promptly transferring the nationwide inventories of spent fuel assemblies that have been cooled for at least five years from US pools to dry cask storage would be “relatively inexpensive”—less than (in 2012 dollars) a total of $4 billion ($5.4 billion in today’s dollars). That is far, far less than the monetary toll of losing vast tracts of urban and rural land for generations to come because of radioactive contamination. One should also consider that plant owners are required, as part of the decommissioning process, to transfer spent fuel assemblies from storage pools to dry cask storage after nuclear plants are permanently shut down. So, in accordance with industry protocols, all spent fuel assemblies at plant sites are intended to eventually be placed in dry cask storage (before ultimately being transported to a long-term surface storage site or a permanent geologic repository). If the NRC continues to allow the industry’s **mismanagement** of spent fuel to pose an **existential threat** to the **U**nited **S**tates, Congress must be compelled to pass legislation requiring utilities to swiftly thin out spent fuel pools.

**Collapse destroys life-affirming infrastructure. It’s an existential threat.**

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In the industrial world, when a switch is flipped, we take for granted that it will produce light, boot a computer, illuminate a stadium or activate a power plant. We know, of course, that power losses can and do occur. Many of us have lit candles during a thunderstorm or brought out extra blankets when a blizzard takes down transmission lines. As of this writing, the most populated state in the United States, California, is experiencing rolling blackouts.1 Yet even in prolonged power outages, we expect that electricity will be restored and, consequently, life will return to normal. Perhaps we need ask, however, what if power **cannot** be restored in a timely manner? Concern is growing that in the not-too-distant future our electricity supply could be irreparably compromised by a cyber attack. The issue when considering a systemic grid failure of this nature is twofold: how did we reach a point where something so **critical** to **routine life** now presents an **existential threat**, and what can we do to **mitigate** the risk of a catastrophic grid attack? This article posits that the emergence of cyber attacks on industrial control systems, as a means of war or criminal menace, have reached a level of sophistication capable of crippling those systems. This article argues that a new grid security policy paradigm is required to thwart catastrophic grid failure – a paradigm that recognises the inextricable link between commercial power generation and national security. In section 5, seven policy recommendations are outlined that may, in part, mitigate a future where grid attacks pose **existential risk** to nations and their citizenry. Those recommendations are: first, develop a comprehensive insurance programme to minimise the financial risk of grid disruption; second, train more cybersecurity professionals with particular expertise in industrial control systems; third, institute a federally mandated information-sharing programme that is centralised under United States Cyber Command; fourth, subsidise and/or incentivise cybersecurity protections for small to mid-size utilities; fifth, provide university grants for grid security research; sixth, integrate new technologies with an eye towards securing the grid; and, lastly, formulate clear rules of engagement for a military response to grid disruption. The purpose of this article is to provide the reader with an introduction to this complex topic. It is the aim of the author to give orientation to this issue and its many branches in the hope that better understanding will animate further curiosity and, ultimately, positive action on the part of the reader. Although many skilled and earnest people work tirelessly to prevent a grid failure scenario, it is essential that more be added to their ranks each day. Advisors, engineers, regulators, private counsel to power generators, and many others who play roles in electric power production are crucial to this subject. So, while this article provides entrée to the topic of grid security, its long-term objective is to spur action by the entire energy-related community. In the end, no one is immune to consequences of grid failure and, therefore, everyone is responsible, in part, for promoting grid integrity.2 In this regard, lawyers who represent various actors in the energy sector are going to be faced with questions and potential legal risks of a magnitude that they have never experienced before. 1.2. Turning the power back on in a powerless world ‘Black start’, not to be confused with the term ‘blackout’, is the name given to the process of restoring an electric grid to operation without relying on the external electric power transmission network to recover from a total or partial shutdown.3 At first glance, this description is unremarkable, but it implies a disturbing catch-22 – how might one restore power if the entire external transmission network is compromised? If an electric disruption occurs at a household level, some homes may be equipped with a modest gasoline generator to temporarily restore power. If a hospital loses power, it will almost invariably be resupplied by automatic, industrial-scale generators. These **micro** considerations hardly give **anyone pause**; they are hiccups on a stormy night or a snowy day. In other words, their ‘black start’ is a quick and effective process for restoring power. But what happens, at a macro level, when an electric **grid** supplying power to **large portions** of the **U**nited **S**tates goes black, or worse, what happens if **all** of the United States’ electric grids go down **simultaneously?**4 In that scenario, how might enough non-grid power be harnessed and transmitted to turn the United States’ lights back on? Moreover, how might such a catastrophe occur in the first place? Perhaps the more **ominous question** is **not how**, but **whether or not we can survive** such circumstances if they persist in the long term. The United States electric grid (‘the grid’) is the ‘largest interconnected machine’ in the world.5 It consists of more than 7000 power plants, 55,000 substations, 160,000 miles of high-voltage transmission lines and millions of low-voltage distribution lines.6 The scale and complexity of the grid in the context of the modern digital world are beyond comprehension because within it are innumerable industrial control systems; incalculable connections to digital networks; millions, if not billions, of analogue or digital sensors; many thousands of human actors; and trillions of lines of programming code.7 Further complexifying the grid is that it is comprised of generations of technologies, stitched together in ways that are not inherently secure in a world of cyber threats.8 The vastness of the grid makes security of it challenging. Likewise, the **vastness** of the grid makes the opportunities for intrusion **seemingly infinite**. By **any measure**, grid **failure** will unleash a **parade of horrors**. **Stores** would **close**, **food** scarcity would follow, **communication** would cease, **garbage** would **pile up**, planes would be grounded, clean **water** would become a **luxury**, service stations would yield **no fuel**, **hospitals** would eventually **go dark**, financial **transactions** would stop, and this is only the **tip of the iceberg** – in a prolonged grid failure **social chaos** would reign, once-eradicated **diseases** would **re-emerge** and, increasingly, hope of returning to a normal life would fade.9 The notion of complete grid failure, once relegated to science fiction comics or James Bond movies, is now not only possible but also one of the most pressing national security threats today.10

### Contention 2 – Climate Leadership

#### Paris withdrawal puts climate leadership up for grabs

Gibson 25 [Kalina Gibson, dual degrees in economics and environmental science and policy from the University of Maryland. 1-21-25, The Trump Administration’s Retreat From Global Climate Leadership, https://www.americanprogress.org/article/the-trump-administrations-retreat-from-global-climate-leadership/]

As climate disasters grow in frequency and intensity, from devastating wildfires to relentless hurricanes to record-breaking heat waves, the Trump administration has once again taken a step that threatens to deepen the climate crisis: formally announcing the United States’ withdrawal from the Paris Agreement. In the midst of an escalating climate crisis that’s upending livelihoods and lives, this decision raises urgent questions about the future of national and global progress. Namely, what does it mean for the international climate effort to combat climate change when the world’s largest historical emitter steps away from the table? And what are the implications for Americans already grappling with the mounting costs of a warming planet? Since its adoption in 2015, the Paris Agreement has represented a historic act of global solidarity and a framework for collective accountability in addressing the climate crisis. Nearly 200 nations committed to curbing greenhouse gas emissions, bending the global emissions curve, and striving to limit warming to 1.5 degrees Celsius. While progress has been uneven and insufficient, the agreement underscores the power of collective action. At the same time, it fosters transparency and accountability, enabling nations to measure their ambition and progress against one another. This dynamic has not only spurred innovation but also inspired nations to vie for leadership in the global clean energy economy, proving that addressing climate change is both a shared responsibility and a pathway to prosperity. President Donald Trump’s decision to again withdraw does not reflect a failure of the Paris Agreement, but rather signals a profound abdication of leadership. The United States now joins Iran, Libya, and Yemen as the only countries in the entire world not party to the agreement. Other countries have already reaffirmed their commitments to the agreement by announcing their updated nationally determined contributions (NDCs) in an effort to uphold the agreement’s goal despite America’s retreat. Yet the withdrawal sends a troubling message: The United States is an unreliable partner. This is not just about one nation stepping back; it is a deliberate weakening of the multilateral system at a time when global unity has never been more critical to combat the climate crisis. In addition, it will serve to amplify the voice of China, the world’s largest greenhouse gas emitter still at the table. The question now is whether global momentum can overcome the absence of U.S. federal leadership—and what role subnational actors, international partners, and everyday citizens can play in ensuring climate progress continues, even as the clock ticks ever louder.

#### And, investment in nuclear energy is the only way to restore leadership

Pazzanese 25 [Christina Pazzanese, Master of Arts in Regional Studies, News writer at Harvard University, 1-7-25, “Nuclear has changed. Will the U.S. change with it?,” https://news.harvard.edu/gazette/story/2025/01/nuclear-has-changed-will-the-u-s-change-with-it/]

Fueled by artificial intelligence, cloud service providers, and ambitious new climate regulations, U.S. demand for carbon-free electricity is on the rise. In response, analysts and lawmakers are taking a fresh look at a controversial energy source: nuclear power. Two new reactors in Georgia are the first in consecutive years in the U.S. since 1990. In June, Congress overwhelmingly passed the ADVANCE Act, a bipartisan bill that boosts the number of reactors coming on line. Late last year, tech giants Google, Amazon, and Microsoft all pledged to invest in small reactors to help meet their future energy needs. In this edited conversation with the Gazette, Daniel Poneman, a senior fellow at the Belfer Center, discusses the growing momentum behind nuclear power plants. Poneman served as deputy secretary of energy and chief operating officer at the U.S. Department of Energy from 2009 to 2014. From 2015 through 2023 he was CEO of Centrus Energy, a supplier of nuclear fuel to power plants around the world. Is nuclear power making a comeback? I believe the answer is yes, because we have new factors present and they’re all converging to add momentum to nuclear. For a long time, a lot of people have been worried about climate change and reducing carbon emissions. The only source of clean power that’s been proven to work — day or night, season in, season out, in any geographic location, and successfully operating at large scale — that’s nuclear. It’s just shy of 20 percent of our total electricity production and nearly half of our carbon-free electricity. On top of that is this vertiginous increase in electricity demand that’s driven by 1) the AI revolution and 2) the effort to decarbonize not only power generation, which is about one-quarter of total emissions, but also transportation and industrial processes. If you have electric vehicles and you get the power for the vehicles from coal plants, you haven’t solved the emissions problem. The last factor is the hyper scalers, which have the wherewithal and frankly the balance sheets to support these very substantial investments in nuclear. So, you have all of those market-driven factors and strong recognition by the government of the importance of nuclear. I don’t think there’s any issue that has broader or deeper bipartisan support than this one. All of these things are converging to add new momentum to American nuclear energy. Historically, opposition to nuclear power has been linked to safety and environmental concerns — including waste — and on the business side, to high costs and low profits. What’s different — is today’s nuclear power safer, cleaner, more cost-effective? In terms of security, when people were concerned after 9/11, changes were undertaken. And obviously, a lot of lessons were drawn after Fukushima. There has been a continuous set of improvements over the years. When you ask what’s different: There is a whole new generation called advanced reactors. One of the problems over the years is that large reactors got larger and larger, and each one became a bespoke project. There were too many change orders within a single reactor project, and that just kills you on budget. One thing is to go to factory-built, small reactors that can be standardized, punched out like a cookie cutter, the same design over and over. The more of these things you punch out, the cheaper it gets, and the more practice you have installing them, the cheaper it gets. If you do things like that, you can improve on safety and budget. The waste issue depends on the specific reactor technology. Some advanced reactors are based on existing Gen III designs, so their waste would be the same but with smaller quantities because the reactors are smaller. Gen IV reactors use fast neutrons, which allow a more efficient use of fuel and therefore a reduction of total volumes. Some Gen IV reactors can burn used fuel that has already been irradiated, which would have the effect of both burning out some of the minor actinides and turning what is now considered “waste” into a source of more energy. At the end of the day, all nuclear waste, whether from current generation or advanced reactors, will need to be disposed in deep geologic formations; this is a safe process with well-known technology. The Biden administration late last year announced several new U.S. nuclear benchmarks at the United Nations Climate Change Conference. Are those goals realistic? They’re ambitious, but I think they’re necessary if we’re going to reach our targets. At the Belfer Center, I’m working on a project on how to get 200 gigawatts of new nuclear built in the United States by 2050. A bunch of things have to happen right for that to be achievable. But I have great confidence that when there’s something that’s truly important, and people in the United States put their minds to it, we can do great things. But it’s going to take smart government policies. We’re going to have to have lean and effective regulations. We’ve got to figure out a way to spread the cost and risk sufficiently, so you induce people to act sooner rather than later. Government loan guarantees that reduce the cost of capital can both defray first-mover risks and also give confidence to the private sector to co-invest. If we concentrate our efforts, we have a chance to restore U.S. global leadership. What factors will determine whether those goals are reached or derailed? Government is going to have to be there in terms of smart tax policy, in terms of providing things like cost-overrun insurance. The government also can be an important source of demand, especially for small and micro reactors that have potential applications such as supporting micro grids for things that can’t afford to go dark — military bases, things of that character. If there’s a cyber threat from an enemy or from some natural event, I would recommend the government buy a bunch of these small reactors to help them get over that first-of-a-kind challenge that is so hard to overcome for private entrepreneurs who can’t wait decades for an adequate return on investment. Private capital can then take the confidence that comes from having strong co-investment and commitments from the federal side. You’re going to have to have the engineering, procurement, and construction contractors who got rusty over the last few decades get back into the game and execute well. And we’re going to have to have the talent pool grow and training programs at the university level, but also in the trades and organized labor. Many thousands and, ultimately, hundreds of thousands of jobs are needed. You’re going to need well-trained people in the supply chain manufacturing these very precise components and parts. It’s going to take a group effort. And to maintain the social license to do this, we have to bring all of civil society along with us. So far, in recent years, you see a lot of very positive movement in that direction.

#### It's specifically key to climate leadership

Baker et al 20 [James Baker III (Law degree from the university of Texas), George Schultz (PhD in industrial economics from MIT), and Ted Halstead (Masters degree from Harvard's Kennedy School of Government), May/June 2020, The Strategic Case for U.S. Climate Leadership How Americans Can Win with a Pro-Market Solution, <https://clcouncil.org/reports/Foreign-Affairs.pdf>]

Although the United States and its trading partners have a long way to go in reducing emissions, a fundamental paradigm shift is occurring. Climate action and economic growth, far from being mutually exclusive, are not only compatible but also increasingly interdependent. The U.S. economy has prospered in recent decades because the U.S. public and private sectors were the frst to embrace the communications and information technology revolutions. The transition to clean energy promises equally far-reaching economic advantages. Nextgeneration renewables and nuclear energy could substantially drive down the per unit cost of electricity, just as the digital revolution drove down costs in recent decades. That is why China is investing so heavily in these sectors. And that is why the United States could be putting its global economic leadership position at risk if it continues to ignore this transformation.

#### Ceding climate leadership opens the door to Chinese soft power in the Asia-Pacific---it collapses our alliances.

Goodman ’18 [Sherri Goodman (degrees from Harvard Law School and Harvard Kennedy School; 2x DOD medal for Distinguished Public Service); October 17; Senior Advisor for International Security at the Center for Climate and Security and a Senior Fellow at the Woodrow Wilson International Center and CNA, former President and CEO of the Consortium for Ocean Leadership; Iris-France, “How Climate change challenges the US Department of Defense?” https://www.iris-france.org/121024-how-climate-change-challenges-the-us-department-of-defense/]

Your article on China mentions that Japan is worried that diminished US leadership in climate change can also impact on US’s influence in Asia and might also give more space for China to rise. Can you please explain this?  
  
I deeply worry about the vacuum created by the absence of climate leadership in the US right now at the highest levels of the government. There is a lot of good work going on in the defense and military departments at the working levels. But when the President declared that he is going to pull the US from the Paris agreement, President Xi Jinping of China said “we are going to be climate leaders” and now they are using that soft power to enhance their global influence, particularly in the Asia Pacific region. I think we have to be very concerned about that. China, by virtue of its position in Tibet, controls most of the headwaters of the major rivers in Asia and is in a position to monopolize that water. It has worked cooperatively with many others in the region, thus I will not say it will not continue to cooperate. However, it will cooperate from the position of strength.  
In the US we talk about utilizing all elements of national power and that includes our military forces, diplomacy, economic tools and trade. In the current era, it also includes climate leadership and diplomacy, as well as clean energy and resilience building, particularly in the Asia Pacific region where you have so many nations and people who are completely vulnerable to the effects of rising sea level and increasing extreme weather events. We should not be in a position where China is the only country that can come to rescue. We need to have a combined allied presence that we had across the Asia Pacific region for decades since World War II. Japan is our very strong ally as well as Australia. The French and the Americans have a strong partnership. Today this is a region where I think we should continue to show leadership and presence.

#### That’s needed more than ever before to prevent a nuclear South Asian water conflict.

Godara ’24 [Hari; Jyoti Pathania; Gaurav Kumar; September 1; Doctoral candidate at Jindal School of International Affairs; Professor at the School of International Affairs, O.P. Jindal Global University; Graduate Student at O.P. Jindal Global University; Sage Journals, Journal of Asian Security and International Affairs, “Hydro-Political Dynamics Between China–India–Pakistan: Dams and Transboundary River Governance Amidst Geopolitical Contestations,” vol. 11]

Introduction The South Asian region, a vital hub for some of the world’s most significant transboundary rivers, finds itself at a critical juncture characterised by mounting geopolitical tensions and severe environmental concerns. This intricate interplay has propelled the issue of water security to the forefront of strategic considerations for the states bordering the Hindu Kush Himalayan (HKH) range. At the heart of this complex discourse lie ambitious plans to establish an extensive network of hydroelectric dams, a development characterised as an unprecedented ‘water grab’. India, with plans for nearly 292 dams in the Indian Himalayas, envisions a future in which the region’s dam density would surpass that of any other in the world. It is also important to highlight that this study involves states that have been engaged in active military conflicts on various occasions and very frequent minor border skirmishes with claims/counterclaims on one another’s territories. Varady et al. (2023) explain this dynamic, pragmatic and ever-changing transboundary relations through Kautilya’s Mandala concept: ‘one’s neighbour is one’s enemy and neighbour’s neighbour naturally becomes one’s ally’. While the New Water Justice Movements (NWJM)1 and approaches such as political ecology can provide a substantial theoretical paradigm for this study, its scope falls short in the unique cartography represented at the confluence of China, India and Pakistan, with their powerful attempt to delegitimise current hydro-political borders and to exert influence through all means available. When Foucault et al. (2008, p. 313) defined hydro-social re-patterning attempt as a coercive act by powerful water actors led by legal, economic and military compulsion backed by the government (sovereign power), no extension or application was informed about the potential use of water as a hydro-political extension for geopolitical significance among different states. Concurrently, China, already a significant player in dam construction, intends to add another hundred dams to this landscape. These concurrent efforts transcend economic endeavours, intricately intertwining with strategic imperatives that possess the potential to reshape regional power dynamics. However, this surge in dam development does not occur without consequences. While these projects yield economic advantages and bolster hydropower capacity, they necessitate a re-evaluation of geopolitical realities. China’s dominance as the ‘upstream hegemon’ in the HKH region and its substantial control over water outflow underscore the strategic leverage that water resources confer. These consequences ripple downstream, impacting states dependent on these river systems where geopolitical ally Pakistan, whose agrarian economy heavily relies on the Indus River, is centred vis-à-vis adversary India, who happens to be an upper riparian of Pakistan. Figure 1 illustrates how both Pakistan (with Chinese support) and India have intensified their bid to erect more dams and, very recently, the completion of the Shahpurkandi barrage on the Ravi River (i.e., one of the five rivers of Panjab under the Indus Water Treaty [IWT]) has stopped the flow of its water. It has brought a strong reaction from Pakistan, with it being called ‘water terrorism’, but the point of contestation remains that the Ravi River, as per the IWT, falls under Indian purview for developmental or any other use. The timing, however, brings forward a different narrative that has basically morphed this arrangement into a strong act of hydro-politics that is being viewed with Indian PM Modi’s dictum that ‘Water and blood cannot flow together’ (ET Online, 2024). The collapse of the Nova Kakhovka Dam during the Russia-Ukraine war further imposes a strong warning for many, as the possibility of military conflict or any act of terrorism targeting such structures and overwhelming destruction can certainly be guaranteed, which again can be cited on multiple instances as back or even before WWII as well. <<Figure 1 Omitted>> In this context, the governance of transboundary rivers becomes paramount, with legal frameworks such as the IWT seeking to establish an equitable distribution system. However, these legal arrangements operate under pressure within a complex geopolitical landscape where governments grapple with issues of sovereignty, territorial integrity and strategic interests. As governments navigate the notion of shared resources, the very concept of sovereignty within the context of transboundary aquifers and rivers becomes a subject of debate. The qualitative structure of this article starts with the existing frameworks governing hydro-diplomatic2 measures as well as structures, which then explains how the cleavages of these structures give way to hydro-politics and have the potential to emerge as a significant irritant for perceived state security. This article aims to dissect the multifaceted dimensions of geopolitical hydro-diplomacy, unveil the strategic imperatives underpinning the surge in dam construction, and evaluate the repercussions for regional stability and security. Contemporary Water Governance and Cooperation Structure in South Asia South and Southeast Asia’s water security heavily relies upon ‘non-binding MOUs, expert-level mechanisms, exchange of hydrological information, etc’. However, China’s dominant position as an ‘upstream hegemon’ with unsymmetrical dependence on its sovereign control over 40% of the outflow of water with just 1% inflow interacts consistently with geopolitical rivals such as India (Ho, 2020, p. 31). According to Rogers and Hall (2002), water governance encompasses ‘the variety of political, social, economic, and administrative frameworks established to advance and oversee water resource development, as well as the provision of water services, across various societal tiers’. Araral and Wang (2013), while highlighting the structural ambiguity of such a definition, point out changes inculcated in future evolvements (UNDP, 2013); however, it does not express the geopolitical configuration of regions of South and Southeast Asia with water scare developing states that operate as per ‘hegemonic theory of cooperation’ (Lowi, 1993, p. 8). In the absence of a structured basin-level transboundary governance system, China uses its unrestricted manoeuvrability to decide unstructured and loose bilateral relationships that resound more with geopolitical needs than a mere quest for governability. <<TEXT CONDENSED NONE OMITTED>> Legal scholarship extensively addresses the allocation of transboundary rivers as resources, delineating two principal categories. The Doctrine of Territorial Sovereignty first asserts a state’s sovereign right over water within its territorial boundaries. The second, the Doctrine of Natural Water Flow, designates transboundary water as a shared common resource among all riparian states (Swain, 2015, p. 446). Based upon the Roman maxim aqua currit, et debet curerer, ut solebat es juienaturae, which roughly translates to ‘let the flow of water remain in its natural state of constant flow’ (Cole, 1989). The Law of the Non-Navigational Uses of International Watercourses in its structure presents two major substantial principles: (a) equitable and reasonable utilisation and participation and (b) obligation not to cause significant harm principle, which translates in specific details presently in a limited scope of harm caused by riparian state’s activity (Water Convention, 1997). These two principles again have different positions in relation to each other when an inquiry is made about which one should be the preceding principle. Whether it is the principle of equitable and reasonable utilisation where informed developmental projects and projects of capacity enhancement can be undertaken by the upper riparian states with prior notification and approval. The other part is the ultimate precedence of the obligation to cause no harm, which is considered to reflect the lower riparian position, where the flow of harm is deemed to flow from the upper riparian only. Salman (2010) describes this situation where lower riparian states have unquestionable rights over development, which originates from their position while creating a case of future foreclosure for upper riparian states. Any simple observation will reflect the weak position of the lower riparian state in relation to the upper riparian state, which consolidates their support for the no-harm principle. However, in alignment with this perspective, Professor Stephen McCaffrey (2007) presented the following inquiry: ‘Should a downstream State advance its water resource development to the degree that it precludes otherwise reasonable future utilisation of the watercourse by an upstream state, could this be deemed as causing “significant harm” to the latter?’ Additionally, does the downstream state have any procedural duties towards the upstream state regarding its prospective projects? It roughly translates to the position where ‘social and economic growth of Upper Riparian newcomer’ will be heavily regulated in relation to the case of early development of lower riparian capabilities, which forecloses any future use of equitable and reasonable use for the upper riparian state (Caflisch, 1998). In realist interpretation, the ambiguity of international law, where a neutral term ‘watercourse state’ aims at inclusivity, will fluctuate and reflect the temporal position of relative capability, where a capable lower riparian state will push forward for the precedence of no harm principle and vice versa. International legal instruments such as the Water Convention have huge prerequisites as well as basic presumptions in its language of neutrality, and they are deeply embedded in the rationality of state leaders and interact incompatibly with the Law of Transboundary Aquifers through its reiteration in subsequent UNGA meetings of the acceptance of the state’s sovereignty over a territorial portion of aquifers. McCaffrey (2011) argues that the potential dangers of such acts as The article’s overlap with the 1997 United Nations Watercourses Convention, which contains an even more serious flaw: they introduce the novel and potentially dangerous concept that a state has sovereignty over the portion of a transboundary aquifer located within its territory. These legal proceedings become essential aspects of any given bilateral or multilateral transboundary governance system as they form or are supposed to be the theoretical basis of any given relationship, which is also valid for South Asia. McCaffrey (2011) builds a case against state sovereignty as the bifurcation of ‘confined groundwater’ against the backdrop of surface water of the Transboundary River curtails its scope massively. McCaffrey (2011) again cites the notion as stated: A state simply cannot have the exclusive ownership that sovereignty implies in something that is shared with another state. In fact, as discussed elsewhere, the entire concept of ‘sovereignty’ in international relations is highly questionable and tends to be used as a fig leaf to cover up ill-advised, improper, or unlawful conduct. (McCaffrey & Neville, 2010; Henkin, 1994) It is almost a paradox that if this treaty is to be bilaterally or even multilaterally decided, it will be entrenched in political issues, defeating the critical aspects and avenues of newer avenues (McCaffrey, 2011). Interstate relations are bound by a geopolitical reality where, through the realist paradigm, neighbouring states consider the relationship in its actual and relative impact as part of a zero-sum game, making it hard to cooperate in certain avenues reflected through a considerable number of regional border conflicts. The interstate relationship requires a nuanced approach to understanding significant irritants and the scope of cooperation. Marshall (2021) states in his seminal book Prisoners of Geography that China’s aim to control Tibet was fuelled by ‘Geopolitics of Fear’, where if left as it is, India would have China’s Achilles heel in its constant reach. The first is the benefit of higher ground in case of a conflict that becomes a challenging situation to deal with, and the second is the fear of losing control over three major Chinese rivers originating from Tibet: Yangtze, Mekong and Yellow River. The other aspect is that water is a scarce resource that needs to be economised for its proper allocation and protection, as reverberated in China’s Water Law, 2002, as well as the Swajaldhara scheme of India announced in 1999. This aspect aims towards negating irresponsible use of shared natural resources, which has been explained, nevertheless not without academic criticism, by what has been termed the Tragedy of Commons. However, it fails to consider geopolitical realities, especially in the case of transboundary rivers. Therefore, analysis of water scarcity follows various approaches, albeit with adequate academic criticism due to the lack of a universal framework that also accounts for what has been termed ‘Societal Adaptive Capability’ by Ohlsson (1998, 1999) in his analysis of Falkenmark’s indicator, that is, ‘Social Water Stress Index’. One other approach by the International Water Management Institute (IWMI) categorises two stages of water scarcity, that is, physical and economic scarcity indicators, except in India and China (Rijsberman, 2006; Seckler et al., 1998). The two thresholds or categories, except for India and China, are (a) future adaptive capacity (b) increase in irrigation efficiency, which are self-explanatory. Amidst all these analyses, frameworks and indexes, the critical aspects can be explained through Figure 2, which highlights how adaptive capacity reacts as new hotspots of hydro-political stress. Only those states that are unable to meet water demands after the period of consideration for future adaptive capacity will be termed ‘physically water scarce’, and the states that have abundant water resources but lack the infrastructure or technological aspects fall into the category of ‘economically water scarce’. For the analysis of National Water Resource, this analysis stands accurate, accounting for multifaceted aspects and implications; however, that does not seem to be the case for transboundary water resources. China’s adaptive capacity building can be explained better with three significant projects whose transboundary or ecological impact has far-reaching consequences; however, China’s self-assumed leadership through adaptive capacity building exercises in Global South states needs further in-depth explanation with more than 380 large hydropower projects in 70 states, primarily in the Global South (Siciliano et al., 2019). The first can be called ‘virtual water’ import, where water-intensive crops can be imported rather than utilising one’s available water resources while aiming at producing water-intensive commodities (Allan, 1999; Hoekstra, 2003; Yu et al., 2016). The water import of China stood at 276.64 billion m3 in 2013 in retrospect compared to 68.55 billion m3 in 2001, and further results in the research point out at almost 11.03 billion m3 from India and heavy reliance from Pakistan as well (Yu et al., 2016). Yu et al. (2016) have categorised the states into four major types: (a) Mutual Benefit Countries, (b) Unilateral Benefit Countries, (c) Supported Countries and (d) Double Pressure Countries. India and Pakistan have been categorised as double-pressure countries under immense water scarcity pressure. The second involves projects such as the Mekong River Project with large cascade and reservoir dams that have a significant transboundary impact on the entire lower riparian ecologies. The third is China’s river interlinking projects, such as the ‘South-North Water Transfer’ project, which has a plethora of academic scholarship on its negative and positive implications. These water linkage projects are estimated to account for 25% of water withdrawal worldwide, and China aims to develop 4.48 × 10 billion cubic meters of water from the Yangtze River to water-scarce regions of North and North-West China (Yan et al., 2023). Water, being a finite resource, can be attributed to a zero-sum game while analysing the potential utilisation and management, especially as a transboundary resource. If media reports are to be retrospectively analysed in conjecture with China’s attempts at future adaptive capacity building, then the project aimed at transferring water from Tibet’s Yarlung Tsangpo River to Xinjiang’s Taklimakan Desert through 1,000-km-long tunnels appears very problematic to lower riparian states (Chen & Chen, 2017; FP Staff, 2022; GCR Staff, 2017). <<Figure 2 Omitted>> These aspects necessitate an in-depth analysis of how China regulates or views its natural resources through basin-level treaties and municipal law. The critical aspect of China’s Water Law, 2002, is that Article 26 showcases a renewed spirit towards the economisation of water through dams: the cascade and reservoir dams in a planned manner to extract hydro energy as well as hold back water. However it can be argued that Article 76 of this document supplements a realist necessity yet moral irritant. The article reads as Article 78 Where any international treaty or agreement relating to international or border rivers or lakes, concluded or acceded to by the People’s Republic of China, contains provisions differing from those in the laws of the People’s Republic of China, the provisions of the international treaty or agreement shall apply, unless the provisions are ones on which the People’s Republic of China has declared reservation. China is not a party to the Water Convention, 1997; however, neither is India nor Pakistan. This position, however, results in an uneven impact as Pakistan’s declaration on monopolising the Indus River’s water is grossly incomparable with a similar announcement by India or, in the worst-case scenario, China, based upon Hegemonic Theory of Cooperation or any other realistic explanation for an idealistic goal set by a set of principles that warrants selfless collaboration due to a lack of temporal power exuding global agency. Article 8 (1) of the Water Convention reads as follows: Watercourse States shall cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilisation and adequate protection of an international watercourse. Conca et al. (2006) argue that political and financial inequity-induced unequal distribution of resources and capabilities weaken these institutions, making them grossly ineffective. Weinthal (2002, p. 35) argues that hegemons, that is, hydrohegemons, have sufficient structural capability to coerce unsymmetric cooperation. This spirit is reflected in the entire legal scholarship in the case of international water aw, as the significant point of contestation about structural inequality, albeit natural, is masked under a language of neutrality through the use of the ‘watercourse state’ word, which is unresponsive to upper and lower riparian predicament (Salman, 2010). In continuation of previous arguments, poorly defined and overlapping laws with jurisdictional ambiguity make transboundary governance a nightmare regarding conflict resolution. Ironically, no major war has been fought on or for water; however, that does not account for continuous strains on states with huge populations, such as those in South Asia or Southeast Asia, where China is heavily invested in hydropower projects, as shown in Figure 2. China’s proposed projects on the Lancang River4 have different impacts on each Mekong River Basin (MRB) state, with ecological, social and economic impacts, among others (Ogden, 2022). The presence of about 100 ethnic groups scattered across all these states, who depend economically on the Mekong’s ecosystem, makes it difficult to maintain life, as they have known when artificial draughts threaten to uproot their balance. Ogden (2022) claims that the Chinese government has been able to project itself as an economically and technologically capable ‘preference multiplier’ of their ‘shared preferences’. The question remains whether the public or the actual stakeholder also perceives China in such an image. In 2020, what started as a meme war quickly escalated into a youth-led online movement titled ‘Milk-Tea Alliance’, a very vocal and critical stance of the younger population against China and their regimes (Godara, 2021). It must also be noted that due to Chinese projects, the Mekong River witnessed the lowest level of water, an almost draught-like situation from 2019 to 2021 in the last 60 years (Ogden, 2022). These social movements fall short of providing a clear, comprehensive picture; however, they assist greatly with what has been explained in the scientific literature and have a visible impact on a significant number of lives through such behemoth projects. Middleton and Allouche (2016) write about how MRC’s legal inadequacy with China’s unilateral control over projects on Lancang and Mekong has potential for ‘Transboundary hydropower cascade coordination’ and, more importantly, ‘Flood and Draught Hydro diplomacy’. The dam storage capacity on the Lancang-Mekong River has been estimated to increase 15-fold, from 2% in 2008 to 30% in 2030, which already has a significant impact on the ‘food pulse’ of millions of people dependent on the riverine ecosystem (Kummu et al., 2010; MRC, 2010). MRC (2010) State of the Basin Report put a number as high as 40 million people, that is, roughly two-thirds of the entire Lower Mekong Basin population, at risk due to a significant impact on their ‘food pulse’. Chinese hydro-political as well as hydro-diplomatic stances reaffirm how water has now become an extension in the pursuit of diplomacy. Both the Lancang Mekong Commission and China’s Ministry of Foreign Affairs spokesperson stress the importance of these ‘water facilities’ in combatting drought and flood after releasing water at Vietnam’s request. However, records show that even without official records and requests, water can be released, which is again detrimental to unsuspecting people in the Lower Basin area (Biba, 2013; Global Times, 2016; Reuters, 2016; Wangkiat, 2016). Upon analysis of China’s transboundary governance structures with its riparian neighbours based upon the Basin at Risk (BAR) event intensity scale, Ho (2020) argues that China cooperates better with some than other riparian neighbours (Wolf et al., 2003). When China chose to become a dialogue partner of the Mekong River Commission in 1988, two aspects can be deconstructed from this step: (a) To avoid legal responsibility through MRC’s strict aquatic environmental standards as well as dam building, (b) to reiterate its sole sovereign control over almost 50% of the Mekong River (known as Lancang in China). The analysis further on the BAR scale shows that China cooperates with Kazakhstan, a central Asian state adjacent to the Xinjiang region and considered (potential for future) base for rebelling Uyghur Muslims, and records a positive 5–6 and for Lower Mekong Region 1–5 (Ho, 2020). On this scale, 0 is neutral, positive 7 marks voluntary unification into one nation and negative 7 indicates war. Positive 6 falls under the scope of a major bilateral or multilateral strategic alliance; however, this same scale marks China’s interruption of blocking India’s request for a loan from the Asian Development Bank at negative 3, which translates to diplomatic-economic hostile action. Water scarcity is considered a growing limitation to ensuring food security and promoting sustainable agricultural development in Northern China (Wang, 2012). However, the same applies to India and Pakistan, which have a growing population under erratic climate conditions. China’s Geopolitical Utilisation of Transboundary Rivers: Strategic Imperatives and Implications for the Region The impact or potential impact of any such hydrological projects, rather than being superficially different from the implementation perspective, also varies in its structural coherence and consideration through language of specificity. The principles of the Water Convention,6 1997, appear to provide a generic structure that aims not to hinder existing treaties or structures of governance; however, as per Professor Lucius Caflisch, it expects a ‘harmonising’ assimilation with its ‘basic principles’ (McCaffrey, 1998). Apart from structural incoherence in these ‘basic principles’, as mentioned in the previous section, inferences from data highlight that some regions have achieved better governance through carefully drafted basin-level agreements. Pacific Institute’s Water Conflict Chronology (WCC) highlights that only 10 significant conflicts (mostly related to local resistance, especially in France) occurred in Western Europe post-1999 in comparison to 287 in South Asia with actual terrorist or state-led attacks on water infrastructure during the same period (Water Conflict Chronology, 2024). Even at the European level, we can highlight considerable disparities in the overall conflicts, which have broadly been categorised into (a) casualty, (b) trigger and (c) weapon, as Eastern Europe stands at 81 conflicts, which even includes an attack on Nova Kakhovka as well as other direct attacks on water infrastructures (category weapon and casualty) (Shumilova et al., 2023). The significant categorical difference can be explained by the need to balance sustainable means of energy generation in the EU, which led to a considerable developmental boom of dams in Southeast Europe (Danube river tributaries), with 80% of its 35,000-km-long network of rivers not facing anthropomorphic transformations, which resulted in more detailed and specific guiding principles/policy recommendations (Huđek et al., 2020). The document, named Sustainable Hydropower Development in Danube Basin, 2013, has more than a functional level of assimilation with the Danube River Protection Convention, 1994, without failing to be more reflective of ground realities as well as national policies. It must also be stressed equally that most operational dams in this region are 636, and it includes 42 large-scale (>10 MW), 72 medium-scale (1–10 MW) and 522 small-scale (<1 MW) dams, which pales in comparison to some of the operational dams such as Baglihar Dam (900 MW) or even planned projects such as Pakul Dul (1,000 MW) in India. Even the decades-long Gabčíkovo–Nagymaros Dams issue between Hungary and the Slovak Republic reached an amicable end, with Hungary choosing to abandon the Nagymaros dam project in favour of the EU 2030 Biodiversity strategy aiming at the removal of blockading structures on watercourses (Gabčíkovo–Nagymaros Project (Hungary/Slovakia), 2017). <<PARAGRAPH BREAKS CONTINUE>> As per the ancient Chinese proverb, ‘Two Tigers cannot hide in the same mountain’, and this proverb, apart from being present in Indian or even Pakistani fables, resounds closely with the intense geopolitical contestation to have a strong position in the region or beyond. China intensified its bid at the start of the year 2000 through military, political, cultural and economic tools to consolidate its position while strengthening its weaker aspects, ranging from Xinjiang Tibet to its access to sea routes (Kumar, 2019). Chinese Water Grab, with its bid to not only build dams but also projects such as the South-North Water Diversion Project and West-East Power Transfer Project, is also facilitating hydrological capability building elsewhere with sketchy contracts that reflect it being an extension of Chinese foreign policy (Donnellon-May, 2023; Ho, 2017). Donnellon-May (2023) further explains through scholarship how Indian capability building (Figure 1) can restrict Pakistan’s potential, thus strengthening its energy security, and simultaneously, Indian geopolitical analyst Brahma Chellaney explains how India also faces a challenging situation vis-à-vis China as almost half of Indian transboundary water comes from China, which further percolates to Bangladesh’s apprehension towards Indian projects (Vidal, 2013). It is also worth mentioning that these projects carry an inherent risk of being undermined due to the massive impact of ecological imbalances, as they impacted negative 15.9% hydroelectric output for China and negative 6.2 for India, directly increasing fossil fuel utilisation during these periods in early 2016 (Desk, 2023). The erratic monsoon pattern, increasing global temperature and increase in demand for fresh water under rising population might prove a more significant hurdle with the justification of these behemoth projects as a dual-edged sword. However, states bordering Asia’s HKH range—Afghanistan, Bhutan, China, India, Nepal and Pakistan—are collectively in the process of initiating over 500 new hydroelectric dams in the HKH region. Some describe this development as the most extensive ‘water grab’ in recorded history. According to various studies, India has ambitious plans to erect 292 dams across the Indian Himalayas in the next few decades. Should this endeavour be realised, it would result in dams being situated in 28 out of the 32 major river valleys, effectively doubling India’s existing hydropower capacity. Consequently, this would confer upon the Indian Himalayas the distinction of possessing ‘one of the highest average dam densities in the world, with one dam for every 32 km of river channel’ (Adeel & Wirsing, 2016, p. 10; Grumbine & Pandit, 2013; Vidal, 2013). China, already responsible for approximately 20% of the world’s extensive dam projects, is also poised to construct about 100 dams within the HKH region (Adeel & Wirsing, 2016). It is also essential to understand that such massive infrastructure projects are planned based on a practical estimate of the minimum water flow required for the production of hydro facilities as well as electricity. Jaitly (2008) and Ballabh (2008) argue that the water crisis can no longer be categorised as a potential threat as it has materialised when per capita water availability fell from 6,000 cubic metres to projected 1,500 cubic metres in 2025, which again is not reflective of concentration of water scarcity in specific regions or communities. Even with all the perceived sovereign control over water resources, China’s two-thirds of farmlands and almost half of its population are situated in the arid northern part of mainland China with access to only 20% of its total water resources (Araral & Wang, 2013). Even the Yellow River is considered unusable for human needs due to extensive pollution and mismanagement. Construction of dams to exploit one’s hydrological resources is constantly pursued in favour of one’s strategic allies, while, as explained earlier, constructing large dams for national use is also pursued in a very intense manner regardless of the increasing strain of water scarcity in such a volatile surrounding. Three of the four riparian states in South Asia are big military powers armed with very exclusive nuclear weapons, along with a history of various actual wars (India’s four wars with Pakistan and one with China) and the constant threat of aggravation of conflict through constant border skirmishes. Zawahri and Michel (2020) argue that water sharing in such a volatile neighbourhood can be used as a paradigm to understand some long-standing territorial disputes, such as all western tributaries majorly earmarked for Pakistan under the IWT meander through India-controlled Jammu and Kashmir. Thus, the Indus River issue is highly intertwined with the geopolitical scope of a territorial dispute that is being supervised by a bilateral treaty, suffering from timeless rigidity intensified by complex conflict resolution mechanisms.

#### Extinction.

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ABSTRACT Climate change poses grave challenges to global peace and stability. Nowhere is the relation between the climate crisis and the increased threat of nuclear war clearer than in South Asia, where approximately 700 million people in India, Pakistan, China, and Bangladesh depend on the shared waters of the Indus, Ganges, and Brahmaputra river basins. These river systems, fed by Himalayan glaciers, are diminishing markedly due to climate change. As geopolitical tensions in the region intensify, it becomes even more crucial to address and eliminate the two intertwined existential threats of water scarcity (caused by climate change) and the risk of nuclear war. This paper analyses the Indus River conflict and the Brahmaputra conflict in turn and offers effective strategies and recommendations for dealing with the threats. In the last few years, tensions between the three nuclear-weapon states of India, China, and Pakistan have intensified, partly due to water and border issues (Johnson Citation2019). These tensions will only get worse due to two existential threats: the climate crisis, and the danger posed by nuclear weapons. This is not a new situation; the water crisis and the threats posed by weapons of mass destruction (WMD) have ranked in the top five of the World Economic Forum’s Global Risks by Impact list nearly every year since 2012. What is new is the growing realization that these threats are intertwined. Climate-triggered water scarcity is escalating the tensions between countries, especially in Asia, and consequently increasing the threat of nuclear war (Albinia Citation2020). At the same time, research over the past 10 years shows that even a so-called “limited” nuclear war involving less than 0.5 percent of the world’s nuclear weapons would cause catastrophic global climate disruption and a worldwide famine, putting up to 2 billion people at risk (Helfand Citation2013). According to the most recent research, the climatic effects of the smoke produced by an India-Pakistan nuclear war would not be confined to the subcontinent or even to Asia (Robock et al. Citation2019). These global effects are in addition to the immediate death of 50 million to 125 million people in South Asia, depending on the weapons’ yield.

#### And now is key because Beijing’s is decreasing climate commitment – so its our last chance to reverse the status quo

Moore ’23 [Scott; Erin Sikorsky; March 30; Director of the Penn Global China Program at the University of Pennsylvania; Director of the Center for Climate and Security, an institute of the Council on Strategic Risks; Foreign Policy, “The U.S. Can Steal China’s Climate Leadership Crown,” https://foreignpolicy.com/2023/03/30/us-china-climate-finance-negotiations-cop-emissions-loss-damage/]

For decades, China was a leader in international climate negotiations. But that changed at the latest United Nations climate change conference in Sharm el-Sheikh, Egypt. At the November 2022 summit, known as COP27, China became the target of criticism for failing to do enough to address climate change. The disapproval came not just from other big greenhouse gas emitters but also from other developing countries: Gaston Browne, the prime minister of Antigua and Barbuda and chair of the influential Alliance of Small Island States, called China a “major polluter” that could no longer expect a “free pass” on contributing to climate finance. This shift underscores an inconvenient truth for Beijing: Given its status as the world’s largest emitter and second-largest economy, China’s climate commitments increasingly look insufficient, and even its former allies in climate negotiations want Beijing to do more. This creates major geopolitical vulnerabilities for China—and opportunities for the United States and its allies. In short, Beijing’s leadership loss on climate is Washington’s gain. China has played an essential role in climate talks since the 1990s. Beijing took part in the original negotiations that led to the main global climate agreement, the U.N. Framework Convention on Climate Change, which then-Premier Li Peng signed in 1992. As China became the world’s largest emitter of greenhouse gasses in the early 2000s, it began to play a more prominent role in international climate policy, underscored by a 2014 U.S.-China joint announcement in which Beijing, for the first time, promised to take steps to reduce its emissions alongside similar steps pledged by Washington. In 2020, when the United States had stepped back from its climate commitments under the Trump administration, Chinese President Xi Jinping pledged to reach net-zero emissions by 2060. Despite this increasingly prominent role, the bedrock of China’s climate policy has remained the principle of “common but differentiated responsibilities”—the idea that while all countries should do their part to fight climate change, wealthy industrialized nations that contributed the bulk of emissions over time should bear most of the effort and expense. This principle helps hold together the Group of 77, or G-77, a caucus of developing countries at the United Nations. Beijing has long been influential in the G-77—so much so that it is technically called the Group of 77 and China—and has coordinated its role in U.N.-sponsored climate negotiations largely through the coalition. Yet it has become increasingly difficult for China to draw a clear line between itself and the industrialized nations it argues should bear the brunt of costs in responding to climate change. When the Paris Agreement was signed in 2015, China was able to secure its status as a developing country in the world’s climate regime. But every year since then, China has been the world’s largest emitter. Though China was responsible for about 12 percent of cumulative global emissions since the start of the Industrial Revolution to 2017—compared to 25 percent for the United States and 22 percent for the European Union and United Kingdom—China now emits about a third of the world’s greenhouse gasses each year, well ahead of any other economy. Analysis suggests China could surpass the United States’ cumulative emissions around 2050. The difficulty of Beijing’s balancing act became fully apparent at COP27 when it was effectively abandoned by other developing countries as they fought to secure “loss and damage” compensation for countries heavily affected by climate change. A key sticking point in the negotiations was the United States’ and European Union’s insistence that China be ineligible to receive compensation from the fund. Initially, the G-77, leading negotiations on behalf of the developing world, balked at any effort to exclude China. Eventually, however, the coalition agreed that the landmark loss and damage fund would focus on the most vulnerable countries rather than China and other rising economies. China, for its part, conceded to the agreement, but refused to rule outpursuing future claims to compensation. Beijing’s growing isolation in international climate talks bodes ill for its overall geopolitical standing for three main reasons. First, China will be even more vulnerable to criticism for its growing environmental footprint abroad, especially in small island developing states, as its Belt and Road Initiative-linked projects damage and disrupt local ecosystems. In 2019, for example, Papua New Guinea ordered a Chinese-owned factory to close after it breached environmental laws, while a Chinese tourism development project in Antigua and Barbuda was criticized for destroying mangroves that help prevent climate-linked storm surges. This criticism may eventually make it harder for China to expand its influence and market access across the developing world. Second, Beijing’s reputation as a difficult partner in managing resources shared between countries that are threatened by climate change, such as fisheries and transboundary rivers, will only worsen. Already, dams built and financed by Chinese firms have attracted growing scrutiny for disrupting the flow of major rivers, such as the Mekong, that are shared with several neighboring countries. As the costs of climate change mount, China is likely to become a larger target for countries experiencing growing disruption to key natural resources, and it may lose out on access to those same resources. Third, China’s growing isolation in climate talks dulls Beijing’s narrative of steadily expanding global influence. Climate action is arguably the area in which Beijing has been most successful in acquiring soft power, which has helped bolster its overall standing on the world stage. Due to the sheer size of its economy and emissions, China has been treated as an equal by other major powers in climate policy, especially the United States and the European Union, since at least the 2009 U.N. climate summit in Copenhagen, in which China played a decisive role. Since then, Beijing has trumpeted its involvement in climate talks as an example of its global leadership, but that will be harder to do as fewer countries want to take China’s lead. To be sure, China’s isolation on this issue is not inevitable, and Beijing may well make an ambitious commitment to climate finance akin to its pledge to decarbonize by 2060. But a serious pledge would probably require Beijing to abandon its longstanding insistence that it has no obligation to contribute to adaptation funds due to its limited historical contribution to climate change—an unlikely scenario since China rarely makes abrupt changes in long-held diplomatic positions. Given these constraints, China will likely become increasingly politically vulnerable due to its position on climate action. If the Biden administration steps up, Beijing’s loss can be Washington’s gain. The United States should do at least three things to seize this opportunity to enhance its leadership on climate.