# Lovejoy CM TFA State 1NC

We negate

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

## Contention One is Water.

**Lydersen 16** explains that many proponents of nuclear power argue that the energy source is crucial to reducing the impact of climate change. However, the irony is that we have to solve global warming first if we want to keep using nuclear power.

Lydersen further explains that this is because nuclear power plants require large amounts of water for cooling, as overheating presents a major safety risk. Problematically, as lakes and rivers that typically supply cooling water become hotter thanks to climate change and as droughts dry up bodies of water, nuclear plants face severe problems. Moreover, **Cooper 08** writes that if new power plants continue to be built, by 2030, 7.3 billion gallons of water will be needed every day to cool the generators, an amount equal to the entire country’s water consumption in 1995. **Wareham 07** continues that water requirements for a nuclear power station are up to 83% higher than for other sources of energy.

There are two impacts.

The first is water contamination.

**Sovacool 08** explains that nuclear plants don’t just use water – they also contaminate it at multiple points in the cooling cycle. This is critical as **Environment America 12** explains that a common leak at a nuclear power plant threatens the drinking water for millions of Americans, disaster or no disaster, and these leaks are becoming more and more common. In fact, 75% of US nuclear plants have leaked tritium, a radioactive toxin that can cause cancer and genetic defects.

Expanding the nuclear fleet would lead to increased contamination for millions more.

The second impact is water scarcity.

**Cooper 08** furthers that because nuclear power requires so much water, as electricity demand grows, continued reliance on nuclear power will inevitably create a water scarcity crisis, as nuclear power saps freshwater resources forcing the rest of the economy to ration water resources.

This is problematic as **Stuckenberg 18** writes that water is a vital factor of production and thus diminishing water supplies can translate into slower growth. GDP could decline by as much as 6% by 2050 is water losses are sustained, resulting in long term negative growth. All economic supply chains would be impacted by water scarcity, effectively throwing millions into poverty.

## Contention Two is Fire and Fury.

### Sub Point A is Terrorism.

**Seattle Post 08** explains that nuclear reactors pose significant terrorist threats as they are a prime target for a terrorist attack. **Speigel 07** continues that even a small expansion in the use of nuclear power would have serious consequences in the form of increased chances of nuclear terrorism. **Grunlond 07** explains that a group of terrorists could successfully cause a meltdown by physically attacking a nuclear facility in a matter of minutes which is especially dangerous as nuclear plants have performed poorly in mock terrorist attacks stages by the NRC.

### Sub Point B is Cyber Threats.

**Johnson** of Entrepreneur explains in **2018** that in the next few years, artificial intelligence or AI will enable cyberattacks to reach an unprecedented new scale, wreaking untold damage on companies and critical systems. We are on the verge of a new age in cybersecurity, where hackers will be able to unleash formidable new attacks using self-directed software. **Firdosi 19** adds that cyberterrorists will exploit AI systems to improve attacks dramatically.

This is critical as the **Nuclear Security Index 18** writes that nuclear facilities are not immune to cyberattack which is problematic as the pace of cyberattacks on nuclear facilities has accelerated in recent years. That reality is extremely worrisome as a successful cyberattack on a nuclear facility would have catastrophic consequences. For example, facilities’ access control systems could be compromised, and reactor cooling systems could be disabled, resulting in a Fukushima-like disaster. Problematically, government authorities and facility operators are struggling to keep pace with the new threat.

Fortunately, in the status quo, **NPR 16** finds that renewable energy and other new technologies are becoming increasingly cheap, thus undercutting nuclear power, which has led to significant decline in the nuclear industry as several unprofitable reactors are shutting down, thus eliminating the threat of a devastating terrorist attack or cyberattack. However, by voting affirmative, the risk of attack goes up drastically as new reactors are built, and existing ones stay afloat.

The impact to both arguments is nuclear meltdown.

If a successful attack were to occur, it would be devastating. **National Interest 19** finds that death tolls from nuclear meltdowns can cause the death of upwards of 500,000 people.

Thus, we negate.

# CARDS

## C1 Water

#### Cooper ‘08

William and Mary Environmental Law and Policy Review. “Nuclear Nonsense: Why Nuclear Power is No Answer to Climate Change and the World's Post Kyoto Energy Challenges.” https://scholarship.law.wm.edu/cgi/viewcontent.cgi?article=1040&context=wmelpr

With electricity demand expected to grow by approximately fifty percent in the next twenty-five years, continuing to rely on nuclear generators could create a water scarcity crisis. In 2006, the DOE warned that consumption of water for electricity production could more than double by 2030 to 7.3 billion gallons per day in the U.S., if new power plants continue to be built with evaporative cooling.35' This amount is equal to the entire country's water consumption in 1995. 352 The nuclear industry's vast appetite for water has serious consequences, both for human consumption and the environment. Assuming the latest Census Bureau projections, the U.S. population is expected to grow byaboutseventymillionpeopleinthenexttwenty-fiveyears.3 3Suchpopu- lation growth is already threatening to overwhelm existing supplies of fresh and potable water. "Few new reservoirs have been built since 1980... [and] some regions have seen groundwater levels drop as much as 300 to 900 feet over the past fifty years."354 Further, "most state water managers expect either local or regional water shortages within the next 10 years," according to a recent survey, even under "normal" conditions." In fact, about forty-eight percent ofthe continental U.S. reported drought conditions during the summer of 2002.356 Three stages of the nuclear fuel cycle-uranium milling and mining, plant operation, and nuclear waste storage--consume, withdraw, and contaminate water supplies. As a result of this vast need for water, most nuclear facilities cannot operate during droughts 357 and in some cases can actually cause water shortages.3 Uranium mining, the process of extracting uranium ore from the ground, is extremely water intensive. Since the necessary concentrations of uranium are mostly prevalent at very low concentrations, uranium mining is volume intensive. The problem is that such mining practices can greatly damage and degrade local water supplies. Early mining tech- niques were very similar to other hard rock mining such as copper, gold, and silver, and involved the creation of underground mines. Open-pit mining, the most prevalent type of uranium extraction in the world today, ceased in the U.S. in 1992 due to concerns about environmental contami- nation and the quality of uranium, as most ore found in the U.S. was lower grade uranium from sandstone deposits.5 9 Currently, uranium miners use only one type oftechnique to extract uranium ore in Wyoming, Nebraska, and Texas: in-situ leaching. Uranium miners perform in-situ leaching by pumping liquids into the area surrounding uranium deposits. These liquids often include acid or alkaline solutions to weaken the calcium or sandstone surrounding ura- nium ore.36' Operators then pump the uranium up into recovery wells at the surface, where it is collected. 62 In-situ leaching was deemed more cost effective than underground mining because it avoids the significant expense ofexcavating underground sites and often takes less time to implement. 63 In 2005, nuclear power plants produced an annual output of 781,986 MWh requiring more than thirty million gallons ofwater per day for uranium mining and processing around the world.36' Even though the bulk of these mining and processing facilities are outside of the U.S., the DOE estimates that three to five million gallons ofwater per day are still associated with mining and processing of uranium within the country Nuclear reactors also require massive supplies of water to cool reactor cores and spent nuclear fuel rods, and they use the most water compared to all other electricity generating facilities, including conven- tional coal and natural gas facilities.366 Because much of the water used by nuclear plants is turned to steam, substantial amounts are lost to the local water cycle entirely. One nuclear plant in Georgia, for example, "withdraws an average of 57 million gallons every day from the Altamaha River... [but actually] 'consumes' 33 million gallons per day [from the local supply,] that is lost as water vapor"'3-enough to service more than 179,000 Georgia homes."' The Shearon Harris nuclear reactor, operated by Progress Energy in New Hill, North Carolina, near Raleigh, sucks up thirty-three million gallons a day, and loses seventeen million gallons per day due to evaporation." 9 Duke Energy's McGuire Plant on Lake Norman, North Carolina, uses more than two billion gallons of water per day."' Southern Company's Joseph M. Farley nuclear plant in Dothan, Alabama, consumes about forty-six million gallons of water per day, primarily as evaporative loss.371

#### Sovacool ‘08

William and Mary Environmental Law and Policy Review. “Nuclear Nonsense: Why Nuclear Power is No Answer to Climate Change and the World's Post Kyoto Energy Challenges.” https://scholarship.law.wm.edu/cgi/viewcontent.cgi?article=1040&context=wmelpr

Nuclear plants do not just use water-they also contaminate [water] it at multiple points of [in] the cooling cycle: at the point of intake, at the point of discharge, and during unexpected accidents. At the point of intake, nuclear plants bring water into the cooling cycle through filtering structures. To minimize the entry of debris, water is often drawn through screens.374 Seals, sea lions, endangered manatees, American crocodiles, sea turtles, fish, larvae, shellfish, and other riparian or marine organisms are frequently killed as they are trapped against the screens in a process known as impingement.375 Organisms small enough to pass through the screens can be swept up in the water flow where they are subject to mechanical, thermal and toxic stress in a process known as entrainment.376 Billions ofsmaller marine organisms, essential to the food web, are sucked into nuclear reactor systems and destroyed. Smaller fish, fish larvae, spawn, and a tremendous volume of other marine organisms are frequently pulverized by reactor condenser systems. One study esti- mated that more than 90% are scalded and discharged back into the water as lifeless sediment that clouds the water around the discharge area, blocking light from reaching the ocean or river floor, which further kills plant and animal life by curtailing photosynthesis and the production of 377 oxygen During periods oflow water levels, power plants induce even more environmental damage. Nuclear plants must extend intake pipes further into rivers and lakes, but as they approach the bottom of the water source, "they [often] suck up sediment, fish, and other debris... "371 Impingement and entrainment consequently account for substantial losses of fish and exact severe environmental consequences during the riparian environ- ment's most vulnerable times. For example, federal environmental studies of entrainment during the 1980s at five power plants on the Hudson River in New York estimated grave year-class reductions in fish populations-the percent offish killed within a given age class.379 One study concluded that the power plants were responsible for age reductions as high as 79%for some species.8 ° "An updated analysis [of entrainment] completed in 2000 at three of these plants estimated year-class reductions of 20 percent for striped bass, 25 percent for bay anchovy, and 43 percent for Atlantic tom cod. . ...,' Another study "evaluated entrainment and impingement impacts at nine . . . facilities along a 500 mile stretch of the Ohio River."3 2 The authors estimated that approximately 11.6 million fish were killed an- nually through impingement and 24.4 million fish from entrainment.3 The study calculated recreational related losses at about $8.1 million per year.3 4 The U.S. Environmental Protection Agency ("EPA") calculated impingement losses at the Delaware Estuary Watershed at more than 9.6 million age-one equivalents of fish every year, or a loss of 332,000 pounds offishery yield.385 The EPA calculated that entrainment related losses were even larger at 616 million fish, or a loss of sixteen million pounds ofcatch.38 Put into monetary value, the recreational fishing loss from impingement and entrainment at nuclear facilities was estimated to be about $5 million per year.38 ' Scientists also calculated that the cooling intake systems at the Crystal River Power Plant in Florida, ajoint nuclear and coal facility, kill about twenty-three tons offish and shellfish every year.88 Top predators, such as gulf flounder and stingray "have either disappeared or changed their feeding patterns.3 8 9 In other parts of Florida, the economic losses induced from four power plants-Big Bend, PL Bartow, FJ Gannon, and Hookers Point-are estimated to be as high as $18.1 million.3s Similarly, in Southern California, marine biologists and ecologists found "that the San Onofre nuclear plant impinged nearly 3.5 million fish in 2003 ....391 As a less noticed but equally important impact, water intake and discharge often alter natural patterns of water levels and flows. Such flows, part ofthe hydrological cycle, have a natural variability that differs daily, weekly, and seasonally.392 Plants and animals have adapted to these fluctuations, and such variability is a key component ofecosystem health.39 3 Withdrawals and discharges alter this natural cycle by removing water during drought conditions or discharging it at different times ofthe year with potentially serious, albeit not well-understood, consequences to eco- system and habitat health.3 94 Interestingly, in some cases the environment has fought back, literally. "In September 1984, a flotilla of jellyfish 'attacked' the St. Lucie nuclear plant in Florida, forcing both of its reactors to shut down for several days due to lack of cooling water. At the point of discharge, nuclear plant operators often treat cooling water with chlorine, anti-fouling, anti-microbial, and water condi- tioning agents "to limit the growth ofmineral and microbial deposits that reduce... [its] heat transfer efficiency,"396 while "re-circulating water is treated with chlorine and biocides" to improve efficiency and eliminate nuisance organisms.39 7 What makes such treated water so effective in kill- ing unwanted species, however, also makes it a potent "kill[er ofl non- target organisms as well."398 Chlorine, biocides, and "their byproducts... present in discharged water plumes... [which] [are often] toxic to aquatic life even at low concentrations."3 99 In addition, discharged cooling water is usually higher in temperature than intake waters, "making electric utilities the largest thermal discharger in the U.S."4 °° Significant temperature differ- ences between the intake water and its discharge, or temperature deltas, "can contribute to destruction of vegetation, increased algae growth

#### Wareham and Green ‘07

Green, Jim and Wareham, Sue. Oct 28 2007. “Nuclear power and water scarcity.” Science Alert. https://www.sciencealert.com/nuclear-power-and-water-scarcity

Less well known is the fact that nuclear power is the most water-hungry of all energy sources, with a single reactor consuming 35-65 million litres of water each day. Water scarcity is already a serious problem for Australia's power-generation industry, largely because of our heavy reliance on water-guzzling coal-fired plants. Current problems in Australia's power industry resulting from water shortages include: expensive long-distance water haulage to some power plants as local supplies dwindle; reduced electrical generating capacity and output at some coal and hydro plants; higher and more volatile electricity prices; increased risks of blackouts; and intensified competition for water between power plants, agriculture, industries, and environmental flows. Introducing nuclear power would exacerbate those problems. A December 2006 report by the Commonwealth Department of Parliamentary Services notes that the water requirements for a nuclear power station are 20-83 per cent higher than for other power stations. Moreover, those calculations do not include water consumption by uranium mines. The Roxby Downs mine in South Australia uses 35 million litres of water each day, with plans to increase this to 150 million litres each day. Mine operator BHP Billiton does not pay one cent for this water despite recording a record $17 billion profit in 2006-07. Australia can ill-afford to replace one thirsty industry, coal, with an even thirstier one, nuclear power.

#### Environment America ‘12

Environment America Research and Policy Fund. “Too Close to Home Nuclear Power and the Threat to Drinking Water.” https://environmentamericacenter.org/sites/environment/files/reports/Nukes%20and%20H20%20vUS.pdf

According to the new report, “[Too Close to Home: Nuclear Power and the Threat to Drinking Water](http://environmentamericacenter.org/sites/environment/files/reports/Nukes%20and%20H20%20vUS.pdf),” the drinking water for 49 million Americans is within 50 miles of an active nuclear power plant – the distance the Nuclear Regulatory Commission uses to measure risk to food and water supplies.  Major cities, including New York, Boston, Philadelphia, San Diego, Cleveland and Detroit receive their drinking water from sources within 50 miles of a nuclear plant. Radiation from a disaster like the one in Fukushima can contaminate drinking water and food supplies, as well as harm our health.  But disaster or no disaster, [and] a common leak at a nuclear power plant can also threatens the[eir] drinking water for millions of people, and as our nuclear facilities get older, leaks are more common.  In fact, 75 percent of U.S. nuclear plants have leaked tritium, a radioactive form of hydrogen that can cause cancer and genetic defects.

#### Lydersen ‘16

Kari Lydersen, 9 Sept 2016, Energy News Network, <https://energynews.us/2016/09/09/midwest/nuclear-plants-feel-the-heat-of-warming-water/>

Nuclear power proponents say the energy source is crucial to reducing the impact of climate change. But ironically, “We’ll have to solve global warming if we want to keep using nuclear power,” says [Union of Concerned Scientists](http://www.ucsusa.org/) nuclear safety expert [Dave Lochbaum](http://www.ucsusa.org/about/staff/staff/dave-lochbaum.html#.V9C05PkrJD8). That’s because nuclear power plants need large amounts of water for cooling, and overheating can present a major safety risk. As the lakes and rivers that typically supply cooling water become hotter thanks to climate change — and as droughts dry up some water bodies — nuclear power plants face problems, researchers say. They may need to temporarily shut down or scale back their generation on hot days, which is just when their power is needed most. This challenge is the focus of ongoing research spearheaded by Oak Ridge National Laboratory and also involves the national laboratories at Sandia, Los Alamos and Argonne. Researchers are modeling predictions about population, temperature, electricity demand, precipitation, land use and other factors to predict the water-related stress on power plants. “You need to have enough water to cool the power plants and have drinking water and water for agriculture and other industries,” said Melissa Allen, a leader of the team effort and a post-doctoral researcher at Oak Ridge’s [Climate Change Science Institute.](https://climatechangescience.ornl.gov/) “If you have a rise in temperature mid-century and with that rise in temperature the atmosphere is able to hold more water, it rains less and when it does rain it’s in a huge amount all at once, so much of it is being wasted,” Allen said. “During those droughts expected with climate change you can run into a situation where you may not have enough water. At the same time more water is evaporating from lakes and streams, people need more air conditioning to feel comfortable. So at the same time you have extra demand for that resource, you have less ability to meet it because of water shortage or water temperature.”

#### Stuckenberg ‘18

David Stuckenberg, 18 May 2018, National Security Journal, <https://harvardnsj.org/2018/05/water-scarcity-the-most-understated-global-security-risk/>

In 2012, the World Economic Forum elevated water scarcity to a Top 5 global economic risk.[[25]](https://harvardnsj.org/2018/05/water-scarcity-the-most-understated-global-security-risk/" \l "_edn25) According to World Bank Group (“WBG”), “[w]ater is a vital factor of production, so diminishing water supplies can translate into slower growth . . . . Some regions could see their growth rates decline by as much as 6 percent of GDP by 2050 as a result of water-related losses in agriculture, health, income, and property—sending them into sustained negative growth.”[[26]](https://harvardnsj.org/2018/05/water-scarcity-the-most-understated-global-security-risk/" \l "_edn26) Impacts from water scarcity slice through all economic dimensions. The shocks from water cannot be isolated to any one economic sector. This potential requires a new look at water, not as a peripheral contributor to a region’s economic health, but rather a primary enabler. One way of measuring the size of water’s economic importance is comparing it to the amount that nations spend on defense, a statistic that receives much more attention. The twelve nations with the largest defense budgets relative to their GDP spent between 1.0 and 10.4 percent of their nation’s GDP on defense in 2015, for an average of 3.23% of GDP.[[27]](https://harvardnsj.org/2018/05/water-scarcity-the-most-understated-global-security-risk/" \l "_edn27) In comparison, a WBG Climate Action Plan projects that by 2050 water scarcity in the Middle East and North Africa (“MENA”) could negatively impact that region’s GDP by up to four times this average.[[28]](https://harvardnsj.org/2018/05/water-scarcity-the-most-understated-global-security-risk/" \l "_edn28) Where economic segments are concerned, all supply chains and all sectors are increasingly being impacted negatively by water scarcity. In 2016, the Carbon Data Protocol, a survey of more than 1,200 of the world’s largest companies, noted:

## C2 Fire

### A Terror

#### Seattle Post ‘08

Seattle Post-Intelligencer, July 18, 2008, p. B6

Along with proliferation, there are terrorist threats to existing nuclear reactors, such as Entergy's controversial Indian Point nuclear plant just 24 miles north of New York City. Lovins calls these "about as fat a terrorist target as you can imagine. It is not necessary to fly a plane into a nuclear plant or storm a plant and take over a control room in order to cause that material to be largely released. You can often do it from outside the site boundary with things the terrorists would have readily available."

#### Spiegel ‘07

Spiegel Online, July 4, 2007, http://www.spiegel.de/international/business/0,1518,492404,00.html

And with the United Nations Intergovernmental Panel on Climate Change (IPCC) insisting that emissions be drastically reduced by 2050 to prevent the world from warming up by 2 degrees Celsius (3.6 degrees Fahrenheit) the nuclear industry is finding an increasingly warm reception. But now a leading British research group is arguing that any nuclear expansion would only be a drop in the ocean in terms of future energy needs. More importantly, it would dangerously increase the risk of proliferation and terrorist attacks. According to the Oxford Research Group, "Even a small expansion in the use of nuclear power for electricity generation would have serious consequences for the spread of nuclear weapons in countries that do not have them, and for nuclear terrorism."

#### Beyond Nuclear

Beyond Nuclear, no date, The Nuclear Power Danger (Beyond Nuclear was founded by Dr. Helen Caldicott, )http://www.beyondnuclear.org/nuclearpower.html

The opportunity for theft by terrorists of nuclear materials usable in even a "dirty bomb" would substantially increase if nuclear power is expanded. This could result in a level of destruction hitherto unenvisaged. Reactors are themselves terrorist targets and current ones are not even defended to the level of the 9/11 assault – 19 men in four teams, including air attack scenarios. Thirty-two U.S. reactors have fuel pools on the upper levels of the reactor building, shielded only by sheet metal and an open invitation to air attack.

#### Grunlond ’07

Lisbeth Grunlond, Union of Concerned Scientists, December 2007, Nuclear Power in a Warming World, http://www.ucsusa.org/assets/documents/global\_warming/Nuclear-Power-in-a-Warming-World.pdf

Indeed, if a team of well-trained terrorists forcibly entered a nuclear power plant, within a matter of minutes it could do enough damage to cause a meltdown of the core and a failure of the containment structure. Such an attack would have a devastating and long-lasting impact on public health, the environment, and the economy.

#### Grunlond ‘07

Lisbeth Grunlond, Union of Concerned Scientists, December 2007, Nuclear Power in a Warming World, http://www.ucsusa.org/assets/documents/global\_warming/Nuclear-Power-in-a-Warming-World.pdf

The NRC stages mock attacks to determine if plant owners can defend their reactors against DBT-level attacks. Test results reveal poor performance, and the integrity of the tests themselves is in question. The federal government is responsible for defending against attacks more severe than the DBT, but it has no mechanism for ensuring that it can provide such protection.

### B Cyber

#### Wolff ’18

https://www.nytimes.com/2018/10/02/opinion/trumps-reckless-cybersecurity-strategy.html.

The idea of using offensive cyberattacks for defensive purposes is not a new one — discussions about the potential risks and rewards of “hacking back,” especially in the private sector, go back more than five years. But for the American government to embrace this strategy is a sharp change from the cautious, defense-oriented approach of the past decade. President Barack Obama was notably restrained in his authorization of offensive cyber missions. When deciding whether to use the Stuxnet worm to compromise uranium enrichment facilities in Iran in 2010 (his administration’s most famous use of offensive cyber capabilities), he reportedly expressed repeated concerns about the precedent it would set for other countries. The Obama administration’s forbearance and careful decision-making around cyberattack authorization aligns with the 2015 Department of Defense cyber strategy, which identified controlling the escalation of cyber conflicts as a key strategic goal. That goal is conspicuously absent from the Department of Defense’s new strategy.The Trump administration’s shift to an offensive approach is designed to escalate cyber conflicts, and that escalation could be dangerous. Not only will it detract resources and attention from the more pressing issues of defense and risk management, but it will also encourage the government to act recklessly in directing cyberattacks at targets before they can be certain of who those targets are and what they are doing.

#### Firdosi ’19

Ahad Firdosi, Medium, 3 January 2019, <https://medium.com/datadriveninvestor/cybersecurity-2019-artificial-intelligence-and-iot-devices-in-sight-6108b6ba5c27>

According to the report, cyber terrorists will exploit Artificial Intelligence (AI) systems and use their techniques to improve attacks. Automated systems powered by AI could probe networks and systems to search for undiscovered vulnerabilities that could be exploited. In turn, the AI ​​could be used to make more sophisticated some phishing attacks and social engineering, from the creation of much more realistic videos and audios or well-designed emails to deceive specific people. This highly credible resource will also easily allow the spread of fake news.

#### Johnson ’18

Larry Johnson, 21 Dec 2018, <https://www.entrepreneur.com/article/325142>

In the next few years, artificial intelligence, machine learning and advanced software processes will enable cyber attacks to reach an unprecedented new scale, wreaking untold damage on companies, critical systems and individuals. As dramatic as Atlanta’s March 2018 [cyber “hijacking” by ransomware](https://www.cnn.com/2018/03/27/us/atlanta-ransomware-computers/index.html) was, this was nothing compared to what is coming down the pike once ransomware and other malware can essentially "think" on their own. This is not a theoretical risk, either. It is already happening. Recent incidents involving Dunkin Donuts' DD Perks program, CheapAir and even the [security firm CyberReason's honeypot](https://www.securityweek.com/honeypot-shows-power-automation-hands-hackers) test showed just a few of the ways automated attacks are emerging “in the wild” and affecting businesses. (A honeypot experiment, according to [Wikipedia](https://en.wikipedia.org/wiki/Honeypot_(computing)), is a security mechanism designedto detect, deflect, or, in some manner, counteract attempts at unauthorized use of information systems.) In November, three top antivirus companies also sounded similar alarms. [Malwarebytes](https://blog.malwarebytes.com/cybercrime/2018/11/malwarebytes-2019-security-predictions/), [Symantec](https://www.symantec.com/blogs/feature-stories/cyber-security-predictions-2019-and-beyond) and [McAfee](https://securingtomorrow.mcafee.com/other-blogs/mcafee-labs/mcafee-labs-2019-threats-predictions/#extortion) all predicted that AI-based cyber attacks would emerge in 2019, and become more and more of a significant threat in the next few years. What this means is that we are on the verge of a new age in cybersecurity, where hackers will be able unleash formidable new attacks using self-directed software tools and processes. These automated attacks on their own will be able to find and breach even well-protected companies, and in vastly shorter time frames than can human hackers. Automated attacks will also reproduce, multiply and spread in order to massively elevate the damage potential of any single breach.

**Dixon ’19**, Dixon, William. June 19 2019. “3 ways AI will change the nature of cyber attakcs.” World Economic Forum. <https://www.weforum.org/agenda/2019/06/ai-is-powering-a-new-generation-of-cyberattack-its-also-our-best-defence/>

Not only will AI-driven attacks be much more tailored and consequently more effective, their ability to understand context means they will be even harder to detect. Traditional security controls will be impotent against this new threat, as they can only spot predictable, pre-modelled activity. AI is constantly evolving and will become ever-more resistant to the categorization of threats that remains fundamental to the modus operandi of legacy security approaches. The cybersecurity community is already heavily investing in this new future and is using AI solutions to rapidly detect and contain any emerging cyberthreats that have the potential to disrupt or compromise key data. Defensive AI is not merely a technological advantage in fighting cyberattacks, but a vital ally on this new battlefield. Rather than rely on security personnel to respond to incidents manually, organizations will instead use AI to fight back against a developing problem in the short term, while human teams will oversee the AI’s decision-making and perform remedial work that improves overall resilience in the long term. AI-powered attacks will outpace human response teams and outwit current legacy-based defenses; therefore, the mutually dependent partnership of human and AI will be the bedrock of defense strategies in the future. The battleground of the future is digital, and AI is the undisputed weapon of choice. There is no silver bullet to the generational challenge of cybersecurity, but one thing is clear: only AI can play AI at its own game. The technology is available, and the time to prepare is now.

**Wilson Center ’19**, April 4 2019. “AI raises the risk of cyberattacks – and the best defense is more AI.” World Economic Forum. https://www.weforum.org/agenda/2019/04/how-ai-raises-the-threat-of-cyberattack-and-why-the-best-defence-is-more-ai-5eb78ba081/

Artificial intelligence promises to accelerate the speed and success rate of cyber attacks by sophisticated actors and eventually by those less-skilled (if off-the-shelf tools are developed and made available). It will also further blur traditionally understood lines between cyber offence and defence. Whichever side better deploys these automated technologies fastest will hold an advantage. AI will bring about attacks for which a majority of the public and many private sector companies will not be prepared. The good news is that the cybersecurity industry is using the same methods for defence. But these services require sustained investment and incentives for evolving cybersecurity defences that do not yet exist at scale. In protecting networks against adversaries, humans will continue to be important players in defending their own networks. But, it is imperative that autonomous systems play a central role in any such strategy. Effectively using artificial intelligence for defensive purposes will require a hybridization of various tactics and tools of both a proactive and responsive nature. Policymakers must encourage analysis of best practices for employing such tools and consider setting standards for their use.

#### Nuclear Security Index 18

3 Sept 2018, NTI Index, <https://ntiindex.org/news-items/cyber-threat-to-nuclear-facilities/>

The cyber threat has expanded exponentially in recent years. A series of damaging, high-profile attacks has made headlines around the world, and recent attacks against banking and commerce systems, private companies, and governments highlight the growing gap between the threat and the ability to respond to or manage it. Like all critical infrastructure, nuclear facilities are not immune to cyberattack. That reality is particularly worrisome, however, given the potentially catastrophic consequences of a cyberattack on a nuclear facility. Such an attack could facilitate the theft of nuclear materials or an act of sabotage. For example, facilities’ access control systems could be compromised, allowing the unauthorized entry of persons seeking to obtain nuclear materials or to damage the facility. Accounting systems could be manipulated so that the theft of materials goes unnoticed. Reactor cooling systems could be deliberately disabled, potentially resulting in a Fukushima-like disaster. The pace of cyberattacks, including those involving nuclear facilities, has accelerated in recent years. For example, in 2016, three publicly known cyberattacks or attempts on information systems at nuclear facilities occurred at[: the University of Toyama’s Hydrogen Isotope Research Center in Japan](https://www.infosecurity-magazine.com/news/nationstate-hackers-hit-japanese/); the [Gundremmingen Nuclear Power Plant in Germany](https://www.reuters.com/article/us-nuclearpower-cyber-germany/german-nuclear-plant-infected-with-computer-viruses-operator-says-idUSKCN0XN2OS); and [one incident that affected both the Nuclear Regulatory Commission and the Department of Energy](https://www.justice.gov/opa/pr/former-us-nuclear-regulatory-commission-employee-pleads-guilty-attempted-spear-phishing-cyber) in the United States. In 2017, the Wolf Creek Nuclear Station in Kansas had [its business systems compromised](https://www.nytimes.com/2017/07/06/technology/nuclear-plant-hack-report.html) in a series of attacks targeting the energy sector. Government authorities and facility operators are struggling to keep pace with this new threat, and national and international guidance is still evolving. As this edition of the [NTI Index highlights](https://ntiindex.org/data-results/cyber-defenses/), some countries are making progress while many others are not. Furthermore, countries with new nuclear programs face additional challenges. Not only do those countries need to establish appropriate regulatory systems, they also must attract or train cyber-nuclear experts, who are in short supply globally. Looking forward, cyber risks to critical infrastructure (including nuclear facilities) will continue to grow, and much more work is needed to address the threat. Nuclear facilities must be protected from dangerous attacks through a combination of technology and expertise, and governments must provide assistance by sharing threat information and surge capacity provided by skilled computer emergency response teams who specialize in responding to computer security incidents.

#### NPR ‘16

7 April 2016, <https://www.npr.org/2016/04/07/473379564/unable-to-compete-on-price-nuclear-power-on-the-decline-in-the-u-s>

Renewable energy and new technologies that are making low-carbon power more reliable are growing rapidly in the U.S. Renewables are so cheap in some parts of the country that they're undercutting the price of older sources of electricity such as nuclear power. The impact has been significant on the nuclear industry, and a growing number of unprofitable reactors are shutting down. When the first nuclear power plants went online 60 years ago, nuclear energy seemed like the next big thing.

#### National Interest ‘19

The official National Commission for Radiation Protection in Ukraine lists two million official “victims” of Chernobyl — and claims no fewer than 500,000, including 35,000 liquidators, have died. The commission calculates that the cancer rate for victims is three times the normal rate. Infant mortality for children of victims increased by a third.

# FRONTLINES

### F/L No Cyberattacks on Nuclear Ever Happened

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### F/L Coal/Natural Gas Emits Radioactive Material Too

1) The problem is not that nuclear plants uniquely produce radiation in comparison to other forms of energy. The problem is the amount of water used. Our **Wareham 07** evidence from case indicates that water requirement for a nuclear power station are 83% than for other power stations.

#### Wareham and Green ‘07

Green, Jim and Wareham, Sue. Oct 28 2007. “Nuclear power and water scarcity.” Science Alert. https://www.sciencealert.com/nuclear-power-and-water-scarcity

Less well known is the fact that nuclear power is the most water-hungry of all energy sources, with a single reactor consuming 35-65 million litres of water each day. Water scarcity is already a serious problem for Australia's power-generation industry, largely because of our heavy reliance on water-guzzling coal-fired plants. Current problems in Australia's power industry resulting from water shortages include: expensive long-distance water haulage to some power plants as local supplies dwindle; reduced electrical generating capacity and output at some coal and hydro plants; higher and more volatile electricity prices; increased risks of blackouts; and intensified competition for water between power plants, agriculture, industries, and environmental flows. Introducing nuclear power would exacerbate those problems. A December 2006 report by the Commonwealth Department of Parliamentary Services notes that the water requirements for a nuclear power station are 20-83 per cent higher than for other power stations. Moreover, those calculations do not include water consumption by uranium mines. The Roxby Downs mine in South Australia uses 35 million litres of water each day, with plans to increase this to 150 million litres each day. Mine operator BHP Billiton does not pay one cent for this water despite recording a record $17 billion profit in 2006-07. Australia can ill-afford to replace one thirsty industry, coal, with an even thirstier one, nuclear power.

### F/L Desalination

1) No one’s doing it in the US, it’s really expensive.

2) They can’t give you any company who’s doing it in the US.

3) Desalination releases toxic chemicals which goes back into the sea and other water supplies. Means on net it doesn’t help water.

Robbins ’19, Jim Robbins, 23 June 2019, Bulletin of the Atomic Scientists, <https://thebulletin.org/2019/06/desalination-expensive-environmentally-problematic-but-increasingly-necessary/>

There are ecological impacts as well. It takes two gallons of sea water to make a gallon of fresh water, which means the gallon left behind is briny. It is disposed of by returning it to the ocean and – if not done properly by diffusing it over large areas – can deplete the ocean of oxygen and have negative impacts on sea life. A [study](https://www.sciencedirect.com/science/article/pii/S0048969718349167) by the UN Institute for Water, Environment and Health published earlier this year contends that the problem of brine waste has been underestimated by 50 percent and that, when mixed with the chemicals meant to keep systems from fouling, the brine is toxic and causes serious pollution.

4) Nuclear gets rid of a lot more water than it saves for – 7.3 billion gallons of water every day.