## **Tech Aff --- Fusion, AI**

### **Contention 1 is Fusion**

#### **Nuclear fusion can unlock limitless, safe, clean energy. It’s possible and reaching commercial viability. Unlike current reactors which use fission, fusion reactors are inherently more powerful, safer, and waste free.**

**Davis ’22** [Nicola; December 12; the Guardian's science correspondent and presenter of the Science Weekly podcast. She has a MChem and DPhil in organic chemistry from the University of Oxford; The Guardian, “Breakthrough in nuclear fusion could mean ‘near-limitless energy’” https://www.theguardian.com/environment/2022/dec/12/breakthrough-in-nuclear-fusion-could-mean-near-limitless-energy]

**Researchers** have reportedly made a breakthrough in the quest to unlock a “near-**limitless**, **safe**, **clean**” source of energy: **they** have **got more** energy **out** of a nuclear fusion reaction than they **put in**.

Nuclear fusion involves smashing together light elements such as hydrogen to form heavier elements, releasing a huge burst of energy in the process. The approach, which gives rise to the heat and light of the sun and other stars, has been **hailed** as having **huge potential** as a **sustainable**, **low-carbon** energy source.

However, since nuclear fusion research began in the 1950s, researchers have been unable to a demonstrate a positive energy gain, a condition known as ignition.

That was, it seems, until now.

According to a report in the Financial Times, which has yet to be confirmed by the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory in California that is behind the work, researchers have managed to release 2.5 MJ of energy after using just 2.1 MJ to heat the fuel with lasers.

Dr Robbie Scott, of the Science and Technology Facilities Council’s (STFC) Central Laser Facility (CLF) Plasma Physics Group, who contributed to this research, described the results as a “momentous achievement”.

“Fusion has the potential to provide a near-limitless, safe, clean, source of carbon-free baseload energy,” he said. “This seminal result from the National Ignition Facility is the first laboratory demonstration of fusion ‘energy-gain’ – where more fusion energy is output than input by the laser beams. The scale of the breakthrough for laser fusion research cannot be overstated.

“The experiment **demonstrates unambiguously** that the **physics** of Laser Fusion **works**,” he added. “In order to transform NIF’s result into power production a lot of work remains, but this is a key step along the path.”

Prof Jeremy Chittenden, professor of plasma physics at Imperial College London, agreed. “If what has been reported is true and more energy has been released than was used to produce the plasma, that is a true breakthrough moment which is tremendously exciting,” he said.

“It proves that the long sought-after goal, the ‘**holy grail**’ of fusion, can indeed be **achieved**.”

#### **Investment in development jump starts fusion**

**Merrifield ’23** [Jeffrey S. and Sid Fowler; Former Comissioner of the Nuclear Regulatory Commission, JD in environmental law from Georgetown; Energy Attorney focused on advanced energy and energy transition technologies, former Attorney in the Nuclear Regulatory Commission's (NRC) Honor Law Graduate program; June 16; Journal of Fusion Energy, “Promoting Fusion Development Through Financial Policies: An Examination of How Clean Energy Investment Policies Can Better Incentivize Fusion Investment and Support Development and Deployment of Fusion Technology,” Vol. 42]

Over the past two decades, governments and private sector entities have established a diverse array of policies that have catalyzed massive investments in clean energy technologies. The way in which these policies work is as diverse as the policies themselves, but a common theme is that their effect is to create **financial incentives** that make certain **zero-carbon energy tech**nologies more **attractive** for companies, customers, and investors.Footnote1 These policies have shown **great success** and have encouraged the **significant build-out** of renewables while **helping lower** technology **costs**. Recent efforts by the U.S., Canada, and others to expand these incentives to other clean energy sources, including green hydrogen production and advanced nuclear reactors, is anticipated to **spur** even **greater** clean energy **investment**.

**Fusion** could potentially play a role in helping reach **global net zero** by 2050, and is expected by many to be a source of clean and renewable energy for humanity’s long-term future. The size of this role, though, and the **size of the market** for commercial fusion, have the potential to be **impacted** by **similar policies** to those described above. Energy infrastructure can last for decades, and nations may need to build or restructure their energy grids to accommodate certain energy choices,Footnote2 thus the energy choices made in the coming years could have meaningful long term consequences. All else being equal, **incentivized energy sources** may be better able to **attract capital** or **customers** and be **more widely adopted** than non-incentivized sources. Therefore, clean energy investment policies will likely (and in fact are often intended to) influence what portion of the long-term energy mix is made up of energy technologies favored by such policies and incentives.Given fusion’s potential as a clean, carbon free en

ergy source, it might be expected that **these policies** would similarly **incentivize investment** in **fusion**. However, clean energy investment policies, as **currently comprised**, are often **not structured** in a manner that provides similar **benefits to fusion**. Some of these policies may require further action to **add fusion** to the list of **specified eligible tech**nologies. Other policies may be technology neutral but have a limited time frame or require that the investment relate to a specific energy-producing facility, making these incentives ill-suited to fusion energy’s current stage of development. While an exhaustive review of clean energy investment policies is beyond the scope of this editorial, several recent prominent examples are described below.

Clean Energy Tax Credits

**Tax credits** are one **frequently deployed** method for **driving investment** in clean energy, and the **U.S**. has **long had** a variety of **tax credits** to **promote adoption** of renewable generation.Footnote3 Recently, these tax credits were expanded and extended by the U.S. Inflation Reduction Act (IRA).Footnote4 The IRA is a major U.S. law that provides approximately $369 billion for energy and climate change investments over a broad network of incentives, much in the form of monetizable tax credits.Footnote5 The U.S. Department of Energy has estimated that the IRA will boost clean energy investment and result in a reduction in U.S. economy-wide greenhouse emissions of 40% below 2005 levels by 2030.Footnote6

The IRA provides four clean energy tax credits of note here: a technology neutral production tax credit (PTC)Footnote7 and investment tax credit (ITC)Footnote8 for new clean energy generating facilities, and a technology specific ITCFootnote9 and PTCFootnote10 for advanced energy manufacturing.

Although fusion could potentially meet the eligibility requirements for the technology neutral clean electricity PTC and ITC, these **programs** are **scheduled to phase out** starting in **2032**. This means that only facilities which start construction during or prior to the **phase-out** date will be **eligible** for **credits**. While some fusion energy developers have suggested their desire to build and operate pilot fusion plants near this date,Footnote11 the **phase out** is likely to **occur too soon** to **meet** the **time horizon** of most commercial-scale fusion energy facilities. Further, both programs **require** that either production or investment relate to a **specific** generating **facility** which enters service, and so would not apply to investment in broader **R&D** or prototype machines.

The **IRA**’s advanced energy manufacturing **ITC** and **PTC** might be **more beneficial** to fusion developers, as such credits could apply to factories for building fusion facility components or to the components themselves. **However**, these credits are **tech**nology **specific** and do **not** currently include **fusion**. The U.S. **Sec**retary of **Treasury** may issue a **determination** allowing other technologies to **qualify** for the **ITC** but has not yet made such a **determination**.Footnote12

#### **Fusion’s politically popular--- the government has a plan to boost workforce even pre-deployment.**

**Zisk ’25** [Rachael; February; She is a science journalist covering the business and policy of space for Payload. She has covered health, tech, business, and a variety of sciences; “The Fusion Energy Caucus Takes the Stage”; Published 02/27/25;<https://ignition-news.com/the-fusion-energy-caucus-takes-the-stage/>; DOA 04/13/25] manan + STRONG + A10 + SH

In a country where it’s tough to find broad **bipartisan support for most anything, fusion energy has managed to buck the trend. At least, that’s how it sounded from the stage Wednesday afternoon at** the **F**usion **I**ndustry **A**ssociation meeting, where the US House Fusion Energy Caucus co-chairs and vice chairs reassured the industry that they’re all in on fusion.

Reps. Chuck Fleischmann (R-TN), Don Beyer (D-VA), Jay Obernolte (R-CA), and Lori Trahan (D-MA) lead the congressional Fusion Energy Caucus, which aims to solidify and maintain government support for the pursuit of fusion power in the US.

Let’s talk money: **The biggest issue the fusion industry wants the government to solve is, unsurprisingly, funding**. While fusion research is ongoing, the **private sector says it requires increased government commitment**—and that the reward is worth it. The panel agreed.

“Now that we have millions of dollars of private investment flowing into fusion energy, **we need to fight against the feeling in Congress that our work is done,” Obernolte said. “You and I both know that is not true. There’s a lot of basic research that still needs to be done,** and the federal government is going to have a key role to play in getting that done.”

The workforce question: **Congress is also looking to ensure that the fusion sector can develop a strong pipeline of workers** at every stage of manufacturing and the supply chain. That covers not only **physicists**, but also **machinists**, **electricians**, **welders**—you name it, the fusion industry needs it.

“**We** do have to think of how we **want to attract more people to this field**, and how we’re going to **get ready for**, you know, **hooking up to our grid, advanced manufacturing**, whatever it might be, so that you have a **workforce to really pour the accelerant on your innovation**,” Trahan said.

#### **Commercial fusion’s possible--- already, plants take just four years.**

**Keating ’23** [Dave; April; He is an American-European journalist in Brussels who moderates live events. He is ranked as the [number one EU politics social media influencer](https://znconsulting.com/articles/euinfluencer-2021-all-the-winners/) by ZN Consulting and the second most influential EU observer in [2022](https://znconsulting.com/articles/andrew-stroehlein-is-our-new-number-1-euinfluencer/); “Nuclear fusion ‘could be plugged into the grid in ten years’”; Published 04/24/23;<https://www.energymonitor.ai/sectors/power/nuclear-fusion-commercialisation/?cf-view>; DOA 04/12/25] vizier

This month, the US Nuclear Regulatory Commission (NRC) [announced a change in policy](https://www.nrc.gov/cdn/doc-collection-news/2023/23-029.pdf) that could shape the world’s energy future. From now on, nuclear fusion in the US will no longer be regulated the same as nuclear fission, the process behind all of today’s nuclear reactors. Instead, **fusion reactors will be regulated under the same regime as particle accelerators. The change “will give fusion** **dev**eloper**s** the regulatory **certainty they need to innovate while they grow fusion energy into a viable new energy source**”, said the US-based Fusion Industry Association in a statement. More investment in the US will likely mean more investment worldwide.

That regulatory change follows a [breakthrough experiment](https://www.llnl.gov/news/national-ignition-facility-achieves-fusion-ignition) in December 2022 that for the first time created a fusion reaction that produced more energy than the energy injected into it. The experiment at Lawrence Livermore National Laboratory’s National Ignition Facility (NIF) in California was conducted by the US Department of Energy and the National Nuclear Security Administration. US Energy Secretary Jennifer Granholm called it “a landmark achievement” that will “undoubtedly spark even more discovery”.

Such recent **breakthroughs are spurring more investment into fusion, and moving up timelines**. Massachusetts-based Commonwealth Fusion Systems now says it expects its [**SPARC**](https://cfs.energy/technology/sparc) **demonstration fusion machine, which started construction two years ago, to be operational in 2025**. “We will look to be demonstrating that net gain of more power out than in soon thereafter, and that puts us on a path of looking at putting a commercial fusion power plant into the grid in the early 2030s,” said Jennifer Ganten, chief movement builder at Commonwealth Fusion Systems, at a recent fusion event in Brussels hosted by the media network Euractiv.

#### **Fusion benefits from spin-offs come before the feasibility of nuke power. Specifically, fusion innovations lead to nuclear waste storage and cleanup**

**Clark 24** “Fusion power might be 30 years away but we will reap its benefits well before” Stuart Clark - astronomy journalist and author of several books about space,

Sun 11 Aug 2024, https://www.theguardian.com/science/article/2024/aug/11/nuclear-fusion-research-tae-power-solutions-cancer-propulsion //STRONG

Fusion is the energy-generating mechanism that makes the stars shine. The cliche is that human-engineered fusion on Earth is always “30 years away”. But if we can make it work, it promises such quantities of clean energy that we will finally be able to leave fossil fuels behind.

Large, state-sponsored efforts and, increasingly, private startups are reporting breakthroughs that many in the industry now think will lead to viable fusion energy. Underlining their optimism, in 2022 the UK government announced the site for the Spherical Tokamak for Energy Production (STEP) project, at West Burton in Nottinghamshire. This demonstration plant aims to supply electricity into the national grid by the 2040s. And **in developing such fusion power plants, we are creating new technologies and solutions that can reach far beyond the task of energy generation.**

For example, TAE Power Solutions is a spin-out from America’s TAE Technologies, which was founded in 1998 to develop commercial fusion power. Obliged to invent a way to collect and store 750 megawatts (the power needed to spark their experimental reactor into life) from a commercial electricity grid only capable of delivering 2 megawatts**, the firm is now adapting its breakthroughs to provide more efficient batteries for the next generation of electric vehicles.**

“**We don’t see these as side projects; we see these as happy byproducts that have very high intrinsic value on their own for problems and challenges beyond energy generation,” says Chua.**

In the UK, the Atomic Energy Authority (UKAEA) has established the Fusion Cluster at Culham in Oxfordshire to stimulate the growth of a fusion industry.

Since its establishment in 2021, the cluster has grown from a handful of companies to more than 200. While the key goal remains the development of the skills and technology necessary to build a UK commercial fusion power plant by the 2040s, commercialising the spin-offs is also a high priority.

“One of the roles the Fusion Cluster plays is telling people that not only is fusion coming, but **there is value from it even years before we’ve got the first fusion power plants**, because we’ve got these enabling technologies emerging,” says Valerie Jamieson, the centre’s development manager.

It’s a message that stimulates investment, as Greg Piefer, founder and CEO of Shine Technologies, realised in the early 2000s when he saw that developing commercial fusion power was going to be a long and costly path. It led him to think of how the technologies being developed could be deployed for profit along the way, so that investors could see a more immediate return on their money. “It’s hardcore essential to the mission of commercialising fusion,” he says.

**There are currently four key areas in which fusion spin-off technology is playing a key role.**

**Propulsion**

One of the seemingly impossible things that a fusion reactor must do is confine a gas at around 100m celsius – hot enough to melt any material. Fortunately, at that temperature the gas becomes electrically charged and so can be controlled by magnetic fields.

The strength of the field determines the size of the reactor, and therefore how cost-effective it is to build. So, creating highly efficient magnets has been a core goal of Tokamak Energy, part of the Fusion Cluster and headquartered at Milton Park, Oxfordshire. In 2023, they announced the creation of a new generation of high-temperature superconducting magnets that deliver stable magnetic fields 10 or even 20 times stronger than existing technologies. Not only do such magnets open a path to a viable fusion machine, but they “can transform [existing] markets and create new markets”, says Warrick Matthews, CEO at Tokamak.

One such area is the creation of magnetohydrodynamic (MHD) drives. Known to theoreticians since the 1950s, MHD drives use magnetic fields to create jets of an electrically charged fluid that propel a vehicle. The beauty is that they have no moving parts, so suffer no wear and tear.

Marine applications are particularly attractive because seawater conducts electricity far better than freshwater. Since the engines are silent, they promise a big cut in the damaging noise pollution affecting marine environments. In the 1990s, Mitsubishi built the world’s first prototype MHD ship, the Yamato 1, but the programme was abandoned when its top speed proved to be just 15 km/h (just over 8 knots).

By providing much higher magnetic fields, and therefore more thrust, Tokamak Energy’s magnets should be game-changing. The company is currently collaborating with the US Defense Advanced Research Projects Agency (Darpa) to prove the concept with a demonstration device.

**Medical applications**

There are several possible reactions that a fusion machine can use to generate energy. In 1998, TAE chose to pursue the fusion of boron atoms with protons, which opened their eyes to an old research programme into curing cancer. Atomic pioneers in the 1930s showed that boron possessed a strong affinity for reacting with neutron particles to split into lithium and helium. In 1936, Gordon Locher of the Franklin Institute in Pennsylvania pointed out the reaction’s potential for destroying cancerous cells. As the lithium and helium recoil, they deposit their energy over a range of about 5-9 micrometres, the size of a typical cancer cell. This sudden release of energy destroys the cell.

While the boron can be introduced into the patient with drugs, finding a suitable source of neutrons in the mid-20th century was a big problem. Historically, the patient had to be taken to a nuclear reactor and exposed to the neutrons from its core. Hardly ideal. Now, the problem is all but solved. A key innovation from TAE’s fusion programme has been the creation of compact particle accelerators that can be used to generate tightly focused neutron beams. In fusion they are used to fuel the reactors.

“We’re able to take those beams and reconfigure them for medical purposes,” says Rob Hill, CEO of TAE Life Sciences.

The company is currently in discussions with university hospitals Birmingham and University College hospital London to install experimental apparatus. Meanwhile, Shine Technologies is producing lutetium-177, a medically useful isotope, in its facilities at Janesville, Wisconsin, and Veendam in the Netherlands.

The lutetium is also used to target cancer, similarly delivered on a drug that binds to cancer cells. Unlike boron, it does not need neutrons to activate it. Instead, it is radioactive and decays with a half-life of around six-and-a-half days, emitting a high-energy electron that rips the cancer cell apart. It also emits a gamma ray, opening the possibility of a medical imaging device that can track the progress of the cancer and the effectiveness of the treatment.

Having such a short half-life, however, means the isotope does not exist in nature and so must be created using fusion technology.

Industrial imaging

One method of igniting fusion is to use lasers to compress and heat a pellet of hydrogen fuel. While researching the lasers needed to do this in the early 2000s at the Lawrence Livermore National Laboratory in California, physicist Markus Roth and colleagues discovered that if they changed the target to a thin foil of material, they could accelerate particles from the foil to huge velocities.

In 2021, Roth established [Focused Energy](https://www.focused-energy.world/) in Darmstadt, Germany to develop a laser system capable of accelerating a neutron beam with 100 times the intensity of existing technologies. Neutrons can be used like X-rays for imaging but are more penetrating, meaning they can see inside denser materials, and Roth is currently in discussions with civil engineering firms to deploy the system to inspect the steel inside concrete buildings and bridges for signs of corrosion. The same technique can also produce particles called muons, opening up even bigger imaging projects.

Muons are created naturally when particles from the sun strike atoms in the Earth’s upper atmosphere. They have tremendous penetrating power and were used after 2011’s [Fukushima](https://www.theguardian.com/environment/fukushima) nuclear accident to locate the molten reactor core. A similar set of detectors revealed a previously hidden chamber in 2017 in Egypt’s great pyramid of Giza. Geologists have used muons to investigate the movement of magma in volcanoes before eruptions.

The downside is that the amount of naturally occurring muons is relatively low. Hold your hand up to the sun and just one muon will pass through your palm every second. As a result, it took five months to image the Fukushima core.

Roth’s laser method could improve on the number of muons by a factor of 10,000, tremendously speeding up the imaging process, although the development of systems large enough to study volcanoes currently lies somewhere in the future.

Nuclear waste handling

At present, the biggest spin-out project for Focused Energy is a contract with the German government to build the first laser-driven neutron source for examining **nuclear waste** containers.

Having shut down its last remaining nuclear power plants in 2023, Germany must now deal with the waste, which has been piling up for decades. Focused Energy’s imaging system will determine the contents of the barrels, and what condition the waste is in, so that they can be safely and finally stored.

Across the Atlantic, Shine is planning to take this one step further. Instead of using neutrons to image the waste, if the neutron beam can be made more intense, it can transform the waste into less harmful substances. For example, traditional nuclear reactors split uranium-235 or plutonium-239 to produce energy. The waste product is iodine-129, with a half-life of more than 15m years. However, if it could be bombarded with a high-intensity neutron beam, it would be transformed into iodine-128, which has a half-life of just 25 minutes.

**“You can be rid of this 10 million-year problem in a day,” says Piefer.**

It turns out that the kind of neutrons necessary to do this will be made in abundance in many fusion power plants. So **the reactors of the future will not only solve the world’s energy problems, but can be harnessed to help clean up the dirty legacy of the first nuclear reactors.**

“I believe that fusion, ultimately, will be a gamechanger similar to the steam engine,” says Roth. “We will be able to do a lot of things in our society that were not possible before, and that starts with cleaning up a lot of the mess from the Industrial Revolution.”

#### **Extinction**

**Morris 16** [Margaret Morris; Apr 5, 2016; Nuclear Waste Pollution is an Existential Risk that Threatens Global Health; Institute for Ethics and Emerging Technologies; https://ieet.org/index.php/IEET2/more/morris20160405]

Deadly environmental pollution has become **an** **existential** **risk** that **threatens** the prospect for the **long-term survival** of our species and a great many others. Here we will focus on the nuclear waste aspect of the problem and ways to mitigate it before **there is a** **critical** **tipping point** **in our global ecosystem.** As philosopher Nick Bostrom said in his 2001 paper titled “Existential Risks,” published in the Journal of Evolution and Technology, “Our future, and whether we will have a future at all, may well be determined by how we deal with these challenges.”1 Unlike many radioactive materials that degrade fairly rapidly, some will remain intensely poisonous for incredibly long periods. Plutonium-240 (Pu-240) has a half-life of 6,560 years. The half-life is the time it takes for radioactive decay to decrease by half. But decay does not occur at an even pace, and radioactive isotopes are dangerous for much longer – typically 10 to 20 times the length of their half-life. Pu-238 has an 88-year half-life, and is used for space vehicles despite the frequency of rocket failures. Any exploding rocket including such cargo spreads pollution far and wide. Pu-239 has a half-life of over 24,000 years, and will remain radioactive for about a half a million years. But the situation is more complicated because as Pu-239 decays it transforms to uranium-235 (U- 235), which has a half life of 600 to 700 million years. Iodine-129 has a half-life of 16 million years. Pu-244 has a half-life of 80.8 million years. U-238 has a half- life of 4.5 billion years.2 Plutonium When taken into the body, isotopes of radioactive plutonium are not fully eliminated and tend to accumulate. They are deadly when sufficiently accumulated. Pu-239 was described by its co-discoverer, chemist Glenn Seaborg, as “fiendishly toxic.” In addition to terrible chemical toxicity, plutonium emits ionizing radiation. Pu-239 emits alpha, beta and gamma particles. Gamma radiation can penetrate the entire body and kill cells. Pu-239 has a robust resonance energy of 0.2 96 electron-volts that can badly damage DNA and produce birth defects that carry over generations.3 The body repairs tissues and DNA, but becomes overwhelmed when plutonium concentrates too heavily. According to a 1975 article in New Scientist Magazine, “But if it is inhaled, 10 micrograms of plutonium-239 is likely to cause fatal lung cancer.”4 Experts estimate that Pu-239 is so noxious that only one pound would be enough to kill everyone on our planet if it were so evenly dispersed in the air that everyone inhaled it.5 Although it occurs in nature in exploding stars, almost all plutonium on Earth is man-made – the product of manufacturing nuclear weapons and energy in nuclear power plants. Of the different forms of nuclear products, deadly Pu-239 is very abundant because it is used to make nuclear weapons and is a by-product of energy production in nuclear reactors. As part of the U.S. weapons program (between 1944 and 1988), 114 tons of Pu-239 was produced in nuclear reactors at the Hanford Works facility, in Washington state, and at the Savannah River Site in South Carolina.6 Large quantities of this Pu-239 remains at temporary storage facilities at these locations. Hanford stores about 50 million gallons of high-level radioactive nuclear and chemically hazardous wastes in underground storage tanks that were not designed for long-term storage. Roughly a third of these tanks have leaked, so that at least a million gallons of radioactive waste has reached the natural environment. Hanford is the most toxic site in the U.S., and among the most toxic places on Earth. Over 1,000 contaminated sites at Hanford have been identified. Groundwater aquifers are polluted for over 200 square miles beyond Hanford. No less than nine pounds of Pu-239 is used to make a working nuclear bomb. As of 2015, a total of 15,695 nuclear weapons are stockpiled by nine countries.7 Some of these weapons are 35 years old, but have a shelf-life of only 25 years.8 These aging weapons are undergoing corrosion. oxidation and other detrimental changes, and they must constantly be maintained and upgraded to prevent them from becoming an immanent threat to life on Earth. They are primary war targets. The situation emphasizes the need for absolute global peace. As of 2014, about 435 nuclear power plants have been built in 31 countries around the world.9 A great number of radioactive products, including Pu-239, are byproducts of U-235 fission occurring in the fuel rods of those plants with uranium reactors. In addition to being susceptible to natural disasters and accidents, these nuclear plants are all vulnerable to acts of war. They, too, emphasize the need for absolute global peace. Many nuclear power plants are operating beyond their established service lives, and storing their nuclear wastes remains highly problematic. No method for the long-term storage of high-level nuclear products was available when industries began producing them to make commercial energy and weapons. Storage remains very precarious, and there is no realistic way to safeguard those that are long-lived. There are 93 different long-lived radioactive elements that are toxic for a minimum of 17,000 years, and the time scale extends for many billions of years of total decay time for some.10 The U.S. alone stores tens of thousands of tons of spent fuel containing Pu-239 and other highly radioactive materials from the various reactor cores. The quantity continues to increase worldwide as long as the nuclear plants continue to operate. About 1% of spent nuclear fuel is plutonium, and nuclear power provides about 10 percent of the world’s electricity. A uranium reactor will contain about **a ton of plutonium**. These figures provide a rough idea of the enormity of continual global radioactive waste accumulation. Aside from accidents like the Chernobyl disaster (which contaminated 40% of Europe), **dangers include** **the potential for** **spontaneous fuel combustion and** **nuclear** **meltdown at pools containing spent fuel**. The following quote from a National Research Council Panel report provides a rough idea of the growing tonnage build-up of plutonium from commercial nuclear reactors: “New production of commercial reactor plutonium during the first half of the 1990s was about 70 MT [metric tons] per year.”11

#### **Independently, Energy crash causes extinction --- fusion solves!**

**Freeman 10** (Marsh, Lecturer on Nuclear Physics – New York University, “The True History of The U.S. Fusion Program —And Who Tried To Kill It”, 21st Century Science & Technology, Winter 2009/2010, p. 15-17)

There is no disputing that the world is facing an **energy crisis** of **vast proportions**. But this could have been avoided. For more than five decades, scientists, engineers, energy planners, policy-makers, and, at times, even the public at large, have known what the **ultimate alternative** is to our finite energy resources—nuclear fusion. This energy, which powers the Sun and all of the stars, and can use a **virtually unlimited** supply of isotopes of hydrogen, available from seawater, has been visible on the horizon for years, but seemingly never close at hand. Why?

Legend has it that there are more problems in attaining controlled nuclear fusion than scientists anticipated, and that little progress has been made. “Fusion is still 50 years away, and always has been” has become the common refrain of skeptics. But the reason that we do not have commercially available fusion energy is not what is commonly believed.

In 1976, the Energy Research and Development Administration, or ERDA—the predecessor to the Department of Energy—published a chart showing various policy and funding options for the magnetic fusion energy research program. Each option, called a “Logic,” described how the level of funding for the research would determine when practical fusion power would become available. The most aggressive profile, Logic V, proposed that a budget of approximately $600 million per year would put the fusion program on a path to operate a demonstration reactor by 1990.

At the other end of the scale, Logic 1, set at a level of about $150 million per year, was the option colloquially described as “fusion never,” because the funding never reached the level where the remaining challenges in fusion could be overcome. The U.S. fusion program has been at that fusion- never equivalent level, or below, for the past 30 years. It is a specious argument to claim that there has not been the money available to aggressively pursue fusion research, when one considers the multi-trillion-dollar cost to the U.S. economy of importing oil. In the 1970s, comprehensive studies had already been done, outlining the application of high-density fusion power, not only to produce electricity, but also to create synthetic fuels, such as hydrogen; to create fresh water from the sea, through desalination; to economically create new mineral resources with the fusion torch; to propel spacecraft to Mars and beyond; and myriad other applications. The lack of progress in the U.S. fusion program is **entirely** a result of a lack of political will, a lack of vision, and the promotion of false and destructive economic and energy policies, which have now left us behind the rest of the world in developing practical fusion energy.

One might think that if the **U**nited **S**tates doesn’t push ahead for fusion development, other nations will, leaving the **U**nited **S**tates in the lurch. In reality, the situation is **far worse**. At the **present rate** of **world physical economic collapse**, the ability to sustain the Earth’s 6.7 billion population is **already nearly lost**. A crash program to develop the required physical infrastructure in agriculture, mining, water resource development, housing, health care, and, most of all, power production, must start now. Nuclear power now and fusion power **within a generation** is an **absolute requirement**. Without it, **human civilization** goes the other way—into a **Dark Age**, and the descent has already begun. We must reverse it now.

### **Contention 2 is AI**

#### **Computing power is central to US’s victory in the AI Race.**

**Kahl ’25** [Colin H; He is co-director of the Center for International Security and Cooperation, the inaugural Steven C. Házy Senior Fellow at the Freeman Spogli Institute for International Studies, and a Professor in the Department of Political Science at Stanford University, and was also a Strategic Consultant to the Penn Biden Center for Diplomacy and Global Engagement; “**America Is Winning the Race for Global AI Primacy—for Now**”; https://www.foreignaffairs.com/united-states/america-winning-race-global-ai-primacy-now; Published 1/17/25; Accessed 2/21/25] mnn

The **Trump administration is well positioned to take advantage of the AI policies put in place by the Biden administration to ensure that the United States and its democratic allies win the global AI competition. But doing so will require more than just doubling down on** the United States’ technological edge. It will also necessitate partnering with the private sector to up the country’s AI offering, both at the frontier and in “good enough” AI, to **outcompete China** around the world. The Trump administration can either choose to lead in shaping the rapidly emerging AI future—or watch as this brave new world is built by Beijing.

TIPPING THE SCALES

**Leading AI labs such as Anthropic, Google DeepMind, and OpenAI partner with U.S. hyperscalers Amazon Web Services (AWS), Google Cloud, and Microsoft Azure to provide the computational resources (or “compute”) needed to train and run frontier AI** models, while Meta and xAI combine proprietary data centers with external cloud services. These data centers rely heavily on advanced semiconductors, particularly graphics processing units, known as GPUs. U.S. companies Nvidia and AMD originally designed and developed GPUs to render video game graphics, but AI labs found that they excel in performing the massive number of simultaneous calculations needed to train deep learning models. Amazon and Google have designed their own specialized chips in an effort to make AI workloads even more efficient.

**Progress in frontier AI has relied heavily on scaling compute and data. U.S. companies are banking on this trend continuing. Last year, Elon Musk’s xAI constructed its Colossus data center**, with 100,000 Nvidia H100 GPUs to train the company’s Grok models, in Memphis, Tennessee, and has raised $5 billion to increase the center’s cluster of GPUs tenfold. Other leading U.S. AI labs and hyperscalers are planning similarly massive data centers.

Emerging frontier models have challenged the maxim, common among AI technologists, that inference—using trained models to respond to queries, make predictions, and generate outputs based on new, unseen data—is less compute-intensive than training. **Frontier AI models have come to rely on “test-time” compute, in which a model dedicates more resources during inference to engage in chain-of-thought “reasoning” and improve performance on complex tasks. The proliferation of models with larger context windows (the amount of text a model holds in its memory) and a rapidly growing user base are further driving escalating demands for compute.**

Because compute is central to frontier AI, Washington has focused on restricting China’s access to advanced AI chips and chipmaking equipment. The Trump administration devised this “denial” strategy in 2018 and 2019, when the United States successfully pressured the Netherlands to block China’s acquisition of extreme ultraviolet lithography equipment, exceedingly complex machines critical in the creation of advanced semiconductors, made by the Dutch company ASML. Starting in October 2022, the Department of Commerce’s Bureau of Industry and Security (BIS) intensified these controls, initially restricting the sale of top GPUs, such as Nvidia’s A100 and H100 chips, along with other AI accelerators, to China. To extend the territorial reach of U.S. controls, the Biden administration also imposed a foreign direct product rule covering foreign-made items derived from U.S. semiconductor technology. A year later, the administration expanded the measures to cover advanced GPUs that had been only slightly modified to satisfy previous restrictions and, in December 2024, it added high-bandwidth memory chips, older immersion deep ultraviolet (DUV) lithography machines, and other critical chipmaking software and tools. Implementing these controls has required significant and sometimes contentious negotiations with U.S. allies, especially the Netherlands; Japan, home to equipment makers Tokyo Electron and Nikon; South Korea, home to semiconductor producers Samsung and SK Hynix; and Taiwan, home to the world-leading chipmaker Taiwan Semiconductor Manufacturing Company (TSMC).

Progress in frontier AI has relied heavily on scaling compute and data.

These restrictions have undeniably slowed China’s access to advanced chips and hindered its ability to produce substitutes. SMIC, China’s most prominent chipmaker, has used existing DUV machines to manufacture some advanced chip nodes for smartphones. It also reportedly produced Huawei’s Ascend 910 AI chips, which Huawei asserts match the performance of Nvidia’s widely used A100s. But domestically manufacturing such chips with older DUV machines is expensive, reduces yield, and undermines reliability. Moreover, Huawei’s supposedly SMIC-produced Ascend 910B chip sets actually contained chips produced by TSMC, which TSMC had unknowingly sold to a Huawei front, casting doubt on SMIC’s true capabilities. In November, BIS directed TSMC to end all sales of its most advanced AI chips to China and has since blacklisted Sophgo, the Huawei cutout.

Meanwhile, U.S. chip designers are pulling further ahead. Nvidia’s leading, TSMC-manufactured H100s and H200s and new Blackwell chips are substantially faster than China’s best. Experts generally assess China to be at least five years behind leading-edge chip producers, with export controls slowing Beijing’s catch-up effort.

**Nevertheless, the computing power gap has not stopped Chinese tech giants such as Alibaba and Tencent, and startups such as 01.AI, DeepSeek, Moonshot AI, and Zhipu AI, from releasing high-performing generative AI** models. Chinese firms have capitalized on data centers equipped with Nvidia chips before the United States’ imposition of export controls, used downgraded chips not covered by U.S. controls, and optimized software to maximize less capable hardware. Crucially, many successful Chinese AI models rely on open-source models already released by U.S. labs or use outputs from U.S. models for training.

Despite these achievements, **U.S. AI labs likely remain one or two years ahead at the frontier, especially since many not-yet-released models are closed-source and therefore harder for Chinese companies to emulate. And as long as scaling state-of-the-art computing power remains** vital for frontier AI progress, U.S. companies will expand their lead. As DeepSeek’s CEO Liang Wenfeng has acknowledged, China’s difficulties competing with U.S. AI firms boil down to Washington’s “bans on shipments of advanced chips.”

#### **Investing in the AI-Nuclear nexus is the only way to stay ahead of China.**

**Broughel ’24** [Anna; Anna is a Technology and Innovation focus area co-lead at SAIS Johns Hopkins University. Her career spans academia, government, and industry, including roles at the University of Maryland College Park, the U.S. Department of Energy, St.Gallen University, and Tetra Tech. She is an executive council member at the U.S. Association for Energy Economics; Published 12/29/24; “U.S. Nuclear Power And AI Leadership: The Data Center Connection”; Accessed 2/22/25; https://www.forbes.com/sites/annabroughel/2024/12/29/us-nuclear-power-and-ai-leadership-the-data-center-connection/] mnn

The **U.S. is lagging behind in the industrial race, losing ground to China** in batteries, EVs, solar, wind, and critical minerals processing. Yet in **a**rtificial **i**ntelligence—perhaps the most transformative technology of our time—**America still ranks number one globally. Maintaining this lead, however, hinges on a critical factor: powering the massive data centers that drive AI development**.

While Europeans have pretty much admitted defeat with respect to innovations, as evidenced by the Draghi report and manifested in a recent industry exodus from the E.U. powerhouse, Germany, there's still a lot of fight left on the other side of the Atlantic. **The alliance between tech entrepreneurs and the energy industry could secure both economic prosperity and environmental sustainability—if executed strategically.**

Maintaining the **U.S. leadership position in AI requires clean firm power. This is where nuclear energy comes to play**. In fact, 2024 marks a monumental shift for nuclear —the start of a long-awaited renaissance. Three developments stand out: the commitment of 14 major banks to finance nuclear projects, the tech sector's initiative to reopen retired nuclear power plants, and the signing of the ADVANCE Act, which modified the Nuclear Regulatory Commission's mission.

This renaissance comes at a critical time, as our electric grid faces unprecedented transformation with a sustained 3% growth through 2035. Beyond load growth, we are also decarbonizing and retiring old generating capacity. While data centers will drive the most dramatic expansion—growing from single digits to 22% of consumption—other sectors will also see significant increases, with transportation accounting for 46% of electricity use, buildings 16%, and industry 15%. Meeting this surging demand—particularly from energy-intensive data centers—requires power sources that can **deliver both scale and reliability.**

**Nuclear power plants and new supercomputers are a perfect match. Operating Nvidia's AI chips may demand as much as 1 GW of power – exactly what a typical AP1000 nuclear reactor provides. While data centers could theoretically run on solar and wind, intermittency poses a fundamental challenge**. Ensuring sufficient renewable electricity would require overbuilding grid infrastructure by at least a factor of 4, perhaps higher, paired with utility-scale battery storage. During electricity shortfalls, residential customers – not data centers – would face potential blackouts. With 80% of global internet traffic flowing through servers in Northern Virginia, even brief disruptions would create billions in economic damage.

The **obvious alternative—natural gas power plants—faces its own insurmountable barrier**. Many tech companies have committed to sustainability goals, promising to match their loads both temporally and geographically – meaning they must use clean power at the exact time it is consumed and from the same region as their data centers. Running datacenters on natural gas long-term is not feasible due to the tech sectors' climate commitments, since carbon capture and storage remains too costly.

**Nuclear power emerges as the only scalable solution to meet these demands. Currently, the United States leads in installed nuclear capacity with 94 working reactors and nearly 100 GW of capacity. This needs to triple by 2050 to meet growing demand – hence the Department of Energy's plan for 200 GW of new nuclear capacity. However, China is positioned to take the lead soon, as the U.S. has largely stopped building new plants**. After 1996, only three new reactors were commissioned: Watts Bar 2 in TN (2015), Units 3 and 4 in Plant Vogtle in GA (2023-2024).

How can the U.S. deliver on its plans to build multiple nuclear plants per year until 2050? The nuclear industry has a saying: France has two kinds of nuclear reactors and a hundred kinds of cheese, while the U.S. has two kinds of cheese but about a hundred kinds of reactors. Building a string of first-of-a-kind nuclear reactors has eroded industrial expertise and inflated costs. While Georgia's Vogtle plant unit 3 faced initial delays and cost overruns, the next reactor proved significantly more economical – demonstrating clear learning-by-doing benefits. But focusing just on construction costs misses the bigger picture. Recent research suggests that current **LCOE calculations may be biasing policy decisions against nuclear power, as they do not account for systems costs**, capacity factors, and reliability benefits. The real economic story becomes clear when examining fully depreciated nuclear plants, which can produce electricity at remarkably competitive rates around $31 per MWh.

#### **Specifically, nuclear is the only solution for growing power demand from data centers.**

**Skidmore ’24** [Zachary; He is a senior Reporter - Energy and Sustainability, DatacenterDynamics; “DOE: Nuclear energy needs to triple by 2050, AI and data centers drive demand”; Published 10/7/24; Accessed 2/22/25; https://www.datacenterdynamics.com/en/news/doe-report-highlights-need-to-triple-nuclear-capacity-by-2050-due-to-ai-and-data-center-load-growth/] mnn

The US needs three times its current nuclear energy capacity to meet AI's growing power needs, a new report has warned.

The US Department of Energy (DOE) has published an updated version of its Pathways to Commercial Liftoff Advanced Nuclear report, warning that AI and data center load growth will require tripling nuclear capacity by 2050; from 100GW to 300GW.

The report highlights a significant **rise in electricity demand over the past year, following decades of stagnation. This surge, primarily driven by AI and data centers, has intensified interest in nuclear energy** due to its ability to provide 24/7 carbon-free power within a compact footprint.

The report highlights the increasing value of clean firm resources by companies with clean energy targets and high-reliability requirements.

For example, **Google’s projections for meeting decarbonization targets for its global data centers found that clean firm technologies (including advanced nuclear) would reduce costs by 40 percent** compared to only wind and solar with lithium-ion storage.

Additionally, the report argues that rather than replacing renewables, nuclear energy can act as a complementary technology with more variable renewable assets, especially in sectors such as the data center sector, where much of the demand is disproportionate for 24/7 electricity. This is made more apparent by the fact that when nuclear capacity has been retired, it has not been fully replaced with wind and solar, it has largely been replaced with natural gas.

**The report emphasizes that securing 5-10 deployments of a single reactor design of at least 1,000MW is crucial for commercial success**. Building multiple reactors of the same design is expected to lower construction costs through repetition and learning. The DOE suggests that value and cost control improve when large reactors are built in "fleet mode."

The **major barrier to nuclear development is cost overrun, and the report highlights several measures to overcome this issue. These include sharing costs across multiple units under construction, public/private partnerships on funding**, and ensuring on-budget delivery through improved cost estimating and implementing best project management practices.

Small Modular Reactors (SMRs) are seen as key players in filling the load gap for certain applications. The report contends that SMRs could be the right fit for certain applications, such as replacing retiring coal plants or smaller-scale data centers. However, to justify investment in manufacturing facilities, microreactor designers may require a committed order book of 30-50 reactors.

The DOE recently said there are 190 coal and ex-nuclear sites that could be powered up for new nuclear capacity, potentially offering up to 269GW.

**Data center operators have increasingly begun to target nuclear power as a means to acquire clean consistent power for their operations.**

#### **China AI lead causes a laundry list of existential risks.**

**Kroenig ’21** [Matthew; Winter; professor of government and foreign service at Georgetown University and the director of the Scowcroft Strategy Initiative at the Atlantic Council; Strategic Studies Quarterly, “Will Emerging Technology Cause Nuclear War?: Bringing Geopolitics Back In,” Vol. 15, Issue 4] recut manan

How will states use such a newfound advantage? Technology rarely fundamentally changes the nature or objectives of states. More often, states use technology to advance **preexisting geopolitical aims**. Moreover, enhanced power can result in greater ambition. Given the geopolitical landscape described, it is likely the United States and its Allies and partners at the core [end page 66] of the international system will behave differently with new military technologies than will revisionist powers, such as Russia and China.

The spread of new technology to the United States and its Allies and partners would likely serve, on balance, to **reinforce the existing sources of stability** in the prevailing international system. At the end of the Cold War, the United States and its Allies and partners achieved a technological- military advantage over its great power rivals, with the US using its unipolar position to deepen and expand a rules-based system. They also employed their military dominance to counter perceived threats from rogue states and terrorist networks. The United States, its Allies, and partners did not, however, engage in military aggression against great power, nuclear-armed rivals or their allies.

In the future, these status quo powers are apt to use military advantages to reinforce their position in the international system and to deter attacks against Allies and partners in Europe and the Indo-Pacific. These states might also employ military power to deal with threats posed by **terrorist networks** or by regional revisionist powers such as **Iran** and **North Korea**. But it is extremely difficult to imagine scenarios in which Washington or its Allies or partners would use newfound military advantages provided by emerging technology to conduct an armed attack against Russia or China.

Similarly, **Moscow** and **Beijing** would likely use any newfound military strength to advance their preexisting **geopolitical aims**. Given their very different positions in the international system, however, these states are likely to employ new military technologies in ways that are **destabilizing**. These states have made clear their dissatisfaction with the existing international system and their desire to revise it. Both countries have ongoing border disputes with multiple neighboring countries.

If Moscow **developed** new military technologies and operational concepts that shifted the **balance of power** in its favor, it would likely use this advantage to pursue **revisionist aims**. If Moscow acquired a **newfound ability** to more **easily invade** and **occupy territory** in Eastern Europe, for example (or if Putin believed Russia had such a capability), it is more likely Russia would be tempted to engage in **aggression**.

Likewise, if China acquired an **enhanced ability** through new technology to **invade** and **occupy Taiwan** or contested islands in the **E**ast or **S**outh **C**hina **S**eas, Beijing’s leaders might also find this opportunity **tempting**. If new technology enhances either power’s anti-access, area-denial network, then its leaders may be more confident in their ability to achieve a **fait accompli** attack against a **neighbor** and then **block** a **US-led liberation**.

These are **precisely** the types of **shifts in the balance of power that can lead to war**. As mentioned previously, the predominant **scholarly theory** on the causes of war—**the bargaining model**—maintains that imperfect information on the **balance of power** and the **balance of resolve** and credible commitment problems result in **international conflict**.52 New technology can exacerbate these causal mechanisms by increasing **uncertainty** about, or causing rapid **shifts** in, the balance of power. Indeed as noted above, new military technology and the **development** of new **operational concepts** have shifted the balance of power and resulted in **military conflict** throughout history.

Some may argue emerging military technology is more likely to result in a new tech arms race than in conflict. This is possible. But Moscow and Beijing may come to believe (**correctly or not**) that new technology provides them a **usable** military **advantage** over the **U**nited **S**tates and its **Allies** and partners. In so doing, they may underestimate Washington.

If **Moscow** or **Beijing** attacked a vulnerable **US Ally** or **partner** in their near abroad, therefore, there would be a risk of major war with the potential for **nuclear escalation**. The United States has formal treaty commitments with several frontline states as well as an ambiguous defense obligation to Taiwan. If Russia or China were to attack these states, it is likely, or at least possible, that the United States would come to the defense of the victims. While many question the wisdom or credibility of America’s global commitments, it would be difficult for the United States to **simply back down**. Abandoning a treaty ally could cause fears that America’s global commitments would unravel. Any US president, therefore, would feel great pressure to come to an Ally’s defense and expel Russian or Chinese forces.

Once the United States and **Russia** or **China** are at war, there would be a risk of **nuclear escalation**. As noted previously, experts assess the greatest risk of nuclear war today does not come from a bolt-out-of-the-blue strike but from nuclear escalation in a **regional**, **conventional** conflict.53 Russian leaders may believe it is in their interest to use nuclear weapons early in a conflict with the United States and NATO.54 Russia possesses a large and diverse arsenal, including thousands of nonstrategic nuclear weapons, to support this nuclear strategy.

In the 2018 Nuclear Posture Review, Washington indicates it could retaliate against any Russian nuclear “de-escalation” strikes with limited nuclear strikes of its own using low-yield nuclear weapons.55 The purpose of US strategy is to deter Russian strikes. If **deterrence fails**, however, there is a clear pathway to nuclear war between the United States and Russia. As Henry Kissinger pointed out decades ago, there is **no guarantee** that, once begun, a **limited** nuclear war **stays limited**.56

There are similar risks of nuclear escalation in the event of a **US-China conflict**. China has traditionally possessed a relaxed nuclear posture with a small “lean and effective” deterrent and a formal “no first use” policy. But China is relying more on its **strategic forces**. It is projected to double—if not triple or **quadruple**—the size of its **nuclear arsenal** in the coming decade.57

Chinese experts have acknowledged there is a narrow range of contingencies in which China might use nuclear weapons first.58 As in the case of Russia, the US Nuclear Posture Review recognizes the possibility of limited Chinese nuclear attacks and also holds out the potential of a limited US reprisal with low-yield nuclear weapons as a deterrent.59 If the nuclear threshold is breached in a conflict between the United States and China, **the risk of nuclear exchange is real**.

In short, if a coming revolution in military affairs provides a real or perceived battlefield advantage for Russia or China, such a development raises the likelihood of **armed aggression against US regional allies**, **major power war**, and **an increased risk of nuclear escalation**.

Implications

Future scholarship should incorporate geopolitical conditions and the related foreign policy goals of the states in question when theorizing the effects of technology on international politics. Often scholars attempt to conceptualize the effects of weapons systems in isolation from the political context in which they are embedded.

Studies treat technology as disembodied from geopolitics and as exerting independent effects on the international system. But technology does not float freely. Technology is a tool different actors can use in different ways. Bakers and arsonists employ fire in their crafts to strikingly different ends. In the current international environment, Russia and China would tend to employ technology toward advancing revisionist aims. Technological advances in these countries are therefore much more likely to **disrupt the prevailing international order** and **nuclear strategic stability**.

This approach also suggests the potential threat new technology poses to nuclear strategic stability is **more pervasive** than previously understood. To undermine strategic stability, new technology need **not** directly impact strategic capabilities. Rather, **any** technology that promises to shift the local balance of power in Eastern Europe or the Indo-Pacific has the potential to **threaten nuclear strategic stability**.

This understanding of this issue leads to different policy prescriptions. If the technology itself is the problem, then it must be controlled and should not be allowed to spread to any states. In contrast, the framework outlined here suggests a different recommendation: preserve the prevailing balance of power in Europe and Asia. Technological change that, on balance, **reinforces** the prevailing international system should **strengthen** stability.

Leading democracies, therefore, should **increase investments in emerging tech**nology **to maintain a tech**nological **edge** over their adversaries. Export control and nonproliferation measures should be designed to deny emerging military technology to Russia and China. Arms control should be negotiated with the primary objective of sustaining the current international distribution of power. Making progress in these areas will be difficult. But the consequences of failure could be **shifts in the international balance of power**, **conflict among great powers**, and **an increased risk of nuclear war**.

#### **China cares zero about AI risks – if they take the lead on development, it magnifies every single reason AI could be dangerous and they’ll smother any risky developments or accidents which means no checks**

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UNBRIDLED AMBITION

Not only are experimental technologies seen as largely risk-free in China, but the country has also committed itself to a feverish sprint to become “the world’s premier artificial intelligence innovation center” by 2030.

China’s efforts to overtake the United States in AI have been a priority for the Communist Party since at least 2015, when Xi announced his “Made in China 2025” strategy. This emphasis on AI has since been reiterated in various national documents and speeches. AI has become a linchpin of China’s **military modernization** strategy and is increasingly **integral to** the country’s system of state **surveillance,** **repression**, and **control.** With so much at stake, it is no surprise that China’s government has been investing tens of billions of dollars annually into its AI sector and leveraging its vast espionage network to try to steal foreign corporate technology secrets.