



GENERAL PROBLEMS OF THE MODERN RESEARCH AND INNOVATION POLICY

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BUILDING THE FULL AI STACK AS THE CORE OF CONTEMPORARY U.S. SCIENCE, TECHNOLOGY, AND INNOVATION POLICY

Introduction. Donald Trump’s second presidential term in 2025 has brought about a radical transformation of U.S. science, technology, and innovation (STI) policy. The administration has abandoned the green-energy priorities of its predecessor and has repositioned artificial intelligence (AI) as the central system-forming technology of national development.

Problem Statement. The new strategy is centered on the AI “full stack,” understood as a fully American technological chain encompassing semiconductors, data centers, computing infrastructure, and software platforms. This strategy is being pursued amid intensifying technological competition between the United States and China, as well as growing concerns regarding the emergence of an investment bubble in the AI sector.

Purpose. The purpose of this study is to analyze the transformation of U.S. STI policy during 2024–2025, with particular emphasis on the formation of the AI “full stack,” and to assess the economic and institutional consequences of these changes in the context of global technological competition.

Materials and Methods. The study is based on an analytical review of official documents of the U.S. federal government, reports issued by leading research centers, including Stanford Human-Centered Artificial Intelligence, RAND Corporation, and Atlantic Council, as well as statistical data and specialized scholarly and analytical publications.

Results. Contemporary U.S. STI policy is concentrated around five principal directions: deregulation of AI technologies; semiconductor reindustrialization through protectionist tariff policies; large-scale construction of data centers (including the Stargate initiative valued at USD 500 billion); expansion of energy-generation capacity, ranging from nuclear energy to coal-based power generation; and strategic

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technological confrontation with China through restrictions on exports of advanced semiconductors. A key finding of the study is the fundamental distinction between AI and previous hegemonic technologies, such as semiconductors and Internet protocols of the 1990s. Unlike these technologies, AI functions as a knowledge infrastructure that inherently requires openness, which directly contradicts the logic of monopolization. The study has also identified significant risks of a potential crisis in the AI industry during 2026–2027.

Conclusions. The contemporary U.S. STI strategy creates both challenges and opportunities for Ukraine. An optimal strategic approach involves positioning Ukraine as an important component of the American AI stack, particularly as a unique testing environment for distributed defense-oriented AI solutions, while simultaneously leveraging open-source AI technologies and preparing for the increasing role of public investment in the event of a cooling of private capital markets.

Keywords: science, technology, and innovation policy, artificial intelligence, AI full stack, semiconductor industry, digital infrastructure, industrial policy, US–China technological competition, defense AI.

After the beginning of Donald Trump's second presidential term in January 2025, U.S. science, technology, and innovation (STI) policy has shifted sharply in its priorities. The Biden administration emphasized support for “green” renewable energy and the expansion of public investment, particularly through legislative instruments such as the *CHIPS and Science Act* [1] and the *Inflation Reduction Act* [2]. In contrast, the current Trump administration has eliminated programs supporting renewable energy and has instead pursued a policy of actively stimulating the extraction of oil, gas, and coal. At the same time, federal funding for climate change research and for a number of other programs that do not correspond to the political priorities of the new administration has been reduced.

At the end of 2024, the author of this article predicted [3] that the second Trump administration would concentrate on supporting conventional energy sectors, increasing funding for military technologies, and revising existing innovation programs. However, the complete withdrawal of support for alternative energy and the radical reductions in several fundamental research programs have been unexpected.

U.S. science and technology policy has traditionally served as an instrument for ensuring strategic technological leadership and maintaining economic and military advantages. In particular, a broad consensus has existed regarding the necessity of federal funding for fundamental science at lev-

els sufficient to guarantee U.S. leadership across key research areas, as well as the preservation of academic freedom and institutional autonomy in universities in order to create a favorable and open environment for attracting top talent (highly qualified researchers) from around the world and for the early identification of promising new ideas. This consensus has now been significantly weakened.

First, a shift in public policy priorities has occurred from supporting fundamental research in universities toward more applied directions, accompanied by a growing role of private companies and private research centers in the implementation of science and technology programs. Second, substantial institutional changes have taken place in the sphere of academic governance, including revisions of internal university policies related to Diversity, Equity, and Inclusion (DEI), strengthened migration control with respect to international students and doctoral candidates, and increased attention from government authorities to the activities of researchers from selected countries of origin. The combined impact of these factors has already contributed to the outflow of a portion of highly qualified scientists and researchers who have begun to consider opportunities to continue their academic careers outside the United States, particularly in Europe, China, and other countries.

Changes currently taking place in U.S. science and technology policy have posed certain challenges for Ukraine; however, the Trump administration's focus on applied research and military

technologies has also opened new opportunities for expanding cooperation, which this article has sought to analyze.

The memorandum issued by the Trump administration on September 23, 2025, outlining priority areas for federal funding of science and technology development for fiscal year 2027 [4], has established five groups of priorities: (1) critical and emerging technologies; (2) energy dominance; (3) “strengthening America’s security”; (4) health and biotechnology; and (5) leadership in space.

Each group has included a list of specific directions. In particular, within the category of critical and emerging technologies, the following areas have been identified: (1.1) artificial intelligence (AI); (1.2) quantum information science and technology (QIST); (1.3) semiconductors and microelectronics; (1.4) advanced communications networks; (1.5) future computing; and (1.6) advanced manufacturing (including additive technologies, robotics, and automation).

For comparison, a similar memorandum prepared by the Biden administration in 2023 [5] identified the following priorities: (1) responsible and trustworthy AI; (2) global security; (3) the climate crisis and equitable access to a safe environment; (4) improved health care for all; (5) reducing barriers and inequalities; (6) promoting industrial innovation for competitiveness; and (7) “strengthening, expanding, and utilizing America’s unmatched research capacity,” which, in particular, provided for continued expansion of support for both fundamental and applied research across all major areas of contemporary science.

The Trump administration has criticized these priorities as insufficiently focused. However, the priorities of the previous administration were structured differently rather than lacking focus and also included clear guidance regarding specific research directions. In particular, within the category of critical and emerging technologies, priority areas included microelectronics, biotechnology, quantum information science, advanced materials, high-performance computing, and nuclear energy. In addition, the priorities of the previous administ-

ration also provided for substantial allocations to specific science, technology, and innovation programs, including the *CHIPS and Science Act* [1] and the *Inflation Reduction Act* [2].

Thus, the difference lies not so much in the level of focus or detail as in a noticeable shift in directions and approaches.

EMERGING TECHNOLOGIES: FROM ARTIFICIAL INTELLIGENCE TO ADVANCED MANUFACTURING

Artificial Intelligence. A sustained emphasis has remained on the accelerated development of artificial intelligence (AI), which continues to occupy the top position in the list of priority emerging technologies for the new administration. However, the policy emphasis has changed. The Biden administration emphasized the need for regulation and the protection of human rights and safety in the development and deployment of AI. In contrast, the current administration has advocated deregulation while simultaneously promoting the principle of “ideological neutrality” of AI models, which in practice may imply content moderation approaches that allow private companies to shape the ideological orientation of their models without regulatory constraints, framed as necessary to counter “biased and harmful” ideological influences.

The most comprehensive strategic document currently defining U.S. policy in the field of artificial intelligence has been *America’s AI Action Plan* [6] (hereafter, the Action Plan), which includes more than 90 tasks assigned to various federal government agencies.

The Action Plan has been structured around three pillars, each addressed in a separate section of the document: (1) accelerating innovation; (2) building American AI infrastructure; and (3) leadership in international AI diplomacy and security.

The initial provisions of the section titled “Accelerating Innovation” have emphasized deregulation, the involvement of the private sector in identifying and removing regulatory constraints that hinder innovation, and the simultaneous protec-

tion of “freedom of speech” and “American values.” In practice, this approach has implied a shift from direct government regulation of AI-related content toward a greater role for private platforms in shaping content governance frameworks consistent with the policy orientation of the current administration. This approach has encountered public criticism, including allegations that cooperation between federal authorities and technology companies in monitoring online speech may conflict with protections established by the First Amendment to the U.S. Constitution [7].

Even where the Action Plan has supported the development of open-source and open-weight AI models, this objective has primarily been justified by the need to ensure that the United States maintains leadership in open models aligned with American values. Open-source models allow users to review, modify, and deploy model architectures for further training and application, while “open weights” refer to the availability of trained model parameters for user analysis and evaluation.

In addition to these general policy principles, the Action Plan has also identified a number of more specific technical priorities.

The previous administration emphasized broad international coordination in the field of artificial intelligence, including initiatives such as the G7 Hiroshima AI Process [8], the network of AI safety institutes [9], and the U.S.–U.K. Memorandum of Understanding. The current Trump administration, by contrast, has placed greater emphasis on promoting a U.S.-centric “full AI stack” (American chips, data centers, models, and software) and reducing dependence on technologies associated with geopolitical competitors, while simultaneously strengthening requirements for “trusted” microelectronics.

Accordingly, foreign governments and companies are now viewed less as partners in shaping the global AI ecosystem and more as potential consumers of a fully American AI ecosystem. In this framework, the U.S. government and industry jointly supply allied countries with a complete AI “full stack,” effectively exporting an integrated technological ecosystem.

The United Kingdom appears to be the only country with which the United States is currently positioned to jointly develop a full AI technology stack, as reflected in a recently signed Memorandum [10] between the two governments on the preparation of a “Technology Prosperity Agreement.”

Significant changes have already occurred in U.S. approaches to AI regulation. On its first day in office, among numerous revoked executive orders and memoranda issued by the previous administration [11], the Trump administration rescinded EO 14110 (30.10.2023) — “Safe, Secure, and Trustworthy Development and Use of AI” [12], which had established foundational regulatory principles for artificial intelligence. Subsequently, several additional policy documents were revoked, including those related to promoting responsible AI procurement in government and improving governance, innovation, and risk management in the use of AI by federal agencies [13]. These were replaced by new memoranda, including directives on accelerating the use of artificial intelligence at the federal level through innovation, governance, and public trust [14], and on promoting the effective application of AI in government [15].

Experts at Stanford University, analyzing the Action Plan and the broader AI policy of the Trump administration, have identified a number of structural imbalances [16]. First, the replacement of mandatory regulatory frameworks with “soft” instruments lacking clear enforcement and oversight mechanisms creates gaps in the effective protection of consumers and human rights.

In particular, the rescinded EO 14110 [12] explicitly required model safety testing, evaluation procedures, and content labeling mechanisms. The new Action Plan does not introduce equivalent binding requirements for industry, increasing the risk that such evaluations and labeling will remain voluntary and fragmented. As a result, both the state and the public may lose access to standardized model evaluation results and information on content provenance, which in turn complicates the detection of AI-generated misinformation. More-

over, no operational incident reporting regime has yet been established.

Second, the Action Plan is largely declarative in nature and relies predominantly on recommendations rather than enforceable obligations. Even where specific tasks are assigned to federal agencies, deadlines are generally absent, funding sources remain unspecified, and responsible implementing entities are often not clearly identified.

Traditionally, U.S. science, technology, and innovation programs have been characterized by substantial and predictable federal funding. For example, the *CHIPS and Science Act* [1] (2022) provided USD 52 billion in direct federal appropriations as well as USD 75 billion in loan guarantees. By contrast, the Action Plan and other recent AI-related policy instruments of the current administration do not yet provide comparable guaranteed public funding.

The widely publicized *One Big Beautiful Bill* (H.R.1), signed by President Trump on July 4, 2025 [17], allocates only USD 250 million in total AI-related funding, including USD 150 million for the Department of Energy (DOE) and USD 100 million for the Defense Advanced Research Projects Agency (DARPA) [18]. This amount is more than two orders of magnitude smaller than the budget of the *CHIPS and Science Act* and remains relatively limited even compared to the annual budgets of the National Science Foundation (NSF) and the DOE.

The prospects of a bipartisan AI support bill [19] also remain uncertain. The proposed legislation envisions the creation of a National AI Resource Center within the NSF and the provision of shared access for students, universities, startups, and small enterprises to advanced AI tools and computing resources via a national platform [20].

Political struggles currently unfolding around the next fiscal year's budget indicate that the Trump administration is firmly committed to reducing federal funding for fundamental science, including support for the National Science Foundation (NSF). According to the budget request, NSF funding was to be reduced by more than half, by approximately USD 5 billion. At the same time, Cong-

ress appears inclined to reject this proposal and to maintain funding for basic science in the United States at approximately the current year's level [18]. As a result, funding for fundamental AI research is unlikely to be significantly reduced; however, no substantial increase in funding is expected either.

Not surprisingly, another issue identified in the Action Plan concerns, according to experts from the Human-Centered Artificial Intelligence Institute [16] at Stanford University, an excessive reliance on the private sector, which the current administration assumes will independently build the necessary AI infrastructure once regulatory barriers are removed. In particular, they state that overreliance on private industry for the development of AI infrastructure, combined with insufficient support for fundamental research, may weaken the long-term strategic position of the sector, since sustained leadership requires stable investment in universities, non-profit organizations, and independent laboratories.

At the same time, major private-sector actors — particularly industry leaders — largely support the Trump administration's approach. Although large technology companies (including Google, Microsoft, OpenAI, and others) publicly acknowledge the need for certain safeguards to maintain public trust in AI, they simultaneously advocate a "light-touch" regulatory model, meaning that AI governance should rely primarily on voluntary standards developed and implemented by these same private companies.

It may be stated that a *de facto* consensus has emerged in the United States between the Trump administration and Silicon Valley: minimal mandatory rules and maximal self-regulation by industry. As noted above, this approach has been criticized by civil society organizations and segments of the academic community. Public concern in the United States is particularly strong regarding potential bias in AI systems and issues of privacy. There is also significant demand for regulation of AI-based facial recognition in policing and the use of AI in credit scoring, where cases of discrimination have already been documented. Conse-

quently, some states (including Illinois and Texas) and cities (including New York) have introduced local restrictions, creating a fragmented regulatory landscape that poses challenges for businesses operating across jurisdictions.

At the same time, there are no clear indications that a unified federal regulatory framework for artificial intelligence will be introduced in the near term.

RESHORING OF SEMICONDUCTOR MANUFACTURING IN THE UNITED STATES

The strategy outlined above, aimed at securing absolute U.S. leadership in artificial intelligence through a fully American “full stack” technological ecosystem, presupposes, among other things, full control over the production of semiconductor AI chips and the construction of data centers with the computational capacity required for AI, built entirely from domestically sourced components. At least, this represents the conceptual ideal of the approach.

The Trump administration has strengthened protectionist measures in the semiconductor sector. In August 2025, the President announced tariffs of approximately 100% on imported chips, from which exemptions would apply only to companies with manufacturing operations in the United States or those committing to establish such facilities [21]. It was also stated that companies failing to fulfill these commitments would be required to pay the tariff retroactively, thereby increasing pressure on multinational corporations.

Another dimension of this protectionist strategy involves substantial subsidies for domestic semiconductor production. The *CHIPS and Science Act* remains in force, while new administrative measures further reinforce the localization of production. Major industry players, including TSMC, Samsung, and Intel, are constructing fabrication facilities in Arizona, Texas, and Ohio, although the timelines for some projects have been adjusted.

Notable progress can be observed in the establishment of new high-tech semiconductor manufacturing facilities. Following the adoption of the

CHIPS Act in 2022, a number of advanced microelectronics production sites have been either completed or initiated in the United States, including Micron in New York State, Intel in Ohio, and Texas Instruments in Sherman, Texas.

Construction of new facilities in the United States has also been initiated by leading non-U.S. companies such as Samsung [22] and SK Hynix [23] (South Korea), as well as TSMC [24] (Taiwan). The latter remains the undisputed industry leader, accounting for more than 60% of global chip production and approximately 90% of the most advanced semiconductor manufacturing output [25].

It should be noted that, at present, despite the efforts of both the previous and the current administrations, the entire U.S. semiconductor industry together accounts for no more than 10% of global chip production.

Active pressure from the Trump administration on leading chip manufacturers has contributed to the announcement by many of them of plans to construct major new production facilities in the United States. In particular, Texas Instruments has announced plans to expand its U.S. manufacturing capacity by USD 60 billion. Overall, announced investment plans in the U.S. microelectronics sector and its associated supply chains are estimated at approximately USD 650 billion [26].

However, the most significant tangible achievement of the Trump administration's policy since January 2025 has been TSMC's commitment to expand its manufacturing capacity in Arizona by more than USD 100 billion [27]. TSMC has indeed been rapidly constructing and commissioning new facilities in the United States, where advanced AI chips are already being produced, including for companies such as Apple [28] and NVIDIA [29].

It should also be noted that construction of the recently opened TSMC facility in Arizona began several years earlier under the Biden administration and was supported by subsidies provided through the *CHIPS and Science Act*, which have already been largely allocated. At the same time, the Trump administration has engaged in negotiations with several manufacturers in an effort to encourage them

to accept revised terms and reduced grant allocations previously provided for under the *CHIPS and Science Act* [30]. However, this rhetoric has had limited practical consequences, since most of the funds allocated under the Act have already been disbursed, while the remaining funds are mandated by law and cannot be unilaterally revoked by the administration without congressional approval.

At the same time, the Trump administration has engaged in negotiations with several manufacturers in an effort to encourage them to accept revised terms and reduced grant allocations previously provided for under the *CHIPS and Science Act* [31]. The principal instrument for stimulating domestic microelectronics production, in the administration's view, has been the introduction of high tariffs intended to reduce the economic attractiveness of importing chips into the United States and thereby increase incentives for domestic manufacturing. However, this tariff policy has attracted considerable criticism, since it is likely to increase chip prices in the U.S. market and, consequently, raise costs and reduce competitiveness across industries that rely on advanced microelectronics, including projects related to the construction of AI data centers. Reservations regarding this tariff policy have also been expressed by some semiconductor manufacturers that might otherwise have been expected to benefit from it [32].

Critics have also noted that progress in expanding semiconductor manufacturing capacity has been uneven, with signs of slowing investment in the U.S. microelectronics sector. In particular, Intel has delayed the commissioning timeline of its Ohio facility, and the construction schedule for Samsung's plant in Taylor, Texas, remains uncertain. Although the total number of fabrication facilities continues to increase, several companies have clearly fallen behind their planned construction timelines.

Even in the case of TSMC, there is a clear sense that the Trump administration has sought to overstate the scale of production expected to be relocated to the United States. By threatening extremely high tariffs, Trump has demanded that companies comply with a "one-to-one" rule — namely,

that they produce in the United States as many chips as they sell in the country [33]. In the case of TSMC, the administration has called for the relocation of half of the company's production capacity to the United States [34], which could hypothetically increase the U.S. share of the global market from 10 to 40%.

At the same time, both the company itself and the government of Taiwan have made it clear that relocating half of TSMC's production to the United States and complying with the 1 : 1 rule is not feasible [35]. Even if all planned investment projects in the United States are successfully completed, only about 7% of TSMC's total production volume would be located there. Moreover, the Trump administration's tariff policy itself creates additional risks for the implementation of these projects [36].

Even more concerns arise from the reduction in public funding for semiconductor research and development and the cancellation of the USD 7.4 billion Natcast research and development initiative [37]. Combined with broader plans to reduce federal funding for science overall, this may negatively affect the United States' strategic leadership in the field, since private corporations are typically reluctant to finance fundamental research. It is precisely the unquestioned U.S. leadership in fundamental science that has served for decades as the foundation of the country's technological leadership. The momentum that private investment may provide after the expiration of *CHIPS and Science Act* subsidies for new production facilities and applied development could be rapidly exhausted due to rising production costs, uncertain prospects for domestic demand, and, subsequently, potential technological lag resulting from underinvestment in fundamental research.

Doubts about the realism of the U.S. reindustrialization program are also related to the insufficient availability of a suitably qualified workforce and the absence of a vocational education and training system capable of preparing the necessary specialists relatively quickly and at low cost. As a result of the deindustrialization of recent decades, the system of vocational training in specialties re-

quired for high-technology manufacturing has effectively been dismantled in the United States. In addition to workforce constraints, there are also significant challenges related to scaling advanced high-technology production.

There have also been proposals that the government should play a more active role in stimulating these processes, in particular by creating specialized agencies to support advanced manufacturing. In the Winter 2025 issue of *Issues in Science and Technology*, the renowned innovation policy scholar William B. Bonvillian published the article “*Could an ARPA Help Resurrect U.S. Manufacturing?*” He noted that the United States has lost more than 60,000 factories and one-third of its manufacturing jobs, and that the war in Ukraine has exposed the dangerous dependence of the United States on foreign supply chains [38].

The article states that the United States should establish a dedicated ARPA for Manufacturing (ARPA-M), which would fund high-risk research and bring innovations to the stage of production-ready prototypes, thereby filling the gap between laboratory research and scaling to mass production. Such an agency could support projects in new materials, additive manufacturing technologies, and AI-based manufacturing analytics, as well as contribute to the reshoring of industrial capacity to the United States. Bonvillian’s proposal aligns with the established U.S. tradition of ARPA-type agencies: Defense Advanced Research Projects Agency in defense, Advanced Research Projects Agency–Energy in energy, and Intelligence Advanced Research Projects Activity in intelligence. Many observers believe that the success of these institutional models could be replicated to support the revitalization of U.S. manufacturing.

However, the current policy of the Trump administration is focused almost exclusively on stimulating the private sector through the introduction of high import tariffs. The expectation is that this approach will be supported by the rapid growth of domestic demand for AI chips in the United States, particularly in connection with the construction of new data centers.

CONSTRUCTION OF DATA CENTERS IN THE UNITED STATES

One of the key technological priorities of the Trump administration is the acceleration of construction of new data centers intended to provide artificial intelligence services. As noted above, this is directly linked to ambitions to win global technological competition and achieve the dominance of U.S. artificial intelligence technologies, which is expected to encourage worldwide reliance specifically on American AI services and applications. U.S. leadership in this area is intended to ensure that abandoning American AI services would become practically impossible, as doing so would limit access to the most advanced AI capabilities and imply a loss of competitiveness.

A monopoly over the most advanced AI technologies would enable the United States to capture a premium — effectively a form of monopoly rent — that could finance the development of the full AI stack despite the fact that production costs in the United States may be significantly higher than in other countries. Control over the “full stack,” from semiconductor manufacturing and data center construction to the most advanced software platforms and end-user services, is intended to guarantee this technological advantage.

Accelerated construction of new data centers is regarded as a key prerequisite for maintaining U.S. leadership in the market for large language model (LLM) services, the most prominent example of which is ChatGPT [39]. At present, such models — even when using the most advanced AI-optimized chips (for example, those produced by NVIDIA) — require enormous computing capacity both for model training and for processing user queries. Consequently, the current situation suggests that those with more powerful data centers enjoy a decisive advantage in the provision of large language model services. This segment of AI is currently the most advanced and commercialized, with approximately 700–800 million weekly active users (according to statements by OpenAI in August–October 2025 [40]) and a global generative AI market estimated at approximately USD 63–67 billion in 2025 [41].

The Trump administration sees its role in the expansion of new data centers primarily in deregulation [42], particularly through accelerating and simplifying permitting procedures and supporting workforce development for the maintenance of large-scale AI infrastructure [43].

In July 2025, President Donald Trump signed an executive order to accelerate approvals for data center construction [44], establishing simplified procedures for permitting and financing allocations for “high-priority” facilities [45].

Almost simultaneously with the already mentioned AI Action Plan, the public–private megaproject Stargate was launched [46], bringing together investors led by Sam Altman, Larry Ellison, and Masayoshi Son. The project envisions the construction of data centers in the United States with a total value of approximately USD 500 billion, of which USD 100 billion is planned to be deployed already in 2025 — an amount beyond the reach of most competitors.

OpenAI reports that the deployment of Stargate is already underway, beginning in Texas [47]. The first Stargate data center is currently under construction in Abilene, Texas. In total, the launch of construction of five Stargate data centers has been announced across Texas, New Mexico, Utah, and other locations [48]. Their infrastructure is based on specialized NVIDIA H100/GB200 microchips, proprietary chips developed by OpenAI, and high-speed communication networks provided by Oracle.

The electricity consumption capacity of each of these data centers is expected to reach up to 2 GW, which is unprecedented even by global standards. The total additional capacity required to power the Stargate data centers alone may soon reach 4.5 GW [49].

Despite its private character, Stargate continues the tradition of U.S. public — corporate projects in which the state provides regulatory support and ensures guaranteed demand. Although Stargate is formally a private initiative, the United States Department of Defense is expected to become one of its principal customers. The Department of Defense has openly expressed interest in

securing access to large-scale computing capacity for military AI programs.

In parallel, the already mentioned United States Department of Energy and National Science Foundation are implementing their own initiatives. Within the framework of the HPC for AI program, the Lux and Discovery supercomputers [50] (based on Advanced Micro Devices technologies) were announced in 2025 for centers in Oak Ridge National Laboratory [51], as well as the Solstice and Equinox systems [52] at Argonne National Laboratory — the largest AI-oriented supercomputers of the Department of Energy. All of these systems are being developed in cooperation with NVIDIA, Hewlett Packard Enterprise, and Oracle [53].

At the same time, the National Science Foundation is deploying the infrastructure of the National AI Research Resource (NAIRR) [54], which is intended to provide researchers in the United States with access to computing capacity and cloud environments based on open architecture. The concept of the “American Science Cloud” [55] is also being developed, with the aim of creating a national cloud platform for scholarly research and applied AI research. The draft budget provides for support for such centers through funding from the United States Department of Energy.

Initiatives by major technology companies are also remarkable in scale. Microsoft has announced investments exceeding USD 80 billion in AI data centers (most of them located in the United States) [56]. Alphabet (Google), Meta, and Amazon are likewise investing tens of billions of dollars in data center infrastructure [57].

The rapid expansion of data center capacity is transforming them into one of the leading consumers of electricity in the United States. New data centers will consume up to several gigawatts of power each, placing them in direct competition with major industrial consumers. Accordingly, the question arises as to how to ensure the rapid commissioning of dozens — and, in the longer term, possibly hundreds — of gigawatts of additional generating capacity. The operation of AI models, particularly large language models (LLMs) such

as GPT-4 or GPT-5, requires not only substantial computing resources but also stable and reliable energy supply. Consequently, another key direction of U.S. science, technology, and innovation policy is becoming the expansion of energy capacity — from nuclear power to conventional generation based on fossil fuels.

POLICY IN THE FIELD OF ENERGY TECHNOLOGIES

The deployment of large-scale artificial intelligence infrastructure, particularly data centers for training and operating large language models, is creating unprecedented demand for electricity.

According to estimates by the United States Department of Energy, by 2028 data centers may account for 6.7—12% of total U.S. electricity consumption, compared with approximately 4.4% in 2023 [58]. Similar projections are provided by investment analysts: Boston Consulting Group [59] and Goldman Sachs [60] estimate that by 2030 data centers could consume up to 8% of total U.S. electricity generation, compared with roughly 2% in 2022.

According to the U.S. Energy Information Administration, total annual electricity consumption in the United States amounts to approximately 4.1—4.2 thousand TWh, corresponding to an average load of about 470—480 GW [61]. Data centers alone could require more than 30—40 GW of continuous load capacity in the near term. Meeting this demand will require additional generation capacity on the order of 40—50 GW — equivalent to dozens of nuclear power plants or hundreds of gas-fired generation units. Such a rate of growth has no precedent in the U.S. civilian sector since World War II.

It should also be noted that the United States does not have a single integrated power grid: the country is divided into several large regional electricity interconnections [62] (for example, Electric Reliability Council of Texas, PJM Interconnection, and California Independent System Operator), which exchange electricity only to a limited extent. This means that the growth in electricity demand

will occur within local energy systems, potentially creating “islands” of generation in which data center capacity may exceed existing infrastructure or produce local surpluses that are difficult to integrate.

As already noted, in July 2025 an executive order was signed that substantially simplified permitting procedures for “high-priority” infrastructure projects, including data centers and the associated electricity generation facilities [44].

Overall, the Trump administration’s energy policy is oriented toward the fastest possible large-scale deployment of new generating capacity, with minimal constraints from regulators and environmental standards.

Nuclear power occupies a special place in this policy, as the Trump administration presents it as a “key to national energy sovereignty” [4]. Particular emphasis is placed on small modular reactors (SMRs), accelerated certification of new reactor designs (for example, those developed by X-energy and NuScale Power), and support for the completion of large-scale reactor projects such as Vogtle Units 3 and 4. At the same time, significant attention is devoted to ensuring fully independent domestic supply chains for uranium and the entire nuclear fuel cycle.

At the same time, critics [63] point out that the historical experience of nuclear reactor construction in the United States indicates that most generating units have taken decades to complete and have frequently exceeded their original budgets several times over, raising serious concerns about their economic efficiency. Previous major nuclear projects in the United States — such as Vogtle Units 3 and 4 in Georgia — have experienced delays of more than ten years, with their budgets increasing severalfold. Large-scale construction of new nuclear power plants will therefore require not only multibillion-dollar investments but also solutions to workforce and supply-chain constraints. At the same time, a radical simplification of permitting procedures and regulatory oversight would inevitably increase the risk of incidents, particularly in the context of attempts to rapidly deploy new reactor designs that have not yet been fully tested in

practice. According to some experts [64], expansion of nuclear power could even worsen the climate crisis rather than help mitigate it, because nuclear power plants are constructed too slowly, rapid scaling is extremely costly, and such investments may divert capital away from clean technologies capable of reducing emissions within the current decade [65].

Preventing climate catastrophe is, unfortunately, not a priority of the Trump administration's energy policy. Alongside the development of nuclear power, the administration has provided for subsidies to traditional energy sectors, particularly flexible-load gas-fired generation. Support is even envisaged for coal-fired power generation, which not only increases CO₂ emissions but is also the most polluting source in terms of harmful atmospheric emissions. In part to provide political justification for supporting coal power in several states, the Trump administration has also emphasized the need to develop Carbon Capture, Utilization, and Storage (CCUS) technologies, which are viewed as necessary for preserving the role of coal in certain regions. The underlying logic is that expanding CO₂ capture technologies would allow continued use of coal and gas with a somewhat reduced climate impact.

At the same time, the Trump administration has significantly reduced funding programs for renewable energy and has abandoned the goal of achieving net-zero emissions by 2050. Critics, including RMI and Brookings Institution, state that this policy reflects a short-term industrial bias and ignores the strategic necessity of decarbonization. Supporters, by contrast, emphasize economic efficiency and the importance of energy sovereignty.

In addition, the new strategy stimulates the restoration of investment profitability in fossil energy sectors. For the oil, gas, and coal industries, it creates opportunities for rapid returns by extending the effective operating life of their existing assets. However, this may slow the development of energy innovation and “lock in” the U.S. energy system within an outdated technological paradigm based on fossil fuels.

In the longer term — particularly if the growth of the data center industry proves less rapid than currently projected — the concentration on energy production and exports could create risks associated with the so-called Dutch disease [66]. Under such conditions, the United States could become increasingly locked into a fossil-fuel-based energy trajectory, in which the technological ecosystem built around these sectors would make alternative energy sources comparatively less economically attractive. At the same time, an orientation toward energy exports would increase the relative weight of extractive industries in the national economy, drawing financial and human resources away from more technologically advanced sectors and thereby slowing their development. A similar effect was observed in the 1980s in the Soviet Union prior to its collapse. As a result, investments in clean energy technologies may ultimately prove more attractive in other countries than in the United States.

This potentially risky energy strategy may undermine the historical role of the United States — at least since the 1940s — as a global innovation leader, a role that has been based on broad-based investment in science and technology and on maintaining leadership across the full spectrum of modern research fields. The economic effectiveness of this approach has, of course, depended on the position of the United States in the global economic system, the strength of its armed forces, and its ability to sustain a high average cost of labor and, accordingly, the economic attractiveness of labor-saving technologies [67].

Thus, the technological strategy of the United States in the energy sector is focused on expanding generation capacity by all available means in order to provide a reliable foundation for leadership in artificial intelligence within the framework of a fully American “full stack.” If the country fails to rapidly increase generation capacity, the development of AI infrastructure in the United States may encounter an “energy ceiling.” For political elites, large-scale capital-intensive projects appear particularly attractive, since they make it possible to leverage the United States’ compara-

tive advantage in mobilizing substantial investment resources that remain inaccessible to most competitors.

**AI DEVELOPMENT AS THE CORE
OF U.S. COMPETITIVE STRATEGY
AGAINST CHINA: THE LIMITS
OF TECHNOLOGICAL MONOPOLY
AS A PATH TO GLOBAL LEADERSHIP**

The AI Action Plan, repeatedly mentioned above, was presented from the outset as a foundational document of the U.S. strategy for global competition with China. This is evident both from the wording of the official America's AI Action Plan [6], which explicitly refers to a "race for global dominance" and the need to counter Chinese influence in international organizations, and from analytical assessments by the Atlantic Council [68] and Chatham House [69], which interpret the plan in the context of competition between the United States and China for leadership in artificial intelligence. The Donald Trump administration regards victory in the AI race as a necessary condition for maintaining U.S. economic and military leadership globally.

It is widely recognized that over recent decades the global role of the United States has shown signs of gradual relative decline. The weakening of so-called U.S. "hegemony" has been extensively analyzed by representatives of World-systems theory, particularly Immanuel Wallerstein, who stated that after World War II the United States secured a leading position within the capitalist world-system as both an economic and military leader capable simultaneously of establishing the rules of international trade and ensuring their enforcement through military-political presence in key regions of the world [70, 71].

The United States continues to control major trade and financial routes, maintains a global military infrastructure, and retains the capacity to conduct effective interventions in response to threats to its economic or political interests [72, 73]. This system rests not only on military superiority but

also on monetary and financial hegemony established after the Bretton Woods Agreement and reinforced by the subsequent dominance of the U.S. dollar as the world's principal reserve currency [74].

The financing of this military power has been supported by U.S. control over the global monetary and financial system, in which central banks and financial markets play a key role. Interaction between the Federal Reserve System, the central banks of other countries, and global investors generates sustained demand for dollar-denominated assets, particularly United States Treasury securities. This enables the U.S. government to maintain high levels of budget deficits without macroeconomic destabilization, effectively externalizing part of their impact onto the global economy while simultaneously facilitating more efficient private capital accumulation within the financial sector [75, 76].

At the same time, capitalist elites in other countries are often interested in preserving such a model, since it allows them to externalize part of the costs of defense and security by benefiting from the global public good represented by Pax Americana, as well as from access to U.S. financial markets and mechanisms of capital accumulation — even if this implies a continued transfer of resources from the periphery to the core of the world-system [71, 72, 75].

Of course, such a system could function successfully only under conditions of U.S. economic and military dominance. At the same time, maintaining high profitability of American capital and sustaining economic growth rates required the relocation of industrial investment to countries with lower costs of skilled labor. This led to the expansion of manufacturing capacity outside the United States and to the gradual deindustrialization of the U.S. economy itself [72, 73, 77].

This process, which may be described as a kind of "quest for cheap labor," is examined in greater detail by the author in the article *The Illusion of Knowledge Capitalism*, included in the collective monograph *The Future Without Capitalism: The Contemporary Crisis and Alternatives to the Market*

Economy [78, 79], where it is shown how transnational capital systematically searches for new zones for the externalization of costs and the maintenance of the global rate of profit.

The industrialization of countries that were under full military and political control of the United States — such as Germany, Japan, and South Korea — posed only minimal risks to U.S. hegemony. The economic growth of these countries could be effectively constrained through monetary and financial mechanisms, since the United States exercised significant influence over their governments and central banks [76].

A particularly illustrative example is Japan, which under U.S. pressure agreed to the Plaza Accord in 1985. This led to a sharp appreciation of the yen, making Japanese exports less competitive. The result was prolonged economic stagnation (“the lost decades”), while at the same time allowing Japanese financial elites to preserve privileged access to U.S. markets and capital [75, 80]. Thus, the Japanese model combined formal political loyalty to the United States with integration into the dollar-based financial system, which ensured secure accumulation for national capital.

However, the opportunities for further industrialization of these allied countries were rapidly exhausted, and from the late 1980s onward the industrialization of China — which had never been under U.S. military control — began to play an increasingly important role. This process created evident risks; nevertheless, policymakers in Washington expected that China’s integration into global trade and the enrichment of newly emerging capitalist elites would make them loyal to the U.S.-led global market system [81, 82]. Such expectations were not without precedent, since this had indeed occurred in the cases of Japan, South Korea, and Taiwan: the capitalist classes there became economically dependent on U.S. markets and the dollar-based financial system.

In China, a powerful stratum of the bourgeoisie connected with global capital has also emerged and is interested in maintaining stable relations with the United States. However, this group does

not fully control political power; rather, the state uses the economic strength of private capital to pursue its own strategic objectives [83]. The Chinese economy, which has nearly reached the scale of the U.S. economy (and has already surpassed it in purchasing power parity terms), has developed its own ambitions within the world system, particularly in technological and military domains (see World Bank [84], International Monetary Fund [85]).

Having near-complete military control over maritime trade routes, the United States is theoretically capable of blocking China’s external trade. However, such a scenario would be extremely risky and costly, given the scale of the Chinese economy, the length of its coastline, and the potential consequences for global markets [86–88]. Moreover, the United States has never exercised territorial control over mainland China.

Thus, the assumption that China’s growth could be contained through economic leverage has proven incorrect. Chinese capital, while deeply integrated into the global economy, has demonstrated sufficient strength and strategic autonomy to pursue its own long-term interests.

Some American economists, including Peter Navarro — an adviser to Donald Trump — predicted in the 2000s a natural slowdown of China’s growth due to rising labor costs and industrial saturation. He projected that China’s GDP would plateau well below U.S. levels and expected that its investment attractiveness would subsequently decline, leading to capital outflows toward U.S. equity markets [89].

However, these expectations have not materialized. The Chinese economy has continued to grow, and its real scale is likely underestimated, given China’s dominance in the production of most industrial goods and key high-technology components [83, 85].

Navarro later became one of the principal ideologues of protectionist policy, interpreting China’s economic rise as the result of unfair trade practices [90]. More broadly, however, the “awakening” of the United States occurred only when it became evident that China was evolving into an autonomous center of capital accumulation, gradually

constructing its own economic ecosystem, including through direct investment expansion in Africa, South America, and Southeast Asia — largely outside the control of U.S. financial markets [75, 83]. This shift did not merely represent an expansion of Chinese economic influence but the emergence of alternative channels of global capital reproduction in which the dollar-based system was no longer indispensable.

Against the backdrop of slowing global economic growth, the United States has faced the challenge of identifying a new source of economic rent capable of sustaining its global dominance and continuing to finance budget deficits and military expenditures without undermining macroeconomic stability [73, 81].

A similar challenge had already been addressed during the administration of Ronald Reagan in the 1980s. At that time, large-scale public and private investment in semiconductor and microprocessor production laid the foundation for U.S. technological leadership in computing, software, and the internet, ultimately securing U.S. hegemony in the 1990s [91, 92].

Although early-stage microprocessor manufacturing was largely unprofitable, American corporations were able to extract monopoly rents from technological leadership once they succeeded in promoting a globally dominant information and communication technology stack — from processor architectures and operating systems to internet protocols [93, 94]. The contemporary notion of the “AI stack” is therefore not purely an engineering term but rather a conceptual reference to the historical success of the TCP/IP protocol stack.

Digitalization enabled radical optimization of production and logistics, increasing labor exploitation intensity while simultaneously boosting financial returns at the system’s core, particularly through control over intellectual property [77, 95].

Today, it appears that American elites, under the leadership of the Donald Trump administration, are attempting to reproduce this historical trajectory in the domain of artificial intelligence (AI) and, potentially, quantum computing. In official docu-

ments such as the aforementioned America’s AI Action Plan [6] and the earlier Executive Order 14110 [12], AI is explicitly defined as a “new general-purpose technology” capable of securing U.S. economic and security advantages for decades.

However, having lost much of its manufacturing base, the United States today relies primarily on the dominance of the U.S. dollar and the global influence of American equity markets. Control over these institutions enables Washington to mobilize investment resources unavailable to any other country, including China [75, 76].

Accordingly, the preservation of global leadership is increasingly framed as the search for a new hegemonic technology — one that:

- ◆ possesses the capacity to fundamentally reorganize the global business ecosystem, making control over it a source of systemic rent;
- ◆ requires massive upfront investment that only the U.S. financial system can realistically provide;
- ◆ ultimately enables monopoly control over critical infrastructure (computing centers, algorithms, data, and energy consumption).

In other words, the technology must be expensive but indispensable: its large-scale adoption would compel the world to rely on American-controlled infrastructure, thereby reproducing the economic logic of previous waves of technological hegemony [6, 93, 95].

As aptly noted by Yanis Varoufakis, the contemporary economy increasingly resembles not a free market but a system of “technofeudalism,” in which control over digital platforms, data, and artificial intelligence infrastructure constitutes a new form of rent extraction and global economic power [96].

Beyond AI, potential candidates for such a new “system-forming” technology — at least until around 2022 — were also considered to include quantum computing and blockchain technologies. Both shared a common feature: achieving meaningful economic impact required extremely large capital investments and substantial energy consumption. However, existing quantum computing prototypes remain extraordinarily expensive, in part due to the need for cryogenic systems for qubit sta-

bilization and highly precise control mechanisms, while the cryptocurrency mining industry has already demonstrated its energy intensity, often comparable to that of a medium-sized country [97].

At the same time, alternative energy pathways — solar generation, wind technologies, or even controlled thermonuclear fusion projects — although highly capital-intensive, do not ensure monopolized control over an entire economic ecosystem. Rather, they tend to promote the decentralization of energy production instead of forming a new “technology stack” that can be imposed as a universal infrastructure for global business [93, 95].

However, following OpenAI’s breakthrough with the public release of ChatGPT in November 2022, the focus of the American business community shifted sharply toward artificial intelligence (AI). Within a year, AI technologies began to be perceived as an ideal candidate for restoring U.S. technological hegemony. They combine two key characteristics:

- ◆ resource intensity and high capital cost, making them accessible primarily to countries with deep investment markets, advanced energy infrastructure, and large-scale computing capacity;
- ◆ universality of application — the potential for integration across virtually all sectors of the economy, from finance and defense to logistics and education [59, 60].

Thus, AI emerged as a potentially ideal instrument for constructing a new technological paradigm that could be monopolized through control of the full stack — from silicon and data centers to models and algorithms. The “full stack” implies comprehensive control over intellectual property and the ability to restrict competitors’ access to core technologies [6, 69].

It is evident that China has interpreted this trajectory as a strategic challenge. The *America’s AI Action Plan* (July 2025) explicitly signals that the United States seeks not partners but customers in the AI economy [69]. This reflects an intention to establish asymmetrical dependency relations — where access to American technologies is mediated exclusively through licensing schemes, cloud services, and U.S.-controlled platforms [68].

In response, China is accelerating the development of its own AI technology stack. Following the introduction of U.S. export restrictions on advanced NVIDIA and AMD chips and limitations on Android-based ecosystems for Huawei, Beijing has intensified efforts in domestic software development, semiconductor manufacturing, and large language model (LLM) systems.

Today, HarmonyOS has become a mass-market operating system for Chinese smartphones and consumer devices, capturing a significant share of the domestic market and gradually displacing Android in local segments. In parallel, companies such as Huawei and SMIC are expanding production of domestically developed Kirin processors, demonstrating substantial progress in indigenous semiconductor capabilities, although China still lags behind the West in the most advanced technological nodes. According to analysts, the country is progressively forming a complete technology stack — from silicon to large language models — as part of a state-led strategy of technological self-sufficiency in response to U.S. restrictions [98–100].

Despite the rapid development of Chinese initiatives in artificial intelligence, a 2025 assessment by the RAND Corporation [101] suggests that China’s AI technology stack remains significantly less mature than its American counterpart. In particular, machine learning libraries and frameworks developed by Huawei have not yet achieved substantial adoption outside the Chinese market and continue to lag behind widely used alternatives developed by Google, Meta, and OpenAI. This indicates that the United States, benefiting from substantially larger financial resources, a stronger network of research institutions, and global access to venture capital, still retains a credible opportunity to consolidate technological leadership in AI [60, 101].

At the same time, China’s position in open-source AI appears considerably stronger. It is in this domain that Chinese researchers demonstrate high efficiency in computational resource utilization and strong capabilities in optimizing large language models. The most prominent example is the success of the DeepSeek model, whose training reportedly

required several times fewer financial and energy resources than comparable models developed by leading U.S. companies [68]. Moreover, DeepSeek's software was released as open source, facilitating its rapid diffusion within the international research community.

These advances in open systems likely contributed to the Trump administration's decision to include open-source AI development in its *America's AI Action Plan (2025)* [6]. However, within the document, open-source AI is not framed as a strategy of technological openness per se, but rather as a mechanism for accelerating innovation by mobilizing a global developer community to support the rapid creation of commercial, proprietary products protected under U.S. intellectual property law. In this sense, even references to open source function as an instrument for strengthening corporate control over the emerging technological order. This interpretation is reinforced by analysis from Chatham House, which emphasizes that, under the Action Plan, "open" models are intended primarily to promote American AI standards and to counter Chinese open-source systems [69].

SPECIFICITY OF AI AND RISKS OF THE U.S. STRATEGY

If artificial intelligence technologies are treated merely as another form of "expensive hardware," similar to quantum computers or, earlier, semiconductor electronics, then the strategy of American elites appears logically consistent: leveraging access to surplus financial resources and dollar hegemony, the United States can attempt to construct a new technological paradigm whose entry barriers are so capital-intensive that most countries would be structurally forced to act as "clients" of the infrastructure owners.

However, there is a fundamental distinction: AI is primarily an infrastructure for the accumulation and recombination of knowledge, and only secondarily an infrastructure of computation and energy consumption. Generative models are trained predominantly on what Huang and Siddharth

[102] describe as the *digital commons* — a shared digital space consisting of freely available, openly published texts, images, software code, encyclopedic knowledge, and other public-domain or openly licensed materials.

The digital commons is not merely a "resource" in the form of datasets; it represents the accumulated labor of millions of researchers, programmers, activists, and ordinary users who contribute to and maintain open platforms ranging from Wikipedia and arXiv to open-source code repositories. A defining property of such knowledge is its non-rivalrous and non-excludable nature: its use by one agent does not diminish its availability to others, and its maximum social value is achieved when as many actors as possible have access to the full corpus of data and the tools to process it. This fundamentally differs from the logic of scarce resources such as oil, gas, or rare-earth minerals, where monopoly control can indeed generate stable rents.

For this reason, attempts to transform AI into a monopolistically controlled infrastructure appear inherently contradictory: the effectiveness of AI as a knowledge system depends on openness, whereas strategies of geopolitical and technological hegemony require increasing closure and the strengthening of intellectual property barriers.

This tension is clearly recognized in the work of legal scholars and innovation economists. Schrepel and Potts [103] propose conceptualizing foundational AI models as an *innovation commons*, where access is governed by licensing conditions. They develop a methodology for measuring model "openness" based on criteria such as access to weights, modifiability, redistributability, and commercial usability. Their analysis shows that open licensing substantially increases the number of actors capable of fine-tuning, adapting, and recombining models into downstream applications, thereby accelerating innovation across the ecosystem.

They conclude that (1) the more open a model is, the more effectively it functions as a shared knowledge infrastructure that stimulates further research and innovation; and (2) the more restrictions a license contains — such as prohibitions on

fine-tuning, limitations on commercial use, or restrictions on publishing derivative models — the more the model shifts toward a *licensed monopoly*: a source of rents for its owner, but a weaker engine for cumulative knowledge production.

In a programmatic essay, Küsters [104], *The Future of AI: Open-Source Utopia or Licensed Monopoly?*, articulates this tension in explicitly political terms. Society, he states, faces a choice between a scenario in which AI becomes an open digital infrastructure akin to the Internet or Linux, and a scenario in which core AI capabilities are controlled by a small number of licensed monopolies. In the first case, innovation is decentralized, competition is genuine, and public institutions and universities have access to fully functional tools; in the second, most of the value added is appropriated by a limited number of corporations, while the state becomes a dependent buyer of “black-box” systems.

In this context, a recent MIT study [105] offers a particularly revealing conclusion: the main bottleneck to AI scaling is not the cost of computational resources, not the shortage of talent, and not even imperfect regulation, but training itself. Most generative systems are currently unable to incorporate feedback, adapt to context, or improve over time. They remain static constructs that reproduce knowledge acquired during pre-training, without mechanisms for accumulating experience — mechanisms that, in biological systems, underpin learning and development.

This technical limitation carries profound socio-economic implications. Without the capacity for continuous learning, even the most powerful models remain tools whose effectiveness depends on external commands and capital inputs. A genuine breakthrough would require a shift toward systems capable of continual learning — integrating user experience, collective knowledge, the digital commons, and contextual interaction. In this sense, the MIT argument converges with Küsters’ thesis: openness and shared adaptation are not merely ethical choices but technological necessities. If the primary constraint on progress is indeed learning capability, then only open, ecosystem-ba-

sed systems — developed collaboratively by large communities of researchers — can overcome this barrier and enable genuine advancement in artificial intelligence.

Notably, even purely economic analysts now acknowledge that open-source AI provides a strategic advantage to those who invest in its development. According to *The Washington Post* (including analyses by Eric Schmidt [106] and Kevin Shalhoub [107]), in the domain of open-weight models, Chinese firms — particularly developers of DeepSeek and similar systems — are already outperforming many American competitors on platforms such as Hugging Face, which has effectively become the de facto repository for open-source models. Chinese models increasingly occupy leading positions on these platforms and often achieve superior results in blind evaluations compared to their American counterparts [108].

The very emergence in the United States of initiatives such as the *American Truly Open Models (ATOM)* project — explicitly aimed at “catching up with China in open-source AI” — signals a tacit acknowledgment that closed, proprietary models do not provide the speed and breadth of ecosystem development required for sustained global leadership. In this sense, empirical developments increasingly confirm what theorists of commons-based peer production (notably Benkler [109, 110] and others) had stated even before the rise of generative AI: open, networked forms of knowledge organization systematically outperform closed hierarchical structures in the rate at which information is accumulated, refined, and recombined.

This issue has also been addressed in earlier critical work on the “knowledge economy,” where it was stated that the very idea of “knowledge capitalism” — understood as a model in which knowledge is treated not as a public good but as a tradable commodity and a source of rent — contains an inherent structural contradiction [78, 79]. It has been shown that attempts to bind knowledge production to private profitability tend to slow innovation, restrict access to scientific outputs, and ultimately degrade the systemic capacity for knowledge

reproduction. As an alternative, social criteria of efficiency were proposed — namely, metrics that account for the reduction of socially necessary labor and resource use while preserving quality of life and ensuring open access to knowledge.

Importantly, the question of openness concerns not only models themselves but also the foundational knowledge on which they are trained. The work of Huang and Siddarth [102], *Generative AI and the Digital Commons*, demonstrates that contemporary generative systems are critically dependent on the digital commons — open texts, databases, and code repositories produced and maintained by distributed communities rather than corporations. At the same time, there is a growing risk that large technology firms will operate as purely extractive actors: extensively utilizing shared resources for model training while contributing little in return in terms of open knowledge, tools, or infrastructure investment.

Noroozian et al. further state that the large-scale use of open knowledge bases for training proprietary AI systems creates systemic pressure on digital commons projects such as Wikipedia, effectively amounting to the exploitation of open communities and the private appropriation of collectively produced knowledge [111]. In response, they advance the concept of an “AI commons” — public AI infrastructures designed to sustain, rather than erode, the ecosystem of open knowledge.

At the level of scientific communication, a similar argument is developed by Douglas Youvan in *Breaking the Paywall Paradox: How Open-Access Research is Undervalued Yet Powers AI and Innovation* [112]. He demonstrates that open-access publications and datasets constitute a primary source of high-quality, validated knowledge for model training. In contrast, the paywall-based restriction of scholarly outputs not only limits human and machine access to research results but also generates asymmetric rents for major publishing houses and AI platforms, reinforcing structural inequalities in the knowledge economy.

If research outputs, data, and models remain open, this fosters *epistemic equality* — a principle

according to which all participants in the processes of knowledge creation, validation, and application have equal access to information, verification tools, and the capacity to influence knowledge production. In this sense, openness accelerates the integration of knowledge into AI systems and enhances transparency and accountability. By contrast, when access is privatized, knowledge accumulation becomes one-sided, and epistemic power is concentrated and opaque. As a result, models become less representative, less accountable, and potentially more biased.

From this perspective, a strategy of technological monopoly based on closed models, stringent intellectual property regimes, and control over commercial knowledge-access platforms appears structurally misaligned with the requirements of effective AI development as a knowledge-accumulation system. The more knowledge is enclosed behind paywalls and patents, the less complete, less accurate, and more biased the worldview reproduced by AI systems becomes.

Within a world-systems analytical framework, this implies that a new cycle of hegemony based exclusively on control over “hardware” (chips, data centers, and energy infrastructure) is inherently vulnerable. If AI is understood primarily as a knowledge infrastructure, then the decisive arena of competition is not only the control of factories and power grids, but also the governance of the digital commons — open texts, scientific databases, open-weight models, licensing regimes, and standards of access.

In this context, China’s emphasis on open-source AI (including DeepSeek, a range of open-weight models, and publicly released optimized training stacks) can be interpreted as a strategy aimed at building an alternative center of knowledge accumulation. Over the long term, this may prove no less significant than the construction of domestic semiconductor manufacturing capacity.

If models such as DeepSeek achieve comparable performance while requiring substantially fewer computational resources, then the strategic value of superior U.S. compute capacity alone becomes

less self-evident. In such a scenario, hardware dominance may not automatically translate into the ability to impose a global technological standard or lock users into a unified American AI stack.

The resulting paradox for the United States is that the logic of efficient AI development objectively pushes toward openness, whereas the logic of geopolitical and technological hegemony requires the opposite: tighter control, export restrictions, and increasingly dense regimes of intellectual property protection around models and datasets. In this sense, the inclusion of open-source AI support within the U.S. AI Action Plan appears less as a principled commitment to openness and more as a strategic compromise — where open code is treated not as an end in itself, but as a mechanism for mobilizing a global developer ecosystem to accelerate the production of commercial, proprietary systems ultimately governed by U.S. capital.

If we summarize, a key contradiction in the contemporary U.S. strategy in the field of AI can be formulated as follows:

- ◆ On the one hand, the Trump administration treats AI as yet another general-purpose technology, the monopolistic control of which is expected to secure long-term economic and military leadership for the United States and enable the extraction of global rents from the rest of the world.
- ◆ On the other hand, AI as an infrastructure for knowledge accumulation requires broad participation, openness, and public accessibility in order to function effectively. In this sense, it demands the partial dismantling of precisely the same logic of proprietary intellectual property that underpinned the previous phase of U.S. technological hegemony.

Open models, open datasets, open-access science, and the broader digital commons create conditions for a horizontal distribution of cognitive and computational capacity across countries, universities, civil society organizations, and even individual contributors. By contrast, closed proprietary systems concentrate this capacity in the hands of a small number of corporations and states. How-

ever, this concentration comes at a cost: slower innovation dynamics, increasing epistemic inequality, and greater political vulnerability. Monopolies over knowledge can be sustained only through force — legal, economic, and, in extreme cases, geopolitical and military.

Within this dichotomy, the technological monopoly that contemporary U.S. AI strategies seek to establish appears not only politically contested but also structurally inefficient, as it conflicts with the very nature of knowledge as a non-rival, commons-based resource. This tension opens space for alternative policy trajectories — both within individual states and at the level of global coalitions — that could promote AI not as an instrument of technological hegemony, but as an infrastructure for democratized and open knowledge production.

Responding to the perceived lag in open AI development, the Trump administration has recently initiated policies aimed at expanding public access to governmental data and supporting the use of AI in scholarly research. In particular, in November 2025, a large-scale initiative to accelerate science through artificial intelligence — named the *Genesis Mission* — was announced [113]. The project is explicitly framed as comparable in scale and ambition to NASA's historic lunar program [114].

The Genesis initiative assigns the Department of Energy the task of integrating national laboratories, high-performance computing systems, and large-scale datasets into a unified platform capable of generating new scientific foundation models and enabling robotic laboratories. This approach reflects the logic of a “full-stack” strategy, in which the state invests across the entire technological chain — from hardware infrastructure to algorithms — thereby ensuring technological autonomy and maximizing systemic synergies.

Politically, this initiative is designed to provide the United States with a mechanism for setting global technological standards, thereby offering an alternative to the emerging Chinese AI ecosystem. Economically, it is expected to accelerate scientific innovation and productivity, with official projections suggesting a potential doubling of

scientific productivity over the coming decade through AI integration.

The Genesis Mission has generally received a positive response from the scientific community. However, given the still unclear scale and sources of funding, as well as the often inconsistent and at times fragmented nature of the Trump administration's broader policy approach, the future trajectory of this large-scale project remains uncertain [115].

POSSIBLE AI CRISIS

The internal contradictions of the current AI strategy under the Trump administration are already beginning to shape the broader political atmosphere in the United States. While criticism from the Democratic Party is expected, more significant is the emergence of dissenting voices within the Republican Party itself, including among supporters of the MAGA movement, which is widely regarded as the core of Trump's electoral base [116].

Conservatives in several states have opposed the White House's attempts to preempt state-level regulation of artificial intelligence through federal centralization (the so-called *preemption* initiative), which would have standardized AI governance across the country. Prominent Trump allies, including Congresswoman Marjorie Taylor Greene and Governor Ron DeSantis, have publicly criticized this initiative, insisting on the right of states to define their own regulatory frameworks — particularly in relation to privacy protection, political misinformation, and safeguards for children against digital manipulation.

At the same time, the conservative think tank *America First Policy Institute* (AFPI), which is closely aligned with Trump, has announced the development of a “pro-worker” AI policy (i.e., policies oriented toward the interests of working Americans). This approach acknowledges the risks of unemployment, automation, and potential social backlash. Within the Republican coalition, therefore, a growing division is emerging between a corporate-technocratic faction that views AI as an instrument of global dominance, and a populist-con-

servative faction that emphasizes the concerns of religious communities and wage workers, particularly with respect to labor displacement, local community stability, and cultural identity [117].

Although current-generation AI systems are not in fact capable of replacing most workers across most occupations and are better understood as auxiliary tools for business management and information services, the political and economic emphasis placed on AI investment is increasingly perceived by segments of the American public as a contributing factor to underinvestment in other sectors of the economy, as well as to worsening personal economic conditions, including rising costs of fuel and electricity.

The growing societal distrust of AI, combined with the structural limitations of current technologies and the risks of overinvestment-driven market overheating, may soon generate a broader systemic crisis in AI development — one that is not primarily technological, but economic and social in nature.

Technologically, contemporary AI systems exhibit significant limitations, particularly in at least two key areas: the ability to solve long-horizon, multi-step tasks, and the ability to clearly distinguish between task specification and the informational content required to execute that task.

First, as demonstrated in a recent METR study [118], state-of-the-art models experience a substantial decline in performance when tasks are extended over longer time horizons or decomposed into multiple sequential steps. This suggests that current AI systems tend to “degrade” when required to plan, coordinate, or execute extended chains of actions. Their strengths remain concentrated in localized tasks rather than full-scale projects or complex, multi-stage processes.

Second, there remains a significant challenge in how modern models interpret instructions and contextual information. As shown in recent research [119], even models capable of handling long-context inputs do not consistently identify relevant information within them. When necessary data is embedded in the middle of large textual inputs, retrieval performance can deteriorate

substantially. In other words, while models may perform well when given concise instructions and limited context, their performance weakens when they must first interpret complex task formulations, then locate relevant information within long, structured, or multimodal contexts (e.g., text, code, and data), and subsequently execute multi-step reasoning based on that information.

Within this spectrum of limitations — both technical and conceptual — lies a fundamental barrier to the ability of contemporary AI systems to replace humans not only in isolated tasks, but also in long-term projects, research activities, complex workflows, and creative endeavors.

These internal constraints are further compounded by economic and environmental limits on AI scalability. As demonstrated by Bhardwaj, Alexander, and Becker in *Limits to AI Growth* [120], the continued expansion of Big Tech's computational capacity faces tangible constraints, including rising energy costs, water consumption requirements, the difficulty of scaling electrical grids, and growing political resistance in regions where data centers are being constructed. As noted above, the energy demands of AI infrastructure are already increasing rapidly: according to estimates by the U.S. Energy Information Administration (EIA) and Goldman Sachs, data centers may consume more than 10% of total U.S. electricity by 2030, placing additional strain on power grids and households.

In parallel with these physical constraints, signs of an emerging investment bubble are becoming increasingly visible. Leading financial and analytical institutions, including Goldman Sachs [63] and Empirix Partners [121], warn that the rapid expansion of AI valuations is accompanied by extremely weak profitability. Their estimates suggest that annual capital expenditures in the sector have exceeded USD 1 trillion, while most companies remain unprofitable, with sectoral performance driven primarily by expectations of future growth rather than realized revenues. *Wired* [57] reports that spending on new data centers alone increased by 70% in 2025 compared to the previous year, while revenues from AI services grew by only 20%. Even

OpenAI CEO Sam Altman has acknowledged that “the current pace of capital deployment in the industry is not matched by its actual productivity.” Similar warnings about a potential AI bubble have also been issued by *Bloomberg* [122].

Analysts at TradingView and Goldman Sachs identify a risk of a correction in AI-related equities in 2026—2027, when major technology firms may begin to scale back investments in server infrastructure following a period of aggressive expansion. Around that time, Empirix Partners [121] estimates that the ratio of infrastructure expenditures to operating revenues could exceed 8 : 1 — approaching levels comparable to those observed prior to the dot-com bubble collapse of 2000. Within parts of the investment community, even more extreme scenarios are being discussed, including a so-called “global intelligence crisis” [123], characterized by large-scale displacement of white-collar employment followed by deflationary pressure in consumer markets.

Beyond financial imbalances, a crisis of trust in AI technologies may further accelerate the downturn. A 2025 McKinsey QuantumBlack report [124] finds that 80% of large enterprises do not observe significant productivity gains from AI deployment. The primary bottleneck to scaling AI, according to the report, is not computational capacity or labor shortages, but rather the inability of current models to learn effectively from experience. Systems fail to retain context, integrate feedback, or improve continuously over time, leaving most implementations at the experimental stage. This undermines business expectations and may trigger a sharp decline in investor enthusiasm.

Recent surveys by the U.S. Bureau of Labor Statistics further indicate a decline in the adoption of AI in large enterprises [125], suggesting that the efficiency gains from current-generation generative AI systems may already be approaching saturation.

Thus, a potential AI-related crisis can be expected around the 2026—2027 horizon, when several factors may converge:

- ◆ saturation of the infrastructure investment cycle (exhaustion of demand for new data centers);

- ◆ a widening gap between expected returns and the actual utilization of AI products in business applications;
- ◆ growing socio-political resistance driven by job displacement, rising energy costs, and the concentration of power in large technology corporations.

The likely “cooling phase” may evolve into not only a financial correction but also an institutional crisis of trust in AI as a general-purpose instrument of progress. If the Trump administration’s policy continues to prioritize the interests of large corporations, such a downturn may acquire a broader social dimension — ranging from labor strikes and populist mobilization to a potential revision of the entire national AI strategy under a subsequent administration.

POSSIBLE CONSEQUENCES OF AN AI CRISIS: WHAT HAPPENS IF THE BUBBLE BURSTS?

At the same time, the current AI boom does not imply that artificial intelligence itself lacks long-term potential or will cease to develop. It is possible that the industry is approaching the limits of the current paradigm based on large language models. However, multiple alternative research directions are already under development, and more significant technological breakthroughs may still emerge in the near future. In this sense, a sharp decline in AI-related equities would not represent the collapse of AI as a technological field, but rather a contraction of inflated valuations in a specific segment of the industry.

Nevertheless, such a correction could trigger a broader stock market downturn with significant geopolitical implications. A systemic financial contraction could reduce global liquidity and investment availability, generate social instability in lower-income countries, and weaken demand in the United States for Chinese exports. At the same time, an AI-driven financial crisis may disproportionately affect the American closed AI stack, while the Chinese AI ecosystem could prove relative-

ly more resilient, despite its own vulnerabilities. Historically, however, the United States has tended to be less exposed to external shocks than most other economies.

In the case of a severe geopolitical reaction, such developments could also accelerate a structural decoupling between the United States and China.

Under most realistic scenarios, further consolidation of a U.S.-dominated AI stack appears increasingly uncertain. Likewise, the current U.S. strategic ambition to decouple Russia from China and reintegrate it into an American-centered technological ecosystem also appears limited in its feasibility. Indications of interest in such an approach include, among other signals, references to joint data center development projects with Russia that reportedly appeared in the so-called Dmitriev–Witkoff “peace plan” [126]. This suggests that, for parts of the current U.S. administration, issues related to shared investment in energy infrastructure and AI data centers [127], as well as the potential integration of Russia into an American AI ecosystem, may be perceived as more strategically significant than the security concerns of European NATO allies — and, in an even broader sense, more consequential than the preservation of Ukraine’s sovereignty.

However, the realization of such plans appears unlikely even under conditions of Ukrainian capitulation. In a more realistic scenario — assuming Ukraine maintains its sovereignty — the geographical boundary between the American and Chinese AI stacks would most plausibly run somewhere across the territory of Ukraine.

Accordingly, it would be imprudent for Ukraine to ignore alternative AI ecosystems beyond the American one, including in particular the Chinese stack. China demonstrates some of the fastest rates of AI development in areas such as open-source models, professional education, and the integration of AI into public administration and healthcare systems.

China’s AI development strategy is grounded in the concept of an “intelligent society” (智能社会) — a vision of deep AI integration across all domains

of economic and social life. Official PRC planning documents project a full transition toward an intelligent economy and society by 2035, in which AI permeates law, ethics, culture, and everyday interactions [128].

This implies a transformation of the very structure of social life: changes in work, education, communication, and even cognitive practices. State policy documents emphasize that the “intelligent society” should improve overall quality of life by delegating routine and hazardous tasks to AI systems, providing smart services in education, healthcare, and elder care, enabling “intelligent governance” (including digital courts, e-government, and smart cities), and strengthening security through early-warning and monitoring systems [129]. According to this vision, widespread AI adoption is expected to increase societal welfare, with the principle that “people should fully share in the benefits of AI-driven development,” in line with China’s model of modernization.

In the Chinese conceptualization, the “intelligent society” is not only a long-term normative vision — sometimes interpreted as a form of “digital socialism” — but also a practical, system-level strategy for deploying open AI platforms under strong state coordination. Its implementation relies on centralized planning and large-scale digitalization, with the state acting as the architect of digital transformation. This is operationalized through mechanisms such as the so-called “National AI Team” — a consortium of leading technology companies (including Baidu, Alibaba, Tencent, Huawei, and others) tasked with advancing breakthroughs in key AI domains under state guidance [130].

This model enables a form of civil–military and public–private synergy, allowing the rapid mobilization of large datasets, subsidies, and national-scale infrastructure (including data center networks and supercomputing facilities) to accelerate AI deployment [131].

In addition, Chinese authorities state that digitally enabled governance enhances transparency and administrative efficiency. For example, the introduction of “smart courts” and online adjudication

platforms is framed as a mechanism for reducing local corruption through digital oversight [132]. More recently, Chinese institutions have begun deploying large language models in anti-corruption investigations, with reports suggesting that such systems can identify complex fraud patterns within days that previously required months of manual investigation [133]. In this sense, AI is used to enhance internal “transparency” understood as improved oversight of public officials.

In this context, while Ukraine remains aligned with the American AI stack, it would be strategically unwise to disregard the experiences of other technological ecosystems. In particular, careful attention should be paid to AI regulatory developments in the European Union, as well as to the practical experiences of India and China — especially with respect to civil–military technological integration and the application of AI in anti-corruption governance systems.

CONCLUSIONS ON CHALLENGES FOR AI AND R&D POLICY OF UKRAINE

Overall, Ukraine’s science and technology policy over recent decades has been largely inconsistent and often reduced to bureaucratic formalities. In the view of many researchers, it effectively remains absent. Nevertheless, the situation in the field of artificial intelligence has been comparatively stronger than in other domains. This relative advantage is linked both to the development of a robust IT outsourcing sector and to the presence of a strong academic tradition within Ukrainian universities and institutions of the National Academy of Sciences of Ukraine (NASU). Ukrainian researchers have also been among co-authors of key foundational breakthroughs that contributed to the emergence of the current generation of large language models [134]. The comparatively better state of AI development in Ukraine is also reflected in recent foresight surveys conducted by NASU [135].

A number of programs applying AI for military purposes have been implemented in recent years by the state innovation cluster and incubator Bra-

ve1 [136]. In addition, in March 2026, the Ministry of Defense of Ukraine launched the Defence AI Center of Excellence “A1,” aimed at further advancing autonomous strike capabilities. This is the first in a network of military technology competence centers being developed with support from the Government of the United Kingdom [137]. Superiority in artificial intelligence is critically important for Ukraine, as it may partially compensate for the adversary’s numerical advantage. In this domain, active cooperation with American defence companies and governmental institutions is already taking place. In particular, the Merops interceptor drone, developed with the participation of the former Google CEO Eric Schmidt in collaboration with Ukrainian military specialists, has become one of the most effective countermeasures against Iranian Shahed-type kamikaze drones, accounting for approximately 90% of intercepted UAVs of this type [138].

Ukrainian developments in combat AI are gaining increasing international significance. The escalation of conflicts in the Middle East has transformed these technologies into strategically valuable assets: the United States has deployed interceptor systems originally tested in Ukraine to counter Iranian attacks in the region [139], while Gulf countries have directly approached Ukrainian manufacturers [140, 141]. At the same time, the Cabinet of Ministers of Ukraine adopted a resolution that, for the first time globally, grants partners and international companies access to training AI models on real battlefield data — a dataset comprising millions of annotated frames collected during tens of thousands of combat sorties [142, 143]. In this way, Ukraine’s combat experience is being transformed into a technological asset of global scale, while cooperation with American defence companies and governmental institutions is becoming one of the key vectors of development for Ukraine’s defence technology sector. From a technological standpoint, Ukraine is increasingly functioning as a testing ground for the most advanced components of the American AI stack, which — at least at present — remains the most advanced globally.

Under these conditions, it is advisable for Ukraine to deliberately leverage the favorable dynamics of the global AI race in order to maximize the inflow of foreign technologies and investments into the defence sector, while demand for combat experience and operational data remains exceptionally high. Positioning Ukraine as an indispensable partner in the development of the U.S. defense AI stack creates an asymmetric leverage mechanism capable of partially compensating for traditional dependence on American security assistance. Ukraine’s strategic value for the United States is thus determined not only by geopolitical considerations, but also by a unique technological asset — real-world experience in the application of AI in conditions of full-scale warfare, which cannot currently be replicated in any other country.

Ukraine’s competitive advantages may extend beyond purely military solutions and large centralized AI data centers located near nuclear power plants, which — unfortunately — may become vulnerable targets for aerial attacks. Instead, a more resilient trajectory may lie in distributed AI systems and, correspondingly, distributed energy generation, not limited to modular nuclear reactors. Ukraine’s well-developed transport infrastructure, electrical grid, and fiber-optic communication networks create favorable preconditions for the deployment of efficient decentralized architectures.

A particular strength of Ukraine may emerge in swarm AI technologies for aerial drones and ground-based robotic systems, as well as distributed systems for detecting and countering aerial threats. A relevant example is the distributed acoustic detection system Zvook [144], capable of identifying and localizing Shahed-type drones based on the characteristic sound of their engines.

At the same time, Ukraine should maximize the use of open-source AI technologies and open-weight models, including those developed within the United States and the broader American AI stack, as well as systems originating from other countries. In light of Ukraine’s European integration trajectory, alignment with EU regulatory frameworks is necessary; however, this should not

preclude the adoption of best practices from other global technological ecosystems. In particular, significant potential exists in applying Chinese experience in the development and use of large language models for detecting corruption schemes and financial irregularities.

The U.S. R&D and technological policy, centered on the aggressive promotion and consolidation of its domestic AI stack, is inherently risky and — given the characteristics of the current administration — often lacks systemic coherence. Nevertheless, it is backed by vast financial and institutional resources. Accordingly, Ukraine should pursue a dual strategy: on the one hand, maximizing integration into the American AI ecosystem and developing high-value AI assets within its territory; on the other hand, carefully counterbalancing and, where possible, limiting potential forms of U.S.—Russia technological cooperation in this domain.

Despite the fact that, in the long term, a U.S. victory in the global AI race appears uncertain, and recent changes in the U.S. National Security

Strategy [145] reflect a de facto partial withdrawal from the role of global security guarantor, Ukraine is currently viewed by the Trump administration as a strategic asset in which substantial investments have already been made. Therefore, Ukraine's near-term strategy should be oriented toward strengthening its position as a key AI asset of the United States, particularly as a unique real-world testbed for scalable and distributed AI systems in the defense domain.

A potential collapse of the speculative AI-driven financial bubble may reduce overall investment flows, including those directed toward Ukraine; however, it is likely to have a comparatively smaller impact on defense and security-related AI technologies. In anticipation of such a scenario, Ukraine should already prepare for a post-bubble transition in which the state assumes a more active role as an investor in critical AI projects, ensuring sustained support across the entire innovation pipeline — from fundamental and applied research to prototyping and industrial-scale deployment.

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РОЗБУДОВА ПОВНОГО СТЕКУ ТЕХНОЛОГІЙ ШТУЧНОГО ІНТЕЛЕКТУ ЯК ЯДРО СУЧАСНОЇ НАУКОВО-ТЕХНОЛОГІЧНОЇ ТА ІННОВАЦІЙНОЇ ПОЛІТИКИ США

Вступ. З початком другого президентського терміну Дональда Трампа у 2025 році НТІ-політика США знала радикальної трансформації. Відмовившись від «зелених» пріоритетів попередньої адміністрації, новий уряд сфокусувався на розвитку штучного інтелекту як системоутворюючої технології.

Проблематика. Ключовою є концепція «повного стеку» ШІ — повністю американського ланцюжка від виробництва напівпровідників і дата-центрів до програмного забезпечення, що реалізується на тлі загострення конкуренції з Китаєм і ризиків інвестиційної бульбашки.

Мета. Проаналізувати трансформації науково-технологічної та інноваційної політики США у 2024—2025 роках із фокусом на формування «повного стеку» технологій штучного інтелекту й оцінити економічні й інституційні наслідки цих змін у контексті глобальної технологічної конкуренції.

Матеріали й методи. Застосовано оглядово-аналітичний метод на основі офіційних документів федерального уряду США, доповідей провідних дослідницьких центрів (*Stanford HAI, RAND, Atlantic Council*), статистичних даних та галузевих публікацій.

Результати. Нова НТІ-політика США зосереджена на п'яти напрямках: 1) дерегуляція ШІ; 2) реіндустріалізація напівпровідникового виробництва; 3) масштабне будівництво дата-центрів (*StarGate*, \$500 млрд); 4) нарощування енергетичних потужностей; 5) протистояння з Китаєм через обмеження доступу до передових чіпів. Показано принципову відмінність ШІ від попередніх технологій-гегемонів (напівпровідники, інтернет-протоколи 1990-х): ефективність ШІ як інфраструктури знань вимагає відкритості, що суперечить логіці монополізації. Виявлено ризики галузевої кризи у 2026—2027 рр.

Висновки. НТІ-стратегія США несе як виклики, так і можливості для України. Оптимальним є позиціонування країни як ключового активу американського ШІ-стеку — унікального полігону для тестування розподілених оборонних ШІ-рішень. Доцільним є також використання відкритих ШІ-технологій та підготовка до зростання ролі державних інвестицій після охолодження приватного ринку.

Ключові слова: науково-технологічна та інноваційна політика, штучний інтелект, повний стек ШІ, напівпровідникова промисловість, цифрова інфраструктура, промислова політика, технологічне врядування, технологічна конкуренція США—Китай, оборонний ШІ, подвійне використання технологій.