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119TH CONGRESS
1ST SESSION

# H. R. 5332

To direct the Comptroller General of the United States to conduct a technology assessment focused on liquid-cooling systems for artificial-intelligence compute clusters and high-performance computing facilities, require the development of Federal Government-wide best-practice guidance for Federal agencies, and for other purposes.

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IN THE HOUSE OF REPRESENTATIVES

SEPTEMBER 11, 2025

Mr. OBERNOLTE (for himself and Mr. GOTTHEIMER) introduced the following bill; which was referred to the Committee on Energy and Commerce, and in addition to the Committee on Science, Space, and Technology, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

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# A BILL

To direct the Comptroller General of the United States to conduct a technology assessment focused on liquid-cooling systems for artificial-intelligence compute clusters and high-performance computing facilities, require the development of Federal Government-wide best-practice guidance for Federal agencies, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

**SECTION 1. SHORT TITLE AND PURPOSE.**

This Act may be cited as the ''Liquid Cooling for AI Act of 2025''.

**SEC. 2. FINDINGS.**

Congress finds the following:

(1) The 2024 United States Data Center Energy Usage Report published by Lawrence Berkeley National Laboratory indicates that data centers accounted for 4.4 percent of total United States electricity consumption in 2023, up from 1.9 percent in 2018. The report further projects that data centers could represent between 6.7 percent and 12.8 percent of total electricity consumption by 2028, due to the rapid growth of AI, cloud computing, and other digital technologies.

(2) Traditional air-cooled systems are reaching limits to effectively remove heat from AI chips and hardware, and liquid cooling enhanced thermal performance is increasingly becoming a necessity for high-density AI servers and data centers due to the growing power consumption and heat generation of AI workloads.

(3) Liquid-cooling technologies, including direct-to-chip (DTC) liquid cooling and single-phase or two-phase immersion cooling, can improve thermal performance, enable higher densities, and reduce

cooling system load when properly engineered and maintained.

(4) Effective liquid-cooling deployments require interoperable components and engineered subsystems, including coolant distribution units, secondary loops, manifolds, hoses, quick-disconnects, valves, pumps, filters, leak detection and containment, corrosion control, and appropriate instrumentation and controls.

(5) Interfaces for heat-reuse are integral to liquid systems and can reduce thermal load on heat-rejection equipment by transferring heat through plate heat exchangers or other devices to beneficial secondary uses where technically appropriate.

(6) Federal agencies, including the Department of Energy, are considering the deployment of AI systems across government-owned facilities.

(7) A comprehensive, independent assessment of emerging data center architectures and cooling technologies is essential to inform efficient and cost-effective deployment decisions across the Federal Government.

**SEC. 3. LIQUID COOLING DEPLOYMENT AND SCALABILITY.**

(a) GAO REVIEW.—Not later than 30 days after the date of the enactment of this Act, the Comptroller General

of the United States shall initiate a review of the research and development needs, and the related market, technological, and regulatory conditions, affecting liquid cooling utilization by data centers.

(b) ELEMENTS.—The review required under subsection (a) shall include the following:

(1) An evaluation of liquid cooling research and development needs, and the costs and benefits for high performance computing.

(2) A description of avoided costs of energy, including deferred and avoided new electric transmission and infrastructure upgrades and associated costs.

(3) A description of increased compute capacity by enabling more energy to be used for computing workloads rather than cooling.

(4) A survey and analysis of existing research on the positive and negative effects of liquid cooling on computing performance, resiliency, and cybersecurity.

(5) An assessment of market trends and adoption rates of liquid cooling in United States data centers over the past five years.

(6) A comparison of direct-to-chip (DTC) liquid cooling and immersion cooling approaches across

representative density bands, including relating to thermal performance, maintainability, interoperability, safety, failure modes, and lifecycle cost.

(7) An evaluation of coolant options, including water, water-glycol, and engineered fluids, materials compatibility, corrosion control, bio growth mitigation, filtration, deaeration, and fluid monitoring and management.

(8) Recommendations relating to whether liquid cooling should be considered as a primary cooling option over air cooling due to the thermal conditions of computing components in servers within data centers.

(9) Development of reference architectures and layouts for rack, row, and room-level liquid distribution by density band and cooling approach.

(10) A survey of existing opportunities for reusing waste heat produced by data centers.

(11) An evaluation of failure scenarios (such as pump failures or fluid leaks) and mitigation strategies, especially in shared co-location environments.

(c) REQUIREMENTS.—

(1) RECOMMENDATIONS.—In preparing the review required under subsection (a), the Comptroller General of the United States shall include rec-

ommendations, including considerations relating to the following:

(A) The Federal Government's utilization of and ongoing research on liquid cooling technologies.

(B) Best practices and industry standards for the design and operation of liquid cooling technologies.

(C) Methods to enhance the security, reliability, and resilience of computing equipment and data centers.

(D) Methods to accelerate education on operational best practices.

(2) STAKEHOLDER INPUT.—With the goal of identifying the best practices and industry standards referred to in paragraph (1)(A), the Comptroller General of the United States shall consult with stakeholders from Federal, State, and local governments, the private sector, academia, and National Laboratories.

(3) LIQUID COOLING ADVISORY ORGANIZATION.—

(A) IN GENERAL.—In furtherance of the review required under subsection (a), including the identification of best practices and industry

standards referred to in paragraph (1)(A), the Secretary of Energy and the Comptroller General of the United States shall jointly designate a liquid cooling industry organization with which to consult and coordinate in the preparation of such review.

(B) REQUIREMENTS.—The organization designated pursuant to subparagraph (A), whether preexisting or formed specifically for the purposes described in such subparagraph, shall satisfy the following criteria:

(i) Consist of interested parties who have expertise in liquid cooling system applications in the development, operation, and functionality of AI factories or data centers, information technology equipment, or software, as well as representatives of hardware manufacturers, data center operators, or AI factory development.

(ii) Consult with relevant stakeholders, including the Department of Energy, the National Laboratories, and any college, university, research institution, industry association, company, or public interest group with applicable expertise in

any of the subject matters areas specified in clause (i).

(iii) Have as its mission the development and promotion of liquid cooling for data centers and information technology.

(d) REPORT.—Not later than 90 days after the date of enactment of this Act, the Comptroller General of the United States shall submit to the Secretary of Energy and the appropriate congressional committees a written report containing the results, findings, and any associated recommendations of the review required under subsection (a).

(e) DEPARTMENT OF ENERGY REVIEW.—Not later than 180 days after receiving the report from the Comptroller General of the United States under subsection (d), the Secretary of Energy shall—

(1) evaluate such report and any associated recommendations; and

(2) submit to the appropriate congressional committees an assessment of such report and any associated recommendations, including—

(A) relevant considerations for Congress regarding the importance of liquid cooling for the United States to maintain its global lead in AI technologies; and

(B) recommendations for research and development on liquid cooling and heat-reuse.

(f) DEFINITIONS.—In this section:

(1) AI.—The term ''AI'' has the meaning given the term ''artificial intelligence'' in section 5002 of the National Artificial Intelligence Initiative Act of 2020 (15 U.S.C. 9401).

(2) APPROPRIATE CONGRESSIONAL COMMITTEES.—The term ''appropriate congressional committees'' means—

(A) the Committee on Energy and Natural Resources of the Senate; and

(B) the Committee on Science, Space, and Technology and the Committee on Energy and Commerce of the House of Representatives.

(3) DIRECT-TO-CHIP (DTC) LIQUID COOLING.—The term ''direct-to-chip (DTC) liquid cooling'' means a liquid cooling method that involves circulating a coolant in direct contact with applicable heat-generating components, such as processors and memory modules, to efficiently absorb and transfer heat away.

(4) HEAT-REUSE.—The term ''heat-reuse'' means the capture and transfer of waste heat from

liquid loops for beneficial secondary use through appropriate interfaces and controls.

(5) IMMERSION COOLING.—The term ''immersion cooling'' means a cooling technique that involves submerging electronic components in a dielectric fluid to absorb and dissipate heat within a preset temperature range.

(6) LIQUID COOLING.—The term ''liquid cooling'' means utilization of liquids to remove heat efficiently from electronic components.

(7) NATIONAL LABORATORY.—The term ''National Laboratory'' has the meaning given such term in section 2 of the Energy Policy Act of 2005 (42 U.S.C. 15801).

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