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ABSTRACT

As society's demand for more network storage and advanced generative artificial intelligence systems increases, industries are rushing to deploy more data centers. This rapid growth of data centers has led to increased concern regarding the burden that data centers place on energy and water resources. Potable water intake and energy consumption are two well-established issues related to data centers, given that both water and electricity are necessary to run and cool equipment within data centers. As a result, data centers are developing and implementing new cooling systems that recycle water within their systems, limit evaporation, or do not rely on water so more water may be returned to natural water systems. While eliminating the need for water in cooling systems may be ideal, current waterless cooling systems have not been adapted for all climate systems and pose water-energy usage tradeoffs. Therefore, many data centers still rely on potable water to cool their equipment and discharge cooling water to groundwater, surface water, or municipal wastewater systems. Although returning data center cooling water back into the environment or reusing it as reclaimed water has its advantages, the uncertainties surrounding the potential environmental impacts of discharging cooling water and data gaps created by the lack of transparency in cooling water discharge practices raises some concerns.

This Article examines the potential environmental impacts of data center cooling water discharge practices and the evolving regulatory landscape governing data centers. Given that most data center cooling water discharge practices remain confidential, it is difficult to ascertain whether these practices impact the environment and, if so, the extent of such impact. This Article argues there is a clear lack of transparency in data center cooling water discharge practices despite the release of voluntary corporate disclosure reports. Additionally, this Article argues that although federal and state statutes may attempt to regulate data center practices, the rate of data center expansion and gaps in information likely make it difficult to create effective policies aimed at protecting the environment and human health.

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INTRODUCTION

As society's demand for more network storage and advanced generative artificial intelligence systems increases, industries are rushing to deploy more data centers.[1] Currently, the United States hosts the most data centers in the world and is the leader in data center capacity.[2] While data centers have been advertised as creating new job opportunities and strengthening local economies, data center development has been increasingly stigmatized as a burden on energy and water resources.[3] Potable water intake and energy consumption are two well-established issues related to data centers, given that both water and electricity are necessary to run and cool equipment within data centers.[4] As a result, data centers are working to develop new cooling systems that recycle water within their systems, limit evaporation, or do not rely on water, so more water may be returned to natural

1. *See* Jesse Noffsinger et al., *The Cost of Compute: A $7 Trillion Race to Scale Data Centers*, MCKINSEY & CO. (Apr. 28, 2025), https://perma.cc/QQ3T-DPMH.

2. Marcus Lu, *Ranked: The Top 25 Countries with the Most Data Centers*, VISUAL CAPITALIST (Feb. 20, 2024), https://perma.cc/6DFN-GZSW; Dorothy Neufeld, *Mapped: Data Center Capacity Around the World*, VISUAL CAPITALIST (July 30, 2025), https://perma.cc/SRJ6-6SJ2.

3. Michael Copley, *Data Centers are Booming. But There are Big Energy and Environmental Risks*, NPR (Oct. 14, 2025), https://perma.cc/LA9X-YNWU.

4. *See* Md Abu Bakar Siddik et al., *The Environmental Footprint of Data Centers in the United States*, 16 ENV'T RSCH. LETTERS, no. 6, May 2021, at 6; Rebecca Leppert, *What We Know About Energy Use at U.S. Data Centers Amid the AI Boom*, PEW RSCH. CTR. (Oct. 24, 2025), https://perma.cc/TA6V-4JRB.

water systems.[5] While eliminating the need for water in cooling systems may be ideal, current waterless cooling systems have not been adapted for all climate systems and pose water-energy usage tradeoffs.[6] Therefore, many data centers still rely on potable water to cool their equipment and discharge cooling water to groundwater, surface water, or municipal wastewater systems.[7]

Although returning data center cooling water back into the environment or reusing it as reclaimed water has its advantages, the uncertainty surrounding the potential environmental impacts of discharging cooling water and data gaps created by the lack of transparency with cooling water discharge practices raise some concerns. For example, cooling water that is released to surface waters at elevated temperatures can negatively impact water quality, vegetation, and aquatic organisms.[8] To regulate and limit the harms associated with discharging heated cooling water to surface waters, data centers must receive National Pollutant Discharge Elimination System permit approval and comply with monitoring and reporting standards.[9] However, this time-consuming and costly process may encourage data centers to seek alternatives that circumvent the permit requirement.

Using public government records and voluntary corporate disclosure reports, this paper investigates the potential environmental impacts of data center cooling water discharge. The paper raises two primary arguments. First, there is a clear lack of transparency in data center cooling water discharge practices. While some industry leaders voluntarily disclose their company's water metrics data as a part of its environmental or sustainability commitment reports, fewer companies disclose the volume of cooling water discharged by each data center location.[10] Moreover, unless mandated by federal or state environmental laws, data centers do not voluntarily disclose information on the water quality of cooling water discharge or the method used to discharge cooling water.[11]

Second, although federal and state environmental laws regulate certain discharge practices, data centers often fall outside these regulations and their monitoring and disclosure requirements. Given the costly and time-consuming processes associated with federal environmental permit approval processes, some data centers have agreements with municipalities to discharge cooling water via municipal wastewater treatment plants.[12] As a result, there are limited regulatory mechanisms that require data centers to report their cooling water discharge practices.[13] Furthermore, the absence of publicly available water quality data

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5. Alfonso Capozzoli & Giulio Primiceri, *Cooling Systems in Data Centers: State of Art and Emerging Technologies*, 83 ENERGY PROCEDIA 484, 486 (2015).

6. *Id*. at 490–91.

7. Pengfei Li *et al.*, *Making AI Less "Thirsty": Uncovering and Addressing the Secret Water Footprint of AI Models*, 68 COMM. ACM 54, 57–58 (2025).

8. EPA, THERMAL DISCHARGES IN NPDES PERMITS: OVERVIEW OF RESOURCES AND TOOLS 1 (2023), https://perma.cc/S2KW-DZDQ.

9. 33 U.S.C. § 1342.

10. *See infra* Part III.F.

11. *See infra* Part III.F.

12. *See infra* Part III.

13. *See infra* Part III.

makes it nearly impossible to determine whether data center cooling water discharge practices have an impact on local water resources and systems.[14]

Part I of this paper summarizes data center cooling practices and highlights current controversies surrounding data centers. The variety of cooling systems suggests that cooling water may interact with computing equipment in unique ways, and the water may be limited in the number of times it can be recycled within a given system. As a result, the quality and quantity of cooling water discharge is not likely consistent across all data centers. This raises questions as to the impact that discharged cooling water has on natural water systems and municipal treatment systems. Part II reviews the known environmental consequences of discharging cooling water and assesses the potential impact of data gaps on our understanding of direct and indirect discharges of cooling water. Part III analyzes the environmental laws that may apply to data center cooling water discharges and the pathways companies have utilized to avoid these regulations. This section also investigates the availability of publicly accessible data on data center cooling water discharge practices and the limitations of that information. Concentrating on major industry leaders that utilize data centers and companies that solely provide data center services, this section will review the data gaps and uncertainties resulting from the lack of transparency. Therefore, this article will discuss the potential risks associated with the continued deployment of data centers within an industry that currently lacks mandatory public disclosures and environmental safeguards.

I. WATER USAGE AT DATA CENTERS AND ITS CONTROVERSIES

Across the United States, companies are constructing more data centers to keep up with society's demand for digital services and advances in AI technology.[15] As a result, larger quantities of water and energy resources are being allocated to data centers to run and cool computing equipment.[16] Both the rapid expansion of data centers and their significant resource demands have raised questions about the environmental impacts of data centers.[17] However, many questions regarding the impacts of data centers remain unanswered because of the lack of publicly available information and limited regulatory mechanisms that require the disclosure of information.[18]

This section examines why water is a necessary component of data center cooling practices and how its usage has become a growing concern for local communities and environmentalists. First, this section outlines the various cooling systems used by data centers and summarizes the how water is used during the cooling process. Second, the section reviews the controversies surrounding data

14. *Id*.

15. Manuel Herrera et al., *Sustainable AI Infrastructure: A Scenario-Based Forecast of Water Footprint Under Uncertainty*, J. CLEANER PROD., no. 146528, Oct. 2025, at 1.

16. *See* Corin Cesaric, *AI Data Centers Are Coming for Your Land, Water and Power*, CNET (Sep. 24, 2025), https://perma.cc/P88V-6VP2.

17. Copley, *supra* note 3.

18. *See* Peyton McCauley et al., *Powering Progress or Peril? The Hidden Environmental Costs of Data Centers and AI*, 51 RUTGERS COMPUT. & TECH. L.J. SE1, SE37 (2025).

center water and electricity usage. Finally, this section examines corporate and community responses to data center water usage controversies.

A. Data Center Cooling Systems

Data centers are facilities that house advanced computer equipment and that run artificial intelligence systems and process, store, and transmit network information.[19] Regardless of whether a data center is comprised of one rack or many racks and cabinets containing computing equipment, every data center utilizes some form of cooling system.[20] Cooling systems are an essential part of data centers because they maintain the facilities' temperature and humidity.[21] Data centers must be kept within particular temperature and humidity ranges to prevent equipment from overheating, support operational efficiency, and minimize power consumption.[22]

Generally, data centers rely on air cooling, liquid cooling, and free cooling to maintain temperature and humidity.[23] Air cooling removes heat from computing equipment by pulling hot air from the server room through water-cooled chillers or a cooling tower.[24] The cooled air is then returned to the server room and the cooling loop begins again.[25] Air cooling is the most common data center cooling system because it efficiently cools equipment, has low operation costs, and is easy to maintain.[26] However, air cooling systems are not the optimal cooling system for data centers with high density workloads or high performance computing systems.[27]

Direct and indirect liquid cooling is the preferred system for high density and performance data centers because it is capable of transferring more heat per unit and is more energy efficient.[28] Rather than utilizing water for direct liquid cooling systems, equipment is placed in contact with dielectric coolants that transfer heat and recycle it in a closed loop system.[29] The liquid in indirect liquid cooling systems may consist of water or other liquid coolants since the liquid is not placed in direct contact with the equipment.[30] The challenge with direct and indirect liquid cooling is that it creates a risk for potential damage and equipment failure if the equipment is in contact with an incompatible liquid.[31]

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19. Khosrow Ebrahimi et al., *A Review of Data Center Cooling Technology, Operating Conditions and the Corresponding Low-Grade Waste Heat Recovery Opportunities*, 31 RENEWABLE & SUSTAINABLE ENERGY REV. 622, 623 (2014).
20. *Id*. at 623–24.
21. Capozzoli & Primiceri, *supra* note 5, at 485–86.
22. *Id*. at 485.
23. Ali Habibi Khalaj & Saman K. Halgamuge, *A Review on Efficient Thermal Management of Air- And Liquid-Cooled Data Centers: From Chip to the Cooling System*, 205 APPLIED ENERGY 1165, 1167 (2017).
24. *Id*.
25. *Id*.
26. *Id*. at 1170.
27. *Id*. at 1184.
28. Capozzoli & Primiceri, *supra* note 5, at 488.
29. *Id*. at 489.
30. Habibi Khalaj & Halgamuge, *supra* note 23, at 1175.
31. Capozzoli & Primiceri, *supra* note 523, at 489.

In addition to air and liquid cooling, data centers may rely on free air or water cooling.[32] While free air and water cooling may consume less power, this cooling system can only be implemented within select locations and conditions.[33] Free air cooling pulls in cooler temperature air from outside the data center to cool the equipment and then releases the warm air back outside, meaning this system is limited in its application to cooler, low humidity locations.[34] Free water cooling pulls cooler temperature water from outside the data center to cool the equipment and returns the water, and is therefore limited to locations with access to large volumes of cool water.[35]

Data centers that utilize water within their cooling systems can source water from municipal potable water resources, treated municipal non-potable water resources, private groundwater wells, or nearby surface waters.[36] Water withdrawal is defined as the volume of water that is permanently or temporarily pulled into data center facilities.[37] This water may be used directly or indirectly for data center activities.[38] Indirect water uses include electricity generation and the manufacturing of server equipment, while direct uses include water used in data center cooling systems.[39] Additionally, water consumed by data centers refers to water that has been evaporated or otherwise removed from the cooling system.[40] The water discharged from data centers includes any remaining water released from the facility.[41] Data center wastewater discharge primarily consists of "blowdown," which is cooling water that has been removed from the system and replaced with fresh water to prevent excessive concentrations of dissolved solids.[42]

B. Data Center Cooling Water and Electricity Controversies

The majority of controversies over data centers focus on electricity and water consumption because data centers demand massive amounts of both resources. Although water and electricity are two distinct resources, they are closely linked because data centers that require more energy to operate generally require more water to cool computing equipment.[43] It is estimated that about 626 billion liters of water were consumed by U.S. data centers in 2014.[44] However, it is possible

32. Habibi Khalaj & Halgamuge, *supra* note 23, at 1180.
33. *Id*.
34. MICROSOFT, MODERN DATACENTER COOLING (May 2023), https://perma.cc/KQ59-NK72.
35. Capozzoli & Primiceri, *supra* note 5, at 490–91.
36. Rasheed Ahmad, *Engineers Often Need a Lot of Water to Keep Data Centers Cool*, CIVIL ENG'G MAG. (Mar. 3, 2024), https://perma.cc/5VZ4-PQEF.
37. Li et al., *supra* note 7, at 56–57.
38. Nuoa Lei et al., *The Water Use of Data Center Workloads: A Review and Assessment of Key Determinants*, LAWRENCE BERKELEY NAT'L LAB., June 2025, at 6.
39. *Id*.
40. Li et al., *supra* note 7, at 57.
41. *Id*.
42. *Id*.
43. Miguel Yañez-Barnuevo, *Data Centers and Water Consumption*, ENV'T & ENERGY STUDY INST. (June 25, 2025), https://perma.cc/67Y9-UKDQ.
44. David Mytton, *Data Centre Water Consumption*, 4 NPJ CLEAN WATER, no. 11 (Feb. 2021), at 1.

that this number underestimates the actual total amount of water consumed that year because a majority of data centers supposedly do not track their water consumption.[45] Additionally, it is more than likely that this number does not reflect the current volume of water consumed by data centers because of the boom in data center expansion since then.[46] In regards to electricity, it is estimated that U.S. data centers consumed about 183 terawatt-hours of electricity in 2024.[47] It is likely that this number will continue to rise as the number of data centers continues to expand.[48]

The high demand for water and electricity has resulted in local communities being burdened with higher utility prices, lower water availability, and lower quality of water resources.[49] Given that the controversies surrounding higher utility prices and lower water availability are actively being addressed in other papers and contain their own complexities, this paper will not explore these issues. Instead, this paper will focus on data center water discharge and the potential impacts it has on local water resources.

The relationship between data center cooling water discharge and water resources should be explored because of the limited to non-existent data available on cooling water discharge and uncertainties regarding impacts on the environment. Additionally, communities have recently raised concerns about the impact that cooling water discharge may have on their local water resources.[50] Communities across the U.S. have found that since data centers began operating in their communities, their water quality has dramatically decreased.[51] Residents within these communities near data centers have found that their water contains excess sediment, nitrates, and per- and polyfluoroalkyl substances ("PFAS").[52] Despite these concerns, data centers continue to refuse to release information about their discharge practices, resulting in a lack of knowledge and certainty about the impacts of data center cooling water discharge on water resources.

In response to these tangible impacts, communities have been working to push for more corporate responsibility and data center transparency.[53] In this push for more transparency, communities have actively blocked or delayed data center development in an effort to reduce the potential impacts that data centers may have on their community and resources.[54] A study conducted by Data Center Watch found that from May 2024 to March 2025, 64 billion dollars of data center projects

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45. Yañez-Barnuevo, *supra* note 43.
46. *Id.*
47. Leppert, *supra* note 4.
48. *Id.*
49. Cesaric, *supra* note 16.
50. *See, e.g.*, Sean Patrick Cooper, *'The Precedent Is Flint': How Oregon's Data Center Boom Is Supercharging a Water Crisis*, ROLLING STONE (Nov. 24, 2024), https://perma.cc/37RE-HS58.
51. Michelle Fleury & Nathalie Jimenez, *"I Can't Drink the Water" – Life Next to a US Data Centre*, BBC NEWS (July 10, 2025), https://perma.cc/Y3WW-7QRF; *see, e.g.*, Cooper, *supra* note 50.
52. Tom Perkins, *Advocates Raise Alarm Over PFAS Pollution From Datacenters Amid AI Boom*, GUARDIAN (Oct. 4, 2025), https://perma.cc/TZ8L-VEYK; Fleury & Jimenez, *supra* note 51; Cooper, *supra* note 50.
53. *See, e.g.*, Cooper, *supra* note 50.
54. *See id*.

in the U.S. were blocked or delayed due to local opposition.[55] Interestingly, data center opposition is a bipartisan issue that is largely motivated by local concerns.[56]

II. ENVIRONMENTAL IMPACTS OF COOLING WATER DISCHARGE

Energy consumption, water withdrawal, water consumption, and carbon emissions have been at the forefront of AI and data center environmental discourse.[57] However, data center cooling water discharge has not been well addressed despite its potentially significant interactions with natural water systems and public water utility systems.[58] Cooling water discharged to surface waters, groundwater, water treatment plants, or municipal sewer systems presents distinct challenges, which are further influenced by source water quality and unique cooling systems.

This section will analyze the known environmental consequences of discharging cooling water, drawing attention to the significant data gaps that potentially hide the full impacts of data center cooling water discharge practices. This section will first discuss the variety of factors that potentially alter cooling water quality. Then, this section will review the potential impacts that cooling water discharge has on municipal treatment plants, groundwater, and surface waters.

A. Cooling Water Discharge Quality

The quality of cooling water discharge likely varies depending on the quality of the water pulled into the data center and the specific cooling system implemented at the data center.[59] However, it is difficult to ascertain the actual quality of the cooling water discharge because corporations are generally not required to release information about the contaminants that cooling water may interact with, the concentration of contaminants in the discharged cooling water, the discharge location, or the quantity of cooling water discharge.[60]

55. *See* DATA CTR. WATCH, $64 BILLION OF DATA CENTER PROJECTS HAVE BEEN BLOCKED OR DELAYED AMID LOCAL OPPOSITION 1 (2025), https://perma.cc/B4MJ-NZW4.

56. *Id*. at 2.

57. Whitni Simpson, *A Need to Regulate the Environmental Impacts of Artificial Intelligence (AI): Preserving Clean Water for Humans, Not Robots*, 38 TUL. ENVTL. L.J. 133, 134, 137–38 (2025).

58. WASH. DEP'T OF ECOLOGY, METHODS TO REDUCE OR AVOID THERMAL IMPACTS TO SURFACE WATER: A MANUAL FOR SMALL MUNICIPAL WASTEWATER TREATMENT PLANTS 1–2 (2007); *Water Reuse Case Study: Quincy, Washington*, EPA (July 17, 2025), https://perma.cc/R5RP-ATLE.

59. *Best Management Practice #10: Cooling Tower Management*, U.S. DEP'T OF ENERGY, https://perma.cc/VZL8-CTRY; Rebecca Maco et al., *An Industry in Transition 1: Data Center Water Use,* DATA CTR. DYNAMICS (Nov. 29, 2021), https://www.datacenterdynamics.com/en/opinions/an-industry-in-transition-1-data-center-water-use.

60. *See generally* EQUINIX, UNDERSTANDING CUSTOMER WATER CONSUMPTION AND WUE REPORTS (2024), https://perma.cc/8ZVK-C7X3 (corporations such as Equinix generate data center water reports, but this information is only provided to Equinix customers, and the report may not be released to the public).

The quality of water drawn into data centers can impact the quality of cooling water discharge and number of times the water can be cycled through the system.[61] For this reason, data centers generally prefer to source potable water as their cooling liquid because it reduces the risk of clogged pipes, corrosion, mineral buildup, and bacterial growth.[62] However, sourcing cooling water from surface waters or groundwaters, then running the drawn water through cooling systems, does not guarantee that the discharged water will be of the same quality or have no significant impact to the discharge location/medium.[63]

The development of data centers in water scarce regions and public opposition to large-scale water consumption has pushed some data centers to develop cooling systems that rely on non-potable freshwater or reclaimed water.[64] Cooling systems that utilize non-potable freshwater or reclaimed water may reduce the strain on local water resources, but it creates an issue for data centers because this water is concentrated with harmful bacteria and dissolved solids.[65] Even if the water is run through an onsite treatment system that filters out these contaminants, once the water is cycled through the system several times, the contaminants begin to concentrate again and must be discharged.[66] Some data centers may elect to filter the water through the same onsite water treatment system before discharging it, however, the lack of information on discharge practices makes it difficult to determine if this is a common practice.[67]

Furthermore, water drawn into the data center may not have high concentrations of contaminants, but once it has been cycled through several times, the contaminant concentration increases because water has evaporated from the system.[68] Water that has been cycled through several times is classified as blowdown and generally contains higher concentrations of total dissolved solids, salts, chlorides, and other contaminants.[69] Given that cooling water discharge with high concentrations of pollutants likely poses a risk to water resources, it is important that cooling water discharge practices be monitored. However, companies are not required to disclose information regarding the quality of their discharged cooling water or specific discharge practices.

B. Impacts From Discharges to Treatment Plants

Cooling water discharged to treatment plants may have the potential to indirectly introduce pollutants into natural water resources and reduce the efficiency of municipal sewer and treatment systems. The elevated concentrations of certain pollutants in cooling water discharge may not have historically been

61. U.S. DEP'T OF ENERGY, *supra* note 59; Maco, *supra* note 59.
62. Ahmad, *supra* note 36.
63. *Id*.
64. Katy Allan, *Reclaimed Wastewater to Be Used at 20 AWS Locations*, DATA CENTRE MAG. (Nov. 28, 2023), https://perma.cc/5FG2-KXGL.
65. Dan Swinhoe, *Amazon to Expand Number of Data Centers Using Recycled Water to 120*, DATA CTR. DYNAMICS (June 9, 2025), https://perma.cc/S6QX-HJH2.
66. *Id.*
67. *Id.*
68. Cooper, *supra* note 50.
69. Swinhoe, *supra* note 65.

targeted by municipal wastewater treatment plants that receive industrial wastewater. Therefore, some treatment plants lack the mechanisms to remove these pollutants or reduce their concentration to acceptable levels.[70] As a result, cooling water indirectly discharged to municipal wastewater treatment plants and then to groundwater or surface water resources may be of lower water quality than local potable groundwater resources.[71]

Cooling water discharge at elevated temperatures can also have a negative impact on municipal sewer and treatment systems.[72] The introduction of excess heat that exceeds 104 degrees Fahrenheit can inhibit biological activity in the water treatment facility and disrupt treatment operations.[73] Although cooling water from data centers is given some time to cool before reaching water treatment centers or sewer systems, this does not guarantee that temperatures have sufficiently cooled to levels that will not negatively affect existing wastewater treatment systems.

C. *Impacts from Discharges to the Ground and Surface Waters*

Discharging data center cooling water directly into the ground or surface water may create pollution problems. If the discharged cooling water contains high concentrations of contaminants, then pollutants may be directly introduced into natural water resources. Additionally, even if the discharged cooling water does not contain high concentrations of pollutants, directly discharging to ground and surface waters may still result in the negative alteration of water resources. The limited data on discharged cooling water characteristics and the absence of water quality monitoring near data centers necessitates further exploration of the impacts of data center cooling water discharge on natural water resources.

Enhanced aquifer recharge research published by the EPA has demonstrated that aquifer recharge has the potential to contaminate existing aquifers.[74] The injection of source water into existing aquifers may introduce chemical and microbial contaminants while mobilizing contaminants already present in the aquifer.[75] Treating the source water prior to injection via advanced water treatment or reverse osmosis may alter the water quality of the aquifer if the injection water's acidity and oxygen levels are not matched to the aquifer.[76] Given the complexities and limited scope of existing research on aquifer research using data center cooling water, it is difficult to measure the actual environmental impacts of this practice.

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70. Mary Sadler et al., *Total Dissolved Solids (TDS) Impacts on Wastewater Treatment and NPDES Permit Compliance*, HAZEN & SAWYER (Feb. 7, 2023), https://perma.cc/N3GA-NLAL; Ahmad, *supra* note 36.

71. EPA, *supra* note 58.

72. *High Temperature Impact on Wastewater Treatment Systems*, EBS (June 6, 2025), https://perma.cc/9AFS-HFLD; *Managing Wastewater Temperature in the Water Treatment Process*, WALCHEM, https://perma.cc/T4QS-LGDG.

73. EPA, INTRODUCTION TO THE NATIONAL PRETREATMENT PROGRAM 3-2 (June 2011), https://perma.cc/2W82-26AT.

74. *Enhanced Aquifer Recharge Research*, EPA (Dec. 1, 2025), https://perma.cc/44VY-B72Y.

75. *Id.*

76. *Id.*

In addition to the influx of pollutants such as total dissolved solids and chlorides, the discharge of elevated temperature water can have detrimental impacts to the environment.[77] Similar to cooling water discharge from thermal power plants, cooling water discharge from data centers can physically alter the biological processes of aquatic organisms and water quality.[78]

III. ENVIRONMENTAL LAWS APPLICABLE TO DATA CENTER COOLING WATER DISCHARGE PRACTICES

Currently, there are a limited number of regulatory mechanisms that require the disclosure of data center practices and monitoring data. This absence of data center-focused state and federal regulations has resulted in limited transparency and more uncertainty about the impacts of cooling water discharge practices. The lack of transparency makes it difficult for the public to make informed decisions about data center development and for lawmakers to create regulations that address the concerns associated with data centers.[79]

A. Clean Water Act

Cooling water that has been cycled through the data center facility and has not evaporated can be directly discharged to nearby surface water. Data centers that elect to discharge cooling water to surface waters are regulated by the Clean Water Act ("CWA")[80] and are required to receive National Pollutant Discharge Elimination System ("NPDES") permit approval.[81]

The CWA regulates the discharge of pollutants into navigable waters and sets quality standards for surface waters.[82] Section 301 of the CWA prohibits the unpermitted discharge of pollutants into waters of the United States.[83] The term "pollutant" is defined as "heat . . . industrial, municipal, and agricultural waste discharged into water."[84] To ensure that point sources do not negatively impact water quality, NPDES permits establish pollution limits and require compliance monitoring.[85] Pollution limits are based on water quality-based effluent limits ("WQBELs") and technology-based effluent limits ("TBELs").[86] Additionally, the

77. WASH. DEP'T OF ECOLOGY, *supra* note 58, at 1–3.

78. *Id*. at 3; William Thomas, *Thermal Discharges: A Legal Problem*, 38 TENN. L. REV. 369, 371–72 (1971).

79. Emily Feng & Ryan Murphy, *Virginia Is for … Data Centers? Residents Are Increasingly Saying 'No'*, NPR (July 16, 2025), https://perma.cc/QLA4-6YB6; Peyton McCauley & Melissa Scanlan, *Data Centers Consume Massive Amounts of Water — Companies Rarely Tell the Public Exactly How Much*, THE CONVERSATION (Aug. 19, 2025), https://perma.cc/2SUR-U43P.

80. 33 U.S.C. §§ 1251–1387.

81. 33 U.S.C. § 1342(a).

82. *Summary of the Clean Water Act*, EPA (May 22, 2025), https://perma.cc/G54C-FBLY.

83. 33 U.S.C. § 1311.

84. 33 U.S.C. § 1362(6).

85. *Clean Water Act (CWA) Compliance Monitoring*, EPA (Sep. 2, 2025), https://perma.cc/U8LK-RDRR.

86. *Permit Limits - TBELs and WQBELs*, EPA, https://perma.cc/UMW6-DT8J.

approval of NPDES permits is contingent on permittees monitoring their discharge and reporting on their monitoring results.[87] This information is published on the EPA's publicly available Enforcement and Compliance History Online ("ECHO") database.[88] Discharge monitoring reports may also be available on state NPDES permit databases or equivalent state water discharge permit databases because states often implement the CWA through their own state programs.[89] For example, Google's data center campus in Douglas County, Georgia has received an NPDES individual permit to discharge cooling water to an unnamed tributary of the Chattahoochee River.[90] The monitoring reports and compliance status for the Google Douglas County data center are accessible on ECHO.[91] Discharge monitoring reports are important because they are one of very few sources that provide data on the quality and quantity of cooling water discharge.[92]

Although the CWA may impose strict water quality standards and compliance monitoring requirements, NPDES permittees discharging to U.S. waters may seek a variance from otherwise applicable limits if certain criteria are met.[93] NPDES permit variances may be applicable to data centers because some data centers qualify as manufacturing and industrial facilities that withdraw more than two million gallons of water per day from waters of the United States and use at least twenty-five percent of the water cooling purposes.[94] For example, data center NPDES permittees may receive a thermal variance if they are able to demonstrate to the EPA or state agency that the variance will "assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of water."[95]

Rather than discharge cooling water to surface waters and undergoing the NPDES permit approval process, some data centers discharge to municipal wastewater treatment facilities or sewage treatment facilities.[96] While these data centers may not be required to receive an NPDES permit, they must meet National Pretreatment Program requirements, and municipalities must meet NPDES permit requirements.[97] Under the CWA, the National Pretreatment Program requires that nondomestic dischargers comply with pretreatment standards to ensure that the goals of the CWA are attained.[98] These pretreatment regulations apply to all nondomestic sources that introduce pollutants into publicly owned treatment works

87. 40 C.F.R. § 122.41(l)(4)(i).

88. *Water Pollution Search*, EPA ENFORCEMENT & COMPLIANCE HIST. ONLINE, https://perma.cc/C298-YZXR.

89. *See, e.g.*, *NPDES Permits Lookup*, VA. DEP'T OF ENERGY, https://perma.cc/VNH6-3PXS (example of a state NPDES permit database).

90. *Detailed Facility Report: Google, LLC Lithia Springs*, EPA ENFORCEMENT & COMPLIANCE HIST. ONLINE, https://perma.cc/CG3G-BXCC.

91. *Id.*

92. *See id.*

93. 33 U.S.C. § 1326(a).

94. 79 Fed. Reg. 48300 (Aug. 15, 2014) (codified at 40 C.F.R. pts 122, 125).

95. 40 C.F.R. § 125(h).

96. *See, e.g.*, META, 2025 ENVIRONMENTAL DATA INDEX at K (2025), https://perma.cc/4DCA-7Y68 (all Meta data centers discharge to third-party water sources such as municipal sewers).

97. *See* EPA, *supra* note 73.

98. 40 C.F.R. § 403.

("POTWs"), such as sewage treatment plants operated by a government entity.[99] This program is specifically designed to prevent the introduction of pollutants into POTWs and improve opportunities to recycle/reclaim industrial wastewaters.[100] The pretreatment program specifically targets pollutants with high biochemical oxygen demand, total suspended solids, bacteria, oil/grease, pH, heat, and corrosive pollutants in order to reduce damage to the POTW.[101]

There are three primary challenges associated with regulating data centers and ensuring that data center practices are transparent to the public under the CWA. The first challenge is that not all data centers fall within the scope of CWA and NPDES permitting system. The CWA may not regulate all data center cooling water discharge practices because data centers may not directly discharge pollutants to waters of the U.S or wastewater treatment plants. If the data center's discharge practices do not fall within the CWA, then the data center is not required to comply with the applicable discharge monitoring or reporting requirements. Therefore, the CWA's reach is limited, and information regarding the data center discharge practices is not required to be published on ECHO or other NPDES permit databases.

The second challenge is that even if a data center is regulated by CWA and subject to NPDES permit requirements, it can be difficult to access NPDES permit compliance monitoring data and discharge water standards for the data center. Occasionally, EPA's ECHO and state equivalent NPDES permit databases do not provide complete or accurate reports on data center discharges mandated by NPDES permits.[102] Whether this gap in data results from delays in posting, missing monitoring reports, or other factors, this information gap raises important questions about accessibility and transparency surrounding data center discharge practices.

The third challenge is that data centers may design their discharge method to avoid NPDES permit monitoring and reporting requirements by indirectly discharging cooling water to POTWs. When data centers indirectly discharge to POTWs, data centers are bound by National Pretreatment Program requirements, but are not required to publish discharge monitoring data.[103] Instead, POTWs are the only parties required to publish their discharge monitoring data on ECHO or state equivalent NPDES permit databases.[104] As a result, significant barriers to transparency persist in data center cooling water discharges, particularly where NPDES reporting is avoided through indirect POTW discharges. As demonstrated by cooling water discharge practices at Meta data centers, indirectly discharging cooling water to POTWs is not uncommon.[105] As of 2024, all of Meta's data centers in the United States discharge cooling water to third parties, such as municipal sewers.[106] For this reason, Meta is not required to publish data regarding

99. EPA, *supra* note 73, at 2-2.
100. 40 C.F.R. § 403.2.
101. EPA, *supra* note 73, at 1-4 to 1-5.
102. McCauley, *supra* note 1818, at 39–40.
103. *See* EPA, *supra* note 73.
104. *Id*.
105. *See* META, *supra* note 92, at K.
106. *Id.*

the quality of its cooling water or the volume of cooling water each data center discharges.

B. Safe Drinking Water Act

An alternative to discharging data center cooling water to waters of the U.S. is to inject it underground using injection wells. The practice of injecting water into empty or existing aquifers is known as artificial groundwater recharge (artificial recharge).[107] The primary benefits of injecting cooling water into surrounding aquifers is that it assists in the management of groundwater resources and may be used to store additional water that may be recovered at a later date.[108] Nonetheless, the impacts of injecting data center cooling water underground are uncertain, given the limited data and uncertainty regarding this practice.[109]

Under the Safe Drinking Water Act ("SDWA"), the disposal and storage of water underground using injection wells is regulated by the Underground Injection Control Program ("UIC").[110] The purpose of the UIC is to protect underground drinking water resources and public health.[111] For this reason, owners and operators of injection wells are prohibited from engaging in activities that would allow contaminants to enter drinking water, violate drinking water regulations, or adversely affect human health.[112]

Under the UIC, injection wells are grouped into six classes depending on the well's functions and construction.[113] A majority of UIC activity focuses on Class II wells, which are wells used to inject fluids related to oil and gas production.[114] Class V wells receive the next highest level of regulatory attention under UIC programs.[115] Class V wells are comprised of wells that do not fall within the description of any other well classes and are used to inject non-hazardous fluids underground.[116] The fluids from Class V wells are injected into or above underground sources of drinking water.[117] Unlike other well classes that require permit approval, Class V wells are authorized by rule, meaning that Class V wells receive development and operational approval if the owner or operator demonstrates that the injection will not endanger any underground sources of drinking water ("USDWs"), the well will not be operated in a way that endangers

107. Zachary A. Bray, *The Fragile Future of Aquifer Storage and Recovery*, 57 SAN DIEGO L. REV. 1, 5 (2020).

108. *Aquifer Recharge and Aquifer Storage & Recovery*, EPA, https://perma.cc/EMU4-EB6N.

109. Bray, *supra* note 107, at 16–18.

110. EPA, UNDERGROUND INJECTION CONTROL (UIC) FACT SHEET 1 (Apr. 2020), https://perma.cc/JEJ4-WST2.

111. *General Information About Injection Wells*, EPA (June 24, 2025), https://perma.cc/K5JT-3BBN.

112. 40 C.F.R. § 144.12(a).

113. EPA, *supra* note 110.

114. *Id.*

115. *Id.*

116. *Class V Wells for Injection of Non-Hazardous Fluids into or Above Underground Sources of Drinking Water*, EPA (Oct. 16, 2025), https://perma.cc/PNK8-3SJV.

117. *Id.*

USDWs, and the well will be properly closed when it is no longer being used.[118] However, if it appears that the Class V well requires remedial action, then the owner or operator must receive an individual or area Underground Injection Control program permit or the Director must require remedial action or closure by order.[119]

Even if a Class V well is approved and does not require a permit, the well will be subject to compliance inspections.[120] However, inspections of Class V wells occur far less frequently, typically a few times over the well's operating life, whereas Class II wells are inspected annually or every few years.[121] In addition to being subject to less inspections, Class V wells do not need to meet the same monitoring or disclosure requirements as other well classes.[122] Additionally, the monitoring and reporting requirements of Class V wells depend on the purpose of the well and quality of the recharge water.[123] If the purpose of the Class V well is aquifer recharge or recovery, recharge water quality must be routinely monitored to determine whether the injected fluid contains a pollutant and is compatible with the water quality within the aquifer.[124] If the Class V well is used solely for non-contact cooling water, monitoring may not be required.[125] Monitoring is generally not required for non-contact cooling water because the fluid does not contain additives and has not been chemically altered.[126] The EPA's underground injection control study on non-contact cooling water wells theorized that the only characteristic change in the water is the temperature, and that low levels of additives/chemicals present in water are inconsequential.[127]

Currently, there is no publicly available information that identifies individual data centers that discharge cooling water through injection wells.[128] However, if a

118. *Federal Requirements for Class V Wells*, EPA (June 24, 2025), https://perma.cc/ENX4-5FZR.

119. 40 C.F.R. § 144.1(g).

120. EPA, *supra* note 110.

121. *Id.*

122. *Compliance Reporting Requirements for Injection Well Owners and Operators, and State Regulatory Programs*, EPA (Dec. 9, 2025), https://perma.cc/RR8J-84J6.

123. *See generally* EPA, THE CLASS V UNDERGROUND INJECTION CONTROL STUDY VOLUME 21: AQUIFER RECHARGE AND AQUIFER STORAGE AND RECOVERY WELLS (1999), https://perma.cc/X8BQ-QJAU [hereinafter EPA, AQUIFER RECHARGE AND AQUIFER STORAGE AND RECOVERY WELLS] (the EPA Class V Underground Injection Control Study classified twenty-two types of Class V wells based on what was injected into the wells; Volume 21 analyzed Class V wells used for aquifer recharge and aquifer storage and recovery wells); EPA, THE CLASS V UNDERGROUND INJECTION CONTROL STUDY VOLUME 22: NONCONTACT COOLING WATER WELLS (1999), https://perma.cc/M9ZQ-E6LC [hereinafter EPA, NONCONTACT COOLING WATER WELLS] (Volume 22 analyzed Class V wells that injected noncontact cooling water).

124. EPA, AQUIFER RECHARGE AND AQUIFER STORAGE AND RECOVERY WELLS, *supra* note 123.

125. EPA, NONCONTACT COOLING WATER WELLS, *supra* note 123.

126. *Class V UIC Study Fact Sheet: Noncontact Cooling Water Wells*, EPA, https://perma.cc/CR8L-ESEH.

127. EPA, NONCONTACT COOLING WATER WELLS, *supra* note 123.

128. Mike Price, *Data Centers and Groundwater*, WATER WELL J. (Dec. 23, 2025), https://perma.cc/DEM8-VLJW.

data center discharges its cooling water via injection wells, these wells should be classified as Class V wells because the cooling water is a non-hazardous fluid that has not come into contact with industrial contaminants. Given that Class V wells are authorized by rule, data center cooling water discharge injection wells are not subject to all UIC well monitoring and reporting requirements. Data center cooling water discharge injection wells are also not likely to be subject to the permitting requirements applicable to high risk Class V wells, as noncontact cooling water does not interact with industrial contaminants and is considered unlikely to have the potential to contaminate groundwater. As a result, it is unlikely that data center cooling water discharge injection wells will be required to monitor and report discharge practice information under the SDWA. Without mandatory monitoring and reporting, neither the public nor lawmakers can find out the scope and scale of data center discharge practices or examine the potential environmental consequences of such practices.

C. California Programs

In the absence of federal regulatory or legislative programs, some states have proposed regulatory mechanisms that focus on increasing data center transparency and accountability. For example, in 2025, California proposed a bill requiring data center operators to disclose their estimated or actual water use to their water supplier as a condition of obtaining or renewing a business license. This bill was intended to provide more transparency regarding water usage at data centers. The sponsor of the bill argued that its requirements for data centers were a "pragmatic solution that carefully considers a delicate balance of resource demand, local resources constraints, and revenue benefits of data center expansion."[129] Although the California legislature passed the bill, California Governor Newsom vetoed it, stating that it "imposed rigid reporting requirements about operational details on this sector without understanding the full impact on businesses and the consumers of their technology."[130]

D. Federal Programs

In February 2024, in response to growing environmental concerns and a better understanding of the benefits of AI development, the U.S. Senate introduced the Artificial Intelligence Environmental Impacts Act of 2024.[131] The purpose of this Act is to promote transparency and accountability in AI development and use.[132] This Act requires the EPA to execute a study on the environmental impacts of AI[133] and the National Institute of Standards and Technology to develop a voluntary reporting system for such impacts.[134] One key element of the Act is that

129. *AB 93: Water Resources: Data Centers*, CALMATTERS, https://perma.cc/5TZK-QMVX (click on "Analysis" header in top menu).
130. *Id*.
131. S. 3732, 118th Cong. (2024).
132. *Id*.
133. *Id*. § 4(a).
134. *Id*. § 6(a).

it requires the study of water consumption for data center cooling and the impacts that water withdrawals have on local water resources.[135] Additionally, the Act identifies, as an example guideline for the voluntary reporting system, a guideline on how to calculate and report water consumption.[136] Although this bill does not specifically discuss water discharges, water discharge calculations are a necessary part of determining water consumption values. The Act does not strictly outline AI data center disclosure requirements or mandate reporting, but encourages law makers and agencies to closely examine the consequences of AI development.[137] While the bill was read twice and referred to the Senate Committee on Commerce, Science, and Transportation, it has yet to be passed by the Senate and House of Representatives and approved by the president.[138] This inaction highlights the current lack of transparency surrounding data practices and the need for regulations that specifically target data center operations.

Despite this bill's introduction in Congress, the environmental impact of AI may not be a principal concern for Congress. In 2024, the Bipartisan Senate AI Working Group released a report titled *Driving U.S. Innovation in Artificial Intelligence*.[139] This roadmap was intended to identify AI-related areas that could benefit from policy implementation.[140] One of the primary areas of concern was transparency, explainability, intellectual property and copyright.[141] While transparency and explainability is an area of concern, this concern was specifically targeting the need for disclosure for products that use AI and data sets used to train AI models.[142] The roadmap did not provide an explanation for the lack of discussion regarding the environmental consequences of AI innovation. However, this may be attributed to the fact that at the time the bill was proposed, the working group was focusing on the application of AI, rather than AI infrastructure and AI facility development.

E. Executive Orders

The growth of data centers and increased reliance on AI has prompted the executive branch to publish executive orders ("EOs") and reports on AI use in the United States. Recent EOs have focused on promoting AI development and ensuring AI security.

On October 30, 2023, former President Biden issued EO 14110: Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence.[143] While

135. *Id*. § 4(b).
136. *Id*. § 6(b)(1).
137. *See id*. §§ 4–6.
138. *See S.3732 - Artificial Intelligence Environmental Impacts Act of 2024*, CONGRESS.GOV, https://www.congress.gov/bill/118th-congress/senate-bill/3732 (last visited Mar. 30, 2026).
139. U.S. SENATE, BIPARTISAN SENATE AI WORKING GRP., DRIVING U.S. INNOVATION IN ARTIFICIAL INTELLIGENCE: A ROADMAP FOR ARTIFICIAL INTELLIGENCE POLICY IN THE UNITED STATES SENATE (May 2024), https://perma.cc/YTS7-NU7X.
140. *Id*.
141. *Id*. at 2.
142. *Id*. at 15.
143. 88 Fed. Reg. 75191 (Nov. 1, 2023).

EO 14110 primarily focused on the security of AI technology and consumer protection, it played a role in prompting the publication of a report titled *AI Assessment: Powering and Permitting* in January 2025.[144] Although the 2025 AI Assessment briefly discussed AI permitting challenges, it focused on the CWA permitting process, rather than improving CWA regulations and data disclosures.[145] Additionally, the assessment broadly highlighted the need to safeguard the nation's interests in water, air, and electricity resources while supporting the economic competitiveness of AI by streamlining permitting processes for data centers.[146]

In January 2025, following EO 14110, Biden issued EO 14141: Advancing United States Leadership in Artificial Intelligence Infrastructure.[147] Key provisions of EO 14141 aimed to expedite the development of AI infrastructure by streamlining the permitting process while enforcing climate-related requirements.[148] Similar to EO 14110, efforts to streamline environmental permitting focused on section 404 of the CWA, which regulates discharge of dredged or fill material into U.S. waters,[149] and was directed to assist with environmental permits for the development and construction of AI data centers, not to regulate their subsequent operation.

While President Trump revoked EO 14110 and EO 14141 in 2025, Trump published EO 14318: Accelerating Federal Permitting of Data Center Infrastructure and the related report *Winning the Race, America's AI Action Plan*.[150] Both EO 14318 and the AI Action Plan emphasize that the federal permitting system is a barrier to AI data center development and innovation.[151] EO 14318 and the Action Plan specifically outline that the U.S. Army Corps of Engineers shall review permits issued under section 404 of the CWA.[152] While the Action Plan does mention expediting Clean Water Act permitting, it does so only briefly as a recommended policy action.[153]

Despite the number of executive orders and initiatives addressing AI development and infrastructure, these actions only focus on streamlining permitting requirements for data center construction rather than regulating data center operations. As a result, data center cooling water discharges are not among the issues eligible for expedited review or policy review.

144. U.S. WHITE HOUSE, AI ASSESSMENT: POWER AND PERMITTING (Jan. 2025), https://perma.cc/94QU-B7GR.
145. *See id*. at 7, 14.
146. *See id*. at 7–8.
147. 90 Fed. Reg. 5469 (Jan. 17, 2025).
148. *See id*.
149. *See id.* at 5482; *Overview of Clean Water Act Section 404*, EPA (Feb. 21, 2025), https://perma.cc/GR7T-S6ZJ.
150. 90 Fed. Reg. 35385 (July 28, 2025); U.S. WHITE HOUSE, AMERICA'S AI ACTION PLAN (July 2025), https://perma.cc/RS8F-P8UK.
151. *See* 90 Fed. Reg. 35385 (July 28, 2025); U.S. WHITE HOUSE, *supra* note 150, at 14.
152. *See* 90 Fed. Reg. 35385 (July 28, 2025).
153. *Id*.

F. *Environmental Social Governance and Voluntary Corporate Disclosures*

The limited reach of federal and state environmental laws governing data center cooling-water discharges has led to a lack of transparency regarding these practices and their impacts on local resources, including access to clean, safe drinking water.[154] Residents relying on water from private wells have reported a significant shift in water quality since the construction of nearby data centers.[155] The water drawn from their private wells have become noticeably more sediment-filled, forcing them to repair clogged pipes and purchase drinking water.[156] In response to these statements, data centers have firmly asserted that their operations have not adversely affected groundwater conditions.[157] However, data centers have not provided any hard evidence proving that their water withdrawal or discharge practices have not affected local water resources.[158] While it is unlikely that data centers have monitoring wells in nearby communities checking local groundwater quality, data centers could provide information on the quality and quantity of water that is discharged from their facilities. Information such as additives to the cooling water, concentration of pollutants, interactions with equipment, and discharge location would assist in determining the likelihood of harms to local water resources. The limited amount of data available make it nearly impossible to ascertain the root cause of these changes in water quality or to assess the potential consequences of lower water quality for human and environmental health.

In response to growing concerns about the impact of data center growth, many industry leaders have labeled themselves as "responsible partners" and released sustainability or environmental reports.[159] However, the breadth of data shared in these reports is highly variable and often does not include information about individual data center practices.[160] This reluctance to release information may be partially attributed to fears that sharing information could give rivals a competitive edge or spur more public opposition.[161]

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154. Eli Tan, *Their Water Taps Ran Dry When Meta Built Next Door*, N.Y. TIMES (July 14, 2025), https://www.nytimes.com/2025/07/14/technology/meta-data-center-water.html (on file with the *UC Law Environmental Journal*).

155. Michelle Fleury, *Data Centers Are Causing Problems for Their Neighbors*, MARKETPLACE TECH (Aug. 11, 2025), https://www.marketplace.org/episode/2025/08/11/data-centers-are-causing-problems-for-their-neighbors; Tan, *supra* note 154; Fleury & Jimenez, *supra* note 51.

156. Tan, *supra* note 154; Fleury & Jimenez, *supra* note 51.

157. Fleury & Jimenez, *supra* note 5151.

158. *Id*.

159. *See, e.g.*, AMAZON, 2024 AMAZON SUSTAINABILITY REPORT (July 2025), https://perma.cc/5G64-KRFM; GOOGLE, 2025 ENVIRONMENTAL REPORT (June 2025), https://perma.cc/MS8C-GWSM.

160. Luke Barratt & Rosa Furneaux, *Amazon Strategised About Keeping Its Datacentres' Full Water Use Secret, Leaked Document Shows*, GUARDIAN (Oct. 25, 2025), https://perma.cc/TUC7-42TJ.

161. Mike Rogoway, *The Dalles Sues to Keep Google's Water Use a Secret*, THE OREGONIAN (Nov. 1, 2021), https://perma.cc/E4CN-PD2Y; Nikitha Sattiraju, *Google Data Centers' Secret Cost: Billions of Gallons of Water*, BLOOMBERG (Apr. 1, 2020),

Many industry leaders have also announced commitments to water positive projects and global water initiatives.[162] While these projects have the potential to make a positive impact on water resources and aquatic ecosystems globally, many of them do not attempt to resolve the challenges associated with water scarcity or water quality in areas where data centers are located.[163] If water restoration projects target areas where data centers are located, these projects focus on issues other than water scarcity and quality issues, such as ecosystem redevelopment, flow restoration, irrigation systems, and water well systems installations.[164]

Amazon/Amazon Web Services and Google were selected as examples because they are prominent companies with substantial data center capacity and are expected to continue investing in data center infrastructure. Despite their shared reliance on and continued expansion of data centers, Amazon/Amazon Web Services and Google release notably different voluntary corporate disclosure reports. These reports vary significantly, in both the specificity and quantity of information disclosed about data center cooling water practices. Generally, Amazon/Amazon Web Services is more representative of corporations that limit their voluntary disclosures to broad statements and aggregated metrics, while Google is more representative of corporations that release more detailed reports that include some specific metrics on individual data centers. Although Google has the potential to lead in voluntary disclosures on the environmental impacts of data centers, its reports remain limited and fall short of the transparency needed to implement proper environmental safeguards.

i. Amazon/Amazon Web Services

Of the industry leaders in AI and data centers, Amazon/Amazon Web Services ("AWS") has disclosed the least amount of information regarding its water usage, consumption, and discharge practices.[165] Amazon's 2024 Sustainability Report highlights its work in water use effectiveness and water replenishment projects without providing key data on how much water is withdrawn and how much water is consumed.[166] For example, AWS stated that it reduced its cooling water needs by 946 million liters in North America in 2024.[167] However, without initial water withdrawal or consumption metrics for each data center, it is impossible to fully understand the impacts that this reduction has on data center discharge practices and the surrounding environment.

https://www.bloomberg.com/news/features/2020-04-01/how-much-water-do-google-data-centers-use-billions-of-gallons (on file with the *UC Law Environmental Journal*).

162. *See, e.g.*, MICROSOFT, WATER REPLENISHMENT: OUR LEARNINGS ON THE JOURNEY TO WATER POSITIVE (2023), https://perma.cc/6QSF-3E2P.

163. Fleury & Jimenez, *supra* note 51.

164. *See, e.g.*, *An Approach to Water Restoration That Benefits Communities and the Environment*, META (Dec. 12, 2024), https://perma.cc/T9SC-TBMG.

165. *See* AMAZON, *supra* note 159.

166. *See id*. at 23–24.

167. *Id*. at 23.

It is unclear how AWS's water replenishment projects or its commitment to becoming water positive by 2030 will impact water resources near data centers.[168] Amazon defines being "water positive" as returning more water to communities and the environment than its direct operations use.[169] Amazon calculates water positivity as the sum of reused water and water from replenishment projects divided by total water withdrawal minus water from sustainable sources.[170] It is also important to note that Amazon prioritizes replenishment projects near Amazon facilities, but projects are not required to be located near data centers or in non-water stressed basins.[171]

ii. Google

Since 2022, Google has released annual water metrics for its data centers in the United States[172] and made a commitment to climate conscious data center cooling.[173] As part of its annual Environmental Report, Google discusses its responsible water use approach and water replenishment/stewardship projects.[174] This report includes metric data tables that list the water withdrawal, discharge, and consumption data for each data center location.[175] For data centers that do not meter its water withdrawal or discharge, Google estimates these values using its own methodology and metrics system.[176] These methodologies and metrics are published in a publicly accessible paper.[177] Google has also publicly disclosed its independent accountant's review report that evaluates Google's water metrics.[178] Google's voluntary water metrics reporting and third party assurance report demonstrates Google's work to help maintain transparency.

Google's water replenishment efforts are directed at improving water resources near data centers, but also regions with higher risks of water scarcity or depletion.[179] The company's Water Stewardship Project Portfolio summarizes the 112 projects meant to help it reach its goal of 120% water replenishment by 2030.[180] Google defines water replenishment as the volumetric water benefits from water stewardship projects.[181] None of Google's U.S. projects state whether they

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168. *See How AWS Will Return More Water Than It Uses by 2030*, AMAZON NEWS (Dec. 3, 2025), https://perma.cc/R28H-FR48.

169. AMAZON, *supra* note 159, at 55 n.31.

170. *Id.* at 23.

171. *See Water Positive Methodology*, AMAZON (Nov. 2025), https://perma.cc/957G-5WGZ.

172. *See, e.g.*, GOOGLE, *supra* note 159.

173. Urs Hölzle, *Our Commitment to Climate-Conscious Data Center Cooling*, GOOGLE BLOG (Nov. 21, 2022), https://perma.cc/3SWB-FGBT.

174. GOOGLE, *supra* note 159, at 40–43.

175. *Id.* at 110–11.

176. *Id*. at 102.

177. *See* Cooper Elsworth et al., *Measuring the Environmental Impact of Delivering AI at Google Scale*, GOOGLE (2025).

178. *See* GOOGLE, *supra* note 159, at 114.

179. *Id*. at 42.

180. *See* GOOGLE, 2025 GOOGLE WATER STEWARDSHIP PROJECT PORTFOLIO 2 (2025), https://perma.cc/WU2X-YHWM; GOOGLE, *supra* note 159, at 86.

181. GOOGLE, *supra* note 159, at 102.

are directly connected to the water usage at the data center or will benefit data center cooling practices.[182] For example, Google states that the aim of its aquifer storage and recovery in Oregon project "is for surplus water to be used during periods of drought or high water demand, providing a more secure water supply for the city's future."[183] The project summary does not express whether the stored water will be used for data center cooling during drier periods or only used as a drinking water resource for the general public.

CONCLUSION

The rapid expansion of data centers and limited regulatory mechanisms has resulted in the development of an industry that lacks transparency and environmental safeguards that could mitigate potential risks to local water resources. Although data center cooling waters discharged to groundwater, surface waters, and municipal treatment plants could have a negligible impact on water resources, it may have the potential to contaminate water resources and harm aquatic ecosystems. The lack of publicly available information makes it nearly impossible to definitively determine what these impacts may be. Ideally, corporations would voluntarily disclose information about their discharge practices via environmental social governance measures, however this is unlikely given their desire to remain confidential and competitive within the data center markets. Federal and state regulatory measures that require the disclosure of discharge practices are another alternative, however the rate of data center expansion and gaps in information would likely make it difficult to create effective policies that would ensure that data centers are operating in a manner that is protective of the environment and human health.

182. *See* GOOGLE, *supra* note 159.
183. *Id*. at 23.