A Need to Regulate the Environmental Impacts of Artificial Intelligence (AI): Preserving Clean Water for Humans, Not Robots

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I. INTRODUCTION

As artificial intelligence (AI) becomes prevalent in society's daily life, the potential threats it brings are becoming a critical topic of debate in legal scholarship. These conversations typically center on concerns of privacy, security, due process, democracy, and employment rights.[1] Meanwhile, there is a lack of significant discussion regarding the environmental impacts of AI and how the law could be used to help manage those impacts. As one may predict, AI has a high carbon footprint and uses excessive amounts of energy;[2] however, there are other environmental consequences of AI that may not be obvious to the public eye, such as its enormous water footprint.[3]

This Comment explores the environmental impacts of AI and the ways that certain existing laws and statutes may be used to regulate these impacts. There is a particular focus on the impact of AI on the nation's water supply and the issues it will exacerbate if efforts are not made to decrease its water footprint. Recommendations for future legislature and regulations are also be articulated.

II. BACKGROUND

A. *What Is Artificial Intelligence?*

Although artificial intelligence (AI) is not confined to a single definition, it is defined in the broadest sense as "machines that can learn, reason, and act for themselves."[4] When presented with new information, these AI systems are able to make their own decisions, much like humans.[5] In the early twentieth century, AI was merely a figment of scientific imagination;[6] however, by the 1950s, data scientists began

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1. Amy L. Stein, *Artificial Intelligence and Climate Change*, 37 YALE J. IN REG. 890, 890 (2020).

2. Ricardo Vineuesa et al., *The Role of Artificial Intelligence in Achieving the Sustainable Development Goal*s, 11 NAT. COMMUN. (2020), https://doi.org/10.1038/s41467-019-14108-y.

3. Pengfei Li et. al, *Making AI Less "Thirsty": Uncovering and Addressing the Secret Footprint of AI Models*, 1 (2023), https://doi.org/10.48550/arXiv.2304.03271.

4. Karen Hao, *What is AI?*, MIT TECH. REV. (Nov. 10, 2018), https://www.technologyreview.com/2018/11/10/139137/is-this-ai-we-drew-you-a-flowchart-to-work-it-out/ (last visited Mar. 24, 2024).

5. *Id.*

6. Rockwell Anyoha, *The History of Artificial Intelligence*, SPECIAL EDITION ON A.I. BLOG (Aug. 28, 2017) ("In the first half of the 20th century, science fiction familiarized the world with the concept of artificially intelligent robots.").

exploring the mathematical possibility of making it a reality.[7] Today, in the era of "big data," AI is commonplace in many of society's most critical sectors, such as health care, legal services, agriculture, and transportation.[8] Additionally, AI has gained significant traction in various industries such as technology, banking, marketing, and entertainment.[9] There are many different AI techniques, but much of the contemporary excitement comes from a set of techniques known as machine learning.[10] Machine learning is a "sophisticated application of AI that uses statistics to identify patterns in troves of data, and enables algorithms to automatically improve as it takes in more data and information."[11] Within machine learning is the technique of deep learning, which creates a unique data model consisting of artificial neural pathways passed on those of the human brain,[12] to identify and amplify even the smallest patterns of data.[13] This is the process behind many of today's most popular online services, such as Netflix and YouTube recommendation systems, Google's search engine, social media feeds, and Siri and Alexa voice assistants.[14] Deep learning is also used to create classification or prediction models such as ChatGPT (short for "generative pre-trained transformer"), which is pretrained to generate text based on "prompts" provided by users to tailor the desired response in natural language.[15] To use ChatGPT, one types a

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7. *Id.* In 1950, Alan Turing, a mathematician and computer scientist, published a paper called "Computing Machinery and Intelligence" that discussed "how to build intelligent machines and how to test their knowledge."

8. PEW RSCH. CTR., *How Americans Think About Artificial Intelligence*, AI & Human Enhancement: Americans' Openness Is Tempered by a Range of Concerns 216, 216 (2022), https://www.pewresearch.org/internet/2022/03/17/how-americans-think-about-artificial-intelligence.

9. Anyoha, *supra* note 6.

10. Patrick K. Lin, *Works Featured: The Cost of Training a Machine: Lighting the Way for a Climate-Aware Policy Framework that Addresses Artificial Intelligence's Carbon Footprint Problem*, 34 FORDHAM ENV'T L. REV. 1, 8 (2023).

11. *Id.*

12. Jason Davidson and Hilary G. Buttrick, *Say What?! When ChatGPT Gets It Wrong: Examining Generative AI, Section 230 of the Communications Decency Act, and the Essence of Creativity*, 30 RICH. J.L. & TECH. 143, 149 (2023).

13. Karen Hao, *What is Machine Learning?*, MIT TECH. REV. (Nov. 17, 2018), https://www.technologyreview.com/2018/11/17/103781/what-is-machine-learning-we-drew-you-%20another-flowchart.

14. *Id.*

15. Davidson and Buttrick, *supra* note 12 at 150; *see Introducing ChatGPT*, OPENAI (Nov. 30, 2022), https://openai.com/blog/chatgpt (last visited Mar. 24, 2024) ("We've trained a model called ChatGPT which interacts in a conversational way. The dialogue format makes it possible for ChatGPT to answer follow-up questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests.").

question into the chat box, presses Enter on the keyboard, and the chatbot responds. The user may provide feedback about the quality of the answer by clicking thumbs-up or thumbs-down. The user may also click "regenerate response" to produce another answer to the same question. Additionally, the user can continue to chat with the chatbot and ask it to refine its responses, for it will remember everything said earlier in the conversation. These user interactions further train the chatbot, which helps explain its rapid advancement since its release in November 2022.[16] In light of the modern surge of popularity and speculation around applications such as ChatGPT,[17] this Comment refers to the machine learning form of AI throughout its discussion.

B. Climate Change and the Water Crisis

As the Earth's climate changes, its natural resources become scarcer due to extreme temperatures and shifting ecosystems.[18] Most of the causes are anthropogenic, for human activities are estimated to have caused approximately 1 degree Celsius of global warming above pre-industrial levels.[19] The scientific community has warned that society should limit global warming to 1.5 degrees Celsius;[20] however, if society continues a business-as-usual approach then temperatures could rise to above 3 degrees Celsius by 2100, which would irreparably damage the Earth's ecosystems.[21]

One the biggest risks of climate change is water scarcity. The amount of clean freshwater that is available and useable is "limited and unevenly distributed across the globe."[22] Megadroughts caused by climate change and a rapidly increasing population intensify this challenge.[23] For at least one month each year, 4 billion people, or two-thirds of the global population, are affected by severe water scarcity.[24] Unfortunately, this number is only increasing, and it is predicted that nearly 6 billion people will suffer from clean water scarcity by 2050 due to drivers of water scarcity like "population (economic growth and water demand),

16. CHATGPT, https://chat.openai.com/chat (last visited Mar. 25, 2024).
17. Lin, *supra* note 10, at 1.
18. Masson-Delmontte, V. et al., *Summary For Policymakers in Special Report Global Warming of 1.5°C*, IPCC (2018), https://www.ipcc.ch/sr15/chapter/spm.
19. *Id.*
20. *Id.*
21. *The Climate Crisis: A Race We Can Win*, UNITED NATIONS, https://www.un.org/en/un75/climate-crisis-race-we-can-win (last visited Mar. 30, 2024).
22. Li, *supra* note 3.
23. *Id.*
24. *Id.*

resources, and pollution but also unequal growth accessibility and needs, which are underrated."[25] This water scarcity trend is especially prevalent in the arid western United States, where many tech firms operating AI models decide to build their data centers due to low power costs and availability of solar and wind energy sources.[26] For example, California has at least 239 data centers and desert Arizona has at least 49.[27] In fact, some communities claim that these data centers are draining local water supplies, which are already extremely limited due to issues such as a dwindling Colorado River.[28] This indicates a dire need to understand AI's water consumption, especially in those areas disproportionately impacted by water scarcity.

III. THE HIDDEN ENVIRONMENTAL IMPACT OF AI: WATER DEPLETION

The relationship between artificial intelligence and the natural environment is a bit of a double-edged sword. On one hand, AI has been deemed "naturally poised" to address the transformational challenges presented by the climate crisis.[29] For instance, AI may help integrate renewable energy by enabling smart grids that match demand to ideal wind and solar patterns, model the possible future impacts of climate change, and identify vegetative coverage patterns using satellite imagery.[30] On the other hand, AI produces significant negative environmental consequences at each phase of the hardware's life cycle: production, use, and end of life.[31] There are two different types of water usage that are important for understanding the impacts of AI on water scarcity—water withdrawal and water consumption.[32] Water withdrawal refers to "freshwater taken from the ground or surface water sources, either temporarily or permanently, and then used for agricultural,

25. ETIENNE DELORT, ET AL., ENVIRONMENTAL IMPACT OF ARTIFICIAL INTELLIGENCE: BIBLIOGRAPHIC REPORT 20 (2023).

26. Shannon Osaka, *A New Front in the Water Wars: Your Internet Use*, WASH. POST (Apr. 25, 2023), https://www.washingtonpost.com/climate-environment/2023/04/25/data-centers-drought-water-use.

27. *Id.*

28. *Id.*

29. Stein, *supra* note 1 at 895.

30. Vineuesa et al., *supra* note 2, at 2-4 (discussing the Sustainable Development Goals that AI enables, yet also undermines at the same time).

31. Anne-Laure Ligozat et al., *Unraveling the Hidden Environmental Impacts of AI Solutions for Environment*, ARXIV: 2110.11822 1, 3 (Oct. 22, 2021), https://arxiv.org/pdf/2110.11822.

32. Li, *supra* note 3, at 3.

industrial, or municipal uses."[33] This indicates the level of dependence on water resources and competition among different sectors.[34] Meanwhile, water consumption is "water withdrawal minus water discharge", and refers to the amount of water "evaporated, transpired, incorporated into products or crops, or otherwise removed from the immediate water environment."[35] Measuring water consumption helps understand the impact of water use on downstream availability and is essential for evaluating watershed-level water scarcity.[36] Both of these types of water usage make up AI's water footprint.[37] Although this Comment focuses mainly on water consumption, water withdrawal can be a good measure of potential water impacts, for "water used in manufacturing would rarely be returned to the same water body without some loss in water quality."[38]

AI's immense use of water is especially problematic as tech firms draw from public water supplies and aquifers, adding to the high levels of regional water stress already occurring in the drought-prone areas they choose to build in.[39] Additionally, the water consumption of AI may limit economic development, especially in regions that are already water-stressed.[40] For example, the decrease in water availability could limit food production due to the water resources directed toward AI systems and away from agricultural production.[41] Thus, the impact of AI's water consumption extends far beyond the natural environment and may impair important social thresholds.

A. Production: Embodied/Virtual Water

During the production stage of AI's lifecycle, a large amount of water is required to manufacture AI microchips and servers.[42] For example, it takes approximately 2,200 gallons of Ultra-Pure Water

33. *Id.*
34. *Id.*
35. *Id.*
36. *Id.*
37. *Id.* at 1.
38. Kali Frost & Inez Hua, *Quantifying Spatiotemporal Impacts of the Interaction of Water Scarcity and Water Use by The Global Semiconductor Manufacturing Industry*, 22 WATER RES. & INDUS. 1, 3 (2019), https://www.sciencedirect.com/science/article/pii/S2212371719300150).
39. *The Climate Costs of Big Tech*, AINOW (Apr. 11, 2023), https://ainowinstitute.org/spotlight/climate (last accessed Apr. 1, 2024) [hereinafter AINOW].
40. A. Shaji George, et al., *The Environmental Impact of AI: A Case Study of Water Consumption by ChatGPT*, 1 PUIIJ 91, 95 (Apr. 20, 2023), https://puiij.com/index.php/research/article/view/39/23.
41. *Id.*
42. Li, *supra* note 3, at 5.

(UPW) to produce a microchip.[43] Additionally, clean water is needed for keeping semiconductor plants cool throughout the production process.[44] This form of consumption is known as embodied water usage due to supply chains.[45] Unfortunately there is a gap in available data for embodied water usage in chip making.[46] Yet, this does not make much of a difference in assessing AI's impact on water availability because its operational water consumption is significant enough, irrespective of embodied water usage.

B. Training and Use: Operational Water Consumption and Wastewater Generation

Not only do AI systems consume a lot of power while operating, but they also guzzle water. In addition to using water to manufacture chips and servers, AI models consume fresh water in two main ways: onsite server cooling and offsite electricity generation.[47] As AI servers consume massive amounts of energy onsite, they generate a lot of heat. To avoid server overheating, data centers often dissipate the heat into the outside environment through evaporative cooling towers, which require large amounts of fresh water,[48] which is often potable, to avoid pipe clogs and/or bacterial growth.[49] This cooling method uses approximately 3 to 5 million gallons of water per day per hyperscale data center.[50] In addition to evaporative cooling, on-chip liquid cooling may also be employed due to the high-power densities of AI servers.[51] Additionally, AI is responsible for offsite water consumption, as generating electricity also "consumes a lot of water through cooling at thermal power and nuclear plants and expedited water evaporation caused by hydropower plants."[52] Together, these two forms of (onsite and offsite) water consumption are sometimes collectively called "operational water consumption."[53]

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43. Shaolei Ren, *How Much Water Does AI Consume? The Public Deserves to Know*, OECD.AI: THE AI WONK (Nov. 30, 2023), https://oecd.ai/en/wonk/how-much-water-does-ai-consume.

44. Li, *supra* note 3, at 5 ("Overall, a large semiconductor plant may withdraw several million liters of water each day.").

45. *Id.* at 2.

46. *Id.* at 9.

47. Ren, *supra* note 43.

48. *Id.*

49. Li, *supra* note 3, at 4.

50. Lin, *supra* note 10, at 16.

51. Li, *supra* note 3, at 5.

52. Ren, *supra* note 43.

53. *Id.*

A large portion of AI's operational water footprint comes from the process of training data,[54] which involves running statistical experiments to gradually tune and refine AI models to perform specific tasks.[55] An AI model is not just trained once but is trained over and over again to reach maximum parameter and weight optimization.[56] Using enormous amounts of power and requiring water to cool off the server, this process focuses on accuracy rather than efficiency and can last months.[57] For example, OpenAI's GPT-3's model consumed approximately 700,000 liters of water during its training phase.[58] Additionally, GPT-3 "drinks" a 500mL bottle of water for roughly every 10-50 responses.[59] This is a concerning amount of water on its own but is even more so when one considers that GPT-3 is only one AI model of many.

Additionally, AI generates wastewater from both server and chip manufacturing and data cooling centers.[60] This wastewater often contains a range of pollutants and if untreated, can negatively impact by the environment by contaminating local water supplies and degrading aquatic habitats.[61] These discharged waters can be reused but they require significant additional processing to avoid toxic chemical and hazardous waste contamination; however, water recycling in many cases is still very low.[62]

C. End of Life: Water Contamination from Electronic Waste

The current wave of artificial intelligence contributes to a stream of discarded used equipment, which is known as electronic waste (e-waste).[63] AI is driving faster server innovation, particularly in chip design.[64] Facilitating a technological reset is key to improving efficiency and server capacity; however, these innovations will also increase the scale of e-waste.[65] As one of the fastest growing waste streams in the

54. Li, *supra* note 3, at 3.
55. Lin, *supra* note 10, at 8.
56. *Id.*
57. *Id.*
58. Li, *supra* note 3, at 3.
59. *Id.*
60. *Id.*
61. *Id.*
62. Li, *supra* note 3, at 5.
63. Mark Kidd, *Energy and E-Waste: The AI Tsunamis*, DATA CTR. DYNAMICS (Oct. 24, 2023), https://www.datacenterdynamics.com/en/opinions/energy-and-e-waste-the-ai-tsunamis.
64. *Id.*
65. *Id.*

world, annual e-waste is set to reach 75 million metric tons by 2030.[66] E-waste threatens the environment because electronic devices are a compound of hundreds of different substances, many of which are toxic.[67] The main problem is that roughly only seventeen percent of global e-waste is documented to be collected and properly disposed of or recycled each year.[68] Unfortunately, when e-waste is improperly disposed of in informal recycling sites or landfills, the harmful substances in the electronic devices can leach out into soil and surface water. As a result, there is a significant risk of these toxic substances migrating to underlying groundwater aquifers.[69] This type of water contamination brings multiple human health and ecosystem risks. For example, substances in e-waste may contribute to neurological damage or even cancer.[70] Additionally, these substances can survive for decades in the environment, leading to declines in biodiversity, especially in vulnerable aquatic habitats.[71] Thus, as new chips and technological equipment drive the AI-revolution, it is important to think about what will happen to the old equipment and to ensure that it does not end up in water systems.

IV. CURRENT EFFORTS TO REGULATE THE ENVIRONMENTAL IMPACTS OF AI

As of spring 2025, there are no specific laws exclusively dedicated to regulating the environmental impacts of AI. However, as knowledge about the negative environmental impacts of AI grows, there appears to be a potential trend through federal regulation on the horizon. Additionally, many big tech firms are starting to make sustainability pledges that may help increase corporate transparency and responsibility.

A. S.3732: The Artificial Intelligence Environmental Impacts Act of 2024

In light of growing concerns around the sustainability of AI and specifically the environmental impact of complex generative AI models,

66. *Id.*

67. *From Gadgets to Groundwater: Why E-Waste Stewardship is Crucial to Protect Water Resources*, MCWEC (July 31, 2023), https://mcwec.org/2023/07/from-gadgets-to-groundwater-why-e-waste-stewardship-is-crucial-to-protect-water-resources [hereinafter MCWEC] (Toxic substances in electronic devices include "heavy metals like lead, mercury, cadmium, and chromium and persistent organic pollutants like polychlorinated biphenyls.").

68. *Id.*

69. *Id.*

70. *Id.*

71. *Id.*

the United States Senate introduced the Federal Artificial Intelligence Environmental Impact Act of 2024 on February 1, 2024.[72] The bill was introduced by Senator Edward Markey and was co-sponsored by several senators.[73] The bill addresses the need to assess and mitigate AI's environmental impacts, and specifically emphasizes the need for a thorough understanding of both positive and negative effects of AI.[74] The bill's stated purpose is:

> To require the Administrator of the Environmental Protection Agency to carry out a study on the environmental impacts of artificial intelligence, to require the Director of the National Institute of Standards and Technology to convene a consortium on such environmental impacts, and to require the Director to develop a voluntary reporting system for the reporting of the environmental impacts of artificial intelligence, and for other purposes.[75]

In short, the bill's purpose can be understood as an effort to promote sustainability, transparency, and accountability in the use and development of AI.[76] The bill summarizes multiple findings by Congress regarding the environmental impacts of AI, such as: pollution, water consumption, and land use changes from rapid growth in data center infrastructure, along with increased energy consumption, electronic waste, and resource use from accelerated use and training of AI models.[77] Congress also recognized the environmental and health risks associated with these impacts, emphasizing that such risks may have a disparate impact across different regions and communities.[78] This indicates that the negative effects of AI may even qualify as an environmental justice issue.[79] Additionally, Congress determined that various options for reducing these negative environmental impacts of AI exist, such as: using

72. Hande Yuksel Sen, *The Artificial Intelligence Environmental Impacts Act of 2024: What You Need to Know*, HOLISTIC A.I.: A.I. REGUL. (Mar. 13, 2024), https://www.holisticai.com/blog/artificial-intelligence-environmental-impacts-act.

73. Artificial Intelligence Environmental Impacts Act of 2024, S. 3732, 118th Cong. (2024). (Senator co-sponsors include Sen. Heinrich, Sen. Wyden, Sen. Welch, Sen. Padilla, and Sen. Booker).

74. Sen, *supra* note 72.

75. S. 3732, 118th Cong. (2024).

76. Sen, *supra* note 72.

77. *See* S. 3732, § 2 for the full list of congressional findings.

78. *Id.*

79. *See Learn More About Environmental Justice*, ENV'T PROT. AGENCY, https://www.epa.gov/environmentaljustice/learn-about-environmental-justice (last visited Apr. 1, 2024) (The EPA defines environmental justice as "the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environment . . .").

renewable energy and more efficient models, hardware, and data centers.[80]

As indicated in its purpose statement, the AI Environmental Impacts Act includes four key requirements that the Administrator of the Environmental Protection Agency (EPA), in collaboration with other designated agencies, must complete.[81] First, the Act requires the EPA and other agencies to conduct a study on the environmental impacts of artificial intelligence within two years of the date of the Act's enactment.[82] The Act details specific requirements that must be included in the study, such as examinations of the energy and water consumption for cooling the data centers, the extraction of raw materials and electronic waste, and the pollution associated with the full lifecycle of the hardware.[83] Additionally, the study requires examinations of potential disparate environmental impacts by looking at those that could be acute at local scales, such as "added power loads that create grid stress, water withdrawals that create water stress, or local noise impacts."[84] In conducting this study, the EPA is also required to solicit and consider public comments in the process.[85] Including the public in the process would help achieve the Act's goal to increase transparency and accountability of data centers while also ensuring that those communities that are most impacted have a voice in the process.

Second, the Act requires the Directors of the National Institute of Standards and Technology (NIST), in consultation with the designated agencies, to convene an artificial intelligence environmental impacts consortium of stakeholders, including members from academia, civil society, and industry.[86] The duty of the consortium members would be to identify appropriate measurements, methodologies, standards and other needs necessary to measure and report the full range of environmental impacts of artificial intelligence.[87] The Act defines the goals that the consortium shall include, such as: consistent and comparable reporting on the environmental impacts of AI's full lifecycle, the development of open source software and hardware to facilitate measurements, and

80. S. 3732 § 2(9).

81. *Id.* § 4(a). (In addition, the Administrator of the EPA, these requirements apply to the Secretary of Energy, the Director of the National Institute of Standards and Technology (NIST), and the Director of the Office of Science and Technology Policy (OSTP)).

82. *Id.*

83. *See id.* § 4(b) for full list of the study's requirements.

84. *Id.*

85. *Id.* § 4(b).

86. *Id.* § 5(a).

87. *Id.*

recommendations for mitigating negative and promoting positive environmental impacts of AI.[88] The inclusion of multiple stakeholders from various industries in the consortium will help deliver unbiased solutions and methods that are based in science and feasibility.

Third, the Act requires NIST and the other agencies to develop a voluntary reporting system for entities contributing to the environmental impacts of AI.[89] The Act includes a description of guidelines that the director of NIST should develop. For example, such guidelines may outline how to calculate and report energy consumption, water consumption, pollution, and electronic waste as well as other positive and negative impacts of AI.[90] Additionally, the Act requires a public comment period before finalizing such guidelines, giving communities impacted by the actions of data centers a space to voice their regulation suggestions.[91] Although this reporting system would be voluntary and not required, the participation of just one entity has the potential to create a chain of accountability on data centers with AI systems.

Lastly, the Act requires the agencies to jointly submit a report to Congress no later than four years after the date of enactment. The report shall detail the finding of the required consortium, a description of the voluntary reported system created, and recommendations for legislative or administration action to mitigate negative and promote positive environmental impacts of AI.[92] This could encourage and inform future legislation or administrative programs for the regulation to help control AI's environmental impact further and even more effectively.

Overall, the AI Environmental Impacts Act of 2024 represents a proactive step towards regulating the negative consequences of AI technologies and help to make innovation more environmentally and socially sustainable. However, the act has only been introduced by the senate. The bill must be officially passed by the Senate and the House of Representatives, and then sent to the president for approval before it officially becomes a law. This process could take a significant amount of time,[93] which may be problematic given the rapid acceleration of AI and its impacts. Thus, it may be a while before the benefits that the Act could bring would actually be felt.

88. *Id.* § 5(c).
89. *Id.* § 6(a).
90. *Id.* § 6(b)(1).
91. *Id.* § 6(b)(2).
92. *Id.* § 7.
93. *See The Legislative Process: Overview*, CONGRESS.GOV, https://www.congress.gov/legislative-process (last visited Apr. 3, 2024).

V. POTENTIAL APPLICATION OF EXISTING LAW FOR REGULATING AI'S WATER USAGE

In addition to proposed regulations on AI's environmental impact, there are multiple existing laws and regulations that may indirectly influence or apply to these impacts.

A. National Environmental Policy Act

The National Environmental Policy Act (NEPA), introduced in 1969, requires federal agencies to assess the environmental impact of proposed actions that significantly affect the environment. It also aims to promote harmony between humans and the environment through interdisciplinary approaches and international cooperation.[94] Specifically, if agencies propose "major federal actions significantly affecting the quality of the human environment," they must prepare an environmental impact statement (EIS).[95] The final EIS document shall "provide full and fair discussion of significant impacts and shall inform decision makers and the public of reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment."[96]

As a non-federal agency, NEPA does not typically regulate private technology , but big technology companies may still need to be aware of NEPA requirements if their activities intersect with federal projects, funding, or approvals.[97] Additionally, NEPA could serve as a model for creating a law that regulates the environmental impacts of AI and other actions by private technology companies that impact public resources.

B. Clean Water Act

Congress enacted the Clean Water Act (CWA) to "restore and maintain [the] chemical, physical, and biological integrity of the Nation's waters."[98] To accomplish this goal, Congress enacted Section 316 of the CWA to regulate power plants that draw cooling water,[99] through water

94. 42 U.S.C. § 4321. *See also* 42 U.S.C §§ 270f-322.

95. 42 U.S.C. §4332(2)(C); 42 U.S.C. § 4336e(10) (Major federal actions are defined as "action(s) that the agency carrying out such action determines is subject to substantial Federal control and responsibility.").

96. 40 C.F.R. §1502.1 (2020).

97. *See, e.g.*, Sierra Club v. U.S. Dep't of Energy, 867 F.3d 189, 193 (2017).

98. 33 U.S.C. § 1251.

99. 40 C.F.R. § 125.92 (2014) (Defined as "water used for contact or non-contact cooling, including water used for equipment cooling, evaporative cooling tower makeup, and dilution of effluent heat content. The intended use of the cooling water is to absorb waste heat rejected from the process or processes used, or from auxiliary operations on the facility's premises.").

intake structures,[100] and later discharge the water at high temperatures.[101] Section 316(b) of the CWA requires "that the location, design, construction and capacity of [such] cooling water intake structures reflect the best technology available for minimizing adverse environmental impact."[102] Specifically, the regulations are designed to minimize harmful impacts on aquatic life caused by cooling water intake structures.[103] Starting in 2001, the EPA implemented these standards in phases before finally implementing the final rule in 2014, which expanded its application from solely new facilities to existing electric generating plants and factories.[104] Although this section of the CWA was established to regulate cooling water systems at power plants, it governs multiple industrial sectors today.[105] Specifically, the rule today applies to "existing power generating facilities and existing manufacturing and industrial facilities that withdrew more than 2 million gallons per day of water from waters of the United States and use at least 25 percent of the water they withdraw exclusively for cooling purposes."[106] Thus, this section could potentially apply to tech centers that depend on similar cooling water systems to cool down the equipment to power and train AI applications.

C. *Environmental, Social, Governance (ESG)*

Another option for regulating the environmental impact of AI is to put the responsibility on corporations through Environmental, Social and Governance (ESG) reporting programs. ESG refers to "nonfinancial data

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100. 40 C.F.R. 125.83 (2003) (Defined as "the total physical structure and any associated constructed waterways used to withdraw cooling water from waters of the [United States]. The cooling water intake structure extends from the point at which water is first withdrawn from waters of the United States up to and including the intake pumps.")

101. James R. Holcomb IV, *Restoration Measures, Cooling Water Intake Structures, and the Protection of Ecosystems: The Regulatory Scheme of Clean Water Act Section 316(B)*, 1 ARIZ. J. ENV'T L. & POL'Y 219 (2011).

102. 33 U.S.C. § 1326 (1986)(b).

103. *Clean Water Act (CWA)*, BUREAU OF OCEAN ENERGY MGMT, https://www.boem.gov/environment/environmental-assessment/clean-water-act-cwa#:~:text=HOME-,Clean%20Water%20Act%20(CWA),-Growing%20public%20awareness (last visited Apr. 1, 2024).

104. *Cooling Water Intakes Rulemaking History*, ENV'T PROT. AGENCY, https://www.epa.gov/cooling-water-intakes/cooling-water-intakes-rulemaking-history (last updated Aug. 15, 2024).

105. *Id.* The sectors with the largest number of regulated facilities are: electric generating plants, pulp and paper mills, chemical manufacturing plants, iron and steel manufacturing, petroleum refineries, food processing, and aluminum manufacturing.

106. National Pollutant Discharge Elimination System Final Regulations to Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities, 76 Fed. Reg. 22174 (proposed Aug. 20, 2011).

relating to environmental impact, social impact, and corporate governance"[107] that is used by stakeholders to evaluate a company's sustainability and ethical impact. While stakeholders often refer to investors, they also include customers, suppliers, and employees who all may have an interest in the sustainability of an organization's operations.[108] In general, stakeholders seek to influence companies to lower their ESG risk to mitigate potential reputational damage and align with their priorities.[109]

AI models can impact a technology company's ESG factors both positively and negatively. For example, AI can treat large quantities of data for better decision-making regarding sustainability issues and enhance environmental management.[110] On the other hand, without proper controls, AI models increase greenhouse gas emissions and water consumption.[111] Thus, as AI models continue to advance and expand, it is essential to ensure transparency about its impacts before they become unmanageable. Companies that are leveraging AI or investing in ones that do, have the opportunity to adapt their ESG frameworks to account for unique risks and benefits presented by AI.[112] This will require ongoing research and conversations about AI's ESG impacts, along with collaboration between AI developers, investors, and ESG professionals.[113]

VI. CONCLUSION

It is no secret that the rise of artificial intelligence comes with nearly as many risks as benefits. There is a rise in knowledge regarding the environmental impacts of AI, but it typically centers on energy and electricity usage rather than freshwater withdrawal and consumption. Although big tech firms are starting to make public sustainability pledges, these are often much too ambitious, and many fail to follow through.[114]

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107. *What Are the ESG Risks of AI?*, CFA INST. (Dec. 11, 2023), https://www.cfainstitute.org/en/professional-insights-stories/what-are-the-esg-risks-of-ai.

108. Kyle Peterdy, *ESG (Environmental, Social, & Governance)*, CORP. FIN. INST., https://corporatefinanceinstitute.com/resources/esg/esg-environmental-social-governance (last visited Apr. 2, 2024).

109. *What Are the ESG Risks of AI?, supra* note 107.

110. *Artificial Intelligence and ESG: Stakes and Opportunities for Responsible Business*, ERNST & YOUNG 2 (2020).

111. *Id.* at 18.

112. CFA INST., *supra* note 107.

113. *Id.*

114. *The Climate Costs of Big Tech*, AINOW (Apr. 11, 2023), https://ainowinstitute.org/spotlight/climate.

For example, Microsoft pledged to be carbon negative by 2030 and to reduce data center water usage by ninety-four percent by 2024.[115] Meanwhile, Microsoft's emissions actually increased during the time of its pledge.[116] Thus, there is a clear need for research on the environmental impacts of artificial intelligence, such as fresh water usage, as well as the application of existing laws or the creation of new laws to regulate these impacts.

115. *Id.*
116. *Id.*