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Fellowship Capstone | Policy Brief

LLMs and the Environment: Generating the Need for Action

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I. Executive summary

Generative AI has become a global sensation as its use works its way into daily life. However, the environmental effects of AI demand policy-based action. This brief will cover the various impacts of AI upon the environment, and how these can be mitigated via regulatory policy.

II. Overview

Generative AI in the form of Large Learning Models (LLMs) are some of the most widely used forms of AI.[1] Their applications are numerous, from increasing productivity and efficiency in professional spheres to sparking creativity or even, ironically, combating climate change (though not as effectively as researchers would like).[2] Despite these diverse use cases, recent research has demonstrated that the usage of LLMs comes with a variety of environmental consequences that, thus far, haven't been the object of any significant legislation. The process of developing these models and managing data centers is incredibly energy intensive and requires damage control on a governmental level. This paper seeks to investigate possible regulatory action with regards to two main concerns with regards to AI: freshwater usage and energy consumption.

A. Relevance

LLMs have done nothing but grow more and more popular since the 2022 release of OpenAI's ChatGPT.[3] In the nearly 3 years since its initial launch, ChatGPT alone has become the fifth most visited site in the world,[4] and numerous other LLMs such as Google Gemini, Perplexity AI, X's Grok, DeepSeek, and more have all entered the zeitgeist of popular generative AI models. On the other hand, however, research has indicated that this popularity isn't without costs. In keeping with discussions of ChatGPT, for instance, an inquiry by the Washington Post found that every 100-word email by GPT-4 uses a little over one bottle of water (519 mL). The drain on freshwater isn't the only resource that ChatGPT drains—a similarly high amount of electricity is needed to craft that email.[5] These statistics alone demonstrate the need for policy intervention.

III. History

A. Current Stances

LLMs are rapidly being integrated into various facets of modern life. In fact, some estimates say that by the end of this year, there will be 750 million different apps with various LLM integrations.[6] This phenomenon is something that the world has seen happen: most notably, Google introducing AI Overviews via their Gemini model. This launch, which happened for users throughout the US in June of 2024,[7] brought summaries and compilation of search results to the

top of every page—but this isn't the only change it brought to Google. Recent data shows that the company's carbon emissions have gone up by 51% since 2019, and much of this change can be attributed to the company's new focus on AI: for instance, the 27% increase in year-on year electricity that may be due to AI datacenters, which are notorious for being energy drains.[8]

It doesn't end with electricity. Another study found that by 2027, artificial intelligence models are predicted to withdraw between 42.2 and 6.6 billion cubic meters of freshwater a year; a number that amounts to more than half the annual freshwater usage of the United Kingdom's entire population.[9] This, too, comes during a time where freshwater is a dwindling but vital substance that many still struggle to access.

Both electricity and water are necessary resources that portions of the population still don't have readily available to them,[10] yet there are LLMs that are consuming them at shocking rates.

A. Stakeholders

There are many with a stake in the eventual policy regulating AI. For one, the companies developing and maintaining LLMs will likely be highly affected by whatever form this legislation takes. Their practices will almost certainly have to change in order to be more environmentally conscious and resource-efficient. However, the requirements placed on them must be within reason for corporations trying to make profit, and current green technology.

Also affected will be the people and institutions that use LLMs regularly. This group has come to rely on these models for everything from business to organization,[11] and it's vital that their ability to function is not impaired.

The third stakeholder group, simply put, is humanity. All of the people who rely on what LLMs are using at an unsustainable pace, and who will be impacted if said pace isn't curbed.

B. Risks of Indifference

The risk of indifference to AI's numerous climate effects lies in the perpetuation of the previously discussed environmental harms. LLMs are only going to grow in ability, prominence, and as a result of these things, harms. It's vital that baselines be established to prevent the resource usage rates of LLMs from rising any further than they already have, and to make direct. Indifference will only exacerbate the issue, and the brunt of the damage will be done to the planet all people depend on for survival.

C. Nonpartisan Reasoning

Damage to the environment is an abject fact that affects lives regardless of partisan alignment. For this reason, it's vital that the action taken against the environmental damages LLMs inflict is also nonpartisan. There are many benefits to this form of action, including:

1) Environmental Improvements: Requiring companies developing and maintaining LLMs to limit their electricity and water usage will cause an immediate increase in the sustainability of these technologies. AI certainly isn't going anywhere, but targeted legislation will allow for it to become a true tool of the future – one that can safely be used moving into the future without qualms.

2) Cooperation/Setting of Precedent: Establishing environmental regulation on AI will open the door for further action on other problem areas related to AI, such as deepfakes and IIA (intimate image abuse).[12] Establishing cooperation between the government and AI companies allows for the creation of a non-adversarial relationship between the two entities, and in turn will foster more productive conversation on future issues that benefits both parties.

3) Increased Innovation: Requiring energy and water efficiency of this industry will require development of new technology and processes that have the potential to revolutionize green tech as a whole. This form of action may lead to advances in technological advances that improve environmental engineering as a whole — AI is a fairly new field to which many of today's brightest scientific minds belong, and these new conditions could lead to the creation of something great by said innovators.

IV. Tried Policy

Because of how new AI is as an industry, there's been little to no tried policy when it comes to addressing its environmental harms.

Most notably, the Artificial Intelligence Environmental Impacts Act of 2024[13] was introduced in 2024 as a bill ordering the EPA to perform an assessment of the environmental impacts of AI. The bill was stalled in Congress in February of the same year, and only sought to encourage research and open avenues for private submission of data, not enact any form of regulatory standards.

On the other hand, there has also been failed legislation that sought to do the opposite of regulate. The recently passed Big, Beautiful Bill[14] included, in its earlier iterations, a 10-year moratorium on regulatory policy on AI for states. Though it was removed from the bill, if it had passed, it would've prevented states from instituting any form of law on AI for ten years.

The lack of previous action does all the more to prove the necessity of regulations on LLMs with specific focus on environmental impact. This is a largely unacknowledged issue that demands action sooner rather than later.

V. Policy Options

Mandatory Resource Reports

One of the major roadblocks in AI policy as a whole is a lack of data surrounding nearly all aspects of its internal workings—resource consumption included. This data is oftentimes difficult to find and/or not publicly disclosed at all, leaving room for speculation or faulty calculations instead of direct evidence.

To overcome this, I recommend a system similar to but more rigorous than that proposed by the aforementioned AI Environmental Impacts Act of 2024, requiring the EPA to collect its own data *and* receive mandatory reports directly from companies maintaining or developing LLMs on energy and water consumption of their models, datacenters, and development producers.

LLM-Specific Regulation

Although environmental regulations are notoriously difficult to get passed, should the previous reporting be established, there may be sufficient enough data to instate further EPA policy specifically regulating AI and LLMs. Looking to examples like the Energy Policy Act's[15] requirements for power plants provides a framework upon which these regulations could be based: specifically, the requirements placed by the Biden administration upon coal power plants regarding slashing carbon emissions could be applied to AI datacenters when it comes to lowering freshwater usage or incorporating X amount of renewable energy in the powering of centers. While Trump ended up exempting coal plants from these requirements early in his term, they still serve as a tangible example of what *could* exist. Even so, it's important to stress that this policy's feasibility heavily depends on the data that'd be collected and reported should the former mandatory reporting be instituted first.

Subsidies for Sustainable Development

Although not technically a form of regulation, introducing governmental subsidies for sustainable practices in AI development would have the combined benefits of fueling American ingenuity, allowing for governmental involvement in a growing industry, creating more jobs, and introducing incentives for companies to make changes with reward in mind, not penalty.

VI. Conclusions

In this paper, the environmental effects of AI as well as the necessity for action against them and the forms action to mitigate them could take have been explored. Of the possible actions outlined, I believe Mandatory Resource Reports are the most plausible initial step in beginning to regulate AI, as they will form the backbone for further regulation, including but not limited to my other proposed options.

No matter what, it's vital that there be forward progress when it comes to governmental awareness and management of LLMs—on the environmental front, and others. There is still much to be done when it comes to the intersection of AI and law, but focusing on collaborative policy and educated approaches that allow for success for all parties will be vital to ensuring a bright and safe future for this technology.

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