

A Call for ‘Green AI’ in California: Evaluation of Existing and Alternative Regulations

Artificial Intelligence (AI) legislation has predominantly centered around the promises and risks AI holds. While these policy perspectives are significant, major legislative discussions currently overlook AI's role in accelerating the climate crisis, an oversight that requires immediate rectification (Brevini, 2020)¹. Substantial inferences on the consumption and emissions by infrastructures supporting AI point to the urgency of this matter.

A 2019 study by the College of Information and Computer Sciences at the University of Massachusetts found that a single NLP model can emit CO₂ equivalent to five cars in their lifespan (Strubell et al., 2019)². Further research into this proved that OpenAI's GPT-3 emitted 552 metric tons of CO₂, which is equal to annual emissions by more than a hundred cars (Patterson et al., 2021)³. The model also consumed 1287 MWh electricity (Patterson et al., 2021) and for cooling the servers during training might have evaporated 700,000 liters of freshwater (Li et al., 2023)⁴. Another study by Caltech on the public health costs of AI found that training an open-weight LLM like Meta's Llama 3.1 will introduce air pollution 'equivalent to more than 10,000 round trips by car between Los Angeles and New York City' (Han et al., 2024)⁵.

This issue is especially critical in California, where the state is home to over 300 data centers and is currently facing an intense climate crisis. The tech hub has experienced increasing air temperature, wildfires, hot droughts and heat waves in the past four decades (Franklin and MacDonald, 2024)⁶ and has taken robust steps to achieve 'carbon neutrality by 2045' through 100% clean electricity mandate (SB 100) and climate disclosure laws (SB 253/261). However, the operations of data centres/AI projects and their growing environmental footprint are not measured or managed under the regulations in force. The current cap-and-trade costs, introduced by AB 32 (2006), are borne upstream by utilities and generators, causing tech companies to have little direct accountability for how much CO₂ their AI operations indirectly drive. The AI-specific laws being proposed (SB-1047 & SB-53) call for safe and secure advanced AI systems, but none explicitly mandate environmental transparency or resource efficiency standards.

Lack of a policy intervention in this scenario is like aiding the negative externalities caused by AI development - pollution, greenhouse gas emissions, etc. and disregarding the greatest market failure, climate change. This will significantly affect the progress California has made in achieving the sustainability goals and may impose huge costs on the society over time.

¹Brevini, Benedetta. 'Black Boxes, Not Green: Mythologizing Artificial Intelligence and Omitting the Environment'. *Big Data & Society*, vol. 7, no. 2, July 2020, p. 2053951720935141. DOI.org (Crossref), <https://doi.org/10.1177/2053951720935141>.

²Strubell, Emma, et al. Energy and Policy Considerations for Deep Learning in NLP. *arXiv:1906.02243*, arXiv, 5 June 2019. *arXiv.org*, <https://doi.org/10.48550/arXiv.1906.02243>.

³Patterson, David, et al. Carbon Emissions and Large Neural Network Training. arXiv, 2021. DOI.org (Datacite), <https://doi.org/10.48550/ARXIV.2104.10350>.

⁴Li, Pengfei, et al. Making AI Less 'Thirsty': Uncovering and Addressing the Secret Water Footprint of AI Models. arXiv, 2023. DOI.org (Datacite), <https://doi.org/10.48550/ARXIV.2304.03271>.

⁵Han, Yuelin, et al. The Unpaid Toll: Quantifying the Public Health Impact of AI. arXiv, 2024. DOI.org (Datacite), <https://doi.org/10.48550/ARXIV.2412.06288>.

⁶Franklin, Janet, and Glen M. MacDonald. 'Climate Change and California Sustainability—Challenges and Solutions'. *Proceedings of the National Academy of Sciences*, vol. 121, no. 32, Aug. 2024, p. e2405458121. DOI.org (Crossref), <https://doi.org/10.1073/pnas.2405458121>.

Companies building advanced AI systems must be held accountable for the impact their activities are having on the environment.

With rapid AI developments, adopting a piecemeal approach to policy interventions would not be productive in a critical sector like climate. A comprehensive policy⁷ that monitors the climate impact of AI's full lifecycle and balances transparency, incentives, and collaboration is direly needed. This policy memo analyzes existing regulations and proposes a bipartisan legislative package that ensures AI development in California is environmentally sustainable without stifling innovation.

Key Recommendations:

1. **Introducing mandatory transparency practices:** Creating industry standards for environmental disclosure by large AI models. Implementing tools like experiment-impact-tracker (Henderson et al., 2020)⁸, AI ESG protocol (Sætra, 2023)⁹, etc. to track environmental impacts across the AI lifecycle and making the results publicly accessible to promote accountability.
2. **Carrot and stick approach:** Offer incentives to encourage the AI industry to reduce its carbon and water footprint through renewable energy use, energy-efficient infrastructure, flexible training schedules, etc. The rewards can be tax credits, subsidies, grants, and awards. Also, enforce strict carbon pricing and emission trading schemes (Ahmad et al., 2024)¹⁰ for AI firms emitting high levels of carbon.
3. **Building an innovation ecosystem for 'Green AI':** Create a fund to invest in research on eco-friendly AI infrastructures, water-saving cooling systems, energy-efficient ML algorithms, low-resource AI models, resource recycling, etc. This will allow California to maintain its edge in AI while championing 'Green AI' innovations.
4. **Public-private-civil society partnership to boost behavioral, organisational, and technical measures:** Build a coalition to develop eco-efficiency standards, energy-usage rating systems, guidelines, and data-sharing mechanisms. These practices can be adopted voluntarily, informing policy decisions, and promote continuous improvements.

There are several challenges we expect in implementing these measures - regulatory arbitrage because of the AI development race (Bildirici et al, 2025)¹¹, creating the required administrative infrastructure for effectively enforcing the regulations, and corporate resistance in disclosing information and accurately measuring the environmental (carbon, water, or energy) impact. But focusing solely on substantial AI initiatives, arranging incentives for voluntary commitment, allowing time to build monitoring capability, and collaborating to promote innovations, this policy would yield significant environmental and economic benefits for California.

⁷ *The Environmental Impacts of AI -- Primer*. <https://huggingface.co/blog/sasha/ai-environment-primer>. Accessed 13 Apr. 2025.

⁸ Henderson, Peter, et al. 'Towards the Systematic Reporting of the Energy and Carbon Footprints of Machine Learning'. *Journal of Machine Learning Research*, vol. 21, no. 248, 2020, pp. 1–43. [jmlr.org](http://jmlr.org/papers/v21/20-312.html), <http://jmlr.org/papers/v21/20-312.html>.

⁹ Sætra, Henrik Skaug. 'The AI ESG Protocol: Evaluating and Disclosing the Environment, Social, and Governance Implications of Artificial Intelligence Capabilities, Assets, and Activities'. *Sustainable Development*, vol. 31, no. 2, Apr. 2023, pp. 1027–37. DOI.org (Crossref), <https://doi.org/10.1002/sd.2438>.

¹⁰ Ahmad, Maqsood, et al. 'Carbon Taxes and Emission Trading Systems: Which One Is More Effective in Reducing Carbon Emissions?—A Meta-Analysis'. *Journal of Cleaner Production*, vol. 476, Oct. 2024, p. 143761. DOI.org (Crossref), <https://doi.org/10.1016/j.jclepro.2024.143761>.

¹¹ Bildirici, Melike, et al. 'Climate Policy Uncertainty, Environmental Regulatory Arbitrage, and Internal Carbon Leakage in the European Union: Fourier ARDL and Causality Analyses'. *Journal of the Knowledge Economy*, Mar. 2025. DOI.org (Crossref), <https://doi.org/10.1007/s13132-025-02690-0>.

