

From Data to CO₂: The Hidden Climate Cost of Artificial Intelligence

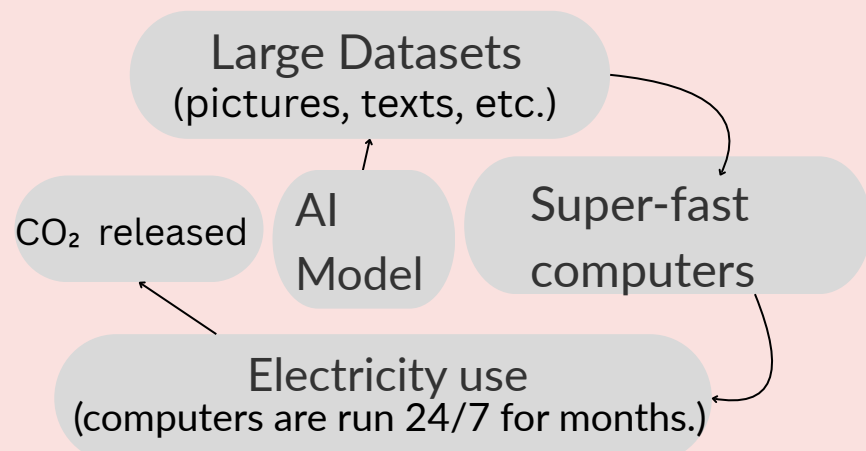


Every time you use an AI model like ChatGPT to ask a question, there is a cost in energy and carbon emissions.

How AI produces CO₂



For an AI model to work, it must be trained, with most emissions coming from this pre-training stage. It requires constant computer use and large amounts of electricity, and if powered by fossil fuels like coal or oil, it releases CO₂ — the gas driving climate change (1).



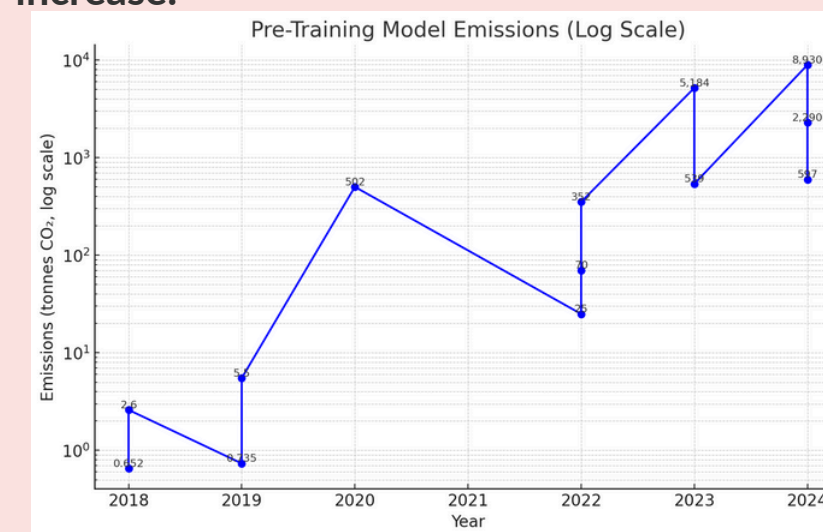
Increased Pre-Training Emissions

Biggest Pre-Training Emission Jumps (Estimated)

From 2019 to 2020, emissions jumped from 5.5t (RoBERTa) to 502t (GPT-3) — **about 91× higher**.

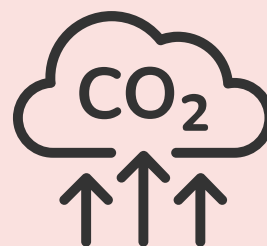
From 2020 to 2023, they rose again to 5,184t (GPT-4) — **about 10× higher** than GPT-3.

In 2022, OPT (70t) to Gopher (352t) saw a **5× increase**.



From 2018–2024, pre-training emissions soared as AI models advanced:

- Models grew larger (e.g., GPT-3 → GPT-4 → Llama 3.1 405B). -Bigger models = more data + more power = more CO₂ (4).

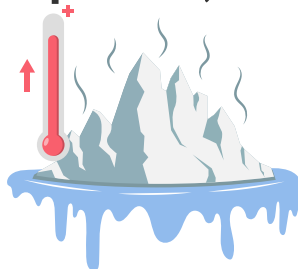


Each interval shows a trend of emissions growing with ever major AI model release.

[Graph Link](#)

Why This Matters

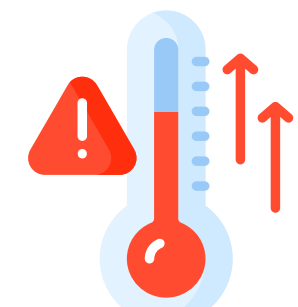
CO₂ emissions act like a blanket, trapping heat and warming the planet, which leads to:



Melting glaciers



Poorer air quality



Rising global temperatures

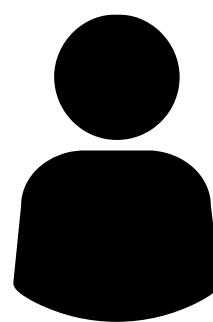
➤ Nature can't keep up. There are not enough trees absorbing CO₂ fast enough to balance out AI emissions. (5).

➤ AI is rapidly creating emissions a lot faster than humans do (6).

Beyond pre-training, inference emissions create CO₂ emissions with every question asked, adding more pressure on our climate.



5,184,000 kg of CO₂ from GPT 4 = 207,360 trees to balance. (5)



8,930,000kg kg of CO₂ created by Llama 3.1 405B= 1 person would produce in 1,860.42 years. (6)

Reported Vs. Estimated Emissions

Out of 13 AI models from 2018-2024, 2/13 of them released their emissions during pre-training. Why do companies prefer to not publish their emissions?



Releasing high emission numbers may discourage people from using the program. This leads to harm in a company's reputation and amount of users.

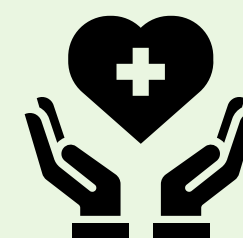


Transparency is needed to bring public awareness towards sustainable AI. With data, we can create solutions to make AI efficient.

Reported	Estimated		
➤ Llama 3 (9)	➤ GPT-4 (2)	➤ DeepSeek v3 (2)	➤ BERT (base) (7)
➤ Llama 2 (8)	➤ GPT-2 (7)	➤ Llama 3.1 405B (2)	➤ GPT-3 (3)
	➤ RoBERTa (Facebook AI) (2)	➤ Bloom (3)	
	➤ BERT-Large (2)	➤ OPT (3)	➤ Gopher (3)

13 AI models

Why AI Still Matters



AI helps detect diseases earlier.



AI makes learning more accessible.

Reducing Your AI Footprint

AI is a groundbreaking tool, practicing sustainable AI use is the next step to keep those benefits.



Be selective with your questions. Ask yourself, do I need to use AI for this? Or can I use other sources? Complex questions use more power and up to 50 times more emissions (10).



Choosing smaller models. They require less power and energy.



Be aware of your choice of models emissions. Opt for energy efficient models.

