Forum

Generative AI and Social Media May Exacerbate the Climate Crisis

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Abstract

The contributions of generative artificial intelligence (AI) and social media to the climate crisis are often underestimated. To date, much of the focus has been on direct emissions associated with the life cycle of tech products. In this forum article, we argue that this narrow focus misses the adverse and indirect impacts of generative AI and social media on the climate. We outline some of the indirect ways in which generative AI and social media undermine the optimism, focus, creativity, and veracity required to address the climate crisis. Our aim is twofold. First, we seek to balance the tide of optimism about the role of digitalization in addressing the climate crisis by offering a skeptic's perspective. Second, we outline a new research agenda that moves beyond counting directly attributable carbon emissions and proposes a more comprehensive accounting of the indirect ways in which social media and generative AI adversely impact the sociopolitical conditions required to address the climate crisis.

Keywords: generative AI, social media, climate, digitalization, LLMs, internet

The year 2023 marked a significant year in the history of the internet. The number of social media users worldwide approached 5 billion, and generative artificial intelligence (AI)—in the form of large language models (LLMs) like ChatGPT—exploded into mainstream usage. Both developments stand to impact the climate, but the causal mechanisms through which they will do so remain poorly understood.

Unlike other industrial sectors (e.g., energy, agriculture, aviation), there has been comparatively little critical reflection on how the information and communication technology (ICT) sector contributes to the climate crisis. To the extent that ICT's adverse impacts are considered, much of the focus has been on counting direct emissions from purchased electricity. Powering data centers

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and extracting/processing the raw materials for devices are emissions-intensive activities. Scholars estimate that the ICT sector accounts for between 1.8 and 3.9 percent of global carbon emissions (Freitag et al. 2021; Jones 2018). This puts ICT in roughly the same category as aviation. Notwithstanding significant emissions reductions from data center efficiency and increased sourcing from renewable energy (Mytton and Ashtine 2022; Rostirolla et al. 2022), analysts largely agree that emissions associated with the sector will rise unless policy interventions are made (Santarius et al. 2023). Rising emissions will be driven by emergent technology enabled by the internet, namely, generative AI, blockchain, social media, and video-sharing platforms like TikTok and YouTube. Estimates for the relative contributions of each of these technologies vary, and the carbon footprint of AI is a particularly contentious topic. While some believe that the carbon cost of machine learning will eventually plateau and decline (Patterson et al. 2022), others believe that growing computational complexity will require increased energy consumption (Strubell et al. 2019).

Yet, the direct impact of internet infrastructure on the climate crisis is only part of the story. The social and political channels through which social media and generative AI affect the climate are arguably far more insidious and consequential for the future of humanity. To decarbonize the global economy and avoid crossing irreversible thresholds for temperature increase, humanity requires wholesale transformation of established economic, social, and political institutions (van der Ven et al. 2017). The impact of social media and generative AI must be weighed against whether they facilitate or hinder such transformations. To date, very little research has examined the indirect effects of these technologies on the climate crisis. In the absence of a full accounting of the adverse impacts of social media and generative AI on the climate crisis, policymakers, investors, and environmentalists risk taking a one-sided view that sees internet-enabled tech as the solution instead of part of the problem.

Here we argue that both social media and generative AI (specifically LLMs) do more to exacerbate the climate crisis than alleviate it. Our reasoning lies in how these technologies indirectly and adversely impact the social and political conditions needed to motivate a timely and ambitious governance response to climate change. We offer this argument to fuel debate about the role of the ICT sector in addressing the climate crisis and to propose a novel research agenda on the indirect impacts of internet-enabled technology on the climate.

Social Media, LLMs, and the Erosion of Attention, Optimism, Creativity, and Veracity

First, there is considerable evidence that social media is reducing humanity's ability to focus on the climate crisis. Social media is partially responsible for destroying our collective ability to concentrate and do deep work (Carr 2010; Hari 2022). The lure of algorithms purposefully designed to keep our attention is simply too great for most people to avoid. The average TikTok video lasts a

scant thirty-four seconds and triggers a release of dopamine that makes users want to continue swiping through more videos (Liu and Luo 2015). A potential consequence of this normalization of fast and superficial content is a disengagement with complex, slower-moving phenomena like climate change. Across all ages and markets, fewer people are taking the time to read detailed news coverage in print or digital newspapers (Newman 2023). In younger people, heavy TikTok use has been associated with distraction and memory loss (Sha and Dong 2021), and studies of US students have found that, on average, students could focus for only six minutes before switching to a technological distractor (Rosen et al. 2013; Siebers et al. 2022).

The loss of our collective capacity to sustain focus on the climate crisis is one reason why the political urgency to confront this crisis has proven elusive (Bromley-Trujillo and Poe 2020). Arguably, the costs of constant attention shifting may outweigh the benefits to collaborative climate activism afforded through social media (Koc-Michalska and Lilleker 2017). Absent the broad and sustained focus of citizens in countries with the most leverage to take ambitious action on climate change (i.e., the OECD countries), policymakers lack the public mandate to push for transformative policies domestically and internationally.

Second, social media may be eroding the optimism needed to confront the climate crisis. The algorithms that govern social media news feeds are purposefully designed to present users with controversy because bad or contentious news is more effective in gaining and keeping attention (Brady et al. 2023). The collective impact of this deluge of bad news can be paralyzing. Between 2010 and 2020, feelings of persistent sadness and hopelessness increased by 40 percent among young people (Abrams 2023). There is growing evidence that social media use is associated with rising levels of anxiety and depression in adolescents (Damodar et al. 2022; Haidt 2024; Roberts and David 2023). This evidence prompted the US surgeon general to issue an advisory on social media and youth mental health (US Surgeon General 2023). Depression and anxiety have been linked to a range of maladaptive responses in young people, including climate change denial and feelings that governance responses will come too late (Hayward et al. 2020; Léger-Goodes et al. 2022). Given that youth have emerged as one of the most important constituencies in pushing for transformative decarbonization (Thew et al. 2020), the youth mental health crisis should be considered a genuine threat to achieving transformative change and one that is at least partially attributable to social media usage (Davidson and Kecinski 2022).

Third, for their part, LLMs may reduce our capacity for creativity and forward-thinking solutions to climate change (Brandt 2023; Koivisto and Grassini 2023; Shanmugasundaram and Tamilarasu 2023). One risk of our growing dependence on generative AI is that we may gradually lose our capacity to think for ourselves and may become overly dependent on machine-driven networks for problem solving (Atske 2018). Asking LLMs for solutions to the climate crisis is problematic because they use historical data to derive projections for future action. If recommendations about climate governance are made

based on previously attempted interventions, then AI-generated policy recommendations may be biased toward incrementalist approaches that are incompatible with the narrowing time frame for action (Allan 2019). Hence an underappreciated danger of our growing reliance on AI is that we are atrophying the parts of our brains that are most necessary for confronting the climate crisis (Ahmad et al. 2023; Mansharamani 2020), namely, the parts that are capable of creative, forward-thinking problem solving (Levin et al. 2012).

Finally, both social media and generative AI contribute to spreading false or biased information that inhibits transformative action on climate change. Social media platforms have proven to be effective vehicles for spreading misinformation about climate change (Treen et al. 2020). The fossil fuel sector (among others) has successfully used social media to downplay the risks of climate change, sow doubts over scientific consensus, or reframe climate governance as an elitist conspiracy to reduce individual freedoms (Ding et al. 2011). Concurrently, LLMs may reinforce existing biases and misinformation because they are often trained on large, unfiltered texts; exclude the majority of non-English languages; and do not distinguish between correct and incorrect information (Choudhury 2023; Schramowski et al. 2022). While some progress has been made in reducing LLM bias in climate information (Lacombe et al. 2023), significant challenges remain. Both LLMs and social media contribute to a broader phenomenon that some have labeled the "death of truth," whereby crowdsourced knowledge usurps scientific consensus and expertise (Kakutani 2019). In the absence of a single narrative of the truth, it becomes increasingly difficult for policymakers to secure the broad consensus needed to take aggressive action on climate change.

Toward a More Accurate Account of Generative AI and Social Media's Climate Impacts

Existing accounts of the relationship between the ICT sector and the climate crisis tend to be either narrow or one-sided (Joppa 2017). There has been a tendency to focus exclusively on direct emissions associated with the life cycle of tech products (Mytton and Ashtine 2022) or the positive impacts of emergent technologies (Adha et al. 2022; Hsu and Schletz 2023). While it is true that internet-enabled technologies like generative AI hold the potential to yield many positive impacts—such as improved climate modeling (Kaack et al. 2022; Larosa et al. 2023; Vinuesa et al. 2020), aviation contrail detection and avoidance (Hoffman et al. 2023), and monitoring climate technology innovation (Toetzke et al. 2023)—these gains must be weighed against their countervailing social and political impacts (Andersen et al. 2021; Dauvergne 2020, 2022; Rillig et al. 2023).

For this reason, we propose a novel research agenda focused on uncovering the indirect impacts of internet-enabled technologies on the climate. Three research questions form the core of this agenda. First, how have internet-enabled technologies, beyond social media and generative AI, impacted

the climate crisis? Second, which intervening variables—in addition to attention, optimism, creativity, and veracity—connect internet use with climate outcomes? Third, where and how have decision makers successfully balanced the twin imperatives of digitalization and decarbonization? These are questions that are well suited to empirical analysis through qualitative methodologies like systematic process tracing and comparative case studies. The primary contribution of this research agenda would be to offer a more holistic picture of the internet's true impact on the climate. This holistic picture is vital to evaluating the benefits and risks of digitalization for the transition toward a decarbonized world. It is also vitally important to the global environmental politics community insofar as it would help identify issues and areas that require governance interventions. In short, an impartial, evidence-based, and skeptical treatment of emergent digital technologies is required to offset the tide of techno-solutionism that flows from the ICT sector.

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