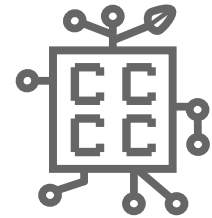


INTRODUCING CARBON COMPUTING



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Computers lie at the heart of climate politics. Computationally-intensive models frame and constitute how governing bodies and public perception alike understands the problem of climate change, while a growing number of digital tools and systems are positioned as the solution to the climate crisis. The urgency of global warming isn't in dispute but how the computing tech industry is setting the terms and horizons for mega climate change projects should be understood and recalibrated.

This inquiry attends to the material realities of computing technologies—including labor, supply chains, and digital infrastructures—and to the widespread faith that digital solutions and technological management are the best and only responses to climate change. Even when carbon reporting mechanisms and software tooling intended to reduce GHG emissions are most effective, it is unclear if 1) carbon cost numbers are accurate across fully supply chains, 2) measuring and reporting emissions leads to substantial reductions in GHG emissions (measurement is not the same as action), and 3) an outsized focus on decarbonization casts aside or, at the very least, deprioritizes other crucial environmental and social factors.

We call this paradigm **carbon computing**. It describes the massive enterprise of using computers to manage the climate system—from measuring individual impacts to adjudicating global climate politics. It is an increasingly core, if under-recognized, feature of climate management and governance. As an enterprise, it makes use of technological expertise and raw computing power to document and archive the past, manage the present, and anticipate the future. It incorporates computing technologies that range from simulation software and supercomputers to accounting sheets, blockchains, and machine learning systems. It is also, at times, paradoxical, as digital networks and infrastructures make up a growing share of global energy and carbon budgets.

Understanding carbon computing requires in-depth historical context, and deeper critical and ethnographic engagements with these dynamics. Techno-solutionist approaches alone won't cut it. It is imperative to include and learn from other perspectives and forms of knowledge, and carefully weigh what society stands to win—and lose—every time we turn to digital tools and networks for solutions. This belief in inclusive, contextualized, and critical engagement with digital carbon narratives motivates our collective.

>> Our Project

The Critical Carbon Computing Collective (4C) is a group of researchers, academics, activists, and artists working to contextualize and demystify the proliferation of technologically-oriented proposals that currently govern knowledge and resources in the climate system. Two core questions drive our work: (1) How is computing tech implicated in the unsustainable resource use that contributes to climate change? and (2) What role should computing tech play in strategies for environmentally just futures? In developing our responses, we do not take “tech” or technology to be a stable category or even one with a single, self-evident definition. We do, however, emphasize the role of the Information and Communications Technology (ICT) sector, given that industry’s increasing climate costs and simultaneous dominance in climate accounting, reporting, and management.

Most members of the 4C work at large universities, and some of us have connections with the work of industry-funded nonprofits in these areas; we therefore don’t claim to speak from outside of these funding structures or power dynamics. However, we each also have connections to groups and movements not represented in conversations at these institutions and understand the importance of elevating independent and under-represented perspectives. We aim to use our multidisciplinary insights to inform ongoing debates and build connections across work that risks being taken as purely technical. This would be a mistake.

As historians and ethnographers of computing and the environment, we hold that:

- Tech and climate change are deeply entwined. Computers and ICT both generate a growing portion of climate emissions and are simultaneously viewed by industry and policymakers as the solutions to climate challenges.
- Dominant framings of computationally-focused approaches to carbon risk upholding harmful aspects of the status quo.
- The relationship between energy and computation needs to be critically understood and historically situated.
- These conversations need to extend beyond industry and academia.

>> Coalition Building

This project is forming at a time where there is a larger push from industry, advocacy, academic, and policy collaborators to account for and alleviate environmental harms, some of which are caused by computing itself. Much of this effort takes the form of nonprofit organizations seeking to address the relationship between climate change and the ICT sector. Academic and industry-connected researchers at [Climate Change AI](#) examine not only the climate impacts of machine learning in a global context, but the ways that machine learning might be used to [mitigate climate change](#). [Green Software Foundation](#), funded by industry steering partners and hosted by the Linux Foundation, is attempting to build tools and provide resources for decarbonizing the ICT industry, changing the culture of how



software is built in order to prioritize sustainability. [The Green Web Foundation](#) is focused on building a fossil-free internet by 2030. 4C acknowledges such ongoing partnerships as important avenues for academics, civil society, and the wider public to redirect machine learning applications toward climate mitigation and to rebuild alternative practices of hardware and software development.

4C aims to contribute to these kinds of pragmatic technical proposals by expanding their scope of analysis to consider the historical and ongoing labor, resource, and social struggles implicated in such interventions. Rather than viewing carbon computing as the route to promissory futures or guaranteed sustainable outcomes, our goal is to recenter equity and justice in tech-oriented proposals around carbon in the present.

>> Generating Resources

For our public launch, we are releasing a set of four short guides designed to break down and demystify common terms, practices, and debates at the intersection of climate and ICT. By making these documents concise and accessible, we hope they will be a resource for circulating through other communities, opening up critical conversations about tech and climate.

- **Carbon Accounting** outlines how the tech sector contributes to (and reinforces) specific ways of monitoring and governing climate actors, and raises the prospect of new monopolies around the tools and data that other sectors need to reduce their carbon emissions.
- **Policy and Tech** discusses how states, corporations, and workers are setting standards, rules, and expectations around climate tech, and how tech companies are maneuvering through these policies (and policy gaps).
- **Computing Net Zero** unpacks the power of language in carbon computing. Words in computationally intensive climate projects are particularly prone to manipulations because of their apparent technical complexity. The computational definition of the term Net Zero depends on the specific context in which it is being used, and calculations can conceal who wins, loses, and profits from combinations of new tech, offsetting, and continued emissions.
- **Labor** emphasizes the roles of organized labor and environmental justice coalitions in advocating for and creating more sustainable computing practices and aims to move beyond carbon emissions reporting as the only mechanism for understanding the relationship between climate action and the ICT industry. Labor provides a lens for including the larger supply chains and marginalized communities that are often left out of carbon-centric discussions of climate change and computing technologies.

In the coming years, our group will publish more of these guides, visual diagrams, reports, and white papers on carbon computing alongside workshops and public programming. We invite those interested in these questions and for future collaborations to reach out: info@carboncomputingcollective.org.

