# Rethinking Academic Conferences: Carbon Footprints and Sustainable Alternatives in the Climate Crisis Era

**Joonmo Kang**
**Babu Gounder**
**Chris Weatherly**
**Aliya Jankowski**
**Lisa Reyes Mason**

***Abstract:*** *In the era of the climate crisis, academic conferences, while crucial for knowledge exchange, present a dilemma due to their significant carbon emissions from air travel. This commentary examines the environmental impact of attending academic conferences, focusing on the carbon footprint of traveling to the annual Society for Social Work and Research (SSWR) conference to begin to shed light on our field's contribution to climate change. We estimate that the average air travel carbon footprint for an individual who presented at SSWR 2023 was 0.82 tonnes of carbon emissions. Furthermore, we explore alternative conference models, such as virtual and hub and node models, highlighting their potential to reduce carbon emissions while enhancing accessibility. As climate change requires collective global efforts and systemic change, we argue that the field of social work, with its commitment to social justice and activism, has a crucial role to play in driving these changes within academia and beyond. Reflecting on our part in climate change, initiating dialogue, and creating a strategic roadmap for alternative conference formats is an essential step for our field to contribute to a more sustainable and equitable future.*

***Keywords:*** *Carbon footprint; climate change; climate justice; ecosocial work; sustainability*

Academic conferences play a vital role in continuing the development of disciplines and fostering growth and community by sharing knowledge, exchanging ideas, and engaging in intellectual and robust conversations. However, in an era where climate change threatens all aspects of life and strongly impacts community health and well-being, academic conferences pose a dilemma for climate-conscious researchers and educators. In-person academic conferences can entail thousands of scholars and practitioners traveling from different parts of the world, resulting in significant carbon emissions from air travel (Tao et al., 2021). As such, a growing number of scholars have documented the consequences of academic flying (Bjørkdahl et al., 2022; Leochico et al., 2021) and started to explore possibilities for envisioning alternative conference modes (Flying Less, 2025; Hiltner, 2016). We also have seen initiatives at the university level to curb carbon emissions. For example, in 2019 the University of Sheffield hosted a hybrid symposium called "Reducing Academic Flight." The ETH Zurich also launched the Air Travel Project that focused on reducing the greenhouse gas emissions from work-related air travel by

Joonmo Kang, PhD, MA, Assistant Professor, School of Social Welfare, University of Kansas, Lawrence, KS. Babu Gounder, doctoral student, School of Social Work, University of Illinois Urbana-Champaign, Champaign, IL. Chris Weatherly, PhD, LCSW, Assistant Professor, School of Social Work, University of Georgia, Athens, GA. Aliya Jankowski, MSW, School of Social Welfare graduate, University of Kansas, Lawrence, KS. Lisa Reyes Mason, PhD, MSW, Professor, Graduate School of Social Work, University of Denver, Denver, CO.

university affiliates through a participatory, evidence-based and solution-oriented approach (Kreil, 2021).

Academia has been closely entwined with air travel since the 1960s (Bjørkdahl & Duharte, 2022). Flying is so deeply embedded in academic culture and identity to the point that frequent travel has become a marker of academic success and prestige (Bjørkdahl & Duharte, 2022; Hopkins et al., 2019). Many academics consider conference-related air travel necessary for career success; however, an increasing number are expressing concerns and recognizing a culture of silence around how this travel contributes to climate change. (Eriksson et al., 2020). Moreover, Kreil (2021) has shown that, contrary to the dominant assumption that reducing air travel negatively impacts academic work, such work would either benefit from or remain unaffected by using alternative conference methods. Since the COVID-19 pandemic, which forced many conferences to shift online, a growing number of scholars in other fields are beginning to challenge the tradition of air travel within academia and reflect on their practice and roles in curbing emissions (Crumley-Effinger & Torres-Olave, 2021; Moss et al., 2021).

In social work, there has been a notable absence of discourse around critically reflecting on how our professional practices and lifestyles may contribute to perpetuating the reliance on and systems of carbon emissions. Given that our field is intricately intertwined with climate justice (Alston, 2015; Dominelli, 2011; Mason, 2021) and that we are a practice-oriented profession that upholds reflexivity and social action, it is imperative that we take proactive steps to develop comprehensive and effective strategies for promoting sustainable practices, fostering climate consciousness, and setting a precedent for a more ecologically sustainable future within our field and beyond. Through this commentary, we aim to reflect on this issue and initiate a dialogue by exploring the issue of air travel to academic conferences. Moreover, we will examine the practices of other disciplines and begin to consider alternative approaches. First, to begin reflecting on our profession's climate impact, we estimated the carbon emissions of the 2023 conference for the Society for Social Work and Research (SSWR), which is one of the largest social work conferences that brings together researchers, scholars, practitioners, educators, and students. Then, we summarize alternative conference models that have been explored as well as measures adopted to diminish the impacts of conferences on climate change. We conclude by urging the field to mobilize to take action.

## Measuring the Carbon Footprint of Attending SSWR

Since conference-related travel constitutes a significant portion of the carbon emissions associated with an academic profession, a growing number of fields are beginning to scrutinize the climate ramifications of academic conferences by calculating their carbon footprint. While various disciplines are beginning to contemplate their environmental impact, we have not observed a similar initiative within the field of social work. This is concerning considering social work's commitment to climate consciousness, which was reflected in the 2022 SSWR conference's emphasis on Environmental Justice. To address this gap, we have taken the initiative to calculate the carbon footprint of SSWR 2023.

Using publicly available information about presenters and their institutions from SSWR's online conference program, we estimated the carbon emissions from air travel of the presenters. We utilized the Carbon Footprint online calculator created by Carbon Footprint Ltd., an environmental consulting firm based in England. Carbon footprint calculators assess an individual's carbon footprint by gathering data on energy use and transportation methods, including flights, cars, motorbikes, buses, rail, and household consumption. Among the many online calculators available, we selected this tool based on a study by Mulow et al. (2019), which identified it as one of the most comprehensive options among 31 online carbon footprint measurement tools. By inputting the airport code of the closest airport to each presenter's institution and the conference location in Phoenix (PHX), this calculator estimates the carbon footprint of air travel by analyzing the distance traveled, type of seats (e.g., economy class, business class), and the radiative forcing factor, which accounts for the emissions resulting from high-altitude impacts, to compute the total emissions generated.

Presenter information was collected from SSWR's online conference program. Initially, we identified a total of 3,901 presenters listed in the program. We then narrowed this to presenting authors, resulting in a final count of 1,677. To calculate the carbon footprint for each presenting author, we determined the closest airport to each presenter's institution using Google Maps. We assumed that each presenter took a round-trip, direct economy flight to Phoenix. For those whose institutions were within 300 miles of Phoenix, we assumed they drove to the conference and did not include them in the carbon footprint calculation.

## Carbon Footprint of Attending SSWR and Its Implications

The 1,677 presenting authors from the SSWR 2023 conference comprised 1,512 domestic travelers and 165 international travelers. Based on assumptions described above, we estimate that these presenters collectively emitted over 1,383.17 tonnes of $CO_2$ through air travel, resulting in an average emission of 0.82 tonnes per presenting author. This is a conservative estimate because not all participants may have chosen direct flights, and those who took a flight instead of driving while located within 300 miles of Phoenix were excluded from our calculations, as we assumed they were commuting by car.

Overall, these results fall within the range of estimates from other studies that have calculated the carbon footprints associated with air travel for academic conferences. For instance, Jäckle (2019) estimated the carbon footprint of Europe's largest political science conferences between 2013 and 2020, revealing that average emissions per attendee ranged from 0.5 to 1.3 tonnes of $CO_2$. Similarly, Milford et al. (2021) estimated that attendees at the annual meeting of the Societies for Pediatric Urology traveled a total of 4,034,964 miles, resulting in 912.47 tonnes of $CO_2$ emissions, with a median emission of 0.61 metric tonnes per attendee.

Conferences with larger participant numbers, particularly those with a more global attendance, exhibit higher carbon emissions. For example, Bousema et al. (2020) estimated that the 4,834 participants of the American Society of Tropical Medicine and Hygiene conference, which attracted attendees from 110 countries, generated a total of 8,646 tonnes

of $CO_2$. The annual meeting of the European Astronomical Society, which draws more than 25,000 participants from over 100 countries, was estimated to have a carbon footprint of 1.5 tonnes per participant in 2019 (Burtscher et al., 2020). Klöwer et al. (2020) calculated that the carbon footprint of the 2019 annual meeting of the American Geophysical Union (AGU) was 3 tonnes per participant. Furthermore, the annual meetings of the Society for Neuroscience, hosting 30,000 attendees from around the world, were estimated to emit 22,000 tonnes of $CO_2$, an amount that the authors equated to the annual carbon footprint of operating 1,000 medium-sized laboratories (Nathans & Sterling, 2016).

Compared to major conferences in other fields, SSWR is relatively modest in scale and does not attract as many international participants, which might explain the lower total carbon emissions as well as the 0.82 tonne carbon footprint per presenting author compared to the other conferences mentioned above. Yet this is still high when considering that this is just a flight for one conference. For each presenter, this is more than the yearly emissions of individuals living in Sub-Saharan Africa, which is 0.7 tonnes, and more than double the yearly emissions of individuals from "the least developed countries," as categorized by the United Nations, which is 0.3 tonnes according to data from the World Bank (2023).

Our finding reflects "the great carbon divide," which describes the extreme inequality of carbon emissions between the rich and the poor (Watts, 2023; Khalfan et al., 2023). Attending a single conference emits more carbon than the average person in some parts of the world produces in a whole year. This stark contrast puts into perspective what Brand and Wissen (2021) described as the *imperial mode of living*, a concept that critiques the everyday life and the norms of production and consumption that are built into the political, economic, and cultural structures in the global North. The imperial mode of living is characterized by excessive consumption, reliance on high levels of resource extraction, and a significant ecological footprint at the expense of marginalized communities (Brand & Wissen, 2021). What many in the global North consider a "normal" lifestyle, such as flying as part of their work, plays a significant role in climate injustice, where the world's poorest and most vulnerable populations experience the most impacts of climate change despite being the least responsible for it. Furthermore, it highlights the significant distance many academics may have from the realities of global inequality. The world's richest 10% of people were responsible for more than 50% of the carbon emissions produced between 1990 and 2015. Moreover, the emissions based on consumption of the richest 1%, which according to Samuel (2023) is a person without children who earns at least $60,000 a year, are more than 100 times higher than the poorest 50%.

To avert the worst impacts of climate change, the Paris Agreement set a target of limiting global average temperature increase to 1.5°C above pre-industrial levels by 2030. To meet this goal, global emissions must decline by 43% by 2030 and the average emission per capita, globally, should not exceed 2.3 tonnes (Khalfan et al., 2023). With most emissions linked to consumption by the world's richest people, the role of people with financial means and resources are vital to meeting the Paris Agreement's 1.5°C goal (Khalfan et al., 2023).

Reducing carbon emissions requires a systemic transformation from carbon-intensive practices, as carbon emissions are deeply interconnected with the systems that govern our

societies and economies. While much of this transformation requires political action and policy change, there is also a role for addressing the lifestyles and consumption patterns of individuals, particularly those living in the global North with financial means and resources. The people driving these systems can recognize their own roles in perpetuating carbon emissions through their everyday behaviors and practices, which requires a fundamental shift in societal values and individual lifestyles. In this context, reflecting on our own carbon emission practices, particularly regarding attendance at conferences, prompts us to consider what role we can play in driving meaningful change. This serves as an example of one approach to questioning and potentially redefining our norms.

With the emergence of ecosocial work, which represents a paradigm shift in the traditional frameworks of social work by advocating for transformative practices that emphasize ecological sustainability and social equity (Boetto, 2017; Coates, 2003; Dominelli, 2012) as well as the pivotal role of social workers in facilitating a just transition (Forbes et al., 2024), it is increasingly vital to take proactive measures to reflect on our current practices and create strategies that encourage sustainable practices, establishing a standard for a more ecologically sustainable future both within our field and in broader society. As academics, particularly in social work—an applied field and one focused on social justice—we must model sustainable practices in our own lives and advocate for changes that demonstrate our commitment to climate/environmental justice and sustainability. Assessing our air travel practices should be an integral part of this effort; our calculations indicate that attending the SSWR conference accounts for nearly 36% of the maximum carbon emissions a person should emit annually to meet the 1.5°C target.

Air travel is deeply embedded in the culture of academia, where it is considered a necessity for performing well and is often seen as beneficial to one's career (Kreil, 2021; Schrems & Upham, 2020). Therefore, a system-wide shift away from air travel in academia requires a change in cognitive norms and culture (Tseng et al., 2022). To be sure, changes to systems via policies, regulations, and institutional frameworks are undoubtedly necessary to create broader structural shifts that can lead to reduced carbon emissions. For example, systemic change could involve increasing public transportation options, such as high-speed rail, which can provide alternatives to domestic air travel. At the same time, a change in society's values is needed to drive progress. Reflecting on individual values and making lifestyle changes are important steps that should go hand-in-hand with systemic efforts to reduce emissions in the near future. Considering that a full discussion of the tension and interplay between systemic drivers of emissions and the potential and limitation of individual changes are beyond the scope of this commentary, we focus the remainder of this paper on immediate implications for social work academics to consider, for alternative conference formats that would reduce air travel related emissions.

## Alternative Formats of Academic Conferences: From Virtual to Hybrid, Embracing Climate Sustainability

When considering how to reduce the carbon footprint associated with air travel for attending academic conferences, there are several alternatives. These include a complete shift to virtual conferences or options that fall somewhere in between. One such option is

a hub model, which minimizes air travel by hosting events in multiple locations while still providing the in-person benefits of conferences, such as networking, collaboration, and direct engagement with peers. Other alternatives involve rotating conferences between virtual formats or fully transitioning to online platforms. In this section, we will examine the benefits and limitations of these alternatives.

Well before the worldwide COVID-19 pandemic, which forced many to shift from in-person formats to digital ones, virtual conferences had been developing since 1992 (Anderson, 1996). These virtual events already demonstrated an ability to deliver a high-quality and engaging professional experience (Anderson, 1996). Yet it was during the pandemic that a growing number of academics began to recognize the advantages and feasibility of participating in conferences online, with some starting to call for a complete transition to virtual formats (e.g., Achakulvisut et al., 2020; Moss et al., 2021; Periyasamy et al., 2022; Tao et al., 2021). For example, Periyasamy et al. (2022) showed that a physical conference emitted 55 times more $CO_2$ compared to a virtual conference. Tao et al. (2021) estimated that transitioning from a traditional in-person to an online format would substantially reduce the carbon footprint of conferences by 94% and energy use by 90%. In addition to minimizing the environmental impact, virtual conferences have advantages such as extending their reach to a broader audience and enhancing accessibility (Le Quéré et al., 2015; Raby & Madden, 2021), particularly for individuals with fewer resources and care responsibilities, including female researchers with caregiving and parental responsibilities (Jöns, 2011), scholars from the Global South (Albayrak-Aydemir, 2020), and people with disabilities (De Picker, 2020).

However, virtual conferences still have challenges including technical issues, time zone differences, lack of engagement and interaction compared to in-person events, and screen fatigue (Moss et al., 2021). Many people have concerns about going completely virtual as there is still a strong belief that physical attendance is more engaging and facilitates better networking (Bousema et al., 2020). Being physically present in a conference encourages active participation where one can have face-to-face interactions, chance encounters in hallways and breaks, and build meaningful and spontaneous connections that can be more challenging to achieve or replicate in a virtual setting.

Those who recognize both the advantages and disadvantages of virtual and in-person conferences are increasingly considering the hybrid format that combines virtual and in-person aspects of a conference as a viable alternative. Often called the "multi-hub conference," this format significantly reduces a conference's emissions by hosting the conference simultaneously in a few locations to accommodate the multiple geographical areas where most academic members cluster. For example, Klöwer et al. (2020) estimated that AGU would experience a 79% reduction in emissions if it shifted its typical conference location of San Francisco to a multi-hub conference in Chicago, Paris, and Tokyo. Bousema et al. (2020) calculated that shifting the conference for the American Society of Tropical Medicine and Hygiene from a single location in Maryland, U.S., to a conference venue per region in Washington, DC, Lima, Bangkok, Nairobi, and Amsterdam would reduce emissions by 60%. Similarly, the International Society for Industrial Ecology estimated an 82% reduction in emissions with the three-hub multi-conference format combined with land transportation (van Ewijk & Hoekman, 2020).

With the multi-hub conference, the program is split across the hubs to cultivate interactions among participants on a single site and across multiple sites (Parncutt et al., 2021). For example, each hub holds its own in-person keynote and sessions, which are also broadcasted, live-streamed, and connected to other locations for virtual discussions (Sarabipour et al., 2021). The multiple sites are virtually linked up for participants at any location to attend and participate in any session. Two-way video systems are set up to enable cross-location discussions (Abbott, 2020). Conference programs include virtual socializing events such as specific topic discussions and prearranged network opportunities (Parncutt et al, 2021). Each conference site organizes and holds its own in-person social events to foster new connections and allow friends in the field to catch up (Abbott, 2020). Furthermore, it provides an opportunity for local engagement, which can benefit local communities and economies (Rosen, 2017).

Integrating pure virtual and in-person has been explored with various hybrid "hub and node" models (Fraser et al., 2017). The hub represents the site coordinating the virtual technical elements of the conference and streaming the conference presentations and proceedings, while the nodes are local areas where participants gather at smaller venues to view the same virtual conference in real-time and have the benefit of face-to-face interaction. These hybrid conference formats with decentralized nodes can be set up with a single hub, multiple hubs, or multilateral hubs that span multiple international locations and time zones (Fraser et al., 2017). Compared to multilateral hub models, single-hub or multiple-hub models act as a central point that is more practical in reducing time and resource requirements for organizing and coordinating between hubs (Fraser et al., 2017). By having hubs and nodes, participants have the choice to attend in person, without having a format that excludes those who may not have the necessary resources or desire to attend in person (Fraser et al., 2017).

However, the hybrid hub and node models are not without their flaws. Most notably, these hybrid models essentially create two classes of attendees as those joining virtually often have a secondary or less immersive experience (Moss et al., 2021). Moss et al. (2021) strongly advocate prioritizing virtual participation in a hybrid space, which implies that even when individuals are physically present, they should participate virtually, irrespective of the existence of an in-person aspect in the event. Moreover, hybrid models double the workload for organizers to maintain a well-synchronized event (Moss et al., 2021).

Aside from these alternatives, some have suggested scheduling conferences biannually (see Zoloth, 2014) and holding in-person meetings every other year and replacing one year with a virtual one. Alternatively, if the decision is to continue hosting conferences in-person, it may be beneficial to select cities with nearby major airport hubs to reduce extensive travel. For example, Klöwer et al. (2020) demonstrated that holding a conference in Chicago, Illinois, compared to coastal cities, could save 12% in emissions.

## Redefining Academic Conferences in the Face of the Climate Crisis: A Call to Action for Social Work and Beyond

With climate change amplifying and making worse the existing inequities and disparities of vulnerable and underserved populations, our professional commitment to

marginalized and at-risk groups embedded within our code of ethics necessitates the profession to be at the forefront of addressing the climate crisis by forging meaningful changes within existing systems.

These discussions are still just emerging within the realm of social work. Lowering the carbon footprint of the most prominent event in the field of social work research will represent an important step in raising awareness and modeling future events both within and beyond our profession. While there are various ways to lower conference-related carbon emissions—such as food and lodging choices—this commentary focused on the air travel aspect of academic conferences, as air travel to conferences, meetings, and talks accounts for more than one-third of carbon emissions in higher education (Hiltner, 2016). We are calling for our field to contemplate the traditional model of academic conferences that necessitate frequent air travel and to think about alternatives as a collective practice.

By advocating for a reduction in carbon footprint, we are not placing blame on individual scholars or discouraging their participation in academic conferences. Instead, we are addressing this matter in line with other climate change concerns, emphasizing the need for reflection on cultural norms and comprehensive systemic changes. Moreover, such changes are likely to falter if they are not accompanied by a fundamental shift in societal values and individual lifestyles. To achieve this, we must initiate a collective discussion within our field, recognizing the need for both systemic change and individual introspection and behavioral adjustments. Addressing the root causes of carbon emissions requires a collective commitment to reevaluating how we live, consume, and interact with our environment.

Other disciplines have acted more than social work in this regard. For example, the American Anthropological Association (AAA)'s Global Climate Change Task Force published a report in 2014, which called for the AAA's executive board to aggressively reduce the carbon footprint from association-wide activities (Fiske et al., 2014). In 2018, the Society for Cultural Anthropology experimented with hosting a hybrid conference creating a carbon-conscious international conference (Pandian, 2018). Also in 2019, the American Association for Geographers (AAG) introduced the Climate Action Task Force and petitioned the Council of AAG to reduce emissions from their annual meeting by 45% by 2030 and by 100% by 2050 (Langham, 2022). These are a few of many examples that we can learn from. Whether it involves adopting a multi-hub or virtual format, scheduling conferences biannually, or selecting venues near major airport hubs to cut extensive travel, it is imperative that we begin to develop a strategic roadmap to ensure that our intellectual interactions prioritize sustainability, equity, and inclusivity.

However, lowering the carbon footprint of one academic conference will not, in the grand scheme of things, significantly impact the challenge of climate change. According to a report by the Intergovernmental Panel on Climate Change (IPCC, Masson-Delmotte et al., 2018), given the shared nature of the climate change issue, one sector's contributions will be insignificant without an interconnected approach and response. Additionally, while written recommendations are easy to produce and disseminate, making sustained changes for a conference that provides the largest platform for social work researchers, scholars, practitioners, and students will be met with multiple real barriers and difficult

conversations. Nevertheless, the field of social work by the very nature of its purported ethos, spirit, and philosophy has a necessary role to play in this process. Sustained systemic change can only occur through taking important first steps, and we urge our colleagues to collectively embark on this path.

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**Author note:** Address correspondence to Joonmo Kang, School of Social Welfare, University of Kansas, Green Hall, 338, 1535 W. 15th Street, Lawrence KS 66045. Email: joonmo@ku.edu