Environmental Justice in the Race to Net Zero

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Introduction

The urgent need to reduce global greenhouse gas (GHG) emissions has been driven home by the increasing frequency of extreme weather events – from floods, droughts, heatwaves, hurricanes to wildfires - which have not spared campuses and communities across the globe. People and communities of color already overburdened by pollution and inequity suffer these impacts disproportionately (Agyeman, Bullard & Evans 2002).

The academic community has been at the forefront of monitoring climate change and alerting humankind of the dangerous repercussions of failing to act to reduce global emissions, leveraging decades of research and best practices (ACUPCC, 2011). Higher education institutions are themselves beginning to take action to reduce emissions.

In the context of higher education and other sectors, "net zero" or "carbon neutrality" commitments are emerging as powerful drivers toward tangible mitigating actions. (For example, at the time of writing, over 1114 Universities and colleges from across the globe have signed the United Nations' Race to Zero for Universities and Colleges, 194 countries have signed the Paris Accord, and 58 percent of Fortune 500 company CEO's have committed to net zero targets by or before 2050.) Many higher education institutions are demonstrating steadfast leadership by committing to net zero emissions targets, exemplifying sustainable energy infrastructure on their campuses, committing to low-emitting operational activities, re-evaluating the use of University investments and research dollars, preparing future leaders, and re-evaluating how they engage with communities around the world (including those burdened by environmental injustices).

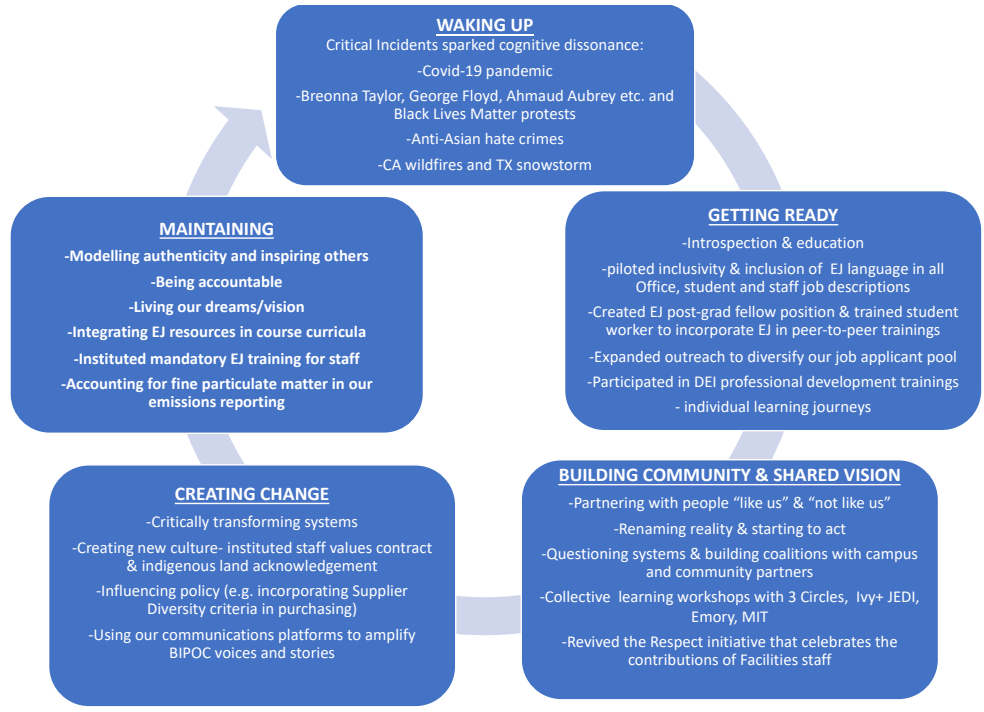
Installation showing the broad actions Princeton University is taking on campus to achieve net zero by 2046, the institution's 300th anniversary.

This essay argues that pathways for achieving net zero targets in higher education must not only contribute to decarbonization but must also be just, fair and equitable in ways that are meaningful to overburdened and BIPOC (black, indigenous and people of color) communities. Traditional institutional staffing structures continue to separate justice considerations from applied climate action on campuses, even as many institutions diligently seek ways to become more inclusive and just. Nevertheless, higher education sustainability programs must grapple with the fact that the path to net zero is riddled with distinctive challenges, including the risk that strategies developed in the absence of justice considerations may make the situation worse for those most impacted.

This moment in history represents an awakening, an opportunity to examine how environmental justice concerns relate to institutional carbon neutrality practices in the moment in which higher education institutions are re-evaluating their histories, purpose and impact in the world. This is also a moment in which the sustainability field can realize its full scope of purpose, which, as the United Nations Sustainable Development Goals outline, encompasses equity, inclusion and justice for all. Structured listening and learning exercises to inform action are an important part of this work of reinvention for higher education sustainability professionals. Some of these opportunities have been explored from a pedagogical standpoint (King and Casanova, 2021), but there has been only limited exploration from a campus operational standpoint.

This essay explores how the sustainability leaders at Princeton University and other colleges and universities are grappling with this intersectional work, through frameworks and practices associated with achieving net zero carbon emissions. It asks: what are the opportunities - and challenges - to advancing environmental justice on the journey to net zero? And what are the immediate first steps as we build a genuine community-facing approach? We will explore possibilities and challenges around transformative action in the following areas:

- Curricular and co-curricular engagement
- Public engagement
- Air & transportation initiatives
- Energy infrastructure conversion
- Carbon offsets



Pathways Princeton University sustainability staff are exploring to advance environment justice (EJ). Adapted from Harro, B., (2000).

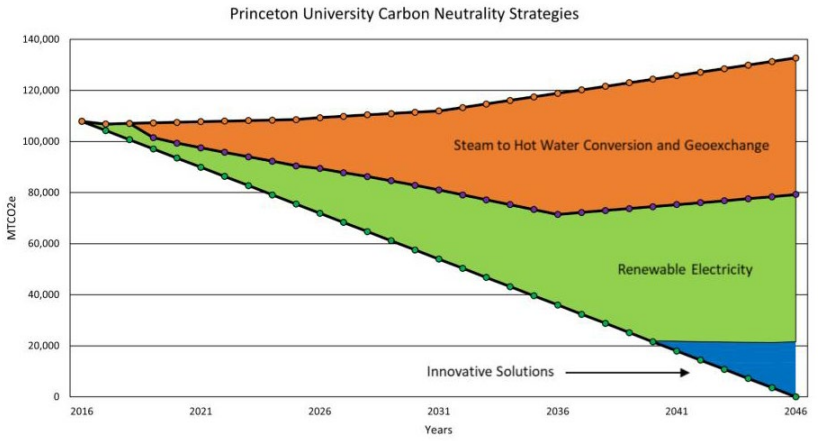
The Net Zero Campus

Since the launch of the American College and University Presidents' Climate Commitment in late 2006, leaders of more than 800 institutions have signed on, vowing to achieve net zero as soon as possible. As of summer 2022, ten colleges have achieved net zero: Allegheny College, American University, Bates College, Bowdoin College, Colby College, Colgate University, Colorado College, Dickinson University, Middlebury College and University of San Francisco (Carbon Neutral Colleges and Universities, 2022). Higher education institution (HEI) commitments to net zero help align emissions with the goal to keep global average temperature increases below 2 degree centigrade, consistent with the science-based targets under the Paris Agreement.

There are a variety of ways to define "net zero" emissions or "carbon neutrality." Princeton University's working definition of net zero for its campus refers specifically to emitting no more greenhouse gasses into the atmosphere than are permanently removed or stored each year (Larson et al., 2021). Princeton intends to reach net zero without the purchase of market offsets and is instead focusing on reducing both direct emissions from on-site energy production and fleet fuel use (Scope 1) and indirect emissions from purchased electricity (Scope 2). Princeton will achieve this by 2046, the university's 300th anniversary (Valenti, 2021), or sooner. Plans for reducing indirect (Scope 3) emissions from commuting, procurement and other activities are in early stages of development. For example, Princeton is currently in the process of developing market-driving strategies and goals to reduce the embodied carbon and community impacts associated with building materials.

Colorado College (top) and Dickinson University (bottom), are two of the ten colleges that have achieved net zero greenhouse gas emissions.

Princeton's pathway to carbon neutrality relies on strategies spanning new on-site energy infrastructure (e.g., installation of campus-wide ground source heat pump and geoexchange technology and expansion of on-campus solar energy generation capacity to cover 19 percent of campus needs), investment in existing building energy-efficiency improvements, the purchase of new renewable electricity generation off-site, and actively cultivating energy conservation behaviors across the campus community. However, while our campus systems are highly efficient, we will continue to combust fossil fuels (natural gas) as our primary energy source until infrastructure conversions are completed over the next approximately 15 years. Our reliance on natural gas will decline dramatically over that timeframe.



Princeton University is on track to reach net zero campus greenhouse gas emissions by 2046 or sooner.

In recent years, emissions reduction efforts on campuses have focused primarily on Scope 1 and 2 emissions. However, institutions also have tremendous market influence and pollution-reducing impact through their procurement activities and other consumption areas (Scope 3). In order for higher education facilities and operations to achieve net zero, and potentially positively impact environmental justice, each scope of emissions needs to be understood and reduced.

Scope 1, 2 & 3 Emissions

Scope 1 emissions are direct. They come from onsite combustion and mobile sources controlled or owned by an organization. Methods to reduce scope 1 emissions include implementing fuel-saving technologies and switching to geoexchange technologies.

Scope 2 emissions are indirect and are generated in the production of purchased electricity and steam. Even though the greenhouse gasses are emitted at the facilities where the electricity or steam is generated, they are considered an organization's responsibility because they are a result of the organization's energy use. These emissions could be reduced through methods such as installing more efficient lightbulbs or purchasing renewable energy certificates.

Scope 3 emissions include all other indirect emissions, including those from the production, transport and disposal of purchased goods, employee business travel, and employee commuting. Scope 3 emissions often represent the majority of an organization's emissions and are typically most challenging to quantify and address. Institutions can reduce scope 3 emissions through more thoughtful procurement contracts, robust alternatives to air travel, community-based pollution reduction efforts and, though controversial, through the short-term purchase of carbon offsets.

Environmental Justice

Strategies that higher education institutions employ to drive down carbon emissions toward net zero have important implications for environmental justice and present powerful opportunities for research and learning. There is a particular opportunity to design these strategies to benefit communities as an explicit desired outcome.

To better understand how environmental justice intersects with sustainability, as well as the historic separation in practice between these concepts, it is important to begin with a common understanding of the term "environmental justice."

Illustration from student-led environmental justice workshop.

Environmental justice issues were powerfully amplified on the radar of higher education in 2020, with a national reckoning around police violence following the murders of George Floyd and many other Black people at the hands of the police. Weeks of powerful direct action to challenge these historic atrocities overlapped with the COVID-19 pandemic. These shed light on the disproportionately negative impacts on the health of BIPOC and low income communities created by the concentration of industrial and waste sites in those communities among many other examples of systemic racism. This pattern of cumulative and disproportionate impact of environmental burdens on communities of color and the poor has been widely referred to as environmental racism or environmental injustice (Agyeman, Bullard, & Evans, 2002). Environmental injustice can be defined as the disproportionate exposure to environmental challenges in certain populations and communities, typically people of color and low-income areas.

"Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."

- Environmental Protection Agency, 2022

Historically, environmental justice concerns in the US came to light through protests by grassroots movements against the routine siting of toxic waste dumps, hazardous facilities and polluting industries in areas inhabited predominantly by people of color and the poor. The phenomenon has been well-documented in landmark studies such as the Government Accounting Office Report (GAO, 1983) indicating statistically that African-Americans comprised the majority population in three of the four communities of south-eastern US where hazardous waste landfills were located. Also, the landmark report Toxic Wastes and Race in the United States (United Church of Christ Commission for Racial Justice, 1987) raised awareness of what Bullard (1994) termed "environmental racism."

Some scholars suggest that concentrated pollution is but one of many forms of violence following a long history of slavery, colonialism, as well as imperialism, formed around the notion of white supremacy, that has regarded people of color as disposable. Ruha Benjamin, Professor of African American Studies at Princeton, uses a concept of "afterlives" to convey that slavery has also left a legacy of social injustice which manifests in the vast economic, social, and health disparities seen today - skewed life chances, limited access to health and education, premature death, incarceration and impoverishment (Benjamin, 2018). According to Benjamin, oppression didn't end with Emancipation, but rather evolved into mass incarceration, debt, and structural inequality in public systems, resulting in many Black people today not having the basic conditions for a healthy and economically prosperous life.

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Environmental Justice & Sustainability in Higher Education

A History of Separation

Unlike environmental (in)justice, which is gradually making its way into academic discourse and practice, sustainability has a long-standing focus for higher education in teaching, research and campus operations (McNaghten and Urry, 1998). Sustainability refers to ideas of living within the finite limits of the planet, or improving quality of life without compromising the ability of future generations to meet their own needs, and of regenerating ecological systems.

Despite the breadth of the concept, sustainability in higher education has too often been seen and implemented mainly through a narrow environmental lens rather than the intersectional social, cultural, justice and ecological lenses that are required. The result is a principal focus on carbon reduction planning efforts that omit environmental justice principles or any analysis of community-scale implications. There has been a policy assumption that simply reducing emissions will also benefit all communities, including low-income and BIPOC communities. Scholars suggest, however, that there is a need to provide a more comprehensive, community-focused, framework for analyzing and promoting fairness and equity throughout the transition away from fossil fuels. (McCauley, Heffron 2018)

For over four decades, sustainability in higher education has manifested as an environmentally-focused and expert-oriented operational endeavor (Breen, 2010). This narrow approach sidesteps policy analyses and the deeper socio-cultural contexts in which institutions are embedded. Campus sustainability programs have been largely housed in operations departments and have focused on operational systems changes and/or individual action measures (e.g., ride a bike, buy local, use reusable water bottles, etc) in the absence of necessary whole-institution initiatives. This approach has failed to address the structural inequities and habitual decision-making that promote environmental and social degradation, particularly in the contexts of underserved communities that have not had a place at the table in the sustainability discourse.

Following the most recent push towards racial reckoning, higher education institutions are paying closer attention to diversity, equity, inclusion and social justice issues, with environmental justice emerging on the radar of many university sustainability experts. Environmental justice, however, is not yet considered an integrative dimension of institutional racial justice or sustainability strategy.

Embedding Environmental Justice into Net Zero Efforts at Princeton

The starting point for Princeton University's efforts in this regard was a formal acknowledgement by its sustainability office, through its Draft Environmental Justice Framework, that "sustainability is not a separate issue from racial justice. The two are, in fact, intertwined as many BIPOC communities are affected by Environmental racism." While progress accelerates to reduce Princeton's absolute campus carbon emissions to net zero by 2046 or sooner, the work of understanding what environmental justice means in relation to campus decarbonization operations and sustainability practice in higher education is just beginning.

It is important to integrate environmental justice concerns in our efforts to address the challenges of a warming climate. Such refocusing is critical in efforts to reach net zero for two reasons: First, to achieve environmental justice, the decision-making processes that higher education institutions exemplify for combating climate change should be deeply informed by both global and community-scale contexts, the latter of which inherently requires far more meaningful community partnerships and exchanges than are currently practiced. Second, without that community-scale understanding, campus sustainability initiatives could have unintended but damaging effects in communities already bearing disproportionate environmental burdens. For example, solar energy technologies require significant land use and use materials and processes that rely on toxic materials or waste flows. This raises important environmental justice considerations, such as how the impacts of the solar energy transition will be distributed (Mulvaney, 2013). Therefore, in the absence of environmental justice considerations embedded in both the planning and reporting processes, and despite the potential for reducing carbon emissions, such efforts may cause direct harm in low-income communities. To date, sustainability in higher education has not yet articulated these imperatives through industry standard metrics and progress reporting requirements.

Solar carport at Princeton University, demonstrating a multi-layered use of land that minimizes sprawl on surrounding communities.

Princeton University recently comprehensively revamped its institutional equity and diversity efforts to promote equal opportunity and campus diversity. In this context, "intersectional environmentalism" inclusive of environmental justice is conceptually better supported as a priority for its sustainability office. Similar patterns are emerging across higher education and represent the potential for a new integrative approach rather than the disconnected approach of the past. It remains, however, that there is very little embedded institutional expertise in the environmental justice space.

To understand what an equity framework for sustainability could look like, members of Princeton's predominantly white Office of Sustainability collaborated with the Emory University and MIT sustainability teams to embark on a series of shared training and workshops, facilitated by the Three Circles Center based in Seattle. The objective was to understand personal positionality and potential programmatic contributions to making the sustainability space more equitable and anti-racist, while authentically amplifying BIPOC voices. With this training, each of the participating teams became more personally aware, and better prepared to support institutional planning, community-facing partner programs on campus, and student programming in this space.

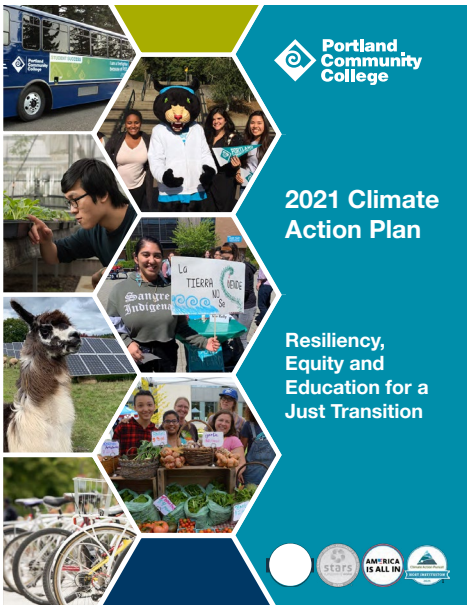
As a result of these efforts, students at Princeton interested in sustainability and justice are bolstered by our sustainability offices to participate actively in legislative advocacy for environmental justice at the national and state government scales, thereby building their leadership and collaboration skills. Students participate in university-sponsored internships with grassroots environmental justice community organizations, raising interest within the Princeton University academic community in hiring faculty who conduct research in this space; and support peer learning opportunities to deepen student focus on issues of environmental racism/equity.

Princeton University Engineering Students visiting a new green infrastructure construction site on campus.

Equitable Net Zero Strategies

There are several methods and strategies that institutions of higher education can employ towork toward both net zero and contribute to environmental justice. Approaches related to curricular and co-curricular engagement, public engagement, air and climate initiatives, and energy initiatives are outlined next.

Curricular and Co-curricular Engagement



An important way to align net zero emissions targets with environmental justice efforts is to engage students, faculty, and staff in the learning process. At minimum, the campus community should be able to understand why certain environmental measures are being taken, and how these measures connect with and impact overburdened communities. More can be done. For example, Portland Community College's 2021 Climate Action Plan: Resiliency, Equity and Education for a Just Transition is a five-year roadmap towards climate justice. The plan establishes a new carbon neutrality goal of 2040 and outlines clear pathways for equity-focused climate action to be woven throughout operations, academics, student engagement and future planning. It enables PCC to acknowledge its neighbors in frontline and vulnerable communities as among those most at risk from the global climate crisis. Supporting resiliency challenges in collaboration with communities forces PCC to answer the climate crisis with holistic and community-based solutions and to confront adaptation equitably on a local level.

The current attention on environmental justice presents an opportunity to deepen the climate action conversation. Princeton University's sustainability office has taken advantage of this opportunity by expanding institutional efforts to immerse students in community-engaged research, internships, and initiatives centered on net zero and environmental justice. An academic course focused on campus sustainability, Investigating an Ethos of Sustainability at Princeton, introduced environmental justice as a critical lens in the project-based explorations that students undertake in collaboration with a range of campus experts to reduce emissions on campus through reducing food waste, clothing waste, energy waste, choosing healthier materials, sustainable construction, etc. The framing of environmental justice was introduced - through a series of lectures, field visits and assignments. The students engaged with scholars and activists investigating and working toward environmental justice, and were required to research how their hyper-local Princeton-based project topics linked with community impacts around the world. For the final assignment, students tackled a real-time decision-making need at Princeton, and generated evidence-based, scalable or repeatable recommendations back to the institution.

Public Engagement

Public engagement directly involves the public at large and local community members in college or university initiatives. Often campuses have an influential presence in their "college towns". As such, colleges and universities play a potentially unique role as convener and partner within their broader communities to galvanize meaningful environmental justice and net zero efforts.

Princeton University has launched a public messaging campaign highlighting its sustainability vision and actions to achieve net zero.

At Princeton, a group of undergraduate and graduate students have been working with a local nonprofit, Sustainable Princeton, to apply their research skills to community concerns such as the air pollution and noise generated by diesel-powered landscaping equipment. The group, known as the Climate Action Plan for Emission Reduction Strategies (CAPERS), collaborated with landscapers providing services within the Princeton municipality to generate a qualitative and quantitative analysis of the economic, socio-cultural and environmental considerations involved in transitioning to cleaner, electric-powered equipment. Community members, including local high school students, co-generating knowledge with CAPERS to support engagement efforts toward sustainable landscaping. In addition to supporting the shift to electric lawn maintenance equipment, the group has effectively aided in the collection of geospatial data on stormwater inlets.

The framing of environmental justice has opened up new partnerships with campus departments and external partners. Sustainability professionals at Princeton University recently partnered with the university's Office of State Affairs to host a series of campus tours for the New Jersey Department of Environmental Protection's Youth Inclusion Initiative, a program designed to help develop the next generation of environmental protection, conservation and sustainability leaders within underserved communities in New Jersey. The tours were extremely valuable to the university as well, given the new perspectives the youth brought to the variety of topics covered - including composting, school gardens, building efficiency and energy infrastructure transition. These shared experiences have strengthened the relevance and applicability of the solutions the campus strives to model.

Air and Transportation Initiatives

Effective and equitable air and transportation initiatives reduce air pollutants and carbon emissions at the same time, thereby positively impacting the health of local communities and regions. Addressing both air quality and greenhouse gas emissions is critical for protecting people from climate change and associated environmental disasters. Air pollution is arguably a more pressing issue for low-income and environmental justice communities than the broader greenhouse gas emissions issue. Low income individuals are more likely to be negatively impacted by both local air pollution and global climate change for multiple reasons, including lack of financial resources and safeguards, lack of knowledge or education about environmental issues, and pre-existing environmental degradation (Byrnes, Davis, 2021). Certain areas are more affected by climate-related disasters and air pollution than others. For example, people in Boston's Chinatown face disproportionately higher levels of dangerous air pollutants than all other areas of Greater Boston (Ryan, 2019). Chinatown is situated right between I-90 and I-93, two major roadways that have hundreds of thousands of travelers daily.

With transportation activities representing a large portion of New Jersey emissions, transitioning to greener transportation methods and improving current transportation infrastructure are two ways the state can improve (NJDEP, 2022). One of Princeton's main initiatives for 2022-23 is to transition away from diesel campus shuttle buses to a full fleet of electric buses. In this transition, the university will also park and charge the buses immediately adjacent to campus rather than in communities that the buses do not serve. For over 10 years the current diesel-powered buses were stored overnight parked in Hamilton, New Jersey, a community approximately 20 minutes drive from Princeton's main campus. By parking campus buses closer to the University, there is less air pollutant exposure to these adjacent communities, and emissions are reduced overall due to proximity.

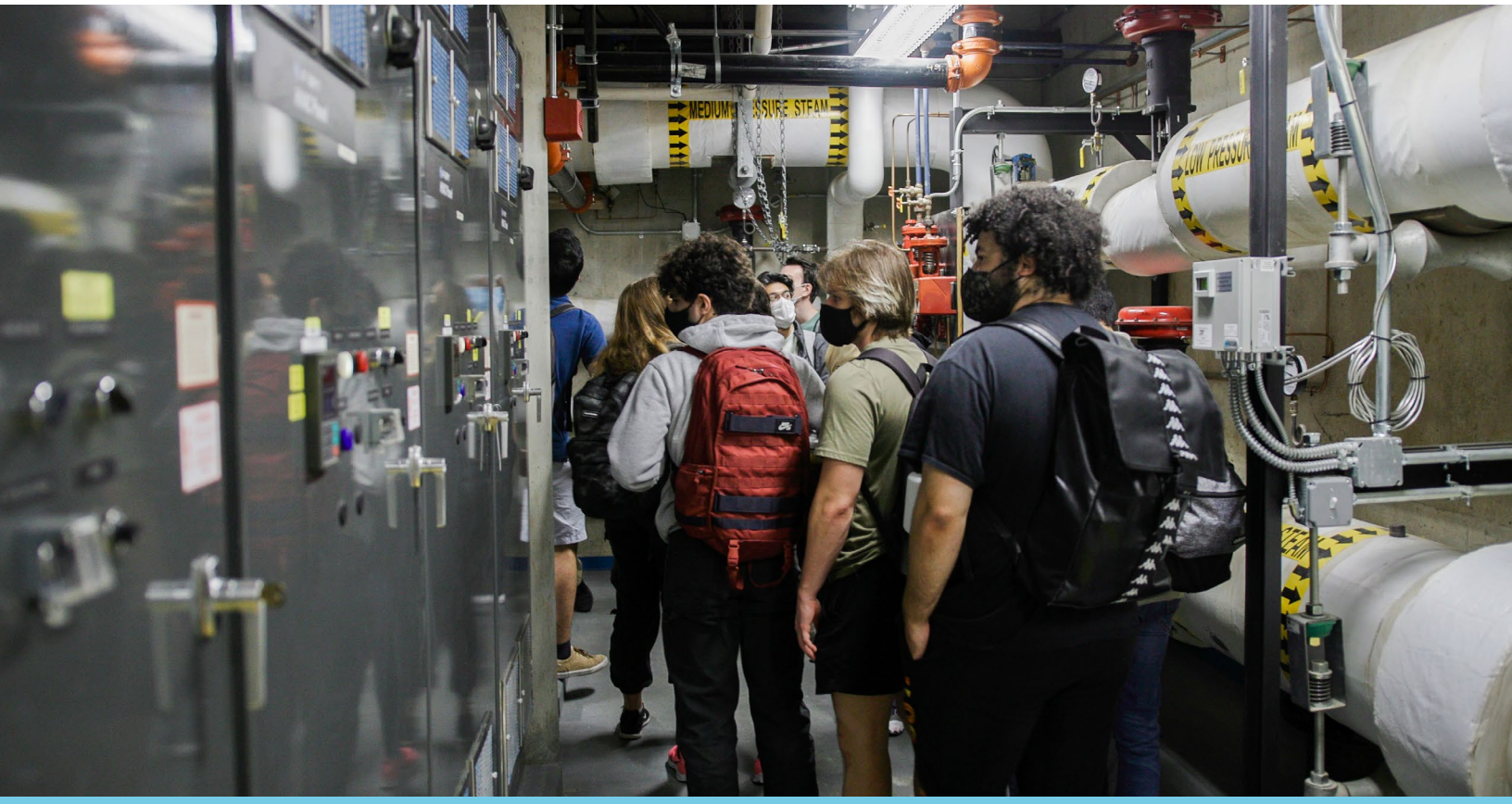
In 2023, Princeton University will have converted its entire bus fleet to electric as it transitions away from single-occupancy vehicles. This is the first bus at the factory.

Today's racial equity priorities are an invitation to not only report on institutional greenhouse gas emissions with global ramifications, but also fine particulate matter emissions, with local community and regional ramifications. Particulate emissions may be reported as part of existing regulatory requirements, but are typically not included in sustainability reporting. At Princeton, efforts are underway to include fine particulate matter emissions from Princeton's cogeneration facility in annual campus climate action performance updates to the public and university leadership. Modeling institutional transparency and rigorous standards around fine particulate emissions(alongside reporting greenhouse gas emissions) is a critical aspect of achieving the public health protection envisaged by the Clean Air Act of 1970, particularly for communities which have increased susceptibility to air pollution (Johnson, Graham, 2005).

Energy Infrastructure Conversion

The energy sector is among the largest sources of greenhouse gas emissions in the United States according to the EPA (2022). Underserved communities are disproportionately impacted by emissions from polluting power generation and transit corridors, as well as renewables which often put pressure on limited land and agricultural resources. Implementing conservation measures and switching to renewable energy sources in ways that are considerate of the concerns of environmental justice communities can make all the difference. For example, for its large biomass plant, Colgate University created a ticketing system to track the procurement of wood chips to ensure alignment with the university's sustainability and social justice standards (STARS, 2017). Such metrics can be replicated by other institutions in accordance with their own environmental and social justice standards.

For example, Princeton University has expanded its on-site solar PV generation to provide 20% of electricity for the campus as part of this broader infrastructure conversion. A relevant design principle has been to layer as many land uses as possible, to avoid sprawl and minimize impacts on surrounding communities. As a result, seven of Princeton's nine solar arrays are incorporated with other functions such as parking garages, rooftops, and surface parking areas. This model of multidimensional use of land is important to highlight from an environmental justice standpoint, considering that decarbonisation transitions can exacerbate vulnerability and inequality where land resources of poorer communities are strained or appropriated by green energy infrastructure such as sprawling solar installations (Savacool et al., 2021).



Students on experiential tour of the Princeton campus energy system.

Carbon Offsets

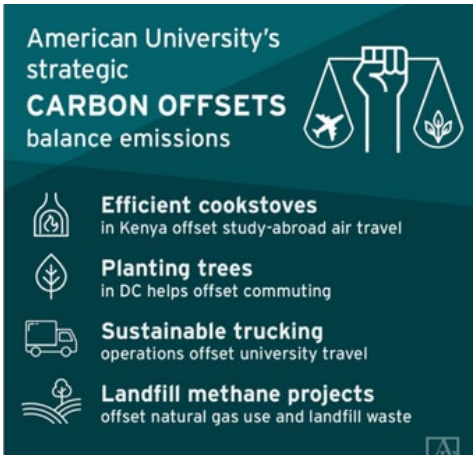
One of the pathways many universities take to reducing their emissions is through purchasing offsets. These can be applied to scopes 1, 2 or 3 emissions, though use of offsets to address scope 3 emissions are becoming prevalent, given that institutions have limited direct control over those emissions at this time. Offsets constitute the largest source of emissions reduction claimed by many institutions (Barron et al., 2021a).

There are many different options in offset markets that an institution can consider, including offsetting university-related travel by investing in efficient trucking technologies as, investing in tree-planting and the associated accounting, or purchasing and "retiring" credits from regional greenhouse gas emissions cap programs as offered through the organization Climate Vault. Offsets can range from activities that remove from the atmosphere and store carbon, to activities that reduce carbon emissions at their source. All provide the function of reducing emissions elsewhere while the organization purchasing the offsets continues to emit, either directly or indirectly.

Many offsets are, even if verifiable, only short-term solutions at best. Eventually, all emissions sources must be reduced in absolute terms if we are to address the climate crisis. Offsets are challenged by verifiability, accountability and additionality concerns. They can also leave vulnerable communities exposed to air pollution by allowing local sources of pollution to continue to emit while paying for greenhouse gas reductions that may be on the other side of the planet (Barron et al., 2021b).

To safeguard its commitment to reducing absolute campus carbon emissions to net zero, Princeton is not planning to claim any reductions in scope 1 and 2 emissions via the purchase of market-based offsets. Princeton is, however, exploring what the institution can do now that is meaningful, additional, accountable and community-facing to reduce emissions while the institution takes the necessary years to transition its energy infrastructure. Given the environmental justice learning journey underway, Princeton (through its sustainability program) is endeavoring to understand what is important to environmental justice communities in New Jersey and what partnership role Princeton and other New Jersey higher education institutions can plan that is meaningful and lasting.

Conducting peer-reviewed offset projects from within the higher education sectors, recognized as an exemplary practice in STARS (Carbon Mitigation Project Development), can help to alleviate issues of verifiability and accountability in impacted communities. Conducting carbon offset projects designed to benefit under-resourced communities may alleviate inequity. Examples of socially focused, peer-reviewed carbon mitigation projects reported through STARS include community urban forestry projects at Arizona State University as well as American University, and establishing tree plantations in partnership with Indigenous communities at McGill University.



Higher education institutions are also developing helpful tools to support the development of credible offset programs. To address accounting challenges, and offer a pathway for reaching net zero through offset projects that reduce the "heat island" effect impacting urban communities, Duke Carbon Offsets Initiative developed an Urban Forestry Protocol. The protocol outlines the methodology for measuring the carbon offsets and documenting project co-benefits (i.e., the non-GHG related project benefits) generated from an urban tree planting project. As Duke's efforts demonstrate, higher education institutions can play an important role in conceptualizing and implementing robust carbon offsets regimes that are designed to benefit overburdened communities.

The Duke University Carbon Offsets Initiative.

Conclusion

Environmental and social justice issues are intertwined, and it is imperative that decisions around achieving net zero are made through an environmental justice lens. Our hope is that the programs and examples highlighted in this essay can provide ideas and inspiration for sustainability practitioners to consider environmental justice along their own journeys toward net zero.

Acknowledgements

The authors wish to thank Abby Van Selous for her assistance with research for this essay.

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