University of Pittsburgh

Climate Action Plan

Our Pathway to Neutral

Pitt Sustainability

Sustainable.Pitt.edu

Pitt Sustainability

The University of Pittsburgh defines sustainability as balancing equity, environment, and economics so current and future generations can thrive. Keeping this in focus, Pitt is actively involved in sustainability initiatives and practices across disciplines, domains, and scales — including our commitment to carbon neutrality by 2037.

From business operations to research collaborations to fostering vibrant student groups and activism to master planning, Pitt is earning a strong reputation for its culture of sustainability across the nation. Join us and follow along as we continually challenge the status quo to create sustainable solutions, actions, strategies, and opportunities for students, faculty, staff, our campuses, and Western Pennsylvania.

Every person and decision matters; we welcome your help and encourage you to get involved!

A NOTE FROM THE CHANCELLOR

The University of Pittsburgh signed the Second Nature Climate Leadership Statement and Carbon Commitment in February 2020 and pledged to achieve carbon neutrality, recognizing that climate change was already a global crisis. Since then, the emergence of the COVID-19 pandemic has further emphasized the ways in which climate change intersects with other pressing systemic challenges we are facing.

With that in mind, I am proud to introduce the first-ever Pitt Climate Action Plan for our Pittsburgh campus. This document outlines our strategy for achieving carbon neutrality by 2037, the University's 250th birthday.

Developed under the direction of the Chancellor's Advisory Council on Sustainability's Carbon Commitment Committee, the PittCAP builds on the goals of the Pitt Sustainability Plan and identifies carbon challenges and opportunities facing our campus, community and world.

As a premier research institution, we are committed to expanding our understanding of climate change and identifying and advancing solutions to this global crisis. Through this important work, current and future generations will have the opportunity to thrive in a world that is more environmentally responsible, socially equitable and economically robust.

- Patrick Gallagher
University of Pittsburgh's 18th Chancellor

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Pittsburgh campus aerial view

EXECUTIVE SUMMARY

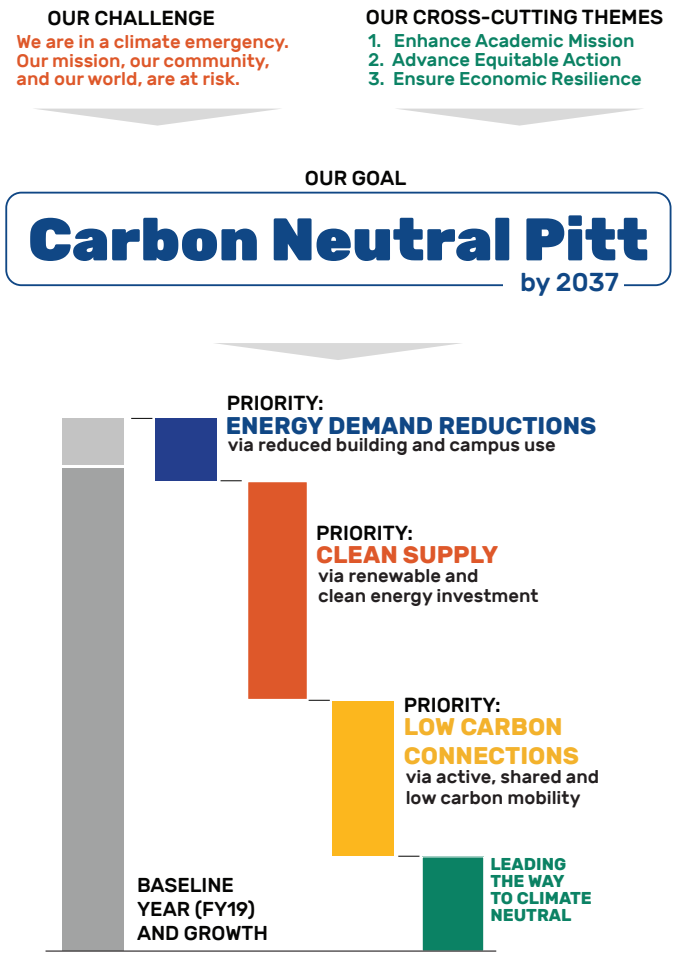


Figure 1. PittCAP Framework and Waterfall Summary

At the University of Pittsburgh, we recognize that climate change is a clear call to action and that humanity is already dealing with unprecedented challenges because of it. Our ability to respond quickly in addressing ongoing climate change directly affects the significant risks facing our community and our world. While long compelled to leverage our capacity as a premier research institution and community anchor to effect change through education, exploration, and engagement, we must also lead with our actions.

This first ever Pitt Climate Action Plan (PittCAP) for the University of Pittsburgh's Pittsburgh campus presents our strategy, approach, and details to achieve carbon neutrality by 2037, the 250th anniversary of our founding. We have worked to ensure that our carbon neutrality strategy fulfills our full sustainability aspirations of reaching toward environmental solutions while balancing and addressing our academic mission, pursuing equitable outcomes, and helping create economic resilience for our University and communities.

Developed under the direction of the Chancellor's Advisory Council on Sustainability's Carbon Commitment Committee, this Pitt Climate Action Plan (PittCAP) builds on the goals of our existing Pitt Sustainability Plan, while setting both an insistent and realistic approach on the carbon opportunities and challenges in front of our campus, community, and world. We commit to updating this document every five years moving forward, until our carbon emissions exist in balance with the natural world.

Our initial 2018 campus-wide greenhouse gas (GHG) reduction goal was a 50% reduction in GHGs below 2008 levels by 2030; this remains an important milestone in our larger journey toward carbon neutrality by 2037. As a university and campus, we have already made strong progress, posting a GHG reduction of 21.2% below baseline for fiscal year (FY) 2019 – but we have much further to go.

As outlined in Figure 1, we will reach carbon neutrality by reducing our demand, cleaning our supply, and increasing our low carbon connections. Energy demand reductions from space use optimization, existing building efficiency, and new building performance will account for 11.5% of our journey from FY19 to 2037, avoiding 27,100 metric tons of carbon dioxide equivalent (MT CO_2e). Cleaning supply via renewable and more efficient and cleaner district energy, electrical grid shifts, and renewable energy procurement will contribute 42.3% of our journey from FY19 to 2037, avoiding 99,900 MT CO_2e. Low carbon connections for commuting and air travel will account for 31.1% of our journey from FY19 to 2037, avoiding 73,400 MT CO_2e; these strategies include federal vehicle efficiency Corporate Average Fuel Economy (CAFE) standards; shifting commuting modes to more active, shared, and low carbon choices; an increase in flex work arrangements, air travel reductions, and air travel offsets. We will continue to carbon neutrality with campus education, behavior shifts, and carbon insets and offsets that balance our remaining GHG footprint by sequestering carbon (removing from atmosphere) regionally, nationally, and/or globally; this will be 15.2% of our journey, representing 35,800 MT CO_2e.

This first ever PittCAP is our opportunity to share our carbon reduction journey, approaches, and expertise with the University community, public, and partners to build a better future for all. As we reach toward a carbon neutral Pittsburgh campus by 2037 with the strategies outlined and detailed herein, our institutional, collective, and individual actions are the cornerstones on which the resiliency of our region and world depend.

Building on the Past, Aligning for Our Future

Doing our part to mitigate the risks of climate change is a vital issue for our University. We are in a global climate emergency and must reduce greenhouse gas emissions while addressing the dangers that climate change presents for our mission, community, and the world.

"Carbon neutrality" refers to balancing all GHG emissions put into the atmosphere by removing or capturing and storing (i.e., sequestering) an equivalent quantity of GHG emissions. This PittCAP sets the strategy and actions required to achieve carbon neutrality for our Pittsburgh campus by 2037, while embracing our academic mission, pursuing equitable outcomes, and helping create and facilitate economic resilience for our University and communities. As we train the professionals of tomorrow and advance the frontiers of knowledge and creative endeavor, our journey toward carbon neutrality provides an ongoing opportunity to connect our operational and academic efforts across departments and disciplines. We will also use our journey to share approaches and expertise with the Pitt community and our many community, public, and private partners.

As a premier research institution of higher learning, we are committed to educating and advancing exploration about climate change, GHG mitigation, adaptation, and resilience. As we extend the frontiers of knowledge and creative endeavors, this PittCAP outlines the copious opportunities for which we must continue exploring, discovering, and creating innovative solutions toward the relentless pursuit of positive change.

Several of our campus-wide sustainability efforts whose strategies are demonstrated in this PittCAP consider the interplay of equity, environmental, and economic impacts. PittCAP approaches are those known and considered today; and yet, we expect that over the next five years new knowledge will emerge about climate processes, impacts, and options for both mitigation and adaptation. We consider that evolution to be part of our overall journey – and embrace the opportunity and potential for all members of our community to help us innovate further in the future.

At Pitt, our climate action is nestled in our larger sustainability efforts balancing equity, environment, and economics so current and future generations can thrive. As an anchor institution in the City of Pittsburgh, we are a proud contributing partner for local and state governments in setting and achieving their own carbon targets. The City of Pittsburgh is working toward carbon neutrality by 2050 and the Commonwealth of Pennsylvania has set a GHG reduction target of 80% by 2050. We also proudly partner with other Pittsburgh universities through the Higher Education Climate Consortium, a collaboration focused on reducing carbon emissions in Pittsburgh's colleges and universities dating back to Pittsburgh's first co-created carbon goal in 2007.

The University of Pittsburgh has a multidecadal history of leading, championing, and exemplifying forward-thinking and innovative practices that have deepened its climate mitigation and sustainability practices both operationally and academically.

Pitt athletes racing at Carrie Furnace in Pittsburgh

1990 Pitt Signs the Talloires Declaration

2003 Launch of Mascaro Sustainability Initiative

2008 First GHG Inventory-updates in '11, '14, '17 and '19

2013 Inaugural Report on Sustainability

2014 Launch of the Student Office of Sustainability

Figure 2.
Pitt's Sustainability Timeline

Regional Campuses

While the University's four regional campuses (in Bradford, Greensburg, Johnstown and Titusville) are not the focus of this PittCAP, opportunities have been considered to enhance our connections, strengthen our collaborations, and accelerate our efforts with those campuses. No activities outlined in the PittCAP constrain those campuses' ability to set and aspire toward their own carbon neutrality goals.

Pitt in Pennsylvania

The 2018 Pennsylvania Climate Action Plan set the Commonwealth's first GHG reduction goals: a 26% reduction in GHG emissions by 2025 and an 80% reduction in GHG emissions by 2050. As a state-related institution, the University of Pittsburgh takes its climate action responsibility seriously, while also supporting climate mitigation by Pennsylvania governments, citizens, and businesses.

The Pennsylvania Climate Impacts Assessment 2021 predicts an average annual temperature increase statewide of 5.9°F (3.3°C) by 2050 from the baseline period (1971 – 2000); more frequent and intense extreme heat events; more total average rainfall in less frequent, but heavier rain events; and more frequent drought conditions.

Pitt in Pittsburgh

The City of Pittsburgh completed its Climate Action Plan 3.0 in 2018, setting a goal for 50% reductions in GHG emissions by 2030 (below its 2003 baseline), with the 2021 additional goal of carbon neutrality by 2050. The University of Pittsburgh embraces its role within the City as a large higher education institution, employer, and landholder with direct opportunity to impact our citywide and regional emissions through operations, academic endeavors, and policy support.

At Pitt we have many collaborations with our peers, neighbors, and partners to accelerate the City's and Commonwealth's carbon reduction plans while advancing our own strategy toward neutrality by 2037. Pitt aspires to be a university that strengthens our communities, especially through in partnership with our institutional neighbors UPMC, Carnegie Mellon University, and Carlow University (along with others across the city). As such, since 2008, Pitt has been an active leader in the Higher Education Climate Consortium (HECC) of Pittsburgh. This higher education collaborative works to accelerate citywide GHG emissions reduction from universities while aspiring to regional carbon neutrality.

Responding to a Global Crisis

The University of Pittsburgh is answering the Intergovernmental Panel on Climate Change's (IPCC) 2018 call to achieve carbon neutrality globally by 2050.

"Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels" already, and "reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate."

"Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5°C and increase further" if we reach 2°C of warming.

- IPCC Statement

2016 University Sustainability Committee Created (now the Chancellor's Advisory Council on Sustainability)

2018 First Pitt Sustainability Plan and First Sustainability Director

2018 AASHE STARS Silver

2020 Carbon Neutrality Commitment by 2037

2021 AASHE STARS Gold

2022 First Pitt Climate Action Plan

Figure 3. Pitt Climate Action Plan Framework

Our Framework

In terms of climate action, we have one vision: a carbon neutral Pitt by 2037. To achieve that goal, we have three GHG mitigation priorities: reducing our demand, cleaning our supply, and shifting to low-carbon connections. As we pursue these strategies, we have three themes that cut across our efforts: Enhance Academic Mission, Advance Equitable Action, and Ensure Economic Resilience

PittCAP is:

- An action plan, focusing on carbon mitigation
- Bold ideas and transparency about our challenges in achieving these goals
- A roadmap, with clear responsibility and accountability
- Connected to the Pitt community, outlining contributors and stakeholders
- A summary of metrics and measurable action milestones
- Focusing CAP investment priorities over the next five years
- Setting the stage for resiliency and climate equity at Pitt

PittCAP is not:

- An appendix to the 2018 Pitt Sustainability Plan
- An examination of technical scenarios
- A techno-economic analysis with full life cycle cost analysis and risk profiling
- A climate resiliency plan

Cross-Cutting Themes

Enhance Academic Mission

As we chart a path to carbon neutrality by 2037, we see an opportunity to enhance our mission as a higher education institution by leveraging our climate action to support intentional direction, coordination, and partnerships focused on climate change and GHG mitigation. To do this, we must meet our University community members where they are and consciously work to understand existing programs' intentions, potential, and aspirations. In building University-wide capacity to integrate climate action into our academic pursuits, the involvement of both undergraduate and graduate students is key.

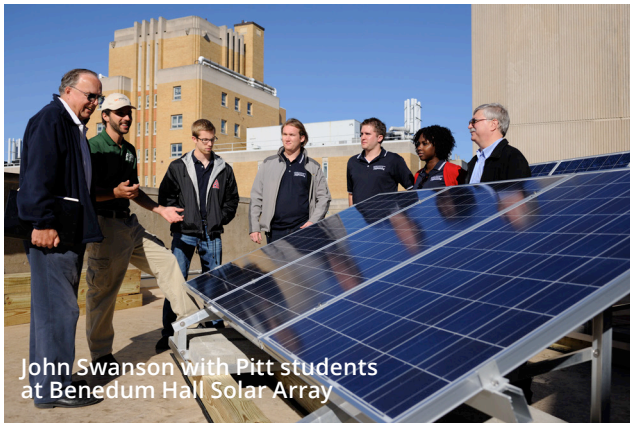
To start, we must partner and shape efforts and platforms to share information on campus, in Pitt classrooms, with Pitt partners, and in our communities about climate change, regional climate action, and Pitt's journey to carbon neutrality.

The efforts below complement the 2018 Pitt Sustainability Plan's comprehensive efforts to integrate multidisciplinary sustainability exploration into our curriculum, groundbreaking research, and community engagement:

1) Awareness: Further explore how the Pitt community is already contributing to our carbon goals and create more opportunities for them to do so, including across disciplines.

2) Education: Collaborate to develop student-focused educational opportunities about climate action on campus and off, including long-term financial literacy implications relating to efficiency, energy purchasing, and travel.

3) Exploration: Determine where Pitt's mission-enabling carbon neutrality efforts complement educational, research, and community engagement efforts.



John Swanson with Pitt students at Benedum Hall Solar Array

4) Teaching: Benchmark where course curriculum is already climate-related and determine opportunities for future inclusion.

5) Engagement: Learn how our institutional carbon neutrality goals and progress are impacting the Pitt community.

6) Research: Expand world-recognized research to advance the science, policy, decision-making, and education of GHG reduction and avoidance.

7) Partnerships: Explore opportunities for community education and engagement strategies focused on climate action, climate change, innovative technologies, and job opportunities in the green economy.

8) Community: Support Pittsburgh community education efforts focused on climate change and sustainability in local high schools and college preparatory programs.

At Pitt, we're committed to planting the seeds of climate action and education across campus and in our communities.

Advance Equitable Action

At the University of Pittsburgh, we are committed to identifying and improving systems that perpetuate advantages for some while continuing to disconnect others from opportunity. Our approach to climate action is no exception.

As we have seen, the adverse impacts of climate change—social, health, environmental and economic—can vary across different populations. Equity is a key pillar of sustainability, and climate justice is social justice. With that in mind, we have worked to ensure that this first PittCAP intentionally considers and creates avenues for all members of our community and partners to collaborate and thrive as we pursue carbon neutrality.

With PittCAP, we are committing to promoting equity in the following ways:

1) Culture:

- Engage and include diverse identities and perspectives in the plan's implementation.
- Revisit the plan in action to ensure priorities and outcomes are progressing in ways that promote equity.

2) Education:

- Raise awareness within the Pitt community about the equity implications of climate action locally, nationally and globally.
- Empower climate action ambassadors who can explain and advocate for our carbon neutrality efforts in our campus communities and beyond.
- Leverage resources and voices to share firsthand accounts of the inequitable impacts of climate change.
- Contribute to and shape scholarly discourse as it relates to equity and its intersection with environmental, health, economic and social factors.

3) Investment:

- Prioritize identifying and investing in minority- and women-owned sustainability organizations that are anchored in Western Pennsylvania.
- Evaluate each potential climate action investment to determine if it is perpetuating bias or widening existing wealth and opportunity gaps at the community and population level.

4) Community:

- Ensure every potential partner understands and complements our commitment to equity and climate action.
- Assist grassroots, front-line and fenceline community organizations in developing or enhancing their sustainability strategies or plans.
- Create and cultivate partnerships that expand our institutional capacity to drive equity and climate action.

5) Celebration:

- Track and share our climate action plan and progress.
- Identify how the plan in action is serving individuals, communities and populations that have historically been disconnected from opportunity.

Pitt Make a Difference Day volunteers in Etna

Pitt students and faculty at Homewood Bioshelter

> "Each of us has a role to play in building a more equitable society and just world. At the University of Pittsburgh, this work takes many forms and actions. This effort should and will continue until every single member of our society has equitable access to opportunities that lead to equitable and just outcomes."
>
> - Clyde Wilson Pickett, Vice Chancellor for Equity, Diversity, and Inclusion

Congress of Neighboring Communities (CONNECT)

The Pitt-facilitated CONNECT collaboration has helped City-adjacent communities advance individual climate action plans and is helping facilitate regional climate action strategy and discussions. CONNECT's regional climate action planning efforts help more equitably distribute outcomes in Allegheny County beyond City boundaries. CONNECT's local and regional climate action plans have been funded by the PA Department of Environmental Protection and developed in partnership with ICLEI– Local Governments for Sustainability.

"Air quality issues. Inequality. Public health challenges. Flash floods. Infrastructure failure. Extreme weather. These are just a few of the chronic stressors and acute shocks that challenge and threaten Pittsburgh. Though Pittsburgh has made significant progress in improving environmental stewardship and transitioning from a city in decline to a thriving hub of innovation, technology, education and medicine, we recognize there is still a need for focused, inclusive efforts to ensure all Pittsburgh residents and visitors live well and succeed.

- City of Pittsburgh's ONEPGH Resilience Plan (2017)

Ensure Economic Resilience

Climate change is undoubtedly the environmental concern of our time, but also poses many risks to Pitt's continuity as an educational institution, employment hub, and community partner in Pittsburgh, the United States and globally. In signing the Second Nature Carbon Commitment in February 2020, Pitt committed to reduce GHG emissions and achieve carbon neutrality by 2037.

Each PittCAP GHG reduction strategy section below includes a "Strategy Impact Data" Table summarizing the strategy's contribution toward Pitt's carbon neutrality, the average GHGs avoided annually, estimated marginal investment, and cost savings or avoided costs.

However, GHG emissions reduction is only one part of the global climate change conversation. With increasing efforts regionally, nationally, and globally, both community capacity-building and climate adaptation help us individually and collectively live in a changing climate and its resulting extremes. Resilience plans typically address community and organizational responses to emergencies, hazards, and systematic shocks and stressors.

While Pitt is unlikely to experience certain catastrophic climate impacts that the general public often associates with climate change (e.g. sea level rise and wildfires), other climate-related risks are already being experienced and/or imminent (e.g., increased temperature average and extremes, localized flooding, and landslides).

This PittCAP is not a climate resilience plan. The Office of Public Safety and Emergency Management leads University-wide efforts on emergency response, including weather, violent extreme events, mental health, and diseases like the global COVID-19 pandemic.

Campus and community resilience does not occur in isolation – and we are institutionally dependent on and part of the systems, networks, infrastructures and connections of our Oakland community, Pittsburgh, and our region. Being both in and of the City of Pittsburgh, Pitt's resilience is intertwined with the strategy set out in the City's ONEPGH Resilience Plan for responding to shocks and stresses that affect us all including, but not limited to, climate change.

As such, the University's financial stability and economic growth rely on cooperation and resource sharing with its neighbors and partners as we collectively overcome the risks presented by climate change. Through future and parallel planning efforts like the in-development 10-year Oakland Plan and ForgingPGH (the city's first comprehensive land use plan), Pitt is collaborating on incorporating climate risks into not just our campus, but our region.

We will also continue to incorporate climate action into decision-making processes, making the case for investments not just on the costs of action, but on the potential additional costs of inaction. To ensure economic resilience, we will:

1) **Investment:** Build life cycle costs and benefits, the social cost of carbon, and risks and costs of inaction into financial models and decision-making processes.

2) **Strategy:** Work toward a formalized resilience strategy that comprehends and mitigates climate and other risks to business continuity.

3) **Neighborhood Partnerships:** Collaborate on system and network resiliency at Pitt, in Oakland, and with Community Engagement Centers in Homewood, the Hill District, and future locations.

4) **City Connections:** Embrace and partner on city-wide ONEPGH resilience work.

Building on a Strong Foundation

Led by the Mascaro Center for Sustainable Innovation, Pitt began actively tracking its greenhouse gas inventory for fiscal year (FY) 2008, with five GHG Inventories complete (for FY08, FY11, FY14, FY17 and FY19). Led by Dr. Melissa Bilec (MCSI/CEE) and performed by graduate students, the Pitt GHG Inventory data and process is incredibly important; their existence helped set the institution's science-based reduction and neutrality targets – and will evaluate our progress moving forward. As part of our Carbon Commitment, we are now updating our GHG Inventory for the Pittsburgh campus annually, with the FY20 inventory underway.

Pitt and other universities follow international methods and emission factors provided by the GHG Protocol; Pitt's inventories have used the SIMAP (Sustainability Indicator Management and Analysis Platform) online tool since the FY14 GHG inventory. Figure 4 illustrates the three scopes of GHG emissions tracked and reported for the Pittsburgh campus. The largest scope for universities (including Pitt) is Scope 2 (Indirect Emissions), which includes GHG emissions from purchased electricity as well as thermal steam energy from the Bellefield Boiler Plant (see "District Energy").

SIMAP converts all GHGs to a carbon dioxide equivalent, or CO_2e, which is the primary unit of our inventories and analysis.

GHG Inventory Exclusions

Though Pitt's GHG data is comprehensive for the Pittsburgh campus, the following categories are not included – and thus not included in GHG reduction potential in this CAP:

• Regional Campuses. This plan's scope is the Pittsburgh campus only. Regional campuses represent future opportunities, including to the extent that Pittsburgh procurement and contracts cascade to the four regional campuses.

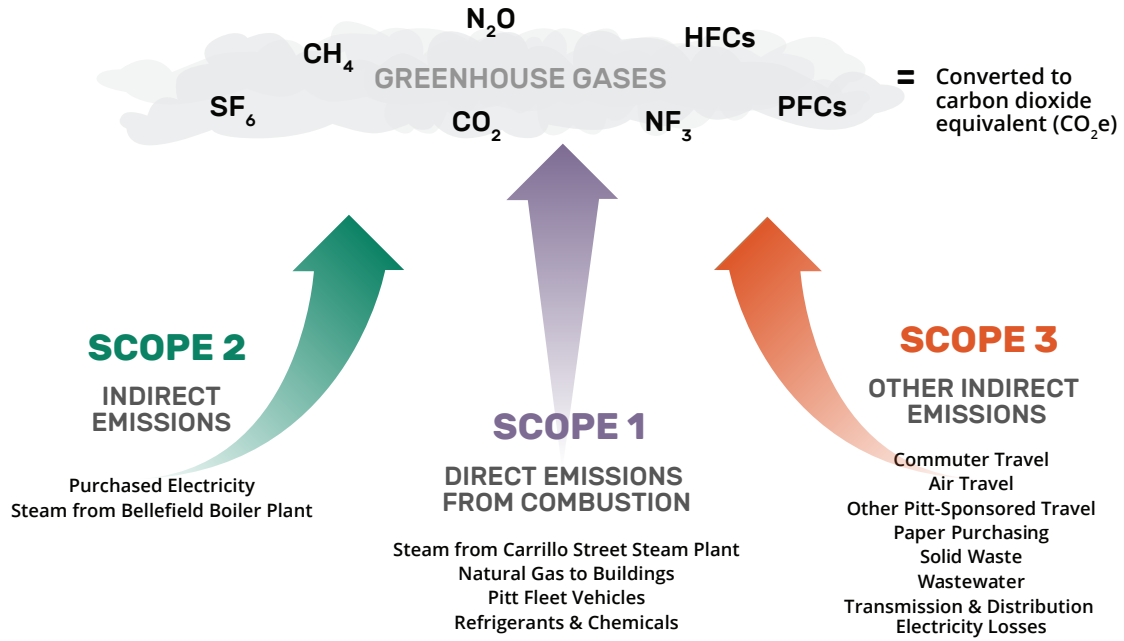


Figure 4. Greenhouse Gas Scopes and Categories in Pitt's Inventories

• Leased Space is not included, though it is ~10% of all Pitt-occupied space. Evolving University space needs require revisiting this limitation annually as part of the inventory process, especially once better information on leased space utilization and utility consumption exists.

• Embodied carbon (CO_2 emissions resulting from the life-cycle of construction materials and processes) is not included in our current inventory, though both Pitt faculty research and facilities management's new construction projects are exploring its impact. Additionally, Pitt's facilities' design guidelines encourage design teams to explore using materials that have lower primary material embodied carbon compared to equivalent baselines, along with conserving embodied life cycle energy by considering durable, regionally manufactured, salvaged, remanufactured, reusable, recycled-content, rapidly renewable, recyclable, and/or biodegradable materials and products.

• Investments are not accounted for in Pitt's GHG Inventory or carbon neutral goal, nor is it common practice for universities to account for the GHG emissions of their endowments in campus inventories. As laid out in the international GHG Protocol, emissions from investments are counted by public and private companies that provide financial services (e.g., banks and credit agencies).

• Food – In 2019, Pitt was one of the first global universities to sign the Cool Food Pledge to reduce GHG emissions from meals 25% by 2030. This goal supports the PittCAP's intent, but was not included in our FY19 GHG inventory or accounted for in this PittCAP. It could be added in the future in the Scope 3 emissions category; Pitt's 2017 Cool Food GHG baseline showed total food-related carbon costs of 39,780 MT CO2e, of which 8,183 MT CO2e are from agricultural supply chains.

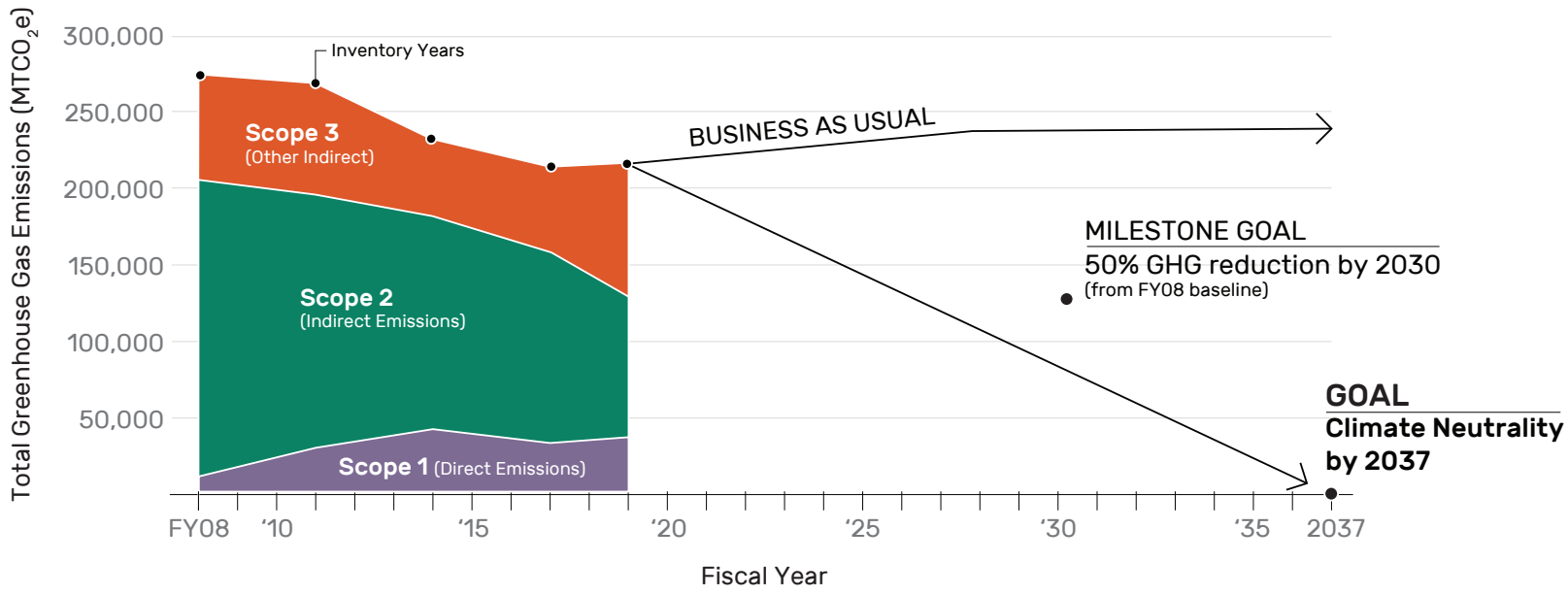


Figure 5. Pittsburgh Campus GHG Emissions by Scope

Campus Emissions

Figure 5 outlines Pitt's historic GHG emissions as they have changed and shifted by scope, forecasts how GHG emissions would continue to evolve under projected growth in a "business as usual" scenario, and adds the perspective of the GHG reduction and carbon neutral goals. Between FY17 and FY19 inventory, there were slight increases in overall emissions from 2017 due to an increase from on-campus stationary sources, commuting, directly financed air travel, and study abroad; detail is provided in the full Pitt FY19 GHG Inventory report.

PittCAP's projections of future emissions are primarily driven by campus population and area growth; both were used to estimate a "business as usual curve," detailed later in this report.

Pittsburgh Campus Carbon Goals

Informed by our historical GHG reduction performance and science-based projections, the University of Pittsburgh set a goal of carbon neutrality for the Pittsburgh campus by 2037, which is also the University's 250th anniversary. This plan's carbon neutrality goal incorporates the following milestone goals adopted as part of the 2018 Pitt Sustainability Plan, which include:

1) Reduce GHG emissions 50% by 2030 (from FY08 baseline).

2) Produce or procure 50% of the University's electricity from renewable resources by 2030.

3) Achieve 2030 Challenge goals of:

a) 50% reduction in energy use intensity (kBTU per square foot) below the national average by 2030.

b) 50% reduction in water use intensity (gallons per square foot) below the regional average by 2030.

c) 50% reduction in greenhouse gas emissions from commuter travel by 2030 (from 2013 modeled Oakland baseline).

4) Achieve 50% reduction in greenhouse gas emissions from Pitt's vehicle fleet by 2030.

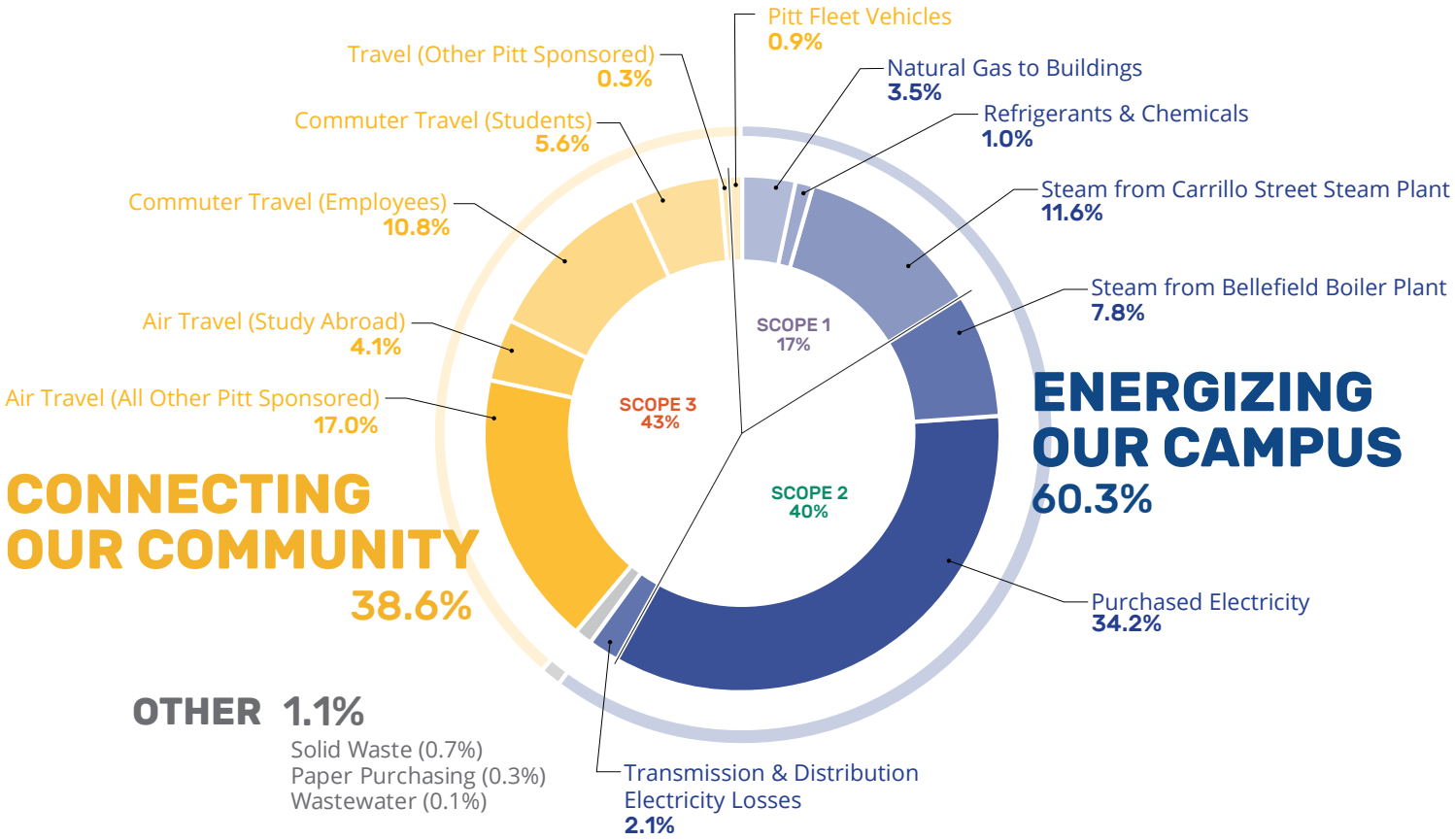


Figure 6. FY19 Greenhouse Gas Inventory Breakdown- By Scope (inner ring) and Category (outer ring)

Baseline Inventory (FY19)

Figure 6 summarizes Pitt's FY19 GHG Inventory (the most recent completed inventory year), which is used as the baseline for this PittCAP. Totaling 215,522 MT CO_2e, our GHG emissions are classified into three categories for application:

Energizing our Campus (60.3%) – Primarily Scope 1 and Scope 2 GHG emissions to power, heat, and cool our buildings and campus. Of note is Purchased Electricity, which represents 34.2% of all campus GHG emissions.

Connecting our Community (38.6%) – Scope 3 GHG emissions from student and employee commuting; air travel; Pitt's vehicle fleet; and travel for Pitt-sponsored activities. Of note is Air Travel combined over Pitt-sponsored travel and Study Abroad, which represents 21.1% of campus GHG emissions.

Other (1.1%) – Scope 3 GHG emissions from solid waste, paper purchasing, and wastewater are important aspects of campus-wide sustainability and emissions reductions, but combined represent a small percentage of the total campus impact.

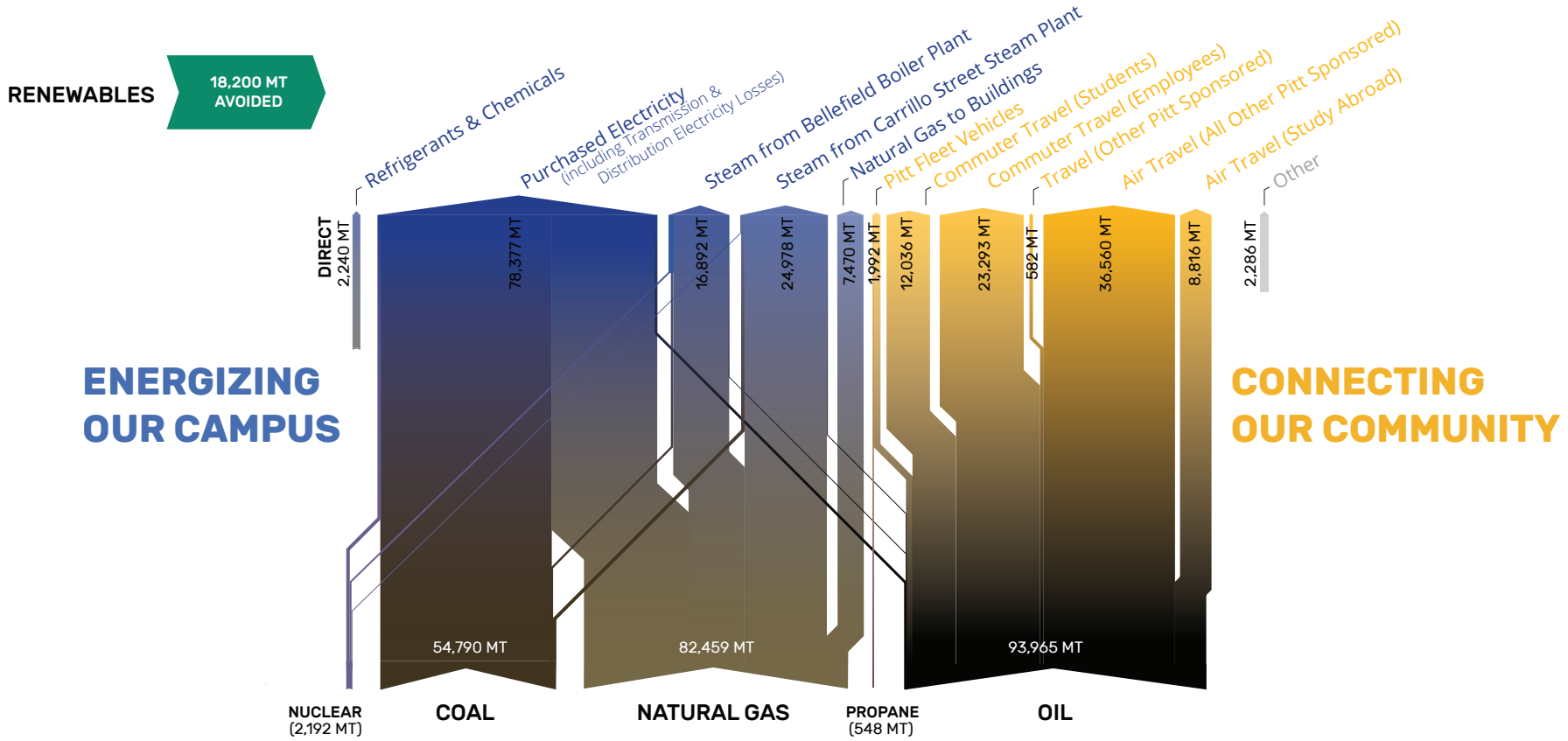


Figure 7. Sankey Diagram of FY19 Greenhouse Gas Emissions Tracked to Primary Fuels (MT CO_2e)

Connecting to Source Fuels

Figure 7 illustrates how Pitt's FY19 GHG emissions by use (top) are connected to their energy sources (bottom); line thicknesses represent the quantity of carbon emissions (in MT CO_2e) from each source. Given the nature of Pennsylvania's electricity grid and on-campus steam production, Pitt's GHG emissions for "Energizing our Campus" are currently dominated by coal and natural gas. Given local, national, and international vehicle and air transportation systems, "Connecting our Community" is strongly reliant on oil (petroleum). In FY19, Pitt's GHG Inventory tallied 18,200 MT CO2e avoided via the procurement of renewables; in that year, renewables were only 5.5% of the standard Pennsylvania electricity mix, but the University procured the equivalent of 19.4% of its FY19 electricity from renewable sources. These avoided GHG emissions are shown in Figure 7 as "Renewables" and "MT Avoided."

National and global energy sources are expected to change dramatically over the next several decades in response to climate change. As the University advances toward carbon neutrality via the strategies in this PittCAP, demand reduction and shifts to cleaner energy sources will both shrink and avoid more emissions due to primary fuel shifts.

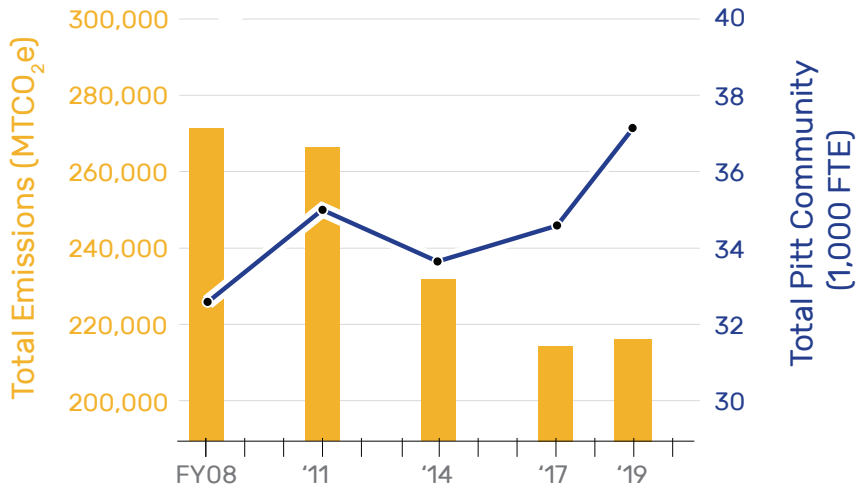


Figure 8. Pitt GHG Emissions per Full Time Equivalent (FTE)

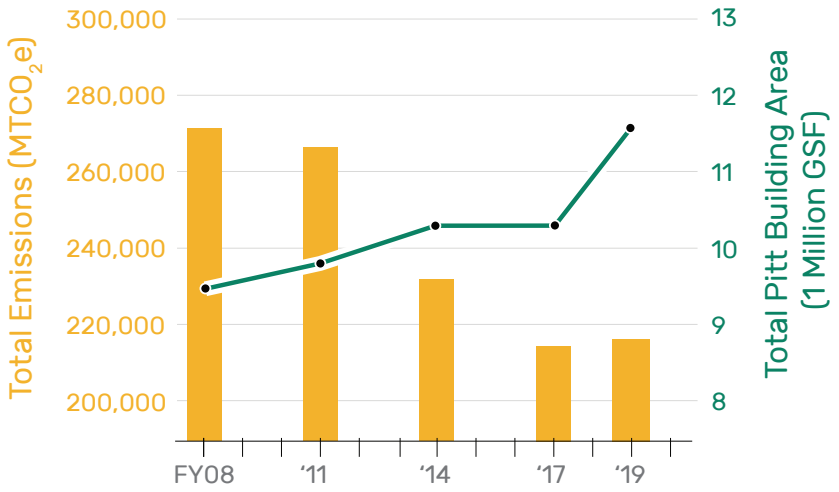


Figure 9. Pitt GHG Emissions per Gross Square Feet (GSF)

Reductions as We Grow

While the challenge of carbon neutrality is to reduce GHG emissions and offset those you cannot reduce, a key global climate challenge is decoupling economic and population growth from climate impact. As Figures 8 and 9 indicate, since 2008, Pitt has been able to successfully reduce GHG emissions while increasing in campus population and building area. Overall, between FY08 and FY19, Pitt reduced its absolute GHG emissions by ~21%, while emissions per full time equivalent (FTE) students and employees and building gross square footage (GSF) have both decreased over 30%.

While we take pride in our ability to reduce per capita emissions and emissions per building square footage, the challenge is to achieve continued GHG emissions reduction as we continue to grow – as our planet responds only to absolute GHG emissions.

The University's challenge is to continue reducing absolute greenhouse gas emissions as campus population increases, building area increases, and our spaces becomes more energy intensive with research, data, laboratories, etc. (as outlined in the 2021 University of Pittsburgh Institutional Master Plan (IMP)).

We have a long way to go and great challenges before us, but the strategies herein keep us on track to achieve carbon neutrality by 2037.

Aerial illustration from Pitt Campus Master Plan

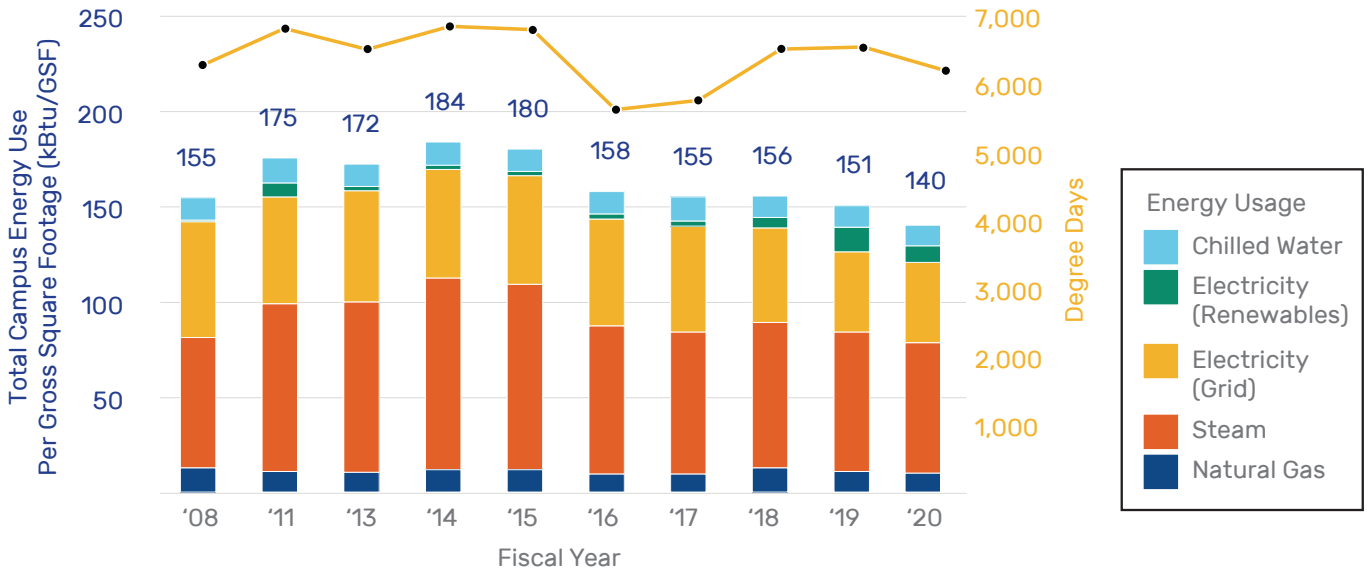


Figure 10. Energizing Our Campus: Pittsburgh Campus Energy Use
(with Energy Breakdown)

DEGREE DAYS

Degree days measure how cold or warm a location is. A degree day compares the mean (the average of the high and low) outdoor temperatures recorded for a location to a standard temperature. The more extreme the outside temperature, the higher the number of degree days (which generally results in higher levels of energy use for space heating or cooling).

eia.gov

ENERGIZING OUR CAMPUS

Energy Trends

Our Pittsburgh campus includes 131 buildings of various ages, prior uses, and utility structures; collectively, energizing campus and these buildings contribute 60.3% of our GHG emissions (143,400 MT CO_2e).

Since the 1970s, Pitt's facilities teams have been diligently working to increase building efficiency campus-wide, while providing high quality learning, living and working environments. Even as Pitt's buildings and uses have changed, campus-wide energy use intensity consumption (energy use per occupiable square foot of building area) has decreased significantly, reaching its lowest level since 2008 in FY20 – and celebrating a 24% reduction between FY14 and FY20. It is notable that these reductions have been achieved as degree days remain constant (meaning the same space heating or cooling requirements were in place due to outdoor temperature).

Despite these significant financial and environmental wins, the University recognizes that a nearly equal reduction in this category is still required. Pitt must continue to find the mechanisms, policies, and investment pathways to prioritize efficiency and conservation first.

Figure 10 connects various utility end uses to how the intensity of energizing our Pittsburgh campus category has changed over time. While efficiency efforts have reduced overall electricity and steam consumption over time, chilled water and natural gas use (for building level boilers and cooking) has remained relatively constant. Additionally, while renewables production and procurement reduces the GHG impact of energizing campus, campus electricity usage remains, which continues to be targeted for use reduction.

Also, in FY20, steam was 49% of campus-wide energy use. Steam is an effective thermal heating mechanism generated both on- and near-campus at the Pitt-owned Carrillo Street Steam Plant and the cooperatively owned Bellefield Boiler Plant.

Energy Flows

Figure 11 links the campus end uses shown in Figure 10 back to their energy sources, which include energy derived from fossil fuels, nuclear, and renewables via the electricity grid, district systems, and direct connection. The diagram shows relative annual energy flows (in MMBTU), which are visually comparable by their arrow width; gray lines indicate energy generation, thermal, and transmission losses in the system.

Even as the University's electric power sources shift toward carbon free sources, we remain reliant upon regional electricity created from fossil fuels. Additionally, steam is a major component of the campus energy mix – and is created by natural gas. Using alternative energy sources for steam generation is a significant challenge and the cooperative ownership of our steam plants means that Pitt cannot act unilaterally. As a result, Pitt is partnered with the City of Pittsburgh, Green Building Alliance, and the other institutional owners of our district steam systems to develop an Oakland Energy Master Plan that fully considers the full opportunity for these systems to support continued GHG emissions reduction, improve environmental quality, and increase resiliency.

Figure 11 below showcased Pitt energy flows in 2024, when large local renewable energy commitments will begin to dramatically shift Pitt's energy source fuels.

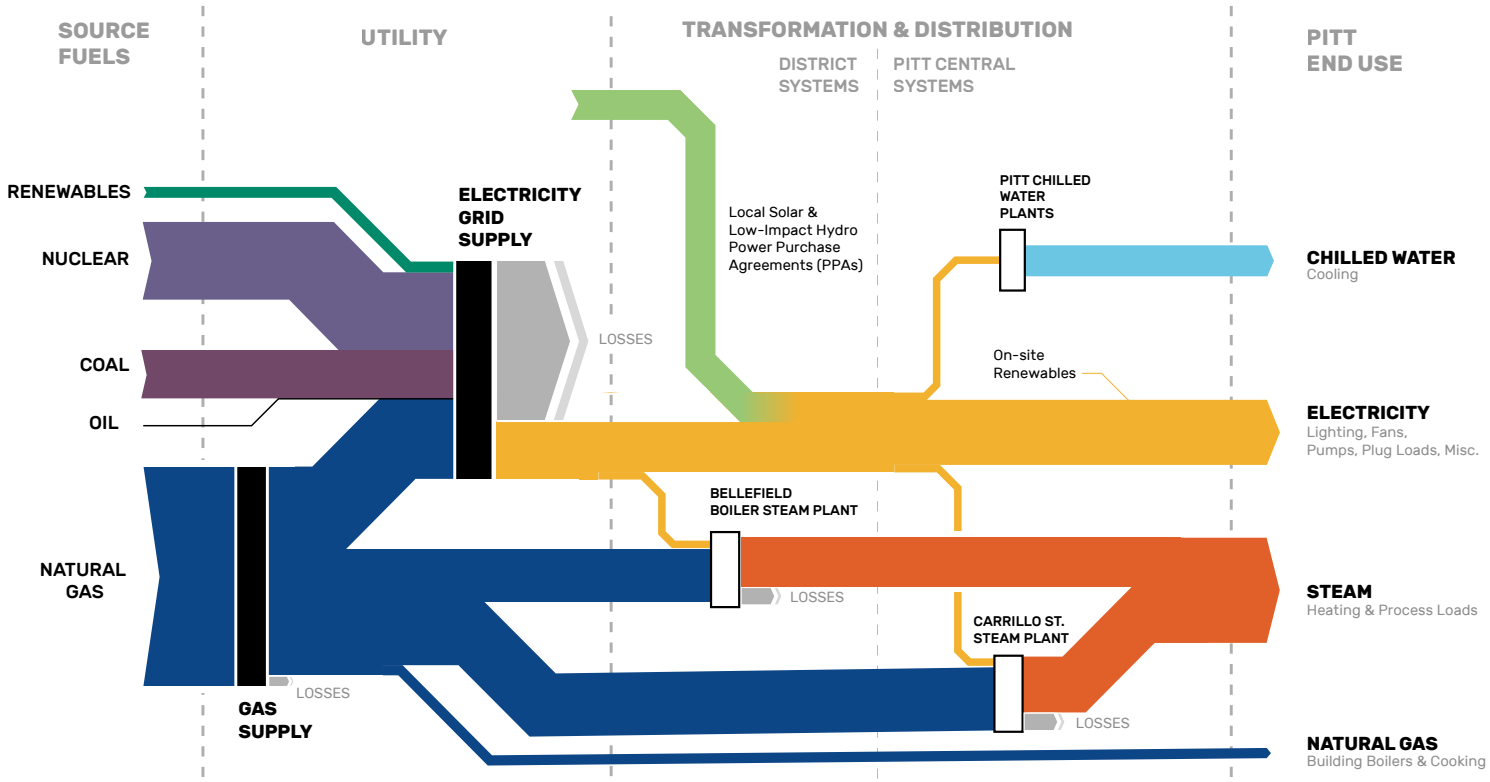


Figure 11. Pitt Campus Energy Use Sankey Diagram for 2024
Note: For illustrative purposes, electricity usage for thermal chilled water and steam is minimized; all thermodynamic rules apply in practice.

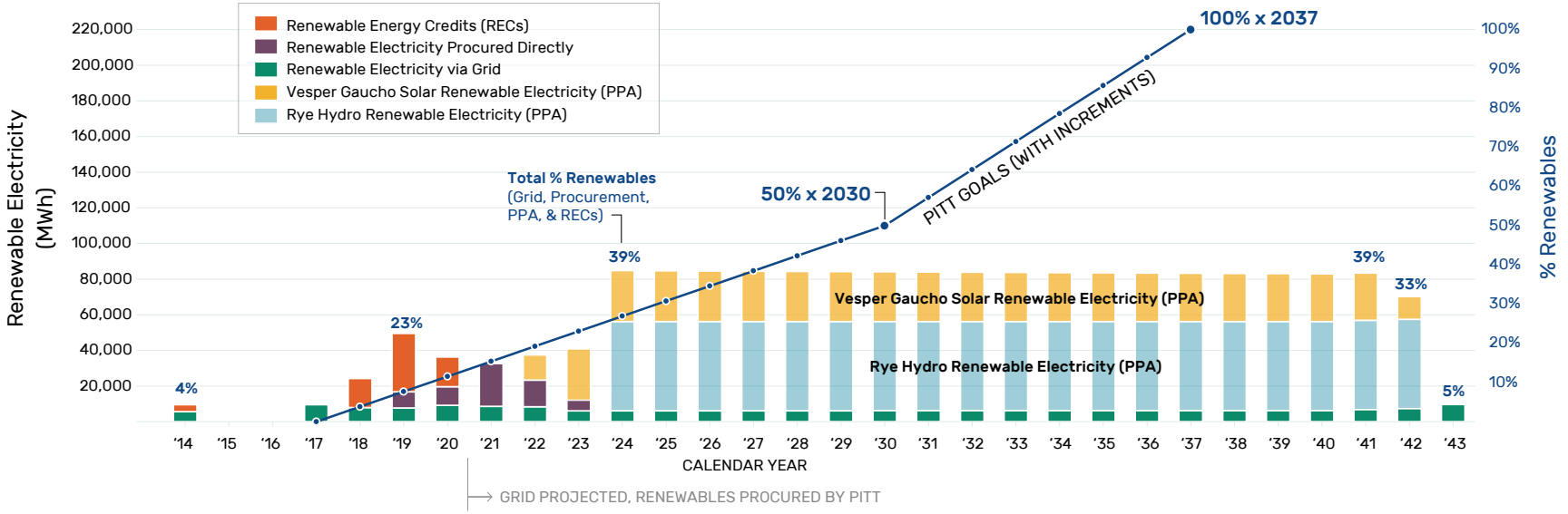


Figure 12. Pitt Renewable Electricity History and Projections

Renewable Energy

Pitt's past and future renewable energy actions and commitments demonstrate progress toward meeting a goal of 50% renewable electricity by 2030 and 100% by 2037. Pitt has had on-site solar power since 2012 (too small to be included above), but Figure 12 indicates that the University of Pittsburgh's renewable energy journey started in earnest in 2018. After a recent high of 23% renewables via procurement in FY19, 18% of the University's electricity originated from renewable energy sources in FY20. Year over year fluctuation in the percentage of renewables in the University's electricity mix is expected on our journey to carbon neutrality by 2037.

Both Figure 11 and 12 also showcase the future contribution of two local Pitt renewable partnerships, which will both be operational by 2024. Under two separate power purchase agreements (PPAs), the University is committed to buying all of the power produced by a both local solar and local run-of-the-river hydro plant, which combined will provide ~38% of the University's electricity for at least 20 years each.

Figure 12 projects the gap between current University renewable plans and commitments and our need for 100% renewable electricity by 2037. Closing this gap will require a combination of solutions, including on-site renewables, long-term power purchase agreements, directly purchased renewables, and renewable energy certificates (RECs).

Projections are only shown through 2043, as University commitments past 2041 have not been made.

Purchase Power Agreement (PPA) - a financial arrangement in which a third-party developer owns, operates, and maintains the system, and a host customer agrees to site the system on its property and purchases the system's electric output from the services provider for a predetermined period. Learn More.

Renewable Energy Certificate (RECs) or REC (pronounced: rĕk), is a market-based instrument that represents the property rights to the environmental, social and other non-power attributes of renewable electricity generation. RECs are issued when one megawatt-hour (MWh) of electricity is generated and delivered to the electricity grid from a renewable energy resource. Learn More.

CONNECTING OUR COMMUNITY

While our physical campus is a powerful place from which we advance our academic mission, connecting the Pitt community both to campus and around the world provides a carbon challenge. Whether for student and employee commuting to campus, air travel for business or study abroad, "Connecting Our Community" contributed 38.6% of our GHG emissions (90,360 metric tons of carbon dioxide equivalent or MT CO_2e) in FY19. As we strive toward carbon neutrality by 2037, finding low-carbon connections via active, shared, and low carbon mobility has to happen both to and from campus and around the world.

Related to commuting, Figures 13-16 illustrate FY19 GHG Inventory simplified estimations that 67.7% of employees and 98% of students already make shared or active commutes to campus, but 32.4% of employees still drive alone. These estimates are our baseline for evaluating the impact of future commuting mode shifts and other commuting policies. Combined with working from home strategies, opportunities to shift more people to more active and shared modes must be embraced more broadly and regularly. Regular car commuters will be encouraged to consider and try carpooling, vanpooling, parking and riding, and/or transit. If every member of the Pitt community currently commuting alone in a car was able to make a different commuting decision seasonally or one day a week, it would make a big difference in aggregate.

Additionally, our commuting GHG estimates are only as good as our data collection and tracking, which must improve over time. As illustrated in Figure 16, Pitt employees' home zip codes compared to campus (faculty on left, staff on the right), were recently used to re-estimate commuting distances to Oakland. While past Pitt GHG Inventory estimates were assuming an average employee vehicle commute of 25 miles, Figure 16 demonstrates that employees commute 10 miles to and from the University on average; this updated information will be used in our FY20 inventory and revisited moving forward.

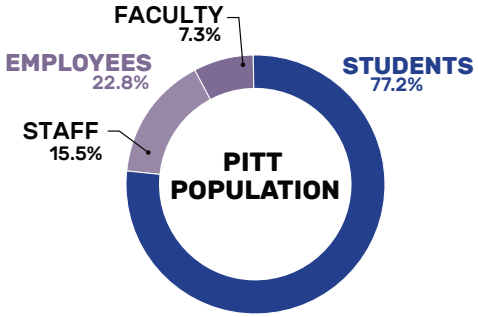


Figure 13. Pitt Population Breakdown (FY19)

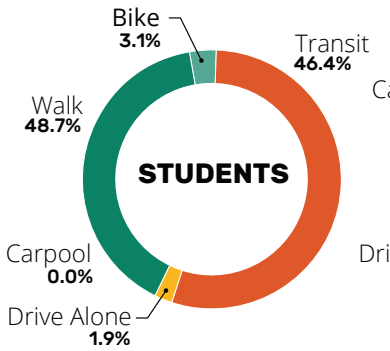


Figure 14. Student Commuting Mode Split (FY19)

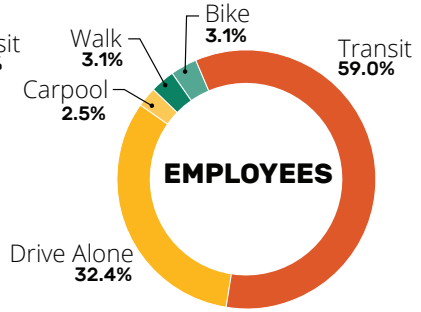


Figure 15. Employee Commuting Mode Split (FY19)

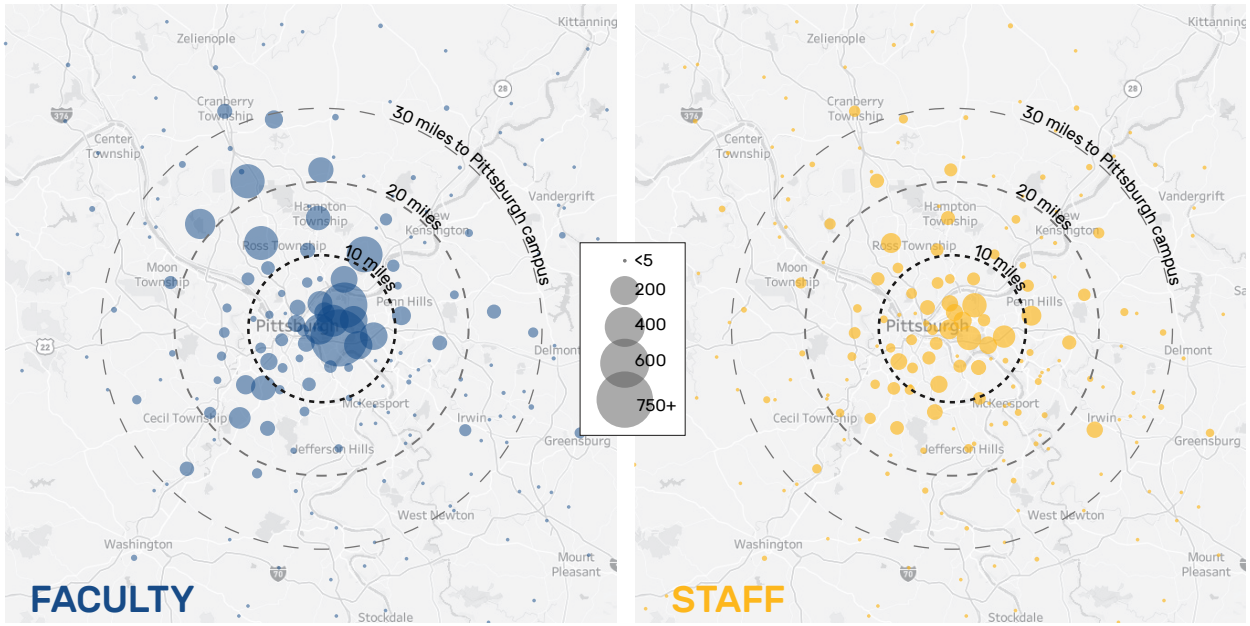


Figure 16. Employee Commuting Distances to Pittsburgh Campus
(Bubbles Indicate Employee Home Density)

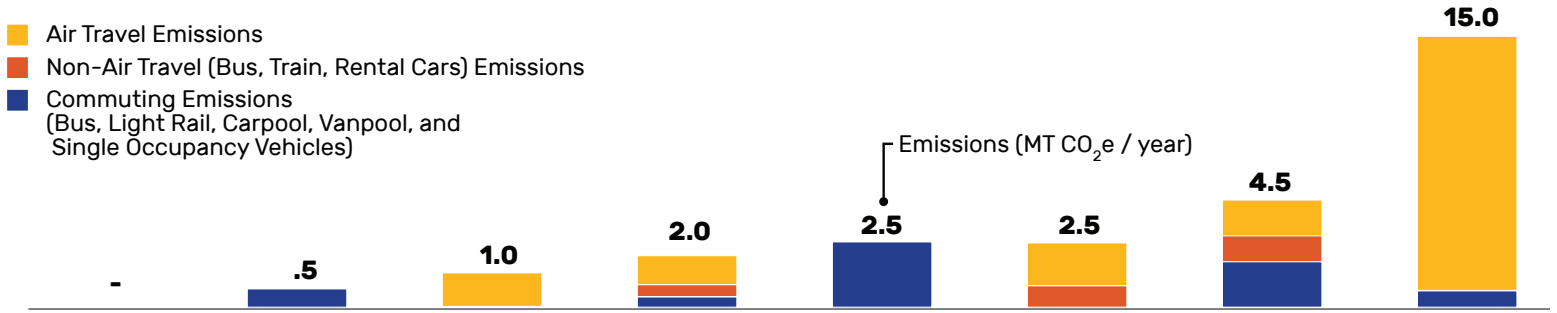
Individual Decisions Make a Difference

While student data is not provided in detail here, it should be noted that many data improvements are needed in estimating student commutes from off-campus.

Beyond campus, connecting our community occurs both nationally and globally. Pitt-sponsored travel includes ground and air travel for sporting events, conferences, meetings, workshops, and other educational, research, and operational functions.

Of additional significance is air travel, which accounts for 21.1% of Pitt's overall GHG emissions (49,850 MT CO_2e), including both study abroad and Pitt-sponsored air travel.

Addressing GHG emissions from our community connections is critical to meeting our goals. As Figure 17 visualizes, every Pitt student and employee has a different local and international contribution to our collective carbon impact; based on home location and University requirements, the GHG impacts of travel vary widely across our community. As we take this journey together, every Pitt community member will continue to make important daily and trip decisions that will help us reach our carbon neutrality goals.



Affiliation	First-year student studying philosophy	Facilities management maintenance manager	Graduate student in the School of Law	Medical researcher	Part-time instructor	Third-year student in the School of Nursing	Assistant swimming coach	Economics professor (acclaimed global speaker)
Commute	Bikes to campus	Bus from neighboring Squirrel Hill	Walks to campus	Drives from neighboring North Oakland community	Drives in from Murrysville, PA	Bikes or walks from South Oakland	Drives from Mt. Lebanon, PA most days, Bus sometimes	Ubers from Downtown when in Pittsburgh
Air and Ground Travel	None	None	2 flights for conferences	Regional travel for research by air and bus	None	Air and bus travel for the wrestling team	Air and bus travel for the swimming team and recruiting	Air travel for course abroad, plus train or plane to conferences

Individual Profiles

Figure 17. Hypothetical Individual Pitt Employee and Student Community Connections GHG Impacts
(MT CO_2e / year)

Pathway to Neutrality

A "waterfall diagram" highlighting the collection of strategies the University of Pittsburgh will use to achieve its goal of carbon neutrality by 2037 is shown in Figure 18. This visualization is not a timeline or prioritization of actions, but demonstrates the relative GHG emissions changes after FY19, including expected growth and the relative impact of strategies across three GHG mitigation priority areas:

- Energy Demand Reductions via reduced building and campus energy use
- Clean Supply via renewable and clean energy investment
- Low Carbon Connections via active, shared, and low-carbon mobility

The fourth group is other strategies we'll depend on to get to carbon neutrality, namely campus education and behavior shifts, as well as the eventual purchasing of carbon insets and offsets. For clarification, the three hatched strategies in Figure 18, are future carbon reductions relating to procurement decisions, specifically for renewable electricity and carbon offsets.

Expected Growth

To best determine where we're going, we need to understand not only where we've been, but also where we could be without the efforts outlined in this PittCAP. , "business-as-usual" (BAU) comparisons in this document (Figure 5) have been projected to 2037. As nearly every GHG impact category is connected to campus population or built area, GHG emissions growth was projected for each category using projected growth in built-area and campus population over time (as laid out in the 2021 Institutional Master Plan). As a result, in the BAU case, Pitt could experience an 8.8% growth in GHG emissions for the Pittsburgh campus by FY29 (from 215,500 MT CO_2e in FY19 to 236,200 MT CO_2e in FY29).

Pitt Population Growth Assumptions

- Targeted undergraduate first-year enrollment growth of 9.7% from FY23 through FY29
- Increase of 700 transfer students per year to FY29
- Maintain employee to student ratio

Pitt Built Area Growth Assumptions

- 1.8 million increase in owned square footage through FY30 (+15.2%); held constant beyond
- Capital project timing aligned with 2021 Institutional Master Plan
- Does not include leased space
- Does not account for workspace densification and reduction resulting from future flex work arrangements

ANALYSIS METHODS

Data provided in the adjacent waterfall diagram was compiled and calculated from a number of Pitt projections, sources, and engagements throughout campus community.

Potential GHG reductions were estimated in partnership and with consensus with the Pitt teams working most closely on activities and decisions impacting each category.

The PittCAP development team numerically modeled and forecasted carbon impact potential from both business-as-usual and GHG mitigation impacts from investments and decisions through 2037. These models established viable, yet aggressive reductions for various components of this plan. Details and assumptions for each strategy are outlined hereafter, with more detailed plans for each category available internally.

The "Acknowledgments and References" section at the end of this report includes many of the individuals and groups consulted for this plan.

The Waterfall image below is active. It links to sections in this report. Try it!

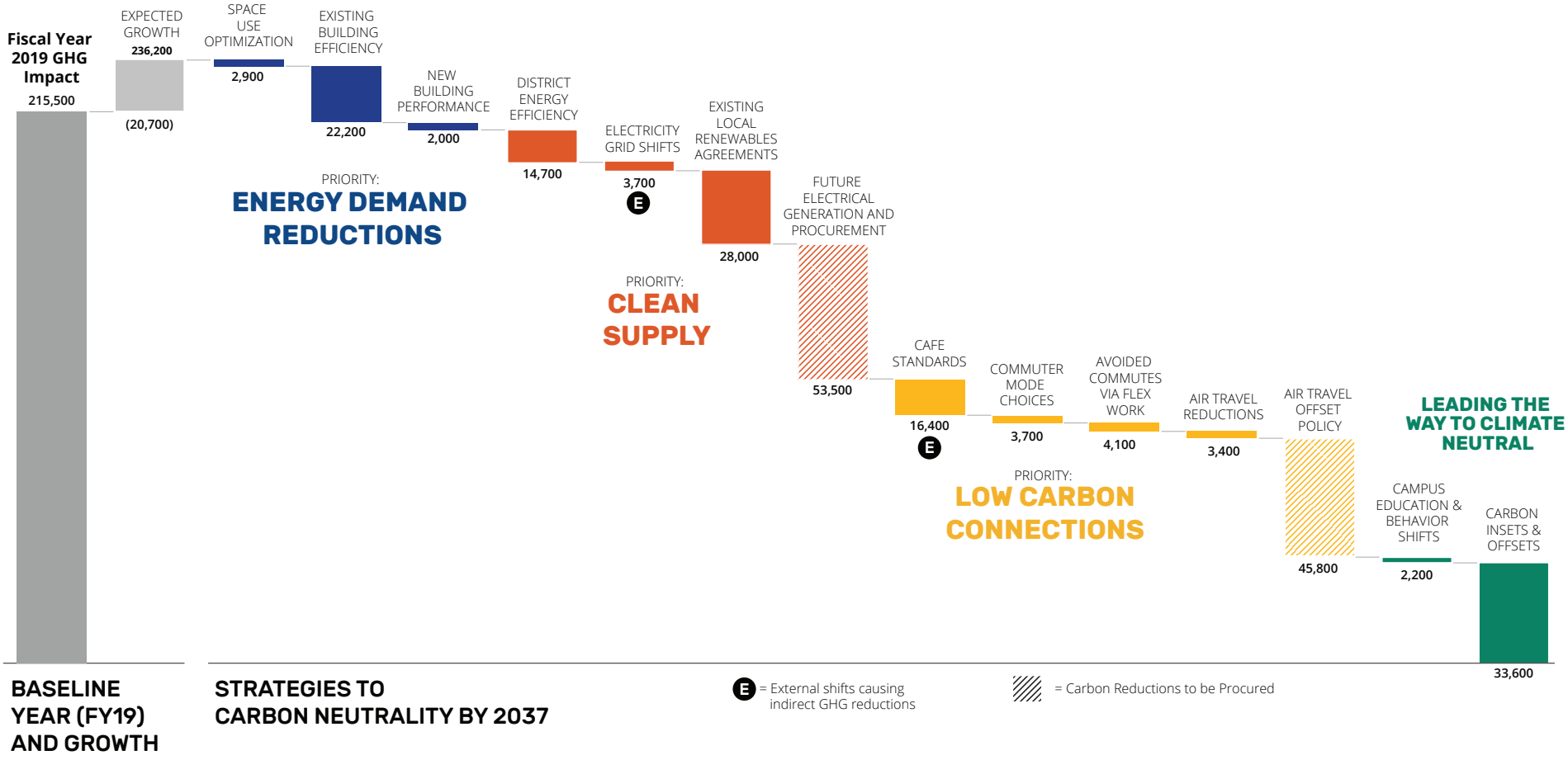


Figure 18. University of Pittsburgh Climate Action Plan Waterfall Pathway to Carbon Neutrality
(Projected Numeric GHG Reductions in MT CO_2e Annually)

Strategies

The details of each of these waterfall strategies are summarized here and in our PittCAP Roadmap, with each section including:

- Strategy description and its contribution to our three themes (academic mission, equitable outcomes, and economic resilience)
- Types of actions required, campus leaders, and stakeholders
- Collective impact of actions
- Financial investment required and payback

Each strategy is also tagged with an icon representing a physical, operational, policy, procurement or partnership opportunity (as outlined below).

Physical	Building or infrastructure investment
Operational	Internal processes, initiatives, and maintenance relating to campus and facilities
Policy	Campus-wide policy or procedure
Procurement	Funding, financing, incentives, or procurement
Partnerships	Opportunities to advance strategy through partnership and collaboration

'OTHER' CATEGORIES (Not in Waterfall)

While important for campus-wide sustainability efforts, four other categories are not addressed on the waterfall diagram because they collectively represent only 2% of Pitt's total FY19 GHG emissions. However, campus-wide efforts relating to solid waste, paper purchasing, and wastewater are important aspects of campus-wide sustainability and emissions reductions -- and represent opportunity to raise awareness about our commitment to neutrality by 2037; they're briefly addressed below:

PAPER – Before FY19, Pitt's paper purchasing averaged ~1,800 MT CO_2e annually; however, with campus-wide paper use reduction in FY19 and broader adoption of the TreeZero carbon neutral paper, paper emissions dropped by ~60%. A continued push for reduced printing and the use of carbon neutral and recycled content paper will continue.

VEHICLE FLEET – The University has 217 vehicles that support the Pittsburgh campus, which are on a transition to more efficient, hybrids, and electric vehicles (~60 vehicles upgraded annually). Eighteen of our 20 shuttles are currently fueled by propane (which reduced emissions from them by 33%). Pitt intends to fully electrify its vehicle fleet over time (including shuttles) while raising awareness among the Pitt community about the global shift to low carbon vehicles.

REFRIGERANTS- Pitt's overall refrigerant use is part of required maintenance across campus. As it phases out older equipment, the University has been shifting away from more potent Global Warming Potential (GWP) refrigerants in preference of lower GWP refrigerants over time.

SOLID WASTE – Pitt has a goal to reduce materials to landfill by 25% by 2030 (from 2017 levels), which it has been working up to over time by diverting an increasing number of specialty recyclables and compostables.

ENERGY DEMAND REDUCTIONS

Efficiency and conservation should always come first; these energy demand reductions include three basic GHG mitigation strategies: 1) Space Use Optimization, 2) Existing Building Efficiency, and 3) New Building Performance. Together, these three approaches offer the opportunity to avoid 27,100 metric tons of carbon dioxide equivalent (MT CO_2e) – or 11.5% of our path toward carbon neutrality by 2037.

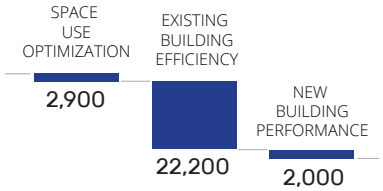


Figure 19. Energy Demand Reductions Strategies
(MT CO_2e Avoided)


Mascaro Center for Sustainable Innovation

Link back to Waterfall Graphic

HOW TO READ THE PITTCAP STRATEGIES:

Strategy

Average GHGs avoided annually (MT CO_2e)

Percent reduction toward neutrality

Action categories

Physical Operational Policy

1) SPACE USE OPTIMIZATION

1.2%

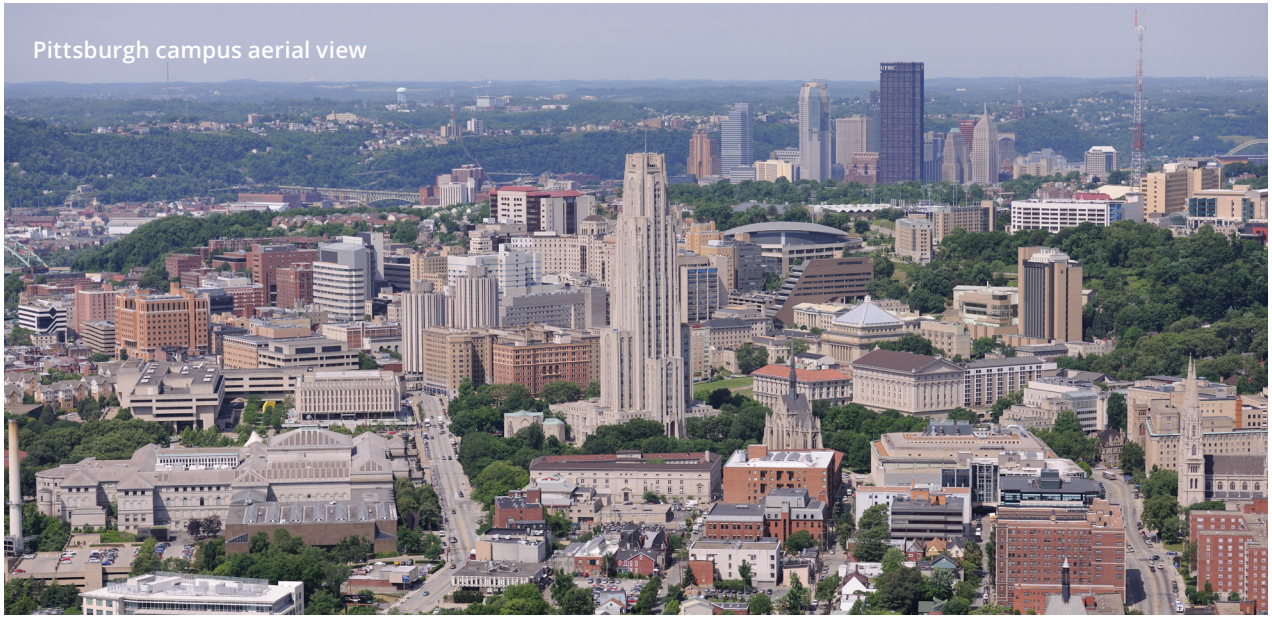
2,900 MT CO_2e Avoided

Opportunities exist within Pitt's current and future building stock to optimize space utilization across campus. To respond to changing uses, programming, occupancy, and density preferences and efficiencies across campus, opportunities must be explored to optimize building layouts, room and space utilization, controls, and systems. While the space implications of the global COVID-19 pandemic are not yet fully known, increasing remote work and health precautions should be considered.

Hybrid work opportunities combined with changing on-campus space needs could have positive impacts for employee flexibility and campus energy consumption.

However, with an associated decrease in off-campus lease utilization, space optimization could result in bringing emissions currently outside the boundary of this PittCAP into it. This shift could serve to mask the extent of campus-wide energy demand reductions, which is why assessing emissions reduction both in absolute and normalized terms is important to ongoing progress evaluation.

Action: Explore and implement space utilization and optimization with administrative departments across campus.



Pittsburgh campus aerial view

Strategies:

1) Undertake a space utilization and optimization study across both campus and Pitt's real estate portfolio.
2) Develop better information on leased space breakdown and utilization to help hone estimates of future carbon impact.
3) Incorporate clauses into all existing and future Pitt leases for utility usage and cost data sharing.
4) Design and develop more touch-down spaces for students and faculty – along with guidance on how to safely and politely share them.
5) Celebrate experimentation and evolution in this space by creating locations that meet people's needs and make them happy to work at Pitt.

Lead: Office of Planning, Design, and Real Estate (PDRE)

Stakeholders: Offices of Facilities Management, the Chief Financial Officer (CFO), and the Provost

Impact: Energy use reduction approximated at 2% due to space optimization and utilization.

% reduction toward neutrality	1.2%
Average GHGs avoided annually (MT CO_2e)	2,900
Investment ($)	$25,000 - $100,000 annually through 2030
Cost Savings ($)	$50,000 to $100,000 annually

Table 1.1 Strategy Impact Data

2) EXISTING BUILDING EFFICIENCY

9.4%
22,200 MT CO_2e Avoided

Physical Operational

In 2014, the University became a founding Property Partner of the Pittsburgh 2030 District, publicly committing to the international 2030 Challenge reduction targets of 50% reductions in energy use, water consumption, and transportation GHG emissions by 2030 (below baselines). As shown in Figure 20, through continued investment in and focus on energy efficiency and conservation measures in our existing buildings, Pitt's Facilities and Housing teams have enabled the University to surpass its 2030 goals since 2016, most recently achieving a campus-wide reduction in energy use intensity of 25% below its baseline – and the lowest total energy use per square foot since data tracking began in 2008 (remaining ahead of schedule on reaching for the 50% reduction target).

Beyond standard and innovative internal standards, guidelines, practices, and technologies, Pitt has been working to implement a suite of efficiency efforts in 25 buildings across the Pittsburgh campus (previously prioritized in the 2017 Pitt Campus Energy Plan by impact, need, and financial payback). Across campus, Pitt has already reduced energy use by 30% since 2014 with building efficiency projects, resulting in ~55,000 MT CO_2e reductions.

Based on current energy benchmarking, use trends, goals, and analysis of potential ongoing energy conservation and efficiency opportunities in existing buildings for building reductions, we estimate a total energy reduction of up to 360,000 MMBTU by 2037 (across electricity, steam, chilled water, and natural gas) is achievable. These future upgrades will span lighting, heating, cooling, controls, and plug load systems, and collectively represent a reduction of 22,200 MT CO_2e annually.

Buildings across the University of Pittsburgh have a variety of uses, which expectedly affect their overall energy usage and use intensity, as illustrated in Figure 20. Pitt's laboratory spaces represent roughly 30% of total floor area, but 60% of total energy use; consequently, labs continue to be an opportunity for investment across campus. Though five of Pitt's most energy intensive buildings represent 40% of the total campus energy use of Pitt's campus, their consumption matches their use as laboratories (which require more air changes per hour (ACH), equipment plug loads, and/or occupancy) – and Pitt has already made (and continues to make) significant investments in these buildings, making additional reductions in these spaces challenging.

Action: Continue to advance toward 2030 reduction goals at both individual building and campus scale, both expediting and expanding current efforts to every building.

Lead: Office of Facilities Management, and Housing Services

Stakeholders: Athletics, Offices of Business and Auxiliary Services (BAS), Sustainability, Parking and Transportation Services (PTS), the CFO, and the Provost

Impact: Acceleration of individual building and campus-wide energy efficiency and conservation to achieve our 2030 Challenge goals while improving indoor environmental quality

% reduction toward neutrality	9.4%
Average GHGs avoided annually (MT CO_2e)	22,200
Investment ($)	$4.5 million to $7 million annually
Cost Savings ($)	$4.5 million to $7 million annually

Table 2.1 Strategy Impact Data

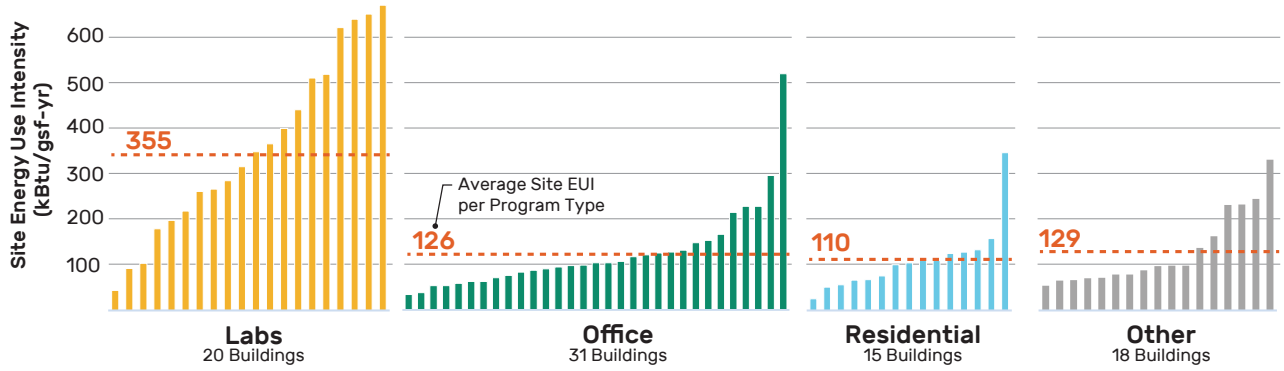


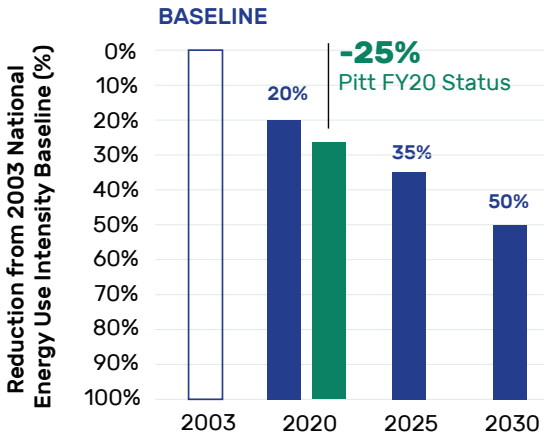
Figure 20. University of Pittsburgh Building Energy Use Intensity by Use Category

3) NEW BUILDING PERFORMANCE

0.9%
2,000 MT CO_2e Avoided

Physical Operational Policy

Existing Buildings



New Buildings

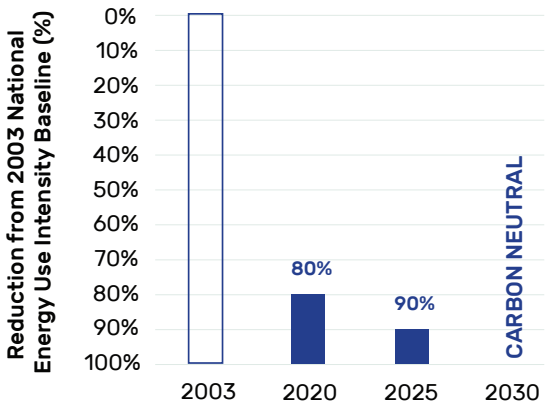


Figure 21. 2030 Challenge Goals by Year and Pitt's Progress Toward Them

Along with the 2030 Challenge goals for aforementioned existing buildings, in 2014 Pitt committed to the 2030 Challenge's new construction goals also shown in Figure 21 (which were recodified in the 2018 Pitt Sustainability Plan). Given the projected increase of 1.8 million square feet through FY30 (laid out in the 2021 Institutional Master Plan, the continued focus on achieving carbon neutral new construction by 2030 is important. Pitt will continue to provide all new construction, major renovations, and interior projects energy and water use intensity performance goals aligned with these 2030 targets – and project teams engage in iterative energy modeling throughout the design process to help ensure these goals can be reached, while considering the interactive effects of design decisions alongside investment paybacks.

Pitt will continue to ensure it provides adequate capital resources to create long-lasting, high quality new building projects that help the University meet its long-term carbon and fiscal stewardship goals. The University will also continue to consider life cycle costs, benefits, and savings to accurately consider investments and paybacks beyond first costs. Additionally, the social cost of carbon should be incorporated into investment decision-making for new buildings.

Actions:

1) Continue to set and achieve rigorous building energy performance goals in line with the 2030 Challenge , including for shared interior spaces.

2) Focus on whole building site energy performance first, but also consider on-site renewable energy generation.

3) Incorporate the social cost of carbon into all investment scenarios.

Lead: Office of Facilities Management, and Housing Services

Stakeholders: Offices of the CFO and Provost, Athletics, Business & Auxiliary Services, Sustainability, and Parking & Transportation

Impact: High performing new buildings and spaces that achieve our high energy and water performance goals in line with the 2030 Challenge goals, while being responsive to long-term carbon and financial realities

% reduction toward neutrality	0.9%
Average GHGs avoided annually (MT CO_2e)	2,000
Investment ($)	Up to $15 million annually through 2030
Avoided Costs ($)	Up to $3 million annually

Table 3.1 Strategy Impact Data

The Pittsburgh 2030 District is an internationally recognized, locally driven strategic initiative of Green Building Alliance (GBA) that supports building owners and managers as they strive toward the goals outlined in Figure 21, along with similarly aggressive water and transporation goals by 2030. Pitt has been a proud Pittsburgh 2030 District partner since the District's 2014 expansion into Oakland.

CLEAN SUPPLY

As we reduce energy demand (thus reducing the carbon required to energize our campus), we have to simultaneously focus on cleaning our energy sources. As illustrated in Figure 11 (Pitt's Energy Use Sankey Diagram), cleaning our supply focuses on electricity and thermal sources (i.e., district steam and chilled water). There are 4 strategies in this area: district energy infrastructure efficiencies, cleaning of the electricity grid, existing local renewables purchasing agreements, and future renewables generation and procurement. Combined, these 4 approaches offer the potential to avoid 74,700 metric tons of carbon dioxide equivalent (MT CO_2e) – or 42.3% of our path toward carbon neutrality by 2037.

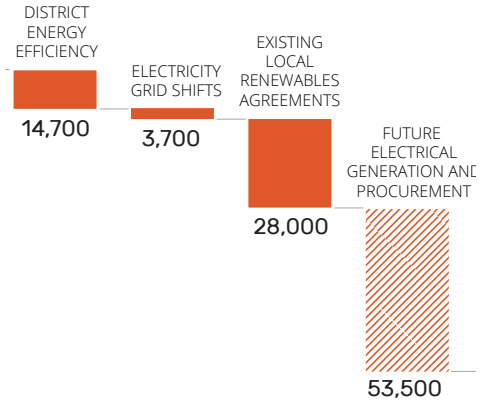


Figure 22. Clean Supply Strategies
(MT CO_2e Avoided)

4) DISTRICT ENERGY EFFICIENCY

6.2%
14,700 MT CO_2e Avoided

As illustrated in Figure 11, the University owns, co-owns, and cooperatively owns district thermal systems that create both chilled water and steam.

Chilled Water: Given the age of Pitt's chilled water systems, system upgrades are expected and included in this "District Energy Efficiency" strategy section. Once implemented, upgrades to an existing campus chilled water plant are expected to avoid 2,800 MT CO_2e annually; a new upper campus plant will also be extremely efficient (though costs are not included here because they are already part of the campus master plan).

Because the University's chilled water is generated by electricity, current use consumption is included in the "Existing Building Efficiency" strategy section and the source of that electricity is covered below in electricity procurement.

District Steam: As shown in Figure 11, Pitt's campus uses a significant amount of locally generated steam for thermal heating. Generating and using steam locally has many benefits, including energy resilience, reduced equipment needs at the building scale, and reduced losses from distribution. While universities and municipalities across the United States have chosen district steam for these reasons, most generate their steam from fossil fuels – and Pitt is no different. In 2009, the cooperatively owned Bellefield Boiler Plant fully transitioned from coal to natural gas, significantly reducing Pitt's GHG emissions from steam from this facility. Concurrently, Carrillo Street Steam Plant (co-owned with UPMC) came online, powered by natural gas. Today, the Bellefield and Carrillo steam plants both serve Pitt, UPMC, and other Oakland buildings tied into a cooperative commercial district steam network.

Because Pitt's campus steam is created by natural gas, it represents a potential opportunity for reducing carbon emissions leading up to 2037. Campus-wide energy demand reductions are included in the "Existing Building Efficiency" category. Upgrades to existing campus steam infrastructure over the next 5 years are included in this PittCAP, including steam system and trap upgrades. The consideration of combined heat and power (CHP) at either facility is not included in current projections, but will be investigated. However, since our steam network connects many Pitt buildings and our neighbors, progress toward low carbon sources for steam generation is complicated, must be collaborative, and potentially expensive upfront.

In this regard, Pitt is partnered with the City of Pittsburgh, Green Building Alliance, and the other institutional owners of our district steam systems in developing an Oakland Energy Master Plan; this strategy will fully consider the opportunity for these systems to support continued GHG emissions reduction, improve environmental quality, and increase resiliency. While not in the emissions reductions or costs below, these future opportunities and decisions are predicated here – and expected to advance over the next 5 years so that when we update this document the district steam opportunities will be more fully incorporated.

Building Electrification: This refers to shifting all building energy sources to electricity by eliminating the on-site combustion of fossil fuels for cooking; heating, cooling, and ventilation, back-up generation, and process use. Moving beyond steam is a multidecadal decision simultaneously linked to electrification of new and/or existing buildings. Pitt has in the past and is committed to continuing to explore building electrification on a project-by-project basis.

Physical Operational Policy Procurement Partnerships

Action: Continue to make existing district thermal energy systems more efficient, while partnering on a long-term strategy to transform energy sources to lower carbon.

Lead: Office of Facilities Management

Stakeholders: PDRE, Office of Sustainability, BAS

Impact: Resilient, locally created thermal energy physically connecting us to our institutional neighbors, while strategizing system evolution

% reduction toward neutrality	6.2%
Average GHGs avoided annually (MT CO_2e)	14,700
Investment ($)	$9 million through 2026
Cost Savings ($)	$2.5 million annually

Table 4.1 Strategy Impact Data


Carrillo Street Steam Plant - Steam Boiler

5) ELECTRICITY GRID SHIFTS

1.6%
3,700 MT CO_2e Avoided

Policy Partnerships

As Figure 11 indicates, campus electricity is linked to the larger regional electricity grid, which is a network of electricity generation units powered by coal, natural gas, nuclear, and renewable sources. Even as Pitt incorporates more renewables via on-site installation and procurement efforts, most electricity will be generated off-site and the University's real-time electricity will be linked to the larger regional electricity grid. As a result, the University cannot avoid a certain amount of transmission and distribution line losses under Scope 3 emissions (currently 2.1% of Pitt's FY19 GHG emissions or 4,575 MT CO_2e). Thus, the continued evolution of the regional electricity grid will help reduce this impact. As Figure 23 indicates, the regional electricity grid is not expected to decarbonize quickly, so we expect to reflect regional reliance on fossil fuels in our carbon impact as well. Reductions in the carbon intensity of the electricity grid are imperative because the results improve quality of life for everyone in our region.

Lead: Office of Governmental Relations

Action: Advocate for the inclusion of lower and no carbon energy sources in the regional grid mix.

Stakeholders: Office of Sustainability, faculty, staff, students, and community members

Impact: Diversified local energy sector that contributes to a just economic transition, improved regional air quality, and applied research and learning opportunities

% reduction toward neutrality	1.6%
Average GHGs avoided annually (MT CO_2e)	3,700
Investment ($)	n/a
Cost Savings ($)	n/a

Table 5.1 Strategy Impact Data

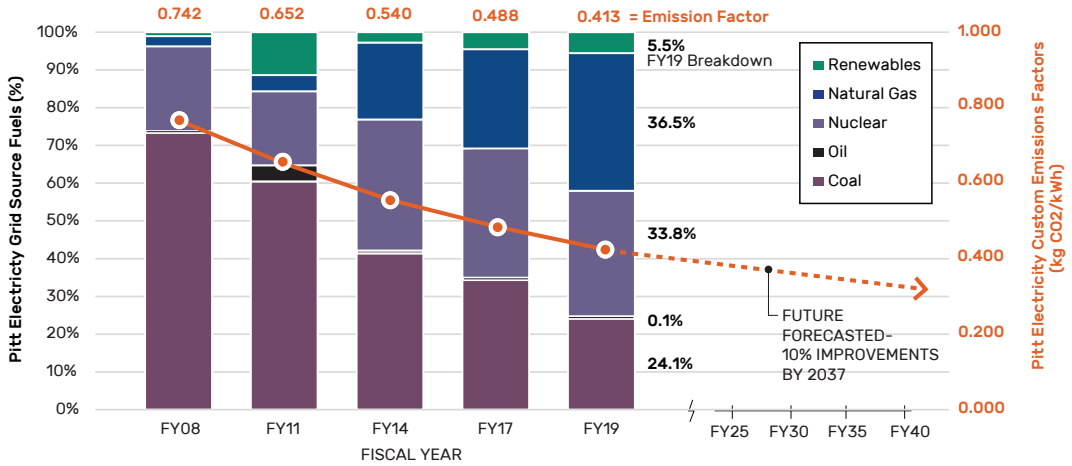


Figure 23. Custom Pitt Electricity Grid Carbon Factors (History and Future Forecast)

6) EXISTING LOCAL RENEWABLES AGREEMENTS

11.9%
28,000 MT CO_2e Avoided

Procurement Partnerships

As detailed in Our Current Efforts: Renewable Energy, the University of Pittsburgh has two existing 20-year agreements to purchase all of the electricity from two future local facilities that will collectively represent 38% of our total electricity usage:

1) Gaucho Solar - Pitt will purchase all of the renewable electricity produced from this 20 megawatt (MW) solar power facility just 25 miles from the Pittsburgh campus (on the border of Allegheny and Beaver Counties). It will be operational in mid-2022.

2) Allegheny Run-of-the River Hydropower – Pitt is committed to acquiring all of the renewable electricity from this 8.4 MW low impact hydro facility at the Allegheny River Lock and Dam No. 2 (less than 5 miles from campus near the Highland Park Bridge). It will come online in 2023 and produce 50,000 MWh of power annually, which represents 25% of Pitt's electricity needs.

Action: Partner with renewable asset developers Vesper and Rye Development on applied research and learning opportunities specific to these two local renewable projects.

Lead: Offices of Facilities Management and Sustainability

Stakeholders: Mascaro Center for Sustainable Innovation, faculty, students

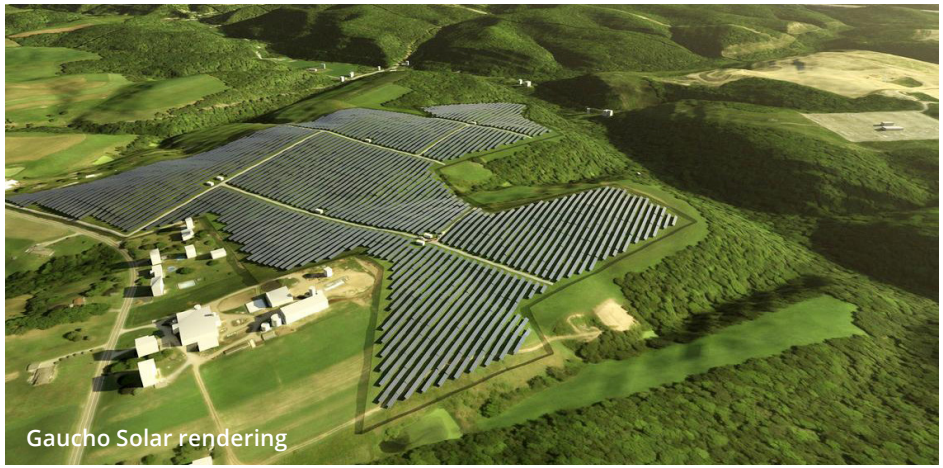
Impact: Diversified local energy sector that contributes to a just economic transition , improved regional air quality, and applied research and learning opportunities

% reduction toward neutrality	11.9%
Average GHGs avoided annually (MT CO_2e)	28,000
Investment ($)	n/a
Cost Savings ($)	~$100,000 annually*

* Dependent on regional electricity prices

Table 6.1 Strategy Impact Data


Allegheny Run-of-the River Hydropower rendering


Gaucho Solar rendering

7) FUTURE ELECTRICAL GENERATION AND PROCUREMENT

22.6%
53,500 MT CO_2e Avoided

Policy Procurement Partnerships

While ~38% of Pitt's future electricity usage is committed to renewables, the University's goals are to achieve at least 50% renewables by 2030 and 100% by 2037 or earlier. Achieving those goals will include a combination of solutions, including on-site renewables, long-term power purchase agreements, directly purchased renewables, and renewable energy certificates.

On-Site Renewables- Pitt has had a small 4.32 kW on-site solar array on Benedum Hall since 2012 – and (though outside our GHG inventory boundary) a new 50 kW solar array was installed at the off-campus Energy Innovation Center in 2020. The potential for on-site solar, wind, and other renewables is regularly considered relating to new construction projects; as a result, several new buildings in design and construction will be "solar ready." On existing buildings, roof-mounted solar is limited by roof architecture, conditions, and existing or future shading. Additionally, given the dense urban nature of the Pittsburgh campus, if Pitt blanketed all non-green campus roofs with on-site solar, it could produce up to ~13,000 MWh of electricity annually (just ~6% of the total campus need). Regardless, on-site renewables have important campus and community benefits – and the University is currently assessing the potential for installing on-site solar on buildings with newer roofs that would produce 1,560 to 1,990 MWh annually.

Long-Term Power Purchase Agreements (PPA) – The possibility of another 15-year+ contract for local or national renewables would be the most direct way to guarantee a long-term University commitment to renewables, while generating specific academic mission alignment and equitable outcomes.

Electricity Retail Contracts – Pitt currently procures ~11% of its electricity as 100% renewables through structured retail contracts that include unbundled RECs. This strategy aligns with electrical and environmental procurement – and represents opportunities for future early integration of more renewables into the University's electrical mix, which would result in faster GHG reduction overall.

Renewable Energy Certificates (RECs) - Pitt has been regularly purchasing small amounts of RECs specific to LEED building certifications since 2009. The University only purchases Green-e certified RECs, which are independently verified clean energy.

Pitt students' top carbon action priority is that the University advance toward 100% renewables faster – and we are making solid progress. Over the next five years, the University will solidify how the above strategies combine and change over time to achieve our renewable goals and carbon neutrality by 2037.

Pitt GRID Institute Solar Installation at Energy Innovation Institute

Action: Generate and procure increasing amounts of renewable electricity via installation and procurement.

Lead: Offices of Facilities Management and Sustainability

Stakeholders: Office of the CFO

Impact: Significant overall GHG reduction University-wide, with the possibility to simultaneously enhance our academic mission, advance equitable action, and ensure economic resilience.

% reduction toward neutrality	22.6%
Average GHGs avoided annually (MT CO_2e)	53,500
Investment ($)	n/a
Cost Savings ($)	Up to $6 million annually*

* Dependent on regional electricity prices

Table 7.1 Strategy Impact Data

Pitt green fleet

LOW CARBON CONNECTIONS

While our physical places have a significant GHG impact, as the University drives those carbon emissions down by reducing demand and cleaning its supply, how we connect to and from campus and around the world will start to have a greater share of our campus carbon footprint. Low carbon connections primarily include two categories: 1) Commuting of students and employees to and from campus and 2) Air travel for business or study abroad. Regardless of who is doing it and how, combining both commuting and air travel offers the potential to avoid 73,400 metric tons of carbon dioxide equivalent (MT CO_2e) – or 31.3% of our path toward carbon neutrality by 2037.

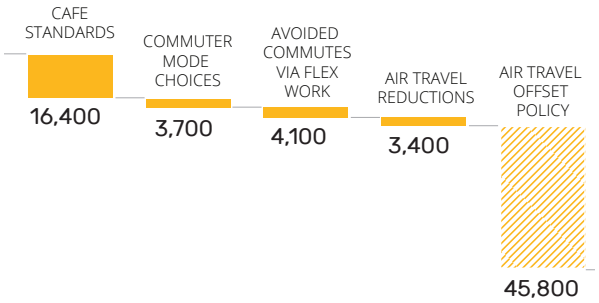


Figure 24. Low Carbon Connections Strategies
(MT CO_2e Avoided)

8) CAFE STANDARDS

7.0%
16,400 MT CO_2e Avoided

Policy Procurement

In terms of commuting, the vehicle fuel efficiency (miles per gallon) of individual vehicles has a large impact on Pitt's commuting emissions. Whether driving a car or van to campus (with or without someone else in tow), the vehicle you choose makes a collective difference – and federal standards guide the efficiency of consumer vehicles. The Corporate Average Fuel Economy (CAFE) standards were created by the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) and the U.S. Environmental Protection Agency (EPA).

Federal vehicle CAFE standards increase over time (ensuring you have more efficient vehicles to drive and ride in) – and this PittCAP uses those NHTSA and EPA projections. Due to time required for consumer uptake, we have projected that federal CAFE Standards will affect overall on-road vehicles five years after deployment, reducing Pitt's emissions on the same delayed timline. If you're a transit rider, we're projecting a 50% reduction in related GHG emissions for the Port Authority of Allegheny County (PAAC). Current estimates were verified with SIMAP calculation protocols and the Southwestern Pennsylvania Commission (our regional metropolitan planning organization).

The good news is that as Pitt commuters update their vehicles, those choices matter, reducing both personal and University GHG implications. Additionally, global vehicle electrification trends are reflected in CAFE standard expectations – and the University is working to expand on-campus electric vehicle charging infrastructure to support that evolution.

	FY2019	FY2035
Single Occupancy Vehicle	0.33	0.24
Carpool	0.21	0.15
Bus	0.28	0.14
Vanpool	0.14	0.10

Table 8.1 GHG Emissions Factors per Passenger Mile Traveled (MT CO_2e/PMT)

Actions: Advocate for a continued federal expedition of CAFE standards. Expand the on-campus electric vehicle charging network.

Lead: Offices of Governmental Relations and Parking & Transportation

Stakeholders: Offices of Sustainability, Facilities Management, and Human Resources

Impact: Cleaner on-road vehicles for everyone, also reducing localized air pollutants

% reduction toward neutrality	7.0%
Average GHGs avoided annually (MT CO_2e)	16,400
Investment ($)	n/a
Avoided Costs / Cost Savings ($)	n/a

Table 8.2 Strategy Impact Data

Athletics Sports Medicine Electrical Vehicle

Pitt EV Charging Station

9) COMMUTER MODE CHOICES

1.6%
3,700 MT CO_2e Avoided

Operational Policy Partnerships

Our Pittsburgh campus is located in the Oakland neighborhood, which is the third largest area of economic activity in the Commonwealth of Pennsylvania. As a result, both our urban scale and density compel us to prioritize active, shared, and low carbon mobility choices for traveling to, from, and around campus. Pitt is also committed to deprioritizing vehicle traffic and enhancing and increasing safe and accessible pedestrian routes across campus.

Relatedly, every member of the Pitt community makes a personal and daily decision about how to get to and from campus. These decisions are based on where we live, who else we may be responsible for, our access to transit, the weather, our personal mobility, and more. These decisions also tend to change over the seasons of our lives.

This PittCAP acknowledges the networked and personal nature of commuting decisions, while simultaneously committing to helping every member of the Pitt community consider how and via what modes they commute. Whether you're a regular transit rider interested in adding biking or walking options to your decision suite or you drive alone and are interested in determining your carpool or park and ride potential – the University of Pittsburgh is committed to helping us each individually and collectively shift. We're not alone on this journey. The collective commuter mode splits shown in Figure 25 are part of our 2021 Institutional Master Plan commitments to the City of Pittsburgh – and can only be achieved in partnership with Pitt students and employees, the City of Pittsburgh, Port Authority of Allegheny County, Healthy Ride, and others.

FY19 GHG Inventory assumptions are that 67.7% of employees and 98% of students already make shared or active commutes to campus, but we must continue to shift to create a safe and carbon neutral University by 2037. Our goal is 78.6% of employees and 95.5% of students using shared and active commute modes by 2037. If every Pitt employee and student was able to make a lower carbon decision seasonally or one day a week, it would help us reach our goals and create a healthier Pitt and Pittsburgh in the process.

Action: Support Pitt students and employees in choosing active, shared, and low carbon commuting options more often and regularly.

Lead: PTS

Stakeholders: Offices of Facilities Management, Human Resources, and Sustainability; employees, and students

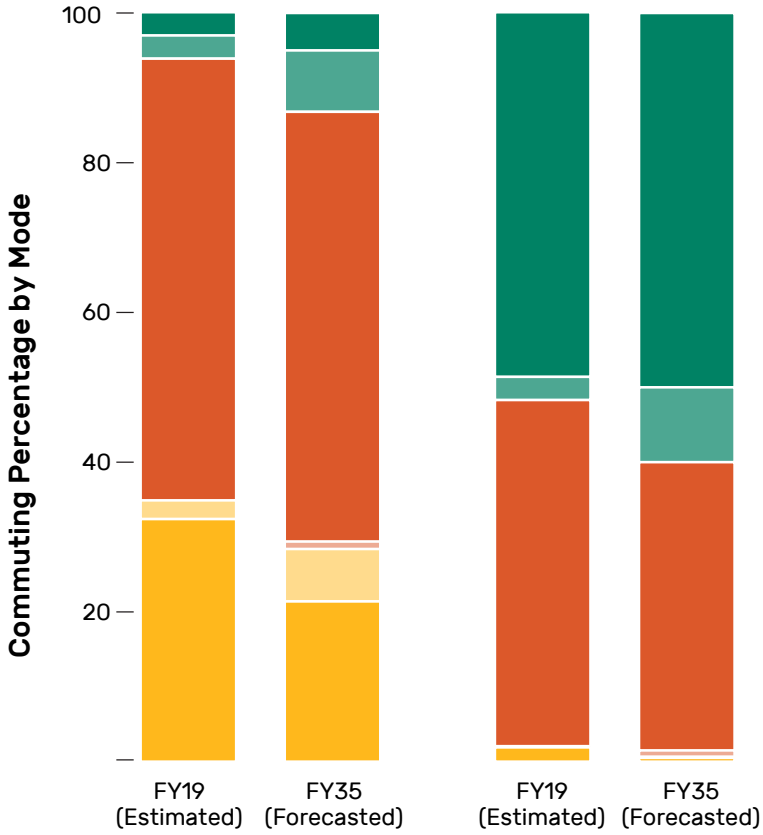
Impact: Safe and healthy commuters and campus

% reduction toward neutrality	1.6%
Average GHGs avoided annually (MT CO_2e)	3,700
Investment ($)	$50,000 to $100,000 annually
Avoided Costs ($)	Up to $1 million annually

Table 9.1 Strategy Impact Data

Pitt bike commuting


Healthy Ride bike share in Oakland



	EMPLOYEES			STUDENTS	
FTE	8,473	9,207 ▲		28,673	31,096 ▲
Commuting Percentage by Mode					
WALK	3.1%	5.0% ▲		48.7%	50.0% ▲
BIKE	3.1%	8.2% ▲		3.1%	10.0% ▲
BUS	59.0%	57.4% ▼		46.4%	38.5% ▼
VANPOOL	-	1.0% ▲		-	1.0% ▲
CARPOOL	2.5%	7.0% ▲		-	-
DRIVE ALONE	32.4%	21.4% ▼		1.9%	0.5% ▼

Figure 25. FY19 Estimated and FY35 Forecasted Modal Splits

Pitt shuttle

71A bus riders in Oakland

10) AVOIDED COMMUTES VIA FLEX WORK

1.8%
4,100 MT CO_2e Avoided

Operational Policy

Before the COVID-19 pandemic, Pitt's incorporation of working from home and telecommuting options was already gradually evolving (growing from 0.2% to 1.7% between 2015 and 2018 alone)[1].

Simultaneously, Pitt Human Resources' multi-year Shaping the Workplace Environment initiative has examined Pitt as a workplace through the lens of prospective and current staff – and, of course, many of the University's employees have worked remotely in response to the COVID-19 pandemic.

As a result, the Office of Policy Development and Management has a "Flexible Work Arrangements Policy Committee" to develop a revised flex work policy for the University that reflects commonplace work arrangements that include flextime, adjusted work schedules, and telecommuting options.

As with commute mode choices, the avoided GHG impact of not commuting is significant for the University – and this PittCAP has incorporated early assumptions about how Pitt's flex work approach and policy will evolve. While not all job classifications may have flex work arrangements, the GHG reduction from avoided commutes of those that do will positively contribute to our ability to achieve carbon neutrality by 2037.

Action: Integrate flex work arrangements into post-pandemic "return to campus" planning and activities, while evolving existing University "Working from Remote Locations" policy into a more inclusive Flexible Work Arrangements Policy

Lead: Offices of the Provost, Human Resources, Sustainability; IT; and Purchasing

Stakeholders: OHR, PDRE, Pitt IT, Offices of the Provost and Sustainability; Purchasing, Pay, and Travel

Impact: Happy, healthy, and virtually connected employees and University community

% reduction toward neutrality	1.8%
Average GHGs avoided annually (MT CO_2e)	4,100
Investment ($)	Up to $500,000 through FY2023
Avoided Costs ($)	Up to $1 million annually

Table 10.1 Strategy Impact Data

Pitt Green Home Office Challenge

The goal of the Pitt Green Home Office Challenge is to help Pitt employees more holistically consider their home workspaces — and how tweaks to them might create a more comfortable, healthy, and productive environment that supports Pitt's culture of sustainability remotely. Developed during the COVID- 19 pandemic, the Pitt Green Home Office Challenge will evolve as post-pandemic flexible work arrangements do for Pitt employees.

[1] Data from 2015 and 2018 Make My Trip Count regional commuter survey data. Green Building Alliance.

11) AIR TRAVEL REDUCTIONS

1.5%
3,400 MT CO_2e Avoided

Operational Policy Partnerships

Connecting with colleagues at in-person conferences, advancing exploration on research trips, experiencing the world via study abroad, and competing in national athletic endeavors are important pieces of who we are as a University. Air travel in the post-COVID-19 world is expected to rebound, but stay below the previous level – and we at Pitt are no different. We expect (and are accounting for) more virtual connections in the future, thus reducing our GHG emissions from air travel.

Pitt is not currently pursuing a "fly less policy," but is encouraging all community members to find the right balance of in-person and virtual connections that matches their personal and professional journeys. By valuing our personal health and work-life balance, we can support productive, engaged scholarship even with reduced air travel, helping each other make deliberate travel decisions that demonstrate our collective commitment to combating climate change.

We ask everyone to look for opportunities to avoid or reduce air travel; even one trip a year can make a difference, as can choosing rail, transit, or buses for more regional trips. Additionally, as many faculty and staff have leadership roles in professional societies, we must individually and collectively advocate for professional events to encourage and consider low carbon connections, including reduction of air travel. These actions will help to advance the cultural change required to implement smart travel decisions moving forward -- and not assume it will happen on its own.

In terms of athletics, Pitt's sports teams compete nationally, requiring travel, but opportunities for positioning flight choices and partners that reflect our institutional preference for lower carbon connections exist, along with partnered offset opportunities.

Pitt has not yet fully tallied the air travel emissions decreases in FY20 and FY21 resulting from the global COVID-19 pandemic, but know these are extreme reductions. We anticipate it will take several years for a Pitt air travel "COVID rebound" to occur, but are projecting a 7% reduction from our FY19 baseline over time, which includes reductions in both costs and GHG emissions.

Action: Encourage Pitt employees and students to find the balance between in-person and virtual connections to reduce air travel.

Lead: Office of Sustainability

Stakeholders: Athletics; Offices of the Provost, Senior Vice Chancellor (SVC) for Research, and Global Experiences; and Purchasing

Impact: Happy, healthy, productive, and connected employees and University community

% reduction toward neutrality	1.5%
Average GHGs avoided annually (MT CO_2e)	3,400
Investment ($)	n/a
Avoided Costs	$150,000 - $300,000 annually

Table 11.1 Strategy Impact Data


Zero-GHG flight example (!)

12) AIR TRAVEL OFFSET POLICY

19.4%
45,800 MT CO_2e Avoided

Operational Policy Partnerships

Behind Purchased Electricity, combined Air Travel is our second largest emissions category. Air Travel represents 21.1% of Pitt's overall GHG emissions (49,850 MT CO2e), with 17% of all Pitt GHG emissions coming from Pitt-sponsored air travel and 4.1% from study abroad. While we're projecting some reduction in air travel (above), the importance of engaging with national and global communities in-person will remain core to our academic, research, and athletic endeavors. As a result, we must, as a university, start a conversation about the opportunity for air travel offsets – and their imperative role in our journey toward carbon neutrality by 2037.

Some Pitt employees and students are already likely buying carbon offsets for their flights from airlines, but that information is not currently tracked, aggregated, or reported. Additionally, for Pitt-sponsored travel, there is no way to select carbon offset for air (or any other type of travel trip). Questions also abound relating to whether certain sources of funding will allow reimbursement of air travel offsets, how to ensure all offsets purchased are verified and tallied, and whether or how we can capture air travel offset funds, and how we might leverage those funds toward local and impactful programs.

Every university on its carbon neutral journey has wrestled with air travel offsets differently – and it is time for us to take the first steps on that path as well. We are committed to figuring out our short-, medium-, and long-term solutions in this space. To reach carbon neutrality, we must.

Action: Create an air travel carbon offset strategy with immediate and long-term solutions.

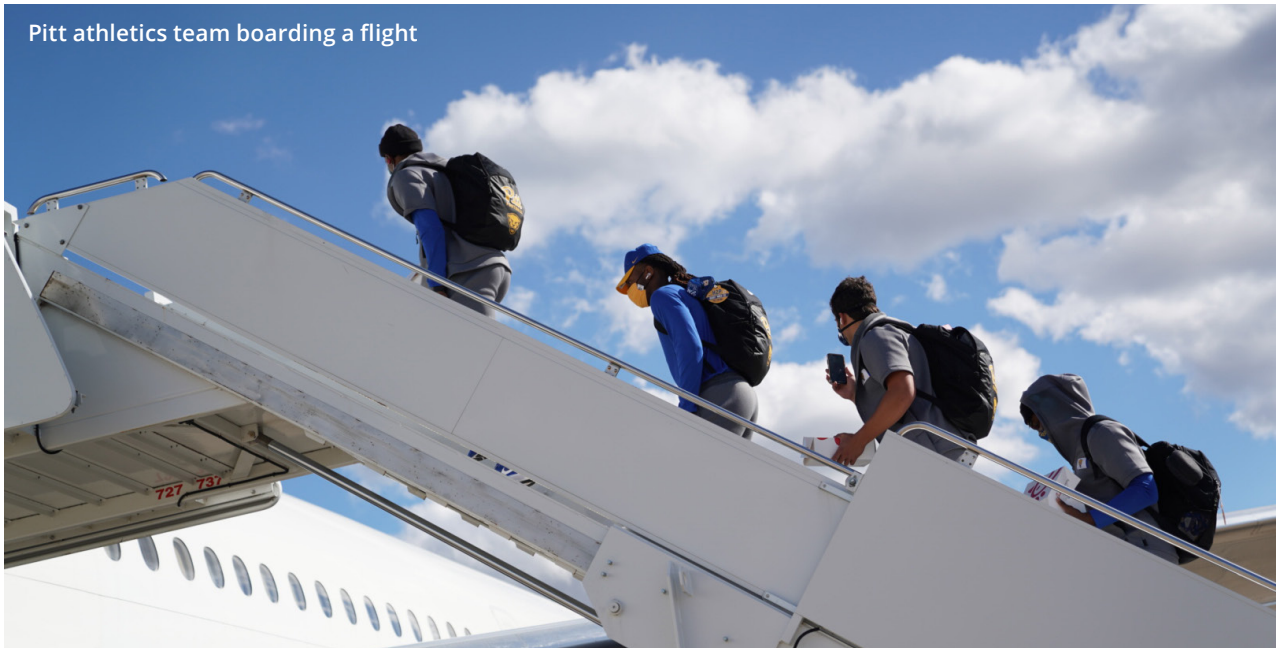
Lead: Purchasing Services

Stakeholders: Athletics, Offices of the CFO, Provost, SVC Research, and Sustainability; Global Experiences Office

Impact: Happy, healthy, and virtually connected employees and University community

% reduction toward neutrality	19.4%
Average GHGs avoided annually (MT CO_2e)	45,800
Investment ($)	$75,000 to $225,000 annually
Avoided Costs / Cost Savings ($)	n/a

Table 12.1 Strategy Impact Data


Pitt athletics team boarding a flight

LEADING THE WAY TO CARBON NEUTRAL

Climate change is being caused by human activity because many of our activities create GHG emissions. Even as we reduce our demand, clean our supply, and make more low carbon connections, as we continue to advance our academic mission, we will have remaining GHG emissions associated with energizing our campus and connecting our community. As a result, to reach carbon neutrality by 2037, we must educate our campus on behavior shifts and purchase carbon offsets.

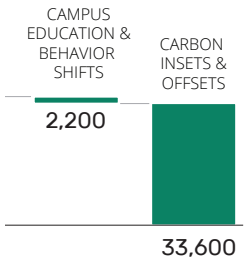


Figure 26. Leading the Way to Carbon Neutral Strategies
(MT CO_2e Avoided)

13) CAMPUS EDUCATION and BEHAVIOR SHIFTS

0.9%
2,200 MT CO_2e Avoided

Operational Policy Partnerships

Given the effects of climate change already being experienced in Pittsburgh and around the world, there is a multitude of opportunities for us as an institution to engage our students, employees, communities, and partners in discussions and solution-making. However, individual decisions matter, and we are assuming collective individual change will make a measurable difference in our GHG emissions; these areas include (but are not limited to) using more natural ambient light and/or task lighting (rather than office area lighting) and layering clothing to allow for a broader temperature setpoint ranges.

We also commit to better incorporating climate education into our conversations and curriculum to help advance shifting preferences. Students are very interested in engaging in and leading some of these activities. Relatedly, as our society continues its transformation toward lower and decarbonized activities and systems, we have an institutional responsibility to prepare our students, use our research, and collaborate with others to advance this journey while advancing equitable outcomes and increasing economic resilience.

Behavior shifts are embedded in many of the prior Pitt climate action strategies; for example, building energy reductions rely on occupants turning off lights and commuting mode shifts rely on individual and daily decisions by every Pitt student and employee coming to campus.

Consequently, though the estimate of behavior shifts may seem small for this strategy, individual decisions are an imperative part of achieving carbon neutrality at Pitt by 2037.

Action: Create and deploy a strategy for campus and community education and engagement about Climate Change, GHG Mitigation, Adaptation, and our journey toward carbon neutrality by 2037.

Lead: Office of Sustainability, Mascaro Center for Sustainability Innovation, and Student Office of Sustainability

Stakeholders: Offices of Provost, Research, Engagement and Community Affairs, and Human Relations; University Communications

Impact: Informed, engaged, and knowledgeable on- and off-campus participants, leaders, and change-makers in our campus and global journey to combat climate change.

% reduction toward neutrality	0.9%
Average GHGs avoided annually (MT CO_2e)	2,200
Investment ($)	$50,000 to $150,000 annually
Cost Savings ($)	$50,000 to $150,000 annually

Table 13.1 Strategy Impact Data

14) CARBON INSETS and OFFSETS

14.2%
33,600 MT CO_2e Avoided

Policy Procurement Partnerships

Carbon offsets are GHG emission reduction "units" traded in the voluntary carbon market that measurably avoid, reduce, or sequester GHG emissions. As implied in Figure 27, though the carbon offset market is voluntary, offsets are a globally traded commodity. Carbon offsets can be generated via several strategies, including tree planting, efficiency efforts, renewable energy, methane capture, regenerative agriculture, and other approaches.

Traditionally, carbon offsets are procured from external entities, are independently verified, and externally achieved. An increasing number of companies in Pitt's existing and future supply chain already purchase carbon offsets of their own (Lyft, various airlines, etc.) – and we are already starting to track what carbon offsets may already exist within our GHG boundary.

However, as we set our institutional strategy for carbon offsets, we must determine our needs, values, and preferences. Will we want to create a portfolio of solutions locally and globally? Or focus our investments toward specific projects and/or geographies? Student surveys as part of this PittCAP development indicated an early preference for local carbon offset options.

Depending on the answers to these questions, we may also choose to focus on projects that offer benefits beyond carbon; these co-benefits could include community, educational, health, equity, resilience, and environmental benefits, as indicated in Figure 27. We could also choose to pursue carbon insets, which are carbon emissions outside of our campus boundaries, but within our real estate holdings, supply chain, and value chain. Carbon insets are beyond the official Pitt GHG inventory boundary and would be peer-reviewed, but would have the related benefit of increasing resilience and being able to more closely control outcomes.

Via either or both methods, as we advance on this journey, we must engage and educate the Pitt community about carbon offsets in general, as well as our options and considerations. Carbon offsets and insets are a required piece to reach carbon neutrality by 2037 – and we can use that opportunity to reflect our values and create a cascade of mission-related, environmental, equitable, and economically resilient solutions.

CARBON OFFSET
A greenhouse gas (GHG) or "carbon" offset is a unit of carbon dioxide-equivalent (CO_2e) that is reduced, avoided, or sequestered to compensate for emissions occurring elsewhere. wri.org
See Figure 27 for examples.

CARBON INSET
Carbon insets are an investment by our institution in emissions reduction projects within the supply chain. In contrast to emissions reduction in external climate protection projects (carbon offset projects), climate protection money remains within Pitt's value creation cycle. Examples include tree planting or renewable development on Pitt-owned land not in Pittsburgh. myclimate.org

Action: Create a carbon insetting and offset strategy for Pitt.

Lead: Carbon Commitment Committee's Carbon In/Offset Subgroup

Stakeholders: Office of Engagement and Community Affairs, Offices of the CFO and Provost, PDRE; Purchasing; collaborating research faculty

Impact: Informed, engaged, and knowledgeable on- and off-campus participants, leaders, and change-makers in our campus and global journey to combat climate change

% reduction toward neutrality	14.2%
Average GHGs avoided annually (MT CO_2e)	33,600
Investment ($)	$75,000 to $225,000 annually
Avoided Costs / Cost Savings ($)	n/a

Table 14.1 Strategy Impact Data

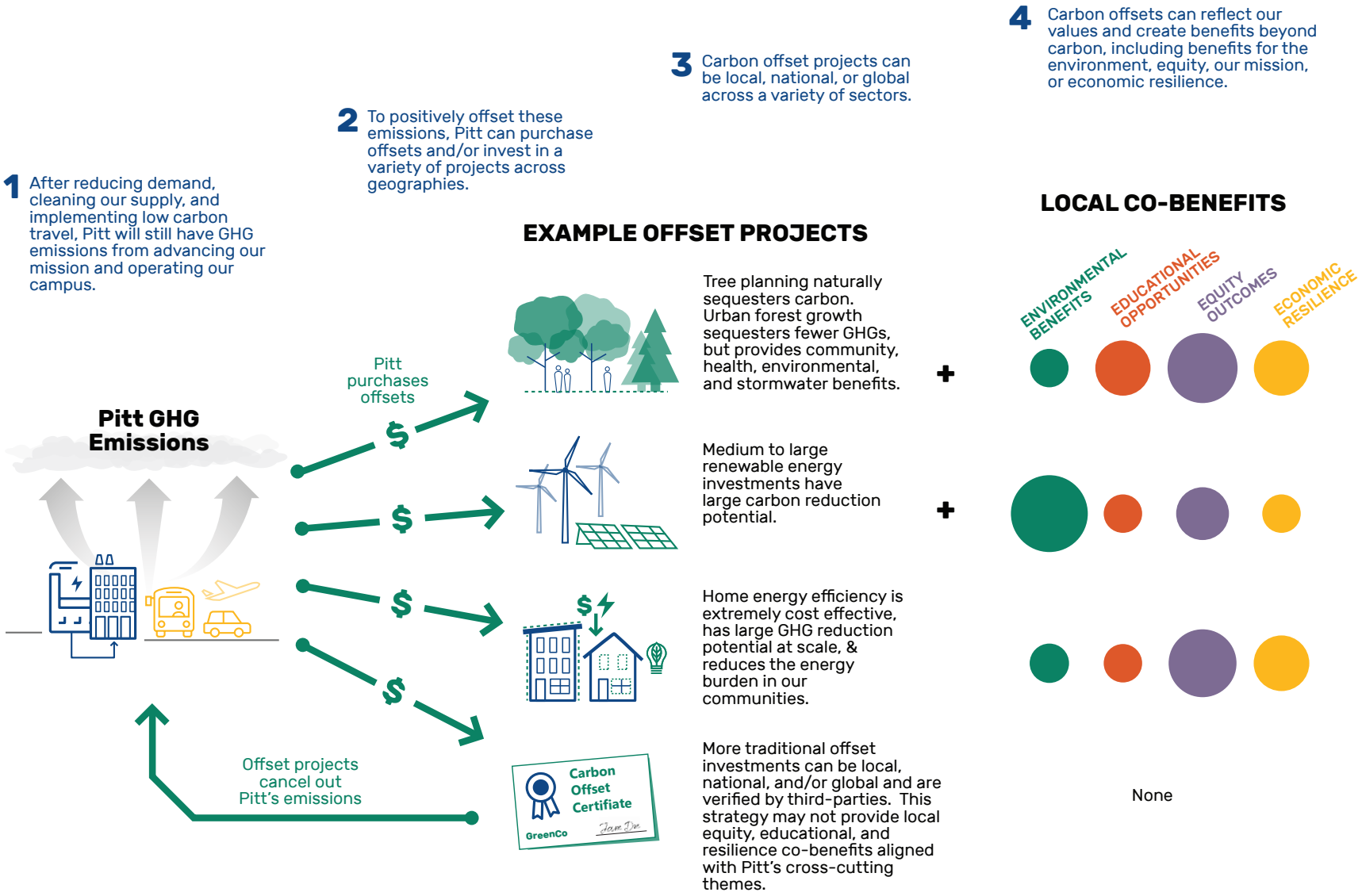


Figure 27. PittCAP Example Carbon Offset Projects and Benefits

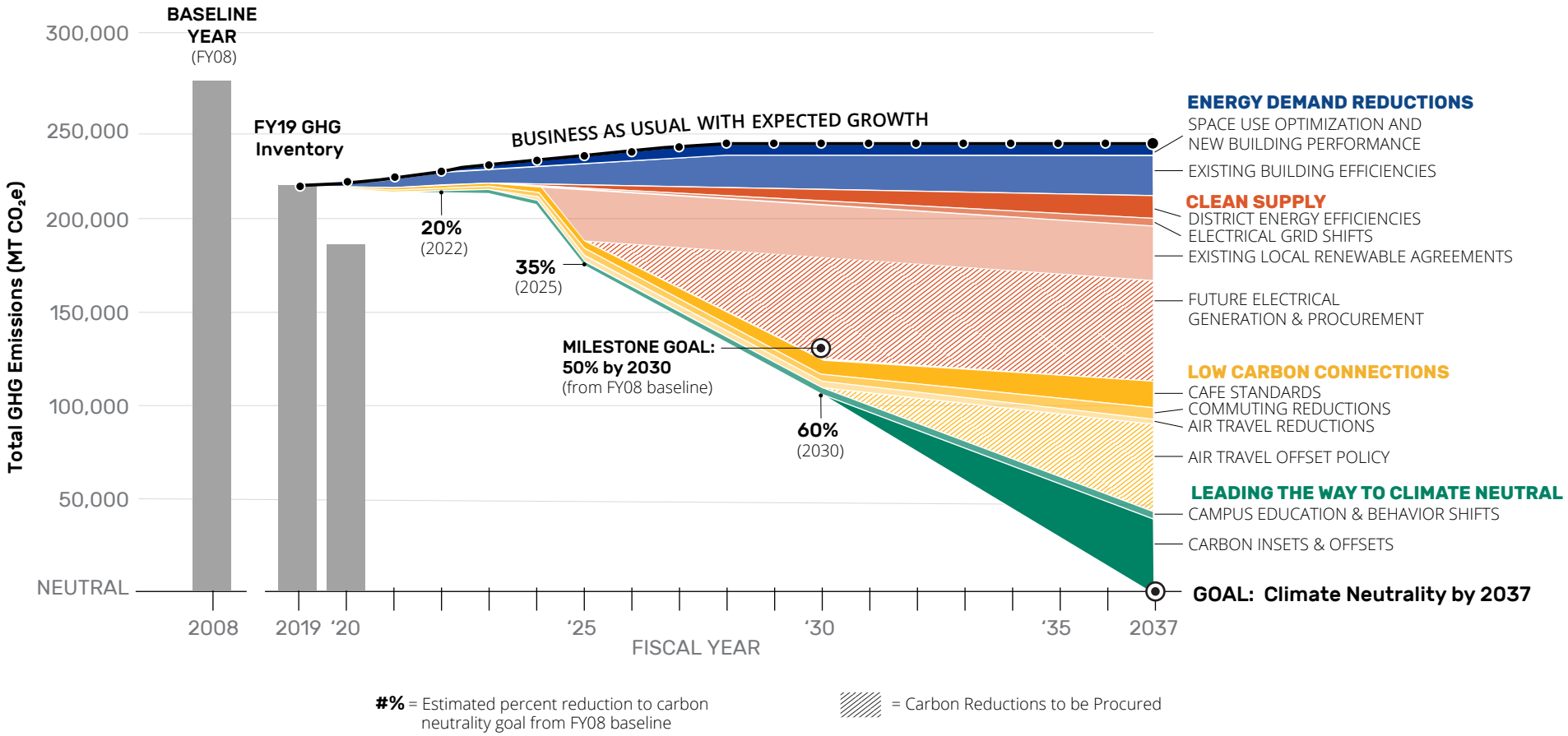


Figure 28. PittCAP Wedge Diagram - Pathway to Neutrality by 2037

Pathway to Neutrality

All actions delineated in this Pitt Climate Action Plan will cascade over time, reducing demand, cleaning supply, and shifting to low carbon connections, as shown in Figure 28. These projections for our Pitt GHG mitigation activities show how each strategy contributes to our carbon reduction journey between now and 2037, helping us meet our incremental target to reduce GHG emissions 50% below 2008 levels by 2030 and reach carbon neutrality by 2037.

While the publication of this PittCAP coincides with the University's Fiscal Year 2022, due to Pitt GHG Inventory timelines and the COVD-19 global pandemic, our latest GHG Inventory year is 2019. As a result of the pandemic, estimated GHG emissions reductions are expected to drop for FY20 and FY21, as estimated on Figure 28; they are also being officially inventoried and analyzed.

The global pandemic has not delayed (and in some ways has helped advance) ongoing Pitt GHG reductions. Figure 28 simplifies progress to date for display reasons – and it is our hope that the coming months and years will show how our Pittsburgh campus GHG performance exceeds the timing of reductions projected here. Additionally, as Figure 28 and each preceding strategy section illustrates, making key decisions sooner (or later) will shift the influence of each of these reduction wedges, helping us achieve our 50% milestone reduction goal and carbon neutrality sooner (or later). We look forward to achieving that future while enhancing our academic mission, advancing equitable outcomes, and ensuring economic resilience.

IMPLEMENT

Strategies

- Integrate 50% renewables by 2030 and 100% by 2037.
- Determine the path to 50% renewables by 2030 and 100% by 2037.
- Facilitate campus air travel offset discussion and process.
- Create carbon inset and offset strategy considering co-benefits.

Actions

- Empower the Carbon Commitment Committee
- Achieve 2030 Challenge goals at building and campus scales for both existing and new buildings.
- Electrify Pitt's vehicle fleet, including shuttles.
- Expand commuter electric vehicle charging locations.

MEASURE

Strategies

- Build a robust GHG inventory library.
- Create opportunities to improve GHG emissions data.
- Develop additional strong visual communication devices.
- Update PittCAP every five years

Actions

- Continue annual GHG inventory process and regular public reporting.
- Incorporate utility clauses for all spaces leased by Pitt.
- Track progress on PittCAP actions.
- Advance online public dashboards of GHG emissions and associated energy use.

ENGAGE

Strategies

- Develop campus-wide space use optimization study.
- Facilitate and deliver campus and community climate-focused education.

Actions

- Educate the Pitt community about climate change, GHG mitigation, and adaptation
- Develop student course projects related to PittCAP strategies
- Accelerate Pitt Green Office and Laboratory programs
- Develop behavioral change campaigns relating to energy conservation and commuting choices
- Engage commuters with shared, active, and low carbon modes.
- Embed equitable outcomes into all decision-making
- Celebrate and share successes via storytelling
- Highlight Pitt climate champions

LEAD

Strategies

- Explore building electrification on a project-by-project basis.
- Develop Oakland Energy Master Plan with City of Pittsburgh, GBA, and institutional partners.
- Spearhead Pitt Sustainability Challenge including a carbon neutral sub-focus.
- Collaborate with City and Commonwealth on climate action leadership.
- Support policy changes that advance Pittsburgh Climate Action.

Actions

- Practice efficiency and conservation first.
- Deploy local renewables with partnered research and teaching options
- Continue to drive Higher Education Climate Consortium (HECC) of Pittsburgh
- Support continued decarbonization of Pennsylvania's Alternative Energy Portfolio Standard for the electricity grid
- Support Federal CAFE Standards

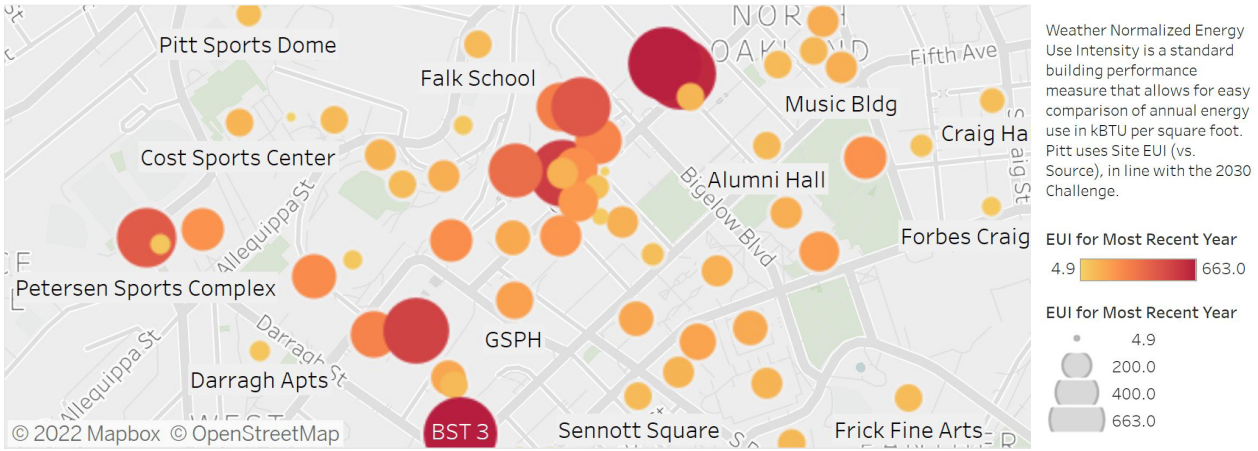


Figure 29. Pitt's Energy Dashboard Showing Energy Use Intensity (Calendar Year 2020)

Roadmap

Beyond this document, the University is already operationalizing a roadmap of climate action and investments that includes prioritized strategies and timelines with clear actions, leaders, stakeholders, and success measurements. Pitt's Carbon Commitment Committee is responsible for ensuring both this PittCAP and its roadmap are followed, as led by the University's Office of Sustainability.

As we advance through our GHG reduction strategies, we'll be integrating the cross-cutting themes of academic mission, equitable outcomes, and economic resilience. Each is fundamental to every climate action decision we make and are included in our roadmap to ensure we're addressing each intentionally as we advance toward carbon neutrality by 2037. As a result, the roadmap includes both traditional decision-making criteria (GHG reductions, capital costs, operational costs, implementation difficulty, etc.) alongside our academic mission, equity, and resilience, ensuring we consider our true carbon achievements in context with our larger sustainability aspirations.

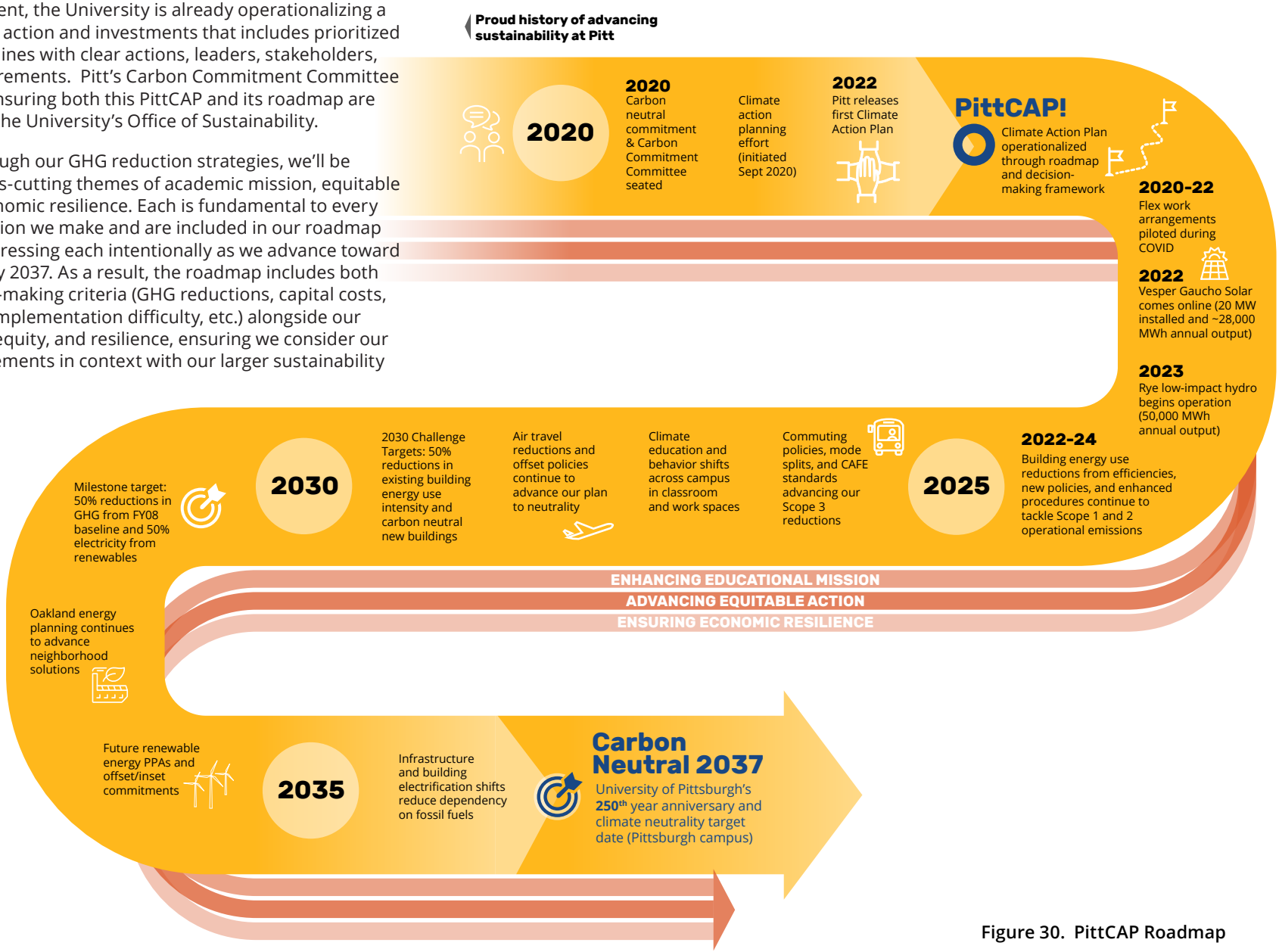


Figure 30. PittCAP Roadmap

Academic Courses

If you are an existing or prospective University of Pittsburgh student and looking to take your climate-related education to the next level in the classroom, we've identified the following undergraduate and graduate courses for your consideration:

Pitt faculty members seeking to incorporate more climate-related content into additional courses can reach out to the Mascaro Center for Sustainable Innovation for assistance (WC)

Staff interested in elevating their climate knowledge should consider the Pitt HR Sustainability Professional Development Certificate.

All Pitt stakeholders and interested parties can follow along with our journey at Sustainable.Pitt.edu.

COURSE NUMBER	COURSE TITLE
ANTH 1741	Energy and Energopolitics In Eurasia
ANTH 1752	Anthropology of Food
ANTH 2724	The Anthropology of Science: Global Perspectives
BIOSC 2361	Advanced Ecology
BIND 2710	Global Research Practicum: Global Energy (Eastern Europe)
BSEO 2578	Sustainable Business Strategy
BUSADM 3030	Managing the Triple Bottom Line
CEE 1609/2209/2609	Life Cycle Assessment Methods and Tools
CEE 1610/2610	Engineering and Sustainable Development
CEE 1617/2620	Green Building Design and Analysis
CEE 1618	Design for the Environment
CEE 1410/2410	Water Resources Engineering
CEE 2720	Urban Transportation Planning
CEE 3209/3609	Advanced Topics in Life Cycle Assessment
CLASS 700	Environmental Classics
CHE 0200	Chemical Engineering Thermodynamics
CS 0090	Sustainability and Computing
ECE 1701	Fundamentals of Electric Power Engineering
ECE 1710	Power Distribution Systems Engineering and Smart Grids
ECE 1774	Power Systems Analysis 2
ECE 2270	Fundamentals of Photovoltaics
ECE 2776	Microgrid Concepts and Distributed Generation Technologies
ECE 2780	Renewable and Alternative Energy
ENGLIT 0800	Weather, Climate, Literature
ENGR 1075	Energy Development, Use, and Impact
ENGR 1075	Energy Development, Use, and Impact
ENGR 1281	Clean Energy Grid Engineering: Scandinavia Ug
ENGR 1300	Energy Tomorrow
ENGR/HONORS 1909	Sustainable Food Systems
ENGR 2017	Manufacturing for the Future: Flexible, Green, And Digital
ENGR 2623	Engineering for a Better Environment: Brazil
ENGR 2905	Current Issues in Sustainability
GEOL 0840	Introduction to Environmental Science
GEOL 1006	Environmental Modeling

COURSE NUMBER	COURSE TITLE
GEOL 1030	The Atmosphere, Oceans and Climate
GEOL 1055	Environmental Ethics
GEOL 1312	Environmental Law and Policy
GEOL 1330	Sustainability Flash Lab
GEOL 1339/1340	Environmental Issues: Mining and Gas Extraction
GEOL 2515	Environmental Geochemistry
HIST 705	An Environmental and Climate History Of The World
HIST 1080	Empires and the Environment in World History
HIST 1695	Environmental History
HONORS 1021	Energy, Science, Society and Communication Seminar
HPS 0517	Thinking about The Environment
HPS 2643	Philosophy of Climate Science
IE 3083	Operations Research in Energy
LAW 2038/5038	Energy Law and Regulation
LAW 2082/5082	Climate Change and the Law
ME / MSE 1111/2111	Materials for Energy Generation and Storage
ME / MSE 2130	Nuclear Fuel Cycle and Environmental Issues
PIA 2096	Capstone Seminar: Water Resource Management
PIA 2115	Environmental Economics
PIA 2164	Natural Resources Governance and Management
PIA 2208	Energy Production and the Local Economy
PIA 2231	Contemporary U.S. Energy Policy
PIA 2306	Competing Perspectives on Global Energy: From Western PA to Eastern Europe
PIA 2502	Political Economy Global Environment
PIA 2520	Food Security: Agricultural Rural Development
PIA 2522	Energy Transition and Climate Resilience
PIA 2613	Global Energy, Economics, and Geopolitics, Washington D.C.
PIA 2740	Planning and Analyzing Sustainable Regions
PS 1364	Climate Change and Public Policy in Europe and the U.S.
PS 2300	Global Energy
SOC 1445	Society and Environment
URBNST 0114	Urban Sustainability

Table 15. Climate-Related Academic Courses at Pitt

ACKNOWLEDGMENTS

Carbon Commitment Committee: As part of our commitment to achieve carbon neutrality on our Pittsburgh campus by 2037, the Chancellor's Advisory Council on Sustainability created a Carbon Commitment Committee to hone, design, and manage the University's plan to achieve its carbon neutrality goal by 2037, while annually evaluating progress. Before the development of this Plan, the Committee had two subgroups focused on 1) Pitt Climate Action Plan and 2) Carbon In/Offsets.

- CHAIR: Dr. Aurora Sharrard, *Director of Sustainability*, Office of Sustainability
- Joshua Ash, *PhD Candidate*, Graduate School of Public and International Affairs
- Jennifer Barnes, *Supplier Diversity and Sustainability Coordinator*, Purchasing Services
- Scott Bernotas, *Vice Chancellor*, Office of Facilities Management
- Dr. Melissa Bilec, *Co-Director*, Mascaro Center for Sustainable Innovation; *Professor*, Civil and Environmental Engineering
- Federica Geremicca, *PhD Candidate*, Civil and Environmental Engineering
- Dustin Gray, *Executive Associate Athletic Director for Administration*, Athletics
- Dr. Michael Holland, *Vice Chancellor for Science Policy and Research Strategies*, Office the Senior Vice Chancellor for Research
- Mary Beth McGrew, *Vice Chancellor*, Planning, Design, and Real Estate
- Ellen Oordt, *Undergraduate Student*, Ecology and Evolution, '22
- Rebecca Roadman, *Chief of Staff*, Business and Operations

Past Committee Members
- Dr. Max Harleman, *Alum*, Graduate School of Public and International Affairs (GSPIA '21)
- Dr. Katrina Kelly-Pitou, *Former Assistant Research Professor*, Electrical and Computer Engineering

Senior Leadership: This group would like to recognize the regular contributions and direction provided by the Chancellor's Advisory Council on Sustainability. The Council and Carbon Commitment Committee would also like to personally thank Chancellor Patrick Gallagher; Dr. David N. DeJong, *Senior Vice Chancellor for Business and Operations*; and Hari Sastry, *Senior Vice Chancellor and Chief Financial Officer*, for their guidance and support.

Campus Engagement: The PittCAP planning team was honored to and invigorated by engaging with various groups of students, faculty, and staff throughout the planning effort, including:

- *Student Groups*: Student Office of Sustainability and its affiliated student groups
- *Faculty Groups*: Council of Deans and the University Senate's PUP Committee
- *Staff Groups*: Offices of Business and Auxiliary Services and Facilities Management, HR Partners, Staff Council, Operations Council, and University Communications

Greenhouse Gas Inventory Team: Special thanks are due to the individuals who have overseen, created, and reviewed Pitt's five GHG inventories, along with a much larger set of individuals across University departments who have and continue to supply information to the GHG Inventory process.

- ADVISOR: Dr. Melissa Bilec, *Co-Director*, Mascaro Center for Sustainable Innovation; *Professor*, Civil and Environmental Engineering
- FY19 & FY20: Jessica Vaden, *PhD Candidate,* Civil and Environmental Engineering
- FY17: Haley Gardner ('17, '19 SSOE)
- FY14: Vaclav Hasik ('19 SSOE)
- FY11: Kevin J. Ketchman ('17 SSOE)
- FY08: Can B. Aktas ('10 SSOE)
- REVIEWERS: Laura Zullo, *Director of Administration*, Business and Operations; Rich Heller, *Retired*, Office of Facilities Management (FY17); Dr. Aurora Sharrard, *Director of Sustainability*, Office of Sustainability (FY19 and FY20)

We'd also like to thank all individuals who helped create, mold, and advance this plan from concept into being.

- Nalyn Siripong (Pitt IT) deserves special thanks for her contributions in reviewing, improving, and visualizing campus commuting data.
- Thanks also to John Sebastian and students in Civil and Environmental Engineering 's Fall 2020 Professional Development class for their contributions in advancing ideas and future opportunities for Pitt related to campus insets and offsets.

Planning Consultant: Extreme thanks are too little to acknowledge Steven Baumgartner's contributions as a practical, visionary, and creative partner throughout this process. Steven's Pittsburgh-based consultancy is Baumgartner Urban Systems Strategy (BUSS).

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Pitt Climate Action Plan