CLIMATE ACTION STRATEGIES

The CAP working groups developed strategies for climate action across the Institute. Community, Equity, and Accessibility strategies are presented as an initial framework and integrated throughout the other focus areas to ensure equitable access and impact. The remaining strategies were organized into eight focus areas:

COMMUNITY, EQUITY & ACCESSIBILITY

MITIGATION & ADAPTATION

BUILDING ENERGY
Strategies that reduce Scopes 1 and 2 emissions, increase energy efficiency, and reduce energy consumption in buildings.

MOBILITY
Strategies that support fossil fuel-free mobility within campus and to and from campus.

WATER MANAGEMENT
Strategies that increase the efficiency and conservation of water management, including potable water, greywater, blackwater, and stormwater.

CARBON SEQUESTRATION
Strategies that increase the amount of carbon dioxide sequestered through natural resources on campus.

RENEWABLE ENERGY & OFFSETS
Strategies for implementing renewable energy sources and offsets.

MATERIALS MANAGEMENT
Strategies that address how materials are bought, used, recovered, and disposed.

INNOVATION

RESEARCH
Strategies that support and expand current climate-related research and solutions.

EDUCATION
Strategies that advance Georgia Tech’s academic programs to prepare staff and students for climate action.

How to Read These Pages

PRIORITY
It is important to assess the priority of each strategy for reaching 50% reduction in carbon emissions by 2030 and 100% by 2050. Priorities for each strategy are based on emissions reduction potential, broader goals of the Institute, and stakeholder feedback. Stakeholder feedback was collected from students, staff, and faculty during engagement events through polls and comment periods. Priorities are indicated by low, medium, and high.

• HIGH
• MEDIUM
• LOW

COST OF IMPLEMENTATION
A cost analysis was developed to estimate expected implementation costs through 2050. Estimated costs are based on assumptions in the GHG model. Strategies that were not modeled are estimated for cost based on time and resources necessary for successful implementation. The estimated cost for each strategy is indicated by dollar symbols.

• $$$: High Cost
• $$: Medium Cost
• $: Low Cost

TIME FRAME
Strategies will be implemented at varying start dates and require different timelines between 2024 and 2050. Some can be implemented quickly while others require ongoing implementation. Time frames are based on expected implementation dates.

• Short-term: by 2026
• Medium-term: by 2040
• Long-term: by 2050
Transitioning to renewable energy sources is one of the most important opportunities to reduce GHG emissions. This focus area includes strategies developed by the Renewables and Offsets working group. The strategies center on increasing renewable energy sources and exploring options for offsetting fossil fuel use.

As Georgia Tech advances plans to electrify the campus and vehicle fleet, its electricity and fuel mix must transition from gas, coal, and oil to renewable sources. This includes increasing on-site renewable energy, integrating energy battery storage into renewable projects, procuring electricity from clean energy sources, and investing in potential offsets.

If Georgia Tech continues with business as usual, it would rely solely on Georgia Power to continue adding more renewables to the grid. In 2022, Georgia Power’s energy mix included gas and oil (48%), nuclear (23%), coal (15%), and renewables and hydro (9%).

Strategies in this section also include resilience planning for designing, building, and operating infrastructure that can withstand, respond to, and recover from climate disruptions to centralized power systems. This means ensuring backup storage to reduce the likelihood of power outages and decrease the recovery time from outages that do occur.

In the event of a natural disaster, the combination of renewable energy and energy storage can maintain essential services such as building lighting, heating and cooling, and municipal water services.

"Integrating renewable energy sources and energy storage increases the resilience of the campus grid by decentralizing electricity sources."
Increasing the amount of on-site renewable energy contributes to Georgia Tech’s net-zero emissions goal while decreasing reliance on fossil fuels and increasing resiliency and the ability to respond to natural and other disasters.

Solar Photovoltaic (PV) systems are currently the most established and compatible renewable energy sources for Georgia Tech. Solar PV can be installed on building rooftops and over parking decks, parking lots, and sidewalks.

In addition, solar thermal systems for heating water and waste-to-energy systems that capture heat from waste streams can be considered to diversify the renewable energy portfolio. Alternative fuels from waste products, including biodiesel, biogas, and renewable natural gas that can be derived from food waste, wastewater, and other organic materials, can also be explored, and considered as potential options.

Georgia Tech produces about 1 Megawatt (MW) of renewable energy through rooftop PV that produces approximately 1.4 million kWh per year. By maximizing PV on existing rooftops and parking lots, it has the potential to reach 7 MW of renewable energy. Additional PV can be added by implementing solar arrays over open parking lots, sidewalks, and outdoor seating areas. These implementations serve a second purpose by providing increased shade during hot weather. Further, by 2050, it is likely that additional renewable technologies will become commercially viable and can further support on-site renewable energy opportunities.

Implementing energy storage, the practice of capturing and storing energy for later use, allows for the increased use of intermittent renewable energy sources.

For example, when used in conjunction with solar PV, energy storage provides a mechanism for storing excess energy on sunny days and then using it on cloudy days. In addition, energy storage helps increase Georgia Tech’s resilience to potential natural disasters by providing an additional source of backup power.

By employing next-generation technologies and strategies, Georgia Tech can amplify the impact of its emissions reduction efforts by improving our understanding of the performance of these technologies, reducing uncertainty, and building capacity throughout the region to implement the sustainability transition.

— Daniel Matisoff,
Professor, School of Public Policy

Implementing energy storage technologies include traditional batteries and other chemical, thermal, and gravity-based systems. Buildings or central energy plants can also store chilled water, ice, or hot water for later use when it is generated at times of increased renewable or low-carbon electricity availability. Key actions to implementing this strategy include identifying optimum locations for energy storage systems, ensuring safety and regulatory guidelines are met, and identifying cost-effective financing mechanisms.
To meet its net zero emissions goal, Georgia Tech must consider investing in Power Purchase Agreements (PPAs) and Virtual Power Purchase Agreements (VPPAs).¹

PPAs provide on-site renewable energy implementation, delivery, and maintenance of systems without requiring upfront capital. VPPAs are financial agreements that fund off-site clean energy projects, allowing the project funder to take ownership of the clean energy attributes, even if the electricity is not directly used by the purchasers. Both options provide viable opportunities for decreasing emissions. (Note: PPAs and VPPAs were modeled separately since they have different cost models.)

Carbon offsets are activities that aim to reduce GHG emissions through the removal of carbon from the atmosphere.¹

Examples of offsets include reforestation, carbon sequestration, methane capture at landfills, and renewable energy. Offsets must have a validated impact of reducing carbon emissions. They must adhere to recognized standards and cannot be used as an offset activity for another project. Georgia Tech will use carbon offset projects as a secondary strategy to account for the remaining Scopes 1 and 3 GHG emissions that are difficult to eliminate through other mitigation strategies.²

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¹ A Power Purchase Agreement (PPA) is an arrangement in which a third-party developer installs, owns, and operates an energy system on a customer’s property. Source: U.S. DOE Better Buildings. (n.d.) What is a power purchase agreement? https://betterbuildingssolutioncenter.energy.gov/financing-navigator/option/power-purchase-agreement

² Fossil fuels used to supply generators that produce emergency power and life safety functions are among Georgia Tech’s emissions that are difficult to eliminate. Other difficult to eliminate emissions include Georgia Tech’s use of refrigerants to support cooling demand and Scope 3 emissions from air travel, upstream natural gas leakage, and commuting.
A Resilience Hub is defined as a "community-serving facility augmented to support residents and coordinate resource distribution and services before, during, or after a natural hazard event." ^{1}

Campus hubs would serve as a utility-independent resource center where students, staff, and faculty could go in the case of a natural or human-caused disaster. This strategy involves implementing at least three Resiliency Hubs on Georgia Tech’s campus that support on-site renewables, battery storage, and potable water systems. ^{2}

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2 Key areas for consideration include The Kendeda Building for Innovative Sustainable Design, McCamish Pavilion (and its parking lot), and the John Lewis Student Center.

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"Protecting our planet is not a choice; it is a responsibility. Georgia Tech’s Climate Action Plan is our commitment to a prosperous future, where every action we take today ensures a thriving tomorrow for generations to come."

— Shan Arora, Director of The Kendeda Building for Innovative Sustainable Design

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## What is a Resilience Hub?

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## TABLE 3: RENEWABLES AND OFFSETS MEASURES OF SUCCESS

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
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<td>5MW</td>
<td>7MW</td>
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<tr>
<td>Implement energy storage projects</td>
<td>300 kWh</td>
<td>1 MWh</td>
<td>2 MWh</td>
</tr>
<tr>
<td>Implement Resiliency Hubs</td>
<td>1 Hub</td>
<td>2 Hubs</td>
<td>3 Hubs</td>
</tr>
</tbody>
</table>