

Academic Climate Action Plan: Report to
the University Faculty Council and
Provost O'Donnell

Climate Action Task Force

University of Mary Washington
President's Council on Sustainability

April 2026

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Letter from the President's Council on Sustainability

The President's Council on Sustainability (PCS) presents the University's Climate Action Plan – a roadmap for achieving meaningful progress toward climate neutrality and resilience. The plan was initially developed through the collaborative efforts of the Climate Action Task Force between March 2022 and August 2023. However, since the Climate Action Task Force was meant to be a temporary committee with the goal of creating a Climate Action Plan, the PCS was charged with the responsibility of finalizing, publishing, and stewarding this plan. This ensures the plan's long-term success since implementation requires dedicated leadership and accountability, which the PCS will provide.

The Climate Action Plan reflects the hard work and expertise of the Climate Action Task Force, whose collaborative efforts have produced a comprehensive set of strategies to reduce greenhouse gas emissions, enhance sustainability across campus operations, and prepare our community for the challenges of a changing climate. Our role is not only to share the vision outlined by the Task Force, but to ensure that its recommendations are implemented effectively and transparently. As the University's central coordinating body for sustainability, the PCS will oversee progress toward the plan's goals, facilitate cross-campus collaboration, and report regularly on achievements and areas for improvement. We will work closely with academic departments, facilities management, student organizations, and community partners to integrate climate action and resilience into every aspect of university life.

The Climate Action Plan is more than a document – it is a commitment. It calls on all of us to take ownership of our environmental impact and to act boldly in the face of climate change. The PCS will serve as the driving force behind this commitment, ensuring accountability and fostering innovation as we move forward. We can transfer these recommendations into measurable outcomes that reflect our shared values and responsibilities.

We invite every member of our university community to engage with this plan, to contribute ideas, and to join us in creating a campus that models climate leadership. The work ahead will require persistence and collaboration, but with campus-wide support, we can achieve the ambitious goals outlined in this plan and make a lasting difference for future generations.

President's Council on Sustainability

Executive Summary

Introduction

Global climate change, driven by human production of greenhouse gases, is one of the most important challenges facing the modern world. The University of Mary Washington Climate Action Plan Proposal lays out an ambitious path to decrease, and ultimately end, the University's production of greenhouse gases. Our goal is to reach carbon neutrality by 2040. Guided by our Strategic Vision, the University of Mary Washington (UMW) must commit to addressing this challenge on behalf of its students, the institution, and our local community. UMW Strategic Plans have placed climate action in the broader context of sustainability.

"Sustainability is no longer an option; it is now a defining value for the future of the University of Mary Washington, reflecting a balance of economic, environmental, and socially responsible values (UMW Strategic Planning Steering Committee 2009)."

"Our institutional values of service to community and civic engagement lead us to act sustainably. The University will "promote stewardship of the planet and the region's abundant natural resources through educational and community-based sustainability initiatives which enhance the University's visibility and reputation as a 'green' campus that aims along with the City of Fredericksburg to be carbon neutral by 2035." (UMW Strategic Planning Steering Committee 2022)

In March 2022, President Paino asked the Climate Action Task Force, to address four questions:

- What is UMW currently doing to minimize negative impacts on the global environment? What can be done to improve the reach and effectiveness of current actions?
- What visible and impactful action(s) can be implemented immediately, i.e., within 6 months?
- What can be done to empower individuals and campus groups to join senior leadership in promoting and supporting university-wide climate actions?
- What new programs, resources, and policies should be implemented, including ongoing mechanisms, that will decrease UMW's negative impacts on the global environment?

The goals and objectives developed by the Climate Action Task Force (CATF) detail the recommendations for actions necessary to achieve carbon neutrality in a 15 year time frame. Actions we take will showcase UMW's willingness to be a leader, and will develop future leaders in climate action. The CATF's work 1) identifies specific actions and policies, 2) provides measurable objectives, and 3) includes timeframes for implementation in five areas:

- Energy Management
- Operations
- Transportation
- Research & Curriculum
- Community & Engagement

This report and its recommendations, to the UMW academic community, focus on the last two areas of climate action: research & curriculum and community & engagement. Details on the first three action

areas are captured in the report to President Paino, “Climate Action Plan: Report and Recommendations to the President.”

The Climate Action Task Force has also completed the first UMW greenhouse gas inventory, documented climate change ideas and actions in the University curriculum, and launched three climate action projects. Greenhouse gas inventories are the measures by which UMW will track our path to carbon neutrality. Climate action is already embedded in UMW's curriculum, so we present three cases of courses focused on climate change and climate action. Finally, three projects rose to the surface for visible, impactful, and immediate climate action. So we report on the work begun on 1) installation of an EV charger on campus, 2) significant energy savings projects for multiple buildings, and 3) installation of solar panels on multiple buildings.

History of Sustainability and Climate Action

The University of Mary Washington has a consistent and significant history of sustainability and climate action. Sustainability includes ideas and actions supporting social, economic, and environmental needs of current and future generations. Climate action is an area of focus within sustainability that deals with how energy use impacts social, economic, and environmental needs.

Sustainability became a core value at UMW with the 2009 Strategic Plan. “Institutions of higher learning influence generations of students whose future behaviors and decisions are shaped by what they learn from their campus experience and the actions of the University’s leaders. Sustainability is no longer an option; it is now a defining value for the future of the University of Mary Washington, reflecting a balance of economic, environmental, and socially responsible values” (UMW Strategic Planning Steering Committee 2009).

Subsequent to the 2009 Strategic Plan, the University organized around sustainability action, and has been recognized for what we do. The University President formed the President's Council on Sustainability in 2009. The Council on Sustainability includes students, faculty, and staff and so, represents all communities on campus. The Council provides critical advice to the President on 1) sustainability issues and policy, 2) development and implementation of sustainability initiatives, and 3) the presentation of a cohesive public face for UMW sustainability efforts. The Environmental Sustainability minor began in 2011 (University of Mary Washington 2011). The Office of Sustainability was instituted in 2018 and the first full-time Sustainability Coordinator came on board in 2021. Our curriculum, policies, and campus environment have been recognized nationally since 2015 by the Arbor Day Foundation in its Tree Campus Higher Education. The Princeton Review's Guide to Green Campuses has recognized UMW since 2021.

A significant number of campus organizations, through cooperation and pressure, contributed to important climate actions, at the same time as the University embraced sustainability:

- Climate, Environment, And Resiliency (CLEAR) regional partnership (2012)
- UMWDivest and BOV fossil fuel divestment (2015-2016)
- UMWDivest and George Washington Hall sit-in (2015)
- Better Energy Awareness and Mobilization (BEAM) club (2018)
- UMW Climate Strike (2019)

- BEAM and UMW University Faculty Council resolutions for renewable energy (2019)
- PCS Climate Charge and establishment of the Climate Action Task Force (2022)

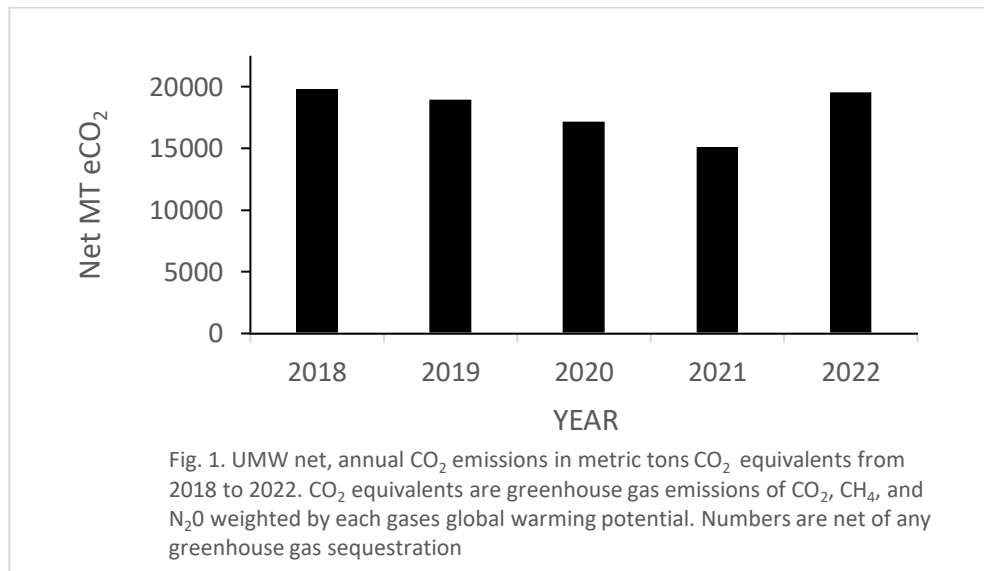
Where are We Now?

The UMW community, the Fredericksburg community, and communities across the globe experience the results of climate change daily. Greenhouse gas emissions from burning fossil fuels are therefore the primary targets to slow and reverse climate change. It is the responsibility of individuals, institutions like UMW, and governments to take actions and create policies to decrease greenhouse gas emissions. Climate Action by the University would be an important step showing that the University commits to doing its part in cutting its use of fossil fuels.

Beyond our history of sustainability, it is important to recognize the University's current climate actions and how climate change is embedded in our curriculum. We developed the first annual UMW CO₂ emissions report, a baseline measure for all future work. We surveyed all faculty to find the extent that climate change issues are taught in our classrooms. We planned or implemented three carbon reduction projects.

CO₂ emissions are measured accurately using carbon accounting systems. The Climate Action Task Force partnered with SIMAP (Sustainability Indicator Management & Analysis Platform) (<https://unhsimap.org/cmap/about>) to estimate the University's greenhouse emissions. SIMAP is a carbon accounting system using internationally accepted standards. So, our enumeration of greenhouse gas inventories will be complete, standardized, and comparable to other carbon emissions estimates.

The University's mean annual greenhouse gas emissions were 18117 MT eCO₂ from 2018 to 2022 (Figure 1). Emissions were highest in 2018 and decreased each year through 2021, while rebounding to near 2018 levels in 2022. Emissions likely decreased in 2020 and 2021 due to decreased campus activities during COVID-19 operations. In each year inventoried, carbon emissions from natural gas and electricity far exceeded emissions from fertilizers, refrigerants, and fleet fuels.



We propose using an average of the net carbon emissions from 2018, 2019, and 2022 for the UMW carbon emissions baseline. Carbon emissions data from 2020 and 2021 are excluded because these data would artificially decrease the University carbon emission baseline. Therefore, the proposed UMW emissions baseline is 19,435 MT eCO₂.

Through our survey of faculty, we found that climate change and climate action are already significant parts of curricula in all corners of the University. Ten departments / programs and the First Year Seminar (FSEM) program teach at least one course with topics related to climate change. Thirty faculty teach 45 climate related courses. During the 2021-2022 academic year, Climate Action themed courses were taught in three departments: Cultural & Philosophical Inquiry (formerly Sociology & Anthropology), Earth and Environmental Sciences, and Management.

The CATF was also charged to immediately implement "visible and impactful action(s)." So, in parallel with our planning work we began three projects: 1) an Energy Savings Performance Contract (ESPC) – energy efficiency projects that are neutral cost to the University, 2) Solar panel installations on campus – using a Power Purchase Agreement, and 3) an Electric Vehicle charging station installation on campus. Each of these projects was attractive for immediate implementation because of their cost neutrality or low upfront costs, high visibility, and energy savings potential.

Our Path Forward – The Climate Action Plan

President Paino stated in his charge to the UMW Climate Action Task Force:

"With [this] plan, UMW will join the broad movement of colleges and universities fighting climate change [...] The plan will 1) identify specific actions and policies, 2) provide measurable objectives, and 3) include timeframes for implementation."

The broadest goal of the University Climate Action Plan should be carbon neutrality within 15 years and an increase in academic, research and community related Climate Actions. The Climate Action Plan is framed around five action areas: Energy and Facilities Management, Transportation, Operations, Research and Curriculum, and Community. The action areas for Energy and Facilities Management, Transportation, and Operations are detailed in the "Climate Action Plan, Report and Recommendations to President Paino. The goals for academic action areas are as follows:

- Energy and Facilities Management

[Details included in the CAP Report and Recommendations to the President]

- Transportation

[Details included in the CAP Report and Recommendations to the President]

- Operations

[Details included in the CAP Report and Recommendations to the President]

- Research and Curriculum

Goal 1: Improve student knowledge about climate change

Goal 2: Increase faculty knowledge about climate change and how they can incorporate it into their courses

Goal 3: Increase climate-related research and/or internships

A high priority objective for Research and Curriculum is, by fall 2026, all UMW first year and transfer undergraduate students will be educated about climate change, its impacts and the initiatives UMW is taking to reach carbon neutrality.

- Community

Goal 1: Expand UMW's commitment to sustainability through effective institutional communication of core values such as climate action, resiliency, and justice.

Goal 2: Establish UMW as a local leader in Sustainability & Climate Action by increasing community connection through definitive local engagement and climate communications.

A high priority objective for Community is, by 2027, the University should increase the presence of sustainability and climate action as a core value throughout the UMW website and future communications.

Implementation and Progress

This Climate Action Plan is the Council on Sustainability's recommended outline for UMW's journey to carbon neutrality within 15 years. The CATF has learned very well the difference between goals and objectives planning, the purpose of this Action Plan, and project implementation. Project implementation requires that we 1) discover project costs and benefits; 2) arrange all necessary procurement processes; and 3) secure available financing, grants, and/or incentives available. The CATF recommends that the President's Office designate a sub-committee within the President's Council on Sustainability to track and manage the planning and implementation of Climate Action objectives.

The CATF discovered, as we began implementation of the three energy management projects, there are a variety of programs to decrease the costs of projects. First, energy service performance contracts (ESPC's) would be contracts between the University and an energy services contractor. These contracts require that any building or system improvement costs must be balanced by project energy savings. Second, solar energy production capacity can be financed through power purchase agreements (PPAs). Using PPAs the University could purchase renewable energy electricity for a long-term price comparable to our current electricity costs. Third, electric vehicle (EV) charger installations can happen with no upfront cost to the University. For instance, UMW partnered with Greenspot to launch the University's first public EV charger. Fourth, the federal government recently introduced provisions allowing direct payments to tax exempt institutions. In the future, direct payments might directly offset costs of institutions like UMW to build carbon neutral energy production or management systems. Finally, Virginia state agencies can finance cost effective, energy efficiency projects through The Energy Leasing Program (VA Treasury Board 2020).

The University's journey to carbon neutrality will require support and oversight by the President's Office, the President's Council on Sustainability and the Office of Sustainability. Oversight should include a periodic Climate Action Progress Report. The progress report will review and supplement annual GHG Inventory updates through SIMAP.

1 Introduction

1.1 Letter from Dr. Paino



UMW Climate Action Task Force

Originator of the charge: Troy Paino, President

Nature of the group: Planning and Initial Implementation of Actions to Reduce UMW Carbon Footprint

Charge Statement: Climate change is one of the most important challenges facing the modern world. This assertion arises from both its global scope and ultimate dire consequences if left unchecked. Guided by our Strategic Vision, the University of Mary Washington (UMW) commits to addressing this challenge on behalf of its students, the institution, surrounding community, and global stakeholders. We must act now as a leader within the community and in recognition of the signs of climate change we experience daily. The primary tools at the University's disposal are the interested, committed and resourceful students, faculty and staff of UMW. Both faculty ([UJC Resolution on Climate Change](#)) and students (BEAM petition) have called for action on Climate Change.

The Climate Action Task Force (Task Force), under the direction of the UMW President, will develop a detailed Climate Action Plan for the implementation of the University's commitment to climate leadership. With our plan, UMW will join the broad movement of colleges and universities fighting climate change. We will join with local communities and seek synergies to decrease climate change. The plan will 1) identify specific actions and policies, 2) provide measurable objectives, and 3) include timeframes for implementation.

The Task Force will recommend immediate and longer-term actions and policies for the consideration of the President. These actions and policies will be guided by the following questions:

- What is UMW currently doing to minimize negative impacts on the global environment? What can be done to improve the reach and effectiveness of current actions?
- What visible and impactful action(s) can be implemented immediately, i.e., within 6 months?
- What can be done to empower individuals and campus groups to join senior leadership in promoting and supporting university-wide climate actions?
- What new programs, resources, and policies should be implemented, including ongoing mechanisms, that will decrease UMW's negative impacts on the global environment?

The grave threats posed by global climate change must be recognized and addressed by individuals and institutions alike. Climate action success will require students, faculty, and staff to work together to transform the University. The Task Force should seek out ways to engage students and faculty in the classroom, in student-driven projects, and in broad collaborations between students, faculty, and staff.

Timeline: UMW Climate Plan should plan a pathway by which UMW will be carbon neutral by 2035. The Task Force will deliver a completed action plan by July 2023.

Communication Plan: The President will announce to the University community the charge of the Task Force and the significance of its work upon his approval of the Task Force Charge. Task Force co-chairs will meet with the Chief of Staff bi-monthly. Task Force co-chairs will update the President at the end of summer 2022. Further updates will be planned at that time.

1.2 Letter from the Task Force

The primary goal of the proposed UMW Climate Action Plan is to reach carbon neutrality at the University by 2040. Our plan is ambitious, but the present dangers driven by climate change necessitate ambitious actions. Global climate change is one of the most important challenges facing the modern world. Daily the UMW community and the world experience consequences of increasing greenhouse gases and the resulting global temperatures. Guided by our Strategic Vision, the University of Mary Washington (UMW) must commit to addressing this challenge on behalf of its students, the institution, and our local community. We must act now as leaders within the community and in recognition of the impacts of climate change we experience daily. It is clear from the history of sustainability and climate action at UMW that students, faculty, and staff are interested, committed, and ready to slow and reverse climate change.

In 2019, the student group known as Better Energy Awareness and Mobilization (BEAM), delivered a letter to President Troy Paino urging immediate action towards renewable energy. This came at an important time within the community, when the City of Fredericksburg had adopted its [100% renewable energy resolution](#). The student-written letter resulted in a meeting between the President's Council on Sustainability (PCS) and Dr. Paino to discuss an approach to achieving this goal.

In March 2022, President Troy Paino assembled a small group of students, faculty, and staff as the Climate Action Task Force (CATF). We, the members of the CATF, represent the aspirations, skills, and experiences of the broader UMW community. We were guided by President Paino's charge, which proposed four main questions:

- What is UMW currently doing to minimize negative impacts on the global environment? What can be done to improve the reach and effectiveness of current actions?
- What visible and impactful action(s) can be implemented immediately, i.e., within 6 months?
- What can be done to empower individuals and campus groups to join senior leadership in promoting and supporting university-wide climate actions?
- What new programs, resources, and policies should be implemented, including ongoing mechanisms, that will decrease UMW's negative impacts on the global environment?

The product of this task force is this proposed UMW Climate Action Plan. The Climate Action Plan is our recommendations, to the President and the Academic Community, regarding the most significant actions for the University to achieve a 2040 Carbon Neutrality goal. We believe the overarching goals of this plan reflect the University's commitment to leadership and action. With this plan, UMW would join the broad movement of colleges and universities to fight climate change. The University has a strong history of sustainability and climate action. Any continued actions would showcase UMW's willingness to be a leader, and develop future leaders in climate action. The plan 1) recommends specific actions and policies, 2) provides measurable objectives, and 3) includes timeframes for implementation in five areas:

- Energy Management
- Operations
- Transportation
- Research & Curriculum

- Community & Engagement

The Climate Action Task Force, while developing the UMW Climate Action Plan, has also taken significant steps to launch climate action projects. In consultations with the Office of Facilities and Capital Outlay and the Office of Procurement, the University explored three climate action projects: 1) installation of an EV charger on campus, 2) significant energy savings projects for multiple buildings, and 3) installation of solar panels on multiple buildings. We know that part of the public's concern about purchasing electric vehicles is the current lack of EV charging infrastructure. UMW will be part of the solution by installing EV chargers on campus. Next, much of the University's energy usage comes from heating and cooling air and water in campus buildings. Through contracts called Energy Savings Performance Contracts (ESPCs), UMW can partner with energy service companies to implement energy management projects. Importantly, these ESPCs are designed to pay for themselves through energy saving. For the University, energy saved means lower carbon emissions. Finally, we are exploring locations and financing for rooftop solar panel installation on campus buildings. Many of our buildings will likely support high output solar electricity to reduce our demand for electricity from the grid, a large proportion of which is produced from burning natural gas.

1.3 Members of Climate Action Task Force

Members of the Climate Action Task Force came from across the University: students, faculty, and staff. We brought a breadth and depth of experiences and perspectives to the work of the task force. The single attitude we had in common was a focus on the goals of our work, the University's work, and the significance of accomplishing this work. The names and affiliations of task force members are listed below.

Alan Griffith (co-chair)	Professor	Biological Sciences
Sean Morrow (co-chair)	Sustainability Coordinator	Office of Sustainability
Samira Fallah	Assistant Professor	Management
Pamela Grothe	Assistant Professor	Earth and Environmental Sciences
Sarah Kerner	Graduate student	Geospatial Sciences
Melva Kishpaugh	Director	Procurement Services
Katherine Stoneman	Student	Earth and Environmental Sciences
Jay Sullivan	Project Manager	Capital Outlay
Pamela Taggart	Assistant Director	Budget and Financial Analysis
John Tippett	Adjunct Professor	Earth and Environmental Sciences

2 Our Path Forward – The Climate Action Plan

The objectives of the proposed UMW Climate Action Plan fulfill the request of President Paino, as stated in his charge to the task force:

With our plan, UMW will join the broad movement of colleges and universities fighting climate change... The plan will 1) identify specific actions and policies, 2) provide measurable objectives, and 3) include timeframes for implementation.

The task force used several processes to identify the needs of the University, climate action goals, and objectives. We consulted extensively with internal stakeholders, including students, faculty, staff and University leadership. To create these action areas, the Task Force completed the following:

- Conducted a SWOT analysis (strengths, weaknesses, opportunities, and threats) surrounding climate action at UMW
- Conducted a greenhouse gas inventory
- Surveyed and engaged with UMW faculty, staff and students
- Researched and connected with successful, established climate programs of local universities

The recommended actions and policies are stated as goals grouped by five action areas: Energy and Facilities Management, Transportation, Operations, Research and Curriculum, and Community. Each action area represents a cohesive group of goals and objectives that are often interrelated. The goals for each action area are as follows:

- Energy and Facilities Management
[Details removed. Details in CAP Report to the President]
- Transportation
[Details removed. Details in CAP Report to the President]
- Operations
[Details removed. Details in CAP Report to the President]
- Research and Curriculum
 - Goal 1 - Improve student knowledge about climate change
 - Goal 2 - Increase faculty knowledge about climate change and how they can incorporate it into their courses
 - Goal 3 - Increase climate-related research and/or internships
- Community
 - Goal 1 - Expand UMW's commitment to sustainability through effective institutional communication of core values such as climate action, resiliency, and justice.
 - Goal 2 – Establish UMW as a local leader in Sustainability & Climate Action by increasing community connection through definitive local engagement and climate communications.

Each objective under a goal also includes a list of stakeholders and a priority level. Broadly speaking, every member of the University community is a stakeholder in this plan. The primary

stakeholders though are administrative staff or faculty who might collaborate in organizing implementation or overseeing implementation of the objective.

Education and engagement criteria apply to objectives that may directly support the UMW educational mission or promote active engagement of the University community. There are three priority levels:

- High – large potential impact on individual's understanding of climate change or large impact on individual's climate actions
- Medium – average potential impact on individual's understanding of climate change or average impact on individual's climate actions
- Low – minimal potential impact on individual's understanding of climate change or minimal impact on individual's climate actions

2.1 Energy & Facilities Management

The University of Mary Washington should create short-term and long-term reductions in energy costs and consumption through investments in renewable energy and detailed, data-driven planning. The University should utilize innovative solutions to create energy and facilities solutions that are engaging, efficient, cost-effective and provide educational value.

[Details can be found in CAP Report and Recommendations to the President]

2.2 Transportation

The University of Mary Washington should reduce or offset all transportation-related emissions and support new campus initiatives to increase the presence and accessibility of electric vehicles and infrastructure.

[Details can be found in CAP Report and Recommendations to the President]

2.3 Operations

The University of Mary Washington will implement sustainable and climate-positive initiatives in facilities, business services, IT and procurement operations. The University should adopt sustainable principles by which we operate to ensure proactivity and accountability in reducing our contribution to climate change.

[Details can be found in CAP Report and Recommendations to the President]

2.4 Research and Curriculum

The University of Mary Washington is designed to address our changing world through student impact, engagement and research. Through the lens of this plan, the University can support and expand efforts to increase climate literacy and encourage increased opportunities for innovative research, internships and learning for students, faculty and staff.

Goal 1 - Improve student knowledge about climate change

Objective #	Objective Statement	Primary Stakeholders	Priority Level
G1.01	By Fall 2027, all UMW first year and transfer undergraduate students will be educated about climate change and its impacts and the initiatives UMW is taking to reach carbon neutrality	<ul style="list-style-type: none"> a. VP for Student Affairs b. Dean of Students/Associate VP Student Affairs c. Assistant Director of New Student Programs d. Faculty Director of the First Year Experience e. Student Activities and Engagement f. The Office of Sustainability g. A subcommittee with deep knowledge about climate change and the work from the task force with help from the Office of Sustainability 	High
G1.02	By Fall 2027, all current students have access to resources and courses about climate change and its impacts and UMW initiatives to reach carbon neutrality (e.g., through a Canvas page, UMW homepage tab)	<ul style="list-style-type: none"> a. A subcommittee with deep knowledge about climate change and the work from the task force with help from the Office of Sustainability b. Sustainability Coordinator c. President's Council on Sustainability d. Executive Director of University Communications for web management e. UMW Libraries for access to academic resources 	Medium
G1.03	By end of academic year 2035, 50% of UMW students will have a "Climate Change Literacy" score on their co-curricular transcript	<ul style="list-style-type: none"> a. Subcommittee or Office of Sustainability to classify what classes, assignments, events, research, etc., add to a student's climate literacy score b. Student Activities and Engagement to get the Climate Literacy Score set up on the co-curricular transcript c. Student Activities and Engagement to create processes and procedures for review and acceptance of co-curricular activities 	High

Goal 2- Increase faculty knowledge about climate change and how they can incorporate it into their courses

Objective #	Objective Statement	Primary Stakeholders	Priority Level
G2.01	By Fall 2027, all faculty have access to climate change resources and initiatives UMW is taking to reach net carbon neutrality	a. Faculty experts in climate change issues in coordination with the Center for Teaching b. Office of Sustainability c. Center for Teaching d. UMW Libraries for publishing periodicals	High
G2.02	By end of academic year 2035, 25% of faculty incorporate climate issues into their courses	a. Office of the Provost b. Faculties expert on climate change in coordination with the Center for Teaching c. Center for Teaching	High

Goal 3- Increase climate-related research and/or internships

Objective #	Objective Statement	Primary Stakeholders	Priority Level
G3.01	By end of academic year 2035, increase the number of students performing climate-related research by 50%	a. Faculty research or internship sponsors b. UMW Office of Sustainability c. Center for Career and Professional Development	Low
G3.02	By end of academic year 2035, increase the number of faculty performing climate-related research projects related to their discipline by 30%	a. Offices or responsible parties in need of information or data about climate action objectives, e.g. student commuter miles traveled annually b. Faculty researchers	Low
G3.03	By end of academic year 2035, Increase the number of students performing climate-related internships, either on or off campus, by 10%	a. Office of the Provost b. Center for Career and Professional Development c. Faculty and departments to help advertise climate-related internships d. UMW Office of Sustainability	Low

2.5 Community

The University of Mary Washington should strengthen its role as a community leader by promoting, or in some cases unifying, community initiatives surrounding sustainability and climate action.

Goal 1: Expand UMW's commitment to sustainability through effective institutional communication of core values such as climate action, resiliency, and justice.

Objective #	Objective Statement	Primary Stakeholders	Priority Level
G1.01	Develop a university sustainability & climate communications strategy targeting internal & external communities by 2027	a. Executive Director of University Communications b. Director of Digital Strategy c. President's Council on Sustainability d. Sustainability Coordinator	High
G1.02	Increase the presence of sustainability and climate action as a core value throughout the UMW website and future communications by 2027	a. Executive Director of University Communications b. Director of Digital Strategy c. President's Council on Sustainability d. Sustainability Coordinator	High

Goal 2 – Establish UMW as a local leader in Sustainability & Climate Action by increasing community connection through definitive local engagement and climate communications.

G2.01	Create a first-year student communications and engagement program to support an affirmative & inclusive approach to sustainability & climate change by 2027	<ul style="list-style-type: none"> a. VP for Student Affairs b. Dean of Students/Associate VP Student Affairs c. Assistant Director of New Student Programs d. Faculty Director of the First Year Experience e. A subcommittee with deep knowledge about climate change and the work from the task force with help from the Office of Sustainability f. Sustainability Coordinator 	High
G2.02	Beginning in 2027, host a conference and 2+ public conversations, panels, Q&As each year regarding sustainability & climate change	<ul style="list-style-type: none"> a. Executive Director of University Communication b. Director of Digital Strategy c. Director of Media and Public Relations d. Provost e. College Deans f. President’s Council on Sustainability g. Sustainability Coordinator 	High
G2.03	Provide a sustainability and climate action suggestion box year-round to gather feedback about UMW sustainability and climate action from the Fredericksburg community starting in 2027	<ul style="list-style-type: none"> a. Sustainability Coordinator b. Executive Director of University Communications c. Director of Digital Strategy d. Director of Media and Public Relations 	Low
G2.04	Develop internal training courses on university-specific sustainability information by 2027 (For example – green event management for administrative staff, sustainable landscaping for grounds staff, etc.).	<ul style="list-style-type: none"> a. Sustainability Coordinator b. Interested faculty and staff for providing knowledge and topics for the internal certification courses 	Medium

3 History of Sustainability and Climate Action

The history of sustainability and climate action at UMW create part of the context for the University Climate Action Plan. Sustainability and climate action, while not the same, are tightly intertwined ideas and actions. Sustainability includes ideas and actions supporting social, economic, and environmental needs of current and future generations. Climate action, because of its focus on energy, also connects to social and economic needs, but climate action narrows its focus to the impacts of energy as it is

connected to environmental needs. The progress of sustainability and climate action at UMW have led naturally to our University Climate Action Plan.

3.1 History of Sustainability at UMW

The University's journey toward sustainability began in 2009. An appendix of the 2009 UMW Strategic Plan states:

The challenges of climate change, energy and water resource management, environmental health and waste management come at a time of economic strain. This is further compounded by demands of higher education to provide higher level services for a growing student population and expanding campuses. By supporting decisions that strategically and competitively balance environmental resources, economic objectives and social systems we better reflect the unique position of colleges and universities, as we operate our business. Institutions of higher learning influence generations of students whose future behaviors and decisions are shaped by what they learn from their campus experience and the actions of the University's leaders. Sustainability is no longer an option; it is now a defining value for the future of the University of Mary Washington, reflecting a balance of economic, environmental, and socially responsible values. (UMW Strategic Planning Steering Committee 2009)

In our 2009 Strategic Plan, UMW committed "to sustainability as the means for managing resources to meet the social, economic, and environmental needs of the present without compromising the ability to meet the needs of future generations. Furthermore, the University strategic plan recognized 'the very nature of sustainability promotes the values captured in the [UMW . . .] Mission Statement: expecting our students, faculty and staff to take active responsibility for what they do, what they believe, what they know, and what they do not know'" (UMW Strategic Planning Steering Committee. 2009). In short, sustainability is part and parcel of who we are and what we do. Sustainability remains an important component of the most recent UMW Strategic Plan (UMW Strategic Planning Steering Committee 2022) approved by the UMW Board of Visitors (BOV) in November 2022. Among the action steps in Goal 1: Promoting the values of service and community and civic engagement, the strategic plan states:

Sustainability. Promote stewardship of the planet and the region's abundant natural resources through educational and community-based sustainability initiatives which enhance the University's visibility and reputation as a "green" campus that aims along with the City of Fredericksburg to be carbon neutral by 2035.

The President's Council on Sustainability (PCS) was formed in the fall of 2009 and consists of faculty, staff, and students. Its leadership consists of our Sustainability Coordinator and three co-chairs chosen from students, faculty, and staff. The PCS represents all communities on campus through its organization which allows the PCS to gather ideas from and represent all communities on campus.

The PCS plays a critical role in shaping administrative goals and objectives relating to campus sustainability. It makes recommendations on the following:

- Sustainability issues and policy
- Strategies for implementation of sustainability initiatives

- Presentation of a cohesive public face for UMW sustainability efforts.

The work of the PCS is built around goal development in four action areas:

- Administration and Finance
- Education and Research
- Operations
- Innovation and Awareness

Goal development and action plans are shaped by coordination between the President, Vice President, Provost, Executive Board, and PCS members. PCS members spearhead action on goals by forming action groups that can include anyone from the UMW community. Each PCS member becomes an integral part of improving sustainability at UMW as they lead, co-lead, or participate in one or more action groups.

UMW launched the interdisciplinary minor Environmental Sustainability in 2011 (University of Mary Washington 2011), on the heels of these sustainability commitments and the inauguration of the President's Council on Sustainability. Students in Environmental Sustainability build foundational knowledge and skills around a core of environmental science and sustainability issues. Minors elect related courses from across the university, e.g. Anthropology, Economics, Geography, Modern Foreign Languages, based on their personal interests.

UMW is also proud to be recognized nationally for sustainability on campus and in our curriculum, like our Environmental Sustainability minor. UMW first earned a place in The Princeton Review's Guide to Green Colleges in 2021 (The Princeton Review 2021). Green colleges are chosen through surveys of administrators and students that consider 1) campus quality of life, 2) preparation for life and career in a clean-green economy, and 3) environmentally friendly policies (The Princeton Review 2023). Our campus has also been recognized since 2015 by the Arbor Day Foundation in its Tree Campus Higher Education program (No Author 2022). We know that the biodiversity of the UMW campus is one of the first things to capture our students' hearts. The Tree Campus Higher Education program recognizes UMW for its tangible steps to develop and maintain our beautiful green spaces through multiple events and programs:

- Arbor Day celebrations
- A tree advisory committee
- A tree care plan
- An annual budget for the tree care plan
- Service-learning projects incorporating students which focus on green space maintenance

To support all UMW sustainability projects and programs, the UMW Office of Sustainability was established in 2018. The first full-time Sustainability Coordinator came onboard in 2021. The Office of Sustainability works to "inspire students to participate in the sustainability mission through engaging activities, academics, programs, policies and practices. [They]... promote sustainable life routines that students [will] maintain after their time at UMW; these [routines] will lead to practices that impact neighborhoods, cities, states, and ultimately the world (Morrow 2022)." In practice, the Sustainability Coordinator works to educate and engage students, faculty and staff on the connection between

sustainability and UMW's values and frameworks. The coordinator works closely with UMW committees, departments and student groups to promote environmentally conscious behavior that directly benefits cost, community and environmental health.

3.2 History of Climate Action at UMW

Students, faculty, and staff have acted over concerns about climate change, in parallel and in collaboration with UMW sustainability organizations. Actions have been various:

- Climate, Environment, And Resiliency (CLEAR) regional partnership (2012)
- UMWDivest and BOV fossil fuel divestment (2015-2016)
- UMWDivest and George Washington Hall sit-in (2015)
- Better Energy Awareness and Mobilization (BEAM) club (2018)
- UMW Climate Strike (2019)
- BEAM and UMW University Faculty Council resolutions for renewable energy (2019)
- PCS Climate Charge and establishment of the Climate Action Task Force (2022)
- Annual Virginia Student Climate Action Summit (2023)

The CLEAR partnership between UMW, local private and public organizations, and interested citizens is a regional approach to climate action and resiliency. CLEAR, which began in 2012, recognizes the "region's natural systems form a foundation that is critical to the health of our people and our economy, and that climate resiliency is critical to protecting our residents, institutions and infrastructure (CLEAR 2014)." UMW and CLEAR have hosted public forums and conferences highlighting the progress and needs of the region in the context of climate resiliency. In 2014, UMW and CLEAR published the Climate, Environment, and Readiness Plan (CLEAR 2014).

UMW students began a social pressure campaign to end investments in fossil fuels in 2014 that ended in divestment by The University Board of Visitors (BOV) in the spring 2016. Two student leaders first met informally with University administrators in late 2014. In March 2015, a gathering of about 200 marched on campus walk, calling for University divestment. Soon after the BOV asked representatives of UMWDivest to present their request. Perceiving no movement on their requests, UMWDivest members as well as, UMW students, and other Commonwealth students staged a 21-day sit-in at the President's office in George Washington Hall in April 2015 (UMW President's Council on Sustainability 2016, Global Nonviolent Action Database 2017). Soon after the George Washington Hall sit-in, UMW President Mr. Richard Hurley directed the PCS to research and make recommendations regarding divestment from fossil fuels. The PCS (UMW President's Council on Sustainability 2016) recommended divestment and the BOV followed the recommendation of the PCS. As of April 2016, UMW Foundation limits investments in Carbon 200 companies to 2% of all investments (UMW Board of Visitors 2016).

UMW students and faculty continued the work to advocate for carbon reduction actions after UMW divested from the largest fossil fuel owners. UMW students launched the Better Energy Awareness and Mobilization Club, or [BEAM](#), in spring 2018. BEAM advocates for bringing solar energy to campus and club members were awarded the "Outstanding New Club Eagle Award" in 2019 for their renewable energy advocacy. BEAM members gathered approximately 1000 signatures on a petition to increase the University's reliance on renewable energy. BEAM members delivered their renewable energy petition to

President Troy Paino in the fall 2019. Also in 2019, the PCS sent a resolution to the UMW University Faculty Council "acknowledging the serious threat of climate change and promoting a transition to 100% renewable energy" (PCS Officers personal communication). The UMW University Faculty Council unanimously passed this resolution in October 2019:

- There is an urgent need for a transition to 100% renewable energy in Fredericksburg, the Commonwealth of Virginia, the nation, and beyond;
- UMW administrators and the Board of Directors are encouraged to enact a responsible but ambitious plan to produce renewable energy on campus and to develop other good climate policies, such as increasing campus energy efficiency, composting food waste, and adopting electric vehicles (UMW University Faculty Council 2019).

In response to these calls for action, President Troy Paino tasked the President's Sustainability Council to develop a Climate Action Plan in the fall 2019. The Council organized around actions related to carbon emissions reduction: renewable energy, energy efficiency, food waste and recycling, and transportation. The PCS's initial work was postponed due to COVID-19 priorities, but action planning was re-energized through President Paino's current charge to the Climate Action Task Force in spring 2022.

4 Where Are We Now?

Present-day climate change is primarily driven by the precipitous increases in manmade greenhouse gases, particularly CO₂ (carbon dioxide), but also CH₄ (methane) and N₂O (nitrous oxide). While these gases occur naturally in the atmosphere, our dependence on fossil fuels for energy has increased the amount of greenhouse gases in the atmosphere. For example, total CO₂ concentration in the atmosphere has increased from 280 ppm (parts per million) in pre-industrial times (IPCC 2021) to 368 ppm in 1999 (NOAA Global Monitoring Lab 2023) to 418 ppm in 2022 (NOAA Global Monitoring Lab 2023). This increase in heat trapping gases has produced an average rise in global temperatures since the late 1800's, with the most significant warming occurring in recent decades (Figure 1). Global surface temperature from 2001–2020 was 0.99 [0.84 to 1.10] °C higher than 1850–1900 (IPCC, 2021). Global surface temperature was even higher, 1.09 [0.95 to 1.20] °C, in 2011–2020 than 1850–1900 (IPCC 2021).

Global climate models are important tools for understanding how our climate system operates. The observed warming cannot be explained by natural climate variability, such as volcanic eruptions or changes in solar energy, and can solely be explained by the rising concentrations of greenhouse gases (IPCC, 2021). Greenhouse gas emissions from burning fossil fuels are therefore the primary targets to slow and reverse climate change.

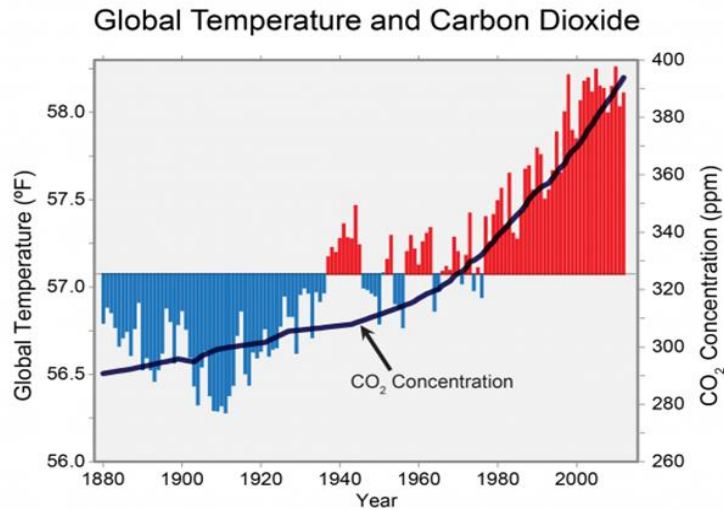


Fig. 1. Rise in global atmospheric CO₂ concentration and global temperatures. <https://www.globalchange.gov/browse/multimedia/global-temperature-and-carbon-dioxide>

It is the responsibility of individuals, institutions like UMW, and governments to take actions and create policies to decrease greenhouse gas emissions. UMW's Climate Action Plan acknowledges that climate change is a problem, and that the University should commit to doing its part in solving this problem. The University, as evidenced by its history and past actions, has been on a trajectory of actions toward sustainability and climate action. There are also three recent and ongoing initiatives that exhibit the University's accomplishments. These initiatives are the development of a greenhouse gas inventory, courses in our curriculum that help our students recognize, analyze, and solve the problems posed by climate change, and the development of highly visible projects with the potential to cut carbon emissions.

4.1 Greenhouse Gas Inventories

In 2023, the University developed its first greenhouse gas inventory. These inventories are methods to quantify and track the emissions of greenhouse gases from local sources, such as transportation and steam production on campus. Our first greenhouse gas inventory is a critical step in defining the University's baseline emission values. The greenhouse gas inventory should be updated and reported annually to track the effectiveness of climate actions and policies. In turn, the University can adjust strategies as necessary. Greenhouse gas inventories are a transparent tool that demonstrates UMW's commitment to reducing its carbon footprint.

4.1.1 Definitions

Greenhouse gas inventories are reported as carbon accounting systems, or standard measurement, calculation, and reporting systems. These systems also translate all greenhouse gas emissions to carbon equivalents, like translating foreign currencies to the US dollar. The CATF partnered with SIMAP (Sustainability Indicator Management & Analysis Platform), a carbon accounting system designed for

colleges and universities, to standardize, document and calculate (UNH Sustainability Institute 2018) our greenhouse gas inventory.

Carbon accounting systems are organized around measures falling in three scopes, or categories, of greenhouse gas emissions as well as a fourth category called carbon offsets (UNH Sustainability Institute 2018):

- Scope 1 emissions are the amount of carbon and other greenhouse gasses emitted directly from all campus operations. A large source of carbon is fuels burned in stationary sources like the natural gas burned in our steam generation plant. Scope 1 emissions also include the carbon produced by University vehicles, i.e. the fleet, refrigerants in heating / cooling systems, and fertilizer applications.
- Scope 2 emissions are the amount of carbon and other greenhouse gasses emitted to generate the electricity we purchase from Dominion Energy. The actual emissions are determined by the mix of fuels used by Dominion to produce electricity in our region. In 2020, Dominion reported our mix of fuels was 10% coal, 45% natural gas, 40 % nuclear, and 5 % renewable energy. Both renewable energy and nuclear are carbon free electricity sources.
- Scope 3 emissions are the amount of carbon and other greenhouse gasses emitted off campus that are used in transportation of people and products to and from campus. For the University, the bulk of Scope 3 emissions likely comes from student, faculty, and staff commuter driving. These emissions also include any travel financed by the University or study abroad travel.
- Offsets are the amount carbon and other greenhouse gases removed from the atmosphere that are attributable to the University. For example, forest preservation in campus woodlots might be used to decrease, i.e. offset, carbon emissions as CO₂ are sequestered in growing trees. Renewable Energy Certificates (RECs) document that the certificate owner has purchased energy from a renewable energy resource. RECs also offset greenhouse emissions.

University offices from across campus have cooperated extensively to gather the data used in University carbon accounting. Our inventory includes data from all University owned buildings and operations on the Fredericksburg campus, but not the Stafford or Dahlgren campuses. We also do not include UMW Foundation owned buildings or operations. Because record keeping for these carbon inventory data varies across administrative offices, our current dataset range is 2018 to 2022. Data has come from the Offices of Facilities and Capital Outlay, Budget and Finance, International Education, Accounts Payable, and the Department of Athletics. These data form the UMW baseline carbon inventory on which future success can be measured.

4.1.2 Always a Work in Progress

Scope 3 emissions are different from Scope 1 and Scope 2 emissions in a fundamental way. Scope 1 and 2 emissions are direct products of University operations. Scope 3 emissions are sources of carbon emissions produced indirectly by the University. An example of emissions from vehicles should help clarify this difference. A university van used by the University's electricians is a Scope 1 carbon emission. Carbon is emitted as a direct result of a University operation or action. A University student commuter,

faculty or staff member driving a personal vehicle to work is a Scope 3 emission. These emissions happen outside of the University, but they happen because of the University.

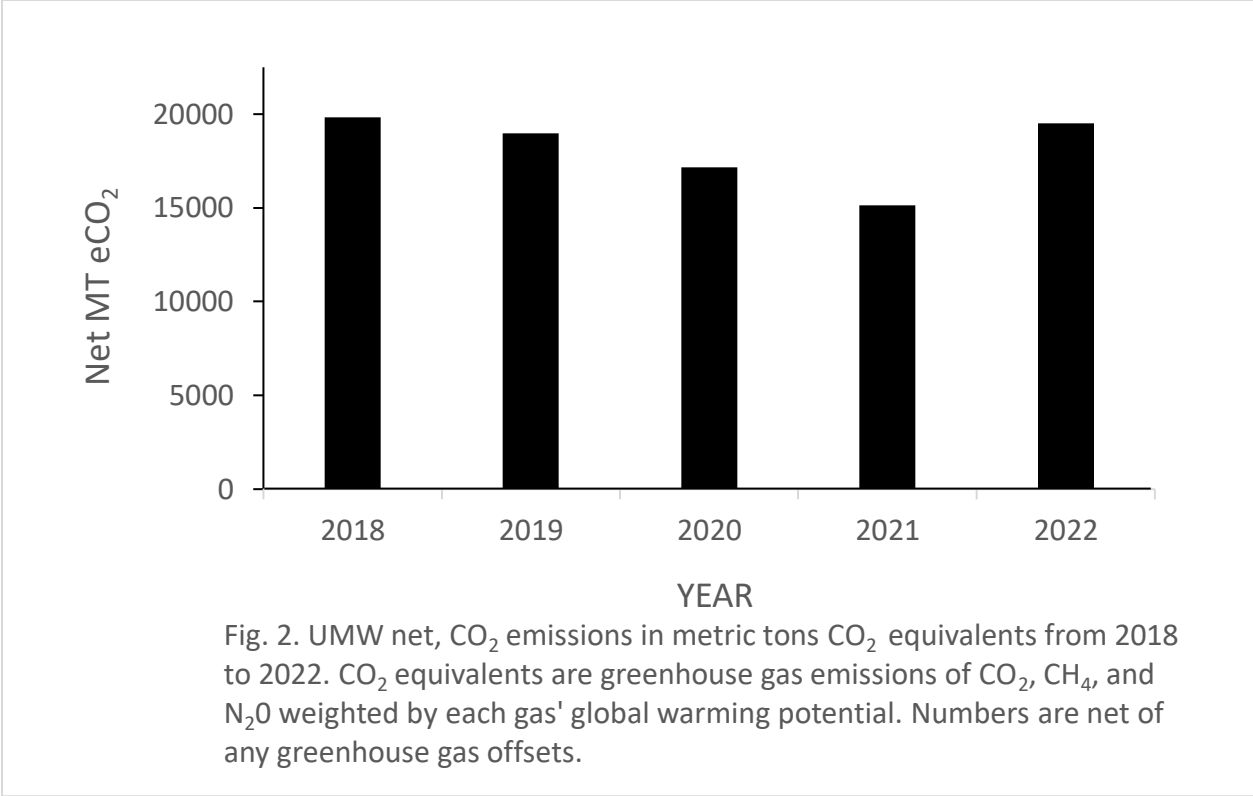
Scope 3 emissions are not included in UMW's inaugural carbon inventory, but we should follow standard guidance to estimate these emissions in the future. Two reasons that Scope 3 emissions are not included in our first carbon inventory is that they are not under the direct control of the University and these emissions can be quite difficult to estimate (Center for Corporate Climate Leadership 2023). Yet, these emissions cannot be ignored because they are potentially the largest source carbon emissions for the University (Center for Corporate Climate Leadership 2023). The EPA's guidance (Center for Corporate Climate Leadership 2023) describes a three-stage process to determine and estimate Scope 3 emissions:

- Determine Scope 3 emissions categories,
- Estimate Scope 3 emissions,
- Improve Scope 3 emissions estimates over time.

Scope 3 emissions will include these categories of carbon production (SIMAP 2019): commuting by students, faculty, and staff; directly financed travel by faculty and staff; study abroad travel; resident student travel to/from home (inclusion is optional); solid waste; sewerage; and paper purchases and recycling. The Climate Action Plan, Transportation Goal 2 commits to reduce transportation related Scope 3 emissions. Administrative offices of the University, e.g. Center for International Education and Accounts Payable, have already provided high quality, first estimates of travel information. Our pathway to improving Scope 3 emissions estimates will include defining potential data owners, gathering existing data, designing new data forms to capture data, and designing models for emissions estimation, e.g. geographic based models of commuter driving miles. The work required to develop and improve Scope 3 carbon emissions estimates will also generate opportunities for research collaborations between student researchers, faculty mentors, and staff data owners.

4.1.3 UMW's GHG Inventory Results

Figure 2 shows UMW net greenhouse gas emissions in CO₂ equivalents in metric tons (MT eCO₂). Net emissions are gross emissions minus any CO₂ offsets by University or Renewable Energy Certificates (RECs) purchased or earned. CO₂ equivalents are the standard unit for the amount of gases produced, regardless of the gas produced. CO₂ is the most common gas produced. But other gases like CH₄, N₂O, and various refrigerants are also accounted for. The amounts of these gases produced are weighted by their global warming potential. Global warming potential (GWP) is each gas' capacity to capture energy in the atmosphere relative to CO₂ over a 100-year period. These equivalencies integrate both capacity to capture energy and lifespan of the gas in the atmosphere. Two examples may clarify. CH₄ has an average lifetime in the atmosphere of 12 years (Forster et al. 2021), while N₂O remains in the atmosphere 109 years (Forster et al. 2021). The GWP of 1 MT CH₄ is 28 MT eCO₂ (Forster et al. 2021) and that of 1 MT N₂O is 273 MT eCO₂ (Forster et al. 2021).



The University's mean annual greenhouse gas emissions were 18117 MT eCO₂ from 2018 to 2022. Emissions were highest in 2018 and decreased each year through 2021, while rebounding to near 2018 levels in 2022. Emissions likely decreased in 2020 and 2021 due to decreased campus activities due to COVID-19. Note that the University's net greenhouse gas emissions equal gross greenhouse gas emissions in all of these years, as we had no measured offsets of greenhouse gases or RECs purchased.

The University's total greenhouse gas emissions by Scope are shown in Figure 3. We report complete UMW carbon emissions data for just Scopes 1 and 2 emissions from 2018 to 2022. UMW is not reporting Scope 3 greenhouse gas emissions with our inaugural greenhouse gas inventory, which is not unusual for first estimates of greenhouse gas inventories. Greenhouse gas emissions from Scope 1 were lower than Scope 2 emissions in every year. Both Scopes' emissions were lowest in 2021 and these 2 Scopes' emissions were closest to parity in 2020.

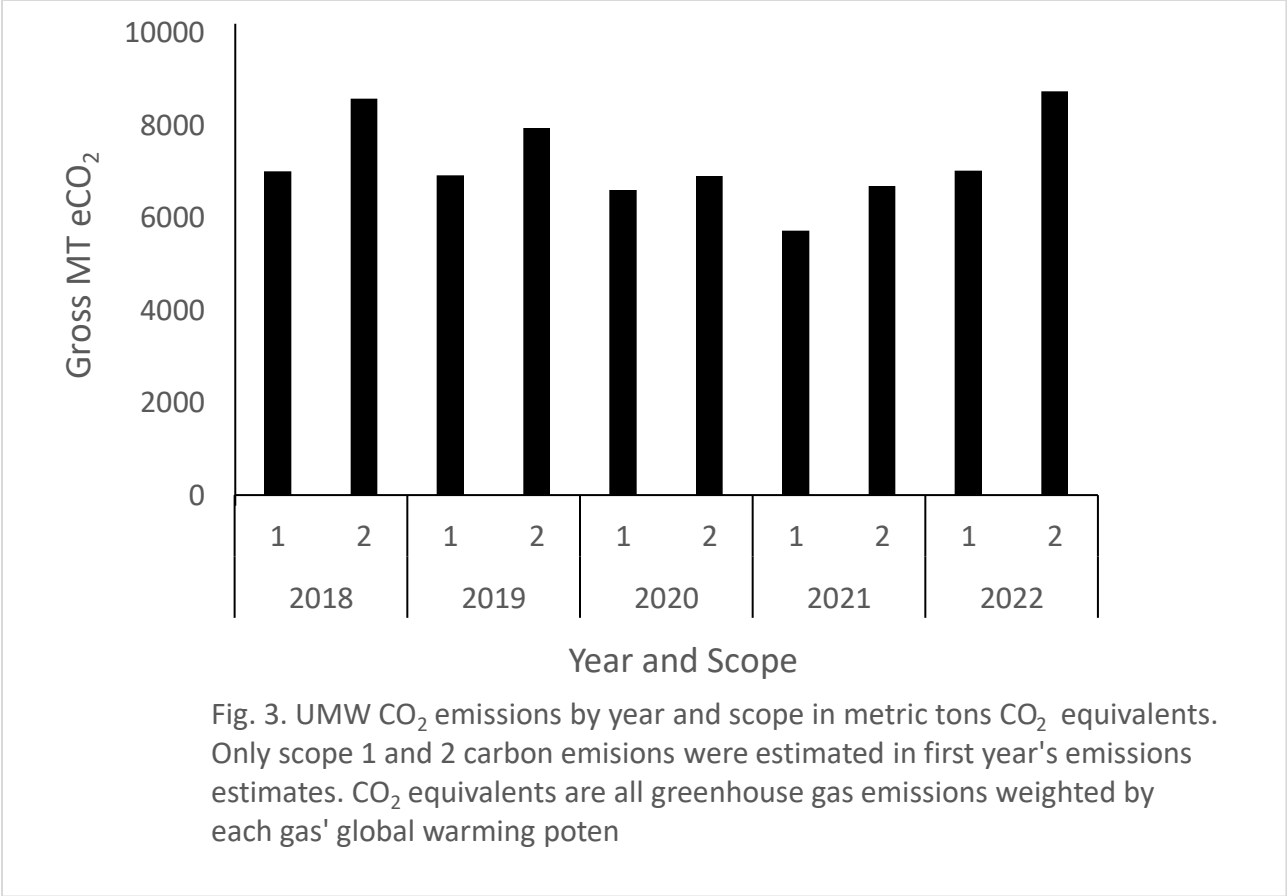
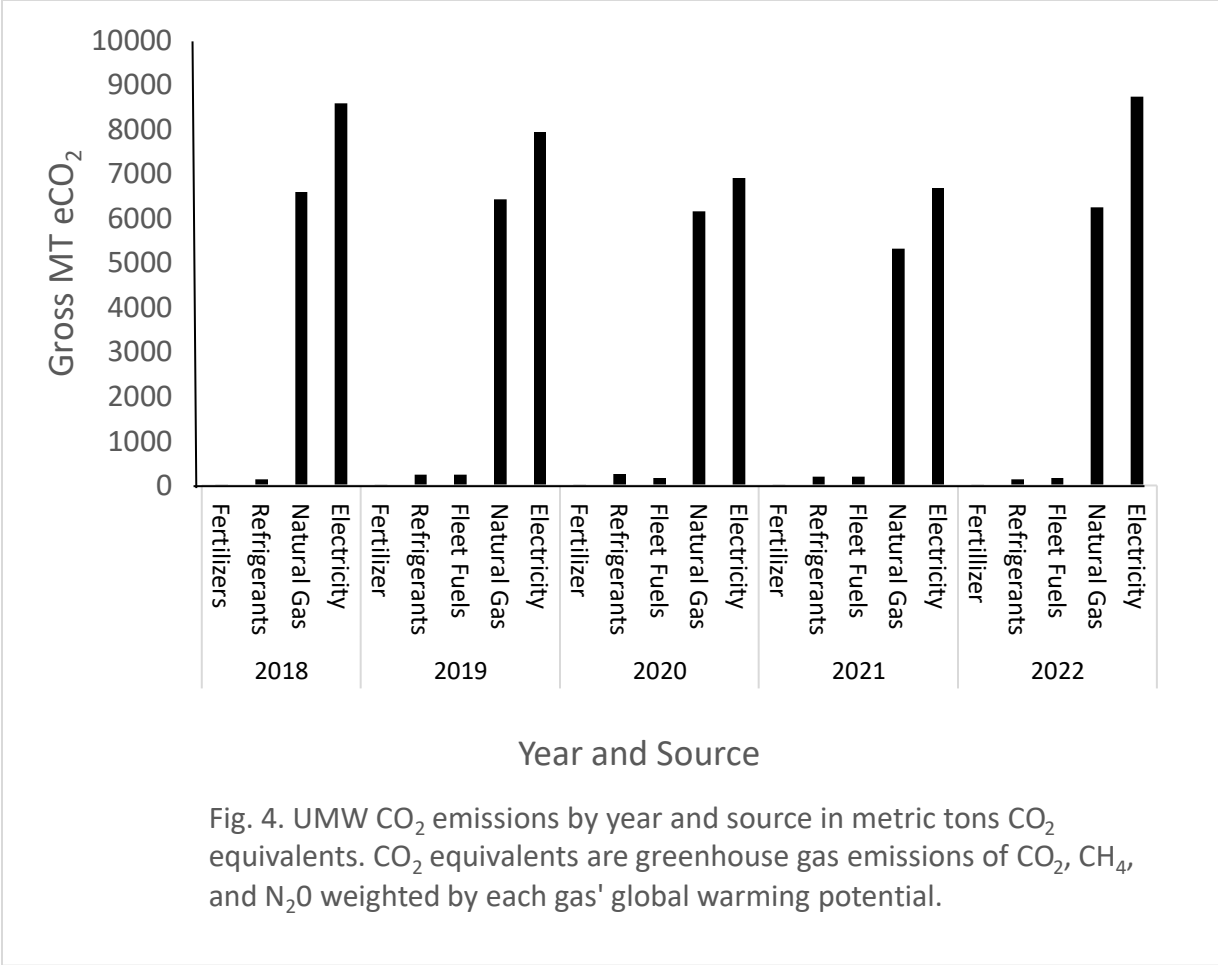


Figure 4 presents total greenhouse gas emissions by greenhouse gas source. UMW fertilizer applications combine all synthetic NPK fertilizers applied on the campus grounds and athletic fields. The University's fertilizer applications are always less than or equal to amounts recommended by standard nutrient management plans. Refrigerant emissions here combine emissions of all refrigerant types. It is important to note that different refrigerants can vary greatly in greenhouse warming potentials, e.g. HFC-32: GWP=771; CFC-11: GWP=6226. Emissions from natural gas at UMW come almost exclusively from steam production in the University steam generation plant. The University's natural gas consumption fuels steam production in the Heating Plant. Steam is piped to most buildings on campus where it is used for heating air and water. The highest emissions source in all years was electricity. Electricity is used for, but not limited to, lighting, heating, cooling, ventilation, and water heating. The difference in emissions from natural gas and electricity narrowed the most in 2020, likely due to changes in campus operations during COVID-19.



Electricity generated in the UMW electric grid region is mostly from the burning of non-renewable resources, natural gas and coal (Table 1). Nuclear fuels are the largest renewable resource fuel for the electricity the University purchases. UMW sources of greenhouse gas emissions come, by far, from the use of natural gas and electricity. The UMW Heating Plant, Fig. 5, producing steam for heating air and water gas across campus, is powered by natural gas.

Table 1. Fuels mix for electricity production in UMW region. Fuels mix for national averages are included for comparison. Estimates are in percent of total fuels consumed from 2021 (Clean Air Markets Division 2021).

Fuel type	SERC Virginia / Carolina Region	National Averages
Natural gas	38.1	38.4
Coal	13.4	21.9
Nuclear	38.8	18.9
Other renewable fuel	9.3	19.7
Other non-renewable fuel	0.5	1.1



Fig. 5. UMW Heating Plant at College Avenue and Powhatan Street, Fredericksburg, VA. Heating Plant is fueled by natural gas and produces steam used for heating air and water in buildings across campus.

4.2 Climate Change Curricula

Education is at the core of the UMW mission and our curriculum drives our learning community. One section of the University's Climate Action Plan addresses increasing the roles of climate change and climate action in teaching and research at the University. But, climate change and climate action are already significant parts of curricula in all corners of the University.

The Climate Action Task Force gathered information about current courses that incorporate topics on climate change and climate action. The task force sent a request for information about courses that include a "climate change component" to all University department chairs. The initial request was sent in October 2022, with a follow up in November 2022. Two colleges offer courses with climate change content. Ten departments / programs and the First Year Seminar (FSEM) program report teaching at least one course with topics related to climate change. Thirty faculty teach 45 climate related courses. Twenty-five of the 45 courses are taught at least once per year. Six of these courses include "Climate", "Sustainable", or "Sustainability" in their titles.

4.2.1 Three Course Examples

Specific topics in climate change and student learning outcomes vary from course to course. We briefly describe here three courses in three departments to illustrate the breadth and depth of climate change topics in our curriculum.

4.2.1.1 *Icehouse – Greenhouse Earth, EESC 355*

Instructor: Pamela Grothe, PhD

Icehouse - Greenhouse Earth studies the history of the Earth's climate system, focusing on mechanisms of climate variability at timescales ranging from millions of years to hundreds of years. Through critical evaluation of primary literature and oral presentations, students develop an in-depth understanding of both long- and short-term cyclic changes that drive natural climate variability and analyze evidence for human-induced climate change.

This is a core Geology course for juniors and seniors, and it is a popular elective for Environmental Science majors, as well as Environmental Sustainability and Climate Science minors. It is speaking intensive and is typically taught once a year as either a single or double section, with 15 students in each section.

The past is key to understanding the future. The course uses historical climate events to provide context for present and future climate change. It also weaves in climate communication and climate solutions through a climate change advocacy project and a mock United Nations Climate Action Summit.

4.2.1.2 *Introduction to Project Management, MGMT 440*

Instructor: John Burrow, PhD

Introduction to Project Management provides a comprehensive overview of project management. The course addresses the framework, culture, principles, and basic techniques of project management; reviews the general stages of a project; and describes how the stages interrelate. Basic tools of project management, such as project charter, work breakdown structure, scheduling, earned value analysis, and risk management are introduced and used in student assignments. The elements of project management critical to the success of a project are also identified and explained.

During the 2022-2023 academic year, Introduction to Project Management students tailored their projects to address sustainability initiatives. The fall class was required to propose projects that aligned with one or more of the sustainability goals identified in the United Nations document “Transforming Our World: The 2030 Agenda for Sustainability Development” (UN General Assembly 2015). The Spring class teamed with the Climate Action Task Force (CATF) to develop project plans for six proposed UMW sustainability initiatives. Working with CATF co-chairs as “sponsors,” students developed project charters, work breakdown structures, integrated master schedules, budgets, and risk management plans for each project. The intent of these assignments was to learn about key tenants of project management as well as to raise student awareness and recognition of the importance of sustainability practices at the university and international levels.

This course attracts juniors and seniors from all Business Administration majors and minors. The number of students enrolled is generally 12-15 per semester.

4.2.1.3. Public and Applied Anthropology, ANTH 345

Instructor: Jason James, PhD

Public and Applied Anthropology highlights examples of how anthropology and anthropological methods are applied outside of academia, ranging from business management and marketing to public policy and conflict resolution. Students learn and refine research methods by working collaboratively on a project for a client.

The client for the course varies. In spring 2023, Applied Anthropology students and Dr. James worked with the Climate Action Task Force to gauge student awareness of terms and issues related to their carbon footprint and the university's efforts to reduce its footprint. Students developed and implemented surveys and focus groups to explore the average student's

- understanding of the term "carbon footprint,"
- habits regarding the topic of carbon footprint and sustainability, and
- impressions of carbon footprint and sustainability at UMW.

The course generally attracts anthropology majors as well as some non-majors, with most in their junior or senior year. The number of students enrolled is generally 12-15.

5 Implementation & Progress Tracking

The University of Mary Washington’s Climate Action Plan is written with the expectation of a 15-year target to reach carbon neutrality by 2040. The success of these goals and their objectives can be supported by:

- Project planning for individual Climate Action objectives,
- Climate Action Plan updates,
- GHG inventory updates,

- Commitment to the Climate Leadership Network, and
- AASHE STARS reporting.

5.1 Climate Action Project Planning

The UMW Climate Action Plan is a combination of goals and objectives, not yet implemented, and three climate action projects that are in different phases of implementation. The Climate Action Task Force has learned very well the difference between goals and objectives planning, and project implementation. Our goals / objectives planning required enough research and documentation to understand the current situation, scope and objectives, potential directions for implementation, and priorities and timelines. Our experiences throughout this process taught us that project implementation requires even more detailed research and planning. The Task Force's interactions with "Introduction to Project Management" students further highlighted the details of project implementation. To develop methods for project implementation (e.g., the ESPC) we must: 1) discover project costs and benefits, 2) arrange and allow for necessary procurement processes and contract development, and 3) secure available financing, grants, and/or incentives available to each project.

The CATF recommends that the President's Office designate sub-committees within the President's Council on Sustainability to track and help manage the planning and implementation of Climate Action objectives. This sub-committee might also be tasked to coordinate curriculum development related to Climate Action.

The Council was designed for this work. "The Council has a critical role in shaping administrative goals and objectives relating to campus sustainability. The PCS is charged with the responsibility of making recommendations on:

- Sustainability issues and policy
- Developing strategies for implementation of sustainability initiatives
- Providing a cohesive public face for UMW sustainability efforts" (President's Council on Sustainability 2022)."

5.1.1 Energy & Facilities Management, Transportation, and Operations Planning [Details of Recommended Projects in CAP Report and Recommendations to the President]

The Climate Action Task Force has been mindful of the costs of energy efficiency and energy transformation projects. Each of our projects under development is built around cost neutrality principles, over the long term. Project planners moving forward will have an array of resources designed to defray costs of new energy projects. This is important because upfront costs of projects designed from long term savings can be an issue. Both federal and state governments have signed laws "offering funding, programs, and incentives to accelerate the transition to a clean energy economy" (Green Power Markets 2023). Public / private partnerships like Power Purchase Agreements will likely continue to ease the initial costs of transitions to carbon neutral, energy systems. Loan programs, designed for energy systems development, can also ease the costs of transition.

The federal government has historically developed strong incentives for the adoption of energy reduction programs by state, local, and private organizations. While many of the provisions of the

Inflation Reduction Act (H.R. 5376 2022) have been reversed, we might expect to see old and new incentives in the future. Federal technology adoption incentives, including energy reduction incentives, often come in the form of tax credits. Tax credits will likely be available to energy management companies with whom the University might partner on energy management and reduction projects. Tax credits are used by private companies to decrease their costs and those cost reductions can be passed on to tax exempt entities like the University. A new financing tool has also been introduced to support technology adoption, direct payments to tax exempt institutions. Because the University has tax exempt status, we can only take advantage of tax credit programs indirectly. Direct payments, potentially available through future legislation, would decrease costs of energy reduction projects in the future.

Two Virginia Treasury Board leasing programs offer financing for energy efficiency programs deemed to be cost effective by a Virginia state institution, like UMW. The Master Equipment Leasing Program can finance equipment, including energy efficiency equipment, for terms up to 10 years (Treasury Staff 2023). The Energy Leasing Program can finance improvements or retrofits to a variety of heating, cooling, electrical, or lighting systems. This program is designed for financing terms of 12 or 15 years (Treasury Staff 2023; VA Treasury Board 2020).

Standard contractual agreements like Power Purchase Agreements (PPAs) and Energy Savings Performance Contracts (ESPCs) facilitate private / public partnerships for the purchase of solar energy or to build energy reduction infrastructure. Power Purchase Agreements are contracts between an energy consumer, like the University, and a non-utility company that produces solar or wind generated energy. One form of PPAs allows the non-utility company to build and maintain solar panels on University property, e.g. on campus rooftops. In exchange, the University contracts to purchase the electricity produced at favorable, long-term rates. All construction and maintenance costs are born by the non-utility company. ESPCs are developed through a structured process to partner Energy Service Companies and large energy users, like the University. These partnerships result in decreases in energy consumption by fixing, maintaining, or replacing energy consuming infrastructure. ESPC projects are financed by guaranteed, decreased energy costs in the future.

5.1.2 Research & Curriculum and Community

The President's Council on Sustainability is in a unique position to provide the direction and coordination required to shape our curriculum to understand the changing climate and climate resiliency. Climate actions related to research, curriculum and the academic community can touch every college, every program, and every department. Curricular development on this scale will likely benefit from coordination from some central point. This kind of broad-based change will more likely happen when a smaller group collects, organizes, and disseminates ideas for curricular development. The President's Council on Sustainability, based on its mission, is positioned to provide this direction and coordination. We propose a partnership between the PCS and the University Faculty Council to manage curricular changes related to climate action.

5.2 Climate Action Plan Updates

To ensure consistent progress towards our goal, the University should provide a Climate Action Progress Report in **July of 2027 and every 5 years following or until a goal of carbon neutrality is met**. The University President, in collaboration with the President's Council on Sustainability, should nominate a group of faculty, staff, and students responsible for the creation of progress reports.

Progress reports should follow a framework similar to the current Climate Action Plan and allow for the addition or removal of any goals or objectives as seen necessary to achieve UMW's carbon neutrality goal.

5.3 GHG Inventory Updates

Greenhouse Gas inventories are the means by which we will measure our climate action successes. The University should continue to gather and report our GHG inventory, covering all relevant University GHG data. This report should be an initiative led by the Office of Sustainability and delivered to the President's Cabinet July 1st of every year or until noted otherwise. The final reports should be posted publicly on the Office of Sustainability website as well as SIMAP's public reporting platform.

This report requires data from many campus departments from Facilities Services to Dining Services. It is important that the University supports a commitment to fold GHG reporting into normal operations. In fact, the UMW Office of Facilities Operations and Capital Outlay is developing an Energy Use Dashboard that can quickly generate a large portion of the data for our GHG inventory data. Normalizing this data collection, as will happen through the Energy Use Dashboard, will increase efficiencies and potentially increase the UMW community's familiarity with University actions that decrease our GHG footprint.

Lastly, significant strides should be made to develop UMW's scope 3 emission data. Scope 3 emissions research, specific for UMW, should be included in future reporting no later than 2027.

5.4 Climate Leadership Network

Second Nature's Climate Leadership Network (Second Nature 2026) is an active network of university leaders who support individual university efforts to combat climate change. By joining the network, the university and university leaders are provided public recognition, access to additional project funding opportunities, networking opportunities, and climate action resources. Second Nature also provides important resources through peer-reviewed and peer-supported frameworks to design climate action programs.

The Climate Action Task Force and the President's Council on Sustainability recommend the University President sign on to Second Nature's Climate Leadership Network by the end of 2027. UMW's Climate Action Plan was designed with these frameworks in mind, specifically, Second Nature's Carbon Commitment. Second Nature's Carbon Commitment creates pathways for colleges and universities to reduce greenhouse gas emissions and achieve carbon neutrality. The Office of Sustainability should lead any reporting efforts required.

6 Acknowledgements

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- Charles Tate, President University Staff Council
- Rachel Graefe-Anderson, Chair University Faculty Council (past)
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- Brian Wolfe, Intern Social Media Development and Implementation (past)

ESPC development

- Melva Kishpaugh, Director Procurement Services
- Patricia Canciglia, Senior Contract Officer
- Ken Manahan, Senior Contract Officer
- Brian Gorham, Assistant VP Facilities Operations and Capital Outlay
- Timmy Wallace, HVAC Supervisor
- Christopher Cook, Electrical Shop Manager
- Jesse Rowley, Controls Senior Technician
- Craig Erwin, Vice President for Administration and Finance (past)

Fertilizer purchases data

- Brian Gorham, Assistant VP Facilities Operations and Capital Outlay
- Holly Chichester, Director of Landscape and Grounds
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- Tony Perrigan, Senior IPM Program
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Initial Climate Action work by President's Council on Sustainability

- Eric Bonds, Associate Professor Sociology and Anthropology
- Elizabeth Heras, Student Biology (graduated)
- Kelly Flynn, Student Biology (graduated)
- Chuck Whipkey, Professor Emeritus Earth and Environmental Sciences
- Shannon Hauser, Associate Director Digital Knowledge Center
- Melanie Szulczewski (PCS Faculty co-chair [past]), Associate Professor Earth and Environmental Sciences

- Jeremy Larochelle, Professor Modern Foreign Languages
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Institutional data

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- Mathew Wilkerson, Director of Institutional Research
- Britney Stockton, Junior Research Analyst
- Sheila Williams, Budget and Financial Systems Analyst

President's Council on Sustainability

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- Eric Bonds, Associate Professor Sociology and Anthropology
- Melanie Szulczewski, Associate Professor Earth and Environmental Sciences
- Rita Dunston, Registrar
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- Jackson Davis (PCS Student co-chair [past]), Student Political Science

Refrigerant purchases data

- David Wilt, Warehouse Manager
- Eleanor Connolly, Senior Storekeeper

Stationary fuels data

- James Marcum, Power Plant Superintendent

Travel miles data

- Jose Sainz, Director Center for International Education
- Sarah Moran, Study Abroad Coordinator Center for International Education

Utilities data

- Gary Hobson (retired), Capital Outlay Program Director
- Stuart Sullivan (retired), Director Facilities Operations
- Mollie Moore, Contracts and Resourcing Manager
- Ellie Drew (retired), Contracts Manager and Coordinator
- Alica Osborne, Work Request Technician

Vehicle fuels data

- Brian Gorham, Assistant VP for Facilities & Capital Outlay
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- Kevin Minter, Equipment Repair Manager

Other

- Kathy Sandor, Director of Business Services
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- Liliana Ramirez, Former Task Force Member (Graduated 2024)

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