

BOARD OF REGENTS MEETING

Annual Sustainability Report

INFORMATION

This item is for information only. It is a regular, annual report.

BACKGROUND

UW Facilities' new Director of Sustainability, Lisa Dulude, joined the UW in May of 2022 and has engaged in a deep dive across the institution to identify opportunities to accelerate and scale-up the University's sustainability efforts. Key sustainability focus areas include:

1. Compliance with state and local mandates on energy efficiency and greenhouse gas emissions reduction, and
2. Establishing and implementing the new energy transformation strategy.

The Sustainability Update slides provide supplementary information for key focus areas 1 and 2. The Sustainability Update document outlines additional sustainability priorities.

Attachments

1. Sustainability Update (slides)
2. Sustainability Update (document)

SUSTAINABILITY UPDATE



BOARD OF REGENTS
NOVEMBER 10, 2022

BE BOUNDLESS



UW Sustainability Key Priorities FY 22-23*

1. Respond to State and Local Mandates
2. Implement the Energy Transformation Strategy

**Please see the accompanying Sustainability Update word document for more information*

1. Respond to State and Local Mandates

Requirement	Start	Action Needed	UW Cost for Non-Compliance
State Agency Climate Leadership Act (Carbon Emissions Reduction)			
2030 target: 45% reduction of greenhouse gas emissions-GHGs (from 2005 baseline) 2040 target: 70% reduction 2050 target: 95% reduction	2022	<ul style="list-style-type: none"> Building Efficiency Measures (Install meters; Upgrade digital controls; Enable data analytics; accelerate energy efficiency) Decarbonize Seattle steam plant 	Reputational Risk: UW has a significant carbon footprint from its steam plant.
State Climate Commitment Act (Carbon Emissions Reduction)			
UW must buy 1 'allowance' for every ton of CO ₂ e we emit. The price is determined at auction. The number of available allowances is capped and decreases over time	2023	<ul style="list-style-type: none"> Decarbonize Seattle steam plant (Convert to Hot Water, electrification) 	Anticipated cost to UW: ~ \$4M/year in 2023 ~ \$9M/year by 2030
State Clean Buildings Act (Energy Efficiency Targets)			
Buildings must meet targets for energy use	2026	<ul style="list-style-type: none"> Building Efficiency Measures (Install meters; Upgrade digital controls; Enable data analytics; accelerate energy efficiency) 	~ \$5.2M/year (fines) by 2029
Seattle Building Tune-Up Standards (2nd Phase) (Energy Efficiency Targets)			
Meet energy efficiency targets; required documentation	2023	<ul style="list-style-type: none"> Building Efficiency Measures (Install meters; Upgrade digital controls; Enable data analytics; accelerate energy efficiency) 	~ \$0.3M/year (fines) by 2026
Seattle Building Performance Standard (Emissions Reduction)			
Meet GHG reduction targets; required documentation	2026	<ul style="list-style-type: none"> Decarbonize Seattle campus 	TBD: City ordinance is being drafted.










Status: We are not currently in compliance with these mandates, but are making significant progress.

2. Energy Transformation Strategy

- **The challenge – requires action!**
- **Our plan**
- **Why steam to hot water conversion is the critical next step**
- **The benefits of energy conservation**
- **Next steps**

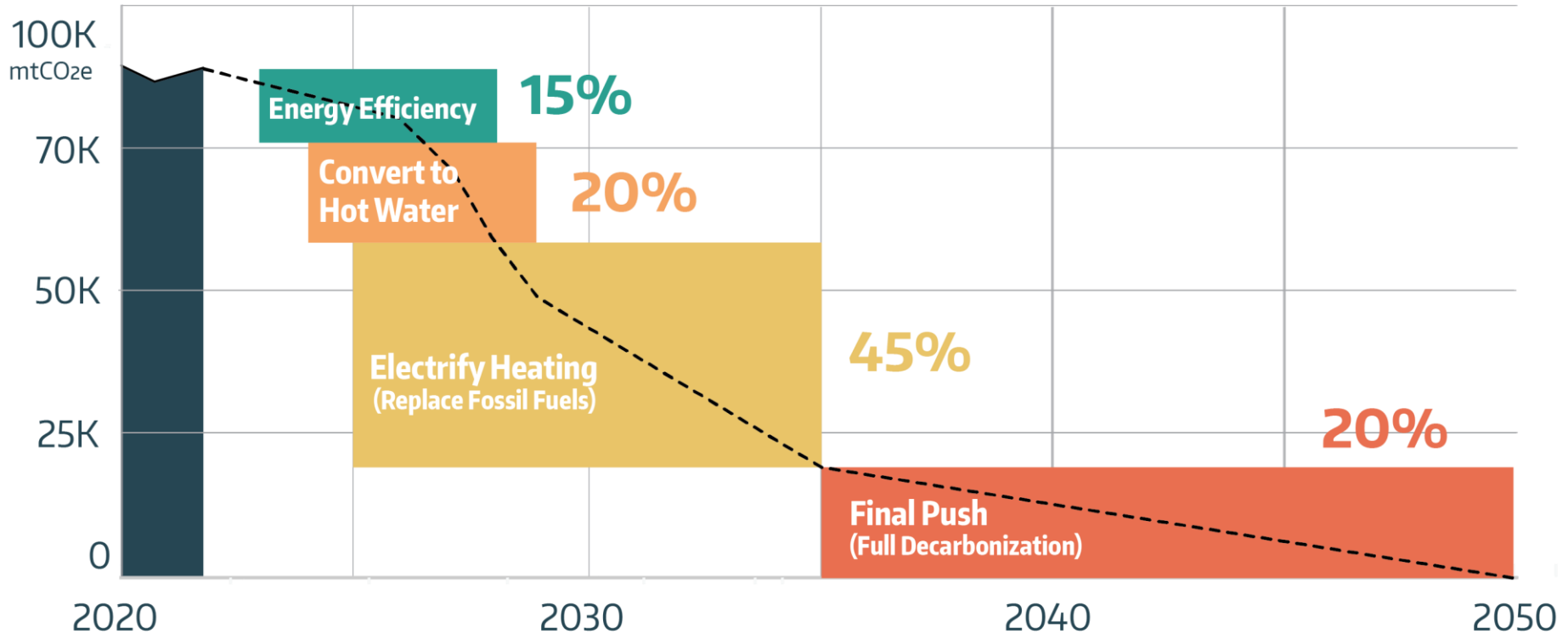


Energy Transformation Strategy

	ENERGY EFFICIENCY 1 <i>Expand metering, upgrade controls, data analytics and green revolving fund.</i> 	CONVERT TO HOT WATER 2 <i>Convert from steam to hot water heating.</i> 	CENTRAL COOLING 3 <i>Replace inefficient chillers, use lake water for cooling, and add thermal storage.</i> 	ELECTRIFY HEATING 4 <i>Use heat pumps to extract heat from cooling towers, sewer and lake water.</i> 	FINAL PUSH 5 (FULL DECARBONIZATION) <i>Continuously evaluate emerging technologies for full decarbonization.</i> 	
ENERGY SYSTEM ISSUES Greenhouse Gas Emissions	15% reduction in GHGs	20% reduction in GHGs	no additional reduction	45% reduction in GHGs	20% reduction in GHGs	GOAL 100% CLEAN ENERGY 100% reduction in GHGs
Energy Consumption	45% energy reduction	10% energy reduction	15% energy reduction	15% energy increase	?	55% Reduction in Energy Use
Electrical Capacity Constraint	2% more capacity	2% less capacity	26% more capacity	30% less capacity	?	Accommodate Capacity Constraint
Aging Infrastructure					?	Resilient Infrastructure



Path to a Carbon-Free Campus



Energy Transformation Strategy

2023 to 2028	2024 to 2029	2023 to 2033	2025 to 2035	2023 to 2035
1A-1D Energy efficiency	2A Convert to Hot Water	3A Central Cooling	4A Electrify Heating	5A Electrical Demand Mitigation
Expand Resource Conservation 6x (\$3M/year)	Bury new pipe, begin with newest buildings	Add efficient chillers to central plants	Capture waste heat, add thermal storage	Cooling from lake, shift electrical consumption, add solar
\$17.8M one-time + \$960K/yr staffing	<i>State support, grants, tax incentives, 3rd party, green funding</i>			
	~\$250M	~\$100M	~100M	~\$100M

Next Steps

1. Implement Phase 1: Energy Efficiency

- Invest in energy efficiency to accelerate energy conservation projects [**In Progress**]
- Obtain funding and initiate metering, DDC upgrades, and data analytics [**In Progress**]

2. Pre-development and implementation plan

- Retain energy services partner

3. Implement Phase 2: Steam to Hot Water

- Begin the conversion to hot water (WCUP loop)



Discussion & Questions

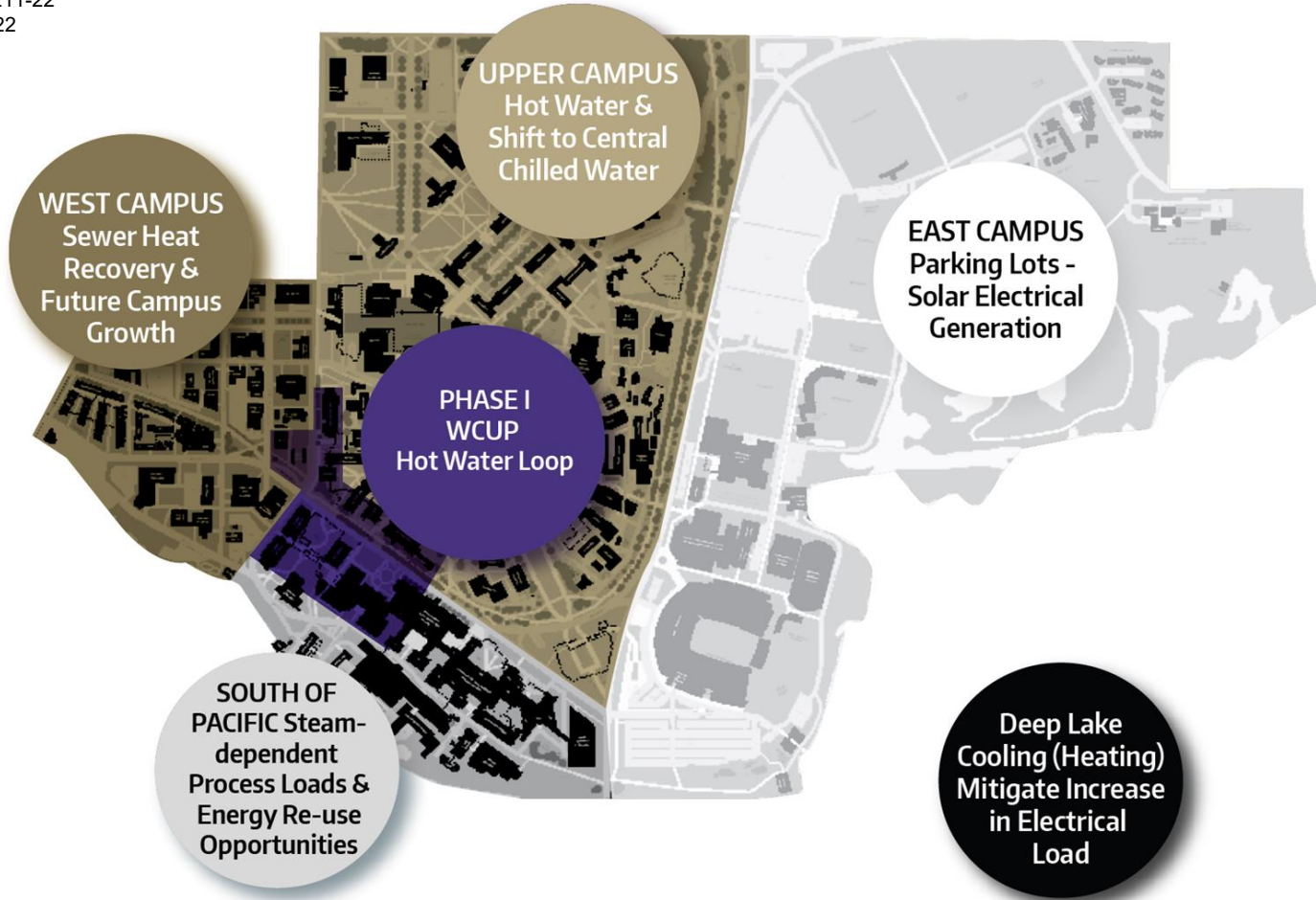


Appendix



LET'S NOT GET DISTRACTED...





SUSTAINABILITY UPDATE

INTRODUCTION

The University of Washington's leadership in sustainability is evident across all aspects of the organization. From campus operations to research and academics to global collaboration – the depth and breadth of UW's contributions to this universal challenge are profound.

Key focus areas for the Office of Sustainability for fiscal year 2023 are outlined below.

1. Respond to Mandates for Energy Efficiency and Greenhouse Gas Emission Reduction

On September 9, 2021, Facilities first briefed the Board of Regents on new state and local mandates for energy efficiency and greenhouse gas emission (GHG) reduction. Since then, Facilities, in partnership with the Office of Sustainability and other stakeholders, has begun developing a strategic energy and decarbonization strategy for the Seattle campus to ensure compliance with the state and local requirements described below and summarized in Table 1. Compliance with these mandates will require significant infrastructure planning and investment, as well as coordination across departments and groups across the University.

a. State Agency Climate Leadership Act

The State Agency Climate Leadership Act enacted in July of 2009 ([RCW 70.235.050](#) and [060](#)) requires some state agencies to reduce their greenhouse gas emissions to the following targets:

- 2020 –15% below 2005
- 2030 – 45% below 2005
- 2040 – 70% below 2005
- 2050 – 95% below 2005 and achieve net-zero GHG emissions.

There is currently no financial penalty or other consequences for not meeting these targets, however UW is required to track and report our greenhouse gas emissions annually to the State.

b. [State Climate Commitment Act](#)

In 2021, the Washington Legislature passed the Climate Commitment Act (or CCA) which establishes a comprehensive, market-based program to reduce carbon pollution and achieve the greenhouse gas limits set in state law. The CCA caps and reduces greenhouse gas emissions from Washington's largest emitting sources and industries, and helps Washington State achieve its commitment to reducing GHG emissions by 95% by 2050. The program will start January 1, 2023, and the first emissions allowance auction will take place in mid-February 2023.

SUSTAINABILITY UPDATE

Under CCA legislation, UW is considered a ‘covered entity’ because we have a carbon footprint greater than 25,000 Metric Tons of carbon dioxide equivalent (CO₂e), which is the emissions threshold. UW, and other covered entities, will need to purchase allowances for all of our carbon emissions above 25,000 MT CO₂e starting in 2023 at auctions administered by the Department of Ecology. The starting price for carbon allowances in 2023 is estimated to be between \$41-\$58 per ton, which means UW is estimated to pay between \$4-5M in 2023. The price of carbon emissions is expected to increase to \$100 per ton by 2030 (impact to UW would be \$9M per year). The State provides some financial assistance to covered entities to assist with getting on-track for compliance, and UW received \$1.7M from the Office of Financial Management for year one (2023). The CCA is considered a Cap and Invest Program, so while UW will pay for carbon allowances, we will be eligible to receive State appropriations to reinvest in GHG reduction projects.

c. State Clean Building Performance Standard

The State Clean Building Performance Standard (BPS) legislation, signed into law in 2019, is intended to improve energy efficiency of all buildings greater than 50,000 square feet. More specifically, the BPS legislation establishes an Energy Use Intensity target (EUI_t), or energy use per square foot, that buildings are required to meet by a specific deadline. Building compliance is phased based on total building square footage, beginning with the largest buildings. The first phase of the BPS covers buildings greater than 250,000 square feet beginning in 2026. Covered entities have five years to achieve compliance, after which time the Department of Commerce will set a new target for 2031 and a new five-year compliance window will begin. Buildings greater than 90,000 square feet have a compliance start date of 2027, and buildings greater than 50,000 square feet have a compliance start date of 2028. The current BPS legislation requires all buildings to submit an operations and maintenance (O&M) plan, and an Energy Management Plan to the State. The UW has 118 E&G buildings on the Seattle campus impacted by this legislation. We anticipate that we can get 87 buildings to be compliant (under the proposed 2026 EUI_t), that leaves 31 buildings (totaling 6.6M square feet) that will need to use the ‘investment criteria’ pathway to achieve compliance (including buildings like all of Magnusson Health Sciences Center). The ‘investment criteria’ pathway includes performing an industry standard level 2 energy audit, a comprehensive life cycle cost analysis of all potential energy savings projects within each building, and then implement all energy savings project that have a viable return (some exceptions based on equipment end of life).

d. Seattle Building Tune-Up Standard (2nd Phase)

SUSTAINABILITY UPDATE

The City of Seattle's Building Tune-Up Standard is similar to the State's Clean Buildings Performance Standard, but the City's legislation was enacted several years prior to the State legislation. UW has already completed the first phase of Seattle's Tune-Up Standard in 2021, which resulted in conducting energy assessments of over 120 buildings across the Seattle campus. The first phase of Seattle's Building Tune-Up Standard did not achieve meaningful energy efficiency reductions, and came at a significant cost to UW (i.e. approximately \$3M to complete, including significant staff time). As currently written, the City's legislation is not conducive for campus settings with centralized district energy systems. As such, UW along with other organizations, is in discussion with the city to identify an alternative compliance path that will be more effective at achieving the intended outcomes of the legislation.

e. Proposed Seattle [Building Performance Standard](#)

The City of Seattle is currently drafting an emissions-based Building Performance Standard (BPS). Similar to the existing State Climate Commitment Act, this proposed City legislation would require buildings to reach GHG reduction targets by a specific date, and GHG reduction targets would reset and ratchet down over time. UW is in discussions with the City to discuss legislation that would minimize the administrative burden and maximize investments into GHG reduction projects.

SUSTAINABILITY UPDATE

Table 1. Summary of State and Local Mandates for GHG Reduction and Energy Efficiency

Requirement	Start	Action Needed	UW Cost for Non-Compliance
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SUSTAINABILITY UPDATE

2. Energy Transformation Strategy

Facilities has developed a five-part Energy Transformation Strategy to achieve compliance with the mandates described in Table 1 above, with a goal to transition the Seattle campus to 100% clean energy as quickly as possible. The Seattle steam plant alone comprises approximately 93% of the Seattle campus emissions, and UW is the second largest State agency polluter. At approximately 85,000 MT CO₂e (metric tons of carbon dioxide equivalent emissions) per year, the GHG pollution from the Seattle steam plant is the equivalent emissions of 20,254 gasoline-powered passenger vehicles driven annually. Transitioning the Seattle plant to 100% clean energy is a critical next step for UW, and a project that will take significant coordination, planning, and investment.

The primary function of the power plant is to provide heating and hot water to the Seattle campus. Currently, it generates heat by combusting natural gas to turn water into steam which is distributed to buildings. The goal of the five-part energy strategy is for the Seattle campus to be fueled by 100% clean energy no later than 2045. To reach this goal, the Seattle campus power plant must ‘fuel-switch’, meaning it must transition off fossil fuels to electricity. The Seattle campus purchases electricity from the City of Seattle, and approximately 97% of that electricity is from carbon-free sources such as hydropower.

The five components of the Energy Transformation Strategy are introduced in Figure 1 and described in more detail below. Figure 1 shows how each of the five parts contribute to the goals of reducing greenhouse gas emissions and energy consumption, while also addressing the need to replace aging infrastructure and accommodate the campus’ electricity capacity constraint.

	ENERGY EFFICIENCY 1 <i>Expand metering, upgrade controls, data analytics and green revolving fund.</i>	CONVERT TO HOT WATER 2 <i>Convert from steam to hot water heating.</i>	CENTRAL COOLING 3 <i>Replace inefficient chillers, use lake water for cooling, and add thermal storage.</i>	ELECTRIFY HEATING 4 <i>Use heat pumps to extract heat from cooling towers, sewer and lake water.</i>	FINAL PUSH 5 (FULL DECARBONIZATION) <i>Continuously evaluate emerging technologies for full decarbonization.</i>	
ENERGY SYSTEM ISSUES						GOAL 100% CLEAN ENERGY
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Electrical Capacity Constraint	2% more capacity	2% less capacity	26% more capacity	30% less capacity	?	Accommodate Capacity Constraint
Aging Infrastructure	✓	✓	✓	✓	?	Resilient Infrastructure

FIGURE 1: Five Part Energy Transformation Strategy (Seattle Campus)

The energy strategy includes five phases to electrify the system:

1. **Scale-Up Energy Efficiency:** The first step is to reduce energy consumption per square foot by 55%. We can reach this efficiency reduction target through expanded energy metering and building data analytics. Energy efficiency projects should be accelerated and could be funded through the mechanism of reinvesting previous year utility savings. This process would enable the UW to continuously invest in energy efficiency to reduce UW's long-term utility costs while meeting State and local mandates.
2. **Convert From a Steam to a Hot Water System:** To enable electrification of our heating system (phase four), the temperature of the system must be reduced, which means heat will be delivered via hot water rather than steam. This conversation will require new distribution pipes and new heat exchanger equipment within buildings.
3. **Centralize Cooling:** Centralizing cooling across the Seattle campus is an important phase of the Energy Transformation Strategy, and has three associated challenges and/or opportunities. The first challenge is that cooling equipment is powered by electricity which is energy intensive. As a result, the Seattle campus has reached the limits of reliable electricity service to campus during the hottest days/hours of the year. A second challenge/opportunity is capture and reuse the heat that is created as a byproduct of cooling. Capturing this 'waste' heat can help to pre-heat the hot water loop and reduce campus electricity consumption for heating and hot water. A final challenge is that the demand for summer cooling continues to increase as summer temperatures rise, making some buildings uncomfortable during the hottest days of the year. Currently cooling for buildings is produced in three locations: the central plant, the west campus utility plant and in individual buildings.

Typically, individual building chillers are installed to provide year-round cooling for process cooling loads and data centers. The chillers in the central plant provide cooling to keep buildings comfortable during the warm months only. In 2018, the West Campus Utility Plant was built to provide highly reliable cooling year round. The plant chillers are more efficient than building chillers and have backup power to keep them running during power outages. We can address all of the challenges with three approaches: 1) by completing the planned expansion of the West Campus Utility Plant and removing the less efficient aging building chillers; 2) by adding chilled water storage tanks to allow cooling to be produced at night when electricity demand is low; 3) an even bigger reduction in electrical demand is possible if deep-lake water is used for cooling. This can have the added benefit of improving conditions for migrating salmon in the Ship Canal.

SUSTAINABILITY UPDATE

4. **Electrify the heating system:** Over the past decade, heat pump technology has evolved such that the technology is widely used in large commercial energy systems. Heat pumps will also enable the capture and reuse of ‘waste heat’. There are several sources of ‘waste heat’ that can be captured to increase the efficiency of the central plant at a relatively low cost. These sources of ‘waste heat’ include the cooling towers, and sewer lines. We can also utilize heat from Lake Washington for efficiency gains in central plant heating and cooling. Lastly, the installation of thermal storage tanks will allow hot water to be generated at night when electrical demand is low to mitigate the increase in electrical load.

5. **Leverage Clean Technology (Final push):** To fully reduce our dependence on fossil fuels, we will need an alternate means to produce the steam used to sterilize research and medical equipment. One existing possibility is to switch to Renewable Natural Gas (RNG) which is captured from decomposing waste at landfills. We will continuously evaluate emerging technologies to find additional options.

The estimated dates and costs of each phase is shown in Table 2:

2023 to 2028	2024 to 2029	2023 to 2033	2025 to 2035	2023 to 2035
1A-1D Energy efficiency Expand Resource Conservation 6x (\$3M/year)	2A Convert to Hot Water Bury new pipe, begin with newest buildings	3A Central Cooling Add efficient chillers to central plants	4A Electrify Heating Capture waste heat, add thermal storage	5A Electrical Demand Mitigation Cooling from lake, shift electrical consumption, add solar
\$17.8M one-time + \$960K/yr staffing	<i>state ask, grants, tax incentives, 3rd party, green revolving fund</i>			
	~\$250M	~\$100M	~100M	~\$100M

Table 2. Cost and Timeline Summary of the Energy Transformation Strategy

Facilities has already made progress on implementing the first phase of the strategy. It is in the University’s best financial interests to plan and invest in the infrastructure and resources necessary to meet these mandates as soon as possible. If UW takes no action and continues the status quo, the fines and allowances that UW will need to pay will grow from approximately \$4 million in 2023 to \$15 million in 2029.

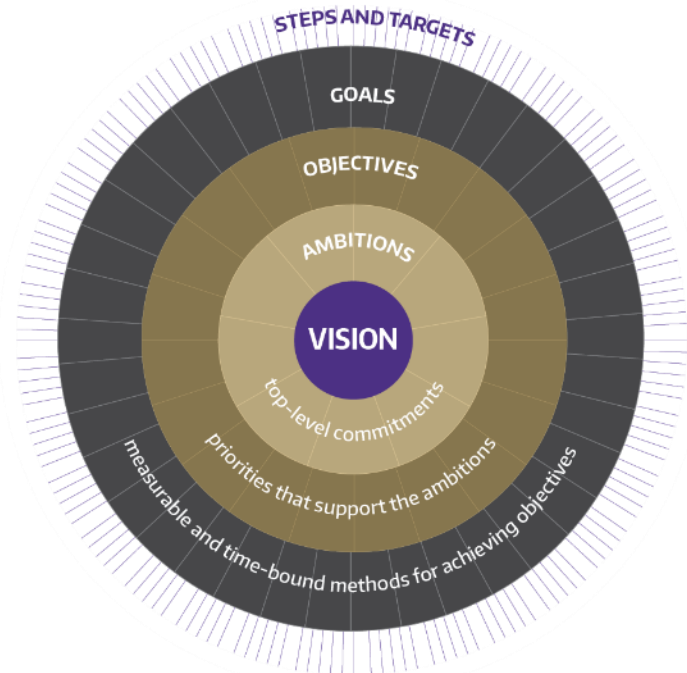
Energy efficiency and clean energy are top priorities for UW’s Sustainability Action Plan, as they contribute to high-performance buildings, reduce energy consumption, emissions, and can

SUSTAINABILITY UPDATE

lower utility costs. Moreover, investments in energy infrastructure advances UW’s vision, as it provides a living lab platform for students and faculty with critical data to move the needle on clean energy innovation. The Office of Sustainability is working closely with campus Energy, Utilities, and Operations, as well as other stakeholders in and outside of the University to advance the energy and decarbonization program with an urgency that matches our global climate crisis. Please see Attachment 2: Sustainability Update (PowerPoint presentation) for more detail on the energy transformation strategy.

3. Clear Organizational Approach to Address Sustainability

UW has a significant opportunity to exercise leadership in addressing the local and global challenges of climate change, supporting a healthy planet, and climate justice. As a higher education institution and world-renowned university, UW is uniquely positioned to foster the next generation of leaders to address our most urgent and complex environmental challenges. Successfully addressing these challenges will require a clear vision and mission for a sustainable future, as well as a commitment to take deliberate action and act with urgency. As such, the Office of Sustainability has begun work with the Environmental Stewardship Committee (ESC), Executive Committee (EC) for the Sustainability Action Plan, as well as students, faculty, and staff to draft a UW sustainability mission and vision statement. This important step will help ensure a clear, shared understanding of UW’s vision for sustainability and our role in that future.



4. Update the Sustainability Action Plan

UW published its first Sustainability Action Plan (SAP) in 2020, which provides a solid foundation for UW’s sustainability efforts. The Sustainability Office and our partners are working to reshape and enhance the Plan. As such, the UW Sustainability Office will lead a strategic planning process to update the Plan in order to address gaps and opportunities,

SUSTAINABILITY UPDATE

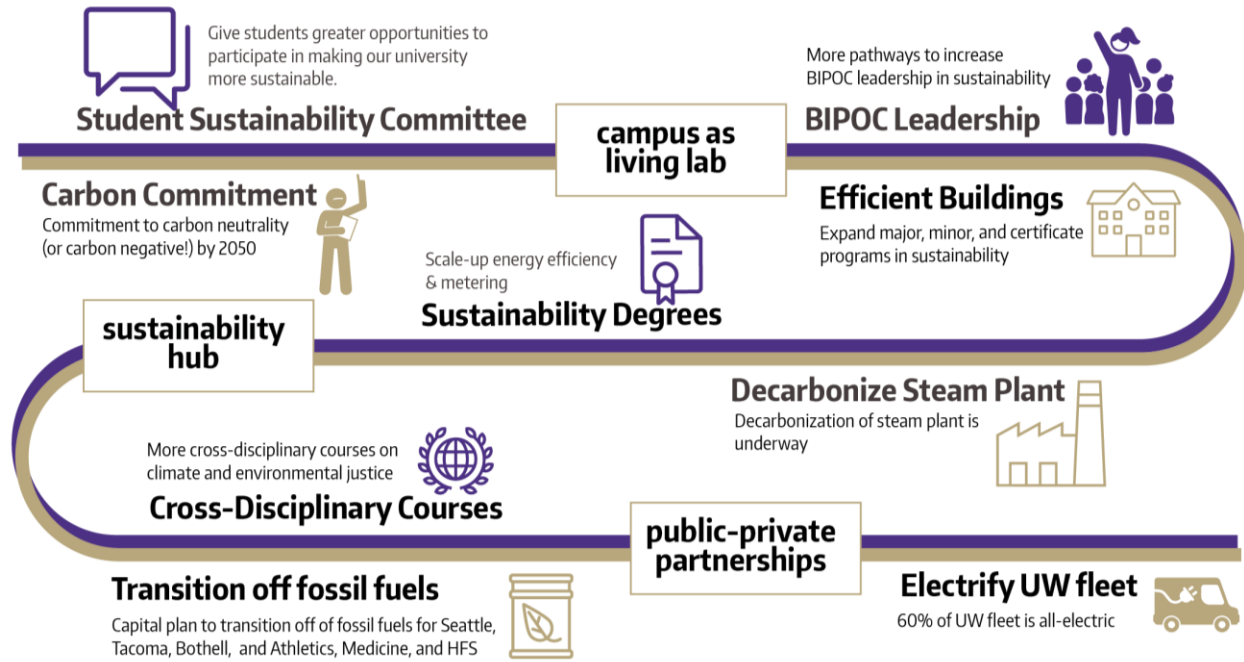
ultimately putting UW in a better position to accelerate and scale-up our progress. Examples of gaps and opportunities to be addressed:

- **Vision and structure:** The updated SAP will follow a more common plan structure that is centered on our vision for a sustainable future. Plan objectives, goals, targets, and actions will be grounded in data and best available science, where appropriate.
- **A plan informed by science and data:** SAP targets and interim targets will be re-evaluated to ensure that they are based on a combination of best available science (e.g. IPCC¹ assessments), an analysis of UW emissions sources, and external factors such as City of Seattle mandates, State legislation, and more.
- **Targets and actions:** The updated SAP will ensure that SAP targets and actions are specific, with intended outcomes that are well defined. The update process will also ensure that targets are measurable (where applicable) and time-bound, with baseline and/or method for measuring progress.
- **Topical gaps:** The updated Plan will include several key topic areas that are absent in the current SAP, such as: natural resources, green building, climate adaptation and resiliency, water conservation in operations, and plastic consumption – especially single use plastics.
- **Policy and Financing:** The updated Plan will identify potential new policies, programs, and procedural changes that will help advance SAP goals. It will also provide rough estimates of cost and/or resources needed, ideally at the action item level.

The process of updating the Plan will involve asking key questions about UW plans for the future, such as: “Where do we want to be in 5 years, 20 years, and 50 years as an organization?”. Forward thinking will help illuminate the goals, interim targets, and strategies for our Sustainability Action Plan. An example of what that forward thinking might look like on a 5-year time frame is below:

¹ IPCC stands for the [Intergovernmental Panel on Climate Change](#), and is the United Nations body for assessing the science related to climate change. With 195 members from across the globe, this body is widely regarded as the global leading body of scientific information on climate change drivers.

SUSTAINABILITY UPDATE



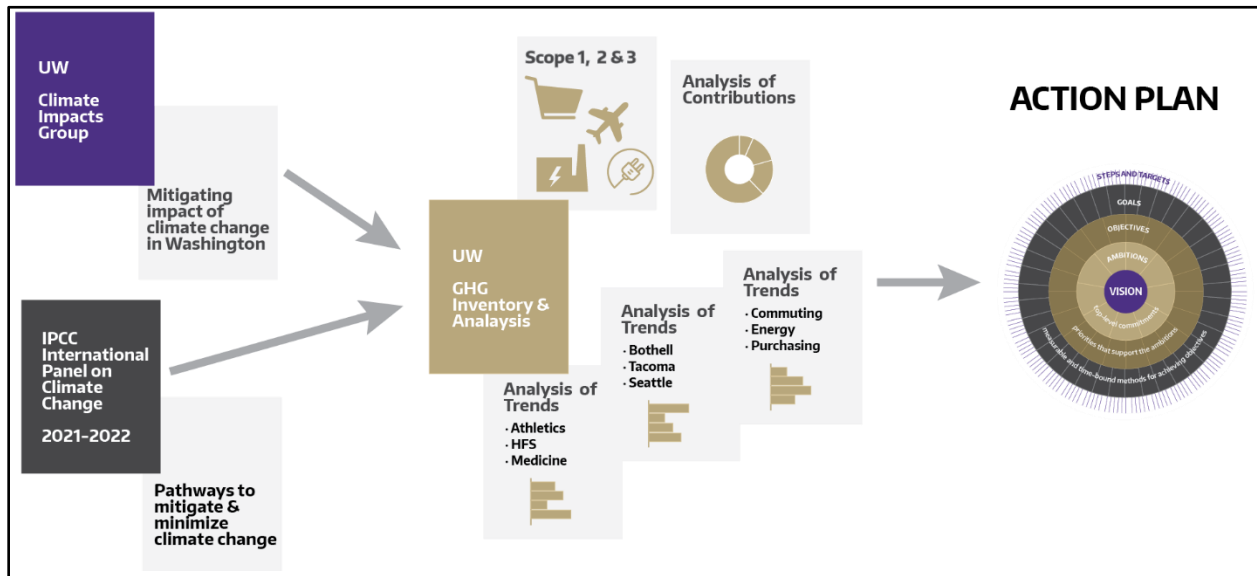
Equitable and diverse engagement across the entire organization will be a priority for this effort, with UW students, faculty, staff, and extended community playing a critical and central role in providing input. The SAP update will begin after completion of the greenhouse gas emission inventory and analysis report, likely in early 2023.

5. Greenhouse Gas Emissions Inventory and Analysis Report

In order to develop a Sustainability Action Plan that is informed by data and best available science, a complete picture and assessment of Greenhouse Gas Emissions (GHG) across the organization is needed. The UW Sustainability Office is conducting a GHG Inventory and Analysis project through a professional services contract. UW tracks and reports “Scope 1” emissions from combustion of fuels (e.g. combustion of fuels in boilers, furnaces, and vehicles), and emissions from the generation of the electricity consumed on campus (referred to as “Scope 2”) annually, as required under State mandates. However, this is the first time that UW will conduct a consumption-based inventory as part of its Scope 3 emissions. Scope 3 emissions are from other sources that an organization has less direct control over. Scope 3 emissions, also referred to as value chain emissions, often represent the majority of an organization’s total GHG emissions. Examples include employee commuting, air travel, goods and services purchased, and more. This report will provide a holistic and granular analysis of GHG reduction progress over our 2005 baseline. The report will also parse out GHG composition for UW’s

SUSTAINABILITY UPDATE

three campuses, for each self-sustaining unit including UW Medicine, and show trends for sectors and subsectors. Below is a diagram demonstrating the GHG Inventory process, and foundational element for the Sustainability Action Plan.



Lastly, the report will include a contribution analysis of key changes in operations-based emissions (e.g. corporate average fuel economy (CAFÉ) standards, fuel source changes in the electric grid, new local, state, and federal policy, etc.), and a wedge analysis of pathways to meet our GHG reduction targets.

This project is more than a simple accounting exercise of UW’s emissions. Rather, it is an accounting and analysis of emissions across the organization to understand trends and potential areas of opportunity for GHG reduction. It will serve as a foundational and comprehensive report of UW’s Scope 1, 2, and 3 emissions, with a level of granularity to better inform where UW can be most impactful, both for the organization as a whole and individual units.

6. Green Building Standard

The Office of Sustainability is leading an inter-departmental effort to update UW’s existing green building standard. The new revised standard will be more robust, addressing such items as: new construction and different scales of building renovation, conducting a life cycle cost analysis for decision-making, addressing embodied carbon, and developing a process framework to successfully implement the standard. This work is being completed in collaboration with a green building consultant professional services contract.

SUSTAINABILITY UPDATE

SUMMARY

The six items outlined above will be the primary focus of the Office of Sustainability's efforts for FY22-FY23. Final key takeaways for the Board of Regents are:

1. New state and local mandates for energy efficiency and greenhouse gas reduction will require significant financial investment, as well as coordination and partnership within and outside the University. It behooves the University to advance the energy transformation strategy as expeditiously as possible to ensure regulatory compliance and avoid costly fees.
2. The energy transformation strategy is a critical step (a once in a generation opportunity) to dramatically reduce and eventually eliminate UW's dependence on fossil fuels. Moreover, implementation of the strategy provides innovative living lab opportunities which will advance UW's core educational mission and vision for responsible global citizenship.
3. The Office of Sustainability is leading the development of a clear organization approach to sustainability, through the development of sustainability mission and vision statements. UW has a profound opportunity to contribute significantly in addressing our most urgent environmental challenges; and UW will benefit from one shared vision and mission for addressing these challenges with deliberate action and a sense of urgency.
4. Updating UW's Sustainability Action Plan (SAP) is an important next step to accelerate and scale-up our efforts to meet our global environmental challenges. Once complete, the updated SAP will: 1) Be centered around a clear vision and mission for UW sustainability, 2) Be grounded in data and best available science, 3) Include targets that are measurable and time-bound, where feasible, 4) Address gaps in scope, 5) Include UW's three campuses and self-sustaining units (i.e. UW Medicine, UW Athletics, UW Housing and Food Services), and 6) Identify specific action items, including policy, process, and programmatic changes. Financing and resource needs will be approximated, ideally at the action item level.
5. Revising UW's green building performance standard is a critical component of our organizational sustainability strategy to better address operational and embodied carbon, total cost of ownership, and high-quality learning environments for new construction, remodels, and renovation of our facilities.