UNIVERSITY of WASHINGTON
FACILITIES

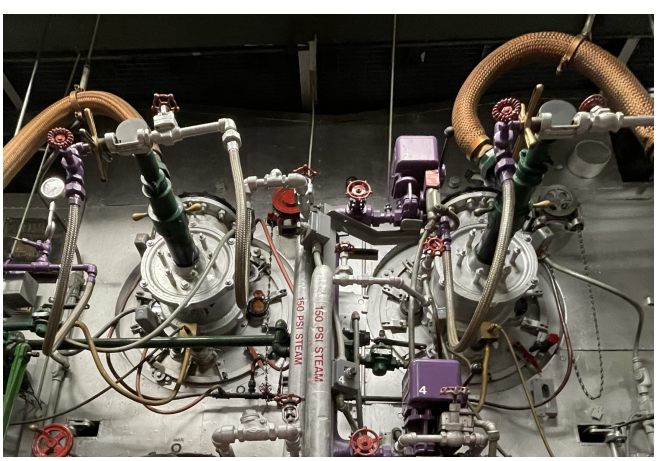
CLEAN ENERGY STRATEGY

The University of Washington is developing an innovative energy transformation strategy for transitioning the Seattle campus energy infrastructure to 100% clean energy. This monumental undertaking will modernize our energy infrastructure and better align UW's sustainability values with daily campus operations.

THE NEED FOR ACTION

The Seattle campus energy system has served the campus well for over 100 years, but its age and dependence on fossil fuels no longer align with the mission of the University. Maintaining status quo puts the UW in substantial financial and reputational risk. UW's clean energy transformation strategy will meet the following objectives:

- Maintain a level of service worthy of a world-class research institution
- Model solutions to environmental and financial challenges
- Remain flexible to future technologies
- Serve as a living lab
- Exceed city and state requirements
- Minimize total cost of ownership



NEED FOR INVESTMENT: The boiler pictured here has served the university for over 74 years and is well past its expected life. The energy system is overdue for recapitalization which positions us to convert to newer, cleaner technologies that will address the needs of the future campus.

Benefits

93% Reduction in Greenhouse Gases (GHGs)

55% Reduction in Energy Intensity

FOUR-PART CHALLENGE

Reduce Greenhouse Gas (GHG) Emissions: 93% of Greenhouse Gas (GHGs) emissions on the Seattle campus are generated by the Steam Plant. Eliminating these emissions will help UW meet city and state GHG reduction mandates. If UW takes no action, UW will pay fines and allowances—from approximately $4 million in 2023 to $15 million in 2029.

Reduce Energy Consumption: Our mild climate and historically low energy costs have limited the financial benefits of many efficiency upgrades. As a result, our energy consumption per square foot of building space is nearly twice as high as targets set in the State's Clean Buildings Performance Standard. Rising utility costs combined with mandates for lower energy consumption are tilting the balance, demonstrating a strong business case for many efficiency projects.

Aging Infrastructure: Much of UW's existing heating and energy equipment is well past its useful life and in need of replacement. Continued reliance on this outdated equipment strains meaintenance resources and puts UW at risk of service disruptions and equipment failures that jeopardize our ability to provide the level of energy service needed by a major research powerhouse university.

Address Electrical Capacity Constraint: All of the electricity for the main Seattle campus comes through a single location. The maximum amount of electricity that can flow through that site at a given moment is constrained by the size of the cables and the need to maintain redundancy in case of a catastrophic failure. On hot summer afternoons when cooling demand is high, the Seattle campus approaches that maximum load and runs the risk of shutting off cooling. Additional electrical capacity is needed to add cooling to campus buildings, and meet new winter demand when we shift from fossil fuels to electricity for heating.

FIVE-PART STRATEGY

1) Energy Efficiency: To accelerate our work to make the campus more efficient we are installing additional meters, upgrading building control systems and expanding data analytics. This will provide the insights we need to optimize energy use. It will also help us comply with State and City building performance mandates.

2) Lower Temperature: A first step to shift off fossil fuels is to transition from a high temperature steam system to a lower temperature hot water system. This steps us up for part four of the strategy.

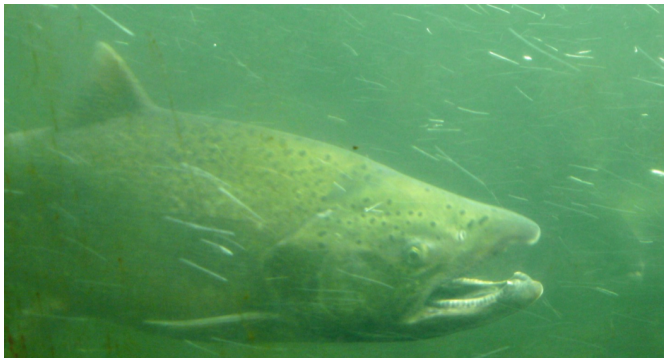
3) Transform Cooling: Cooling is energy intensive: a more efficient system will free up electrical capacity for decarbonizing. We will transform cooling by replacing inefficient, aging building chillers with cooling capacity from the central plant, add chilled water storage and potentially use deep-lake cooling to create a 'win win' for salmon and UW energy infrastructure.

4) Electrify Heating: We can electrify the system by installing heat pumps to recover waste heat from multiple sources including cooling towers, sewer lines and Lake Washington.

5) Final Push (Full Decarbonization): To fully reduce our dependence on fossil fuels, we will need an alternate way to produce the steam needed to sterilize research and medical equipment. We will monitor developing technologies to be prepared to implement the best option to solve this challenge.

INNOVATION OPPORTUNITIES

Sewer Heat Recovery: One of the sources of waste heat is in the major sewer lines that run along the east and south edges of campus. Every day over 7 million gallons of sewage flows within 50 feet of the Central Power Plant and almost 10 million gallons flows within 100 feet of the West Campus Utility Plant. The available energy in this sewage is enough to supply 20% of the heat we need to keep our buildings warm and hot water running from our faucets and showerheads.



NOAA photo of Chinook Salmon in Ballard Locks

Deep Lake Cooling and Heating: Deep in Lake Washington the water temperature is stable making it an ideal candidate for using electric heat pumps to extract heat from that water in winter and cooling in summer. After extracting or rejecting heat from that water it would be released into the Ship Canal where the water is much warmer than deep in the lake. Early modeling suggests that this would cool this portion of the canal to a degree that would benefit migrating salmon who currently suffer from excessive heat.

THE OFFERING

The University of Washington operates one of the largest district heating systems in the state. This is an opportunity to partner with other agencies, universities, hospitals, and cities to show what is possible when decarbonizing a heating system.

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