Thermal Systems Transition Taskforce

Staff Report

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SUMMARY

The University of Oregon has a long-running series of climate commitments, beginning in 2007 with the signing of the American College and University President's Climate Commitment, generally referred to as Climate Action Plans (CAPs)[1]. CAP 2, which was issued in 2019, was largely composed of a series of studies, the most consequential of which focused on reducing greenhouse gas emissions (GHG) from the University of Oregon's Eugene campus steam-based district heating system[2]. This study was released in the fall of 2022. Interim president Phillips established the Thermal Transition Taskforce (hereafter Taskforce) including members of the Board of Trustees, senior administrators, faculty experts and students to recommend a course forward for the President on or around the end of calendar year 2023. The Taskforce charge and membership can be found in Appendix I. If the university were to move forward with any of the decarbonization efforts analyzed in this report it is anticipated that capital investments would be sufficiently large to require action by the Board of Trustees. Because of the scale and significance of potential investments two members of the Board of Trustees were included in the Taskforce to ensure deep familiarity with the subject matter when and if such investments are brought forward. The Taskforce findings and recommendations are expected to be discussed with the Board of Trustees in March 2024.

As a part of CAP 2, an initial study of the campus heating system, using Affiliated Engineers, Inc. (AEI) was commissioned. The AEI final report was issued in late 2022 and included four basic options, Business as Usual (Option 1), conversion to an electrode steam boiler (Option 2), replacing the steam heat distribution system with a hot water distribution system and implementing heat recovery chillers (Option 3) or building on Option 3 with the addition of an alternative heat source – at that time using either the Millrace or the Willamette River (Option 4). The University commissioned a follow-on Conceptual Design report from Burns & McDonnell, a national engineering and construction firm with significant experience in large utility system design and construction.

During the Taskforce's due diligence process and through the analysis of the Burns & McDonnell project team, Option 4 was amended. A geoexchange thermal storage system (hereafter geoexchange) replaced the Millrace and Willamette River as the alternative heat source as these water bodies were not viable. Option 2 was expanded to include two options, Option 2A and 2B which are an 18 MW electrode boiler and 8 MW boiler, respectively. The addition of Option 2B was made when it became clear that Option 2A would require significant up-stream utility system investments and thus was more costly than originally anticipated.

Burns & McDonnell reviewed and updated the cost to maintain BAU through 2085. They completed a conceptual design for a steam to water conversion of the campus heat distribution system and Option 3 heat production, a preliminary design for the Option 4 geoexchange system, and initial designs for Options 2A and 2B. This significantly improved the accuracy of construction cost estimates, operational costs and emissions reductions and allowed for "apples-to-apples" comparisons across BAU and the four options in terms of capital outlays, project timelines, total operating costs, campus operational impacts and emissions reductions, as requested by the Taskforce.

Options 3 and 4 necessitate extensive and disruptive capital projects in order to direct bury hot water distribution lines across campus that connect with nearly every major building, significant in-building improvements, and finally major equipment investments at our central power station and in surrounding

[1] University of Oregon Climate Action Plan. <https://cpfm.uoregon.edu/university-oregon-climate-action-plan>.
[2] University of Oregon: Climate Action Plan 2. <https://cpfm.uoregon.edu/climate-action-plan-two>.

areas.

Options 2A and 2B were determined to be much less disruptive, lower cost on an annual and net present value basis over the 60-year study period, and reduced GHG emissions more quickly and to equal or greater degrees than other available options. Both 2A and 2B have unique attributes which are discussed in greater detail in this report.

The longer than typical analysis period, 60 years, was designed to ensure that the potential benefits associated with the large capital investments with Options 3 and 4 were fully accounted for. It is worth noting that any analysis of that length is highly sensitive to small changes in cost escalation factors and discount rates. The Taskforce spend considerable effort to engage with internal and external experts to model these assumptions. Sensitivity analysis are included in the Burns & McDonnell report found in Appendix III.

No options result in annual cost savings until at least the early 2060's and these options would require such large capital investments that they would not have a positive payback for well over 100 years if ever under the modeling assumptions used.

The final Burns & McDonnell presentation was received in late January 2024. An executive level presentation of material is included as Appendix II and the final report, excluding infrastructure diagrams which include sensitive information not generally disclosed is included as Appendix III.

Ther Taskforce engaged with stakeholders, University of Oregon and external experts, market participants, and the campus community extensively and repeatedly through its 14 month long due diligence process. This staff report summarizes the information developed during that process and utilized during the Taskforce's deliberation. This includes background on the University of Oregon's extensive work over multiple decades to reduce its energy usage on campus, the process the Taskforce undertook, and the options currently available to the university. Separately, the Taskforce has submitted to the President its recommendation on the most prudent course forward for the university to reduce its GHG emissions in line with its charge.

CLIMATE ACTION PLAN (CAP) 1

University of Oregon then-President David Frohnmayer signed the American College and University President's Climate Commitment (ACUPCC), a program supported by the Association for the Advancement of Sustainability in Higher Education (AASHE) in 2007. The University of Oregon's Office of Sustainability was established in Fall 2007, in part to manage the University of Oregon's obligations under the ACUPCC. These obligations included completing emissions inventories and drafting a Climate Action Plan. In 2010, the office's director submitted a Climate Action Plan which was signed by then-President Richard Lariviere. This included an emissions inventory and a public goal to eliminate institutional emissions by 2050 but lacked a detailed plan to achieve it.

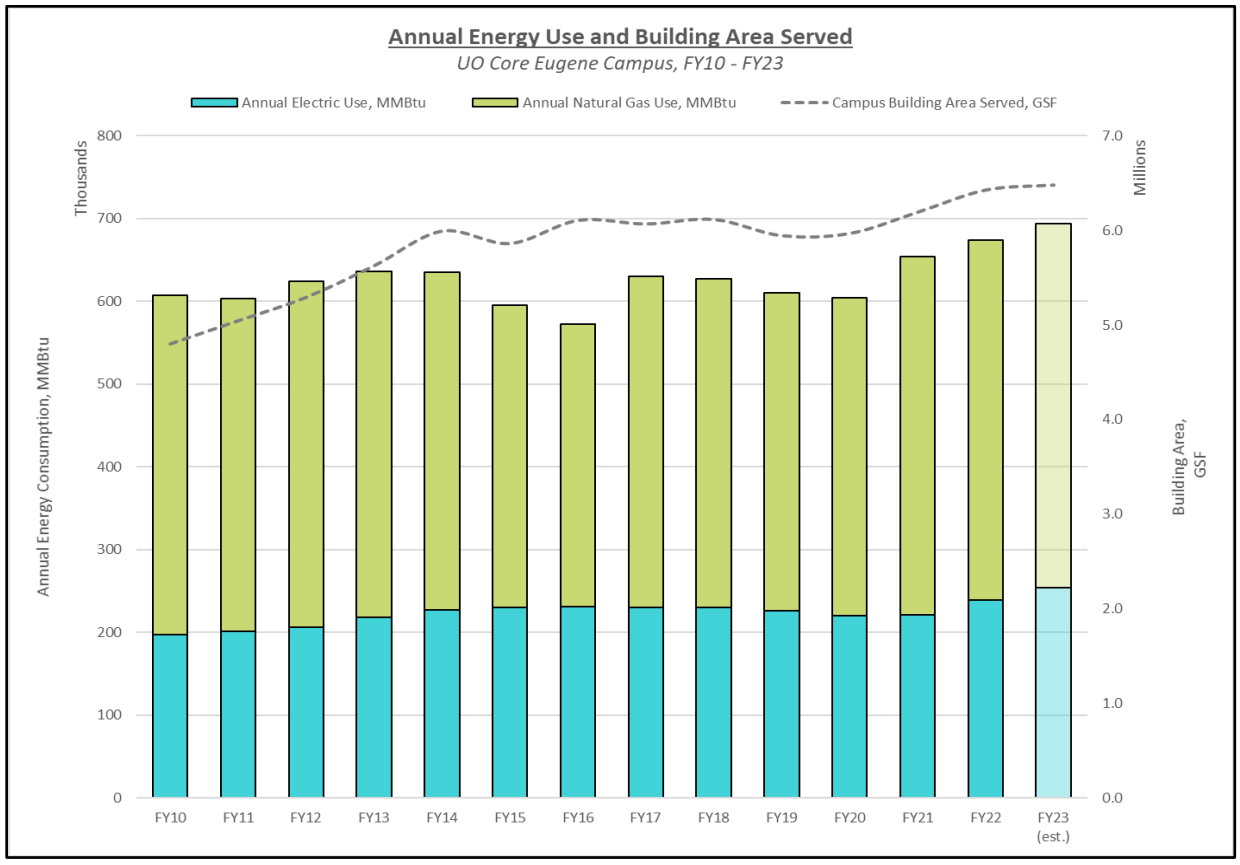
The Oregon Model for Sustainable Development (OMSD) was the most important result of CAP 1. It

required all newly constructed buildings to be certified LEED GOLD and designed to perform 35% better than state energy code. The OMSD also required building projects to invest in energy efficiency work elsewhere on campus in order to offset any new energy loads created by new buildings with energy savings in older facilities. The campus map highlights in yellow newly constructed LEED certified buildings, newly constructed and remodeled energy-efficient buildings in light green (2000-2010), and those improved by OMSD related projects in dark green between 2011 -2020. The graph below shows that until 2019 the OMSD held energy and emissions from campus buildings at 2011 levels while adding significant new building space to campus.

CAP 2

In 2018, student leaders met with then-President Michael Schill to discuss the University's ongoing emissions reduction efforts. They asserted that the University needed to set firm climate action goals in line with University of Oregon's mission to steward resources sustainably and responsibly. Student leaders also petitioned University leaders to develop specific emissions reduction plans that followed the best available climate science and research. At about the same time it also became clear that the University could not continue meeting the OMSD's commitments because easily accessible energy efficiency projects in existing buildings had been completed and new projects – including the Knight campus – would increase energy demand. There were no longer sufficient projects to offset the energy consumption of newly constructed buildings at an acceptable cost. The graph on the following page, Annual Energy Use and Building Area Served, provides information on both total campus gross square footage (GSF) and energy consumption, which remained relatively flat between 2010 and 2020 while GSF served increased from under 5 million to over 6.5 million.

In 2019, then-President Schill rescinded the CAP 1 emission pledge to eliminate GHG emissions by 2050 as it became clear that the University of Oregon did not have action plans that supported this goal. He also rescinded the OMSD requirement that new energy loads be offset with energy efficiency projects on campus. Finally, he updated the University's Climate Action Plan for the five-year period 2019-2024. The



goal for CAP 2 was to invest time and resources into data gathering, analysis, and planning so that new public emission goals could be established, with a better understanding of the investments and plans that would be necessary to implement them. Key among the areas recognized for additional study and planning were:

- identifying means to heat the university's buildings while reducing GHG emissions, and
- studying fast-developing state and federal climate policy.

CURRENT CONTEXT

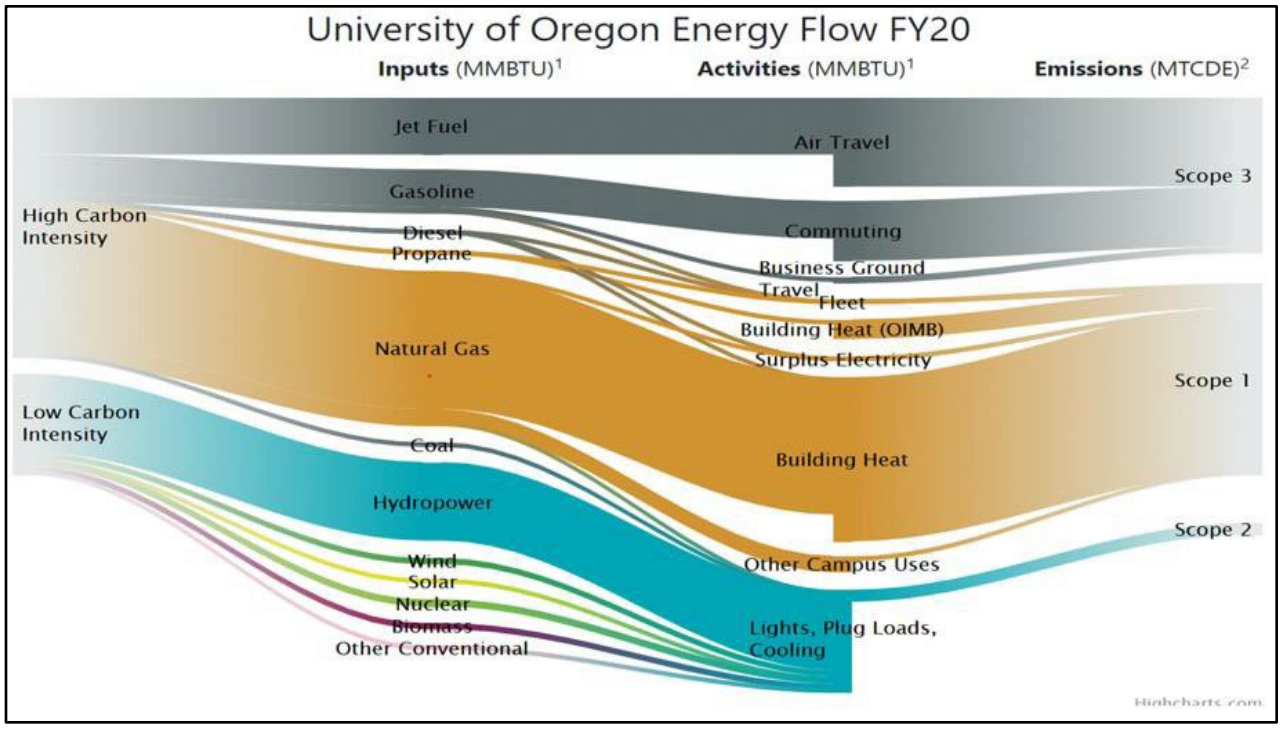
The University of Oregon Energy Flow FY20 infographic on the next page illustrates institutional energy usage, sources, business purpose, and associated GHG emissions for fiscal year 2020. This is the most recent available information for normal campus operations. Fiscal years 2021 through fiscal year 2023 are affected by COVID and do not provide data that is reasonably representative of campus emissions. The diagram shows sources of energy on the left-hand side, their uses in the center right and relative GHG emissions and "scope" classification on the right-hand side. Scope 1 emissions are those that an entity has direct control over. The university's heating system is the largest single point source emitter of Scope 1 GHG at the university. For this reason, it provides the most significant opportunity to reduce emissions.

OREGON CLIMATE POLICY

During the 2019 legislative session the Oregon Legislature proposed a carbon emissions reduction policy commonly known as HB2020. Its goal was to reduce emissions 45% from a 1990 baseline by 2035 and 80% by 2050. The bill proposed a declining state-wide carbon emissions cap that would require large

emitters to reduce emissions. The bill passed the house but died in the Senate when a number of members walked out and denied the Senate the quorum necessary to proceed[3]. Following the walkout, then-Governor Brown charged the Oregon Department of Environmental Quality (DEQ) to develop and manage a program with similar goals. In January 2022, DEQ launched the Climate Protection Program (CPP) utilizing its regulatory authority. The CPP's goal was to cut emissions from fossil fuels in half by 2030 and by 90% by 2050. This includes the emissions from burning natural gas. In December 2023, the Oregon Court of Appeals ruled in favor of fossil fuel companies and ended the CPP. Those challenging the laws include Northwest Natural Gas (NW Natural) who provides transit of natural gas through its pipeline system to the University of Oregon.

The Oregon Court of Appeals found that the DEQ did not properly follow rule setting procedures and thus the program was invalidated. The DEQ has elected to not appeal the decision but will begin the



rulemaking process again, as they believe this will be the fastest means for the CPP to come back into effect[4].

The Oregon Court of Appeals did not rule on the substantive merits of the suit, and it can reasonably be expected that the same or similar groups will take subsequent legal action on those issues if similar rules are adopted by DEQ through its newly launched rulemaking process. It may take several additional years for courts to hear and rule on these issues. Because of this, there is likely to be substantial uncertainty as to the authority of DEQ to implement CPP for several more years. If these regulations survive judicial

[3] Dake, Lauren. "*Oregon's 2020 Legislative Session Ends With Little TO Show After Republican Walkout".* Oregon Public Broadcasting. Mar 5 2020. <https://www.opb.org/news/article/oregon-2020-republican-walkout-legislative-session-ends/>.

[4] Kamins, Jacqueline. "*N.W. Natural Gas Co v. Environ. Quality Comm"*. 329 OR App 648 (2023). Court of Appeals of the State of Oregon. < https://cdm17027.contentdm.oclc.org/digital/search/collection/p17027coll3%21p17027coll5%21p17027coll6/searchterm/A178216/field/all/mode/all/conn/all/order/date/ad/desc>.

"*DEQ moves to re-establish the Climate Protection Program in wake of recent court ruling."* Department of Environmental Quality. Jan 22, 2024. <https://www.oregon.gov/newsroom/Pages/NewsDetail.aspx?newsid=215174>.

scrutiny on the merits it will take many additional years to determine whether these regulations can be implemented without major market disruptions.

The CPP was invalidated by the Oregon Court of Appeals at the very end of the Taskforce process. This caused the Taskforce and its consultants to adjust their modeling significantly. An alternative scenario to BAU had been developed assuming both cost estimates for complying with CPP and GHG reductions associated with CPP. This was, according to the analysis, the least cost means to realizing substantial GHG reductions as it allowed the university to continue using the existing systems in place and natural gas on a heat unit basis is several times less expensive than using electricity. However, there was substantial doubt by Taskforce members that natural gas providers could effectively decarbonize the natural gas supply in compliance with CPP over the long-term, much less do so economically.

After the CPP was invalidated this option was generally removed from the consultant's presentations and reports as it is, as of publication date, not in force. However, that data and analysis exist and can be re-integrated into the University of Oregon's emissions reduction planning at a future date. For information purposes the anticipated total cost and estimated GHG reductions are included in a table listing the total NPV capital and operating costs and anticipated emissions reductions.

THERMAL SYSTEMS TRANSITION STUDY

In 2020, the University of Oregon's Design and Construction office commissioned Affiliated Engineers, Inc. (AEI) with conceptualizing and analyzing options for a less carbon-intensive campus-wide heating system over a 30-year period. Completed in the fall of 2022, the initial Thermal Systems Transition study (AEI Study) identified options for transitioning the University of Oregon campus from its existing to a system with significantly lower carbon emissions (Appendix IV). A wide range of options were considered. Some of these options were eliminated from consideration for reasons including prohibitive cost, lack of space on campus, or because they were insufficient to University of Oregon's energy needs.

When commissioning the AEI Study, the Office of Sustainability specified that any proposal must meet at least a 50% annual emissions reduction and aim for at least 80%. The baseline for calculating these percentages reflects the GHG emissions levels associated with BAU, which consists of the university's existing centralized natural gas-based steam heating plant and steam heating distribution throughout campus.

In the study, AEI identifies five feasible options and describes, in broad strokes, the rationale, potential ramifications and rough order of magnitude costs of each option. University of Oregon staff removed the fifth option, consisting of nodal heating systems in place of a campus-wide district system, from consideration because it was determined that the campus does not have adequate space in sub-districts for multiple heat plants.

Building off of the AEI Study the university commissioned a follow-on report through a competitive bidding process from Burns & McDonnell, a national engineering and construction firm. Burns & McDonnell was initially asked to develop Concept Designs for Options 3 and 4 from the AEI Study to provide detailed feasibility and cost effectiveness at the University of Oregon. In consultation with University of Oregon's Design and Construction office and Sustainability Office, additional options from the AEI Study were analyzed. The full set includes Business As Usual (Option 1), 18MW electrode steam boiler (Option 2A), 8MW electrode steam boiler (Option 2B), steam to hot water distribution system conversion and heat recovery chillers (Option 3), and an expansion of Option 3 to include a geoexchange thermal storage system (Option 4).

DESCRIPTIONS OF OPTIONS

The following descriptions are taken from the Burns & McDonnell report, including the summary below which is taken in whole.

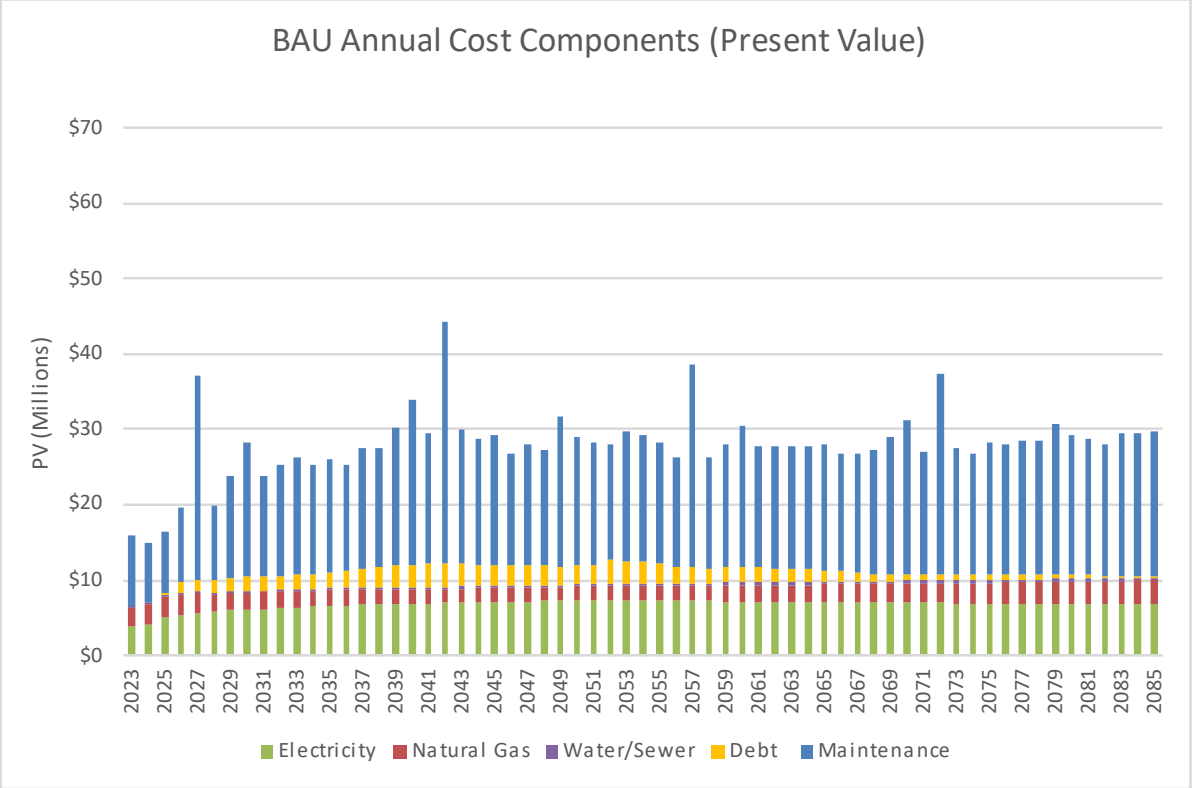
Option	Summary
Business as Usual	Continue providing steam to campus through existing boilers. Chillers and boilers replaced as required. Three additional 1,500 ton chillers added over time to continue to meet campus demand.
Option 2A	Addition of an 18 MW electrode steam boiler and continued use of steam throughout campus. Three additional 1,500 ton chillers added over time to continue to meet campus demand
Option 2B	Addition of an 8 MW electrode steam boiler and continued use of steam throughout campus. Three additional 1,500 ton chillers added over time to continue to meet campus demand.
Option 3	Conversion of campus to hot water with two 1,250 ton simultaneous heat pump chillers, a 1.6M gallon hot water thermal energy storage tank, and (4) 30 MMBtu steam-HW heat exchangers served by existing natural gas boilers. This option contains an expansion of the chilled water plant just to the north of the existing plant to house the new heat pump chillers and heat exchangers. This option also contains all the hot water distribution across campus to serve hot water to buildings, as well as the building conversions required to convert from steam to hot water. This option also requires two additional 1,500 ton electric chillers to meet demand.
Option 4	Conversion of campus to hot water with a similar scope and the same equipment as required for Option 3 plus ground source heat pump chillers connected to a geoexchange field containing 1,400 boreholes 600' deep. The geoexchange borefield is anticipated to be placed just north of the existing chilled water plant across the railroad tracks. This option also evaluated using the Millrace or Willamette as a heat source/sink instead of a geoexchange system although this was found not to be viable due to regulatory issues.
Source: Burns & McDonnell	

EXISTING UTILITY SYSTEM – BUSINESS AS USUAL (BAU)

The existing campus heating and cooling utility systems at the University of Oregon consists of a chilled water plant, a steam plant, and a cogeneration system that provide utilities across campus distributed through approximately four miles of utility tunnels. The existing steam plant consists of two watertube boilers - One 60,000 pound per hour (lb/hr) boiler and one 65,000 lb/hr boiler. The current steam system has a peak demand of 115,000 lb/hr. The existing cogeneration system consists of a 65,000 lb/hr heat recovery steam generator coupled with a 2.5 megawatt (MW) backpressure steam turbine, a 7.5 MW combustion turbine generator, and a 1,200 lb/hr clean steam generator. The gas turbine remains in standby mode most of the year and is only used during maintenance tests and when there is a loss of power from the local utility provider. The existing electrical power system consists of two 115 kilovolt (kV) feeders from the local Public Utility District – Eugene Water and Electric Board or EWEB – 12.47kV power transformers and a GIS switchgear supplying all electrical loads on campus. There is reserved space within the substation yard for a third transformer should it ever be needed. The current electrical peak demand is approximately 14.3 MW.

Annual emissions from BAU are estimated to be approximately 25,000 tons. All emissions in the BAU case are produced on-site from the burning of natural gas at the central power station.

The chart below shows all estimated annual costs in 2023 dollars to operate BAU from 2023 to 2083. These include electricity and natural gas purchases from local utilities, annual debt payments, maintenance, and capital replacement. In 2023, the annual cost is $16 million. Its present value increases to $30 million by 2083. The total present value cost across the 60-year study period for BAU is $1.7 billion. Years with larger Operations and Maintenance expenses include periodic capital replacements.

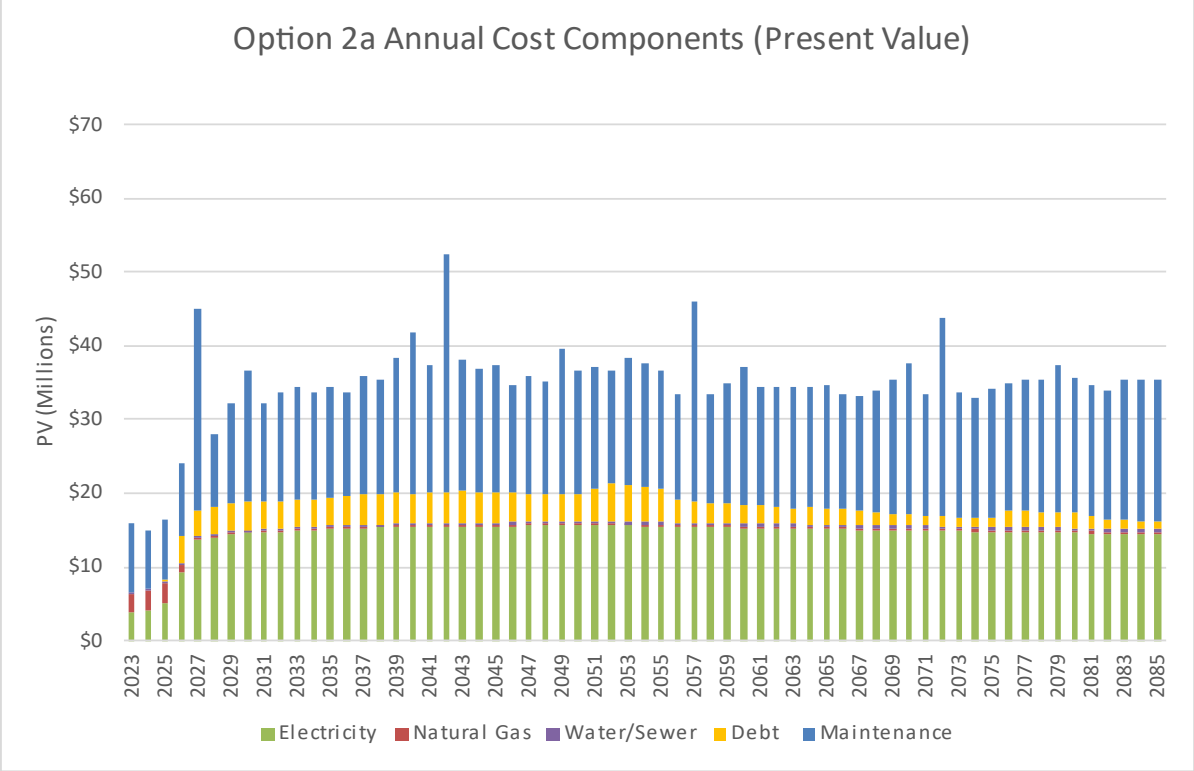


18 MW ELECTRODE BOILER – OPTION 2A

Option 2A utilizes the existing campus steam distribution system, but adds an 18 MW, 61,000 lb/hr electrode boiler at the power station. Based on a weather normalized steam load curve, the electrode boiler is anticipated to provide 387,000 kilopounds (klbs) of steam annually, or approximately 97% of the total campus steam load after installation in 2027. This option will require the existing gas boilers to meet peak load. The electrode boiler is expected to be placed in the empty bay in the boiler plant previously reserved for a second gas turbine. Because of the large additional energy load of the electrode boiler a significant amount of new electrical infrastructure is required, including a transformer at the existing substation. The total estimated construction cost of the 18 MW electrode boiler in 2023 dollars without escalation is just less than $30 million. Instillation and operations could be reached in approximately five years from an investment decision.

Once installed, Option 2A is anticipated to reduce annual emissions by approximately 20,000 metric tons or result in 78% fewer annual emissions than BAU.

The chart below shows all estimated annual costs in 2023 dollars to operate the Option 2A heating system described above. Annual debt payments increase to cover the electrode boiler and associated infrastructure, but are roughly offset by the decrease in natural gas costs. Annual maintenance costs are the same for Option 2A and BAU. However, once the electrode boiler is operational in 2027, the present value of electricity costs would be $13,700,000 annually. The present value of electricity under BAU is $5,500,000. Thus, the total annual cost for Option 2A is roughly $8.2 million more per year than BAU.

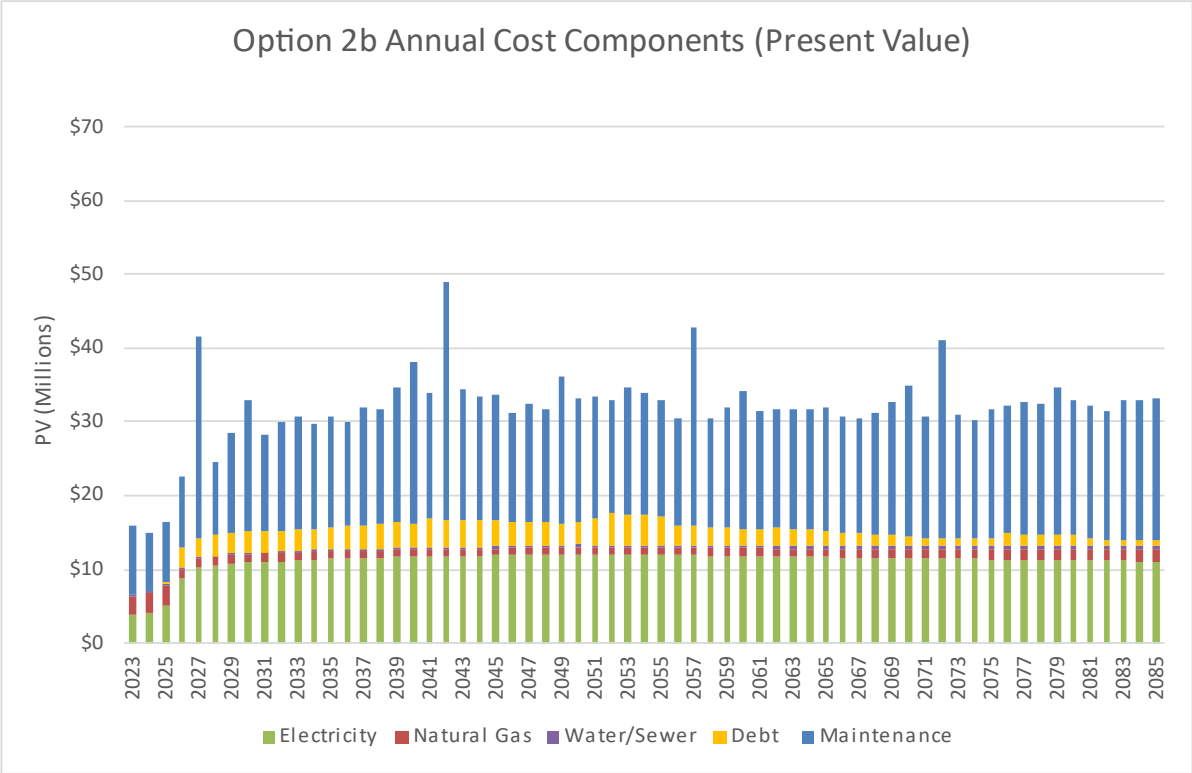


8 MW ELECTRODE BOILER – OPTION 2B

Option 2B utilizes the existing campus steam distribution system, but adds an 8 MW, 26,800 lb/hr electrode boiler. This size was selected to maximize boiler size but avoid the expensive transformer addition required for Option 2A. Based on a weather normalized steam load curve, the 2B electrode boiler is anticipated to provide 230,000 klbs of steam annually, or approximately 54% of the total campus steam load when first installed in 2026. This option will still require the existing gas boilers to meet peak loads. The electrode boiler is expected to be placed in the empty bay in the boiler plant previously reserved for a second gas turbine. The total estimated construction cost of the 8 MW electrode boiler in 2023 without escalation is just less than $15 million.

Once installed, Option 2B is anticipated to reduce annual emissions by approximately 11,700 metric tons or result in 46% fewer annual emissions than BAU.

The chart below shows all estimated annual costs in 2023 dollars to operate the Option 2B heating system described above. Annual debt payments increase as to cover the electrode boiler and associated infrastructure, but are roughly offset by the decrease in natural gas costs. Annual maintenance costs are the same for Option 2B and BAU. However, once the electrode boiler is operational in 2026, the present value of electricity costs will be $10,200,000 annually. The present of value of BAU electricity is $5,500,000. The total annual cost for Option 2B is roughly $4.5 million more per year than BAU.



HEAT DISTRIBUTION SYSTEM UPGRADES NECESSARY FOR OPTIONS 3 AND 4

Options 3 and 4 heat production systems, heat recovery chillers (HRC) in Option 3 and HRC plus geoexchange thermal storage in Option 4, are capable of producing hot water, not steam. The current steam distribution system cannot be re-purposed to carry hot water. Therefore, a new heat distribution system would have to be installed in order to move forward with Options 3 or 4. Generally speaking, the existing utility tunnels are not large enough to accommodate the proposed hot water distribution pipes. Though the University of Oregon's existing steam distribution system is highly efficient for a steam system, a hot water distribution system is an inherently more efficient heat transmission medium. If the university were to move forward with a water distribution system, Burns & McDonnell has recommended trenching and direct burying the pipes across campus to build a new hot water distribution loop.

Constructing a new heat distribution system while maintaining the existing steam system is costly and will be very disruptive to normal campus operations for many years while the new system is being deployed. In addition to installing pipes that connect campus buildings to the central power station, significant changes are required in many buildings. Burns & McDonnell proposed a phased approach with a total estimated timeline of 12 years from the initiation of the first phase. Distribution and building conversions are summarized below. Significant additional detail is contained in the final report from Burns & McDonnell (Appendix III).

HOT WATER DISTRIBUTION INSTALLATION

The majority of a new hot water distribution system would be direct buried, pre-insulated metal piping. The remaining distribution is routed in existing tunnels, where space is available, or in new tunnels. Two new tunnels are planned. The first is a new 'west tunnel' that is routed across the Millrace and Franklin Boulevard from the CHW Plant to the northwest corner of Lawrence Hall. The second new tunnel is from Knight Library to the Student Recreation Center (SRC) via the pathway south of Gerlinger Annex, University St, and 15th Ave. In general, the hot water pipe routing considered the following:

- location of existing tunnel system,
- utilization of routing pipe in existing tunnel sections with extra room,
- building mechanical room locations,
- important trees and landscape across campus, and
- creation of a looped system to allow redundant feeds to most areas of campus.

It should also be noted that the proposed distribution system is routed through multiple public streets in order minimize campus disruption, create a looped/redundant system, and minimize impact to important and historical landscape. Routing is currently proposed in the following public streets:

- Franklin Blvd. from the East Tunnel to Agate St. (East-West),
- Agate St from Franklin Blvd. to 15th Ave. (North-South), and
- Kincaid St from McKenzie Hall to Knight Library (North-South)

Given the scale of the project and the need to operate the existing steam system during construction of the new hot water system, a phased approach was recommended. The phasing approach requires piping/tunnels to be installed while Franklin Boulevard is under construction, tentatively scheduled by the City of Eugene in 2026. The remaining distribution system installation is split into six two-year phases to

complete the campus conversion in roughly 12 years once phase 1 starts. There is a risk that these phases could slip past schedule and be prolonged beyond the anticipated two years.

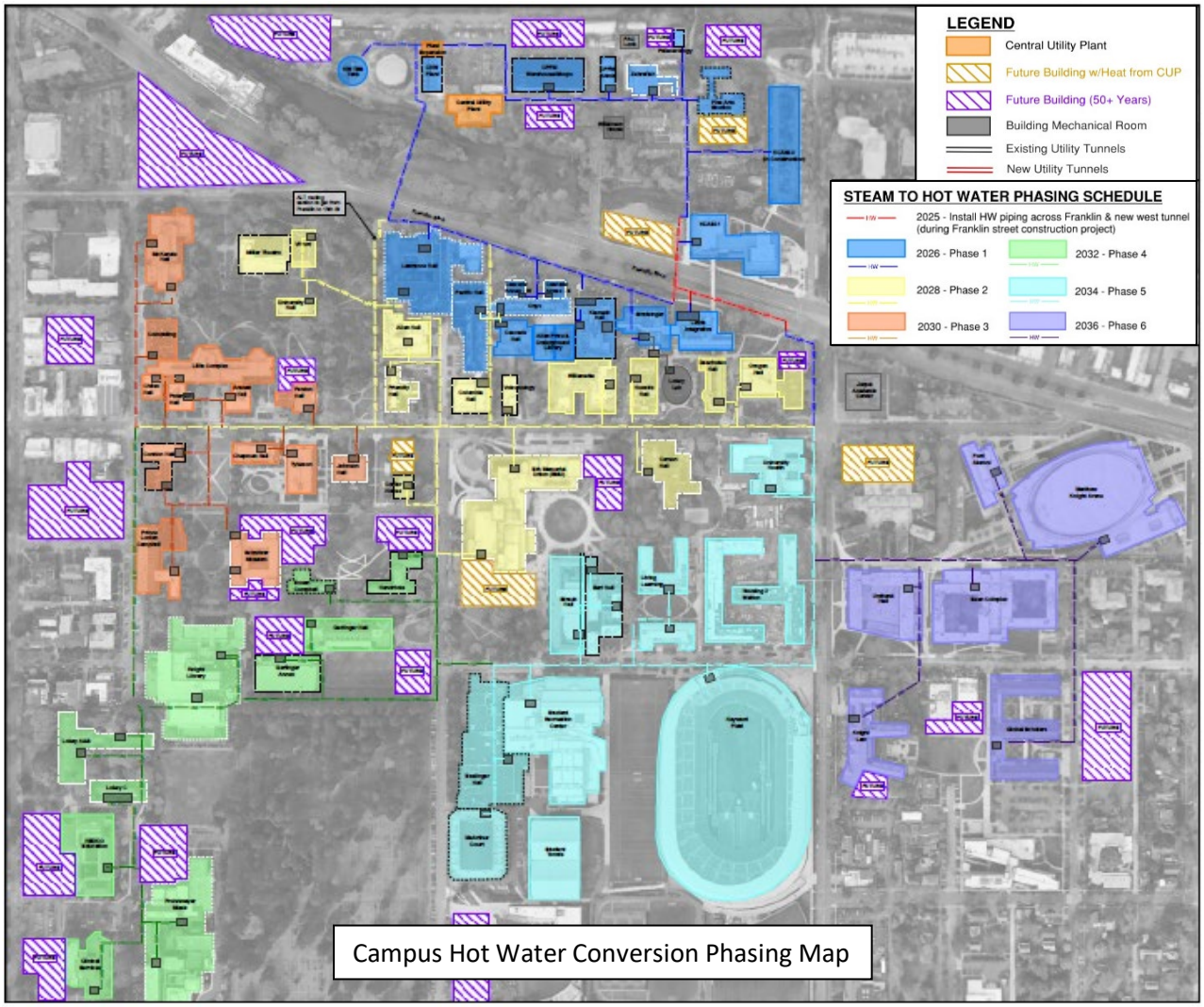
BUILDING CONVERSIONS

Burns & McDonnell examined several buildings on campus and created representative cost estimates to convert these existing buildings from steam to hot water heating. Burns & McDonnell then worked with University of Oregon Design and Construction staff to better understand additional costs that may be incurred from building renovations and related modifications to establish representative cost estimates. These representative cost estimates were then applied to all buildings across campus based on building GSF, building steam usage, and anticipated complexity from site observations or drawings. Costs, developed by Design and Construction, were added for displaced use and preparing new locations for students and faculty during renovations. Additionally, the cost for two rental boilers to be used as needed throughout the building renovation process to minimize building shutdowns were included.

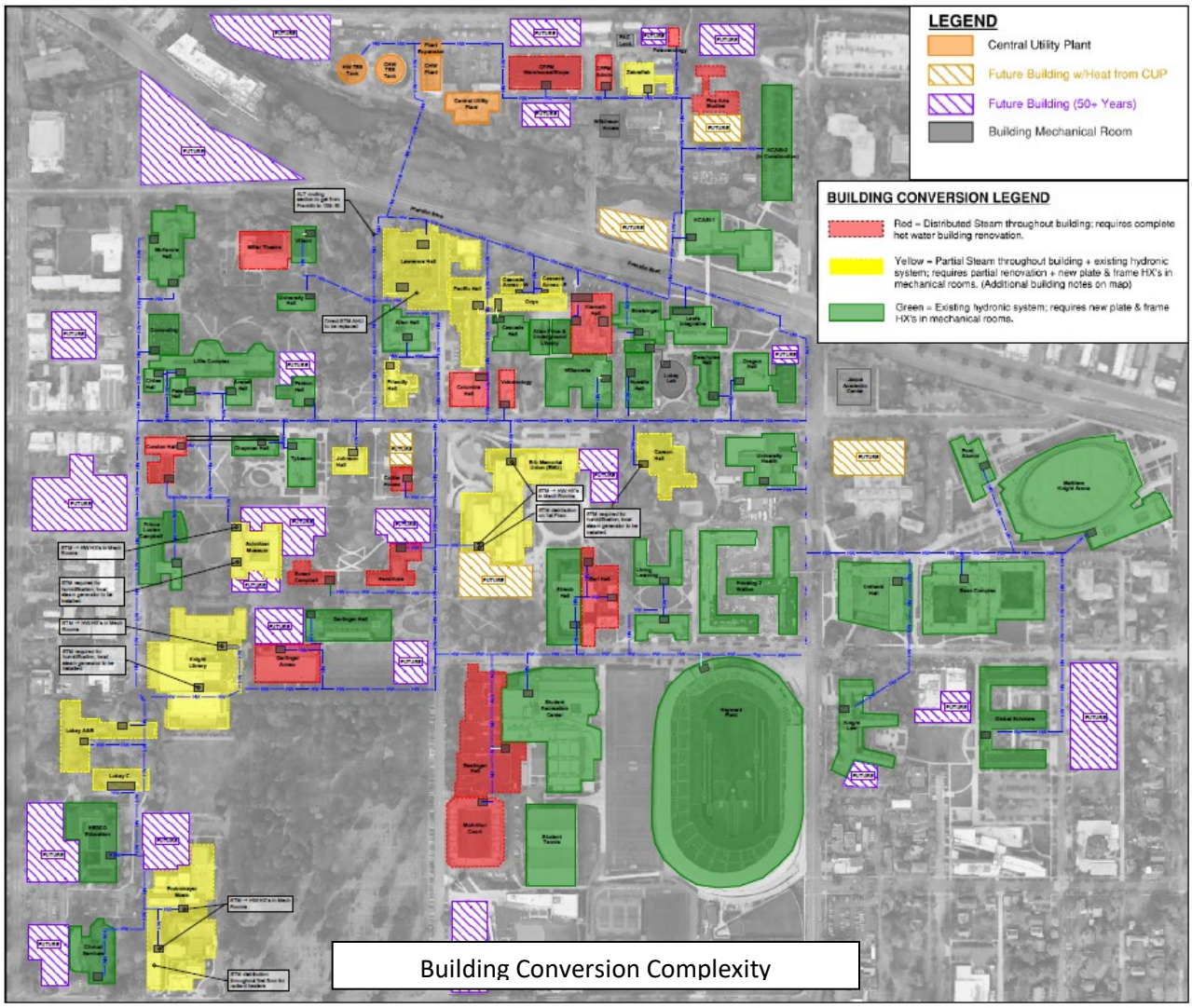
The table below shows the phases and estimated costs for both building a new hot water distribution system and building conversions. The total cost estimate to convert the Eugene campus from steam to hot water heat distribution in 2023 dollars is $582,900,000.

Phase	Distribution System Cost Estimate (2023)	Building Conversion Cost Estimate (2023)
Initial: Tunnels under Franklin Boulevard	$43,400,00	
Phase 1: 2026 - North & Northcentral campus buildings	$60,600,000	$72,600,000
Phase 2: 2028 - Central campus buildings	$57,200,000	$45,400,000
Phase 3: 2030 - Northwest campus buildings	$21,600,000	$39,500,000
Phase 4: 2032 - Southwest campus buildings	$40,400,000	$67,000,000
Phase 5: 2034 - Southcentral campus buildings	$31,700,000	$44,600,000
Phase 6: 2036 - East campus buildings (East of Agate St.)	$31,100,000	$27,800,000
TOTAL	**$286,000,000**	**$296,900,000**

The following maps provide information related to the proposed location for the hot water distribution system, grouping of buildings in two-year conversion phases and the relative complexity of in-building hot water conversions. As a general rule, conversion work in the green buildings is expected to be contained to existing mechanical rooms located in building basements. This means building users can continue to occupy these building with limited disruption during construction. Buildings in red will require extensive work throughout the building. These buildings will likely need to be closed for a period of time and users relocated to surge space elsewhere while construction occurs. Work in yellow buildings fall somewhere in between the two. The building conversion cost estimate includes funding to cover cost to re-locate users during construction. However, a relocation plan has not been developed and will likely entail significant disruption to normal operations.



Campus Hot Water Conversion Phasing Map



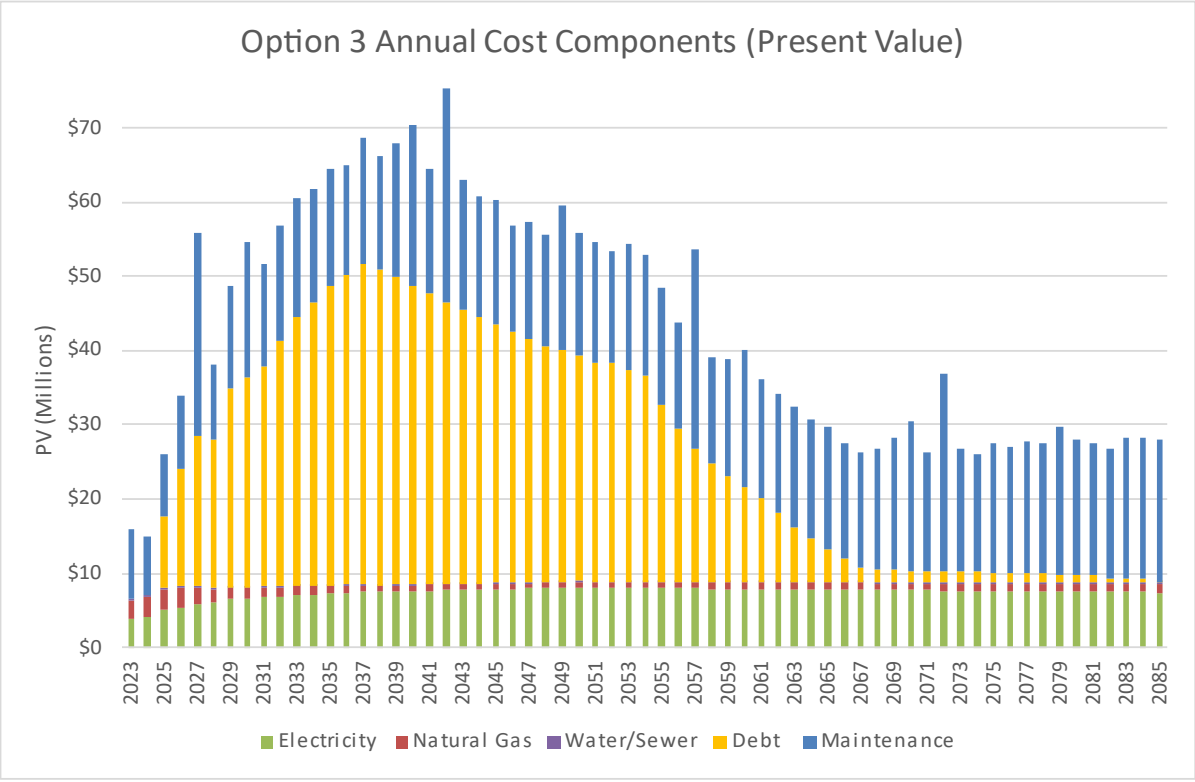
Building Conversion Complexity

HEAT RECOVERY CHILLERS – OPTION 3

Option 3 replaces the existing steam distribution system with a hot water distribution system as described in the previous section. This creates an opportunity to re-purpose the existing campus cooling system which currently vents unwanted building heat to the atmosphere via cooling towers. With the addition of two new 1,250 ton heat pump chillers, the campus cooling system can be used to capture and re-direct heat from some buildings and push it into the hot water distribution system for immediate use elsewhere on campus. Option 3 also includes a new 1.6 million gallon hot water thermal energy storage tank where heat can be stored for short durations. Four 30 MMBtu steam-to-hot water heat exchangers will be added to the plant and the existing gas-fired steam boilers will provide supplemental hot water as needed. Additional space will be added to the Central power station to house the new equipment described above. Building conversions from steam to hot water will add air conditioning to buildings where this does not currently exist. The estimated cost for the plant expansion in 2023 without escalation is $93,500,000. Significant additional detail is provided in the Burns & McDonnell report (Appendix III).

The plant additions can be completed relatively quickly, but the hot water distribution system requires approximately 12 year phase in period. Once fully operational, approximately 64% percent of campus heat will be provided electrically. This results in an estimated 56% annual reduction in emissions from BAU.

The chart below shows all estimated present value annual costs to operate Option 3. Debt service, shown in yellow, is $20 - $40 million annually for the first 40 years. It should be noted that the combined cost for natural gas and electricity is expected to decline by $400,000 compared to BAU in 2038. This is the result of efficiencies gained through the transition to a hot water distribution system and more efficient heat production. Maintenance costs are also expected to decline by $270,000 annually in the 2040's because hot water systems are inherently easier to maintain than steam distribution systems. The total incremental cost on an annual basis from approximately 2030 – 2055 is $30-40 million dollars.



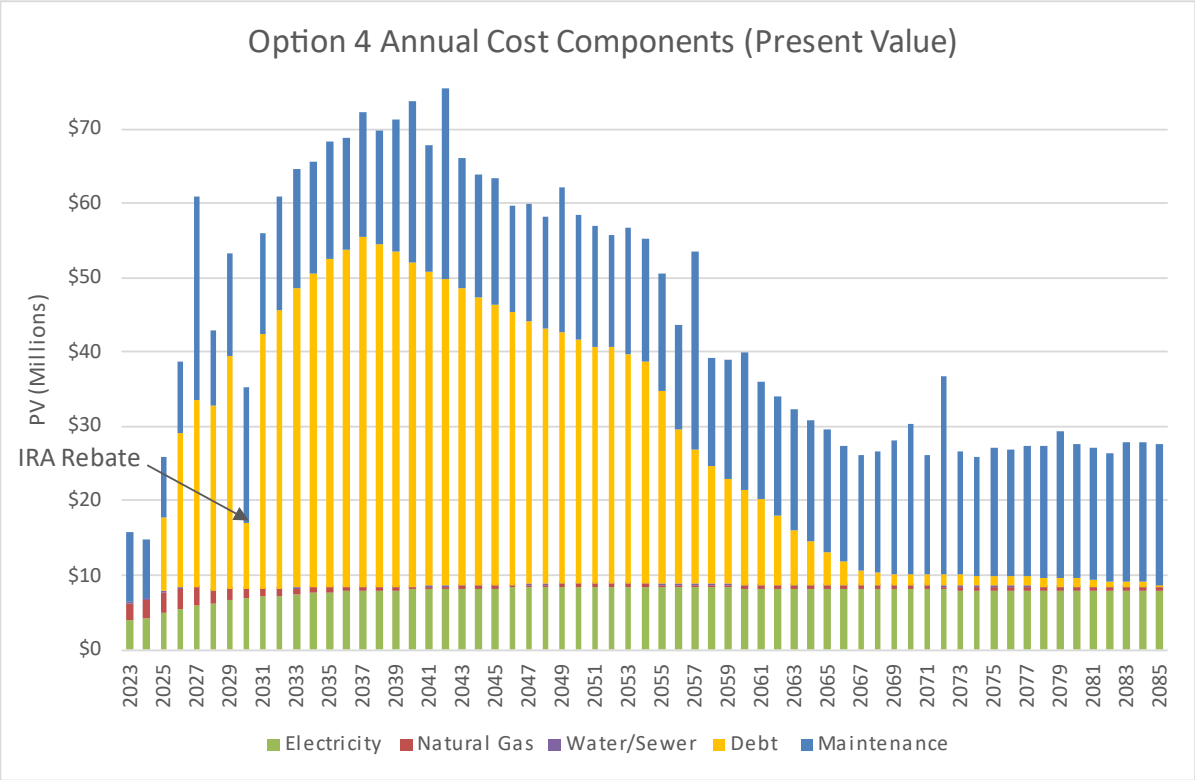
HEAT RECOVERY CHILLER & GEOEXCHANGE – OPTION 4

Option 4 adds a geoexchange system in addition to Option 3. Heat extracted from buildings during the summer months that is in excess of building heating needs elsewhere on campus at that time can be stored for several months in a geoexchange bore field. The stored heat is collected in winter months and distributed to campus buildings via the hot water distribution system, reducing the need to produce new heat from electricity or natural gas during the coldest period of the year.

The bore field is comprised of 1,400 boreholes each drilled to a depth of 600 feet. Once built, the surface can be rededicated to existing or other uses. There will be some limitations to this and pre-planning for future uses would be prudent in order to avoid re-work in the future. An illustrative geoexchange field layout is provided below. No test bores have been completed on-site, though Burns & McDonnell did rely on nearby drilling reports. Additional due diligence would be necessary before committing to moving forward with this option to determine the suitability of this particular location for boreholes and their precise capacity to retain heat. Additional system design detail is provided in the Burns & McDonnell report (Appendix III).

The plant additions and bore field can be completed relatively quickly, but the hot water distribution system requires approximately 12 year phase in period. Once fully operational in 2038, approximately 86% percent of campus heat will be provided electrically. This results in an estimated 76% annual reduction in emissions from BAU.

The chart below shows all estimated annualized costs to build and operate Option 4. Annual debt service shown in yellow ranges up to $46.9 million at its peak, but remains significantly elevated from BAU for approximately 40 years. It should be noted that the combined cost for natural gas and electricity is expected to decline by $330,000 compared to BAU in 2038 with annual savings increasing slightly over time. Annual maintenance costs are also expected to decline by $270,000 in the 2040s because hot water systems are inherently easier to maintain than steam distribution systems. However total annual cost will be dramatically more than BAU until the early 2060s when the bulk of the debt is paid off. This system is eligible for an estimated $27.6 million in Inflation Reduction Act (IRA) subsidies. More detail about potential additional Inflation Reduction Act (IRA) payments is explained below.

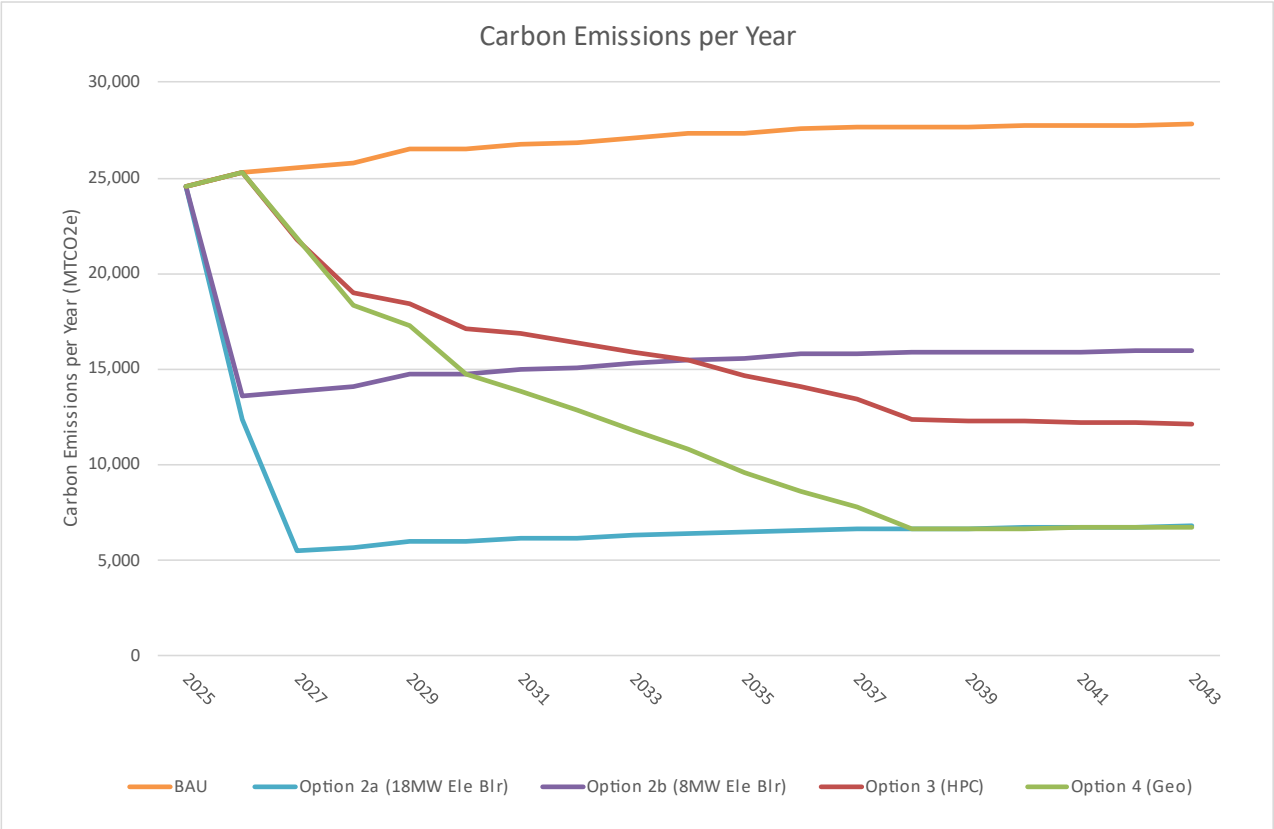


INFLATION REDUCTION ACT (IRA) CREDITS

The Inflation Reduction Act, signed into law by President Biden in 2022, provides billions of dollars designed, in part, to offset the cost to decarbonize the American economy. Both Options 3 and 4 are eligible for funding through the IRA. Burns & McDonnell estimate $3,400,000 in federal support for Option 3 and at least $27,600,000 for Option 4. There is a potential of as much as $138,900,000 in IRA funding depending on determinations by the Internal Revenue Service (IRS). This is a significant difference and will likely require several years of rule making, negotiations and determinations in order for the university to gain confidence regarding how the IRS will interpret the law. There are incremental costs associated with meeting provisions within the IRA regarding prevailing wage and domestic content requirements. These costs have been included in the project estimates. More detail regarding the IRA issues can be found in the Burns & McDonnell report (Appendix III).

GREENHOUSE GAS EMISSIONS REDUCTIONS

The graph below shows expected emissions from each option from 2025 to 2043. Both options 2A and 2B see immediate emissions reductions as they can be fully implemented in a relatively short period of time (between three and five years). The more gradual emissions reductions trajectories for Options 3 and 4 reflect their 12-year phased construction schedules.



The tables below show the annual emissions reductions from the BAU baseline in several key years. 2028 is the first year Options 2A and 2B are fully operational. 2033 marks the approximate half-way mark for construction of Options 3 and 4. In 2043 all options are fully operational and offer maximum annual emissions reductions. The cumulative emissions table demonstrates the impact of the relatively fast time to execution associated with Options 2A and 2B as well as the relatively protracted time to implementation necessary because of the steam to hot water conversion for Options 3 and 4.

Annual Emissions Reduction (vs. BAU)				
Period	**Option 2A**	**Option 2B**	**Option 3**	**Option 4**
2028	78%	45%	26%	29%
2033	77%	44%	41%	56%
2043	76%	42%	56%	76%
2053	75%	42%	58%	75%
2083	75%	42%	58%	75%

Cumulative Emissions Reductions (vs. BAU)				
Period	**Option 2A**	**Option 2B**	**Option 3**	**Option 4**
2025 - 2028	53%	35%	10%	11%
2025 - 2033	67%	40%	25%	32%
2025 - 2043	72%	41%	40%	54%
2025-2053	73%	42%	46%	61%
2025-2083	74%	42%	52%	69%

Estimating emissions arising from regional power production is extremely difficult. While experts generally agree that the IRA and other policies will help renewables such as wind and solar gradually replace carbon intensive electricity generation, many factors are interacting to make this a bumpy, difficult-to-predict path. Electrification of transportation and building heat are increasing demand on the electric grid. Coal

plants are being retired. Large amounts of new wind and solar generation are being proposed and developed. New transmission lines, necessary to move this power to market, are being proposed and challenged in courts. State policies are rapidly developing and getting challenged in courts. Climate Change is making snowpack more variable, which affects hydropower generation. The interaction of these confounding variables make precise emissions forecasts for out-years difficult to predict.

The emissions reduction forecast used by the Taskforce utilizes the prior 10-year average GHG intensity for EWEB-provided electricity, as calculated by Oregon's Department of Environmental Quality. The previous chart, and data tables do not reflect that during early years of the analysis natural gas-fired electricity generation plants may be used to fulfill incremental electrical load that generate higher GHG emissions. It also does not incorporate EWEB's 95% decarbonization plan and additional planned decarbonization of the northwest grid which, over time, may lead to further reductions in GHG emissions. Sensitivity analysis is included in the Burns & McDonnell report (Appendix III).

TOTAL CONSTRUCTION COST COMPARISON

The table below provides the total construction costs discounted to 2023 dollars for all options described above. Available IRA credits are subtracted from Options 3 and 4. Even without the cost of financing, the difference in construction costs is stark. Options 2A and 2B can be built for approximately 5% of the cost to build Options 3 or 4. The cost to convert the distribution system and campus buildings to hot water accounts for approximately 90% of the total construction costs for Options 3 and 4.

Construction Cost Analysis				
	Option 2A	**Option 2B**	**Option 3**	**Option 4**
Electrode Boiler and Modifications	$29,700,000	$14,900,000	$0	$0
Hot Water Distribution	$0	$0	$286,000,000	$286,000,000
Hot Water Building Conversions	$0	$0	$296,900,000	$296,900,000
Hot Water Plant Modifications	$0	$0	$93,500,000	$93,500,000
Geoexchange System	$0	$0	$0	$66,400,000
Potential IRA Credits	$0	$0	($3,400,000)	($27.6M) - ($138.9M)
Total Cost without IRA	**$29,700,000**	**$14,900,000**	**$676,400,000**	**$742,800,000**
Total Cost with IRA Credits	**$29,700,000**	**$14,900,000**	**$673,000,000**	**$715.2M - $603.9M**

ANNUAL COST OF OPERATIONS

The first table below compares annual operating and debt-service costs associated with Options 2A and 2B as compared to BAU in 2028, the year after 2A or 2B could be operational. The added cost is almost entirely due to the additional electricity the University of Oregon would have to purchase to operate the electrode boilers. Electricity is a significantly more expensive means to produce heat and is likely to remain so for the foreseeable future. Even when factoring in the smaller volume of natural gas purchased, Option 2A adds approximately $8.2 million annually in 2023 dollars. Option 2B increases annual operating cost by approximately $4.5 million in 2023 dollars.

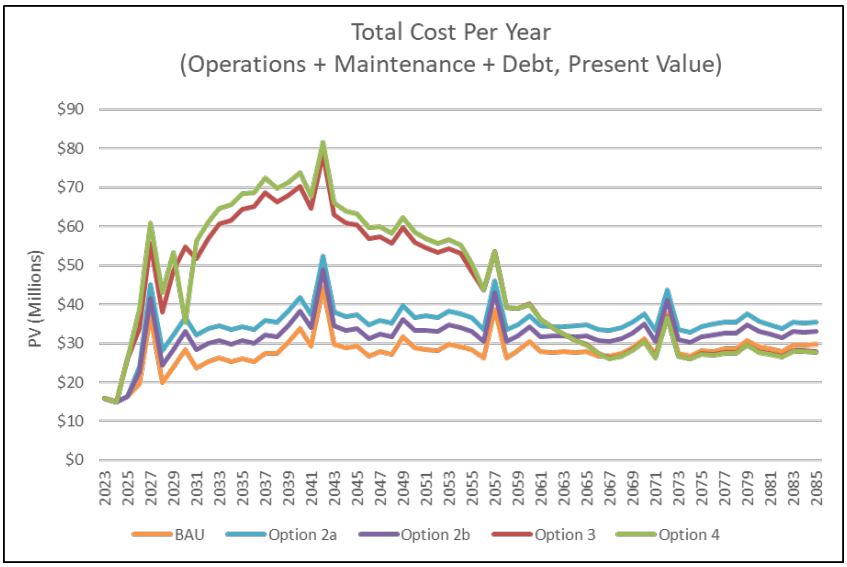
The second table below compares Options 3 and 4 to BAU in 2038, the first year that these options could be fully operational. While electricity, natural gas, and maintenance are all less than BAU, debt service associated with the additional capital costs adds an incremental $38.8 million and $42.4 million annually for Options 3 and 4, respectively.

Options 2A and 2B Annual Cost Analysis (2028)			
	BAU	**Option 2A**	**Option 2B**
NPV Operating Cost (2023 dollars)	$20,000,000	$28,200,000	$24,500,000
Marginal cost vs BAU (2023 dollars)		$8,200,000	$4,500,000

Options 3 and 4 Annual Cost Analysis (2038)			
	BAU	**Option 3**	**Option 4**
NPV Operating Cost (2023 dollars)	$27,500,000	$66,300,000	$69,900,000
Marginal cost vs BAU (2023 dollars)		$38,800,000	$42,400,000

TOTAL COST AND EMISSIONS REDUCTIONS:

The table below brings together the total cost of construction and financing as well as operations over the 60-year analysis period. Costs are discounted at 3% annually to put values in 2023 dollars. Columns represent options available to the university, including the anticipated impact of the Climate Protection Plan on BAU. This table provides both the total marginal cost vs BAU – which can be thought of as the total new outlay of resources necessary for the university – as well as the annual operational cost in 2038 and in 2085 at the end of the analysis period – which can be thought of as the Utilities and Energy department's annual budget for heating the campus. 2038 is used because it is the first year in which all options could be operational. Cumulative Emissions Reductions estimates from 2025 through 2085 for each option are identified and converted to a dollars per metric ton reduced (MTCO2e) which allows for comparisons across options. Given, the difficulty of estimating emissions reductions beyond 2043 explained above, this offers a rough comparison meant to demonstrate that Options 3 and 4 are much more expensive on a per metric ton basis, even when analyzed over a protracted period. Changes in the GHG intensity of the electrical grid will have a substantial impact on these forecasts.



The graph above represents this data in annualized fashion, converting capital outlays to debt service. This demonstrates the very large incremental costs for Options 3 and 4 and relatively small savings, in net present value terms, in operating costs for these options when compared to BAU, Options 2A and 2B.

	BAU	BAU (with CPP)	Option 2a (18MW)	Option 2b (8MW)	Option 3	Option 4
Capital Construction Costs (Present Value, Financed)	$105,000,000	$105,000,000	$179,300,000	$147,300,000	$1,096,800,000	$1,174,100,000
IRA Benefit (Present Value)	$0	$0	$0	$0	-$3,400,000	-$27,200,000
Marginal Cost vs BAU	-	$0	$74,300,000	$42,300,000	$991,800,000	$1,069,100,000
Operating and Maintenance Costs (Present Value, Cumulative)	$1,657,000,000	$1,699,600,000	$2,020,800,000	$1,864,500,000	$1,599,700,000	$1,596,900,000
Marginal Cost vs BAU	-	$42,600,000	$363,800,000	$207,500,000	-$57,300,000	-$60,100,000
Total Option Cost (Present Value, Financed)	$1,762,000,000	$1,804,600,000	$2,200,100,000	$2,011,800,000	$2,696,500,000	$2,771,000,000
Total Marginal Cost vs BAU	-	$42,600,000	$438,100,000	$249,800,000	$934,500,000	$1,009,000,000
2038 Annual Operating + Maint + Debt Service (Present Value)	$27,500,000	$28,200,000	$35,600,000	$31,800,000	$66,300,000	$69,900,000
2085 Annual Operating + Maint + Debt Service (Present Value)	$29,900,000	$30,600,000	$35,600,000	$33,200,000	$28,000,000	$27,700,000
Total Cumulative Emissions (2025-2085, MTCO2e)	1,686,000	774,000	438,000	978,000	805,000	529,000
Cumulative Emissions Reduction (2025-2085, MTCO2e)	-	(912,000)	(1,248,000)	(708,000)	(881,000)	(1,157,000)
Cumulative Emissions Reduction (%) (vs BAU)	-	54%	74%	42%	52%	69%
Cost per MTCO2e Reduction (Present Value)	-	$47	$351	$353	$1,061	$872

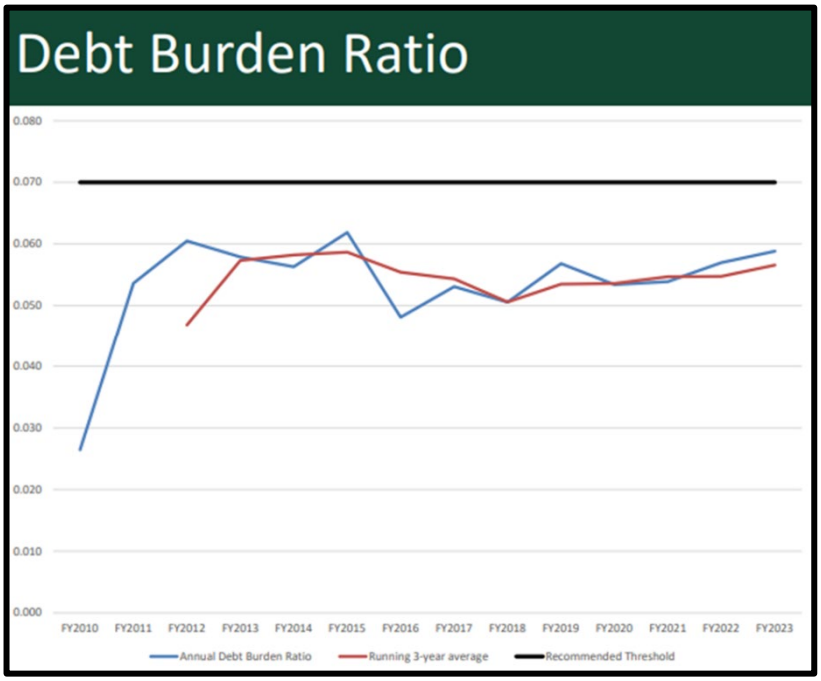
Annual Costs in 2028	BAU	BAU w/ CPP	Option 2a	Option 2b
2028 Nominal Value	$23,200,000	$23,500,000	$32,700,000	$28,400,000
Marginal cost vs BAU		$300,000	$9,500,000	$5,200,000
Present Value	$20,000,000	$37,500,000	$28,200,000	$24,500,000
Marginal cost vs BAU		$17,500,000	$8,200,000	$4,500,000

Annual Costs in 2038	BAU	BAU w/ CPP	Option 3	Option 4
2038 Nominal Value	$42,800,000	$43,900,000	$103,300,000	$108,800,000
Marginal cost vs BAU		$1,100,000	$60,500,000	$66,000,000
Present Value	$27,500,000	$28,200,000	$66,300,000	$69,900,000
Marginal cost vs BAU		$700,000	$38,800,000	$42,400,000

UNIVERSITY FINANCIAL COMPARISONS

In order for the Taskforce to place the anticipated annual and total cost associated with the available options, certain institutional financial information was reviewed. These are included below in order to provide context for the likely impact of the university moving forward with any option. Of particular note is that the university currently operates with a Debt Burden Ratio approaching 0.060, while higher education institutional norms suggest that a ratio above 0.070 indicates that the institution may be over-leveraged[5].

The total outstanding debt for the university is $846 million as of the December 2023 Treasury Report to the Board of Trustees. The amount of debt contemplated by Options 3 and 4 ($673 to $712 million, after IRA rebates) would necessarily increase the debt burden ratio above 0.070 and increase the total outstanding debt by as much as 84%.



The Taskforce also reviewed the amount of Education and General Fund support provided to each school or college within the university, revenue from state appropriations, net tuition and fees from resident and non-resident students. Finally, the annual amount set aside through the Strategic Investment Fund is $2 million. This program identifies and funds a wide range of academic, student support, and other administrative initiatives through an annual competitive process.

E&G Revenue Source	FY 2023	E&G School and College Budgets	FY 2023
State Appropriations	$90.5M	College of Design	$25.8M
Res Undergrad Tuition & Fees	$85.4M	College of Arts & Sciences	$153.2M
Non-Res Undergrad Tuition & Fees	$288.1M	Honors College	$3.4M
Institutionally Funded Remissions	$69.0M	Lundquist College of Business	$36.4M
Annual Strategic Investment Fund	$2.0M	College of Education	$20.0M
		School of Journalism & Communication	$15.8M
		School of Law	$25.8M
		School of Music and Dance	$13.9M

[5] Tahey, Phil, et. al. *"Strategic Financial Analysis in Higher Education"*. 7th Ed. KPMG LLP, Prager, Sealy & Co. LLC, Attain LLC. 2010. <https://emp.nacubo.org/wp-content/uploads/2017/10/NSS_Handbook.pdf>.

The least cost option, Option 2B, requires an additional $4.5 million to cover the new electricity consumption or more than twice the annual allocation from the Strategic Investment Fund. The incremental cost for 2A would be about half of the annual budget for the School of Journalism and Communication or the School of Music and Dance. The most costly option, Option 4, would cost more than any school or college's annual Education and General Fund budget, except the College of Arts and Sciences.

PEER INSTITUTIONS

Many peer institutions also signed the ACUPCC and have developed CAPs. A summary of actions taken or being considered by other Pac 12 institutions is summarized in Appendix V. This information was collected in October of 2022 and updated in summer of 2023. No information is available on institutions in the Big 10 at this time.

TASK FORCE PROCESS

The Thermal Systems Task Force was commissioned by interim president Patrick Phillips in Fall 2022. The Task Force was responsible for reviewing the university's thermal heating infrastructure and recommending a best path forward while balancing the following principles, which, at times may be in conflict with each other:

- reduction of greenhouse gas emissions,
- assessment of technical feasibility risk,
- resiliency of campus heat production to market and natural hazards,
- limited disruption to student campus experience, and
- maintenance of appropriate fiscal stewardship.

The full charter is available in Appendix I. The Taskforce included two members of the Board, senior staff members, faculty with expertise relevant to the analysis and ASUO/student representatives.

The Taskforce began its process by immersing itself in data on the university's existing heating system, the AEI report which set an initial context for future action, and heard from technical experts, senior executives at relevant utilities, non-governmental organizations and government agency representatives to understand energy markets, production, distribution and the regulatory/policy landscape. As information became available the Taskforce engaged in extensive public outreach. This included five public forums, numerous class presentations, and hosting a public survey process with questions geared towards the specific issues at play for the Taskforce at that time.

Campus outreach began in the spring of 2023, resumed with the start of the new academic year in fall 2023 and concluded with campus forums during winter term 2024. The final presentation to campus included draft recommendations so that the Taskforce could convey their rationale and hear directly from interested parties on their thoughts before finalizing its recommendation to the president. These presentations included significant educational information necessary to provide background context for those who joined in order for them to inform their perspectives and feedback to the Taskforce. The forums in Fall 2023 did not include final financial or emissions analysis as even initial information was not available until mid-December and were not finalized after suits seeking to overrule CPP prevailed in the Oregon Court of Appeals in late December.

It is important to note that the Taskforce engaged with campus constituents routinely throughout the process. This included five public forums, numerous class presentations, hosting a public survey process with questions geared towards the specific issues at play for the Taskforce at that time as well as an email address where anyone could mail feedback. Feedback from each of these channels was shared with the Taskforce either directly or in summary form. Appendix VI includes detailed information on the feedback received by the Taskforce.

APPENDIX I: Thermal Transition Taskforce Charge & Membership

University of Oregon
Thermal Study Task Force Charter

Task Force Charter:

- Review technical studies, regulatory and market structures and identify additional analysis that needs to be completed to inform decision making on the University of Oregon's Eugene campus heating infrastructure.
- Create a forum for and inform the university community on options available to recapitalize the University of Oregon's heating infrastructure including the factors impacting decision making and incorporate public input when recommending options to the President.
- Recommend to the president a long-term plan to support the recapitalization of the University's campus heating infrastructure that is in alignment with our values and responsibility as prudent stakeholders with a long-term view, these include balancing;
    - reduction of greenhouse gas emissions,
    - assessment of technical feasibility risk,
    - resiliency of campus heat production to energy markets and natural hazards,
    - limited disruption to student's campus experience, and
    - maintenance of appropriate fiscal stewardship.

Task Force Membership:

- Marcia Aaron, *Board Member*
- Brendan Adamczyk, *Department of Planning, Public Policy and Management graduate student*
- Andrew Coskey, *Associated Students of the University of Oregon (ASUO) Advocacy Director, undergraduate student (from Jun. 2023)*
- Darin Dehle, *Director of Capital Construction*
- Greg Dotson, *Associate Professor, School of Law*
- Brian Fox, *Associate Vice President for Budget, Financial Analysis and Data Analytics (co-Facilitator)*
- Keith Frazee, *Interim Vice President for Communications (Jun. 2023 through Dec. 2023)*
- Mike Harwood, *Associate Vice President for Campus Planning and Facilities Management*
- Ritchie Hunter, *Vice President for Communications (through May 2023)*
- Finn Jacobson, *Associated Students of the University of Oregon (ASUO) Student Body Vice President, undergraduate student (from Jun. 2023)*
- Carol Keese, *Vice President for Communications (from Jan. 2024)*
- Paul Kempler, *Research Assistant Professor and Associate Director, Oregon Center for Electrochemistry*
- Steve Mital, *Director of Energy and Sustainability (co-Facilitator)*
- Jamie Moffitt, *Senior Vice President for Finance and Administration and Chief Financial Officer*
- Erin Moore, *Department of Architecture, Associate Director, Environmental Studies Program*
- Cass Moseley, *Vice Provost for Academic Operations and Strategy (through Dec. 2023)*
- Lillian Moses, *Board Member*
- Justin Mouledous, *Associated Students of the University of Oregon (ASUO) Sustainability Secretary, undergraduate student (through Jun. 2023)*
- Meghan Turley, *Associated Students of the University of Oregon (ASUO) External Chief of Staff, undergraduate student (through June. 2023)*
- Jesse Williams, *Treasury Analyst*
- Rachel Withers, *Associated Students of the University of Oregon (ASUO) Sustainability Secretary, undergraduate student (from June. 2023)*

Project Manager for AEI and Burns & McDonnell reports

- Jeff Madsen, *Assistant Director Energy Utility Systems*

Staff Support:

- Brandalee Davis, *Operations & Executive Assistant*
- Lindsey Hayward, *Project Manager*

Appendix II: Burns & McDonnell Taskforce Presentation (Jan. 2024)

Refer to appended report.

Appendix III: Burns & McDonnell Report (Feb 2024)

Refer to appended report.

Appendix IV: Affiliated Engineers, Inc. (AEI) Study Dated (Nov 2022)

Refer to appended report.

Appendix V: PAC-12 Thermal Systems Plans/Actions

The table below is based on information collected by University of Oregon Sustainability Office in October 2022 and updated in summer 2023.

Pac-12 Comparisons		
Institution	**Current Heating/Cooling System description**	**Plans**
ASU	Nat gas, 17 MW CHP	Shift to all-electric
UC-Berkeley	Nat gas, 21 MW CHP, steam distribution	Shift to all-electric, with heat recovery and hot water distribution
UCLA	Nat gas, 42MW CHP, steam distribution	Decarb study underway to explore electrification in parts of campus and retrofitting plant to hydrogen.
Stanford	Electric (w/ minimal diesel back-up) heat recovery, water distribution, (completed)	Completed transition from nat gas, co-gen, steam at approximately $475 million.
UU	Nat gas, 6.5MW CHP, boilers	Evaluating all-electric options for new buildings and developing scope for campus emissions reduction plan to target centralized utilities
UW	Nat gas, steam distribution	Shift to all-electric, with heat recovery and hot water distribution
UC-Boulder	Nat gas & electric, steam distribution	Exploring all-electric, with heat recovery and hot water distribution. Also exploring supplemental heat via hydrogen for peak days and on-site electrical generation for resiliency.
UO	Nat gas, 7 MW CHP, 2 nat gas boilers, steam distribution	Consultant report on alternatives to gas heating due Oct. 2023. Board of Trustees decision due in Spring 2024
OSU	Nat gas, 5 MW CHP, steam distribution	Exploring hot water heating districts via heat pump
USC	Nat gas, steam distribution	RFP to develop Infrastructure Decarbonization Roadmap
WSU	Nat gas, steam distribution	Exploring district heat pumps and conversion to low temp hot water distribution
UA	No response	

Appendix VI: Task Force Outreach Summary Notes

Public Forums and Key Campus Stakeholder Engagement		
Dates	**Type of Outreach**	**Attendance**
April 25, 2023	Campus Public Forum	128
May 1, 2023	Campus Public Forum	47
October 24, 2023	Campus Public Forum	Approx. 130
January 22, 2024 (daytime)	Campus Public Forum	Approx. 30
January 22, 2024 (evening)	Campus Public Forum	Approx. 20
Several themes carried across the forums that were held in the Spring and Fall of 2023 and in January 2024. Overall, students prioritize sustainability and support the option that will provide the largest reductions in GHG. Further, the UO should not rely of CPP to realize these goals. Costs and funding of the project are of major concern; students sent a strong message that tuition should not be the primary funding source. Disruptions to the campus are less of a concern compared to emissions reductions and cost. Students called for transparency of the process, requesting clear, well advertised updates, as well as, a reliable way to provide feedback to the Taskforce.		
At the January Forums, participants were asked to rank the Evaluation Principles in order of importance. Strongest support was for reduction of greenhouse gas emissions, along with strong support for resiliency and appropriate fiscal stewardship. Impact to campus experience ranked lower overall.		
The responses to the recommendation provided at the January forums were generally positive. Participants appreciated the clarity of the presentation, and how it had developed from previous forums. It was also clear that the recommendation was clearly supported by the findings. Taking immediate action while at the same time exploring additional funding, new technologies and avoiding Business as Usual echoed through several responses. There is still some support for options 3 & 4. Ensuring student feedback is factored into the recommendation remains important.		
Other thoughts and priorities that forum participants wanted the Taskforce to consider included thinking about other ways to produce electricity for campus (solar, hydrogen, wind generation), in addition to exploring new technologies for heating systems and storage systems. Participants appreciated seeing how fiscal stewardship applied when comparing the options to one another within the scope of the university budget as a whole. There continued to be comments regarding concern for surge space at the January forum, should variations of Options 3 & 4 come into play in the future.		

Key Stakeholders Engagement Feedback Summary		
Date	**Units Involved**	**Attendance**
November 3, 2023	Key Stakeholders - Student Facing Units	6
November 6, 2023	Key Stakeholders - Facility & Operational Users	5
November 8, 2023	Key Stakeholders - Academic Leadership & External Facing Units	2
January 8, 2024	Key Stakeholders - Student Services and Enrollment	5
November 3, 2023	Key Stakeholders - Student Facing Units	6
Key Stakeholder outreach sessions were designed to be small briefings and discussions with key administrative units that would be impacted by any changes to the campus heating system. The feedback they provided was very detailed and thoughtful. Major themes coming out of these engagement events focused on costs, disruptions to campus, future uncertainties and questions specific to departments.		
There was concern that dedication of large amounts to debt financing when risks around enrollment are significant. Competition for students is at height and taking out large amounts of new debt could be problematic particularly if there was a decline in enrollment. They urged the Taskforce to be able to clearly define long-term plan to justify cost to students. A 12-year project, and debt service for another 25-20 years afterwards would significantly reduce ability to make investments in other operations and academic areas.		
Any impacts to students, auxiliaries, and traffic are a large concern for phased work, particularly for buildings that will need to taken offline including finding and paying for surge space. The Taskforce will need to be strategic in operationalizing the project and consider how it fits with other upcoming capital projects.		
There was strong concern that committing to options 3 & 4 with so much uncertainty, may not make sense for the UO at this time. There was a question of how big of an impact could regulatory uncertainty and changes could have. It was suggested the Taskforce consider short-term solutions while new technologies mature.		
Departments wanted to know how costs might impact students beyond tuition e.g., health center, housing – and had these costs been included in the analysis? How will changing from steam to water affect humidity/temperature swings (museums, labs and research). How/will redundant systems be maintained during construction and transition?		
There was significant concern from units that are directly responsible for recruitment and enrollment that the costs of Option 3 and 4 would negatively impact enrollment. Cost is the first and most important question asked by families, then academic reputation.		

Online Survey and Email Account Responses	
Survey Details	***Respondents***
Total Respondents (April 2023 - January 2024)	174
Undergrad	113
Grad	7
Officers of Administration	6
Classified Staff	5
Faculty	9
Other	32
The online survey responses closely matched those provided during the forums held in Spring and fall of 2023 and in January 2024. Respondents wanted to clearly understand how costs were being analyzed and what was included in estimates. Questions of how the projects would be financed were also brought up. Transparency in providing information to the UO Community as well as taking feedback and concerns of students seriously was stressed. An administration just going through the motions of public outreach would not be acceptable to students. Respondents also wanted to understand how emissions reductions were being calculated with a strong preference to support the option which provided the largest reductions in emissions. It was also clear that a large increase in tuition would not be tolerated to fund the project. There was little support for the status quo, or "Business as Usual" to be considered a viable option.	

Email account Feeback	
Description of Email Received	**Number of emails**
Open Letter from Multiple Signers - Fossil Fuel Eugene	1
Form Letter from multiple senders	120
Unique Letters from Community Members	1
The Thermal Transition email account received a number of emails. All but two emails were identical or nearly identical form emails. From early October through mid-January a total of 122 emails were received. These letters supported "Option Four... or whichever option provides both the greatest emissions reductions and highest efficiency in order to maximize benefits for our community and climate." An open letter sponsored by Fossil Free Eugene and co-signed by a large number of organizations and individual signers was received which also supporting Option Four. One other unique email message was from a community member urging the UO run on 100% renewable energy. Copies of these are provided in the appendix.	

Articles and Announcements	
Tuesday, April 18, 2023	Around The O: Forums will explore changes to the campus heating system
Monday, October 23, 2023	Around The O: Fall Forum explores changes to university's heating system
Friday, January 5, 2024	Around The O: Forums will explore changes to the campus heating system
Tuesday, January 23, 2024	Around The O: UO community asked to give input on heating system project
Friday, October 13, 2023	Daily Emerald: UO thermal systems task force begins drafting report from the Thermal Systems Transition Study
Wednesday, November 29, 2023	Daily Emerald: ASUO passes resolutions favoring Thermal Systems Transition, EMU Board seat redistribution
Wednesday, November 22, 2023	Daily Emerald: ASUO supports option four of UO’s thermal heating system transition, aims to create “working group”
Tuesday, November 7, 2023	Daily Emerald: Local environmental organizations and activists support option four in the UO thermal heating systems transition
Monday, June 5, 2023	Daily Emerald: University of Oregon public forum explores potential transition in campus heating systems to reduce emissions
Saturday, January 6, 2024	Register Guard: University of Oregon students want more climate action at UO
Thursday, February 1, 2024	Daily Emerald: Thermal heating force favors steam boiler option, despite student feedback

Thermal Transition Study

Spring 2023 Outreach – Summary of Campus Feedback

Public Campus Forums

- Tuesday, April 25, 6-7:30 pm – 128 attendees
- Monday, May 1, 11 am-12:30 pm – 47 attendees

Themes:

- Overall, students prioritize sustainability and support the option that is best for the environment.
    - Student sentiment would be favorable – understand the importance.
    - Excited about the potential to make a big impact to reduce emissions.
    - Time is now to invest in our future, and more should be done now.
    - PR - investment in carbon reduction is worth it and needs to feel real to people – critical how the UO communicates the benefits to all stakeholders.
- General sentiment that the UO should do something (not rely on CPP and systems as usual).
    - Reputation - opportunity for the UO to be a leader:
        - Attract new students
        - Further incorporate sustainability into our brand
        - Inspire other universities to take action
    - Mistrust of NWN and new technologies
- Costs
    - Students shouldn't have to entirely bear the cost through tuition increases
    - Yet, students would be supportive of sharing some cost (e.g., emissions fee)
    - "Cost" is less than the anxiety cost students experience around climate change
    - The messaging much be clear the cost will be spread out over many years to many different students
    - Utility Prices – how to account for future natural gas and electricity price changes?
- Disruption to Campus
    - Students are very familiar with ongoing construction
        - Purpose and greater good behind the construction is welcomed
        - First time construction seen as a positive and direct benefit
    - Desire for more specific information to better understand the impacts and timeline
        - Strategic phasing of construction to ensure the college experience is still favorable
        - Visuals of campus would be helpful to understand the impact and scale
    - Concerned about and want to understand the "embodied emissions" of the construction project
- Distribution System
    - Support ability to make changes in stages to allow for flexibility of future options
    - Important to look at the total lifecycle costs and time horizon of equipment
    - Want to make sure we fully explore efficiencies of the current steam system and in-building systems

    - Transition to hot water:
        - Preferrable to allow for new technologies
        - How long will it take to realize GHG reductions?
        - What are the efficiencies gained?
        - What is the impact on the workforce?
- Externalities – the UO should account for impacts to other groups in the decision-making (marginalized communities, electricity increases, impact to general Eugene/Springfield)
- Outreach
    - Appreciate the opportunity for initial input, but also need ongoing transparency of decision making (understand the process and "funnel to the president")
    - Desire for more information and updates – hard to find on website what UO is doing around decarbonization
    - Interest in broader outreach – student and community wide survey
    - Overall – attendees understood the complexity of decision making and the need to weigh multiple options

Campus Outreach Presentations
(15-30-minute PowerPoint + Questions/Discussion)

Group Name	Category
CPFM Building Managers	UO Leadership
Facilities Liaison Meeting	UO Leadership
Chiefs of Staff	UO Leadership
Faculty Advisory Committee	UO Leadership
Senate Exec Committee	UO Leadership
Senior Staff	UO Leadership
VPRI Center and Initiative Directors	UO Leadership
ASUO Senate	Student Organization
CAER	Student Organization
Climate Justice League	Student Organization
Student Sustainability Center Spring Open House	Student Organization
ARCH 495	Class Presentation
CH 610: Decarbonization	Class Presentation
Environmental Policy	Class Presentation
ENVS 201	Class Presentation
Intro to City Planning	Class Presentation
Intro to Political Science	Class Presentation
Intro to Public Policy	Class Presentation
PPPM Advocacy and Social Change	Class Presentation
Sustainable Business - MBA	Class Presentation
Sustainable Business - Undergraduate	Class Presentation
Think Like a Social Scientist	Class Presentation

Online Survey

- 58 Respondents (47 Undergraduates, 2 Graduates, 3 OA, 2 Classified Staff, and 2 Faculty)

- How did you hear about the project?
    - 35 Class Presentation
    - 6 Student Organization Presentation
    - 5 Faculty Presentation
    - 5 Around the O
    - 4 Social Media
    - 2 Campus Forum

- In 2022, the State of Oregon launched an enforceable plan to reduce statewide emissions from fossil fuels by 90% by 2050. Should the University of Oregon rely primarily on that plan or spend money on additional actions that reduce campus heating emissions that may be more costly?
    - 43 Take additional actions to reduce campus heating emissions.
    - 8 Unsure
    - 4 Rely on the statewide plan.

- Why is it important for the University of Oregon to take action above and beyond planned state level emissions reduction plans? Because:
    - 25 We must eliminate as many emissions as possible, no matter the cost.
    - 13 It's important that the UO invests in its reputation as an environmental leader.
    - 4 I don't trust the state will achieve its goals.

- Of the following potential impacts, what are you most concerned about? (select all)
    - 41 Disruption to campus
    - 43 Cost of the project
    - 39 Reliability of new technology

- More info - What would you need to feel more informed and engaged about the university's efforts to transform the university's heating system?
    - Clear cost of each option and where the financing would come from.
    - Understanding of how the cost would impact tuition.
    - How many emissions will be created by implementing the project?
    - What values are guiding this choice?
    - Impact on campus and accessibility mitigation plan.
    - Longevity of each project option.
    - Transparency to the decision-making process.
    - Research from other campuses in similar system transitions.
    - Efficiency of technology.

- Do you have specific feedback for the Thermal Transition Study Task Force? (direct quotes below)
    - How many carbon emissions would be produced in the process of installing the new pipes? It seems like a large scale and intensive operation.
    - There is a planned rebuild of East 13th Avenue to improve walkability. This would be an excellent opportunity to replace the existing steam pipes with hot water pipes instead.

- Has solar water pre-heating been considered as part of your study? Although the subject is not the charge of this task force, I would also like to know what the University is considering related to on-site electrical solar-energy generation.
- The steam heat system in our building (Susan Campbell Hall) does not operate well. We are constantly too hot in the winter due to the inability to really control the heat output of the units in our offices. In the summer we have to install air conditioners in our windows, which takes space from our offices and is very noisy, which is hard for calls and meetings. Additionally, there is always a period in the fall where it is too cold because the steam has not been turned on and a period in the spring where it's too hot because the steam has not been turned off.
- The steam system in my building is quite noisy and disruptive-I'm looking forward to an upgrade!
- Considering that UO destroyed part of the Urban Farm for a construction project, there should be no question as to whether or not UO should take on a large construction project to reduce their emissions.
- It is important for emissions to be reduced as much as possible!! All the young people want this.
- It would be worth $200 million to get off greenhouse gases even if it did not provide increased efficiency. A 50+ year investment that provides early financial returns in efficiency and brands UO as a country leader is worth it.
- Funding should not come from student tuition. University of Oregon is a registered nonprofit and already gets major tax breaks. It is unfair to charge students when the financial aid program is already so mediocre. University of Oregon makes missions off of parking from students when they sell more permits then they can provide spaces. Use some of that money. Don’t send students even more into debt.
- I think a good way to improve the class presentation would be to label the various options on the presented graphs. It was hard to track the different options when they were just numbers.
- I would say a main concern for students might be the disturbance we will see on campus. I would propose that during the presentation to emphasize a little more how campus can work around those disturbances.

Thermal Transition Study

Fall 2023 Outreach – Summary of Campus Feedback

Public Campus Forums

- Tuesday, October 24, 6-7:30 pm – Approximately 120 Attendees
- Question forms submitted at forum: 52

Themes by question

- **Should the UO rely on CPP, or spend money on additional actions?**
    - There is strong interest in spending money on additional actions
        - "UO should spend the extra money to help save our planet! 2050 is too late and UO can afford to spend the money"
    - The time frame that is tolerable for actions to take place is immediate and that UO should not wait on the CPP timeline.
        - "The school is funded by students and the students are demanding robust climate action! The UO prides itself on being a green school, and following these values it should take action right now – it should not wait on a state plan when there are plans in place right now to reduce our carbon emissions."
        - "My understanding is that the immediate emission reduction with the electric boiler (2a/2b) is also relatively inexpensive. Don't just do the bare minimum, reduce emissions now."
    - There was concern that the regulations might be weakened and UO should have its own plan moving forward.
    - General suggestions and questions around funding the project were made in response to this question.
        - "Use pre-exiting funds. Heating and lighting across campus is inefficient, heating could be decreased by a few degrees and lights could be utilized less. Small changes were omitted, and they could pose a significant decrease in all fronts."
        - "Where would extra money come from? Maybe fundraisers? A hybrid plan would be nice to make sure tuition doesn't skyrocket but as long as it's properly described, it should be fine."
    - UO is seen, can be seen as a leader in the community – particularly important as the biggest polluter in the community
    - "Spend more, go solar."
    - "Don't know successful use of synthetic gases."

- **What potential impacts are most concerning?**
    - The high cost, but sense that environment/planet is worth the high cost.
        - "I am not concerned about cost, I am concerned about our planet."
    - Tuition increases, some tolerance is exhibited, but an undue burden for students is of great concern
        - "It's important to ensure that students aren't burdened by the cost of transitioning to electricity."
        - "You did not just threaten tuition increases."

        - "Increased cost of electricity hard for disadvantaged to absorb. While those options are good for environment, don't want to hurt struggling individuals."
    - There is concern that impactful carbon reduction planning will not be performed and there is a possibility that things will stay the same.
    - In general, disruption to campus life is a widespread concern
    - Some concern about the impacts of geothermal were voiced
        - "What kind of risks involved with bore holes? What has to be destroyed for these plans/ Does working around historic/natural areas on campus take longer or cost more money?"
    - Stop using natural gas
    - Removal of trees
    - Concerns about where funding would come from were also provided in response to this question.
        - "What kind of outside sponsorship/monies are available?"

- **What is your feedback on options that offer immediate emissions reductions vs those taking up to 10 years reach same reductions?**
    - Resounding response to do something as soon as possible.
        - "Stick with immediate emission reduction. In the graph both types appear to reduce the same amount of emissions, so if we have the choice doing it now would be best."
        - "More immediate drop in Co2 emissions is important based on the impact already made. The graph presented also demonstrated that plan 4 has most immediate drop and maintained the lowest emissions rate."
    - There is understanding that gradual emissions reduction over the long run could also valuable. Additionally, long-term and short-term could be accomplished in tandem.
        - "Are they mutually exclusive? If not, let's reduce emissions now and look at more long term solution that take longer and require more money.
        - "There is an option missing that bridged the short term and long term options."
        - "More emission reductions faster is good, however what reduces emission the most in the long term is ideal."
    - There is some tolerance for the longer-term options
        - "The longer more gradual emission tactics will be better in the long run even if it takes longer for emissions to drop."
        - "Can it be gradual? Ex. If Option 3, heat recovering is chosen, can it be easily converted into the other options?"
    - Concern for the uncertainty of future costs were also expressed.
        - "How likely are the long term options to fall through? If costs of materials go up, will the long term plan fail?"

- **What do you need to feel informed and engaged about the university's efforts?**
    - "I want more transparency about the decision-making process and what the University is considering AND why."
        - Timely advertising to ensure student participation

        - Larger social media presence
        - Newsletters
        - Notes & minutes from forums made public
        - Online site to monitor progress, with updates, ongoing reports
        - Website that acts as hub for other links to catch students up on details of project
        - Easier to read graphs
        - Provide in class information

- **Any additional feedback about the recommendation principles?**
    - You should recommend the one which best reduces emissions.
    - The task force needs to get the president to agree with these options.
    - Reducing dependency on natural gas is good. Option 1 is so bad, you put us at the mercy of an energy company essentially.
    - I appreciated the timeline shown at beginning, hope to see increased or transparent efforts to be accountable to that timeline.
    - There needs to be a backup plan.
    - Concerns of methane leakage
    - Consideration of Eugene Community – keep neighbors aware of UO activities
    - Option 4 paired with 2B

- **Specific feedback for the Thermal Transition Study Task Force?**
    - Please listen to scientists, your students, and our community.
    - Hard to provide feedback with no numbers or estimates
    - Appreciation for talking through the options and providing different types of graphs
    - What will actual cost impacts be for students
    - The task force needs to be a leader in GFG cuts.
    - Presentation/advertising related:
        - The presentation was too long and included too many details. This presentation could have been shortened to prioritize student voices.
        - Holding open forums benefits everyone when there is an option to give and hear testimonies. UO should not be the primary or dominant speaker.
        - Get these types of conference/talks into the Quick Quack emails, and just advertise more in general.
        - Allow for Q & A

<u>Key Stakeholder Engagement and Input Sessions</u>

- Friday, November 3, 1pm – 6 Attendees (Student Facing Units)
- Monday, November 6, 12pm – 5 Attendees (Facility & Operational Users)
- Wednesday, November 8, 12pm – XX Attendees (Leadership & External Facing Units)

- **Specific Feedback from Key Stakeholder Sessions**

- Exciting that the water systems bring cooling into our older buildings and that we are being more responsible users of our resources
- It is exciting to see that the university is planning to invest a significant amount of funds in an important part of its infrastructure to update it with an eye to the next sixty years.
- Impacts to student and costs increases are concerns about changing the heating system
- I think that our students would be very proud of our efforts to push forward with much more responsible heating and cooling opportunities.
- Although outdated in terms of the current climate change realities, the current system is functional. I am concerned about committing a large amount in debt financing at a time when the competition for the students is at its zenith.
- I think it is important to think about both the short and long term. For example, can we switch to electric heat while also exploring converting to water.
- I think that as we build out long term planning, we need to consider the impact on students when looking at phased work. We will have to be extremely strategic in how we rotate what building might be offline for a period and align this with any upcoming capital projects.
- In our area we have to take into consideration the cost that we transfer over to the clients/students in terms of service pricing. Up to this point we have been careful about raising our prices. Increased costs due to unplanned building retrofits of the steam and water infrastructure along with lost revenue days will unfortunately push us into moving some or all of that additional cost to the clients/students to ensure keeping the labor force intact. Therefore, as much as we share the same goal of reducing our carbon footprint and greenhouse emissions, we have limited flexibility on the tactical end as we have to maintain the daily service levels.
- The cost is one of the large factors. We will need to be able to clearly define the long-term plan with our students to be able to justify the cost, which could result in increased room and board rates to cover that cost.
- My concern is that twelve years is a long time in higher education leadership. Presidential tenures and provost longevity in the industry are well within the length of time. I would be concerned about committing to such a large amount described in options three and four, that it would basically remove the flexibility of decision making on the finance, operations, and academic areas for a significant time. In our changing higher education industry this period may not be realistic.
- I recommend that the task force deeply looks at the operational details of each option and goes deeper around each building and the activities they represent to assess the impact on the students and staff. I am concerned that a prolonged campus physical environment upheaval will have secondary and tertiary effects that will negatively impact student satisfaction, recruitment of students and staff, and staff retention.
- I would like to know more about the opportunity cost of choosing each option, the impact on the overall cash position for the next two plus twelve years, and some insight into what each project will mean for the tuition guarantee program. I would like to see what we are not able to do if we choose each option.
- From what I am seeing there is still a lot to do to understand the opportunities and restrictions of each option. As of 11/3/23, I would say that Option 2B is attainable with a path to Option 2A in a few years. The other options are not fully understood yet in terms of affordability, sustainability, and operability. Please also look at the carbon footprint on the implementation of each option as options three and four are major construction events that have their own impact for the first couple of years. I would not want them to be seen as negligible. Thank you

for the transparency you have provided so far, I find this process to be enriching and informative.

- Serious consideration and planning will need to occur to manage logistics of the few buildings that will need to have all occupants relocated temporarily. Have these costs been worked in?
- Any seismic retrofitting possible during implementation of any of the options?
- The uncertainty of future costs and regulation and new technologies seem significant – buy as much as possible = 8MW boiler.
- How are these projects progressing on campuses in California and Washington? What can we use or infer from them?
- For science buildings, museums, how will the options affect constant/relative humidity?
- How will the redundant systems keep in play during construction?

Thermal Transition Study

Winter 2024 Outreach – Summary of Campus Feedback

Attendance

- Monday, January 22, 12:30-2:00pm Approximately 28 Attendees
- Monday, January 22, 6:00-7:30 pm Approximately 19 Attendees

Questions prompted by Presentation

Technical

- Has the Taskforce taken into consideration the CO2 component from the electricity provided from EWEB?
- What happens during power outages?
- What about equipment not lasting 80 years, and the increases in maintenance costs after 30 years?
- What is the source of UOs electricity? Could the UO make its own energy?
- Would it be helpful to include how changes in last 25-30 years have affected GHG levels on campus?
- Considering other universities, a) are there universities who have done similar projects, and b) what is their feedback about how it's gone?

Financial

- The options increase the annual budget; when is it recouped, if at all?
- Where does the money come from?
- Will tuition be raised, if UO takes on additional debt?
- Can we sell our excess power, if any, to EWEB?

Procedural

- How did student feedback figure into the recommendation, particularly in light of ASUO vote in support of Option 4?
- Has it been specified in the recommendation that money should be put aside, starting now, for future heating needs after this initiative is completed?
- What are the next steps after the recommendation goes to the President?
- If the University installs the 8MW boiler, what will its immediate next steps be to keep going with these efforts?

Table Discussion Summary

Participants were asked to rank the Evaluation Principles in order of importance.

- Strongest support was for reduction of greenhouse gas emissions
    - strong support for resiliency and appropriate fiscal stewardship.
- Impact to campus experience ranked lower overall.

The responses to the recommendation were generally positive.

- Participants appreciated the clarity of the presentation, how it developed from previous forums, and how the findings clearly informed the recommendation.
- Taking immediate action while at the same time exploring additional funding, new technologies and avoiding Business as Usual echoed through several responses.
- There is still some support for options 3 & 4, recognizing the complete.
- Ensuring student feedback is factored into the recommendation remains important.

Other thoughts and priorities that participants want the Taskforce to consider include

- thinking about other ways to produce electricity for campus (solar, hydrogen, wind generation), in addition to exploring new technologies for heating systems.
- It was clear participants made the link between fiscal stewardship of the options within the scope of university's budget as a whole.
- There were several comments regarding concern for surge space, not just being able to find it and afford it, but even a larger consideration for analyzing which buildings could be taken offline completely due to pedagogical changes (virtual learning, staffing).
- Inclusion of student feedback should be key factor.

Transcribed Responses from Table Discussion

Question 1*: The Thermal Transition Taskforce is using the following criteria for evaluating changes to the Eugene campus' heating system and developing a recommendation to the president.*

1. *Reduction of greenhouse gas emissions*
2. *Consideration of technical feasibility risk*
3. *Resiliency of campus heat production to energy markets and natural hazards*
4. *Impact on campus experience*
5. *Maintaining appropriate fiscal stewardship*

As a table group please discuss which are most and least important to the table and collectively rank them. It is okay if you rank several principles equally.

- 3, (1, 5), (2, 4)
- 1, 5, 2, 3, 4
- 1, 4, 3, 5, 2
- 1, no increase in tuition (2), 4
- 1, 3, (2, 4 ,5)

Comments from Question 1:

- Save the earth
- Change over of steam to [hot water] very challenging logistically and financially

***Question 2**: After taking part in today's forum and taking into account the engineering, campus and construction impacts, cost and greenhouse gas reduction information that the Thermal Transition Taskforce has been developing, how do you feel about the recommendation?*

- I think the overall feeling of the group was positive. This was U+E staff, so they naturally had concern about disruption to service/campus experience, as well as cost
- Generally good, keep looking @ alternate technology
- This is all fine, but it's all still just a Band-Aid for the problem (no further extrapolation)
- It's good to avoid options 3&4 since A LOT is going to happen in the next 30+ years
- Options 2a & 2b offer more immediate significant reductions
- Things are changing/developing so fast
- That designing for 60-years out seems ill advised and very risky
- Everyone at table stressed that BAU is not a viable option-we must do something
- Sense of appreciating clarity and legibility of presentation, sense of completely agreeing with findings and, generally, trust
- I was gunning for 2a more than 2b because 2a has greater CO2 emission reduction but I understand that technology can become "stranded". As long as the route of 2b is used as a stepping stone to achieve greater emission reduction as inferred by the 2a model.
- I don't have any strong feelings about it.
- When options were presented initially it was a lot more vague
- Appears that there were many more benefits to options 3 and 4
- Apprehensive about lack of students input on decision and cost transparency- students did not feel heard, forum after decision was made were ineffective
- Insane amount of electricity being used, feel like the best of suboptimal option
- Very thorough fiscal projections confirm the positive intuitive choice of 2B. The only factor not considered was the natural upgrading of the bldg. HVAC. I was very glad to see the 2B option rather than just 2A as the smaller boiler mitigates the initial cost and ongoing operational cost

***Question 3**: What questions, thoughts, or priorities do you have that are important for the Thermal Transition Taskforce to take into account when finalizing a recommendation?*

- Disruption to buildings?
- Backup options?
- Continual exploration of diff technologies
- Consistent fiscal stewardship
- Quantity progress made since 1994
- Was there discussion about taking buildings off line as our educational model potentially changes? As we're able to provide more remote coursework and/or remote work opportunities, we many not need to keep the same physical footprint that we currently have-and if so, we'd want to prioritize taking buildings offline that are less energy efficient and/or are harder/impossible to convert.
- Have we considered solar options for generating electricity, wind generation?
- Immediacy (also important to consider campus construction disruption not just for students but also because we don't have surge space)

- Conclusion: 2B make sense from a financial perspective, also with technology uncertainties moving forward
- The Taskforce should [take] student feedback

Question 4: *Do you have any questions that haven't been answered during the presentation or discussion?*

- Implication of raising debt-Will it raise tuitions?
- What happens in a power outage if we electrify? (Leaving existing system-gas-in place as backup)
- Peer institutions? How has experience been? (Stanford implemented)
- Source of electricity? (hydro? Other? EWEB?)
- Can hydrogen contribute to CO2 reduction?
- If Option 2B is chosen, does the initiative continue until a viable solution is found?

Direct Responses: Online Survey (Jan 22 – Jan 25)

- 4 Respondents (0 Undergraduates, 0 Graduates, 4 Others: 0 Recent Graduate, 0 Eugene Residents)

- How did you hear about the project?
    - 1 Faculty Presentation
    - 3 Around the O

- The Thermal Transition Taskforce is using the following criteria for evaluating changes to the Eugene campus' heating system and developing a recommendation to the president. Please rank the Evaluation Principles in order of importance to you.
    - Reduction of greenhouse gas emissions (5^{th}, 3^{rd}, 2^{nd})
    - Consideration of technical feasibility risk (3^{rd}, 4^{th}, 3^{rd})
    - Resiliency of campus heat production to energy markets and natural hazards (2^{nd}, 2^{nd}, 1^{st})
    - Impact on campus experience (4^{th}, 3^{rd}, 4^{th})
    - Maintenance of appropriate fiscal stewardship (1^{st}, 5^{th}, 5^{th})

- The Taskforce is seeking feedback from you on its draft recommendation to implement Option 2B as a first step which would result in the fastest reduction of greenhouse gas emissions (45% annually) and then launch several additional analysis efforts, with clear deadlines and responsible offices to conduct additional analysis on next steps.

  After reviewing the information made available by the Taskforce, to what degree to you agree or disagree with the draft recommendation?
    - 1 Strongly Disagree
    - 3 Strongly Agree

- Please explain why you disagree with the draft recommendation.
    - High Cost

- What option would you choose and why would you choose it?
    - BAU
    - Start with Option 2B and explore Option 4 as an end goal
    - Option 4 provides low GHG reduction and lowest operating costs.

Direct Responses: Online Survey (Oct 24, 2023 – Nov 22, 2023)

- 19 Respondents (14 Undergraduates, 2 Graduates, 3 Others: 1 Recent Graduate, 2 Eugene Residents)

- How did you hear about the project?
  - 1 Class Presentation
  - 7 Student Organization Presentation
  - 0 Faculty Presentation
  - 2 Around the O
  - 4 Social Media
  - 3 Campus Forum
  - 3 Others: 1 350 Eugene, 1 The Daily Emerald Reporter, 1 Friend

- In 2022, the State of Oregon launched an enforceable plan to reduce statewide emissions from fossil fuels by 90% by 2050. Should the University of Oregon rely primarily on that plan or spend money on additional actions that reduce campus heating emissions that may be more costly?
  - 19 Take additional actions to reduce campus heating emissions.
  - 0 Unsure
  - 0 Rely on the statewide plan.

- Why is it important for the University of Oregon to take action above and beyond planned state level emissions reduction plans? Because:
  - 16 We must eliminate as many emissions as possible, no matter the cost.
  - 1 It's important that the UO invests in its reputation as an environmental leader.
  - 1 I don't trust the state will achieve its goals.
  - 1 Other: "All of the above and more!"

- Of the following potential impacts, what are you most concerned about? (select all)
  - 27 Disruption to campus
  - 27 Cost of the project
  - 45 Reliability of new technology

- More info - What would you need to feel more informed and engaged about the university's efforts to transform the university's heating system?
  - I wish there were more readily available information on how each building's heating/ventilation system worked.
  - Online information sharing and transparency
  - more clear data online
  - More meetings and breakdowns of different options
  - Some kind of email list or easy to access website
  - We need to see the work being done. Climate action now!!
  - Another(or multiple) third party organizations fact checking what this board tells the public.
  - If we had a more direct influence on the outcome of the CAP
  - I would appreciate more open communication. I hope the university actually takes action and doesn't just talk about it.

    - Transparency and more explanation of possible actions plan, such as the extreme measures
    - Comprehensive information should be made available, up to date, online. The data has been
    - Exact numbers about how much emissions are produced and the cost of each project
    - More clarity/transparency, some graphs seem based on wrong assumptions.
    - Be as transparent as possible on what's happening.
    - A clear overview of the science and a review of different funding options
    - Progress.

- Do you have specific feedback for the Thermal Transition Study Task Force? (direct quotes below)
    - I hope that we can choose one that reduces the emissions the most and is relatively fast. we need fast change.
    - Get the president to go along with your CAP!
    - I think that they should provide more information about the current UO spending on new stadiums and large scale funding raising. Aside from that, the Task force needs to frame this as a time sensitive issue and larger environmental goals we need to meet
    - Great presentation
    - The status quo is not an option. Consider combining the short-term gains of 2 with the long-term gains of 4 for maximum impact.
    - There is nothing more important than a livable planet.
    - The thermal transition task force is doing a great job with limited resources and limited information.
    - Don’t look back N years from now and realize what you did was too little. It’s already too late.

- Anything else you would like to share?
    - In general, I think UO heats way too much. Most buildings are hot and stuffy in the winter. Any attempts to get fresh air result in more heat. It is certainly time for UO to take action on these systems.
    - ye s, i was very disappointed by all of the food and drinks being disposable. This is a sustainability meeting and the plastic and compostable€ cups are greenwashing because there are not the specific facilities on campus. it would be worth investing in reusable materials.
    - The university is open about its ability to raise money. The financial cost of sustainable infrastructure need not affect tuition costs, etc.
    - If the university is a leader in solving this planetary crisis, it will boost student enrollment hugely.
    - Young peoples' futures are on the line. We will experience changes here in lane county that will damage our way of life. Its UO's responsibility to reduce emissions no matter what it takes. UO already has the resources to make this happen.
    - Thanks.

Direct Responses: Key Stakeholder Meetings

Question 1: Please share what would excite you & what opportunities you see.

- Being more responsible users of our resources
- UO has the opportunity to balance a commitment to sustainability while achieving its core mission of higher education in communicating the impact of each carbon reduction solution
- This also seems to be an excellent opportunity to create redundancy, resiliency, and some amount of futureproofing of a key operating requirement for the university
- I appreciate that there are several options to consider

Question 2: What concerns about changes in our heating system:

- I am concerned about committing a large amount in debt financing at a time when the competition for the students is at its zenith
- Student impact
- Damage to the physical arboretum that is the UO Eugene campus
- In one word, cost. It is unclear to me if incoming students would be willing to contribute to most (if not all) of the cost.
- Does the committee see a timely and responsible return on investment in what students receive for investment in these heating solutions?
- I am wondering if we have not seen the right technology / "right-sized" solution yet
- Consider the unique value -- the opportunity cost of any project we commit to at the expense of other projects.
- If a change to our heating system were to disrupt access to classroom buildings, then the University would be hard pressed to continue to provide instruction to our students.

Question 3: If the University were to reduce its greenhouse gas emissions by 50% or more over the next decade while other institutions did not – would that be a meaningful advantage for the area you are responsible for at the UO? If the university did not decrease its greenhouse gas emissions over the next decade while other institutions did not would that be a meaningful advantage for the area, you are responsible for at the UO?

- In our area we have to take into consideration the cost that we transfer over to the patients in terms of service pricing.
- I think that our students living within our residence halls would be very proud of our efforts to push forward with much more responsible heating and cooling opportunities.
- there may be an advantage when recruiting students and potential expansion of the academic programs offered regarding sustainability efforts.
- federal, state and local regulatory guidelines will cause a gradual decrease in carbon emissions regardless.
- the advantages in brand reputation (in addition to "doing the right thing" here—would make enrollment more challenging due to the significant increase in cost to the student.
- #1 concern when choosing a college in a competitive college marketplace is cost
- Any increase in cost from this project will have a much stronger real negative impact on recruitment than any potential incremental positive impact.

Question 4: Some options result in immediate emissions reductions. Others require 12 years before

achieving full emissions reductions. Do you have any feedback on this issue to share with the Task Force?

- Twelve years is a long time, it would basically remove the flexibility of decision making on the finance, operations, and academic areas for a significant time.
- We need to consider the Residence Halls when looking at phased work. We will have to be extremely strategic in how we rotate what hall might be offline for a period and align this with any upcoming capital projects involving our halls.
- Currently available I feel the option that immediately impacts reductions while taking a tactful approach to existing regulatory guidelines would be prudent
- Very significant and poorly understood risks related to the changes necessary in the options requiring 12 years to realize potential
- I feel this argues for a stepwise, conservative approach.

Question 5: Do you have any additional feedback about the recommendation principles the Thermal Transition Task Force is considering?

- A prolonged campus physical environment upheaval will have secondary and tertiary effects that will negatively impact student satisfaction, recruitment of students and staff, and staff retention.
- The cost is one of the large factors for our department. We will need to be able to clearly define the long-term plan with our students to be able to justify the cost, which could result in increased room and board rates to cover that cost.
- patience could provide time for technological and engineering advancements to existing options or offer a completely new option that the Task Force is not currently considering.

Question 6: What additional information do you need to feel more informed and engaged about the university's efforts to transform the university's heating system?

- Know more about the opportunity cost of choosing each option

Question 7: Do you have additional feedback for the Thermal Transition Study Task Force?

- As of 11/3/23, I would say that Option 2B is attainable with a path to Option 2A in a few years.
- Please also look at the carbon footprint on the implementation of each option
- Remain true to UO's core mission of higher education. While internal and external pressures will offer their recommendations, educating all stakeholders on the impact from each option should remain the focus

Brandalee Davis

From: Dana Bleckinger <wooflevi@yahoo.com>
Sent: Wednesday, January 10, 2024 5:05 PM
To: Thermal Systems Transition Study
Subject: Prioritize emissions reductions and efficiency in UO thermal transition

Dear University of Oregon Thermal Transition,

President Scholz, Chair Holwerda, and members of the University of Oregon Board,

I am writing to urge the University of Oregon to transition its boiler system off of polluting fossil fuels and reduce emissions in line with the goals of the University's Climate Action Plan (CAP) and Eugene's Climate Recovery Ordinance (CRO). Specifically, I strongly support the University pursuing Option Four as discussed in the Thermal Heating Systems Transition Study, or whichever option provides both the greatest emissions reductions and highest efficiency in order to maximize benefits for our community and our climate.

Methane is an extremely potent greenhouse gas about 80 times more potent than Carbon Dioxide (CO2) over a 20-year period. The University of Oregon's Climate Action Plan calls for reducing greenhouse gas (GHG) emissions to achieve carbon neutrality. The University's 2021 GHG Inventory shows that the use of methane gas in buildings accounts for the largest portion of emissions at over 22,000 metric tons of GHG annually and 72.1% of total emissions, making the transition a clear choice for achieving the University's climate goals. According to the Oregon Department of Environmental Quality's GHG inventory, the University's boiler system is now the single largest source of climate-polluting emissions in the City of Eugene.

Gas use in buildings brings significant health and safety concerns. Research from the American Chemical Society found that burning gas in buildings emits significant amounts of benzene (along with other harmful chemicals), a known carcinogen. In a 2021 study conducted by the Harvard T.H. Chan School of Public Health, burning fossil fuels in buildings in Oregon was responsible for 20 premature deaths and $221,326,511 in health impacts in 2017. 89% of those impacts were from burning gas in buildings. These health harms disproportionately affect low-income and Black, Indigenous, and People of Color (BIPOC) communities. Additionally, gas leaks pose safety risks. According to UO Alert records, the university has evacuated buildings on four occasions due to gas leaks since 2016.

In light of all of this information, I urge the university to choose the cleanest, most efficient system available when replacing its boiler system. This is critical to meeting climate goals, protecting the health and safety of students and community members, and showing the University to be the innovative, forward-looking institution it claims to be.

Respectfully,

Sincerely,
Dana Bleckinger
PO Box 904
Yachats, OR 97498

Brandalee Davis

From: Aya Cockram <aya@fossilfreeeugene.org>
Sent: Friday, November 3, 2023 8:45 AM
To: Office of the President; Board of Trustees
Cc: Thermal Systems Transition Study
Subject: University of Oregon Thermal Task Force Letter
Attachments: University of Oregon Thermal Task Force Letter.pdf

Dear President Scholz, Chair Holwerda, and members of the Board of Trustees,

I would like to submit the attached letter to you on behalf of 28 organizations and unions - representing thousands of members - as well as notable individual signatories. This letter addresses the current question in front of the Thermal Systems Task Force and yourselves regarding the transition of the University's boiler system and urges you to pursue the option that provides the greatest carbon emissions reductions while also maximizing efficiency.

Thank you for your consideration.

Sincerely,

Aya Cockram
Coalition Coordinator
Fossil Free Eugene

541-912-1667
aya@fossilfreeeugene.org
https://fossilfreeeugene.org/

Note: I work part-time and am most accessible before noon.

University of Oregon Thermal Task Force Letter

To: President Scholz and Board of Trustees
CC: Members of the Thermal Task Force

Dear President Scholz, Chair Holwerda, and members of the Board of Trustees,

The undersigned student and community organizations are writing to voice our strong support for the University of Oregon to take rapid action to transition its facilities off of polluting fossil fuels, to clean, renewable electricity. Specifically, we support the University of Oregon replacing its gas boiler system, which runs on "natural" methane gas, with high-efficiency electric heat pumps and heat recovery chillers, as described in Option Four of the "Options Under Consideration" in front of the Thermal Systems Transition Study Task Force.[1] This option would allow the University to take full advantage of the overwhelmingly carbon free electricity provided by the Eugene Water and Electric Board (EWEB), while providing the greatest level of efficiency and mitigating impacts to the electric grid.

Methane Gas is Harmful to the Climate and Public Health

Transitioning the University of Oregon off of methane, a potent greenhouse gas, is critical to meeting local, state and national climate goals, and protecting public health. The University of Oregon's Climate Action Plan calls for reducing greenhouse gas (GHG) emissions to achieve carbon neutrality, yet the University's most recent 2021 GHG Inventory[2] shows the use of

[1] Thermal Heating Systems Transition Study, University of Oregon, 2023 https://cpfm.uoregon.edu/thermal-heating-systems-transition-study
[2] University of Oregon GHG Inventory, University of Oregon, 2021, https://sustainability.uoregon.edu/climate.html

methane gas in buildings accounting for the largest portion of emissions at over 22,000 metric tons of GHG annually and 72.1% of total emissions. According to the Oregon Department of Environmental Quality's GHG inventory,[3] the University's boiler system is now the single largest source of climate polluting emissions in the City of Eugene. Consequently, and in light of (1) the significant portion of GHG emissions generated by continued use of methane gas in the University of Oregon's buildings; (2) the goals of carbon neutrality reaffirmed in the University's updated Climate Action Plan;[4] and (3) the targets stated in the City of Eugene's Climate Recovery Ordinance, which include the reduction of fossil fuel use in the City by 50% of 2010 levels by 2030;[5] It is critical that the University transition off of fossil fuel use in its buildings as rapidly as possible.

If the climate impacts were not enough, the need to transition off of polluting methane gas has become a more urgent public health and safety issue, in light of the mounting scientific literature finding that the use of the fuel in buildings is a significant source of harmful air pollutants including nitrogen oxides (NO_x).[6] According to data collected in a 2021 study conducted by the Harvard T.H. Chan School of Public Health,[7] in Oregon burning fossil fuels in buildings was responsible for 20 premature deaths and $221,326,511 in health impacts in 2017. 89% of those impacts were from burning gas in buildings.[8] As is often the case, these health harms disproportionately affect low income and Black, Indigenous and People of Color (BIPOC) communities.[9]

According to data from the U.S. Environmental Protection Agency, in Lane County the use of gas in residential and commercial buildings, including large-scale boiler systems such as the

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[3] "Greenhouse Gas Emissions Reported to DEQ," Oregon Department of Environmental Quality, 2020, https://www.oregon.gov/deq/ghgp/Pages/GHG-Emissions.aspx

[4] "University of Oregon's updated Climate Action Plan," University of Oregon, May 2019, https://president.uoregon.edu/university-oregons-updated-climate-action-plan

[5] "Climate Recovery Ordinance," City of Eugene, 2014, https://www.eugene-or.gov/3210/Climate-Recovery-Ordinance

[6] "Composition, Emissions, and Air Quality Impacts of Hazardous Air Pollutants in Unburned Natural Gas from Residential Stoves in California", American Chemical Society, October 20 2022, https://pubs.acs.org/doi/full/10.1021/acs.est.2c02581

[7] "A decade of the U.S. energy mix transitioning away from coal: historical reconstruction of the reductions in the public health burden of energy," Jonathan J Buonocore *et al,* 2021, https://iopscience.iop.org/article/10.1088/1748-9326/abe74c

[8] These values are based on additional analysis from Jonathan Buonocore, Sc.D, the study's lead author, RMI used median estimates from the results of 3 reduced complexity models used in: Jonathan J Buonocore (Harvard T.H. Chan School of Public Health) et al, "A decade of the U.S. energy mix transitioning away from coal: historical reconstruction of the reductions in the public health burden of energy", 2021 Environ. Res. Lett. 16 054030, https://doi.org/10.1088/1748-9326/abe74c

[9] "Fumes Across the Fence-Line: The Health Impacts of Air Pollution from Oil & Gas Facilities on African American Communities", National Association for the Advancement of Colored People (NAACP), 2017 https://naacp.org/resources/fumes-across-fence-line-health-impacts-air-pollution-oil-gas-facilities-african-american

type used by the University of Oregon, is responsible for over 226 tons of NO_x annually,[10] the equivalent NO_x emissions of approximately 75,052 cars.[11] As one of the largest users of methane in the county, transitioning the University off of methane gas and to all electric alternatives would create a significant reduction in this pollution, and the associated health impacts.

High Efficiency Electric Chillers Are the Superior Option

Upon review of the report provided to the University by Affiliated Engineers Incorporated (AEI), it is clear that Option 4, "Heat Recovery Chiller, Alternate Source", provides the greatest emissions reductions paired with the highest efficiency, while creating co-benefits such as reducing NO_x pollution associated with the use of fossil fuels. Unlike Option 2, which relies on electrode (electric resistance) boilers that use a tremendous amount of electricity, Option 4 takes advantage of cutting edge heat pump technology that offers between 250-400% efficiency, significantly higher than gas (~90% efficiency) or electric resistance boilers (~100% efficiency).[12] And unlike Option 3, Option 4 provides additional emissions reductions through the use of an alternate source with roughly the same utility costs.

It is critical to consider efficiency when making this decision, as the electrification of buildings and transportation will continue to increase electric loads for our local publicly owned utility, Eugene Water and Electric Board (EWEB). The utility has signaled that it can handle increased loads associated with forecasted building and transportation electrification, and is conducting long range planning with these priorities in mind. However, the University has an obligation to pursue the highest efficiency options available in order to live up to its commitment as an innovator and community leader, and to ensure our community's energy use can be as resilient and sustainable as possible.

About 80% of EWEB's energy supply comes from hydropower, mainly from Bonneville Power Administration but also some local facilities (Carmen-Smith, Walterville, Stone Creek), and over 90% from carbon-free sources.[13] However, these resources are constrained: new dams are not being built, current power plants are fully subscribed, and climate change is already changing the seasonal capacities of regional hydropower stations. When EWEB needs more power, it will

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[10] Emissions data from EPA 2017 National Emissions Inventory. https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data. Appliance emission estimates include residential and commercial emissions for the gas, oil, and other fuel categories. Some commercial source classification codes have been excluded to avoid counting certain non-appliance sources like pipeline compressor stations and industrial-size boilers. All commercial nonpoint source emissions are included, and commercial point source emissions are included if they have input heat capacities less than 10 MMBtu/hr or if they are classified as space heaters.

[11] This estimate is based upon 2020 data of average NOx emissions per gram per mile for light-duty vehicles provided by the Federal Bureau of Transportation, and extrapolated based on average miles driven data in the United States provided by the Federal Highway Administration https://www.bts.gov/content/estimated-national-average-vehicle-emissions-rates-vehicle-vehicle-type-using-gasoline-and

[12] "Back to Basics: Heat Pumps", Energy Efficiency Council, 2016 https://www.eec.org.au/for-energy-users/technologies-2/heat-pumps

[13] "Where Your Power Comes From", Eugene Water Electric Board, https://www.eweb.org/your-public-utility/power-supply

need to either build new generating resources or arrange new power-purchase agreements. Both of these will incur substantial costs that will be passed along to ratepayers, including the University. When considered in the context of broader load growth and electrification of heating and transportation, if the University chooses to deploy inefficient electric resistance boilers, EWEB will eventually be forced to procure more power to meet the needs of the community coupled with the wasteful use of the University's heating plant.

Additionally, we are in a moment in which historic investments in emissions reductions are being made by the Federal Government, and the University of Oregon is positioned to take full advantage of funding and programs in the Inflation Reduction Act and the Infrastructure Investment and Jobs Act including tax credits, zero interest financing, and grant opportunities to help mitigate the capital costs associated with any retrofit of their district heating system.[14] The University must take advantage of these opportunities in order to save money on the capital costs of this transition, and to mitigate the need for students to pay extra tuition or higher fees to support the conversion of the heating plant.

Conclusion

Beyond the evidential basis laid out above, the University has a moral obligation to its students, faculty and staff, and to the broader community to take rapid action to transition off of fossil fuels, reducing polluting emissions, protecting public health, and doing its part to mitigate the climate crisis. The University has long been seen as a national leader on climate and environmental issues, and therefore, must take this opportunity to reaffirm its commitment to climate action and cement its status as a champion for climate justice. As such, we encourage the Board of Trustees to move forward with Option Four.

Thank you for your consideration.

Individual Sign Ons:

Lucy Vinis, Mayor of Eugene

Matt Keating, Eugene City Councilor, Ward 2

Lyndsie Leech, Eugene City Councilor, Ward 7

James I. Manning Jr., Oregon Senator District 7

Phil Barnhart, Oregon State Representative (2001-2019)

Kenny Asher, Community Development Director, City of Tigard

Clark Brockman, AIA, LEED Fellow

Organizational Sign Ons:

[14] Ippolyti Dellatolas, Michelle Faggert, Tim Carter, and Laura Schifter. (2022). "Higher Education and Climate Provisions in The Inflation Reduction Act," The Aspen Institute: Washington, DC. https://www.thisisplaneted. org/blog/higher-education-and-climate-provisions-in-the-inflation-reduction-act

Molly Babcock, Co-Director, Climate Justice League
Chloé Webster, President, Associated Students of the University of Oregon (ASUO)
Ashton Pressman, Organizer, University of Oregon Student Workers Organizing Committee
Leslie Selcer, President, GTFF Executive Board
Luke McCullough, General Leadership, Coalition Against Environmental Racism (CAER)
Victoria Whalen, Co-Director, Student Advocacy and Action for Environmental Justice (SAAEJ)
Adrienne F. Rizzo, Organizer, National Delegate, Sunrise Eugene
Max Jensen, Codirector, UO Radical Organizing Activism Resource Center (ROAR)
David Lefevre, Chair, University of Oregon Young Democratic Socialists of America
Addie Cooper, State Board Chair, Oregon Student Public Interest Research Group
Dylan Plummer, Senior Field Organizer, Sierra Club
Patricia Hine, President, 350 Eugene
Bethany Cotton, Conservation Director, Cascadia Wildlands
Alyssa Rueda, Climate Justice Organizer, Beyond Toxics
David De La Torre, Healthy Climate Program Director, Oregon Physicians for Social Responsibility
Danny Noonan, Climate & Energy Strategist, Breach Collective
Milla Vogelezang-Liu, Marina Moyce, Nora Black, Co-Presidents, EG350 South Eugene High
Alexi Miller, PE, LEED-AP+, Director of Building Innovation, New Buildings Institute
Jacob Trewe, Treasurer/Secretary, Eugene-Springfield DSA
Julia DeGraw, Coalition Director, Oregon League of Conservation Voters
Brian Stewart, Co-Founder, Electrify Now
Ashley Haight, ZERO Coalition Manager, ZERO Coalition
Patrick Donaldson, Principal Architect, Harka Architecture
Ariel Knox, Oregonizers
Kraig Buesch, Chair, Climate Reality Project - Portland Chapter
Phil Carver, Co-coordinator, 350 Salem OR
Masayo Simon, Communications Coordinator, Rogue Climate
Laura Feinstein, Fellow, Sightline Institute

Brandalee Davis

From: Karen Austin <Wild.Horizons@protonmail.com>
Sent: Tuesday, October 17, 2023 11:58 AM
To: Thermal Systems Transition Study
Subject: Catch up UO! Go 100% Renewable!

By 2025, all of OSU's purchased electricity will come from renewable sources. By 2030, OSU's Sustainable Transportation Strategy is to reduce commute emissions, and encourage alternatives to university-funded air travel.

Oregon Institute of Technology already has geothermal installed and by adding a field of made-in-Oregon solar panels, the school will run 100% on renewable energy produced on site. Portland State University, Western Oregon University and Southern Oregon University plan to follow.

Why is UO not planning on doing something similar to these Oregon universities?

Karen Austin, MS from OSU, 1993