
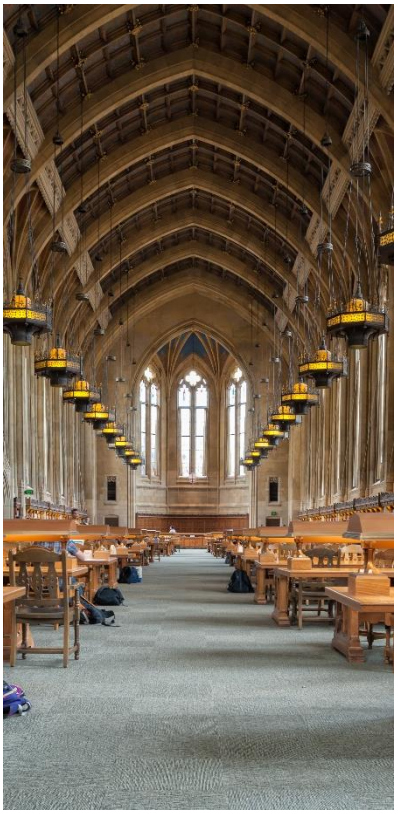


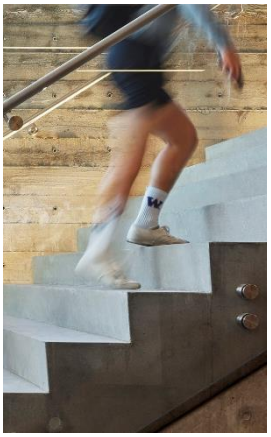


University of Washington

Energy Renewal Plan

INTRODUCTION

December 20, 2024

Affiliated Engineers

1.0 Introduction to the Energy Renewal Plan

The University of Washington (UW) Energy Renewal Plan (ERP) provides a framework for a phased decarbonization of UW's campus utility and energy infrastructure, with the goal of significantly reducing greenhouse gas emissions (GHG).

To fulfill the goals of UW's Energy Strategy, the current campus heating system using fossil fuel-based combustion boilers with steam distribution to the buildings will be transitioned to an electrified system that uses heat pump technology to recover energy from sources within and adjacent to the campus and distribute the energy to the campus buildings through a new medium-temperature hot water system. The operation of this electrified system will be supported by the Seattle City Lights low carbon electrical infrastructure.

This process was executed chronologically in a series of phases:

- Phase 1 – Baseline Assessment
- Phase 2 – Project Identification & Prioritization
- Phase 3 – Implementation Plan

As the implementation process moves forward beyond this planning effort, it will be most useful the reference the reports in reverse chronological order. The following list provides greater detail on the contents of each report, in the order that the team feels is most relevant to the teams that will be planning and executing this work going forward:

- Phase 3 – Implementation Plan
  - Documenting multiple project execution scenarios for the ERP. Accompanying schedules for each of these scenarios.
  - Identifying outside funding opportunities and the necessary steps to secure them.
  - Identifying a plan for completing projects with alternate funding pathways including sources of debt and public-private partnerships (P3s).
  - Lifecycle cost analyses comparing multiple ERP scenarios against business-as-usual (BAU).
  - Final cost estimates (supersedes the information in Phase 2).

- Phase 2 – Project Identification & Prioritization
  - Detailed descriptions and analysis of ERP projects.
  - Background information on the rationale for the selection of the ERP projects.
  - Scope of work documents associated with each project, used in developing the cost estimates and schedules.
  - Cost estimates and individual project milestone schedules.
    - The executive summary of Phase 2 has been updated to capture the revised costs developed in Phase 3, however the cost estimates in the Phase 2 appendices are meant to be a milestone document and are superseded by the cost estimates provided in Phase 3.
- Phase 1 – Baseline Assessment
  - Define the existing campus utility loads – thermal and electrical.
  - Project future campus utility load profiles.
  - Existing conditions documentation.

As a high-level summary of the financial impact of the project work being proposed in the Energy Renewal Plan, Table 1.0-1 on the following page provides the anticipated financing required for different funding scenarios in each biennium appropriation cycle. The four scenarios developed are defined in the table headings by the varying number of funding cycles required to execute the work. Scenario 4 also includes Public-Private Partnerships (P3) for the lake and sewer systems.

Table 1.0-1: Funding Cycle Appropriations

Funding Cycle	Scenario 1: Four Biennia	Scenario 2: Five Biennia	Scenario 3: Eight Biennia	Scenario 4: Seven Biennia (P3)
2025-2027	$292.6 million*	$292.6 million*	$292.6 million*	$292.6 million*
2027-2029	$701,378,783	$433,346,589	$244,363,826	$244,083,918
2029-2031	$613,438,773	$436,853,076	$294,094,771	$295,957,265
2031-2033	$208,730,806	$271,249,040	$270,674,500	$281,006,700
2033-2035		$452,467,620	$279,924,844	$274,277,272
2035-2037			$279,938,183	$178,269,938
2037-2039			$270,349,261	$159,510,416
2039-2041			$66,165,944	
Totals	$1,816,148,363	$1,886,516,326	$1,998,111,328	$1,725,705,509

***Notes:**

The 2025-2027 funding cycle occurred early during the creation of this report. The ERP team supported UW in developing a group of projects (including budget and schedule) for this funding cycle. Refer to section 3.2.1 for additional details on this first phase of the project.

Figure 1.0-1 on the following page illustrates a comparison between the ERP and BAU cases with representative ongoing operational and renewal costs associated with each. The figures shows that each of the ERP funding scenarios have a lower net present value cost than the BAU. This life cycle cost analysis compares the ERP projects (under four different funding scenarios) to a BAU case which maintains the current district steam system, utilizing renewable natural gas as a fossil-fuel free heating source to comply with current state regulations. The analysis assumes a 50-year window which encompasses replacement of major systems in both scenarios.

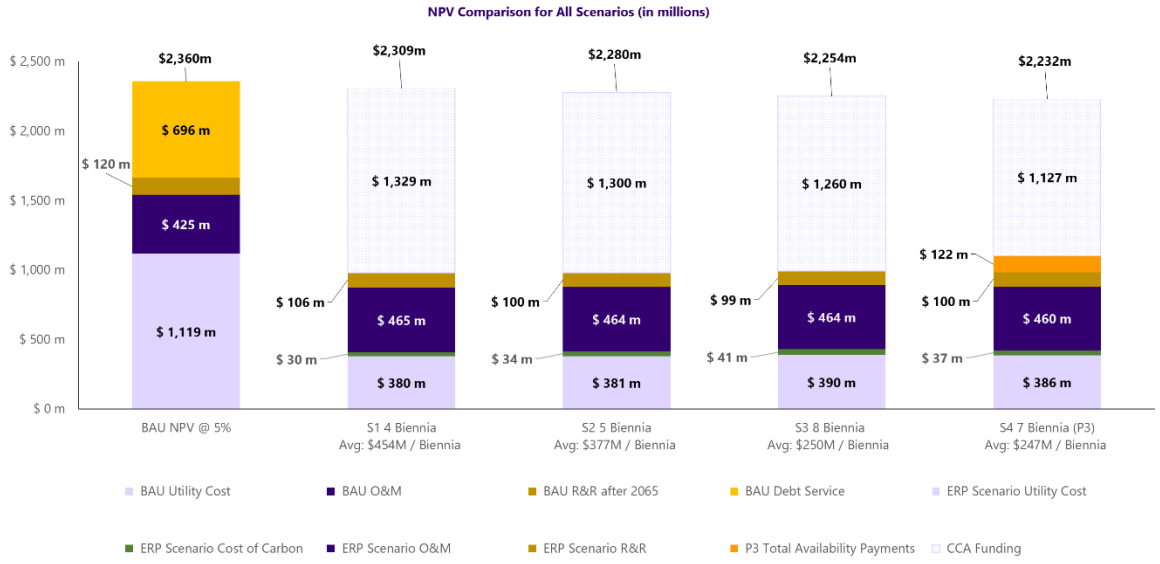

Figure 1.0-1: *Net Present Value (NPV) comparison of the Business-As-Usual (BAU) case to the ERP under four varying funding timeline scenarios.*

An important metric for this analysis is the incremental NPV cost of the proposed plan relative to the carbon emissions being offset over the life of the study. The resulting value is $147 / MTCO2e avoided. As a point of comparison, the University of California system requires their energy projects to be evaluated with an equity-weighted social cost of carbon factor of $265/MTCO2e (as of 2025 and escalated 1.5% annually), so the UW Energy Renewal Plan compares favorably (lower cost / higher effectiveness).

Design and construction associated with the Energy Renewal Program is anticipated to begin in late 2025 upon receipt of capital from the first biennium funding period. Based on schedules developed as part of this report (refer to Phase III Implementation Plan Appendix 10.4, Project Preliminary Milestone Schedules), the ERP could be completed as soon as 2034, in the fastest Funding Scenario 1 (Four Biennium funding cycles). Conversely, the longest timeline is shown in Funding Scenario 3 (Eight Biennium funding cycles) would be completed in 2042.

- END OF INTRODUCTION -