



UNIVERSITY OF OREGON

# **Thermal Systems Project Discussion**

**December 5, 2022**

Presentation to the UO Board of Trustees

Steve Mital, Sustainability Director

Brian Fox, AVP Budget, Financial Analysis and Data Analytics

# Agenda

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- Purpose
- History - CAP 1.0
- Emissions Reduction Strategy
- Current UO Emissions
- Overview of Existing Campus Thermal System
- Thermal System Study
- Thermal System Task Force
- What Are Other Institutions Doing?
- Questions

**University of Oregon**  
**Climate Action Plan Review**

# Pre CAP 1.0 (2000 – 2010)

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# CAP 1.0 - Oregon Model for Sustainable Development

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## **2011 GOAL:**

**Limit additional energy consumption from new buildings by:**

- 1. New projects to certify a minimum of LEED GOLD**
- 2. New buildings must be 35% more energy efficient than state energy code**
- 3. All new energy use must be offset through energy reductions from existing campus buildings**



# CAP 1.0 - Oregon Model for Sustainable Development

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## **2011 GOAL:**

**Limit additional energy consumption from new buildings by:**

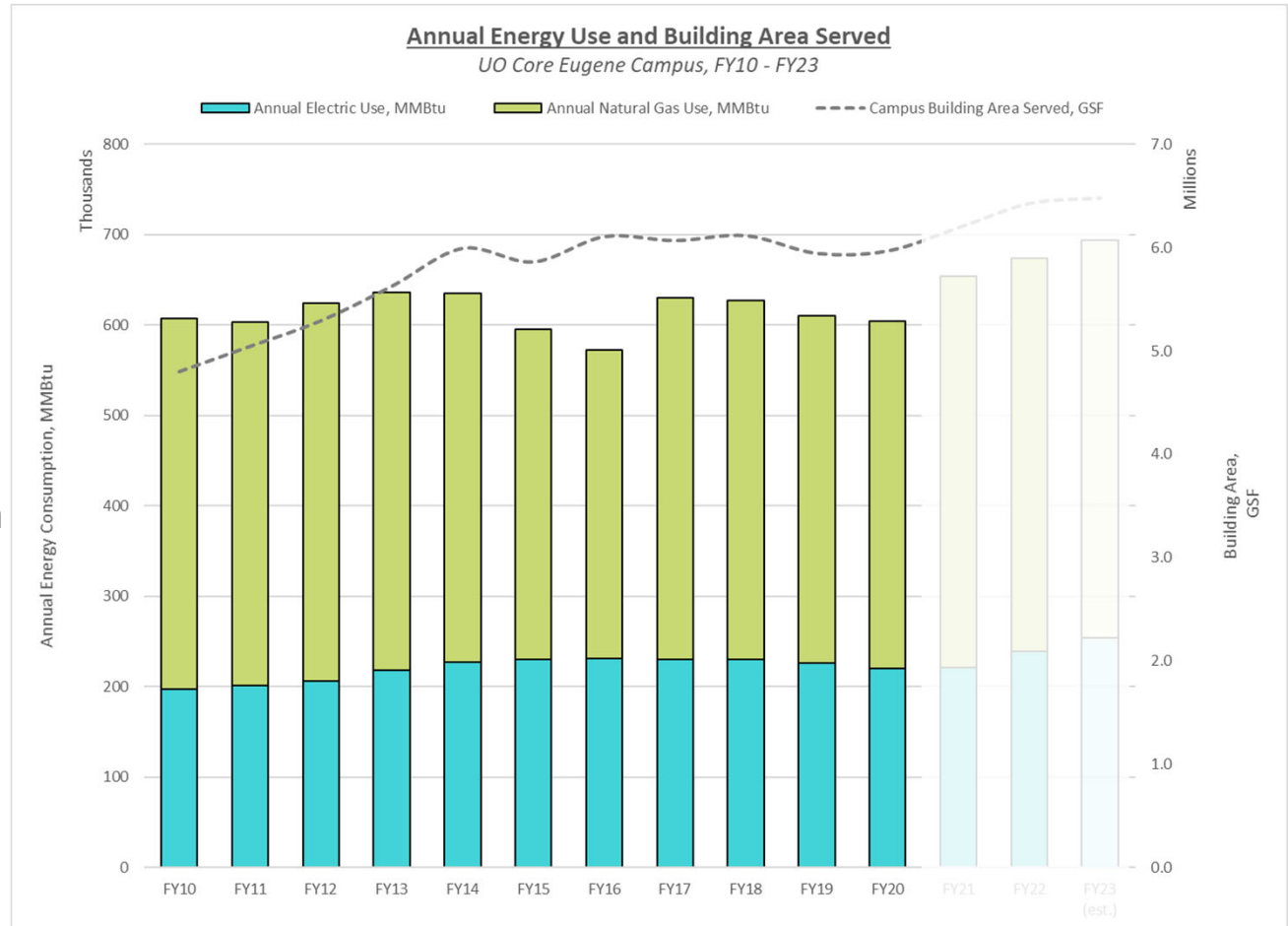
- 1. New projects to certify a minimum of LEED GOLD**
- 2. New buildings must be 35% more energy efficient than state energy code**
- 3. All new energy use must be offset through energy reductions from existing campus buildings**



# Results

**Success!**

**Campus energy consumption from 2011 – 2019 did not increase despite significant growth in building square footage**



# Climate Action Plan (CAP) 2019-2024

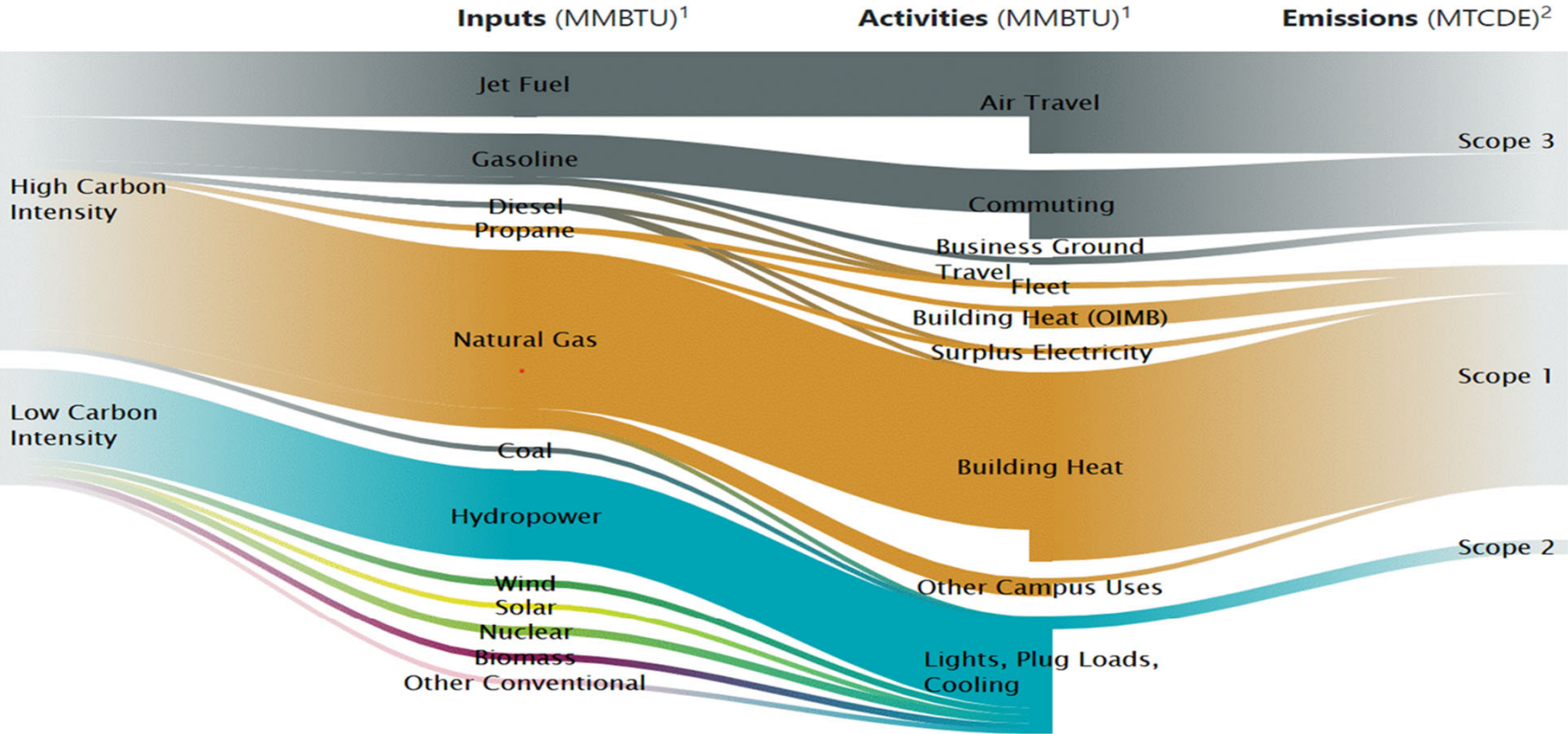
ACTION	STATUS
GOVERNANCE: Establish CAP Advisory Group	COMPLETE
GOVERNANCE: Update Board Of Trustees Annually	ON-GOING
MONITORING: Conduct Annual Emissions Inventory	ON-GOING
REVIEW & UPDATE: Oregon Model For Sustainable Development	COMPLETE
CONSERVATION & EFFICIENCY: Replace Tunnel Steam Pipe Insulation	COMPLETE
CONSERVATION & EFFICIENCY: Establish Energy Management Program	COMPLETE
CONSERVATION & EFFICIENCY: Re-launch Energy Revolving Fund	COMPLETE
CONSERVATION & EFFICIENCY: Launch Building Optimization Program	COMPLETE
STUDY: Internal Carbon Pricing	COMPLETE
STUDY: Low Carbon Heating Feasibility	IN PROGRESS
STUDY: Temperature Set Points	IN PROGRESS
STUDY: Winter Break Turn-Down Program	NOT STARTED
STUDY: LED Retrofit	NOT STARTED
STUDY: Sustainability Transportation Options	COMPLETE
STUDY: District Heating And Cooling Efficiency Improvements	IN PROGRESS
STUDY: Integration with State Carbon Policy	IN PROGRESS



# Emissions Reduction Strategy (Thermal System)

- CAP 1.0 (2011-2019)
  1. Reduce **Demand** by improving energy efficiency in our buildings
- CAP 2.0 (2019-2024) – Conduct detailed studies to evaluate:
  1. Reduce **Demand** by improving efficiency in our steam tunnels
  2. Decarbonize **Supply** by transitioning away from fossil fuels in our power plant

# University of Oregon Energy Flow FY20

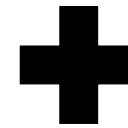


# UO District Heating System

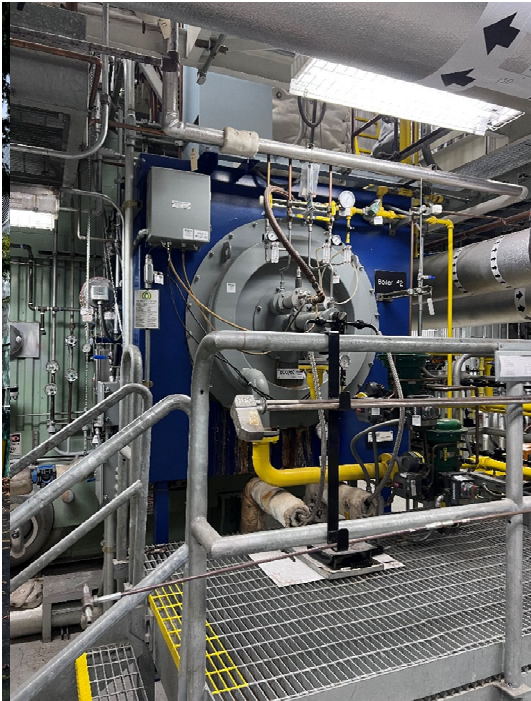
Central  
Boilers



Steam  
Tunnels



Building  
Heat Systems



# UO District Heating System

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## Thermal Systems Study

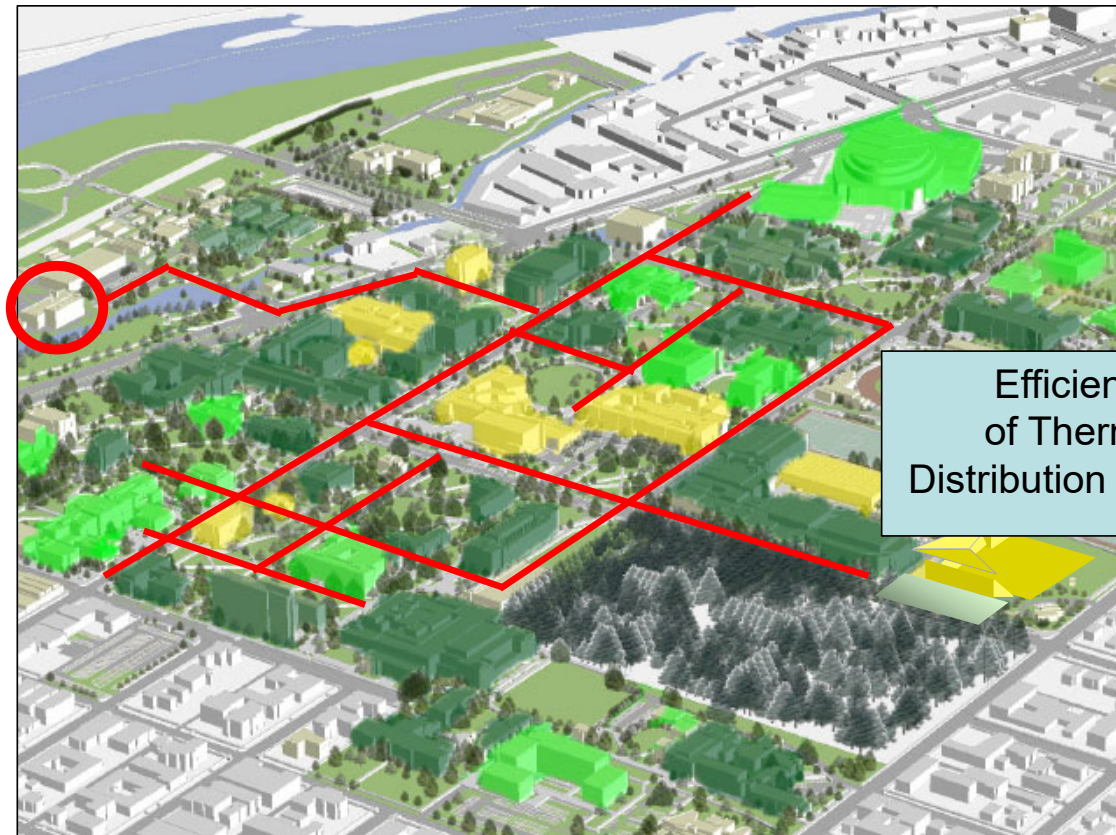
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- UO engaged Affiliated Engineers Incorporated (AEI) to identify and analyze carbon reduction strategies for the campus district heating system
- AEI Analysis identified dozens of potential options and provided an in-depth Life Cycle Cost Analysis (LCCA) on a subset of options deemed potentially viable, including Business as Usual
- RFP in process for a second phase of technical due diligence and LCCA for upgrading campus thermal system

# Thermal System Transition Options

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GHG Intensity of Thermal Production



Efficiency of Thermal Distribution System

## Thermal Systems Task Force

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- Established a Task Force, advisory to the President, including a broad set of stakeholders (trustees, faculty, students, and staff)
- Task Force Charter:
  - Review technical reports, energy markets/regulations and complete due diligence on a potential thermal system transition
  - Engage the campus community on available options and incorporate feedback
  - Recommend to the president a long-term plan to support the recapitalization of the UO's campus heating infrastructure, balancing the following goals:
    - reduction of greenhouse gas emissions,
    - resiliency of campus heat production to energy markets and natural hazards,
    - limited disruption to student's campus experience, and
    - appropriate fiscal stewardship.

# Thermal Systems Task Force Timeline

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- Fall 2022
  - Task Force review phase I heating study, UO emissions, set workplan
  - Commission phase II technical analysis
- Winter 2023
  - Task Force review existing infrastructure, regulatory and market issues
- Spring 2023
  - Task Force designs community outreach and hosts campus forums
- Summer 2023
  - Task Force reviews campus feedback
- Fall 2023
  - Receive phase II technical analysis
  - Task Force drafts initial report to President
- Winter 2024
  - President receives report, makes recommendation to Board
- Spring 2024
  - Launch CAP 3.0



## Pac-12 Comparisons

Name	Current Heating System	On-Site Reduction Planning
ASU	Nat gas, 17 MW CHP	Shift to all-electric
Cal	Nat gas, 21 MW CHP, steam distribution	All electric, heat recovery, hot water distribution
UCLA	Nat gas, 42MW CHP, steam distribution	Retrofit plant for hydrogen
Stanford	Electric (w/ minimal diesel back-up) heat recovery, water distribution, (completed)	<b>Completed</b> transition from nat gas, co-gen, steam at approximately \$485 million
Utah	Nat gas, 6.5MW CHP, boilers	New buildings all-electric, electrify central heating (no plan, budget, schedule)
USC	Nat gas, steam distribution	RFP to explore options forthcoming
UW	Nat gas, steam distribution	Evaluating transition to heat-pump & water
Colorado	Nat gas & electric, steam distribution	Exploring hydrogen (using AEI)
OSU	Nat gas, steam distribution	Exploring hydronic heating districts via heat pump

# Questions

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