

UW ENERGY STRATEGY



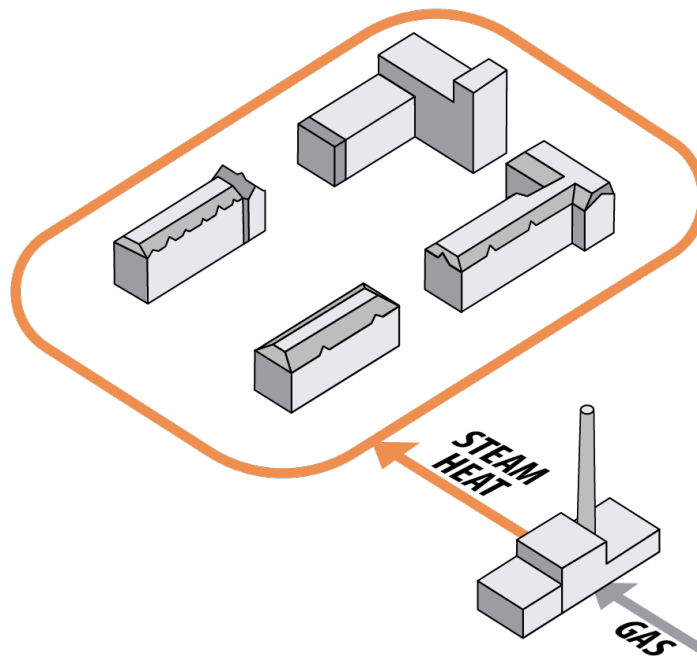
DECEMBER 2022

BE BOUNDLESS



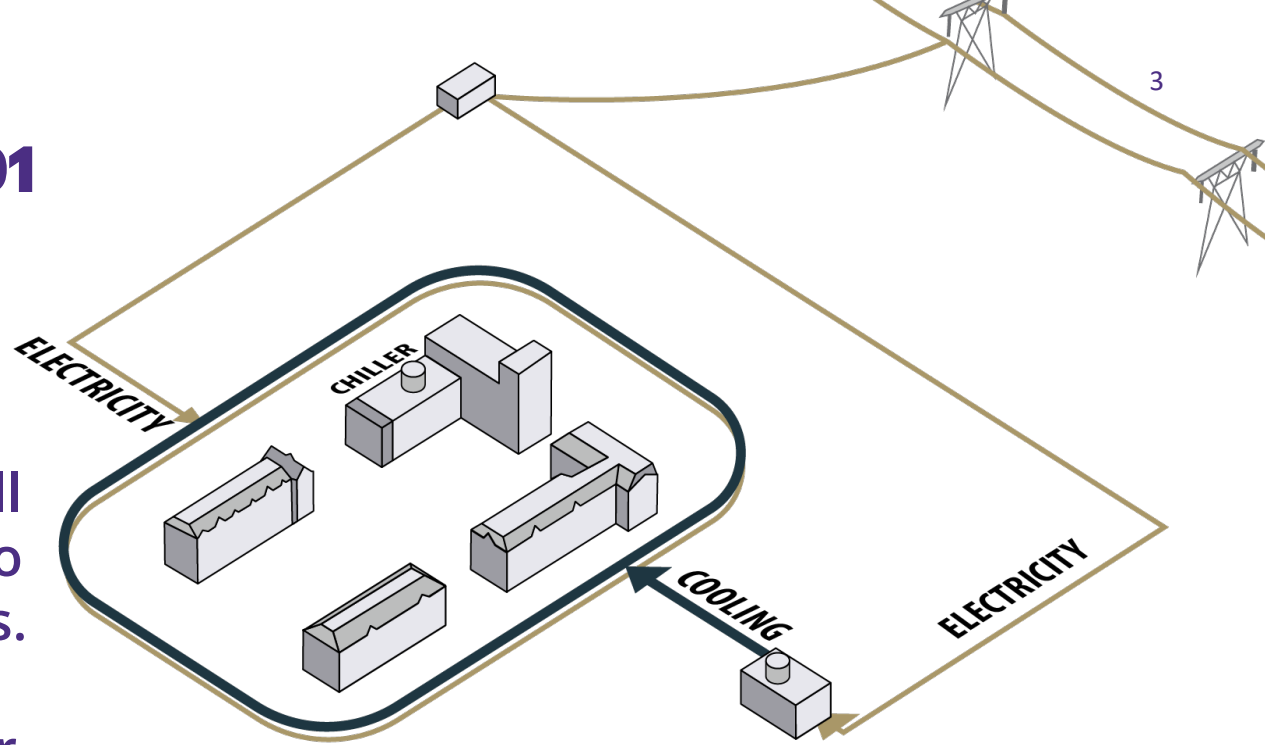
UW HEATING 101

To heat buildings, we burn natural gas to create steam at our central plant and send it to buildings in tunnels.



UW COOLING 101

To cool buildings, we run electric chillers at our central plant to chill water and send it to buildings in tunnels. In addition, many buildings have their own chillers.



TIME FOR TRANSFORMATION

A black and white Alaskan Malamute dog is shown in profile, looking upwards. The dog has a thick coat with black fur on its head and back, and white fur on its chest and face. It is wearing a purple collar with a blue paw print tag. A person's hand, wearing a black sleeve, is reaching out from the right side of the frame, with the index finger pointing towards the dog's head. The background is a bright, out-of-focus white, suggesting an outdoor setting. The overall mood is warm and affectionate.

This heating & cooling system has served the campus well, but we face challenges and opportunities that compel us to transform this system into something even better.

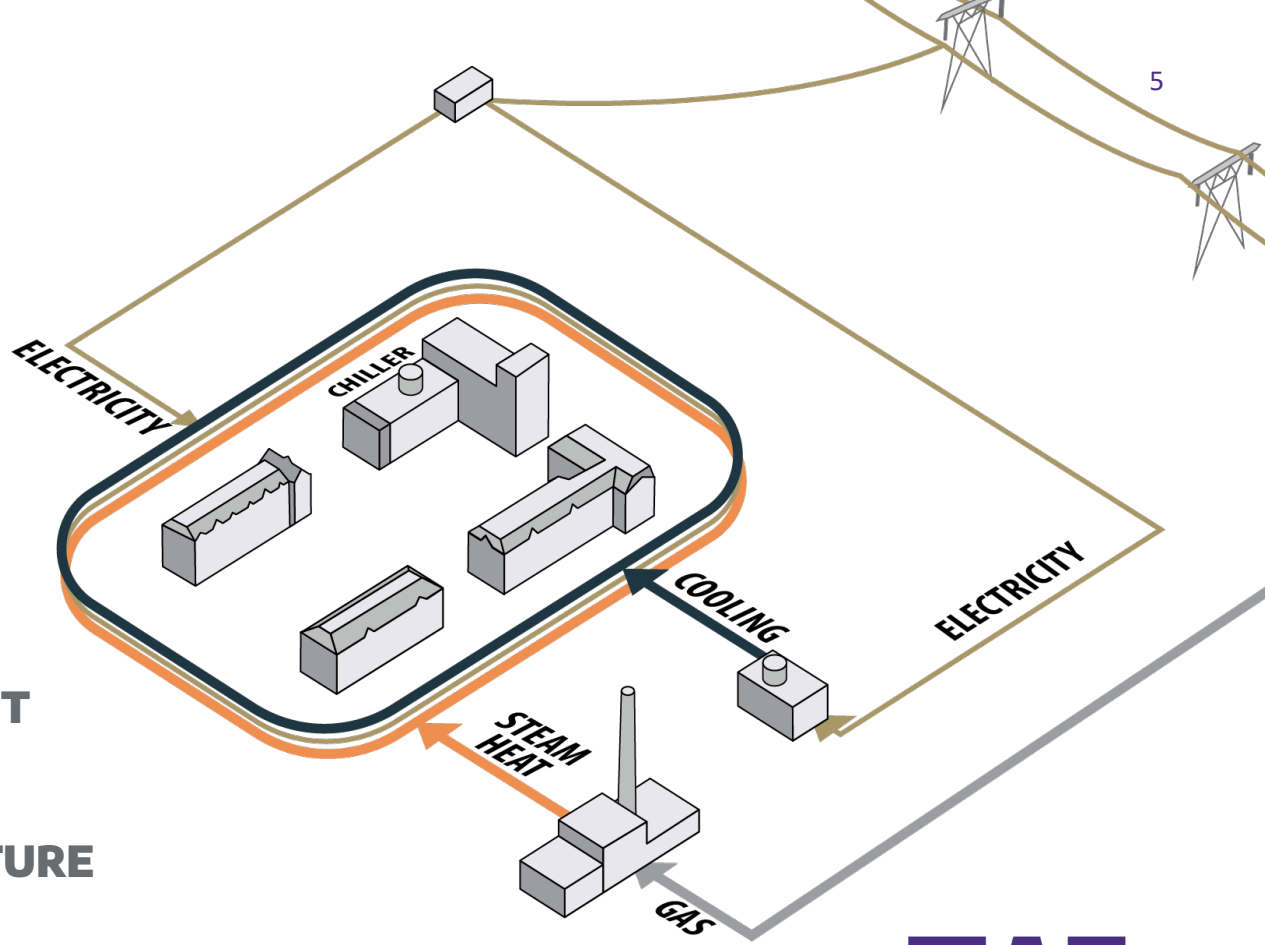
CHALLENGES

**GREENHOUSE
GAS EMISSIONS**

ENERGY EFFICIENCY

**ELECTRICAL
CAPACITY CONSTRAINT**

**AGING
UTILITY INFRASTRUCTURE**



ENERGY TRANSFORMATION STRATEGY

ENERGY SYSTEM ISSUES

**Greenhouse Gas
Emissions**

**Energy
Consumption**

**Electrical Capacity
Constraint**

**Aging Utilities
Infrastructure**



The Energy Transformation
Strategy must address these
4 challenges

ENERGY TRANSFORMATION STRATEGY

ENERGY SYSTEM ISSUES

Greenhouse Gas Emissions

Energy Consumption

Electrical Capacity Constraint

Aging Utilities Infrastructure

ENERGY EFFICIENCY 1

Expand metering, upgrade controls, data analytics and green revolving fund.



15%
reduction in GHGs

30%
energy reduction

2%
more capacity

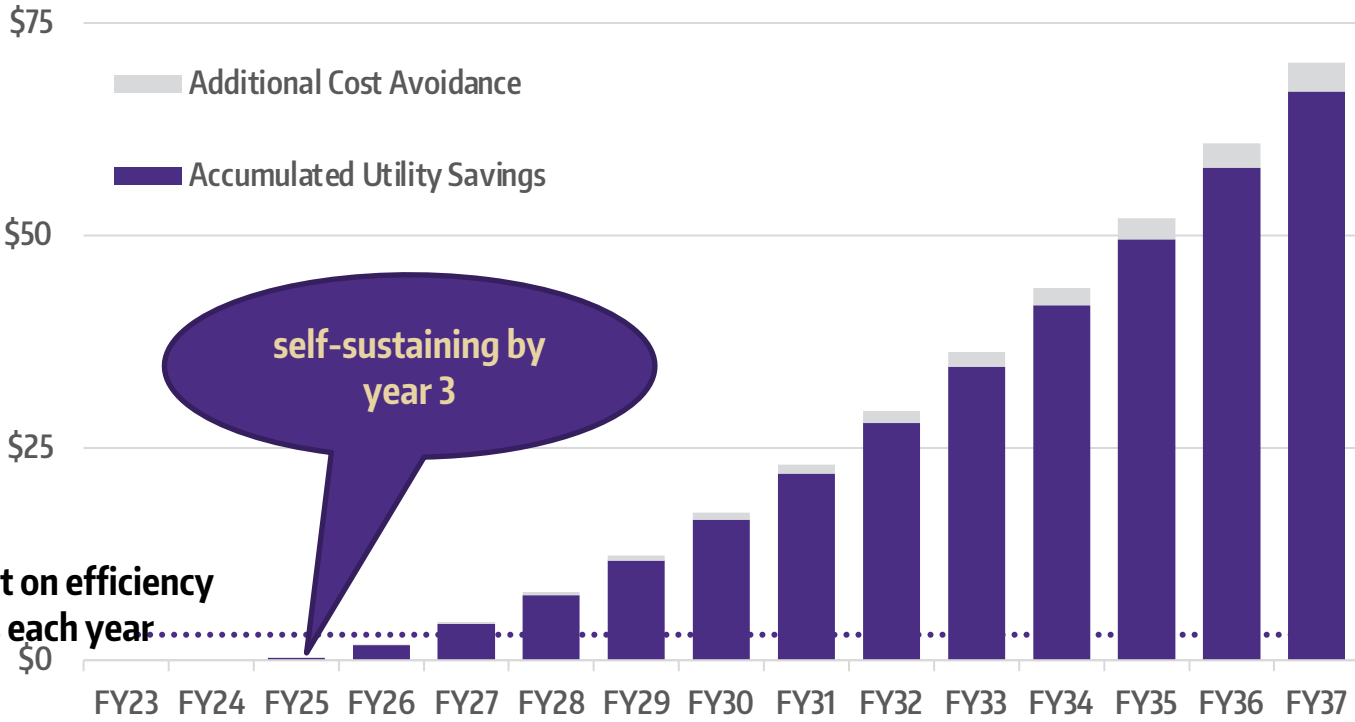


PHASE 1 of the strategy focuses on making our buildings more efficient through:

- Expand Metering
- Upgrade Controls
- Establish Data Analytics
- Fund Efficiency Upgrades with Utility Savings





UTILITY SAVINGS FROM EFFICIENCY



\$3M spent on efficiency measures each year



ENERGY TRANSFORMATION STRATEGY




	1 ENERGY EFFICIENCY <i>Expand metering, upgrade controls, data analytics and green revolving fund.</i>	2 CONVERT TO HOT WATER <i>Convert from steam to hot water heating.</i>
ENERGY SYSTEM ISSUES		
Greenhouse Gas Emissions	15% reduction in GHGs	20% reduction in GHGs
Energy Consumption	30% energy reduction	20% energy reduction
Electrical Capacity Constraint	2% more capacity	2% less capacity
Aging Utilities Infrastructure	✓	✓

PHASE 2 enables phases 3-5

- Convert from Steam to Hot Water Heating



ENERGY TRANSFORMATION STRATEGY





	1 ENERGY EFFICIENCY	2 CONVERT TO HOT WATER	3 CENTRAL COOLING
ENERGY SYSTEM ISSUES	 <i>Expand metering, upgrade controls, data analytics and green revolving fund.</i>	 <i>Convert from steam to hot water heating.</i>	 <i>Replace inefficient chillers, use lake water for cooling, and add thermal storage.</i>
Greenhouse Gas Emissions	15% reduction in GHGs	20% reduction in GHGs	no additional reduction
Energy Consumption	30% energy reduction	20% energy reduction	10% energy reduction
Electrical Capacity Constraint	2% more capacity	2% less capacity	25% more capacity
Aging Utilities Infrastructure	✓	✓	✓

PHASE 3 reduces energy costs and frees up electrical capacity

- Replace Inefficient Chillers
- Use Lake Water for Cooling
- Add Thermal Storage



ENERGY TRANSFORMATION STRATEGY






	1 ENERGY EFFICIENCY	2 CONVERT TO HOT WATER	3 CENTRAL COOLING	4 ELECTRIFY HEATING
ENERGY SYSTEM ISSUES	 <i>Expand metering, upgrade controls, data analytics and green revolving fund.</i>	 <i>Convert from steam to hot water heating.</i>	 <i>Replace inefficient chillers, use lake water for cooling, and add thermal storage.</i>	 <i>Use heat pumps to extract heat from cooling towers, sewer and lake water.</i>
Greenhouse Gas Emissions	15% reduction in GHGs	20% reduction in GHGs	no additional reduction	45% reduction in GHGs
Energy Consumption	30% energy reduction	20% energy reduction	10% energy reduction	15% energy reduction
Electrical Capacity Constraint	2% more capacity	2% less capacity	25% more capacity	30% less capacity
Aging Utilities Infrastructure	✓	✓	✓	✓

PHASE 4 is about moving away from fossil fuels

- Use Heat Pumps to extract heat from cooling towers, sewer and lake water








ENERGY TRANSFORMATION STRATEGY

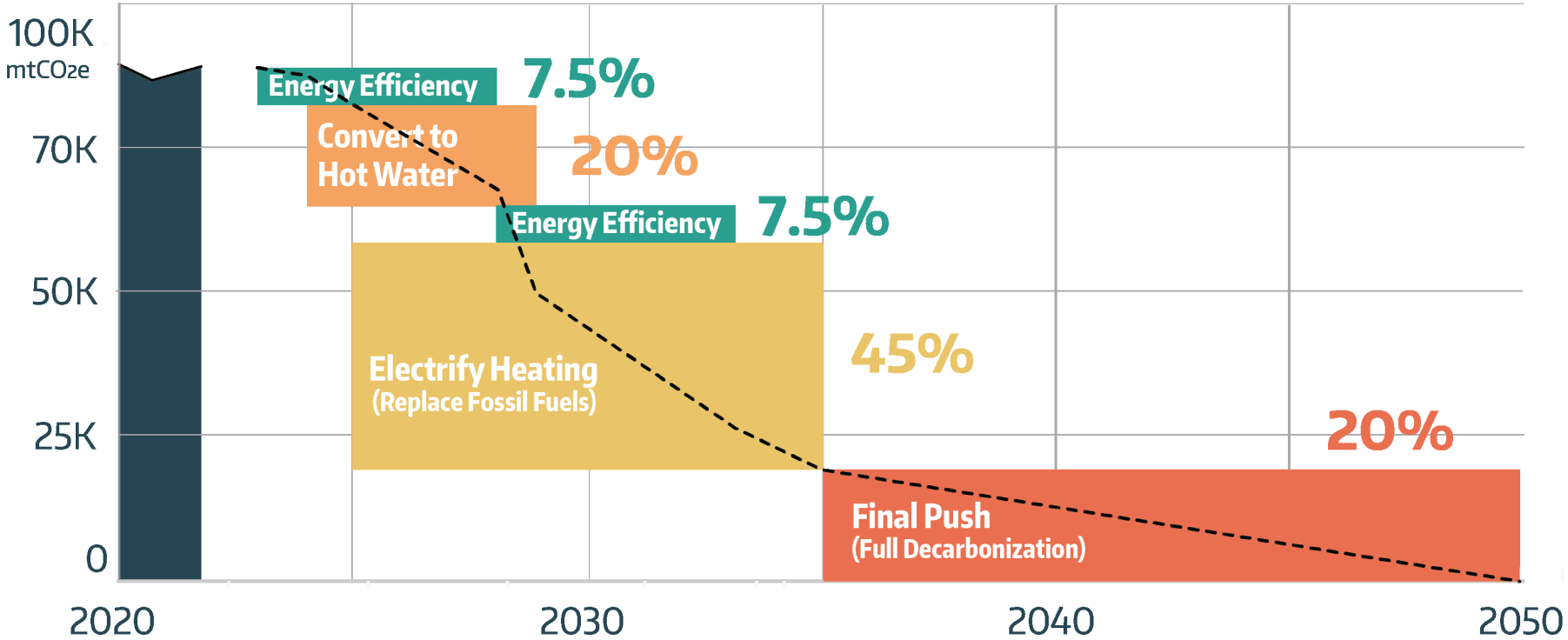
	1 ENERGY EFFICIENCY	2 CONVERT TO HOT WATER	3 CENTRAL COOLING	4 ELECTRIFY HEATING	5 FINAL PUSH (FULL DECARBONIZATION)
ENERGY SYSTEM ISSUES					
Greenhouse Gas Emissions	15% reduction in GHGs	20% reduction in GHGs	no additional reduction	45% reduction in GHGs	20% reduction in GHGs
Energy Consumption	30% energy reduction	20% energy reduction	10% energy reduction	15% energy reduction	?
Electrical Capacity Constraint	2% more capacity	2% less capacity	25% more capacity	30% less capacity	?
Aging Utilities Infrastructure	✓	✓	✓	✓	?

PHASE 5 will remove the remaining carbon from our energy system

ENERGY TRANSFORMATION STRATEGY

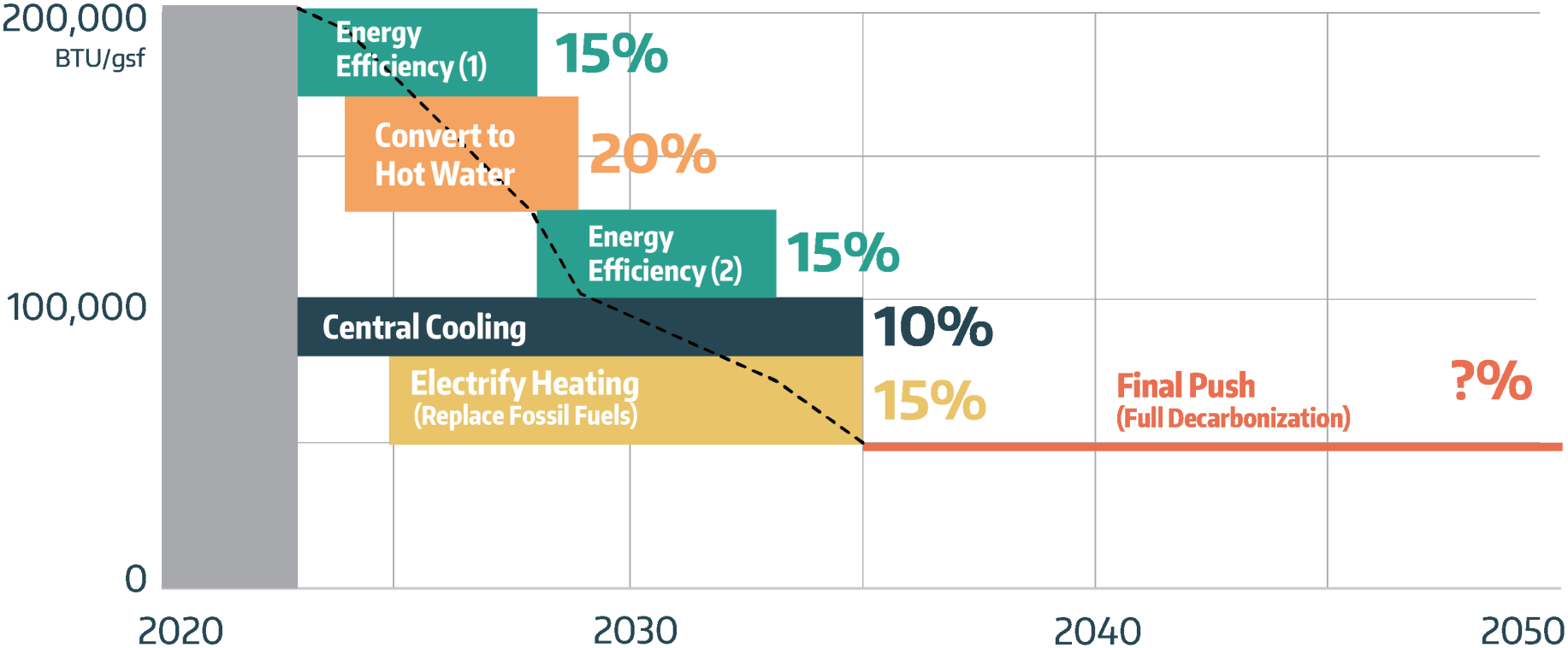
	ENERGY EFFICIENCY 1 <i>Expand metering, upgrade controls, data analytics and green revolving fund.</i>	CONVERT TO HOT WATER 2 <i>Convert from steam to hot water heating.</i>	CENTRAL COOLING 3 <i>Replace inefficient chillers, use lake water for cooling, and add thermal storage.</i>	ELECTRIFY HEATING 4 <i>Use heat pumps to extract heat from cooling towers, sewer and lake water.</i>	FINAL PUSH 5 (FULL DECARBONIZATION) <i>Continuously evaluate emerging technologies for full decarbonization.</i>	
ENERGY SYSTEM ISSUES Greenhouse Gas Emissions	 15% reduction in GHGs	 20% reduction in GHGs	 no additional reduction	 45% reduction in GHGs	 20% reduction in GHGs	GOAL 100% CLEAN ENERGY 100% reduction in GHGs
Energy Consumption	30% energy reduction	20% energy reduction	10% energy reduction	15% energy reduction	?	75% Reduction in Energy Use
Electrical Capacity Constraint	2% more capacity	2% less capacity	25% more capacity	30% less capacity	?	Accommodate Capacity Constraint
Aging Utilities Infrastructure	✓	✓	✓	✓	?	Resilient Infrastructure

TRANSFORMATION STRATEGY OVER TIME: FOCUS ON GHG EMISSIONS








TRANSFORMATION STRATEGY: OVER TIME

FOCUS ON ENERGY EFFICIENCY



TRANSFORMATION STRATEGY: COST

	<p>ENERGY EFFICIENCY 1</p> <p><i>Expand metering, upgrade controls, data analytics and green revolving fund.</i></p>  <p>\$18M for metering and controls, money spent on efficiency is recouped through utility savings</p>	<p>CONVERT TO HOT WATER 2</p> <p><i>Convert from steam to hot water heating.</i></p>  <p>~\$250M this reflects the cost of routing new pipes and updating the heat exchangers at buildings</p>	<p>CENTRAL COOLING 3</p> <p><i>Replace inefficient chillers, use lake water for cooling, and add thermal storage.</i></p>  <p>~\$100M this reflects the cost of new chillers and decommissioning aging chillers</p>	<p>ELECTRIFY HEATING 4</p> <p><i>Use heat pumps to extract heat from cooling towers, sewer and lake water.</i></p>  <p>~\$100M for heat pumps and piping to extract lake cooling ~\$100M for thermal storage</p>	<p>FINAL PUSH 5 (FULL DECARBONIZATION)</p> <p><i>Continuously evaluate emerging technologies for full decarbonization.</i></p>  <p>? this will depend upon emerging technologies</p>
<p>Source</p>	<p>UW Facilities a combination of state support, grants, indirect tax incentives, utility payments to a 3rd party and green bond debt funding</p>				

A collection of various garden tools is displayed in a workshop. On the left, several rakes with green handles and metal heads are hanging. In the center, a row of shovels with dark metal heads and handles is mounted on a wooden rack. To the right, a pitchfork with three long tines is also hanging. The background features a window with a wire mesh screen, through which some greenery is visible. A small white sign with text is mounted on the wall below the window.

HERE'S WHAT WE NEED

WHAT WE NEED

- UW wide initiative and commitment (led by UWF)
- Engaged partners and stakeholders
- Financing strategy support



NEXT STEPS



CURRENT AND NEXT STEPS

We have begun to escalate investment in efficiency

We are purchasing new meters and building controls and are seeking funds for data analytics

We are working on a contract for an engineering firm to refine the technical and financial elements of the energy strategy.

We are developing an initial hot water conversion project (WCUP loop)



Thank you for your interest and support

Send questions to:

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