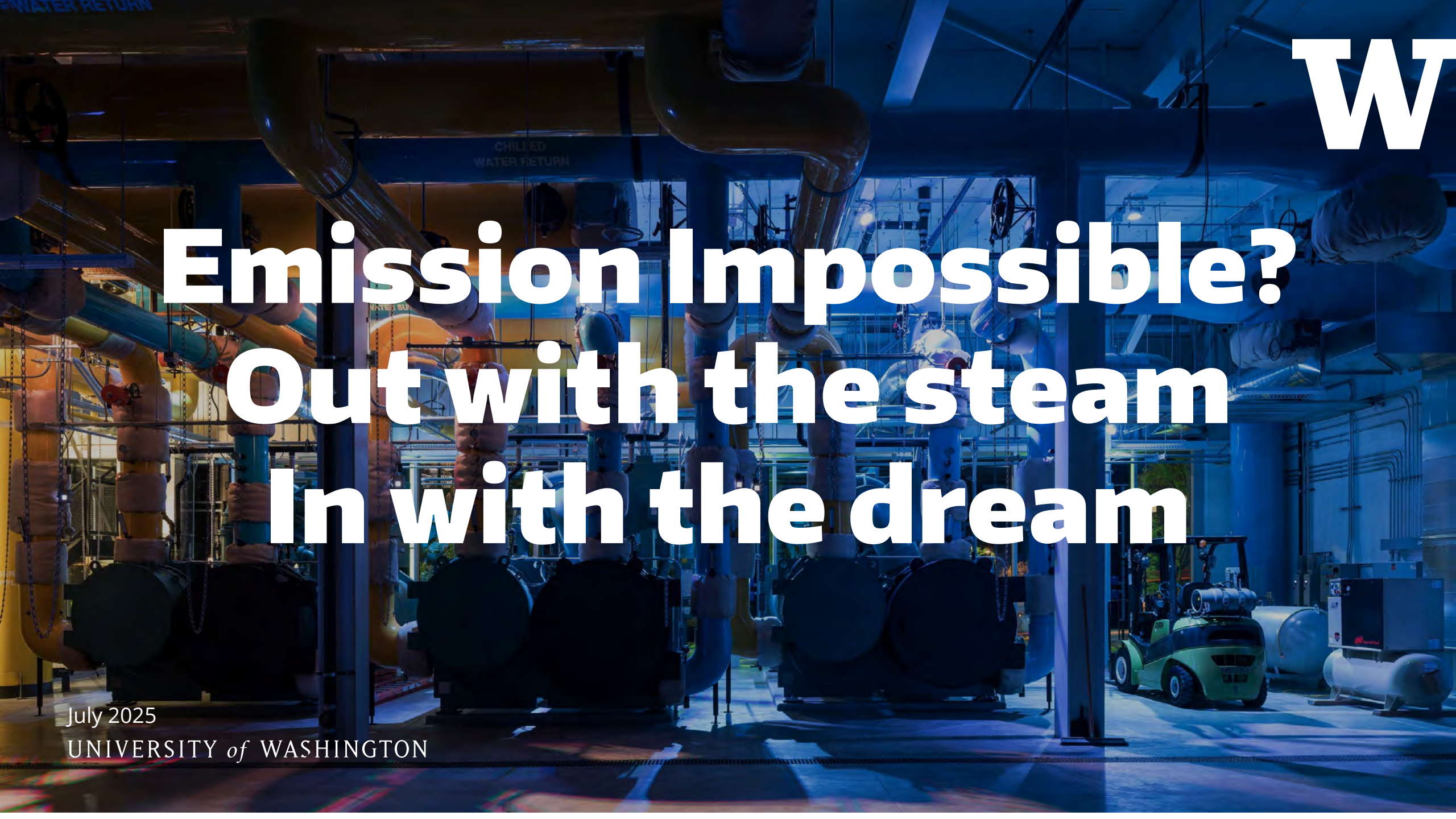


Emission Impossible? Out with the steam In with the dream

July 2025

UNIVERSITY of WASHINGTON

Power Plant Decarbonization

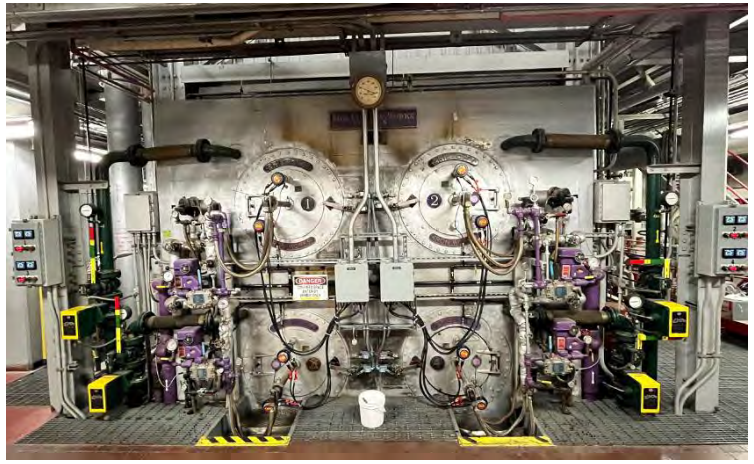
The University of Washington is undertaking a groundbreaking effort to fully decarbonize the energy system of its Seattle campus, transforming how we heat, cool and power our buildings.

At the core of this initiative is the significant upgrade to the UW Power Plant, which currently depends on aging, inefficient infrastructure that burns natural gas to produce steam for heating. By transforming to cleaner, more efficient energy infrastructure, UW is aligning its daily operations with its long-standing sustainability values.

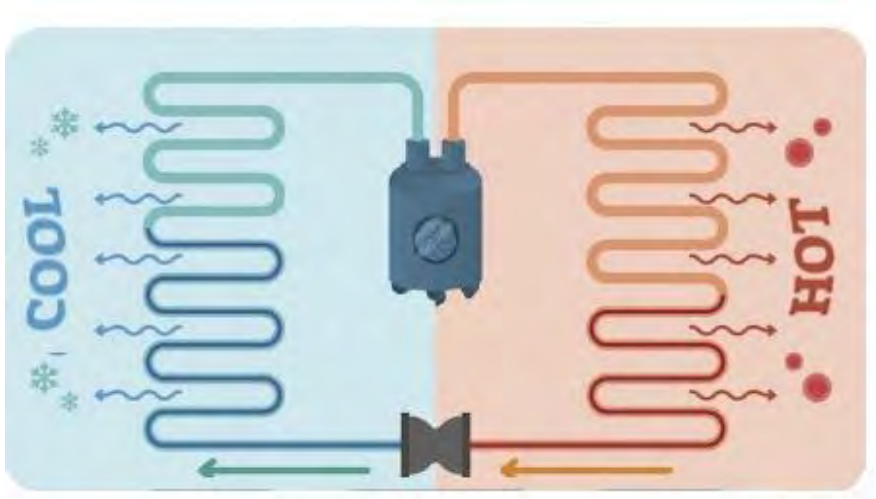
Power Plant Decarbonization – Technology Advances

Energy cannot be created or destroyed – but it can move!

Now: Energy from combustion (boilers)

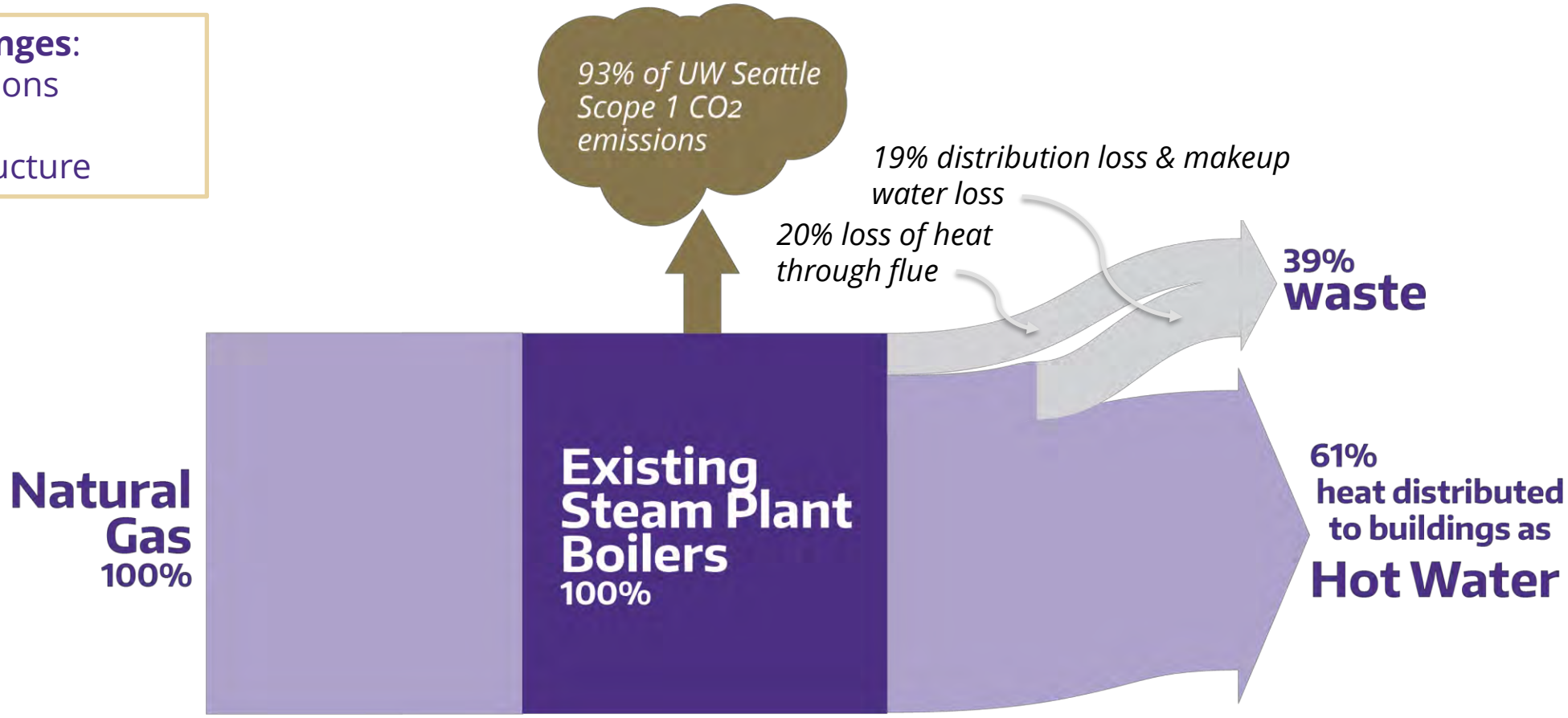


Next: Energy transfer (heat pumps)



Power Plant Decarbonization – Efficiency Gain

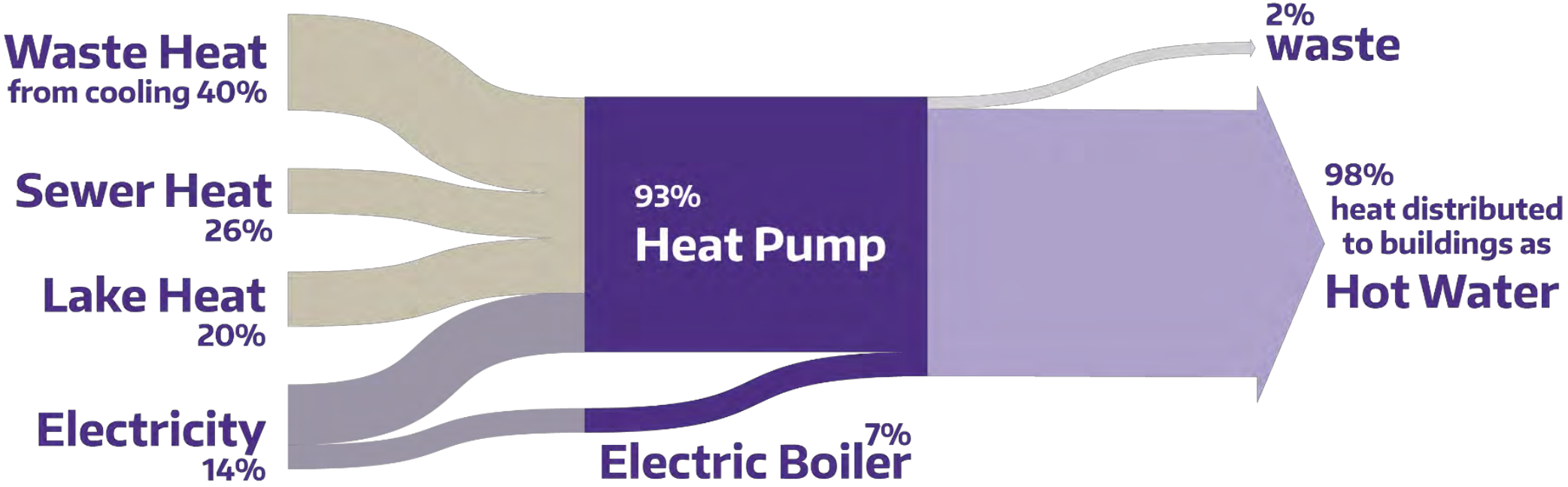
Today's Challenges:
- Carbon emissions
- Inefficiency
- Aging Infrastructure



Power Plant Decarbonization – Efficiency Gain

Tomorrow's Solutions:
- Zero emissions
- Efficient energy transfer
- Future proof

0 CO_2 emissions



Sources of Energy Transfer

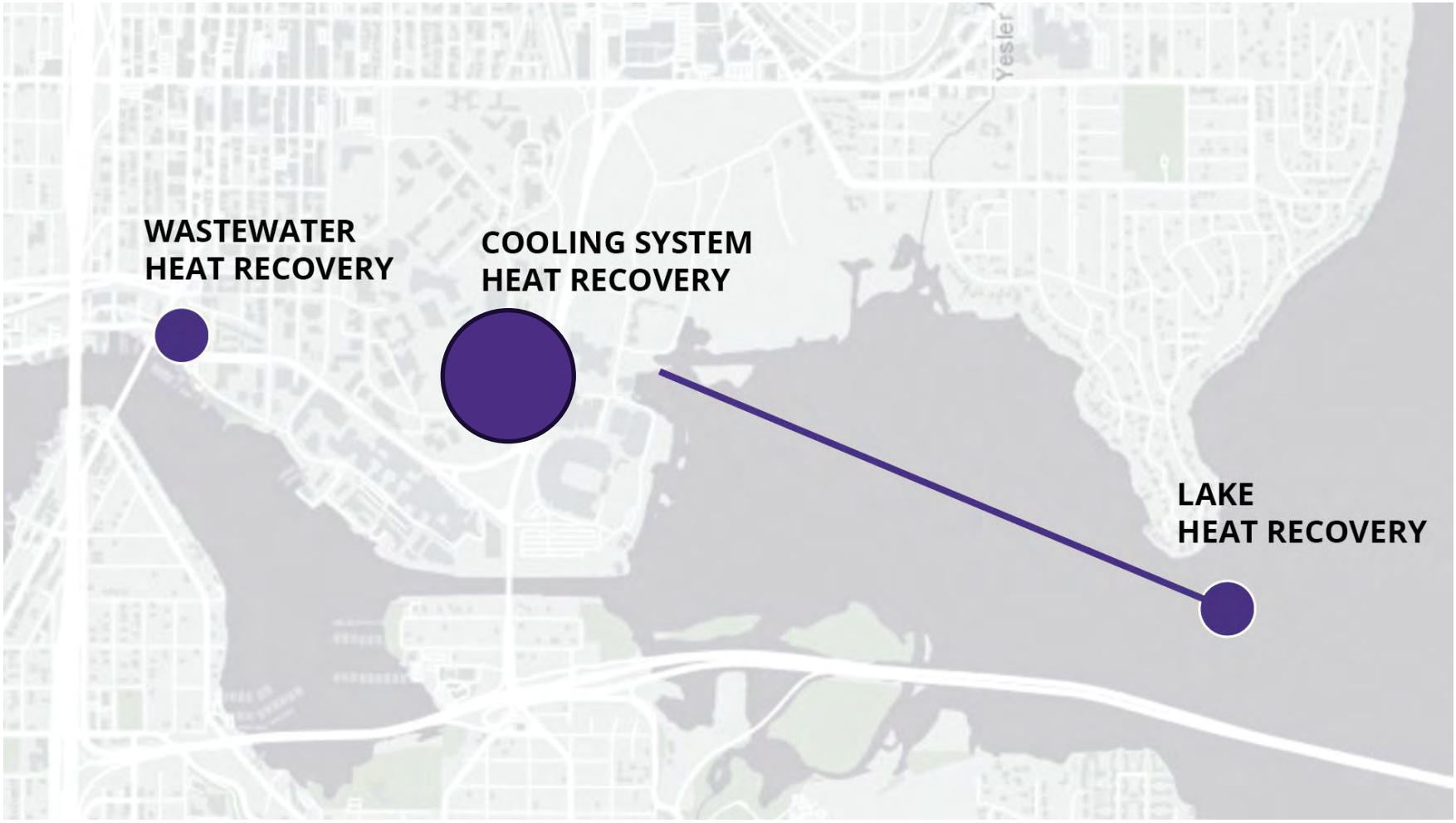
Use heat extracted from our buildings

Move energy via chilled water and hot water systems

Centralize cooling

Other sources required in winter:

- Sewer heat recovery
- Lake interface

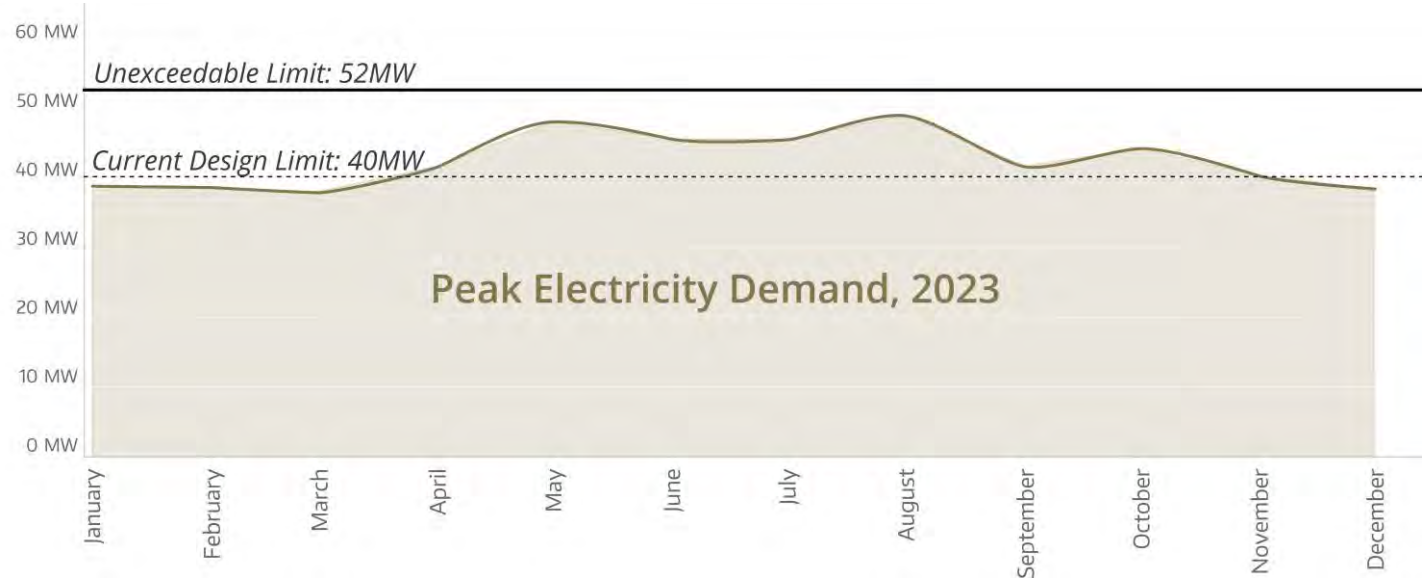


Electrification – Current electricity condition

TODAY'S CHALLENGES:

Our electrical load is taxing our power delivery infrastructure.

We are experiencing voltage sags which can compromise electronic research and medical equipment.

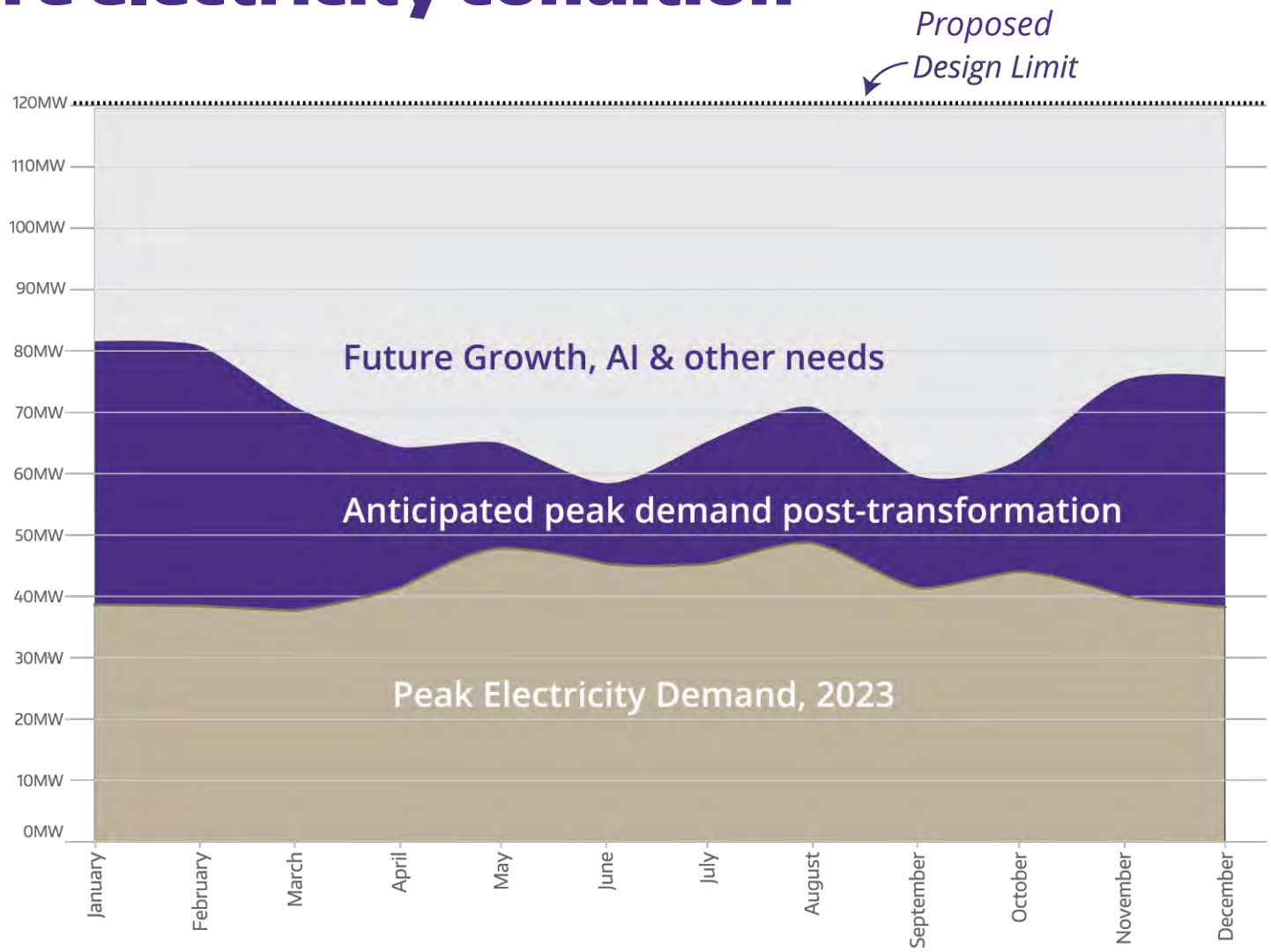


Electrification – Future electricity condition

A new substation dedicated to the UW will provide the reliable, high-quality power we need.

Two strategic benefits to the new UW Substation:

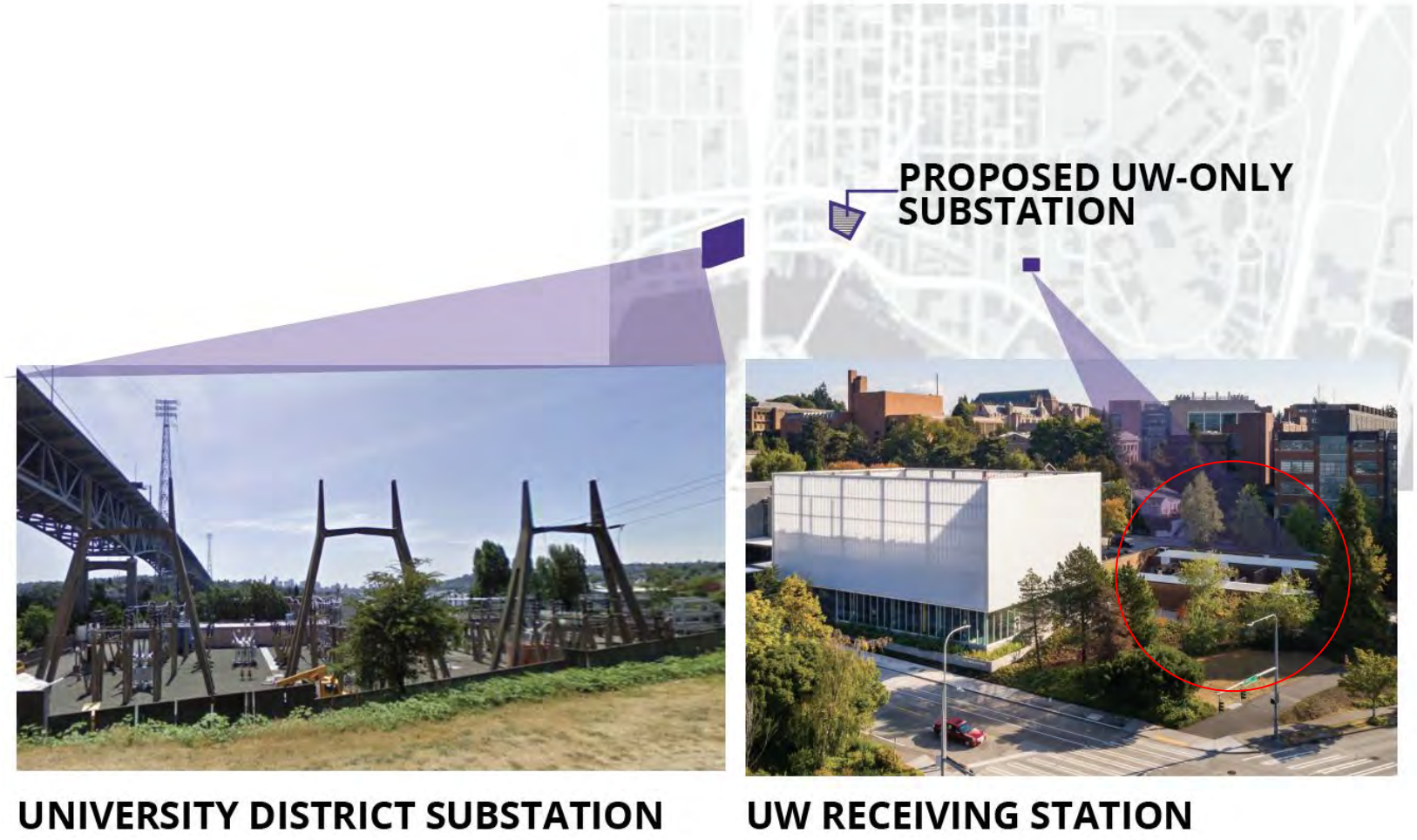
1. Mitigates present risk exposure to voltage sags.
2. Can be sized to meet future growth for the next 50+ years.



Electrification – Build a new electrical substation

A new substation dedicated to the UW will provide the reliable, high-quality power we need.

We are in discussions/ partnership with Seattle City Light on optimizing ownership and project funding.



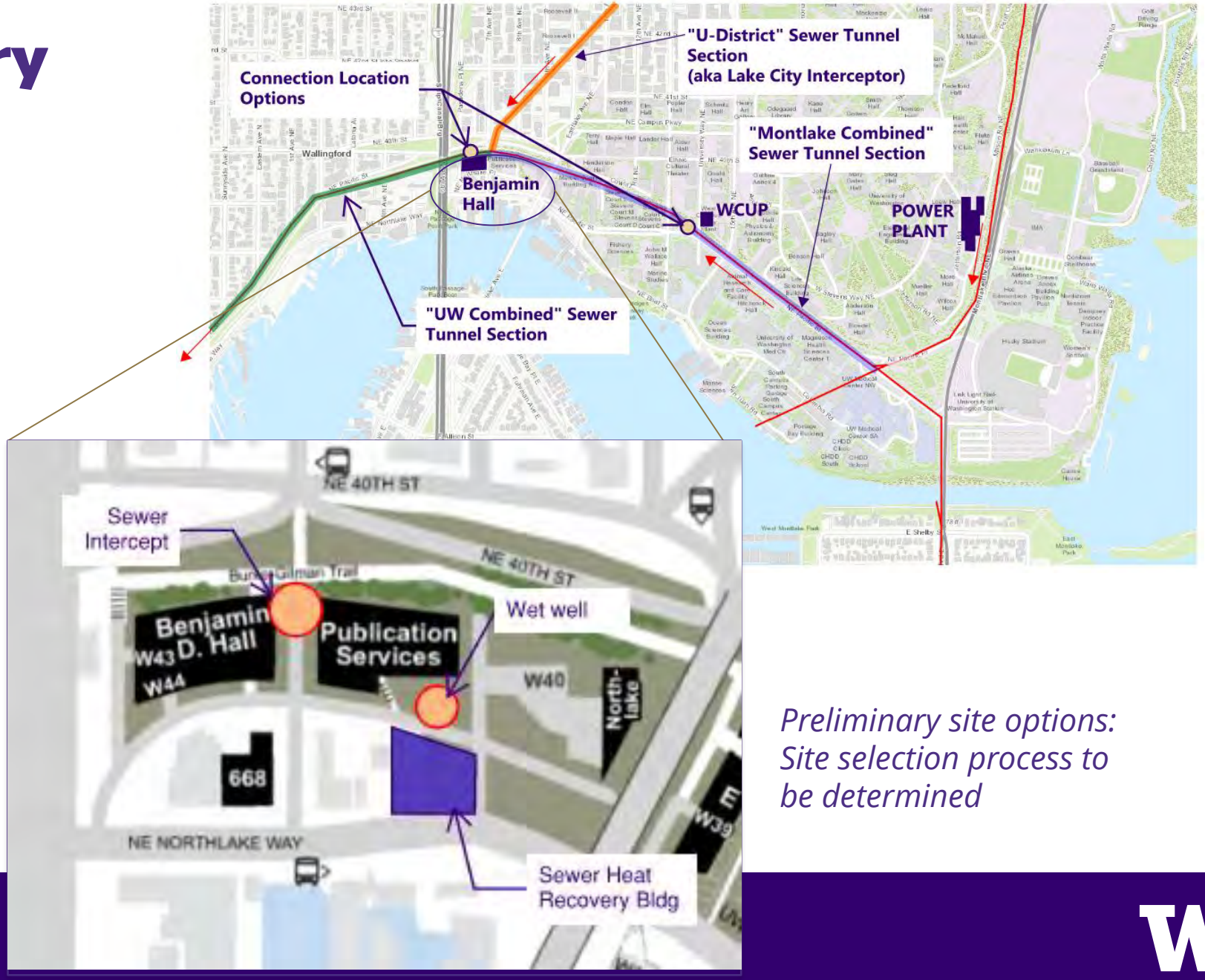
Sewer Heat Recovery

Engage the King County pilot program to recover heat from 50°F -70°F sewer water.

High efficiencies of sewer heat recovery offset electricity & sewer energy charges.

Sewer heat recovery can supply **26% of campus heating** and displace 10% of our current fossil fuel use.

King County Sewer - Heat Recovery Opportunity Map



Preliminary site options: Site selection process to be determined

Improve Building Efficiency

In parallel to power plant improvements, target energy intensive spaces to improve building efficiency:

- Focus on labs that typically use 3-5 times more energy than classrooms
- Upgrade building controls to reduce nighttime air changes
- Recover waste heat from year-round cooling
- Improve steam systems for autoclaves and glass wash

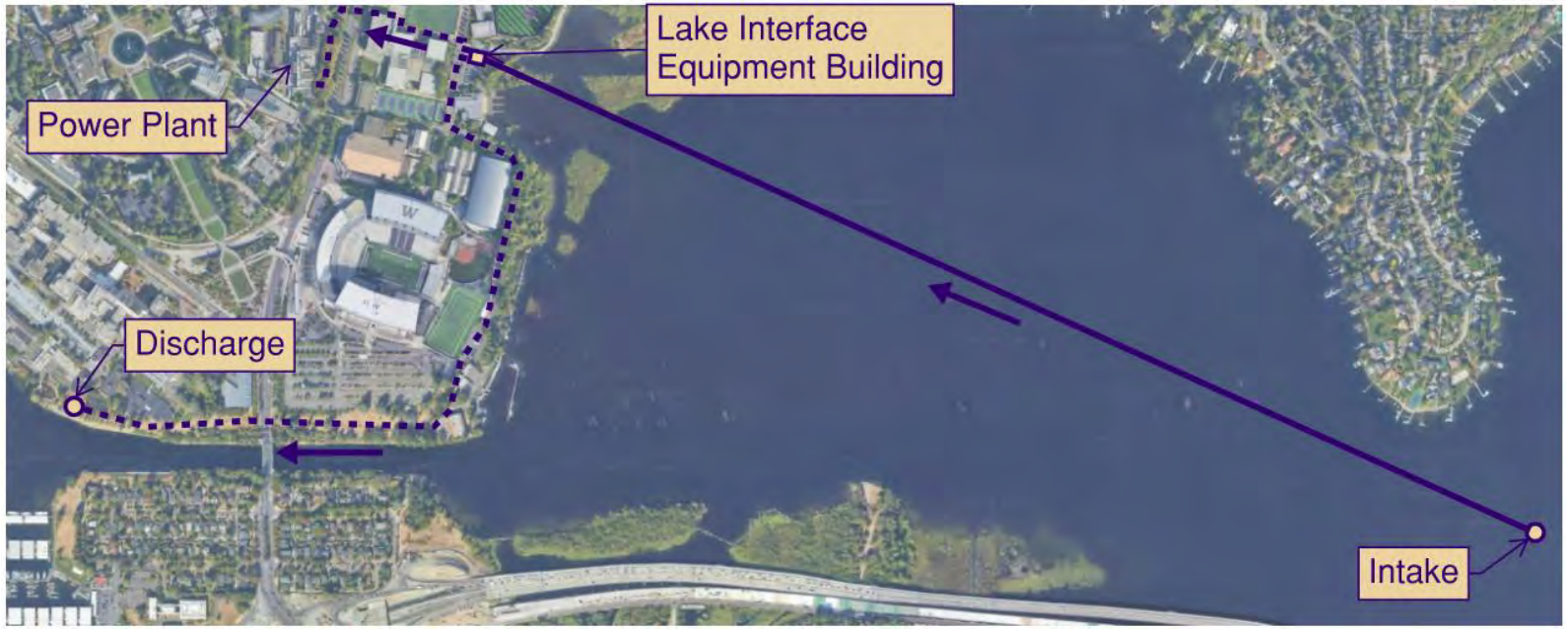
Lake Interface

New building for heat recovery equipment – 1-story 2,000 sq ft facility near Husky Ballpark / Conibear Shellhouse

Buried piping between new building and Power Plant

Heat recovery chillers added to the Power Plant

Submerged piping through Union Bay to Lake Washington (intake) ~1.2 miles



Power Plant Decarbonization

Executive summary of the key steps to decarbonize the power plant

1. Switch from combustion boilers to moving energy with heat pumps
2. Maximize the efficiency of the heat pumps
3. Build a new electrical substation for capacity & reliability
4. Add thermal storage for resiliency & to optimize heat pump performance
5. Address process-based steam loads
6. Convert the campus steam distribution system to hot water
7. Make heat from the cooling system the primary source of heating
8. Connect all cooling systems to the central system
9. Tap the King County wastewater system as a secondary source of heating
10. Access Lake Washington for both heating and cooling
11. Retain the three most efficient boilers as an emergency back-up for cold winter days

Power Plant Decarbonization

Total Project Cost (2024 dollars) = $1,600 million

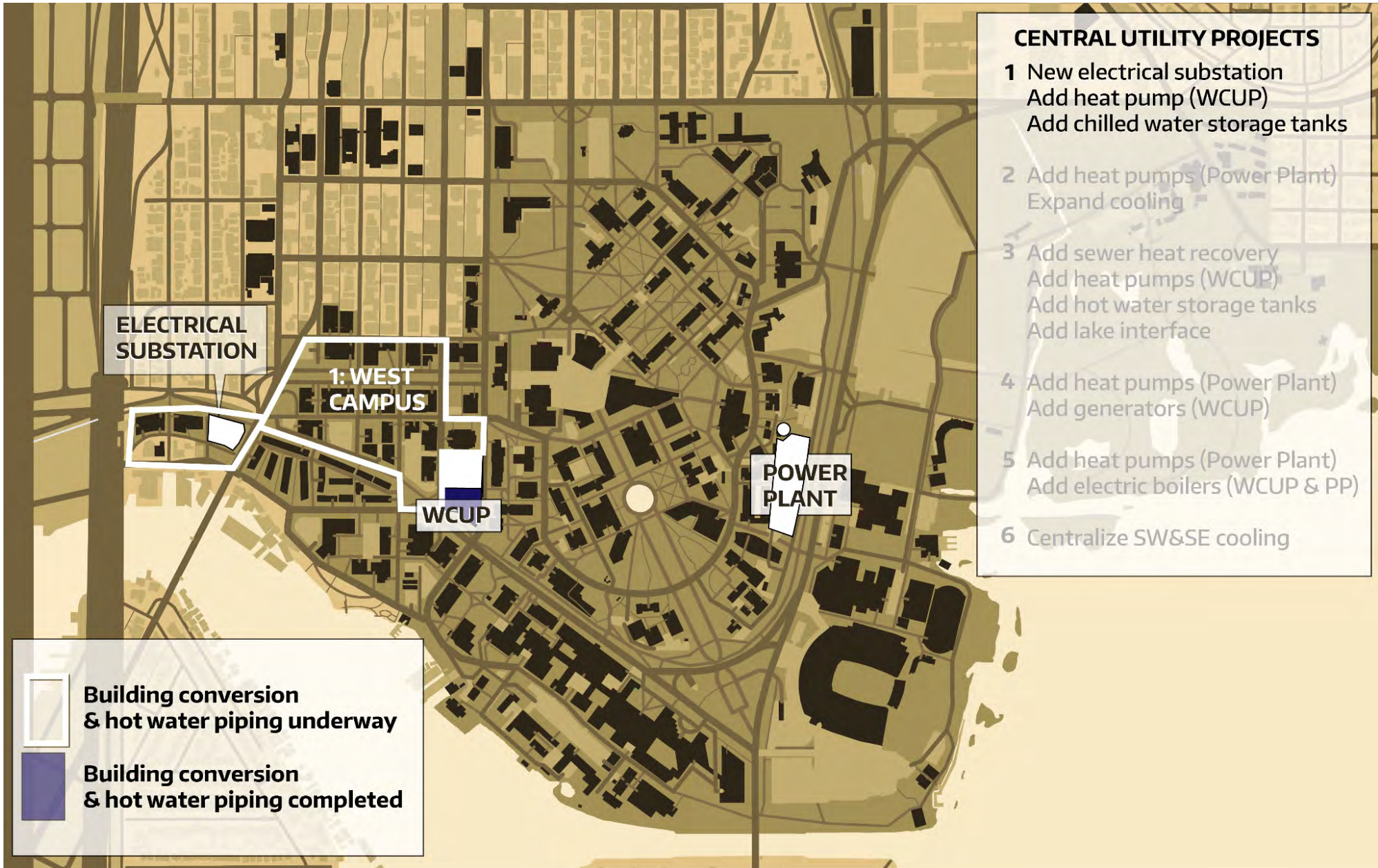
Cost (2024 $'s)	Category	
$1,193 million	**Decarbonization**	Primarily focused on plant heating systems, distribution, and building conversions
$180 million	**Public-Private Partnership Opportunities**	Energy sources: Sewer heat recovery and Lake Interface
$49 million	**Electrical System Upgrades**	New electrical substation and distribution
$178 million	**Climate Adaptation**	Additional cooling systems and distribution
$1,600 million	**Total**	

Power Plant Decarbonization

The NPV analysis considers the present value of each scenario cashflows, inclusive of: utility costs, operation and maintenance costs, lifecycle repair and replacement costs, University debt service costs, State CCA fundings, and any applicable regulatory costs of carbon costs and P3 financial obligations.

Timeline

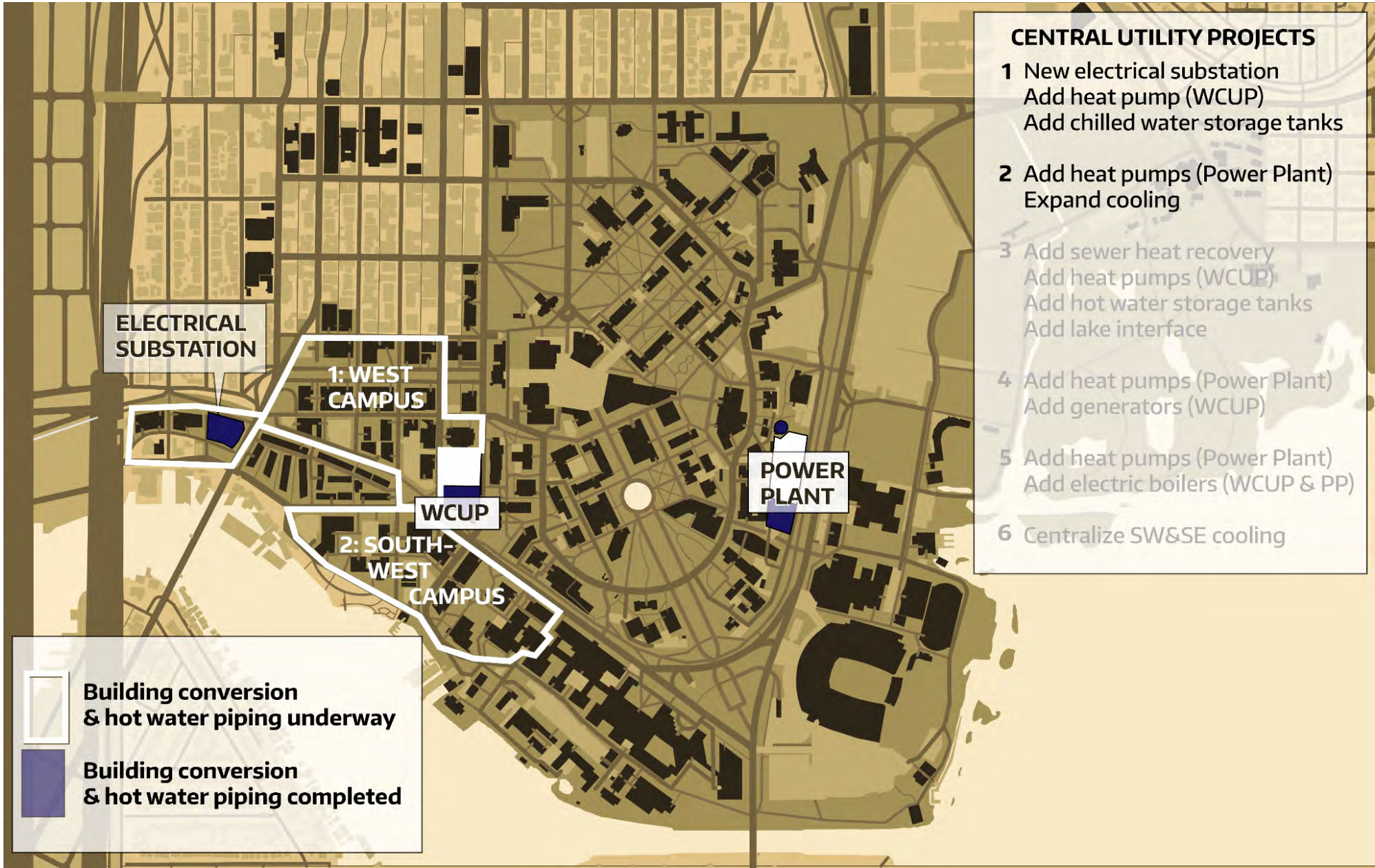
2025



Timeline

2025

2027

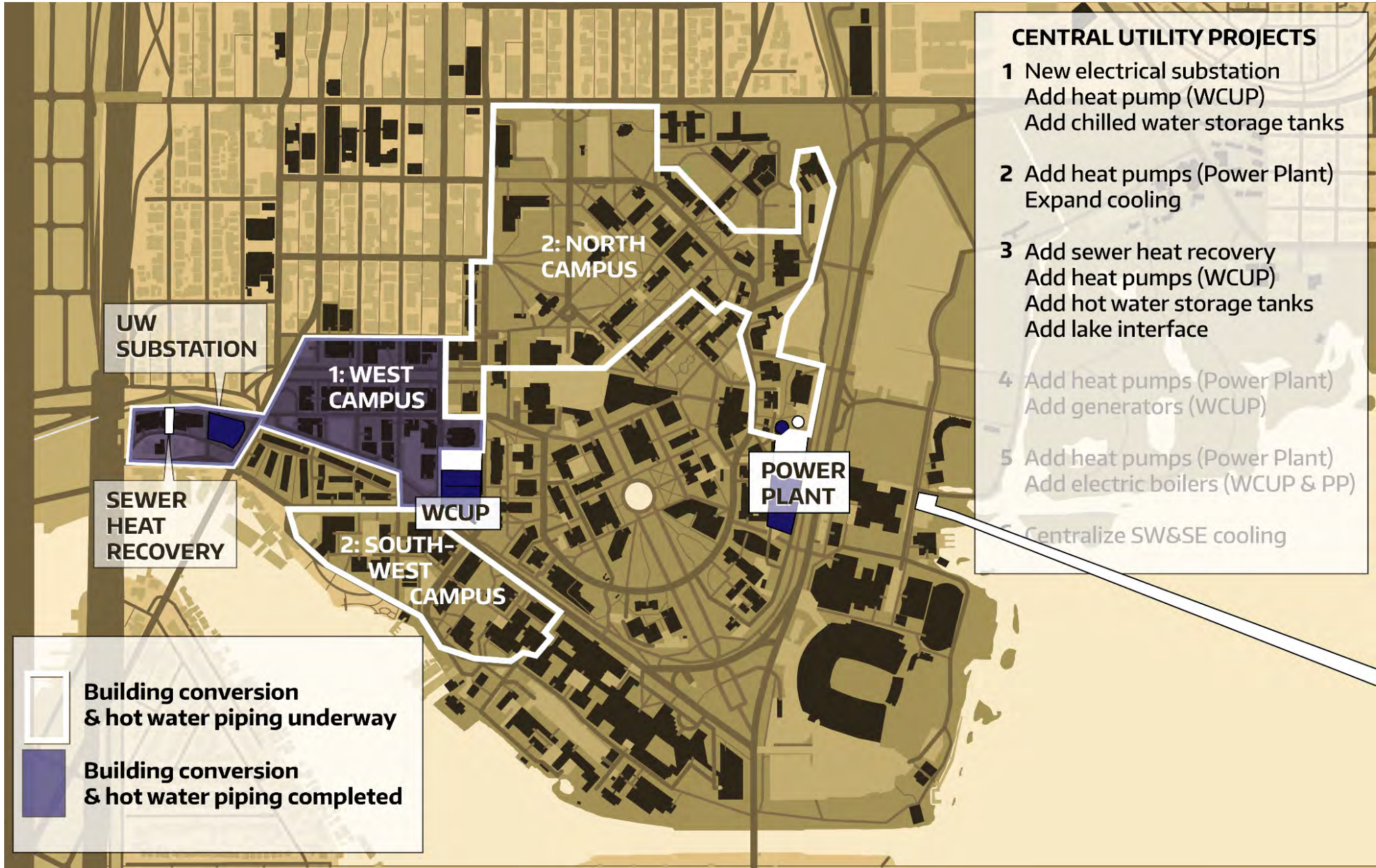


Timeline

2025

2027

2029



Timeline

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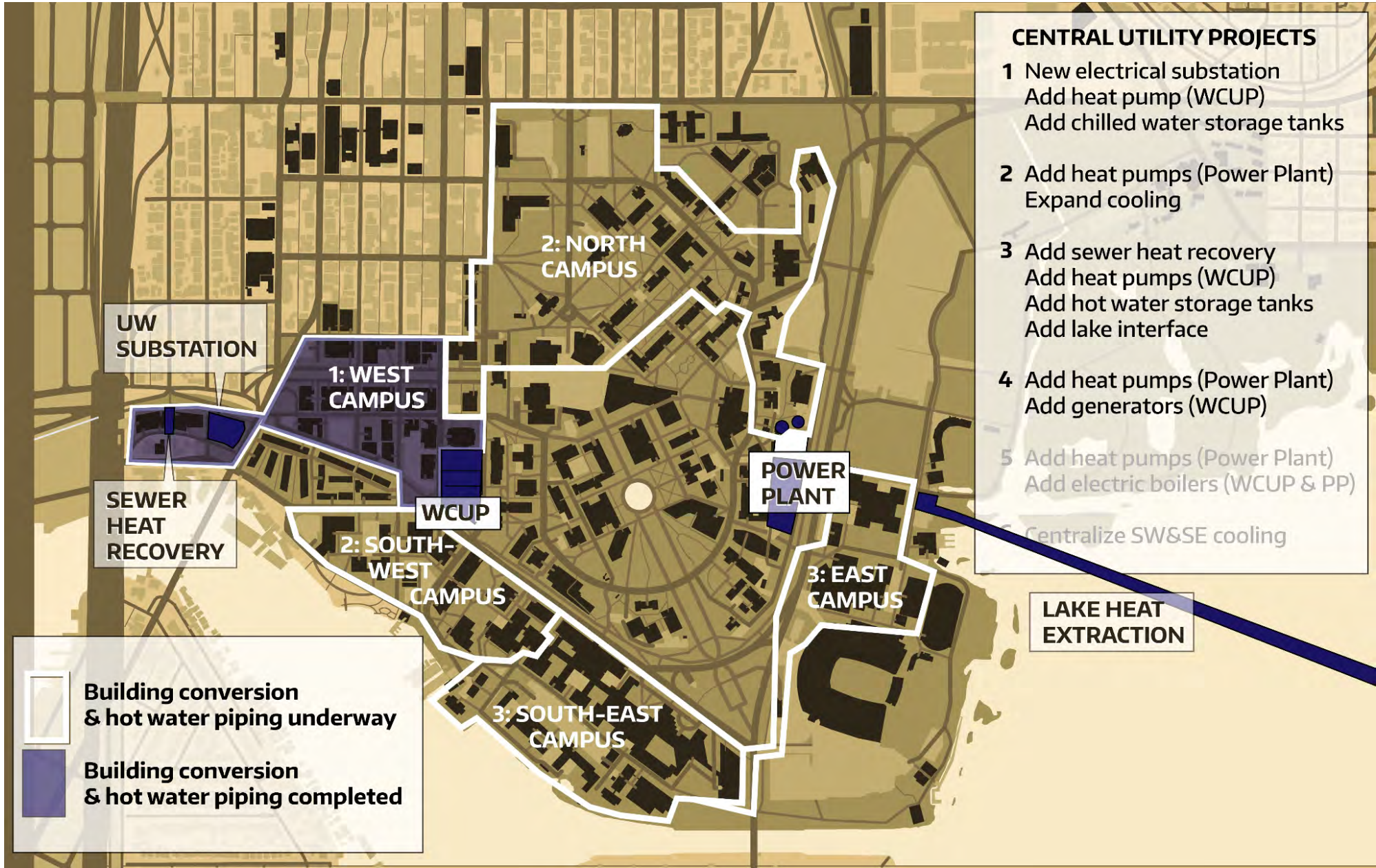

Timeline

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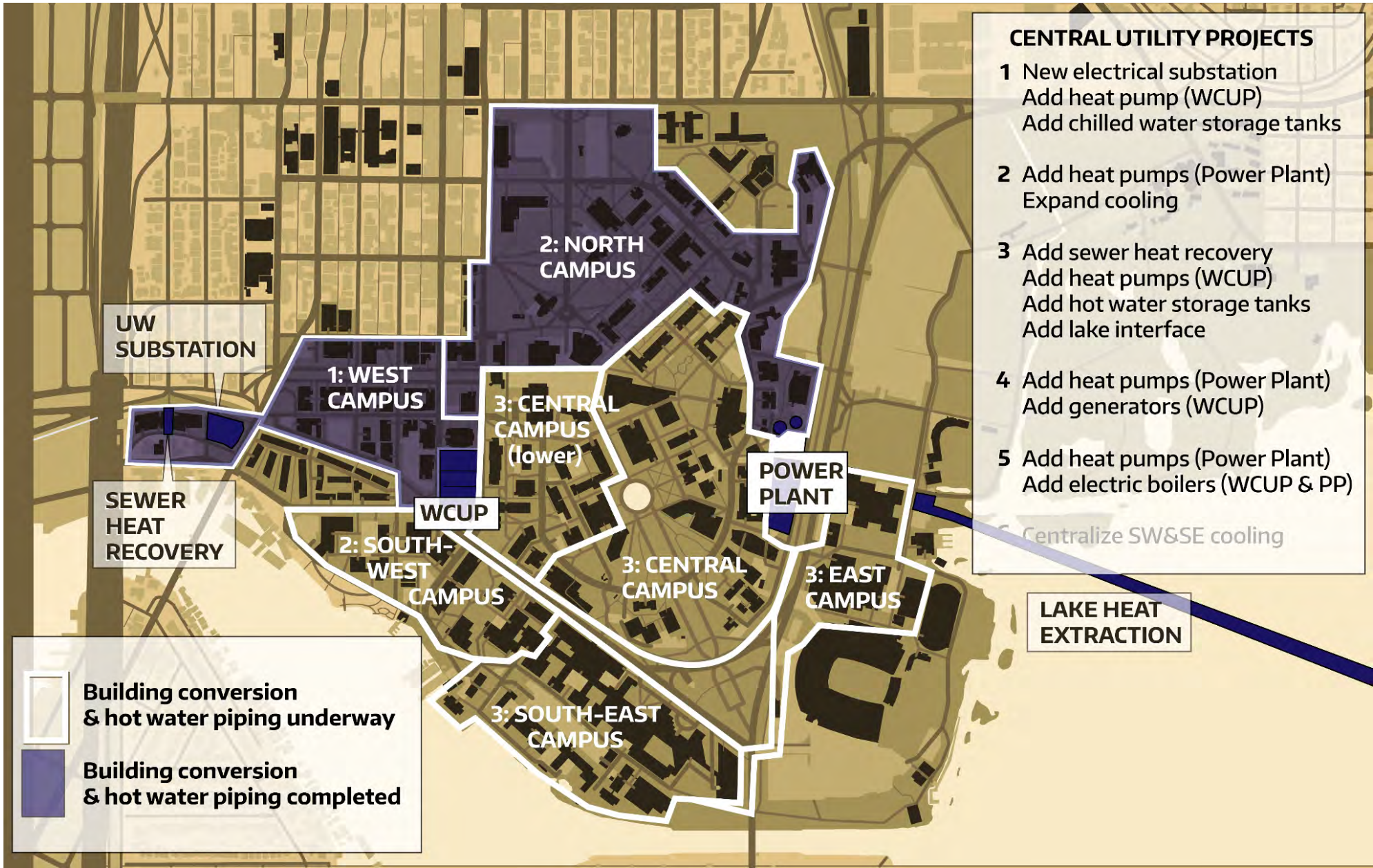

Timeline

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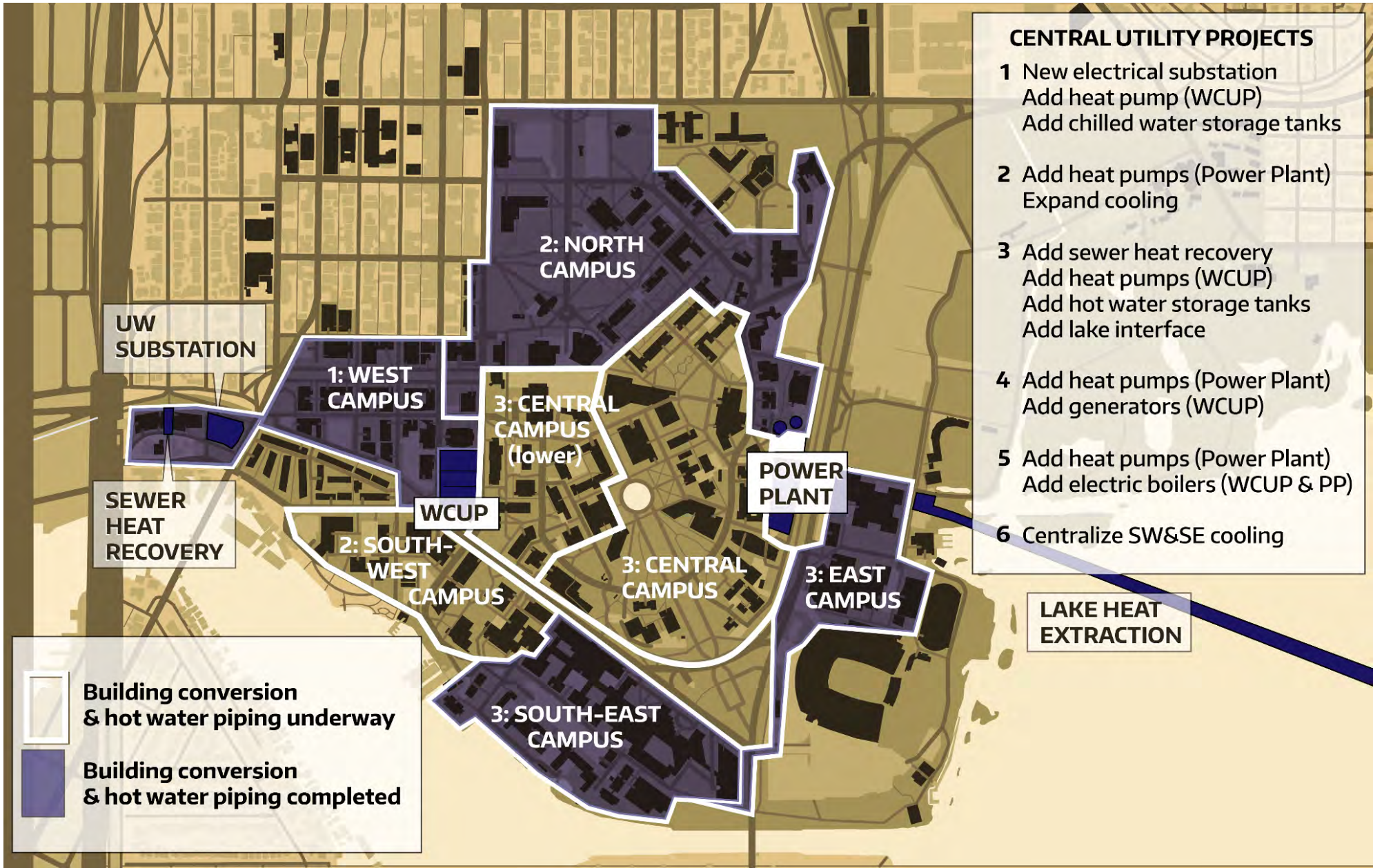

Timeline

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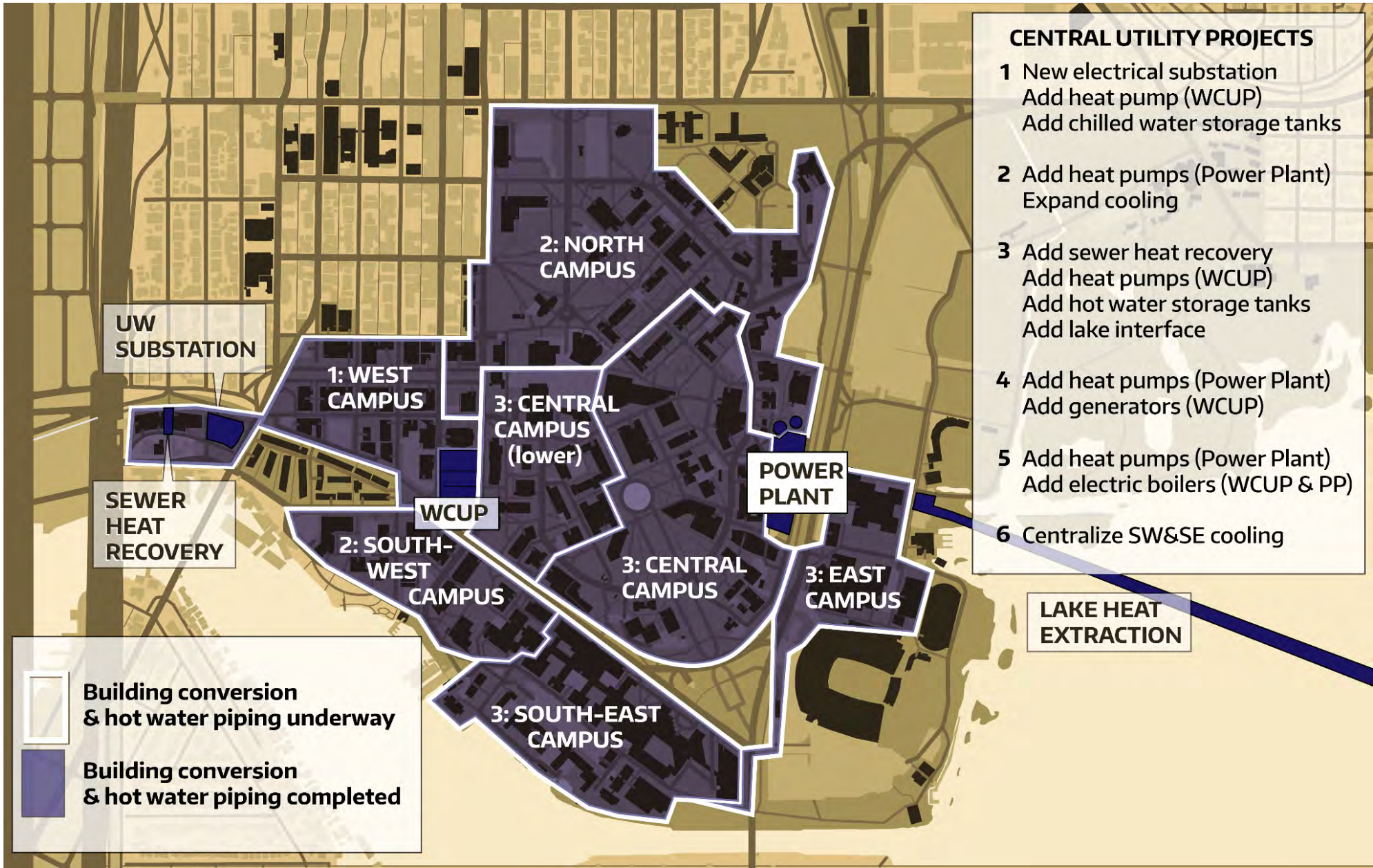
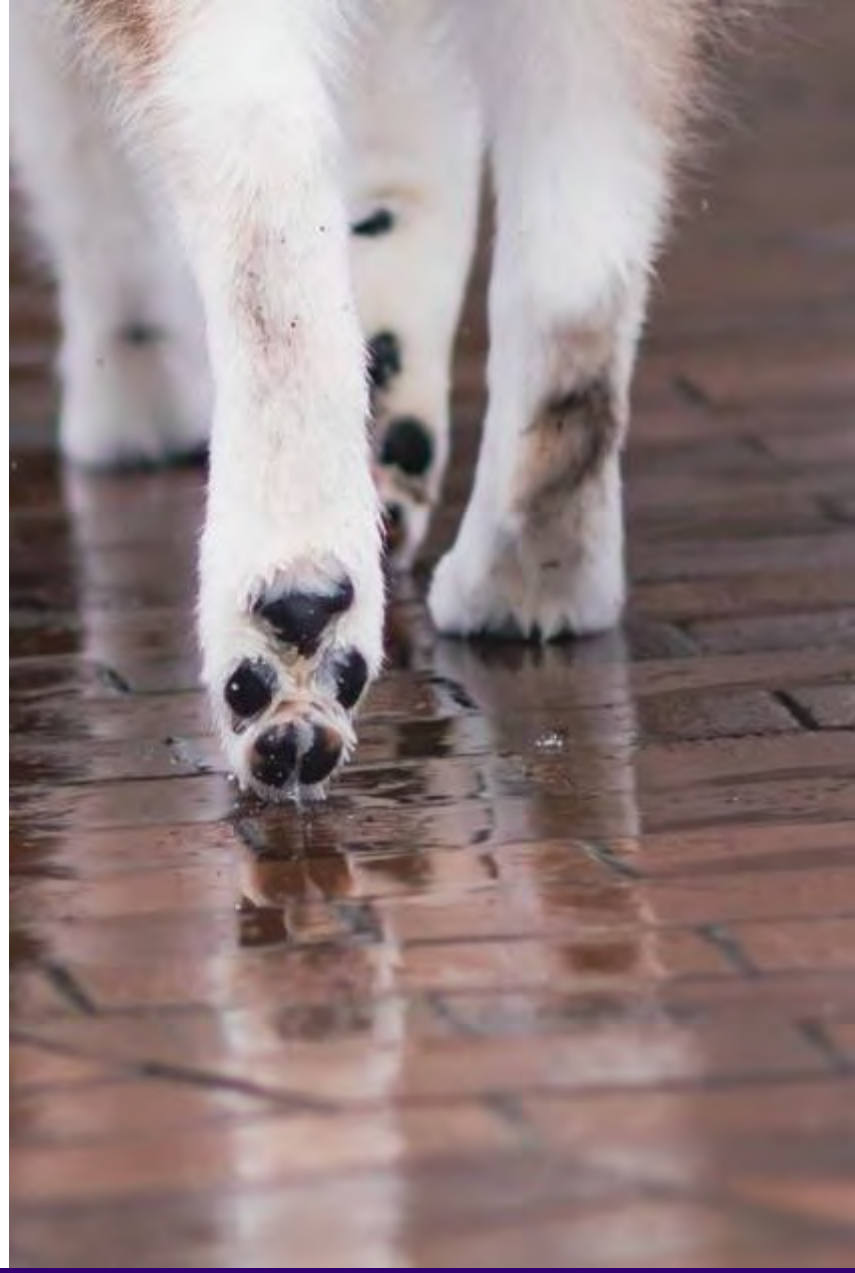


Next Steps

- Secure funding to initiate renewal
- Become one of 3 pilot projects for King County wastewater energy transfer
- Advance Lake Interface agency outreach and permitting process
- Advance UW substation negotiations with Seattle City Light




Questions
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