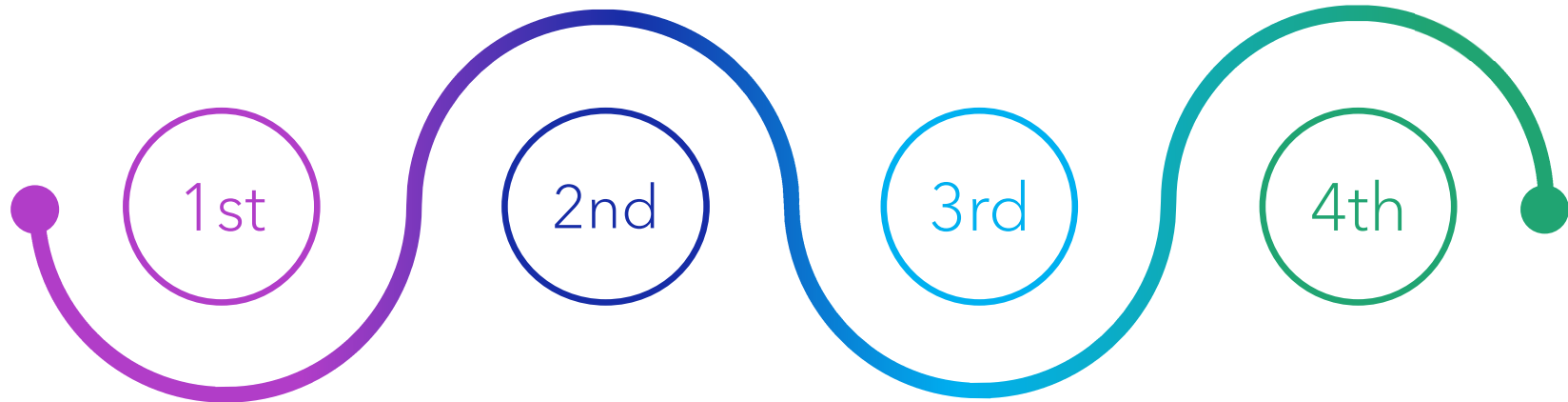




HOW UW BOTHELL / CASCADIA COLLEGE APPROACHED COMPLIANCE



Join PSE's Accelerator Program

Joined December 2021
Assisted by Stillwater Energy
PSE Engineers

Assembled Team

- Owner
- Bldg. Mgr.
- Data Champion-Planning & Systems Mgr.
- Awareness Specialist
- Energy Manager
- Qualified Energy Auditor

Clean up Portfolio Mgr.

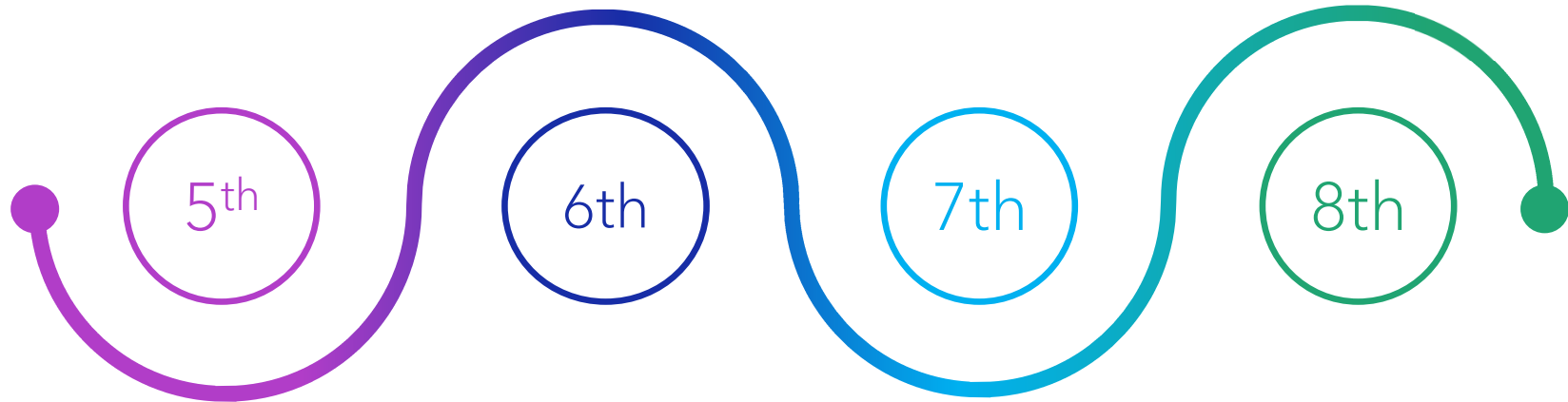
- Originally Installed with ESCO's
- Some missing buildings
- Some missing data
- Now all up and running
- Setup Sharing with Engineers

Find Quick Wins

Went through each bldg. on Metasys
Fixed quick items / adjustments to BAS
Looked at operating schedules
Reviewed PSE/ Stillwater recommendations
Prioritized recommendations



HOW UW BOTHELL / CASCADIA COLLEGE APPROACHED COMPLIANCE CONT..



Review EUI targets vs Actual

- Still need to complete
- District CW usage for Bldgs.
- Added BTU meters all Bldgs.
- Need 12 months of data

Create Energy Mgmt. Plan

- Still Need to Complete

Create O & M Plan

- We have documentation in our CMMS
- Need to complete plan

Submit Documentation

- Still Need to Complete
- After Approval from Commerce
- Resubmit in 5 years



THANK YOU!



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Services and Campus Operations
UW Bothell / Cascadia College
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Desk: 425-352-3557

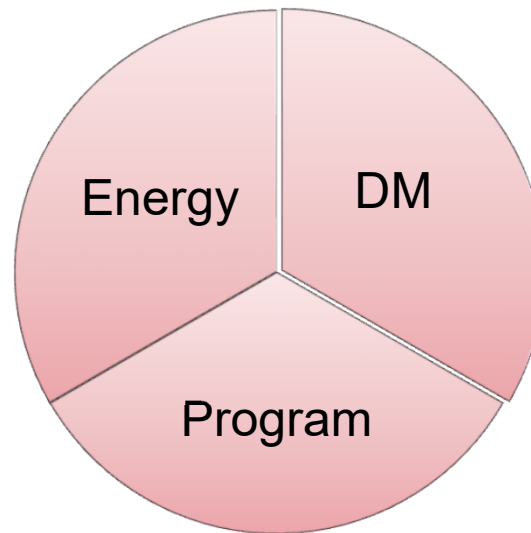


WSU – Key Stats

- (5) Campuses
- (14) Research and Extension Centers
- DM backlog exceeding \$1.6B
- Inventory exceeding 20,000 gsf
 - (115) buildings/complexes
 - Total area ~11.3M gsf



WSU – Approach



- Target “two-fers” and “three-fers”
- Metering and data analytics
- District energy improvements vs. building
- Audits only when necessary!



WSU – Budget Planning

- 2021 Audits
 - (5) Pullman buildings of different use types
 - EEMs identified ~\$10M
- Extrapolated system-wide cost ~\$100M
- Potential annual penalty ~\$11.3M
- Funding Targets:
 - Internal REF
 - Minor Works
 - Major Capital Projects





South Puget Sound
COMMUNITY COLLEGE

Clean Buildings

Approach to compliance, implications for
capital planning and funding requests

Clean Buildings – HB 1257 (2019)

Path to Compliance

CLEAN BUILDINGS REQUIREMENTS

Designated Energy Manager



ESPM Benchmarking and Reporting



Develop & Execute Energy Management Plan



Develop Operations and Maintenance Program



Determine & Comply with EUI



Familiarity

- ▶ **Understand the Clean Building Requirements**
- ▶ **Form an Energy Team**
- ▶ **Prepare Building Energy Scans**

Starting the Process

- ▶ **Establish and update Energy Star Portfolio Manager**
- ▶ **Determine Energy Use Intensity (EUI) for all buildings**
- ▶ **Calculate Energy Use Intensity Targets for each building**
- ▶ **Benchmark buildings using Portfolio Manager**

Create Compliance Path

- ▶ **Identify low-cost/no-cost energy saving opportunities**
- ▶ **Prioritize Buildings and savings opportunities**
- ▶ **Develop Energy Management Plan and O & M Program**

Establish a Compliance Plan

Opportunity Register

Checklists

Training

Engagement

- ▶ **Establish a Clean Energy Team**
- ▶ **Build awareness and Communicate to Institution Community**
- ▶ **Create surveys, questionnaires, and other feedback loops**
- ▶ **Integrate continuous improvements and document everything**

Metering

Submetering Guidance

Section 5.2 Building Energy Monitoring requires that energy-use data for each type of energy imported into and exported from the building be collected from utility or energy delivery bills or by monitoring local energy meters. Owner-provided energy meters shall meet the metering accuracy, tolerances and testing requirements of [Title 480 WAC](#).

In lieu of Title 480 WAC, Commerce will also accept owner provide energy meters that meet the standards of [WAC 51-11C-40904 Section C409.4- Measurement devices, data acquisition system and energy display \(Section 409.4 of the Washington State Energy Code \(WSEC\)\)](#).

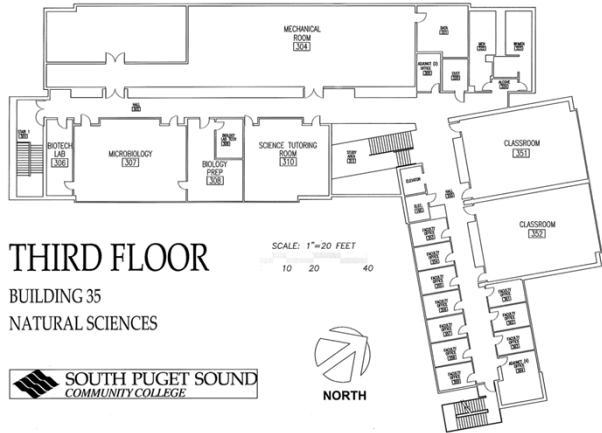
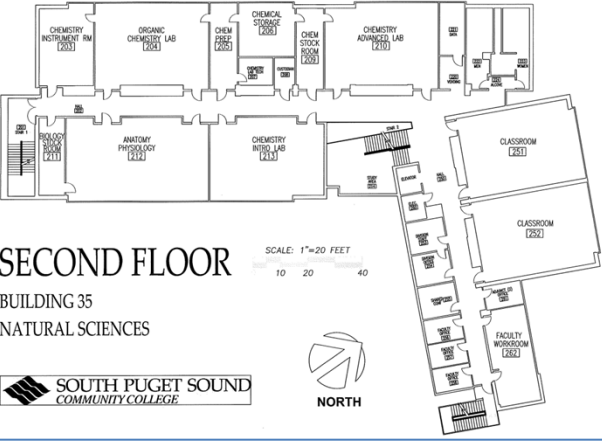
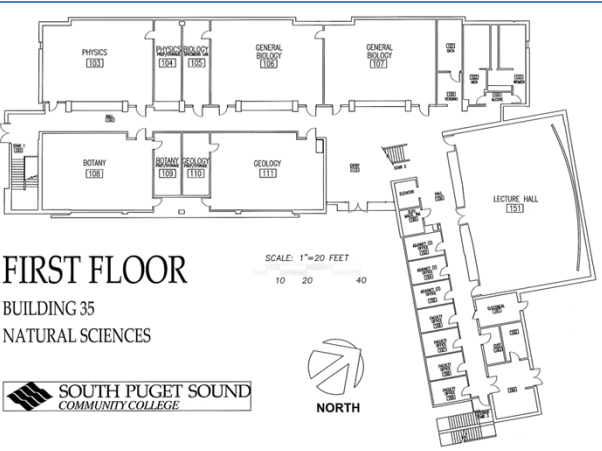
Understand what types of submeters are acceptable

SPSCC – (5) Buildings Compliance Considerations

SPSCC - Campus Facilities Profile				Lighting Measure				Solar System Equivalent in energy output to the lighting measurements				Additional Measure to Commission each building's HVAC Systems			EUI's		Alternative compliance path
Building Name	Building #	Floor Area (s.f.)	kWh	Lighting Cost	Lighting Energy Savings in kWh	Lighting cost savings	Lighting EUI point reduction	Equivalent Solar System Size	Cost to implement Equivalent Energy Solar EUI reduction	Solar cost savings	Solar EUI point reduction	Commissioning implementation cost	Commissioning Energy Savings Kwh	Commissioning EUI point reduction	Existing EUI	Target EUI	Level 2 Energy Audit
Center for Student Success Kenneth J. Minnaert	Bldg. 22	89,308	500,000	\$223,270	62,500	\$5,000	3	65 kWdc	\$292,500	\$5,000	3	\$178,616	15,000	1	54.7	91.8	
Center for the Arts	Bldg. 21	67,500	350,000	\$168,750	43,750	\$3,500	3	45 kWdc	\$202,500	\$3,500	3	\$135,000	10,500	1	75.7	91.8	
Technical Education	Bldg. 34	56,258	550,000	\$140,645	68,750	\$5,500	5	70 kWdc	\$315,000	\$5,500	5	\$112,516	16,500	3	132.8	112.2	
Natural Sciences	Bldg. 35	51,884	900,000	\$129,710	67,500	\$5,400	5	70 kWdc	\$315,000	\$5,400	5	\$155,652	27,000	4-8	340	112.2	Compliance by implementation
Lacey Campus Building 1	LC Bldg. 1	52,657	450,000	\$131,643	33,750	\$2,700	3	35 kWdc	\$122,500	\$2,700	3	\$105,314	13,500	1	92.8	91.8	

Scenario Planning

Know your Utilities



Location Description	Meter Number	
Bldg 35	1378928	
billing period	Usage (Therms)	
	Current	Last Year
06/24/21-07/26/21	989.77	715.53
07/26/21-08/25/21	856.34	547.22
08/25/21-09/24/21	2,562.17	681.39
09/24/21-10/26/21	5,226.16	1,999.19
10/26/21-11/24/21	6,262.77	3,577.89
11/24/21-12/27/21	9,346.56	4,523.41
12/27/21-01/26/22	13,931.42	5,231.78
01/26/22-02/24/22	22,252.24	5,140.48
2/24/2022-03/28/22	11,975.32	4,614.79
03/28/22-04/26/22	6,333.74	3,683.78
04/26/22-05/25/22	3,750.13	2,184.90
		1,474.46
Total	83,486.60	34,374.81

Whoa!

Procurement Considerations

Capital Improvements

Submeters

Contracts/agreements

Operational Budget

Grants, incentives, rebates, fund raising

Washington Clean Buildings Performance Standard: Applied to Campus Settings



Clean Building/Clean Campus

Why:

- Campus environs are unique, relative to the commercial building sector
- benchmark targets are a blunt tool
- align compliance with goals: efficiency/reduce carbon
- respect benefits of District Energy Systems,

Clean Building/Clean Campus

What: Subject Matter/scope

- Campus level reporting vs. building level reporting
- Unique mixed occupancy types
- Complex energy flows among campus buildings
- Avoid pitting campus utilities against building investments

OUR PROPOSAL

Establish a “Green Revolving Fund”

- an approach that invests verified utility bill savings into future energy projects
 - permanently reduces utility charges
 - supports meeting unfunded state/city sustainability mandates
 - avoids costly penalties and risk to UW prestige/reputation

Invest \$17.8M in foundational energy systems (from various sources)

- needed to meet unfunded state/city sustainability mandates
- avoids costly penalties and risk to UW prestige/reputation

Create 7 new operating positions

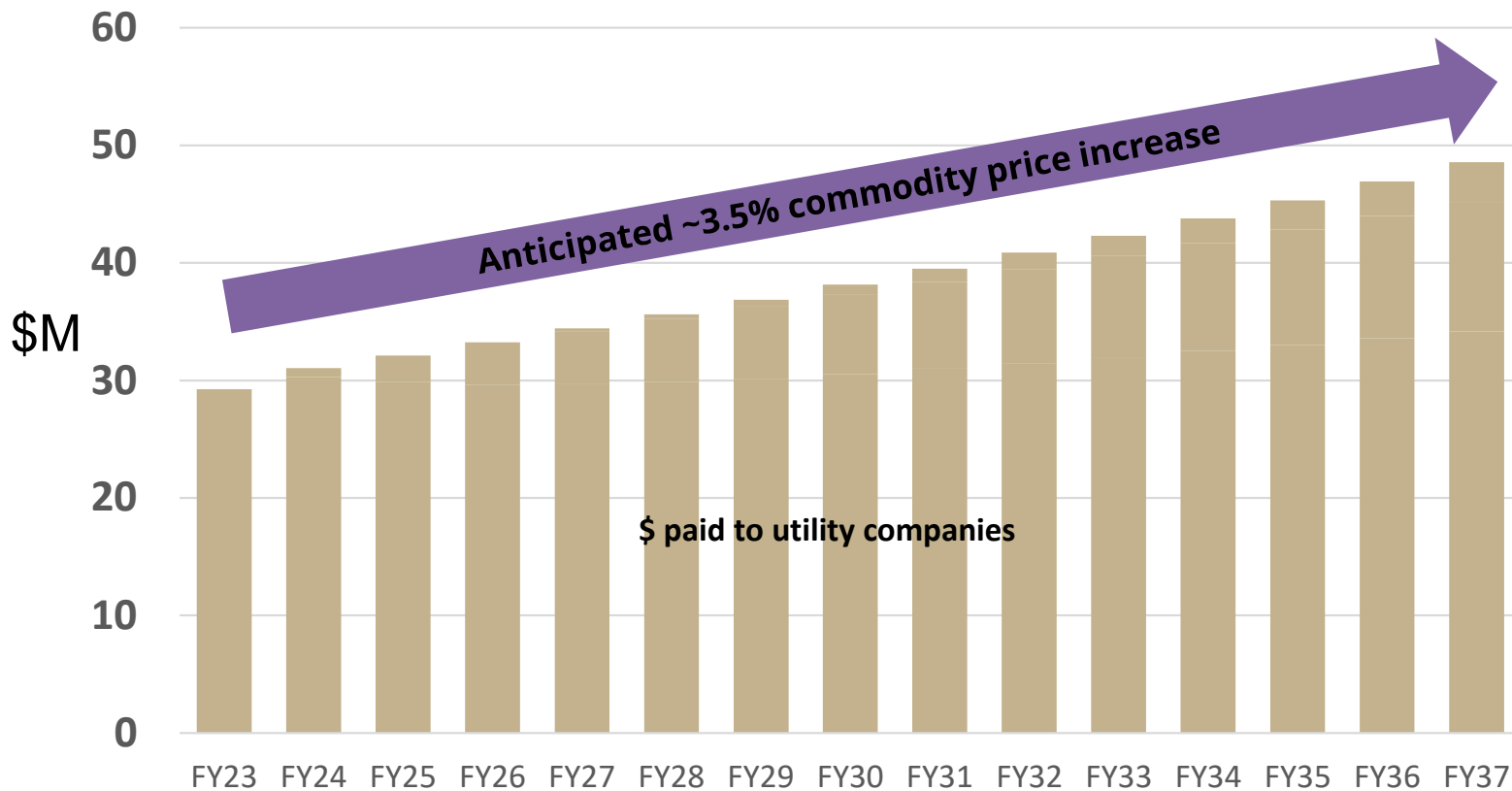
- invest in metering (3), building automation controls (1), and building system data analytics (3)
 - needed to meet unfunded state/city sustainability mandates
 - avoids costly penalties and risk to UW prestige/reputation



PROJECTED UTILITY BUDGET WITHOUT GRF

normalized

- not adjusted to reflect*
- new buildings,*
 - intensification of space*
 - electrification*
 - weather variation*

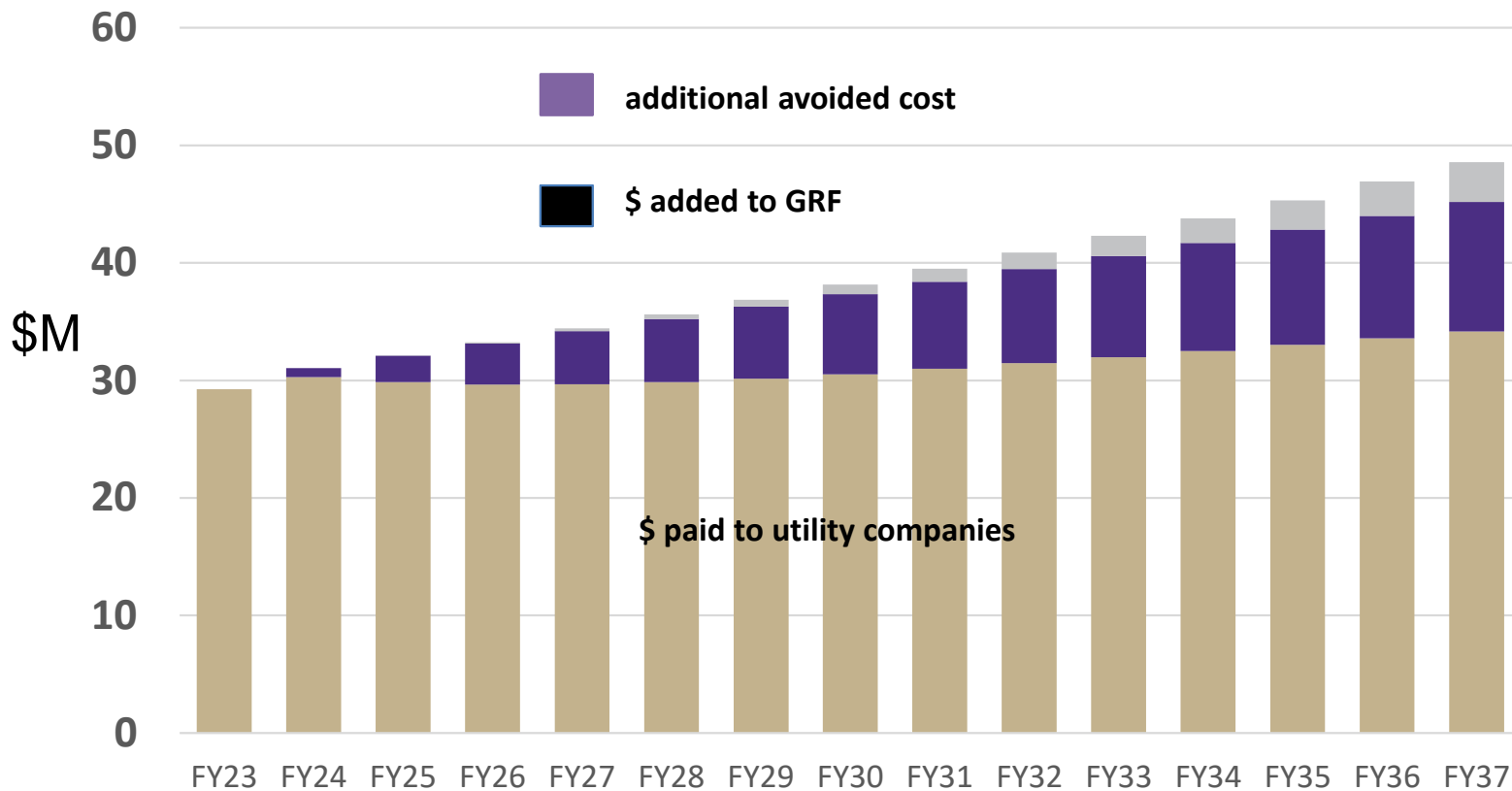


PROJECTED UTILITY BUDGET WITH GRF

simplified

not adjusted to reflect

- new buildings,*
- intensification of space*
- electrification*



GREEN REVOLVING FUND GOVERNANCE

FUND MANAGER (Facilities)
FINANCIAL MANAGER (Treasury)

Projects are identified & entered into **Screening Tool**

For the given cycle, a **Balanced Portfolio** of projects is selected



Projects are implemented
These are carefully chosen to ensure they will reduce energy

natural gas
electricity and
water use are reduced

Actual performed is **Measured & Verified**

REVOLVING FUND

SUPPORT TEAM (reviews)

- Associate VP Treasury
- Associate VP Facilities Finance
- Environmental Stewardship Committee
- Faculty Committee on University Facilities & Services
- Other Participating UW Entities

External fund sources
grants
donations
rebates from utilities

Utility Bills are reduced
Money that would have been paid to utilities is put into the Revolving Fund

SIGN OFF

Executive Director of Energy Utilities & Operations

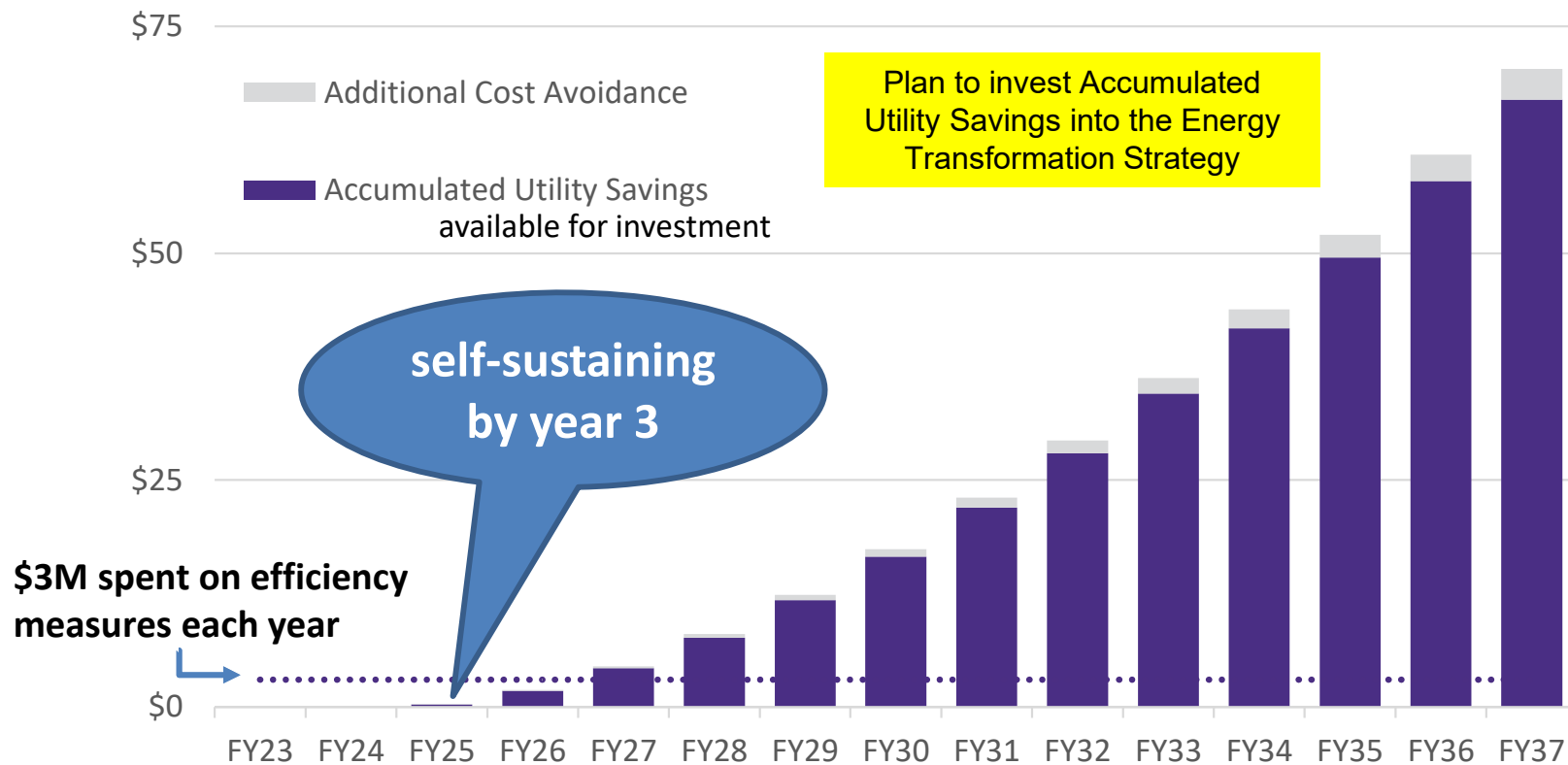
ADVISORY GROUP (2x/year)

- Provost
- Vice Provost
- Vice President of Finance
- Vice President of Facilities

Plan involves investing verified utility savings for future GRF projects

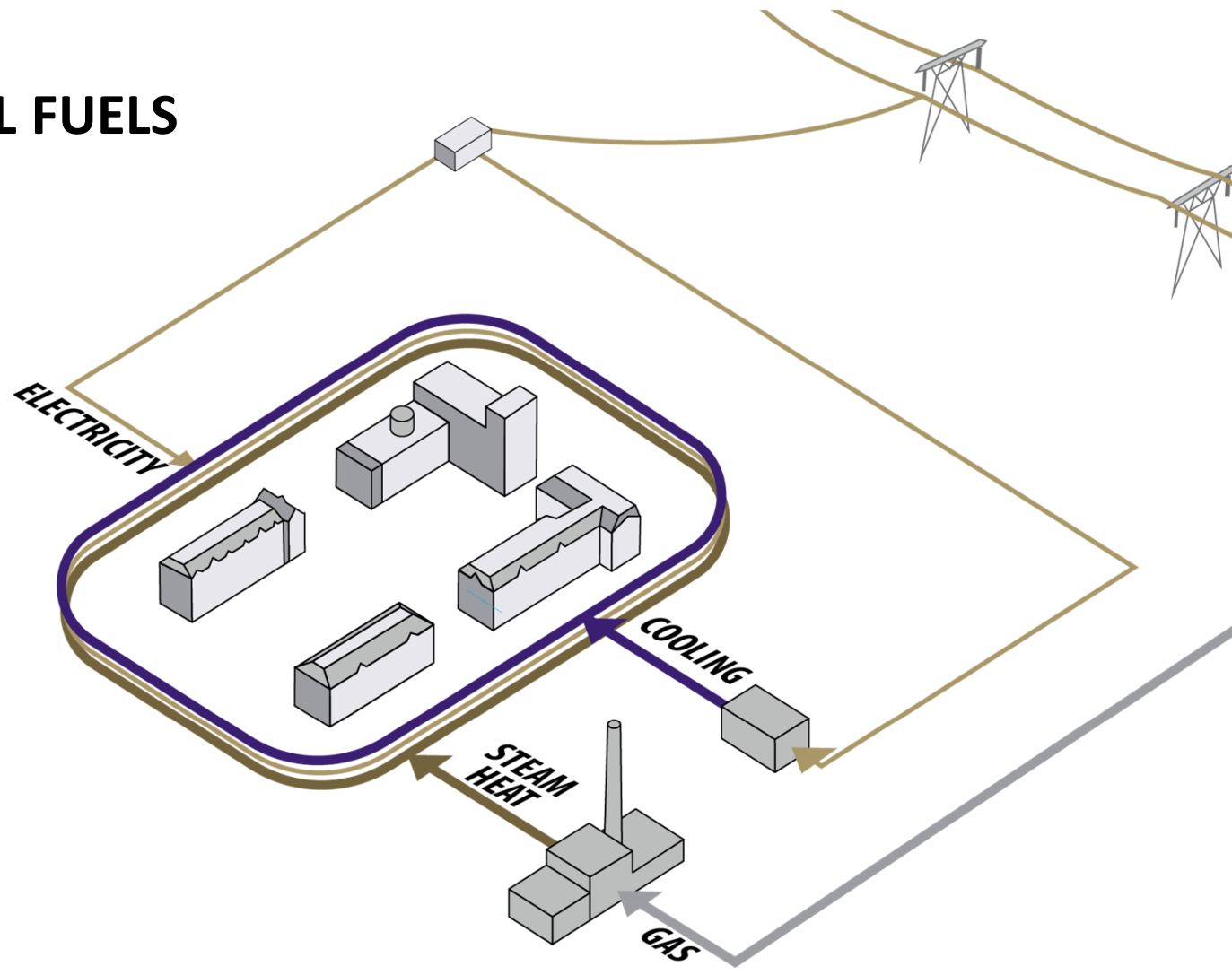


GREEN REVOLVING FUND GROWTH



HEATING AND FOSSIL FUELS

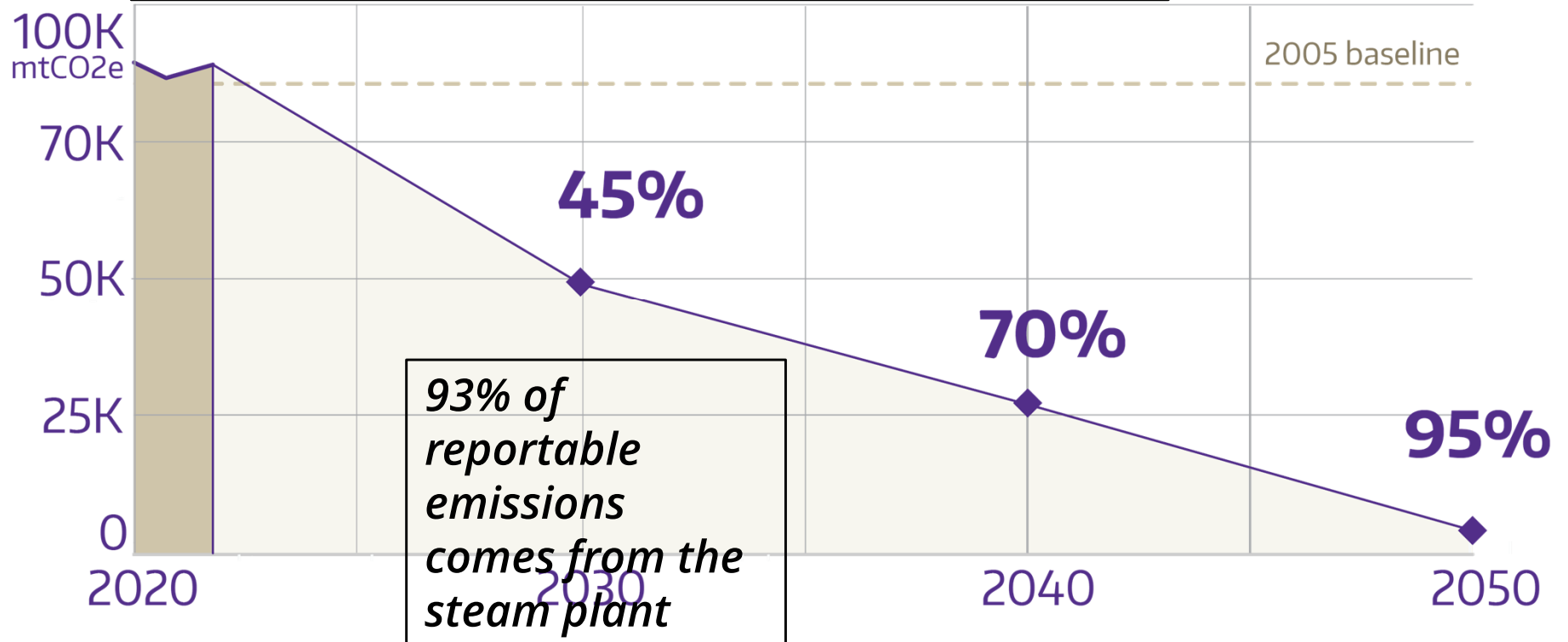
- We presently consume natural gas to produce steam at our central plant, for the primary purpose of providing heat to our buildings.





URGENT ACTION REQUIRED!

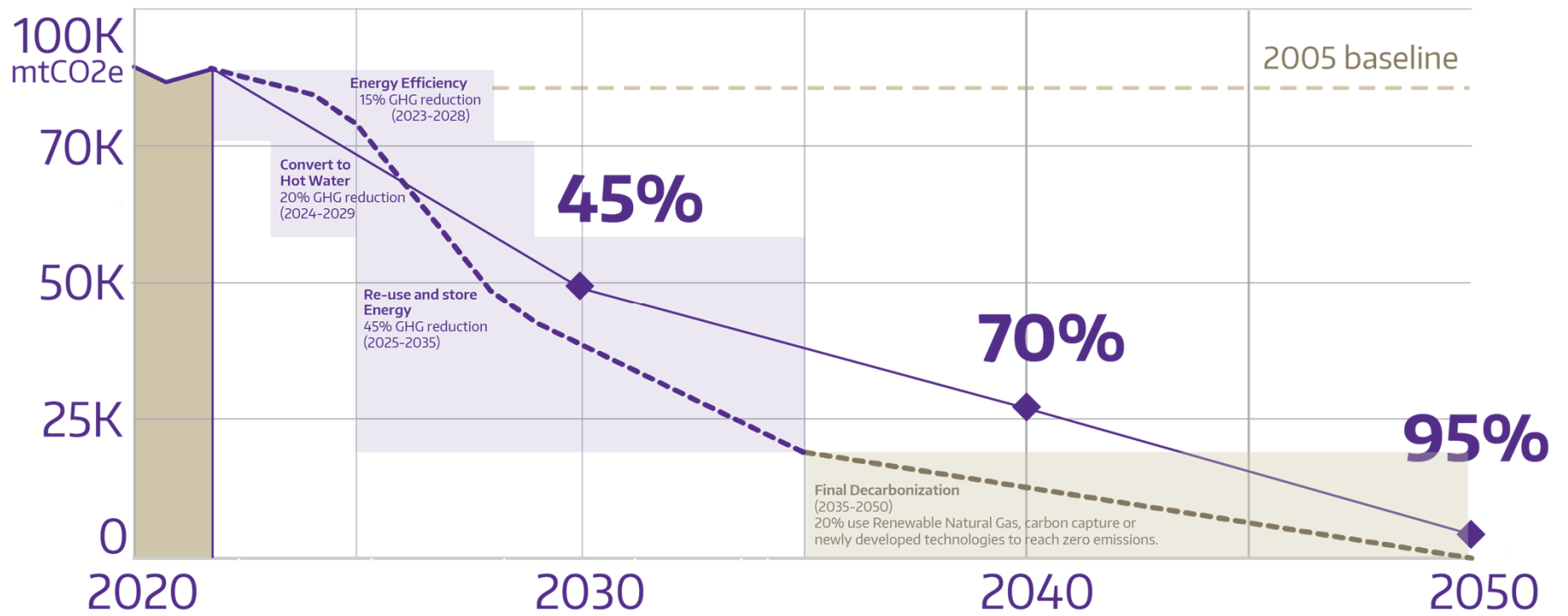
UW initial annual carbon liability between \$3.7 and \$5.2M.



Need a significant shift away from carbon sourced heating!



WE HAVE A STRATEGY!

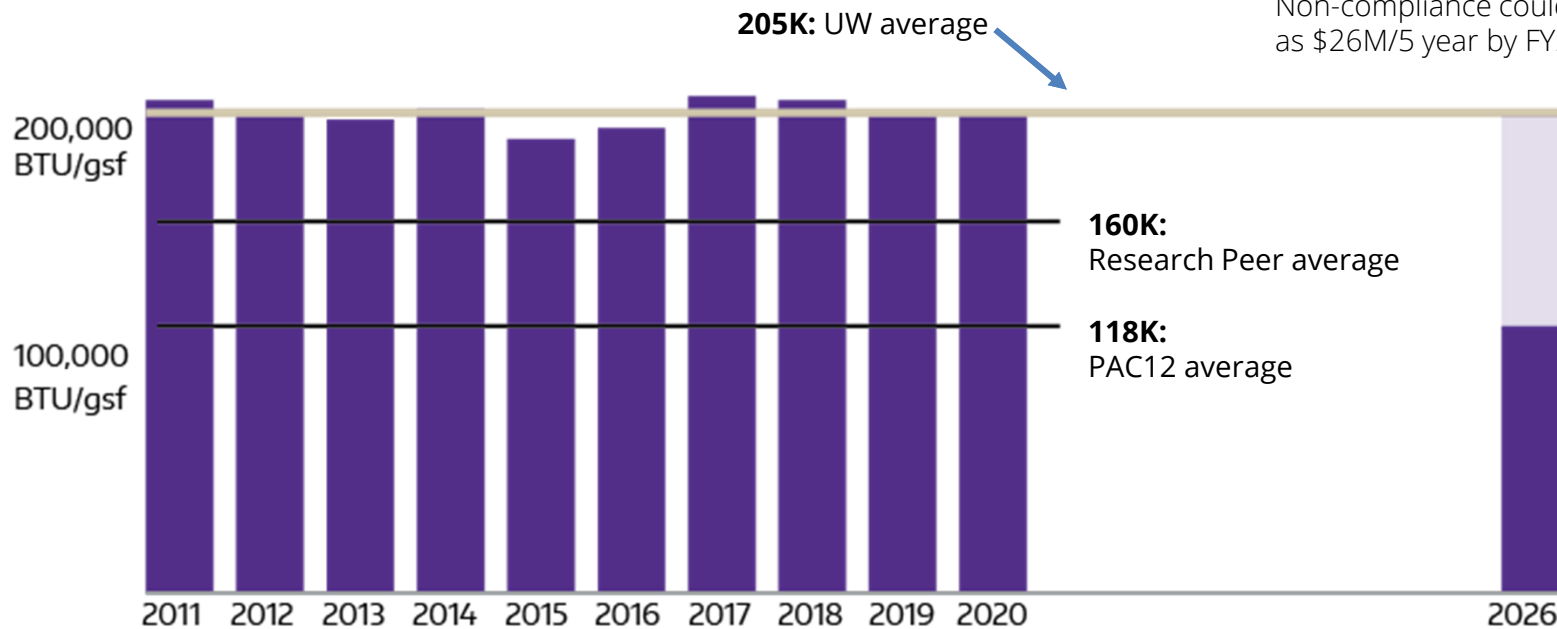


WE CAN/MUST USE LESS ENERGY

CLEAN BUILDING PERFORMANCE STANDARD

Mandate to reduce energy use ~45% by 2026

Non-compliance could result in fines as high as \$26M/5 year by FY26



(Sightlines data)

Research peers:
Clemson U, MIT, Northwestern, The Ohio State U, U of Arkansas, U of Connecticut,
U of Florida, U. Of Georgia, U. Of Maryland, U. of Oregon



WHAT DO WE NEED TO DO?

W

OBJECTIVES

- Inspire & lead: model a path to meet environmental and financial challenges
- Support the UW mission:
 - cooling is no longer a luxury in the PNW
 - avoid regulatory penalties: avoid reputational risk of non-compliance
 - share: democratize actionable campus data and share with research
 - resilient: mitigate service disruption risk
 - no fossil fuels: eliminate dependency on fossil fuels
 - future proof: design to meet changing environmental conditions (climate adaptation)
 - optionality: flexibility to leverage future technologies
 - diversify: mitigate commodity risks/dependency
- Lowest cost: lowest total cost of ownership (CapEx/OpEx)



WHAT DO WE NEED TO DO...

FOUNDATIONAL SOLUTIONS

A. DATA

1. Metering
2. Controls
3. Data analytics
4. Accelerate energy efficiency (6x) - The "Green Revolving Fund"

B. DISTRICT ENERGY

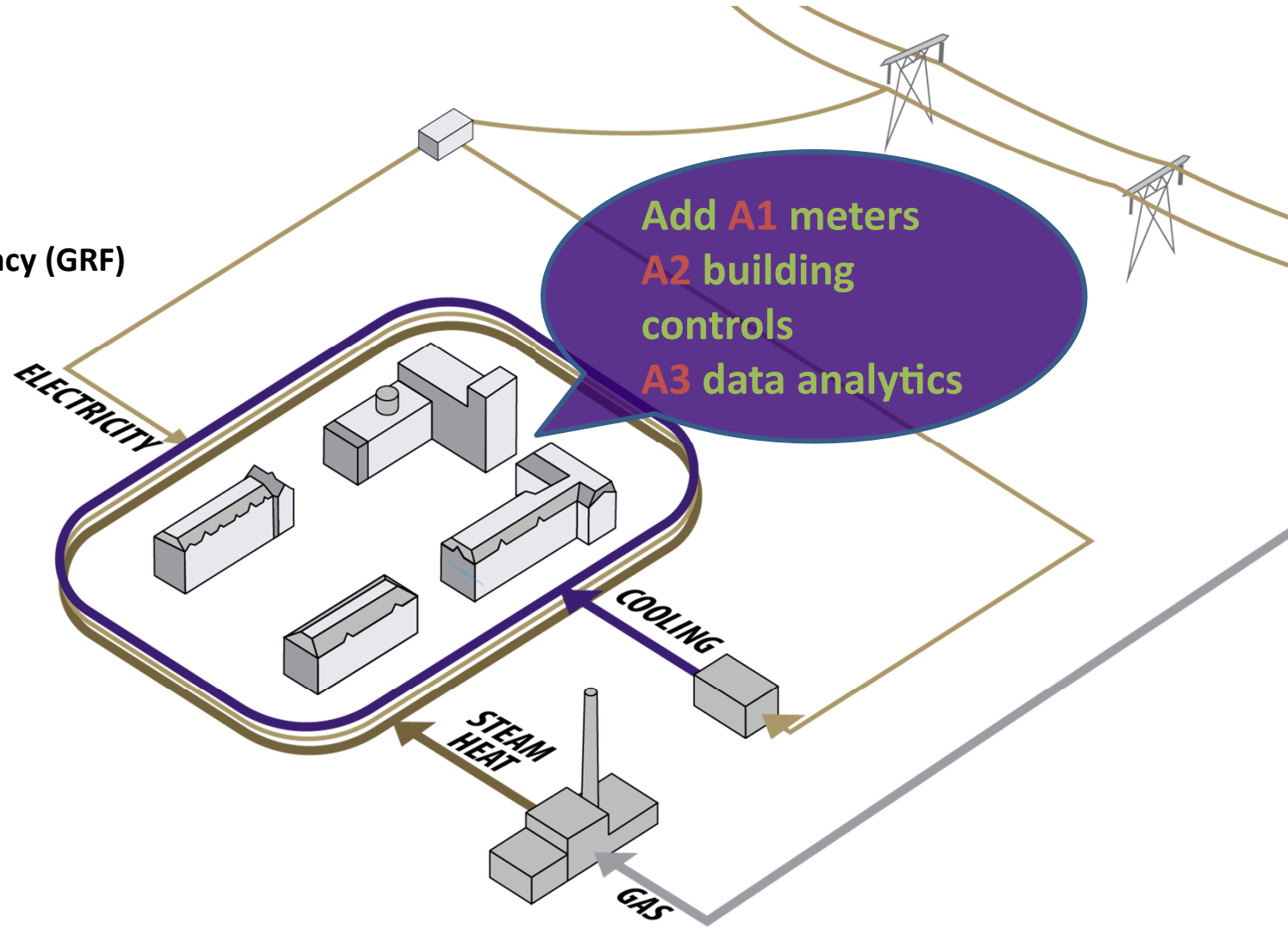
1. Hot water (away from steam),
2. Centralized cooling,
3. Thermal storage & re-use, and
4. Reduce electrical demand.



2023-2028

DATA

- **A4** Accelerate energy efficiency (GRF)
- Enable compliance



FUNDING REQUIRED – DATA (Part A)

(in Millions)

	FY23	FY24	FY25	FY26	FY27	Total	Funded by
A.1 Metering	\$1.5	\$1.5				\$3.0	Capital Budget Request
A.2 Controls	\$1.0	\$1.0	\$1.0	\$1.0	\$1.0	\$5.0	“
A.3 Data analytics	\$1.0	\$1.0	\$1.0	\$1.0	\$1.0	\$5.0	“
A.4 Accelerate energy efficiency							
<i>Rebate Reserves</i>	\$2.7					\$2.7	UWF
<i>Seed Funding</i>	\$0.3	\$1.8				\$2.1	OPB
Total:	\$6.5	\$5.3	\$2.0	\$2.0	\$2.0	\$17.8	



SUMMARY OF POSITION NEEDS

	Position(s)	New positions	Impact (\$M)
A.1 Metering	Establish metering crew	3 FTE	\$0.38
A.2 Controls	Building Automation Systems (BAS) Engineer	1 FTE	\$0.17
A.3 Data Analytics	Operations Technology Manager (BIT) Operations Technology Engineer Utilities Analyst	3 FTE	\$0.41
Total:		7 FTE	\$0.96

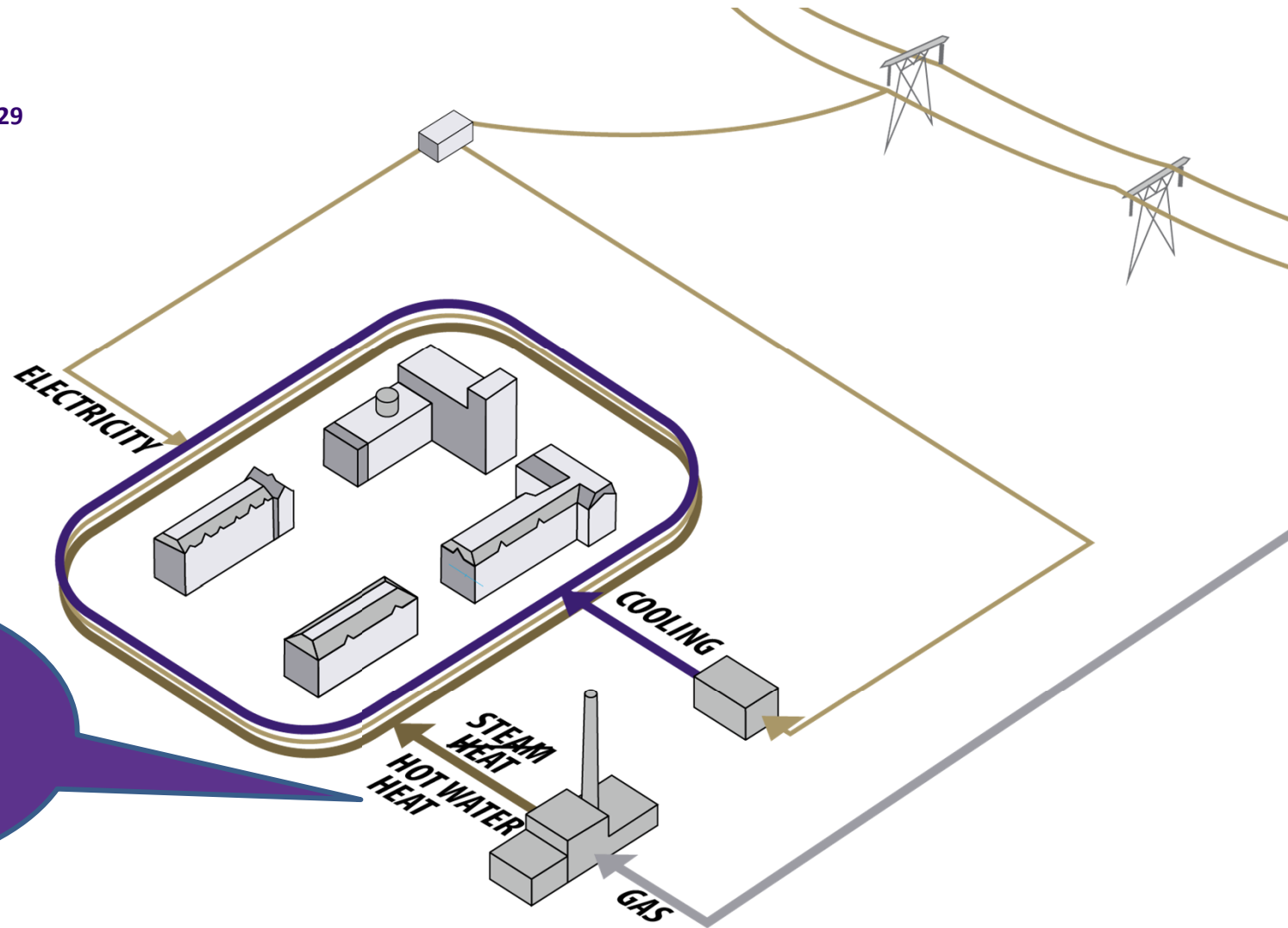


engineering in 2023, completed by 2029

HOT WATER

- Reduce waste
- Enable
 - Heat recovery
 - Non-fossil fuel

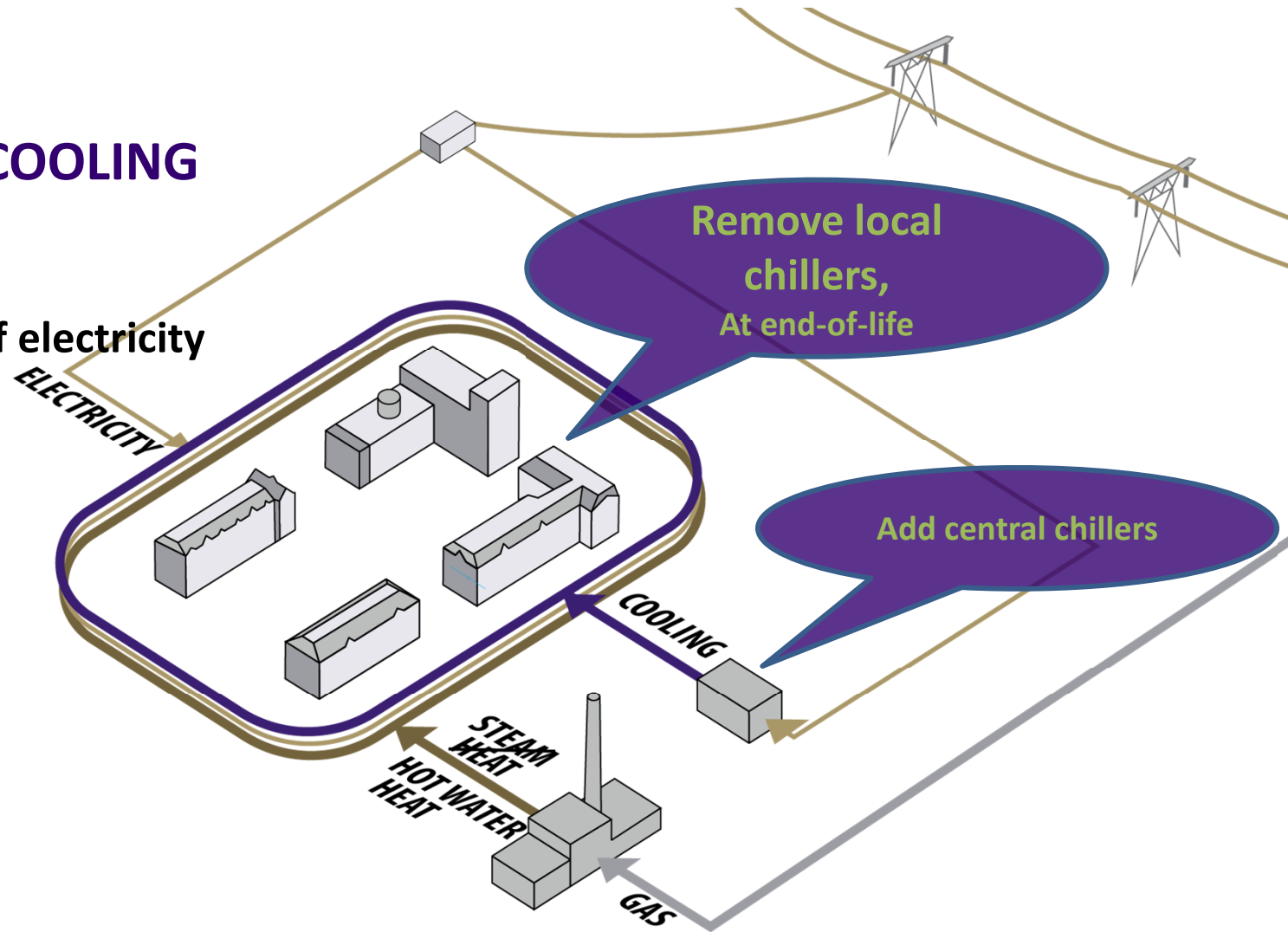
Transition from
steam to hot
water



2023-2033

CONSOLIDATE COOLING

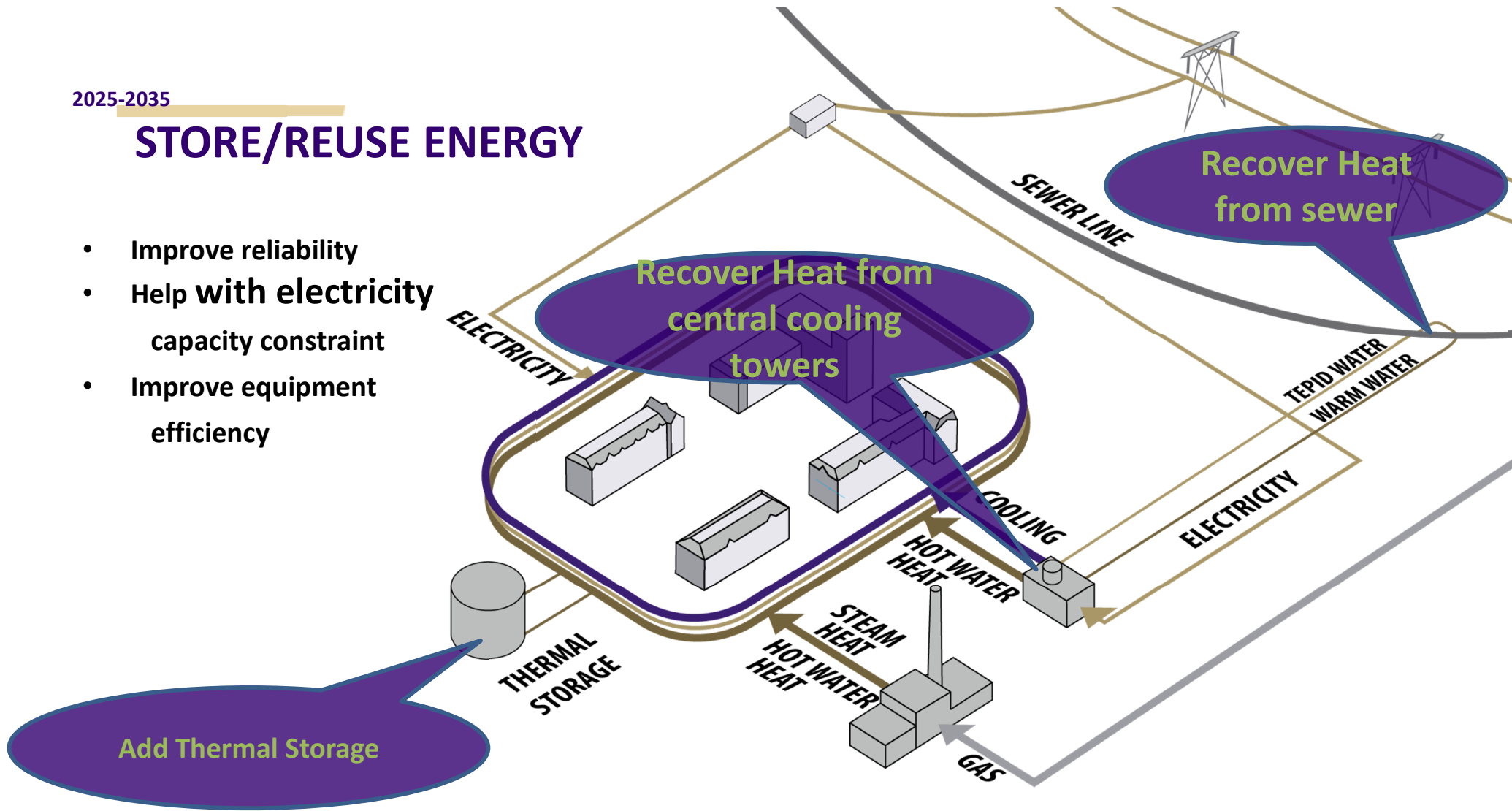
- Increase reliability
- Most efficient use of electricity
- Enable heat recovery



2025-2035

STORE/REUSE ENERGY

- Improve reliability
- Help with electricity capacity constraint
- Improve equipment efficiency



2023-2035

REDUCE ELECTRICITY DEMAND

- Free up capacity
- Increase resilience
- Reduce cost

