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AWC Grant Info Session

Energy Audits

August 28th, 2024

Säzän Group // 111 SW 5th Ave, Portland, OR 97204 // www.sazan.com

Introduction

Dan Tedrow, PE, PMP

Principal

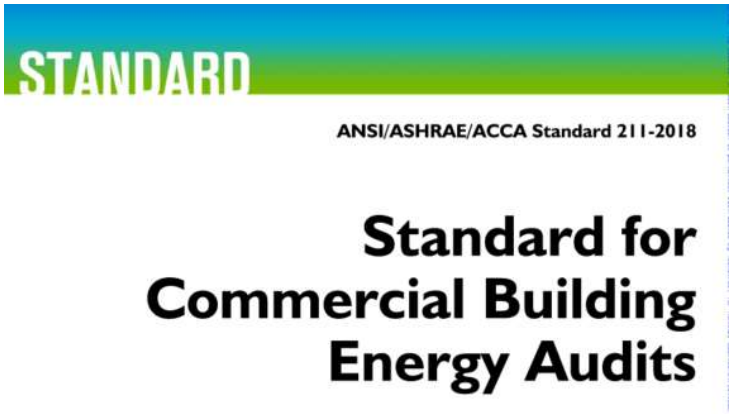
- Registered Mechanical Engineer
- PMP
- Industry experience: 16 years
- PNW Focus
- Energy + HVAC | Focus on existing buildings

Building that work | Empowering client success

Presentation Goals

1. Energy Audit 101
2. What does an energy audit do/not do
3. What information is needed from entities.

What is an Energy Audit



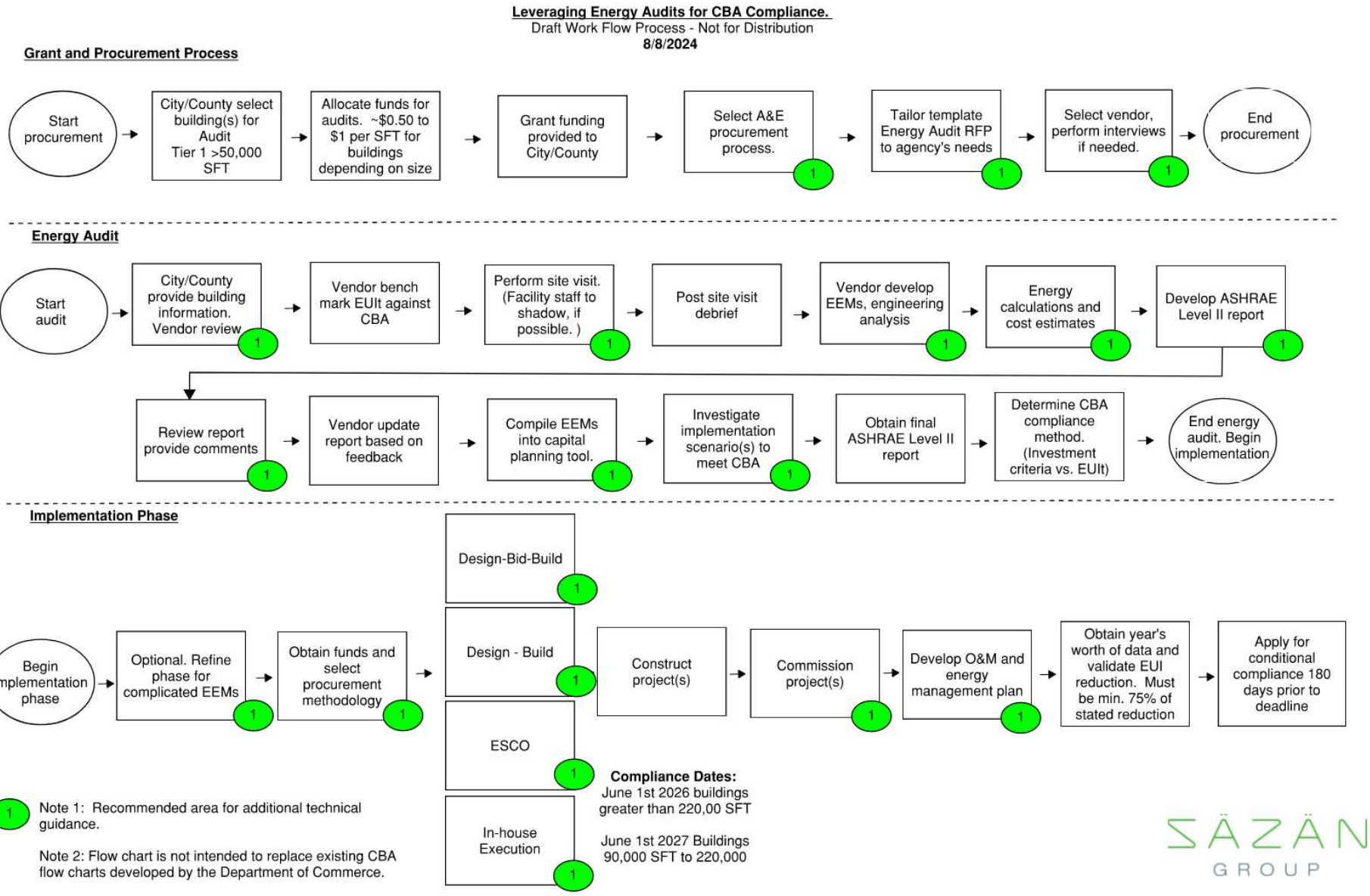
- Inspection and analysis of energy usage in a building aimed at identifying opportunities **to reduce energy consumption.**
- Core Function- Develop Energy Efficiency Measures (EEMS)
- What is the Goal –You implement them and save energy!
- State Adopted ASHRAE with detailed requirements
- However…Not all are created equal.

You get what you pay for…Think PROCUREMENT!!!!!

Leveraging Energy Audits for CBA Compliance.

Draft Work Flow Process - Not for Distribution

8/8/2024



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How do you do an energy audit?

Baseline Needs

1. **Utility Data** - Energy star portfolio manager
2. **Drawings** - Access to available building drawings mech and arch.
3. **Controls** - Sequence of operations
4. **Historical Knowledge** - Prior upgrades and known facility issues.

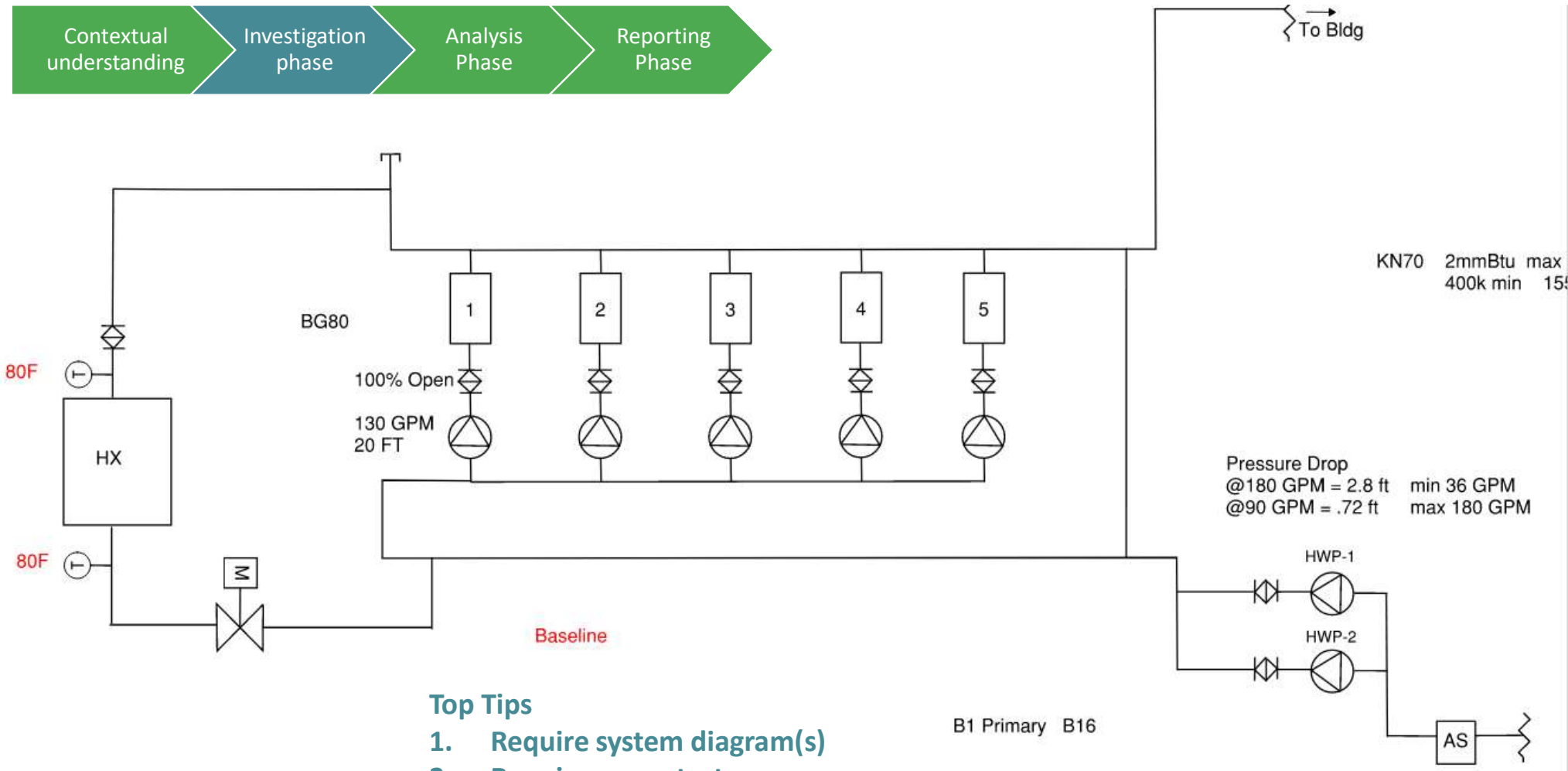
Preferred:

- Access to controls system (preferred!)
- Past project cost(s)

Contextual understanding | Investigation phase | Analysis Phase | Reporting Phase

The low hanging fruit is gone....

Contextual understanding | Investigation phase | Analysis Phase | Reporting Phase



Top Tips

1. Require system diagram(s)
2. Require pump tests
3. Document electrical capacity

Contextual understanding | Investigation phase | Analysis Phase | Reporting Phase

Baseline – 1.5 HP, failure 6 months

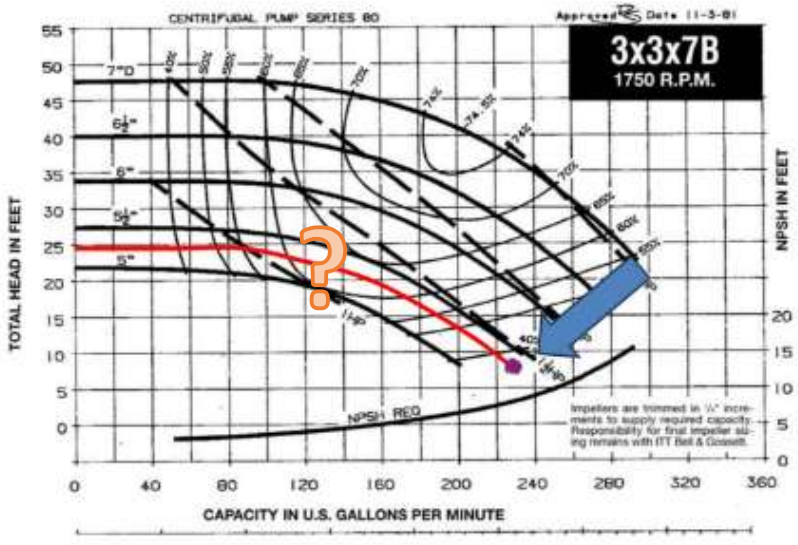
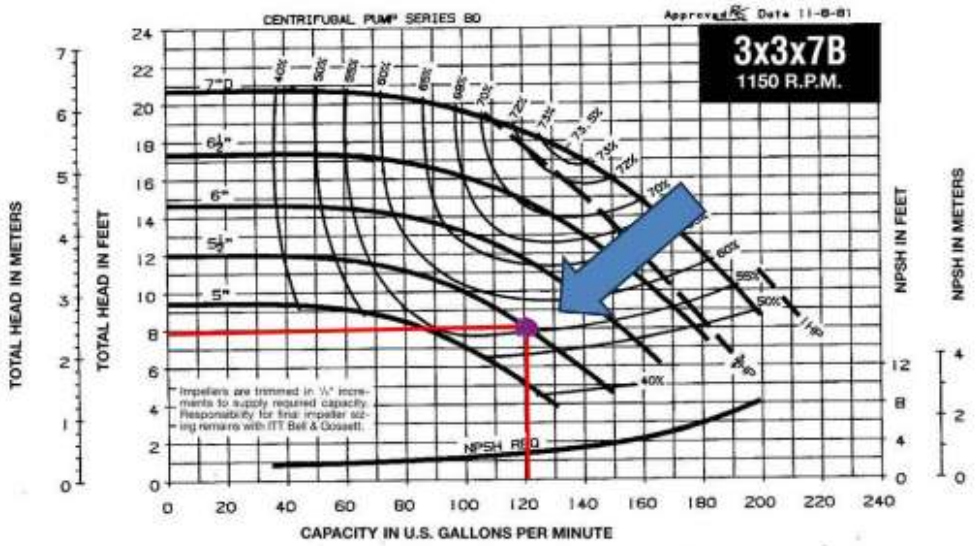


Figure 24: Existing calculated HHW primary pump flow rate.

Proposed - 0.2 HP Preform in-house



Contextual understanding | Investigation phase | Analysis Phase | Reporting Phase

1. Level of effort varies by provider and by building. Scoping issue.
2. **Focus on engineering analysis** - The more you dig the better the results.
3. Identify both capital and low-cost measures
4. Don’t expect perfection with energy calculations

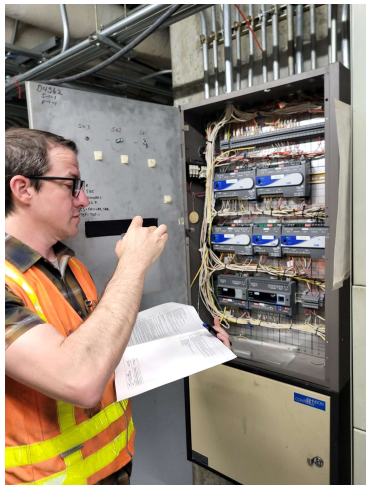
Contextual understanding → Investigation phase → Analysis Phase → Reporting Phase

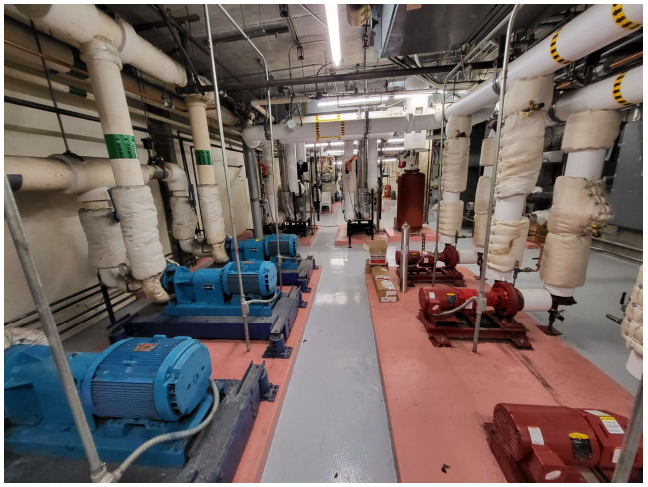
1. Longest phase
2. ASHRAE Mandated content (Validate)
3. However…Level of detail varies
4. Take EEM costs with a grain of salt
5. Think ahead to implementation.

		Energy Savings			Cost Savings		
EEM	EEM Brief Description	EUI reduction (kBtu/ sf. yr]	Estimated Annual Electricity Savings (kWH)	Annual Natrual Gas savings (therms)	Estimated Annual Utility Savings ($)	Estimated Annual Electric Savings ($)	Estimated Annual Natural Gas Savings ($)
EEM-01	Heating and Hydronic Upgrades	9.12	116,212	30,205	$ 38,528	$ 11,063	$ 27,464
EEM-02	RCx and Controls Upgrades	2.76	233,982	10,300	$ 31,641	$ 22,275	$ 9,366
EEM-03	DHW Electricification	6.25	(680,043)	46,408	$ (22,543)	$ (64,740)	$ 42,197
EEM-04	Maintenance Items	-	-	-	$ -	$ -	$ -
EEM-05	Replace Wall St. Kitchen Hood	1.10	46,355	2,517	$ 6,701	$ 4,413	$ 2,288
EEM-06	Install Solar Array on Oakes Ave Roof	1.30	141,800	-	$ 13,499	$ 13,499	$ -
EEM-08	Lighting Upgrades	0.05	5,721	-	$ 545	$ 545	$ -
EEM-09	Ventilation Upgrades	1.30	14,054	4,344	$ 5,288	$ 1,338	$ 3,950
EEM-10	Remove Air Blenders	0.16	17,202	-	$ 1,638	$ 1,638	$ -
	Total:	**22.05**	**(104,716)**	**93,774**	**$ 75,296**	**$ (9,969)**	**$ 85,265**

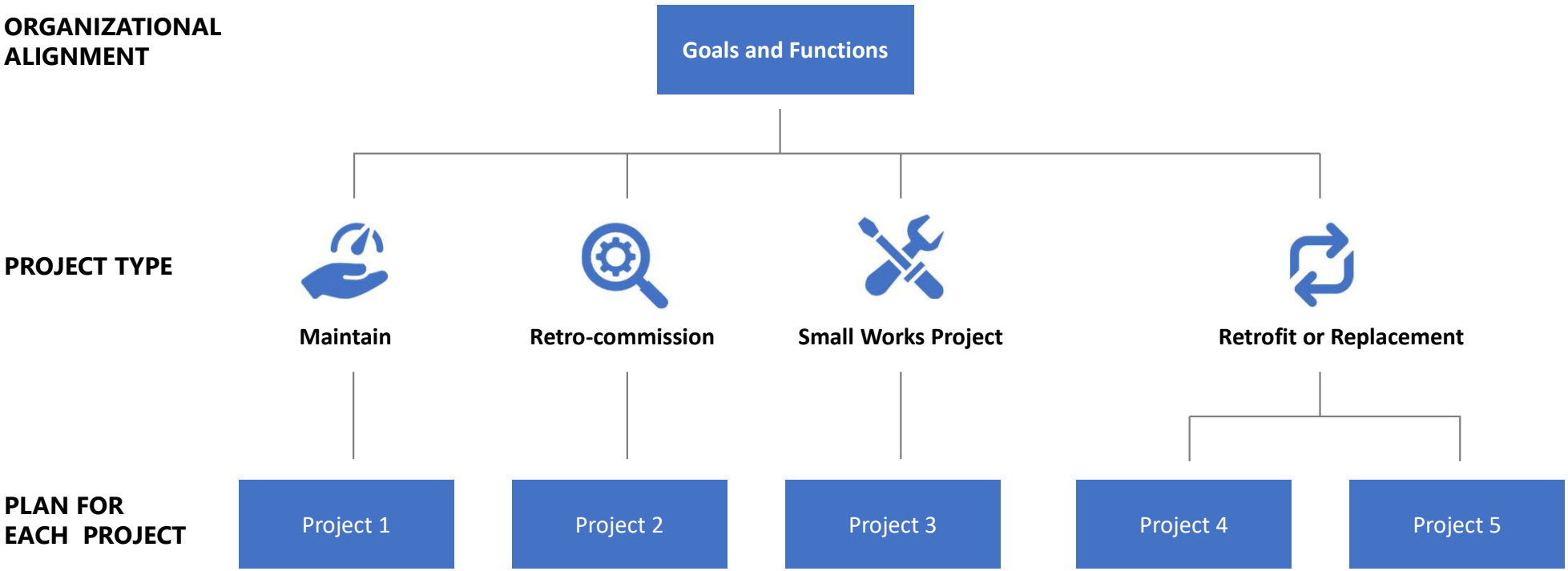
You want detailed EEM descriptions!

Your system types will drive the strategy

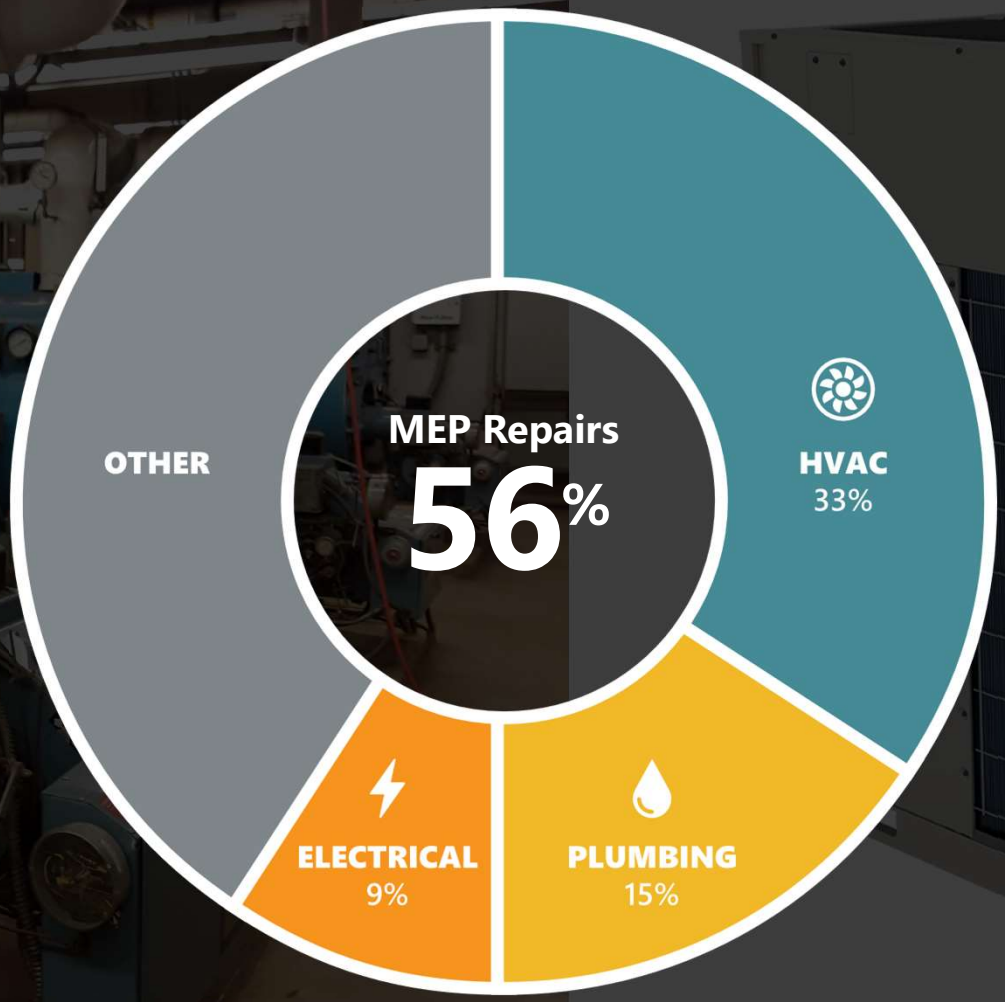




Leverage a Program Approach

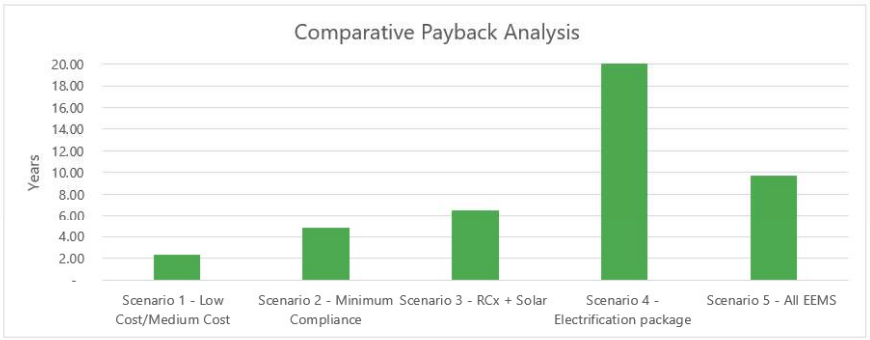


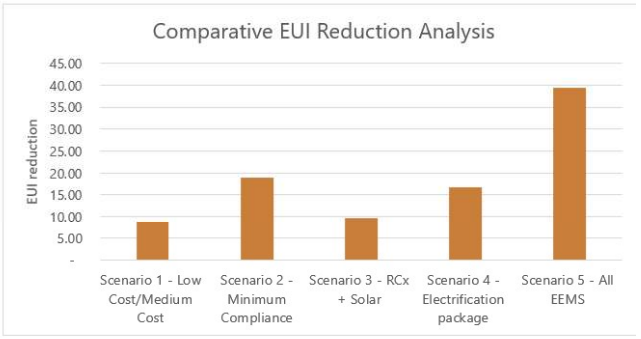
Building Condition Assessment Findings

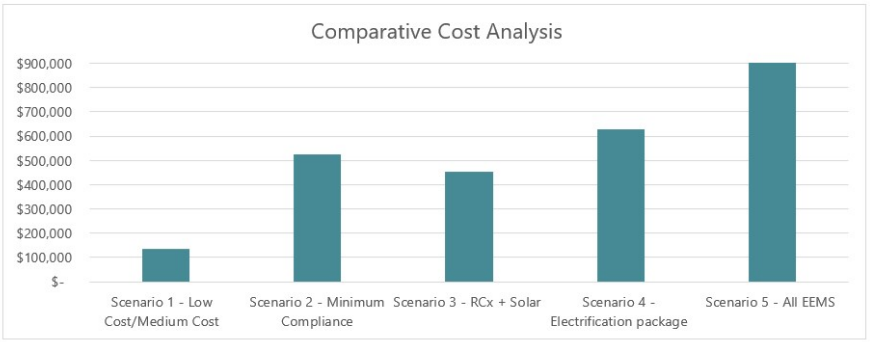


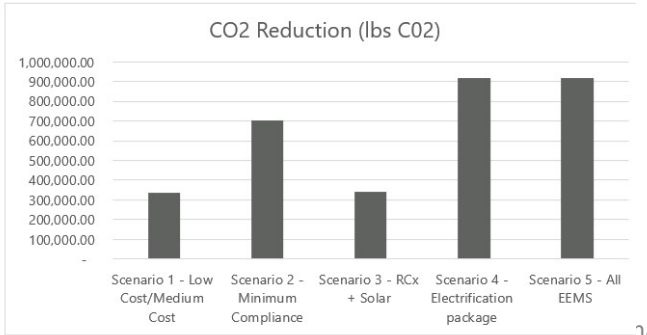
Leverage Capital Planning Scenarios

Capital Plan	Cost	Annual Utility Savings	Natural Gas CO2 Reduction (lbs)	EUI Reduction	Payback (Years)	CBA Compliance
Scenario 1 - Low Cost/Medium Cost	$ 136,799	$ 58,789	338,594.81	8.82	2.33	No
Scenario 2 - Minimum Compliance	**$ 524,453**	**$ 108,660**	**702,800.56**	**18.91**	**4.83**	**Yes**
Scenario 3 - RCx + Solar	$ 454,117	$ 70,132	340,342.76	9.78	6.48	No
Scenario 4 - Electrification package	$ 626,736	$ 29,484	919,354.12	16.67	21.26	Yes
Scenario 5 - All EEMS	$ 1,447,359	$ 149,078	919,354.12	39.53	9.71	Yes









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Thank You!

Any Questions....

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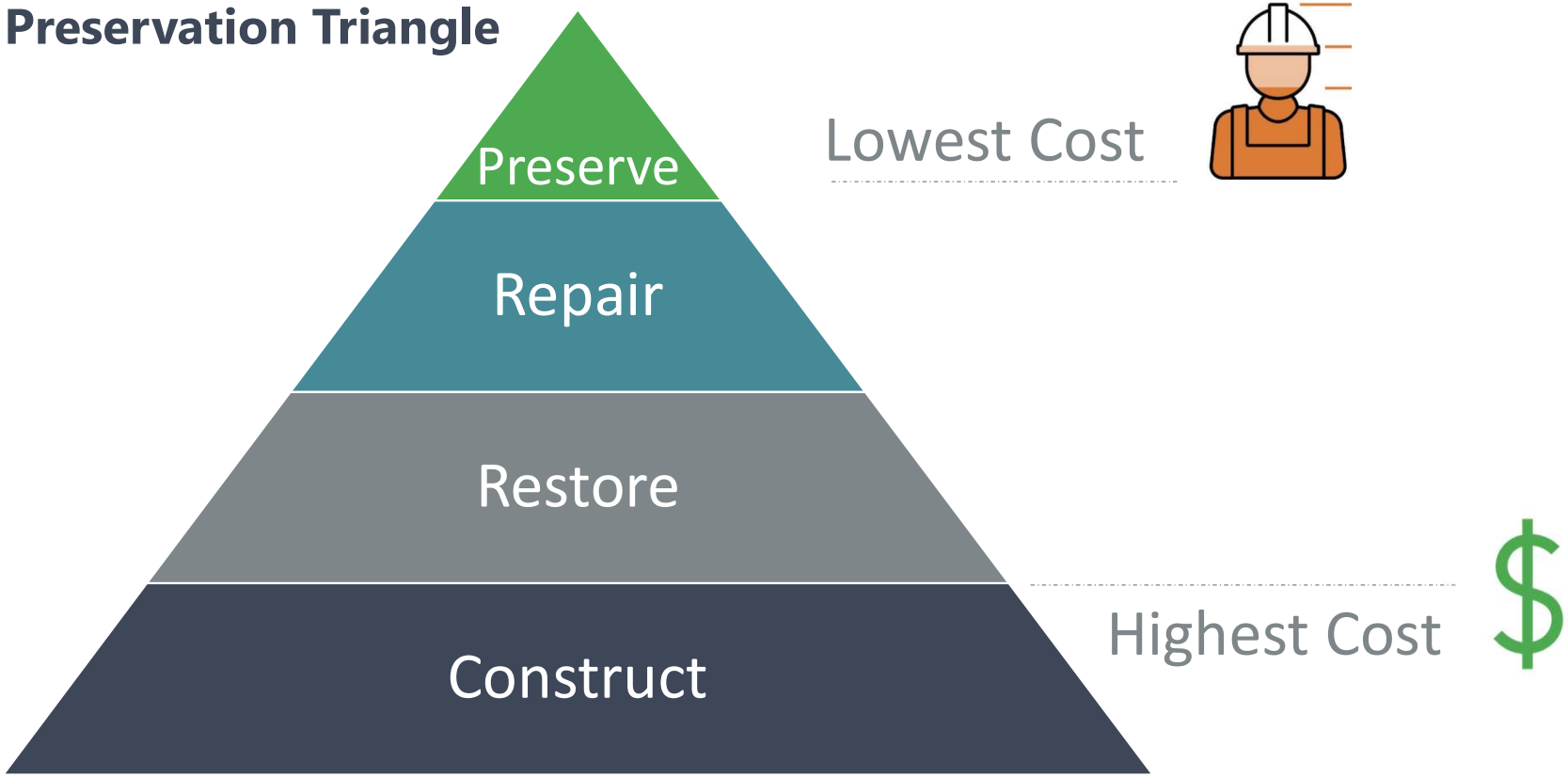
Back Up Slides

Maintenance Requirements

- State follows amended ASHRAE 100 standard.

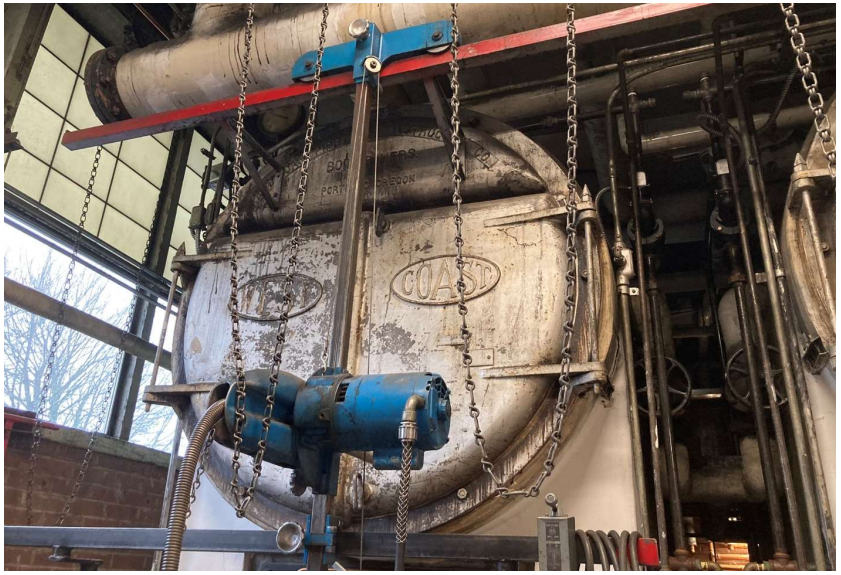
- Outlines compliance methodology including:
  - Energy management plan,
  - **Operations and Maintenance Requirement.**

Building Preservation Triangle



Greenest building is the one you have already built

Maintenance Matters



PM Planning – Plan Tasks, Assign

Task description | Frequency | Duration

Asset Categorization			Maintenance Description		
Uniformat II Level 2	Uniformat II Level 3 Code	Short Description	Task Description	Task Frequer	Labor Source
A10 - Foundations	A1010 - Standard Foundations	Standard Foundations, General	Visual inspection of foundation; check for settling and clear all debris	A	Maintenance
B10 - Superstructure	-	Structural Frame, General	Visual inspection of structural frame.	A	Maintenance
B20 - Exterior Vertical Enclosures	B2010 - Exterior Walls	Exterior Walls, Brick veneer wall	Visual inspection of walls, check sealant joints, inspect mortar joints for cracking and pointing. Confirm weep holes are clear. Clean with mild detergent and seal as needed.	A	Maintenance
D20 - Plumbing	D2030 - Building Support Plumbing	Roof Drains, Standard	Clear roof drains and ensure the free flow of water into drainage system. Observe inside of drain for leakage and correct as needed.	SA	Maintenance
D30 - HVAC	D3030 - Cooling Systems	Fan Wall	1. Check supply fan and/or exhaust fan wheels for dirt and grease accumulation. Clean as necessary. D not use caustic cleaning solutions. 2. If applicable, clean/replace fan filters on electrical enclosures	SA	Vendor

Maintenance Requirements

6.4 Operations and Maintenance Tasks

6.4.1 Maintenance for all equipment, components, and systems shall be in accordance with applicable manufacturers' requirements and shall also include tasks that minimize failures and maintain energy consumption efficiency, such as those found in Informative Annex D for the following *building* systems:

- *Building* envelope
- Domestic hot water
- Heating, ventilation, and air conditioning
- Refrigeration
- Lighting
- Controls
- Electric power distribution and on-site power generation

Washington State Clean Buildings Performance Standard

July 2024 Version, includes covered buildings Tier 1 and Tier 2

Powered by ANSI/ASHRAE/IES Standard 100-2018

- Proper O&M is **key** to persistent energy efficiency and a large industry gap.
- Everyone seems to struggle with O&M
- Looking for **entities/partners to help solve this issue.**

Develop Preventive Maintenance (PM) Plan