2023 Commercial Program and Engineering EE Priorities

Utility Webinar
June 8, 2023

Welcome to the BPA Utility Webinar
Commercial Initiatives Update

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- Bill Crabtree – BPA Energy Efficiency Commercial Program Manager
- Erik Boyer, BPA Energy Efficiency Engineer

- Happy to be here today….let's get started!

Today's Topics

- Review Commercial Priorities
- Highlight outreach activities to increase custom projects
- Preview new measures coming in October IM
  - Heat Recovery Ventilation
  - Pump Variable Frequency Drive
  - Efficient Pumps
  - Revised specs for DHPs and ASHPs
  - Secondary Windows
  - Floating Refrigeration Pressure Controls
  - Refrigerated Display Case Door Retrofit

Future Commercial Priorities

- **Growing reliance on Commercial Sector to deliver EE savings:**
  - Achieve 100.1 aMW from program savings and 6.8 aMW from NEEA market transformation over the next five years
  - Lighting contributes greatest aMWs
- **Priorities include:**
  - New measures in HVAC, refrigeration and energy management
  - Incentive increases for HVAC and lighting including controls
  - Midstream and hard-to-achieve savings types
  - Research for emerging technologies, i.e. Commercial HPWHs

Future savings are focused on delivering energy efficiency solutions through custom projects and emerging technologies.

Commercial Sector Engineering 2023 Initiatives

Delivering new measures and custom projects

Outreach to key partners:

- Schools Facility Managers
- Engineering Firms

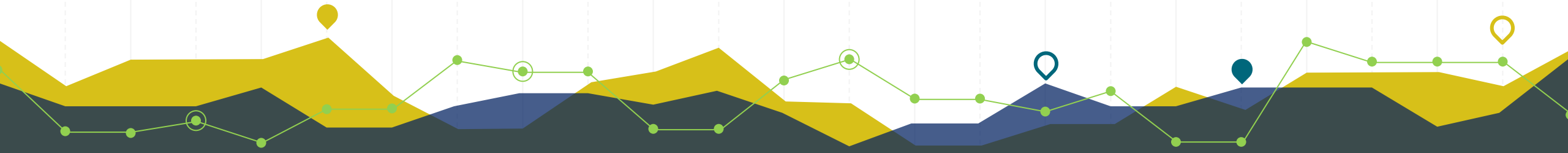
Introducing new measures:

- Strategic Energy Mgmt.
- Energy Project Manager
- Oct. 2023 IM Measures

Future EE opportunities:

- Emerging Technology Research
- Commercial HPWHs
- New HVAC options

Energy Efficiency in Schools – As Easy As 1-2-3



Outreach to school facility managers

Schools Are Important to the Commercial Sector

Using COVID-relief funds, the Salish Coast Elementary School in Port Townsend, WA combined funding sources to install a more efficient HVAC system. Jefferson PUD supported this project:

- $469K WA Dept. of Commerce funds;
- $425K COVID ESSER II funds;
- $680K Salish Coast School Bond funds; and
- $58K **Jefferson PUD** estimated incentive

- BPA engineers have completed **146** projects totaling over **20 million** kWh of savings.
- Schools projects are an opportunity to support local communities by cutting energy costs so funds can be reinvested in other school initiatives. **WIN-WIN**
- BPA CSEs help schools to complete EE projects by providing technical support and encouraging the combination of funding sources to s-t-r-e-t-c-h school budgets. Some upcoming opportunities include:
  - Remaining COVID funding
  - Inflation Reduction Act
  - Infrastructure Act
  - State De-carbonization Funding
  - State Public Building Funds

Elementary and Secondary School Outreach Initiatives

CSEs work with BPA utilities to identify opportunities to connect with schools across the region.

- Leveraged partnerships with existing professional educational organizations including the Washington State Association of Maintenance and Operations Managers (WAMOA).
  - Participated in joint presentations
  - Attended regional chapter meetings and annual conferences.
  - Identified an Oregon organization to begin outreach activities.
- Looking for other organizations to engage with across the region.

Where we start when coaching schools: Meet them where they are – One size does not fit all!

Lighting solutions
LED and lighting controls

Envelope upgrades
Windows
Doors
Insulation

Upgrade existing systems
Smart Thermostats
HVAC controls
Retro-commissioning

New systems
HVAC
Hot Water
EV Charging Stations

New Construction

Easiest → **Most Complex**

School Facility Managers

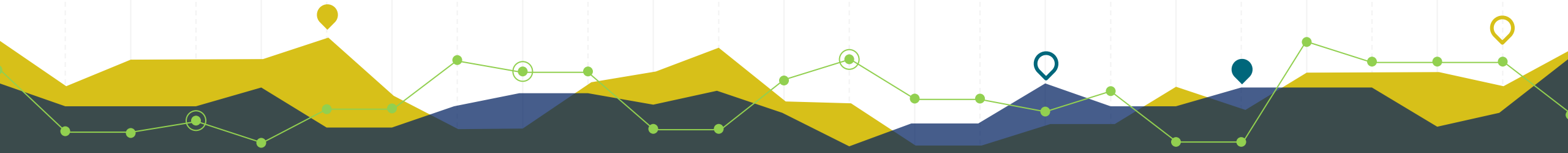
- Over the last year, School Facilities Managers have expressed interest in these measures:
  - Energy Project Manager
  - Strategy Energy Management
  - Performance Tracking
- The Energy Project Manager measure provides funding for additional staff resources to identify, design and deliver energy savings
  - Whether at a campus or district level, additional personnel to deliver energy savings is welcome.

WIN – WIN – WIN!

Future School Collaborations

- CSEs continue to connect with utilities to engage with school districts.
- Leverage existing organizations:
  - Continue with WAMOA regional meetings and annual conference
  - Engage with Oregon Association of Facility and Operations Managers for outreach in coming months
- Participation in annual association meetings in 2023-2024 school year and attend regional meetings.

New Outreach Opportunity – Engineering Firms



Conducting a pilot study to determine if there are opportunities to leverage engineering firms to increase custom projects

Work with Regional Engineering Firms

- BPA learned through the school outreach that many engineering firms are not familiar with EE programs
- Scheduled meeting with several firms to identify EE opportunities and educate program offerings for UES measures and custom projects
- Opportunity to explore new technologies and technical applications worked on by Engineering Firms

Recent successes include:

- Identified potential missed opportunities for custom projects
  - Whole school district retro-commissioning project
  - Near miss DHP retrofit
- Direct Funding Opportunity the BPA team identified additional unclaimed EE savings for several school projects

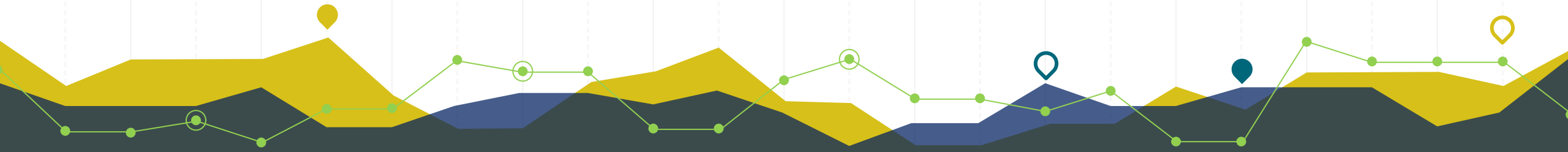
Outreach Activities Overview

- Hold regular meetings with field engineers staff
- Review current projects to identify collaboration opportunities
- Provide updates for new measures
- Identify Emerging Tech research opportunities

Future Collaboration Activities

- Continue regular meetings with interested firms
- Introductions to Customer Service Engineers and Utility staffs
- Sharing updates for new measures, technologies and technical applications

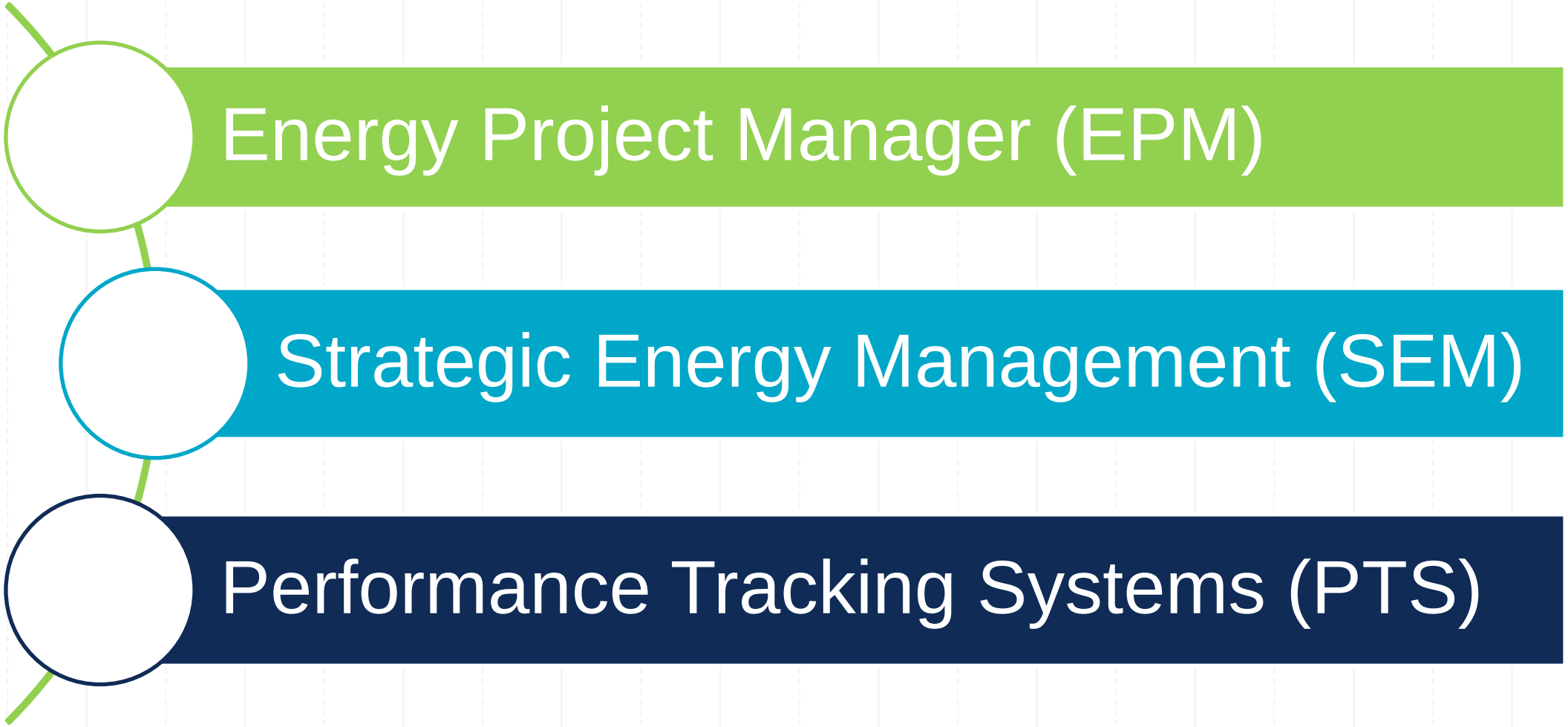
Learnings from Engagement



Several key priorities have emerged from this engagement

Key Future Collaboration Opportunities Identified by Schools and Engineering Firms

MEASURES



Energy Project Manager

Modeled after the Industrial EPM measure.

- Introduced to provide additional funding for staff to support EE.
- Reimburses the cost of personnel to support EE planning and implementation.
- Program requires pre-approval of EE activities and ongoing tracking to achieve EE targets.
- Reimbursement: $ .025/kWh energy savings

Provides financial support for additional staffing is seen as a WIN-WIN-WIN!!!

Strategic Energy Management

Modeled after the Industrial EPM measure.

- Participation pathway includes:

1. Develop strategic energy practices
2. Establish energy savings targets
3. Leverage data to make informed decisions
4. Measurement and verification
5. Review effectiveness of practices

Proposed as a package of measures to support EE including EPM

Performance Tracking Systems

Modeled after the Industrial EPM measure.

- The PTS measure provides a payment to help with:
  - Installation and maintenance costs associated with the verified installation of metering hardware; and/or
  - Electric-energy data collection software that tracks key variables used to develop a meaningful, normalized energy - use profile.

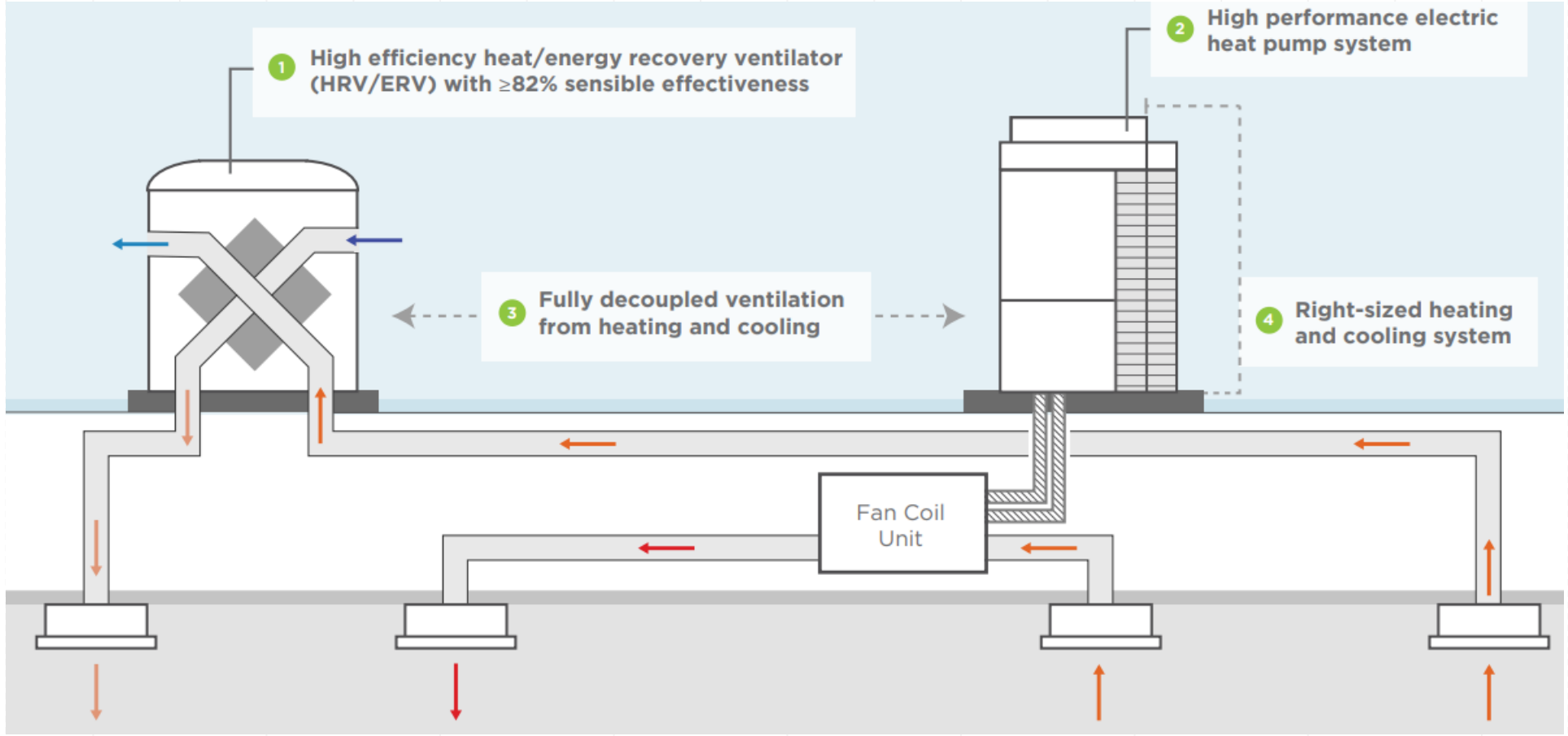
Proposed as a package of measures to support EE including EPM and SEM.

October 2023 New Commercial Measures

- Heat Recovery Ventilation
- Efficient Pumps
- VFD on Pumps
- Revised Specification for DHP
- Revised Specification for ASHP
- Secondary Windows
- Refrigerated Display Case Door Retrofit
- Floating Refrigeration Pressure Controls

Heat Recovery Ventilation

Heat Recovery Ventilation



Courtesy of NEEA

Heat Recovery Ventilation

Heat Recovery Ventilation
Programmatic Approach and Requirements

Retrofits: Everywhere
New construction: Everywhere but WA (required by code, mostly)

Two Tiers:

Tier 1: 70% SRE at 75% of rated airflow
Tier 2: minimum 82% SRE at 75% of rated airflow

Other requirements:
Retrofit: Electric heat baseline, no HRV, existing ventilation present

Efficient Pumps

PEI

Pump Energy Index (PEI)

To establish baseline pump efficiency requirements, over more than 20 manufacturers submitted data on the five pump types, which resulted in more than 3,000 unique pumps. The pump data submitted was flow, head, power and efficiency. The DOE used this information to determine the baseline standards and life cycle cost (LCC) analysis.

A new metric has been established with this DOE rulemaking: the pump energy index (PEI). There are two types: PEICL (constant load) and PEIVL (variable load). PEICL applies to pumps sold without continuous or noncontinuous controls. PEIVL applies to pumps sold with either continuous or noncontinuous controls. Both PEICL and PEIVL describe the weighted average performance of the rated pump at specific load points, normalized with respect to the performance of a minimally compliant pump without controls. The performance of a minimally compliant pump without controls establishes the standard pump energy rating, PER or PERSTD. The PEI is simply a particular pumps energy rating divided by the baseline energy rating. The data gathered from the 3,000 pump samples resulted in what is called C-values (Image 2).

$$PEI_{CL} = \frac{PER_{CL}}{PER_{STD}} \text{ (constant load)}$$

Equation 1

$$PEI_{VL} = \frac{PER_{VL}}{PER_{STD}} \text{ (variable load)}$$

The baseline levels were taken at the 25th percentile (column EL 2). All pumps below the 25th percentile will not be in compliance with the standard. When calculating both PEICL and PEIVL, those values shown in column EL 2 are to be used for PERSTD. The PEI is the ratio of a pump's energy rating divided by the energy rating of a minimally compliant pump (Equation 1).

A PEI greater than 1.00 indicates that the pump consumes more energy than allowed by the DOE's energy conservation standard and does not comply. A value less than 1.00 indicates that the pump consumes less energy than the level required by the standard and is in compliance.

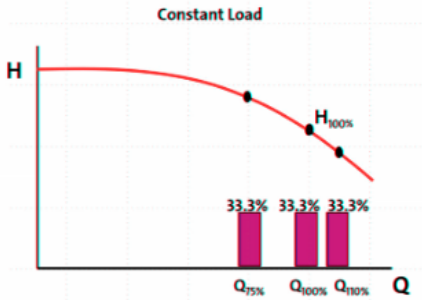


Image 3. Weighted average for constant load is taken at 75 percent, 100 percent and 110 percent of BEP flow rate

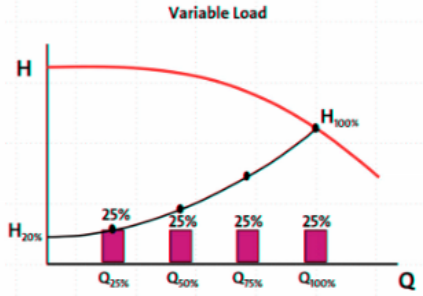


Image 4. Weighted average for variable load is taken at 25 percent, 50 percent, 75 percent and 100 percent of BEP flow rate

Efficient Pumps (C&I)

Size Limit < 200hp
Based on RTF UES Measure for Efficient Pumps

Retrofits: Everywhere
New construction: Everywhere

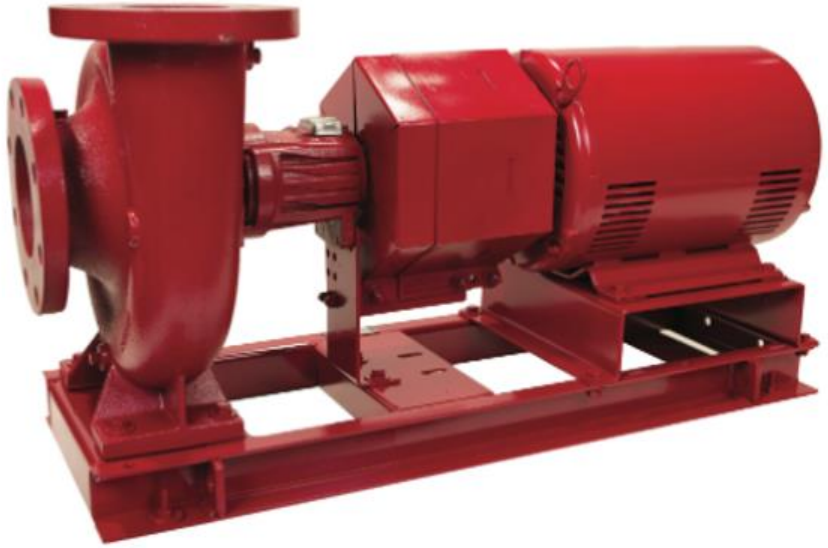
Site specific savings via calculator

Other requirements:
Must have PEI Label

PUMP DATA

PUMP DATA				
Do you know information on the existing pump?	No			
	Existing Pump Info (if available)		**Proposed Pump Info**	
Pump Motor Size (HP)	10		10	10 to 24.9 HP
Pump Motor Speed (RPM)	3600		3600	
Pump Type	In-line		In-line	
Pump Make	XYZ		XYZ	
Pump Model	ZYX		XYZ	
Design Flow (GPM)	X		X	
Design Total Dynamic Head (ft)	X		X	
PEI Rating (from specification sheet)	0.5		0.4	
Current Practice Baseline PEI Rating	0.46			
Delta PEI Rating			0.06	
COST DATA				
Actual Pump/Motor Cost (including taxes, etc.):	$ 5,000.00			
Estimated Incremental Project Cost Metric:	$ 5.87	$/HP/deltaPEI		
Estimated Incremental Project Cost:	**$ 352.07**			
Please upload invoice into BEETS during project submittal.				
INCENTIVE CALCULATIONS				
PEI Energy Savings Metric	20.60327194	kWh/HP/deltaPEI/100		
Total Annual Site Energy Savings	**1,236**	kWh/yr	**Busbar Factor**	
Total Annual Busbar Energy Savings	**1,374**	kWh/yr	**1.11183**	New Busbar Factor (post Oct 1, 2023)
Inventive Rate	**$ 0.33**	per kWh		
Estimated Incentive	**$ 453.57**	Based on kWh savings		
Utility Cap	$ -	(optional)		
Eligible Incentive	**$ 453.57**	Lesser of Estimated Incentive or Project Cost		

VFD on Pumps



[Bell & Gossett 1.5BC e-1510 2 HP ODP Pump | National Pump Supply]

[Variable frequency drive | Grundfos]

VFD on Pumps

Size Limit < 100hp

Retrofits: Both constant or variable load
New construction: Both constant or variable load

Other requirements:
Throttling or bypass control must be removed/disable
New construction applications limited to those not required by code

Revised Specification for DHP

Current State

RETROFIT and UPGRADE must meet spec

- Non Ducted: 11.0 HSPF or 10.4 HSPF2
- Ducted or Mixed: 10.0 HSPF or 9.4 HSPF2

Future State

RETROFIT: Any DHP!

UPGRADE: must meet spec, can be combined with RETROFIT measure

- Non Ducted: 11.0 HSPF or 10.4 HSPF2
- Ducted or Mixed: 10.0 HSPF or 9.4 HSPF2

Revised Specification for ASHP

Current State

RETROFIT and UPGRADE must meet spec

EQUIPMENT SIZE (COOLING CAPACITY; BTU/H)	MODE	SUB-CATEGORY OR RATING CONDITION	EFFICIENCY REQUIREMENT
< 65,000	Cooling	Split System and Single Package	15.0 SEER or 14.3 SEER2
	Heating	Split System and Single Package	8.5 HSPF or 7.2 HSPF2
≥ 65,000 and < 135,000	Cooling	Split System and Single Package	12.4 IEER
	Heating	47°F db/43°F wb Outdoor Air	3.4 COP
		17°F db/15°F wb Outdoor Air	2.3 COP
≥135,000 Btu/h and <240,000 Btu/h	Cooling	Split System and Single Package	11.6 IEER
	Heating	47°F db/43°F wb Outdoor Air	3.3 COP
		17°F db/15°F wb Outdoor Air	2.25 COP

Future State

RETROFIT: Any ASHP!

UPGRADE: must meet spec, can be combined with RETROFIT measure

EQUIPMENT SIZE (COOLING CAPACITY; BTU/H)	MODE	SUB-CATEGORY OR RATING CONDITION	EFFICIENCY REQUIREMENT (UPGRADE)
< 65,000 Btu/h	Heating	Split System	8.1 HSPF2 or 9.5 HSPF
		Single Package	7.0 HSPF2 or 8.2 HSPF
≥ 65,000 Btu/h and < 135,000 Btu/h	Heating	47°F db/43°F wb Outdoor Air	3.5 COP
≥ 135,000 Btu/h and < 240,000 Btu/h	Heating	47°F db/43°F wb Outdoor Air	3.5 COP
> 240,000 Btu/h	Heating	47°F db/43°F wb Outdoor Air	3.4 COP

Refrigerated Display Case Door Retrofit

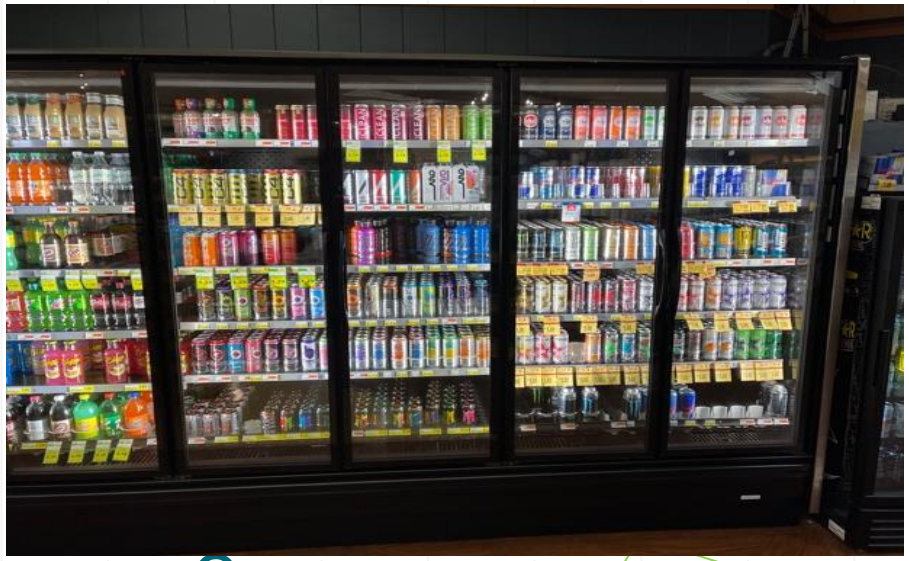
Pre-conditions:

- Existing display case must be open (i.e. not have doors).
- Existing display case must be served by a remote refrigeration system (i.e. not self-contained).

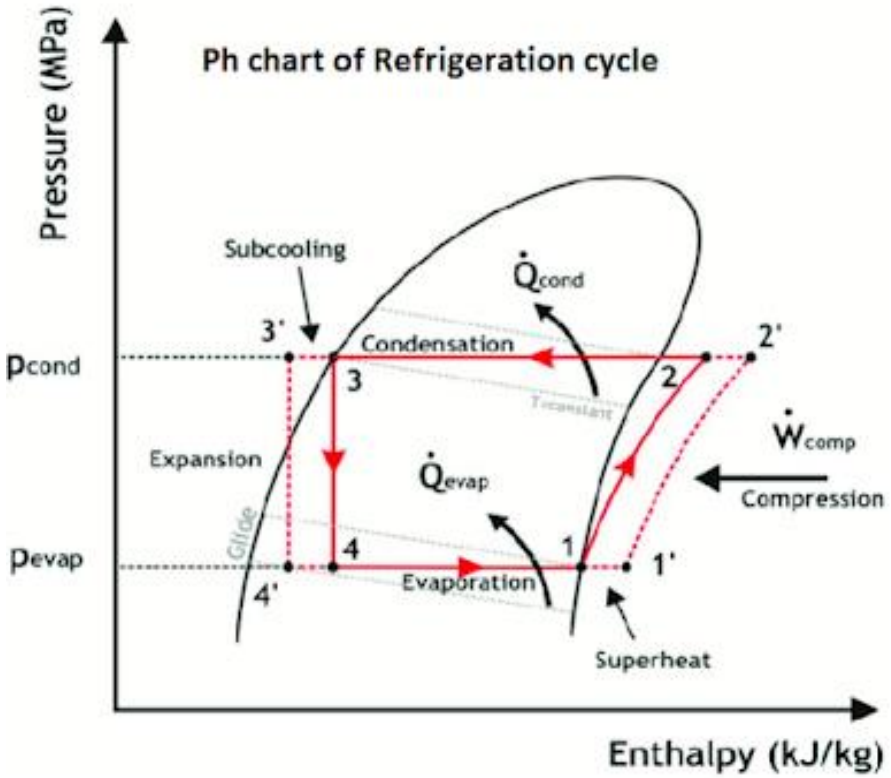
Put a Door on it!

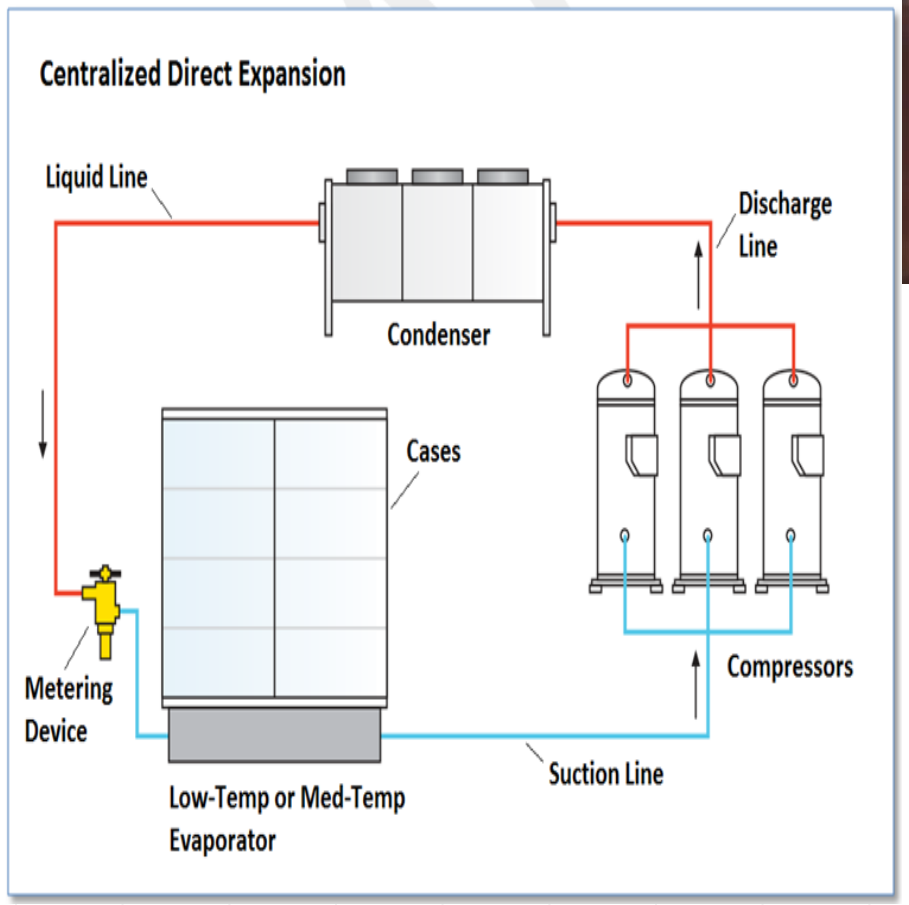
Post-conditions:

- Display case must have double or triple pane glass doors.
- Replacing an open case with a new case with double or triple pane glass doors is eligible.



Refrigeration Floating Pressure Controls





Refrigeration Floating Pressure Controls

This measure is available for:

Commercial sector only.

Retrofits only.

Applies to **multiplex refrigeration systems** (i.e. compressors operating in parallel) only.

The measure unit is evaporator design load in MBH.

Requires BPA Refrigeration Controls Calculator

Floating Head Pressure Control

Pre: Fixed and >80F

Post: Floating and <70F

Floating Suction Pressure Control

Pre: Fixed

Post: Floating

Secondary Windows

- Increased thermal insulation
- Decreased infiltration
- Increased occupant comfort and noise reduction
- Less expensive than full window replacement
- Minimal effect on existing window aesthetics (e.g., historic buildings)

Secondary Windows

Baseline:

Single Pane Windows

Electric Heating

Proposed:

($SHGC_{Overall}$) of 0.55 or less

(U_{COG}) less than or equal to 0.20

Product Specification Sheet
(also referred to as cut sheet)
that documents SHGC and U-factor

Questions

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Thank you for attending

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