January 12, 2017

Industrial Advisory Committee Meeting First Quarter 2017



Agenda Review

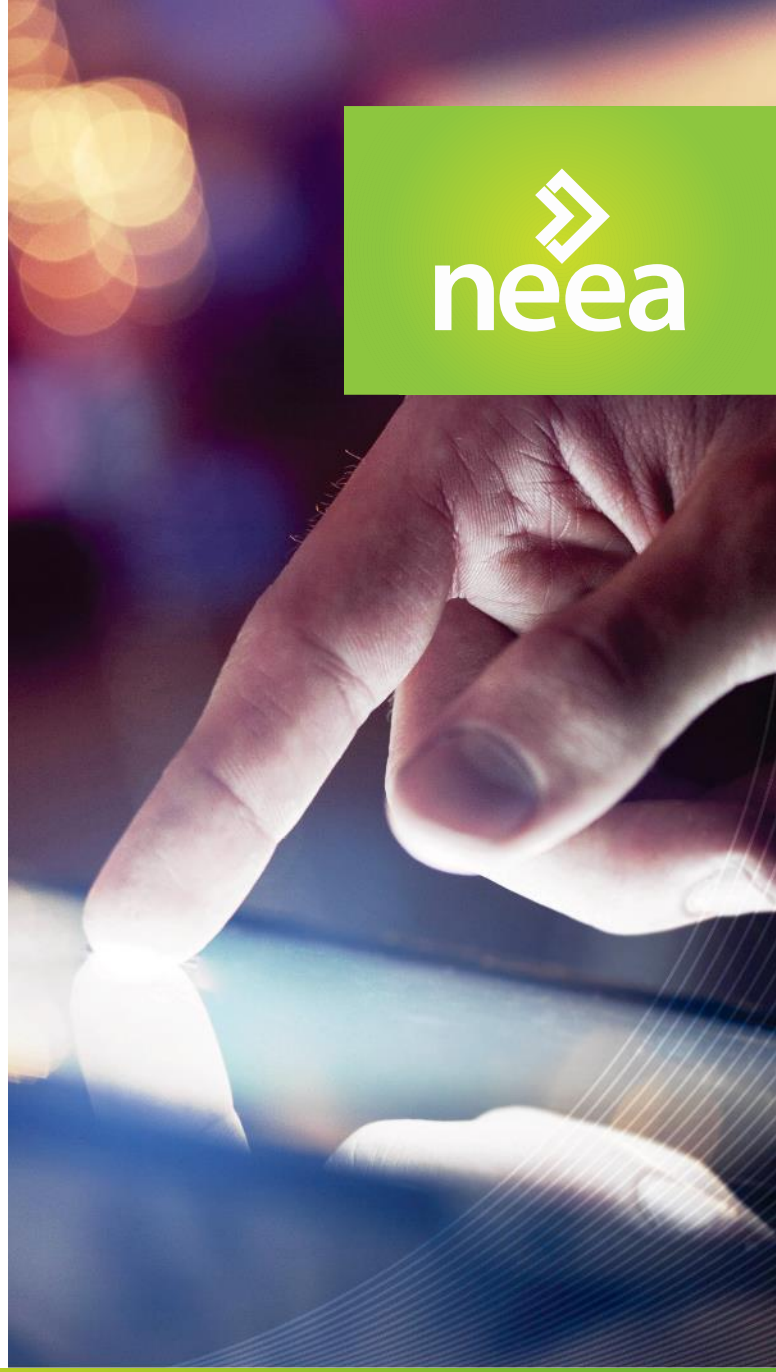
8:30-8:40 am	**WELCOME** Introductions and Agenda review *Desired Outcome*: *Information; agenda approval*	Eugene Rosolie Sepideh Rezania	1-2
8:40-9:15 am	**Emerging Tech Update/New Ideas Forum** • ET Update • Extended Motor Products Labeling *Desired Outcome:* *Information, Input*	Mark Rehley Geoff Wicks	3
9:15:10:00 am	**IAC Member Roundtable** *Desired Outcome:* *Awareness of current activities and issues in the region*	IAC Members	
10:00-10:35 pm	**C&I Strategic Energy Management Infrastructure** • SEM Hub Debut *Desired Outcome:* *Information, Input*	Josh Pelham	5
10:35-10:50 pm	**Break**	All	
10:50-12:30 pm	**RETA-CRES Utility Work Group** • Update on CRES certifications and NEEA/RETA progress and activities • Linkages between Utility Programs and CRES certification • Review 2017 Activities *Desired Outcome:* *Participants understand RETA-CRES initiative activities for 2017 and provide input to for support CRES needs in their program/portfolio once NEEA support ends*	Warren Fish	6-7
12:30-12:40 pm	**Public Comments**		
12:40-12:50 pm	**New Follow-up Actions and Feedback**	Eugene Rosolie	
1:00 pm	**Adjourn**		

Industrial Advisory Committee

Emerging Technology Update January 2017

Mark Rehley

Geoff Wicks



Efficient Commercial & Industrial Pumps

Erin Hope
Bonneville Power Administration
Northwest Industrial Advisory Committee
January 12th, 2017

Background
Extended Motor Products Labeling Initiative (EMPLI)

- Aim is to promote the development and use of efficient “extended motor products” (pump, fan, compressor, etc.)
  - Key strategy is labeling
- Collaborative effort founded in 2013
  - ACEEE
  - Trade associations: NEMA, HI, AMCA, CAGI
  - Utilities & program administrators: PG&E, SCE, ConEd, Northeast Utilities, National Grid, ETO, BPA, NEEA
  - Manufacturers
- PNW Regional EMPLI Efforts
  - NEEA/BPA are pursuing energy savings based on EMPLI
    - » C/I Pumps are the first extended products to be federally regulated and labeled
      - Federal standards and associated support materials provide the basis to estimate energy savings
        - » Standard takes effect in 2020
        - » Standard will eliminate about 25% of pumps on the market
    - » Rulemaking is in progress for Circulator pumps
    - » Pumps for now, more to come later!

DOE Pump Regulations

- Regulations issued in January 2016
- Covers 5 category of rotary dynamic (centrifugal) pumps
  - 1 to 200 Horsepower
  - Clean water only
    - » Does include glycol systems
- Requires all covered pumps to be tested and the rating on the nameplate starting in January 2020
  - Pump must be better to DOE's minimum rating
  - Allows manufactures to include the pump rating prior to January 2020
  - Rating must follow the required test and labeling procedures
  - Pumps not tested, labeled, and reported to DOE prior to January 2020 cannot be sold in the USA starting January 1st, 2020

DOE Test Procedure Pump Rating:
(This is the Basis for the RTF UES Estimate)

Pump Energy Index (PEI) is the ratio of average power of the pump being rated to the average power of the (hypothetical) minimally compliant pump:

$$PEI_{Pump} = \frac{PER_{Pump}}{PER_{STD}}$$

- *PER* (Pump Energy Rating) is the average Test Procedure power
  - Two flavors of PER and PEI, depending on pump controls
    - » **CL**: PER_{CL} and PEI_{CL} for Constant Speed Pumps (with or without motor)
      - 3 test points, equally weighted: 75%, 100%, 110% of BEP flow
    - » **VL**: PER_{VL} and PEI_{VL} for Variable Speed Pumps (with motor and with "continuous or non-continuous controls")
      - 4 test points, equally weighted: 25%, 50%, 75%, 100% of BEP flow
  - PER_{STD} (Baseline set by DOE) is the same, within same equipment class and serving the same hydraulic load, for CL and VL
    - » PEI_{CL} might be 0.97
      - Starting in 2020, federal standard requires all pump systems to have PEI ≤ 1.00
    - » PEI_{VL} might be 0.50

BEP = best efficiency point

Pump Categories

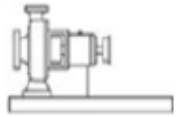
Included

- Clean Water Pumps
- BEP Pump Input Power – 1 – 200 Hp
- BEP flow – 25 gpm or greater
- BEP head – 459 ft or less
- Temperature - -10 – 120 °C
- Speed – 1800 & 3600 Nominal

Excluded

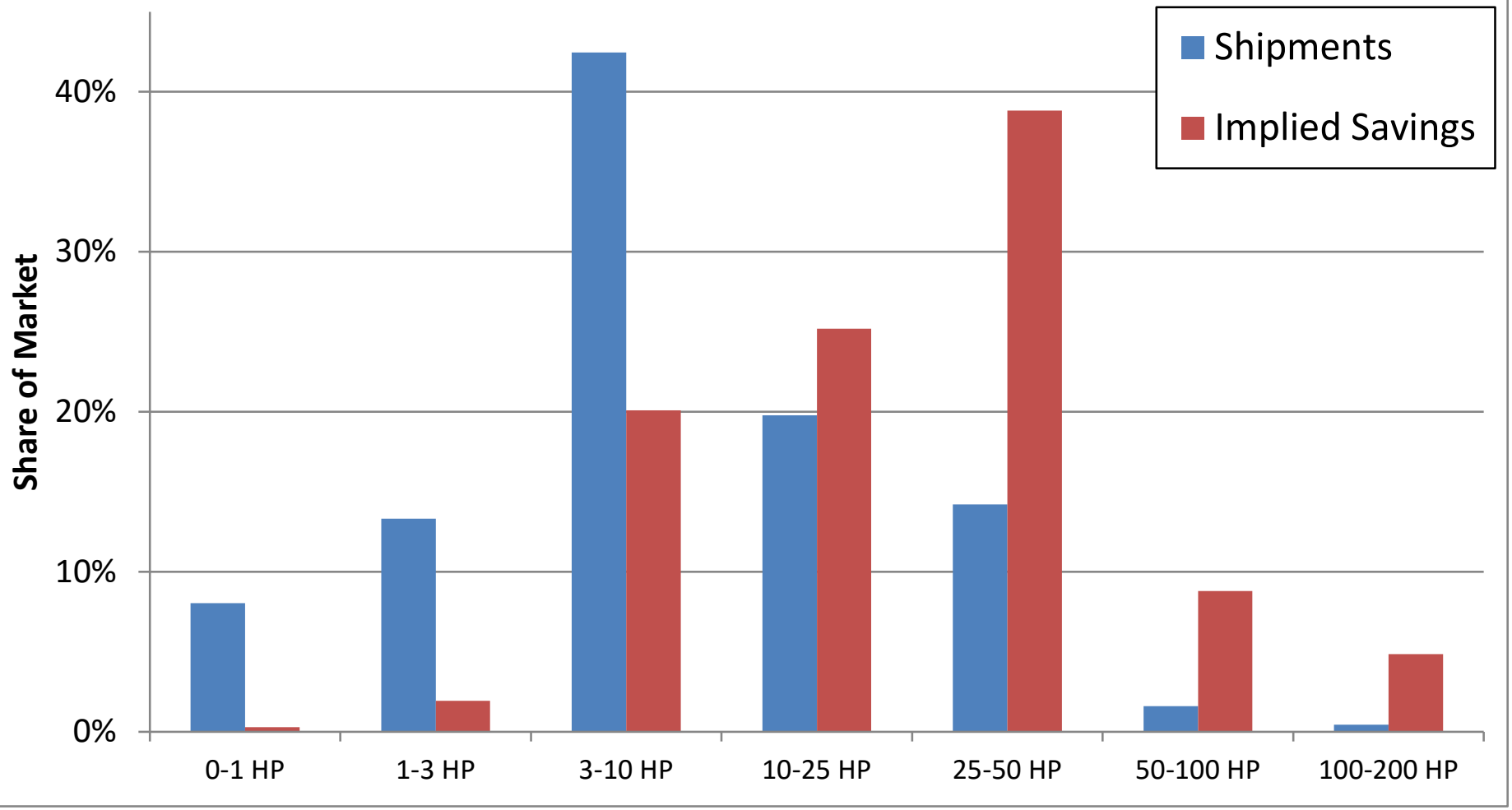
- Non-clean water designs (API, ASME, Slurry, Wastewater, Etc.)
- Mixed & Axial Flow (Ns greater than 5000)
- Nuclear controlled
- Mil Spec
- Sealless
- Fire Pump
- Sanitary (3-A std)
- Self Priming
- Prime assist
- Circulators
- Pool Pumps

http://www.pumps.org/DOE_Pumps.aspx

Diagram	Nomenclature (DOE)/[Industry]
	End Suction Frame Mount (ESFM) [OH0, OH1]
	End Suction Close Coupled (ESCC) [OH7]
	In-line (IL) [OH3, OH4, OH5]
	Radially Split multi-stage vertical in-line diffuser casing (RSV) [VS8]
	Vertical Turbine Submersible (ST) [VS0]

Market Distribution by Pump Size

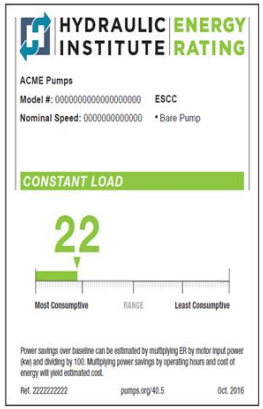
(includes ESCC, ESFM, IL; does not include RS-V and VT-S)



3500 UES Measures

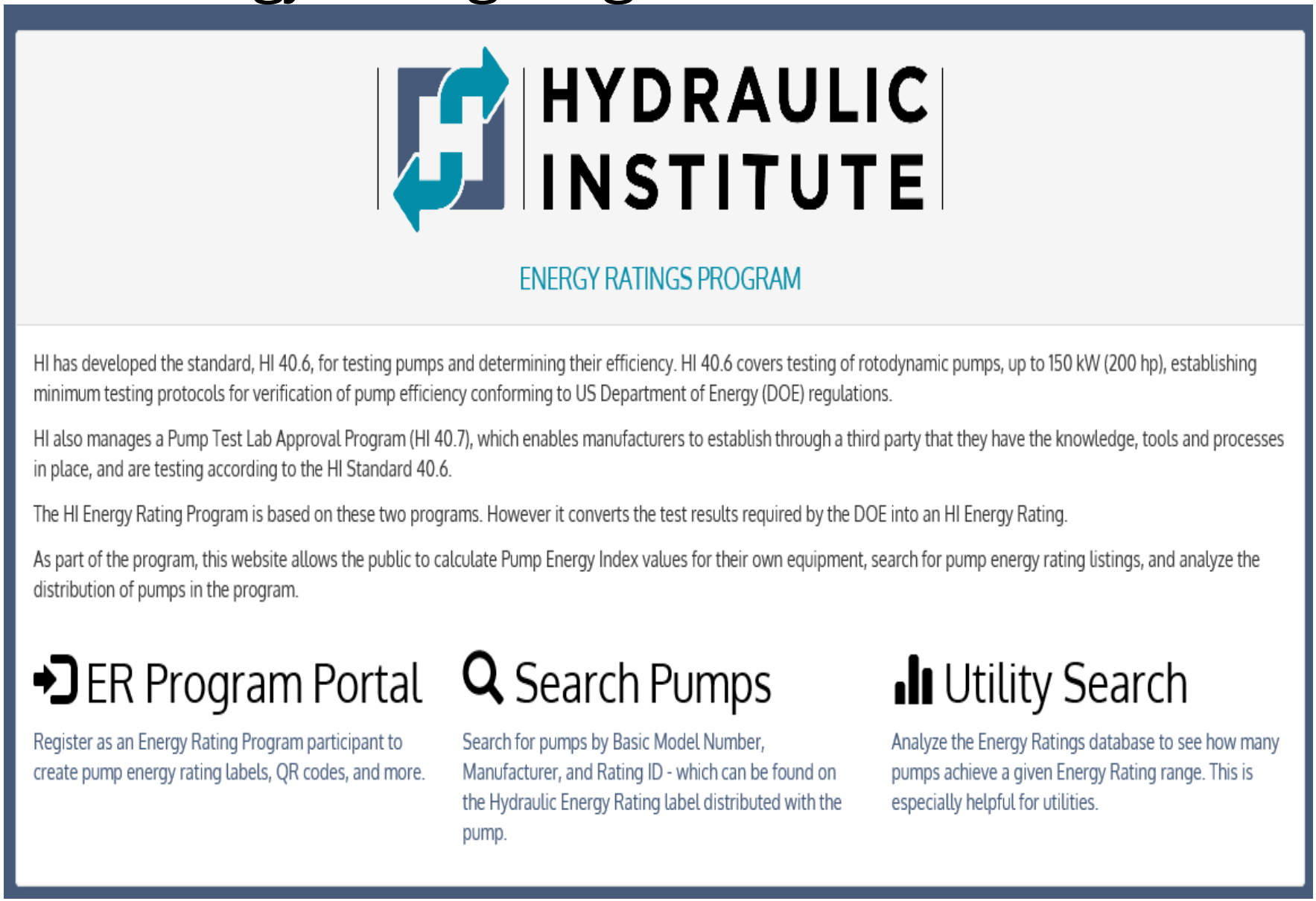
Measure Identifier	Number of Identifiers	Specific Identifiers	Reason for Measure Identifier
Pump Speed Control	3	CL->CL VL->VL CL/VL->VL*	Different baseline & efficient-case PEI's cause different savings * CL/VL->VL allowed only if a) code does not require variable speed, and b) existing pump system is not variable speed
Pump Efficiency Level	~10	Example: ER 11 (or PEI 0.98)* ER 12 (or PEI 0.97) ... ER19 (or PEI 0.90 or less)	Different efficient-case PEI's cause different savings * CL->CL and VL->VL: Starts at 2 ER points (or 0.02 PEI points) better than baseline; CL/VL->VL: Starts at 2 ER points (or 0.02 PEI pionts) worse than baseline
Horsepower	3/4	Constant Speed: 1 to 2.9 HP; 3 to 19.9 HP; 20 to 200 HP Variable Speed: 1 to 1.9 HP; 2 to 2.9 HP; 3 to 5.9 HP; 6 to 50 HP; 50 to 200 HP	Constant Speed: Incremental Cost Variable Speed: Market baseline PEI varies by size (also cost)
Pumping Application	3	Commercial Agricultural Industrial (includes municipal)	Different hours and load profiles cause different savings
Pump Class	10	ESCC 1800; ESFM 1800; IL 1800; RSV 1800; ST 1800 ESCC 3600; ESFM 3600; IL 3600; RSV 3600; ST 3600	Different baseline PEI's cause different savings

Hydraulic Institute (HI) Pump Testing and Labeling



- HI testing methods form basis for DOE Test Procedure
  - HI "Methods for Rotodynamic Pumps Efficiency Testing" 40.6-2014
- HI is also developing rating and labeling program based on DOE test procedure – Program launch is Q1 of 2017
  - Requires testing in certified laboratory
    - » HI "Program Guide for Pump Test Laboratory Approval" 40.7
    - » Third-party inspector/auditor (Intertek) approves lab's ability to test performance of pumps
      - – Lab is certified to adhere to international test lab standard concerning test measurement equipment (ISO 17025)
  - Certified pump data will be available in HI database
  - Provides option to consider/rate pumps, motors, and drives that are paired by distributors in the field

HI Energy Rating Program – Public Database



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Questions?

Member Roundtable

SEM Infrastructure

SEM Hub Project Update

Industrial Advisory Committee
January 12, 2017

Warren Fish, Program Manager
Josh Pelham, Marketing Manager



Points to Cover

- SEM Hub: What is it and Why?
- Approach Recap
- Demo
- Looking Ahead

What is it and Why?

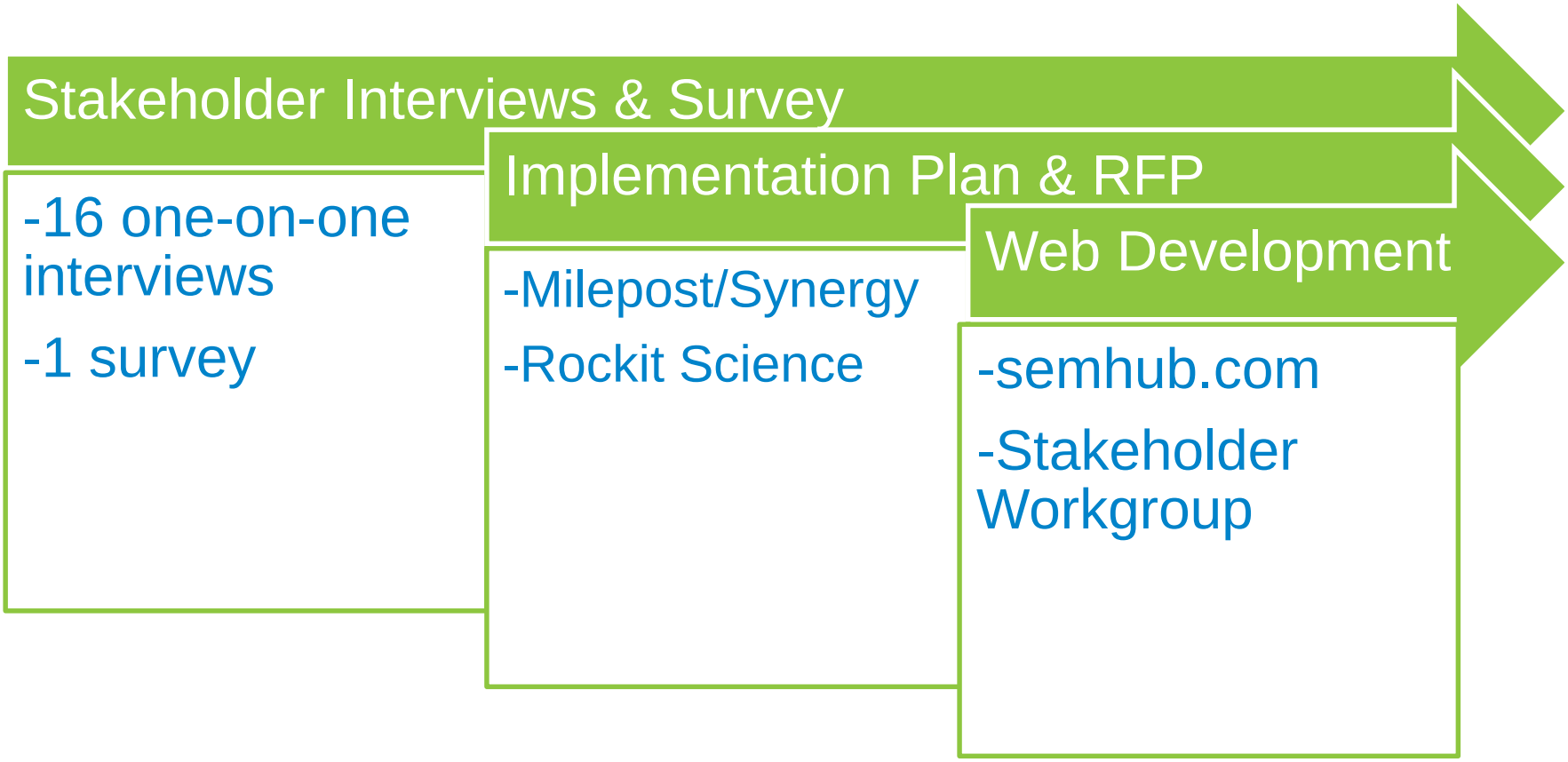
SEM Hub

- SEM Hub is a web-based resource for regional energy efficiency stakeholders
- SEM Hub supports SEM efforts in the region by offering:
  - an easily searchable resource library;
  - an updated and customizable SEM learning platform;
  - communication tools to allow practitioners to easily share SEM best practices.

Goals

- Support effectiveness and cost-efficiency of SEM programs through knowledge sharing.
- Help to achieve consistency in how SEM is communicated in the region

SEM Hub Development Process




semhub
RESOURCES FOR TODAY'S
ENERGY MANAGEMENT

Looking Ahead

- Continue formal UAT with workgroup and other stakeholders (optimize user experience)
- Complete the online-sem.com rebuild in Docebo (LMS) and integrate
- Potentially rebuild the Northwest EMA tool?
- Continue to add useful content

Questions?

TOGETHER We Are Transforming the Northwest

Avista
Bonneville Power Administration
Cascade Natural Gas Corporation
P.U.D. Chelan County
Clark Public Utilities
Cowlitz PUD
EnergyTrust of Oregon
Grant PUD
Idaho Power An IDACORP Company
NorthWestern Energy
NW Natural
Pacific Power
PGE
PSE Puget Sound Energy
Seattle City Light
Snohomish County PUD Public Utility District No. 1
Tacoma Power Tacoma Public Utilities

Break

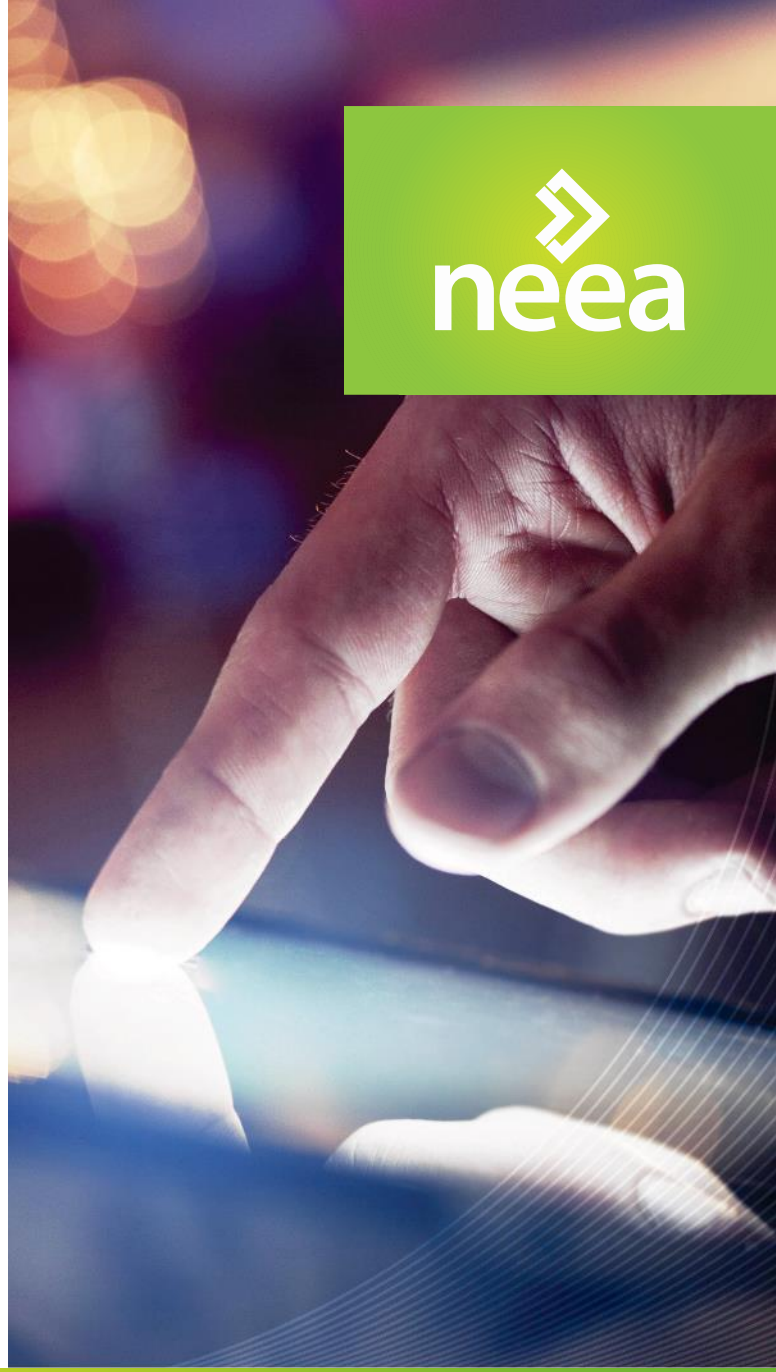
CRES

RETA Certified Refrigeration Energy Specialist (CRES)

Utility Working Group & IAC

January 12, 2017

Warren Fish, Program Manager



Today's Meeting – Purposes and Outcomes

Purposes

- CRES recap & certification update
- Update on CRES review course strategies
- Overview of RCD
- Review strategies for CRES support after 2017

Outcomes

- Shared understanding of CRES & its status
- Shared understanding of review course intent and strategy for providing
- Shared understanding of how RCD operates
- What CRES looks like after NEEA support ends

Previous & Current Meetings – Purposes/Outcomes

April 2015	July 2015	October 2015	Jan. 2016	July 2016	Jan. 2017
Purpose • Establish CRES Utility Work Group (UWG)	**Purpose** • CRES recap & update • Share Market Assessment results	**Purposes** • CRES recap & update • Certificants & activities • Certification barriers & resources to remove • CRES & utility program synergies	**Purposes** • CRES recap & update • Update on resources to support CRES • Discuss CRES & utility program synergies	**Purposes** • Energy 350 team introduction • CRES recap & update • Update on resources to support CRES • Review how barriers are being addressed	**Purposes** • CRES recap & certification update • Update on CRES review course strategies • Overview of RCD • Review strategies for CRES support after 2017
Outcome • UWG Charter and shared commitment to coordinate on CRES to understand and capitalize on synergies with utility programs	**Outcome** • Shared understanding of CRES & its status • First meeting NEEA, UWG & RETA, • Market Assess- ment confirmed CRES appeal & certif. barriers	**Outcome** • Shared understanding of CRES & its status • Shared understanding of resources to be deployed to address certification barriers • UWG members to think about CRES/utility program synergies	**Outcome** • Shared understanding of CRES & its status • Shared understanding of resources to be deployed to address certif. barriers • Shared understanding of opportunities for linkages/ synergies between CRES & utility programs	**Outcome** • Shared understanding of CRES & its status • Shared understanding of CRES evaluation • Shared understanding of resources to be deployed to address certification barriers	**Outcome** • Shared understanding of CRES & its status • Shared understanding of review course intent and strategy for providing • Shared understanding of how RCD operates • Group discussion of what CRES looks like after NEEA support ends

CRES Achievements to Date

Certified Refrigeration Energy Specialist (CRES)

Energy Efficiency certification for individual industrial refrigeration professionals

Offered by **Refrigerating Engineers & Technicians Association** (RETA)

CRES will be **ANSI accredited**

Complements **utility programs**

CRES Statistics: Overview January 2017

140 applications **submitted**

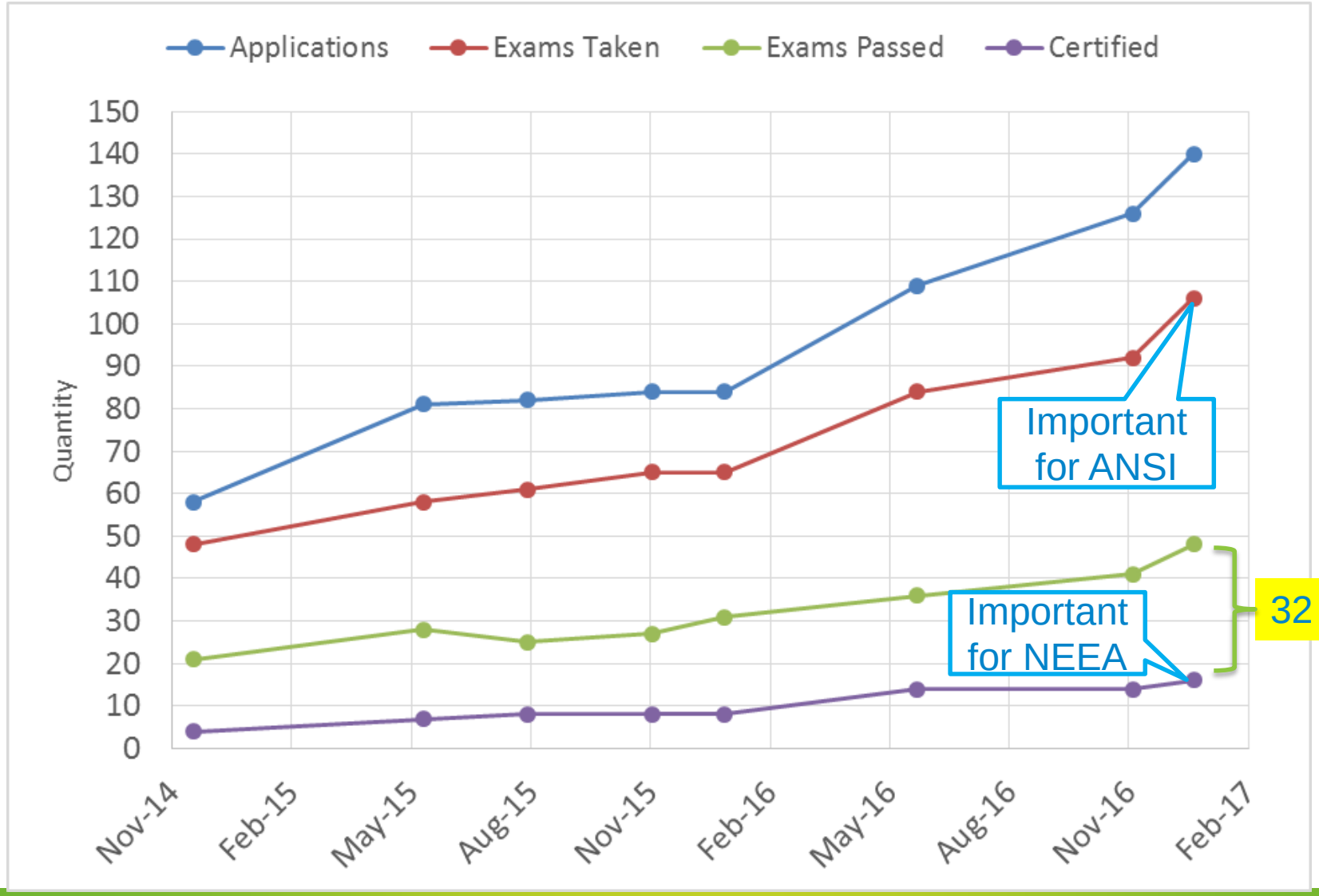
106 **exams** taken

45 **% pass** rate

16 **CRES Certified**

10 in the **Northwest**

CRES by the Numbers



Approaches to Closing the Gap

- Better preparing potential certificants through review courses
- Repeated presentations about activity simplicity
- Aggressive follow-up after passing exam
- Selling value proposition of CRES certification
- Working with RETA to fine tune requirements

2016 CRES Activity Overview

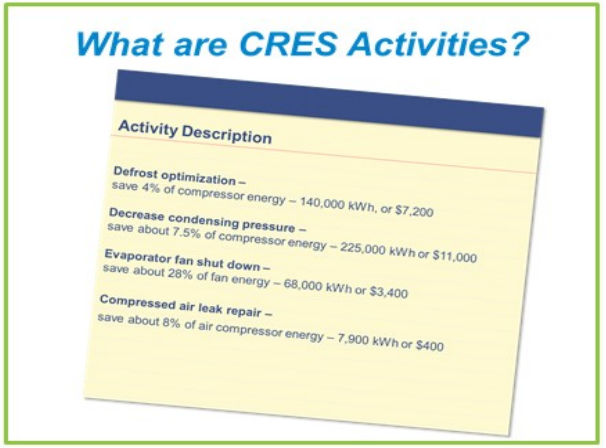
- *RETA national conference*
- *RETA chapters – presentations & material*
- *RETA Breeze articles*
- *Trade association partnerships*
- *Support RETA education committee*
- *Review courses in Wilsonville & Yakima*

NEEA Presence at RETA National

RETA Chapter Packets

Example CRES Presentation

All chapters will receive a CRES overview presentation



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Important to provide content and send unified message to all chapters regarding CRES

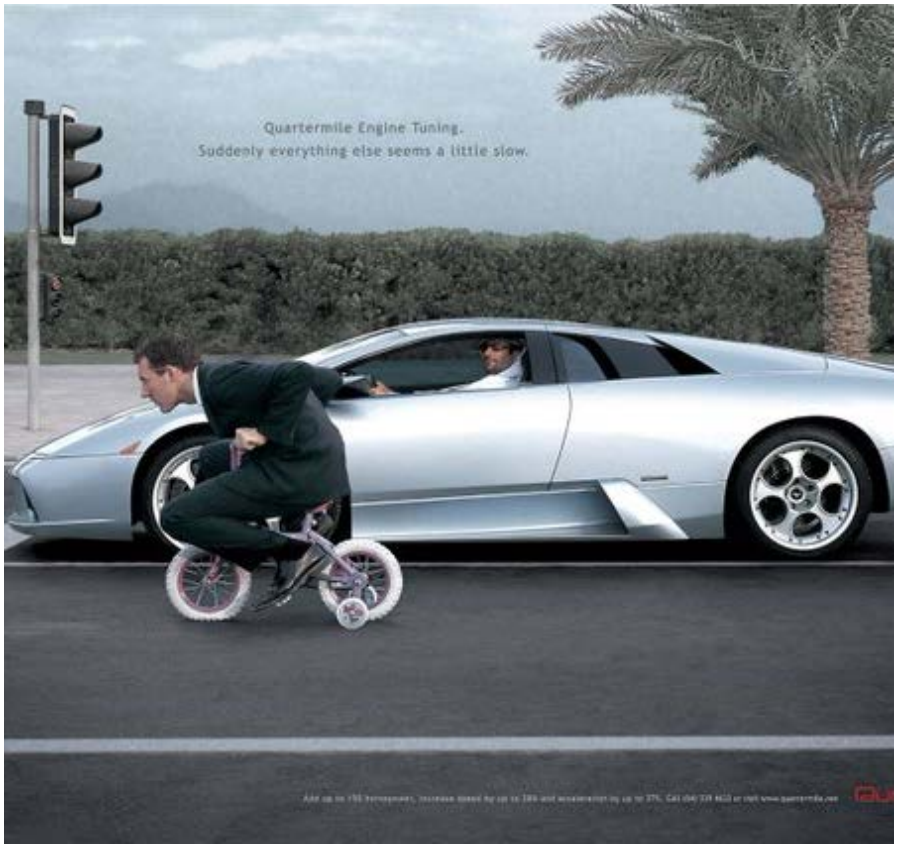
How to Grow It?

- Make **Value** of CRES Clear to Different Audiences

Value Proposition to Individual

- ✓ Demonstrates interest in operations: make the case for promotions and compensation
- ✓ Professional development: complements other training
- ✓ Sets you apart as a refrigeration and energy reduction expert
- ✓ Use wins from low- and no-cost activities, and efficiency incentives to get larger projects done
- ✓ RCD ties CRES activities to you as a RETA member

Value Proposition to Company



- ✓ Offers competitive advantage
- ✓ Enhances production while maintaining safety and reliability
- ✓ Lowers operating costs
- ✓ Improves equipment longevity

Marketing Efforts in 2016

RETA BREEZE

Refrigerating Engineers & Technicians Association 2016 Issue #6 (November / December)

Energy Efficiency Mythbuster: Lower Isn't Always Better

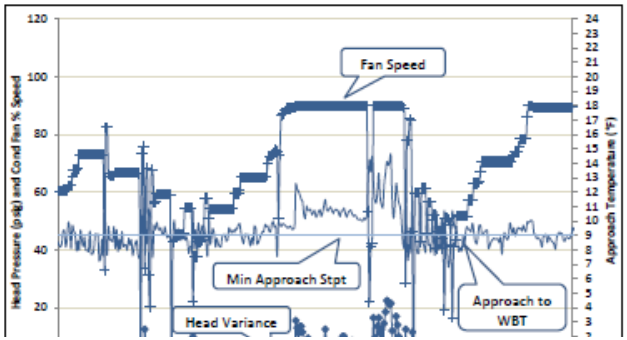
By Phillip McNamara, Engineering Manager – Energy 350

When discussing energy efficiency in refrigeration systems, the mantra is typically "lower lift equals lower energy". However, in some cases, lowering energy use in one area of the system means a greater system wide energy use. For example, the energy penalty required on other parts of the system to achieve a lower lift across the compressors is greater than the energy reduction at the compressors. Here's an overview of a case exemplifying this situation, and our recommendation for an alternative pathway for savings.

System Example

The installed system was upgraded to allow floating head pressure controls based on a user defined wet bulb approach set point. The system was originally set to operate with an approach set point temperature of 9°F between ambient wet bulb and saturated condensing temperature. This was done with the intention of the lower condensing pressure resulting in energy savings at the compressors. However, it was observed that during periods of low wet bulb (but not low enough to achieve minimum head pressure), the condenser fans were operating at higher speeds than expected. Review of trended data from the control system showed that the 9°F approach was not able to be achieved, and the fans were operating at an unnecessarily high speed as a result. This is because the fans were trying to attain a head pressure that was unattainable given the effectiveness across the heat exchange area at the evaporative condenser due to the ambient wet bulb temperature.

Note that in the chart below, the fan speed is highest at night, when wet bulb is lowest. This is a result of attempting an approach that the condenser cannot achieve under these conditions.



INSIDE THIS ISSUE

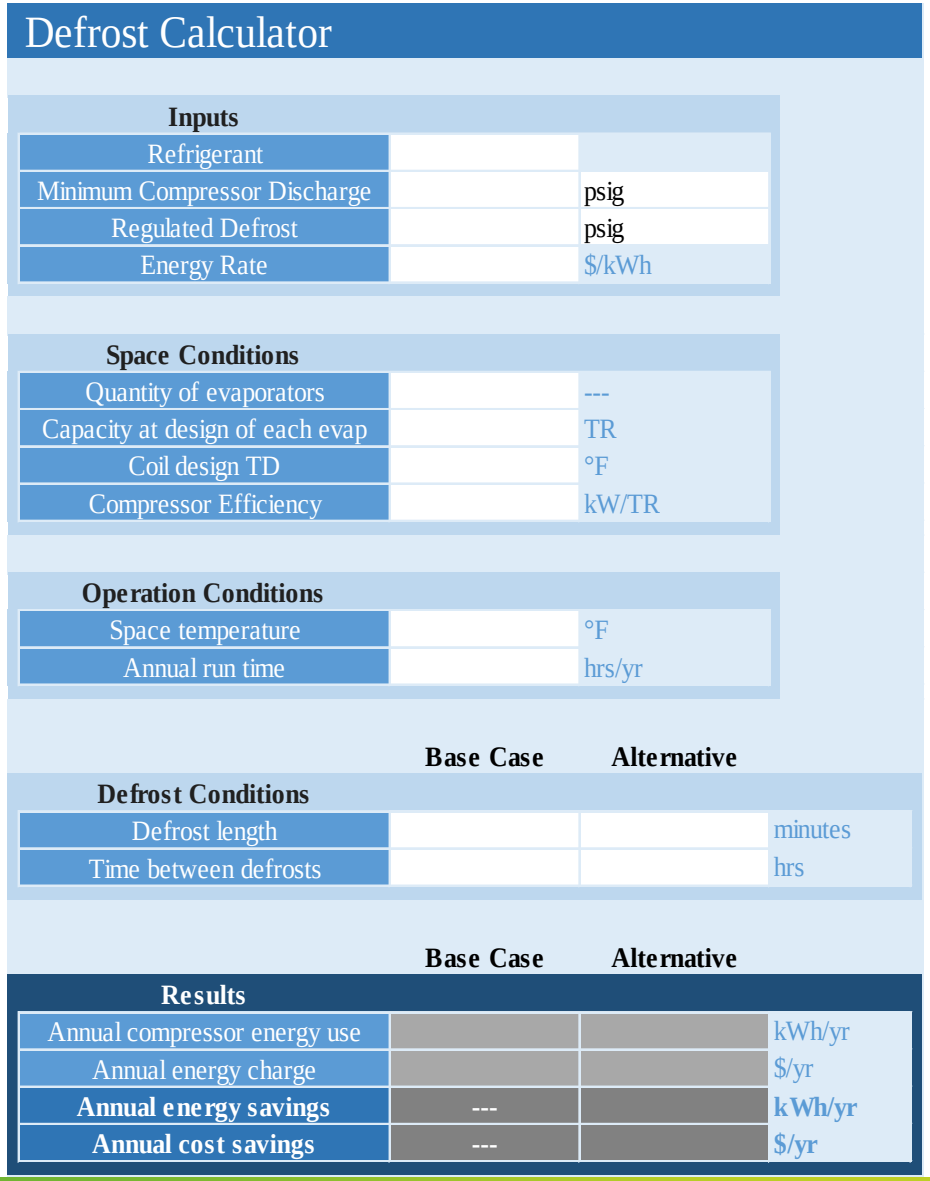
Leveraging Trade Organizations

Organization	Status Update
Global Cold Chain Alliance (GCCA)	Plan to promote CRES through: - GCCA webinar in spring - GCCA Chicago expo in summer - Cold Facts bi-monthly publication
American Society for Heating, Refrigeration, A/C Engineers (ASHRAE)	Potential upcoming partnership RETA meeting in January to align on goals
International Association of Refrigerated Warehouses (IARW)	Presentation/booth presence at February convention in California
Northwest Food Processors Organization (NWFPA)	RETA training offered at NWFPA January expo

Education Committee Work

- Developing new Refrigeration Guide
- Compliment existing RETA guides
- Weekly meetings
- E350 developing content

Education Committee Work



Defrost Calculator

Inputs		
Refrigerant		
Minimum Compressor Discharge		psig
Regulated Defrost		psig
Energy Rate		$/kWh

Space Conditions		
Quantity of evaporators		---
Capacity at design of each evap		TR
Coil design TD		°F
Compressor Efficiency		kW/TR

Operation Conditions		
Space temperature		°F
Annual run time		hrs/yr

Defrost Conditions	Base Case	Alternative	
Defrost length			minutes
Time between defrosts			hrs

Results	Base Case	Alternative	
Annual compressor energy use			kWh/yr
Annual energy charge			$/yr
Annual energy savings	---		**kWh/yr**
Annual cost savings	---		**$/yr**

- Developing online tools for RETA website
- Aim to make calculations easier
- Based on real-world data
- Will compliment RETA resources

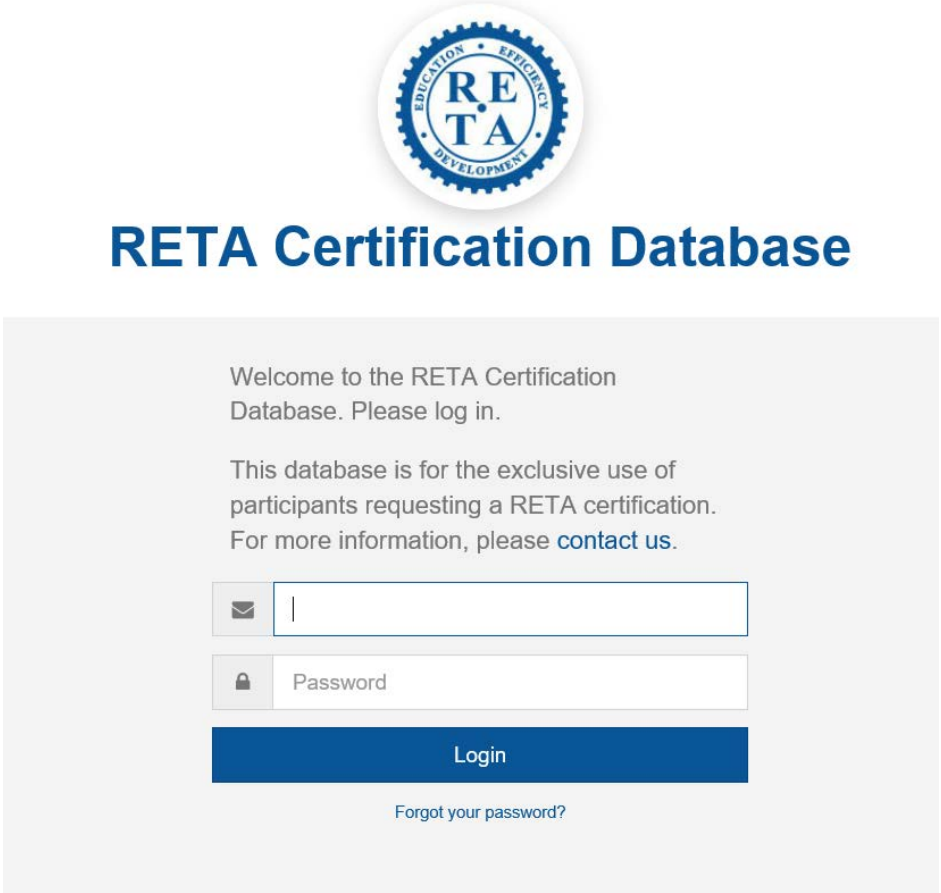
RETA Certification Database Demonstration

The Old Way

Information on CRES Applicant Claiming This Activity for Certification (Up to five persons can claim same activity):				
Your Name	First Name:	Last Name:	Are you a RETA Member? ☐ Yes ☐ No	
Your Job Title	Job Title:			
Job Category	☐ Executive	☐ Plant manager	☐ Maintenance Manager	☐ Production manager
	☐ Refrigeration Operator	☐ Refrigeration Technician	☐ Vendor/ service provider	☐ Other _____
Phone/ Email	Office Phone:	Cell Phone:		
	Email:	Backup Email:		
Can Peers Contact You?	Can peers at other facilities or companies contact you to ask you about this activity? ☐ Yes ☐ No			
Information on where CRES applicant is employed (may be different from where CRES activity was completed)				
Employer Name	Employer Name:			
Employer Address	Street Address:	City:	State:	Zip Code:
Business Type of CRES Applicant's Employer	☐ Controlled atmosphere fruit storage	☐ Refrigerated food storage	☐ Grocery distribution storage	☐ Cold storage warehouse
	☐ Food processing	☐ Dairy	☐ Vendor/ service provider	☐ Other _____
IF APPLICABLE: Information on other CRES Applicant Claiming This Activity for Certification (Up to five persons can claim same activity):				

- Needed for each activity
- Plenty of room for erroneous entry
- Burden on RETA to review entries and ensure no duplication

RCD Overview and Demonstration



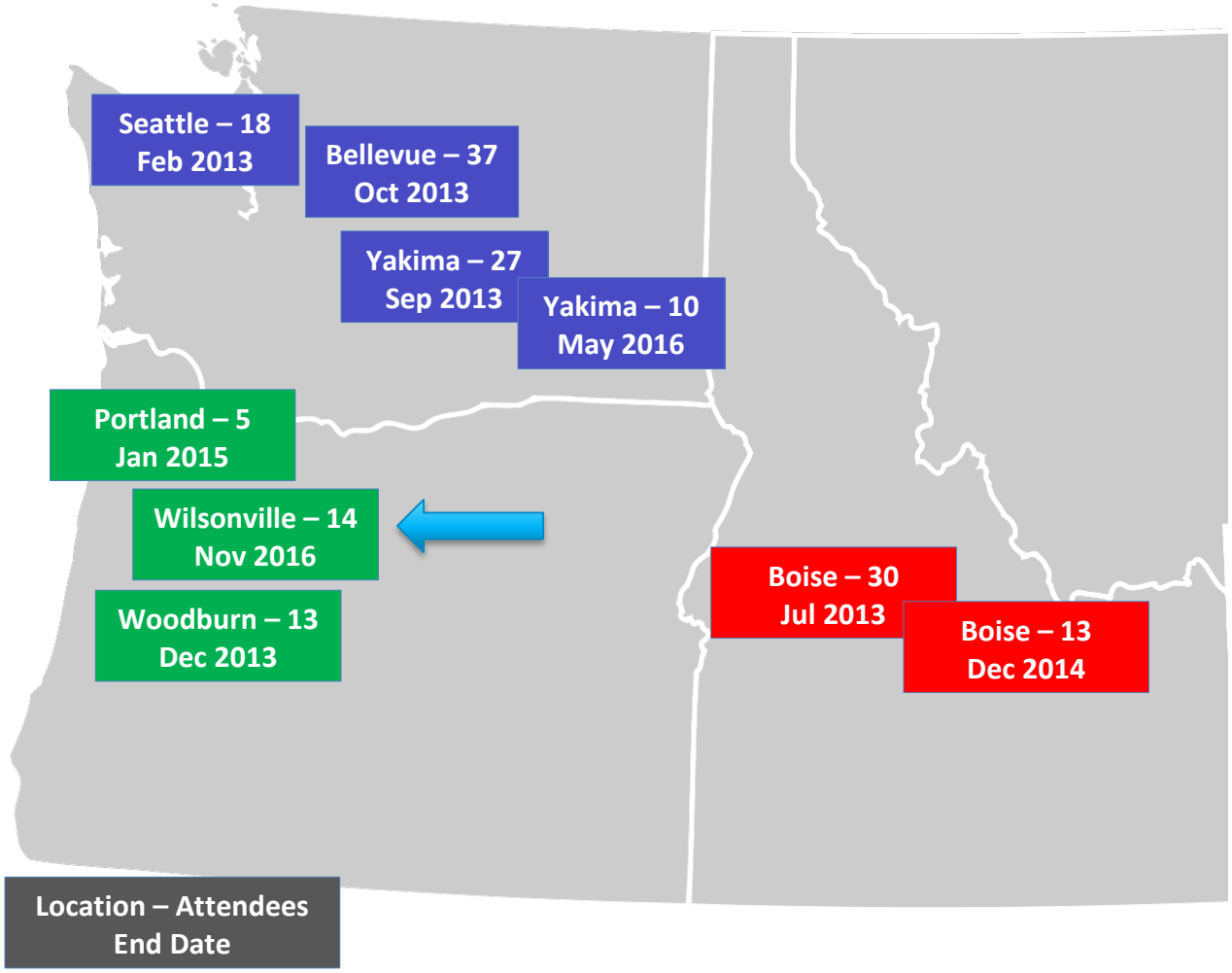
https://rcd.reta.com/users/sign_in

CRES Review Courses

CRES Certification Requirements Review

Exam	Activities
135 Questions Over 50% non-energy Operations, compliance, refrigeration, facility management topics	**At Least 3 Directly Demonstrate Energy Savings** No- or Low-Cost Activities
Resources CRES Application Handbook IR Best Practice Guide CRES Study Guide Industrial Refrigeration I, II, IV Books	**Maximum of 2 Support Energy Savings** 12 months to complete

CRES Review Courses



Why Review Courses are Needed

- Exam touches areas operators not well versed in
- Many have limited history with taking exams
- Provides opportunity for class participation and interaction among peers
- Most importantly: A lot of material to cover

Time	Day 1	Day 2	Day 3
8:00 AM	Course Introduction Pre-test Overview Ammonia Safety Basics of Refrigeration System Operation and Energy Use • Review of refrigeration system components • Highlight each component's contribution to energy use • Address the combined impact of 2 or more components	Thermodynamics Review • Enthalpy and Entropy • Psychrometrics Energy Management • Team Concepts • Training • Existing Programs	Low Hanging Fruit Capital Projects Monitoring and Follow-up
Noon	Catered Lunch Buildings and Auxiliary Systems Energy Usage • Architecture • Boilers • Air Compressors • Ancillary Components Basic Electricity Review • Fundamentals • Electrical Safety • Generation • Power and Cost Calculating	Catered Lunch Best Practices • Baseline Energy Use • Estimates • Identify Opportunities • Prioritize Projects	Catered Lunch Regulatory Compliance Review CRES Exam Basics • Test Layout and Test Taking Fundamentals Review Course Test Test Results Class Evaluation
5:00 PM	Dismiss	Dismiss	Dismiss

Wilsonville Review Course Outline

Follow-up evaluations suggested more time could be needed to adequately cover material

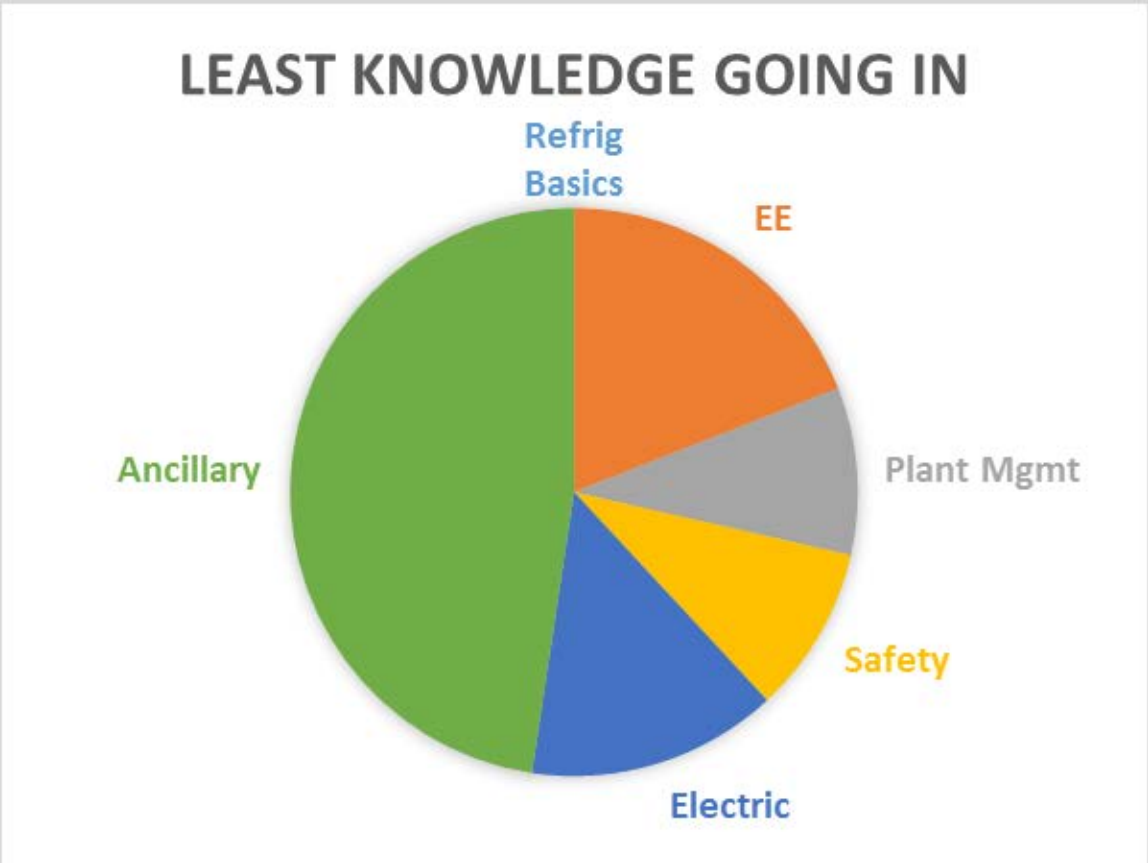
2017 Review Courses

- Pasco – March 2017 & Tacoma – Sep 2017

- Idaho review course – under consideration

Potential Review Course Strategies

- Require attendees to apply to take exam
- Offer exam proctoring in same location
- Provide catered breakfast snacks & lunch
- Host in convenient location
- Provide pre-review course entry exam
- Refine course material based on evaluations



Evaluation Results After Class

These splits matched the pre-test results that were sent out to gauge attendee knowledge

Staged Review Course Strategy

Phase 1 – Review Course

- 2-days long
- Review course to cover exam content only
- Focus on topics:
  - Refrigeration
  - Safety/regulation
  - EE basics
  - Electricity
  - Ancillary systems

Phase 2 – Activity Webinar

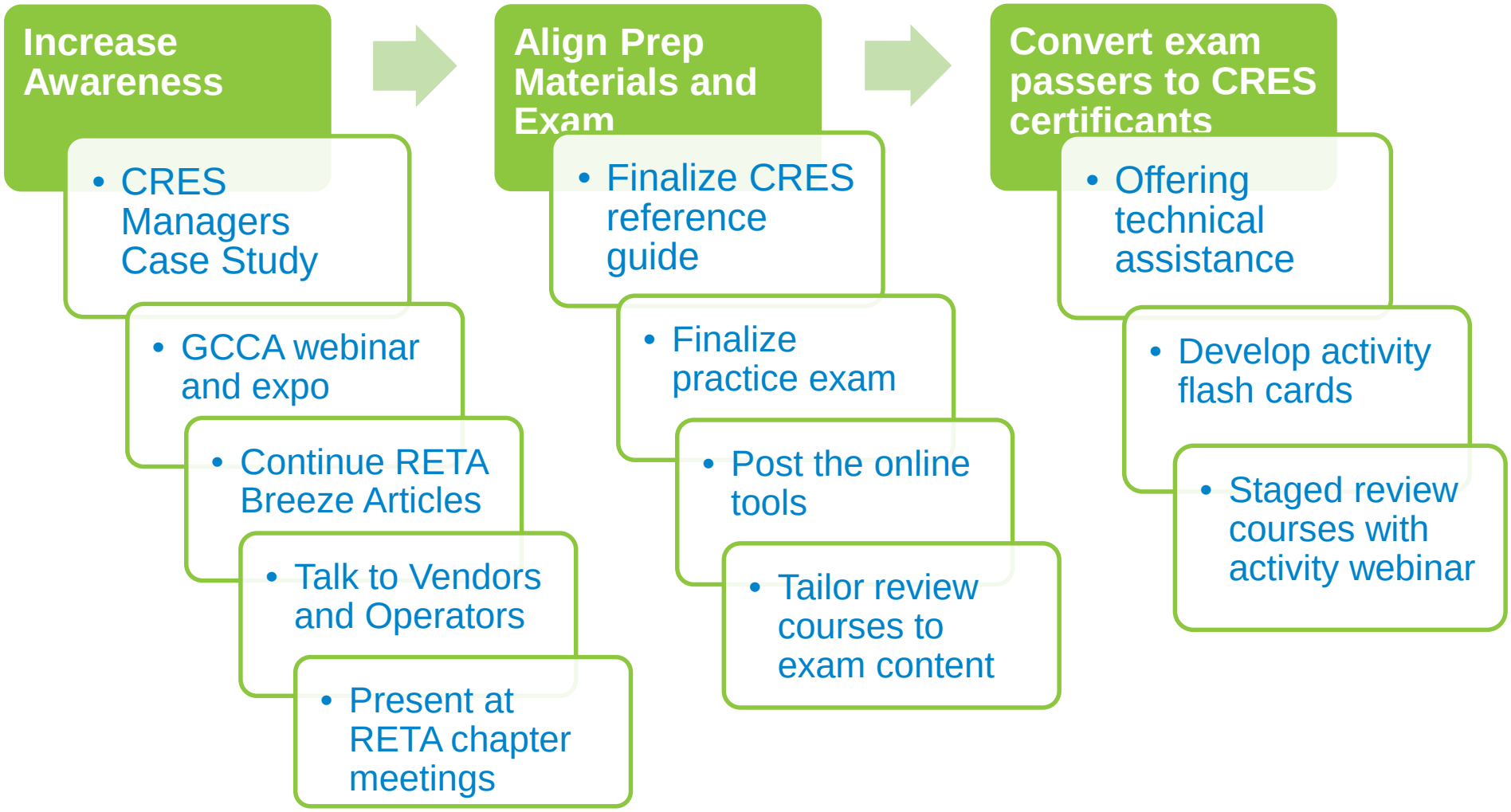
- Target exam passers
- Host 2-3 hour webinar
- Focus on:
  - Identifying activities
  - Establishing baseline
  - RETA Documentation
  - RCD entry

CRES in 2017

CRES Activity Overview for 2017

- Activity Card development
- GCCA webinar and marketing content
- Finalize RETA CRES book
- Assistance with RETA website
- CRES documentation assistance
- More online technical tool development
- More CRES Review Courses

Addressing Barriers to Certification in 2017



Next Steps

NEEA will continue to develop CRES resources in 2017 to support certifications and ANSI accreditation goal by 2018

- **Finalizing education materials for new guide**
- **Hosting GCCA webinar and work with other trade associations**
- **2017 Review courses**
- **Activity Cards for bolstering certification**

What is CRES Beyond 2017?

Group Activity: Where Does CRES Go?

Possible Utility Program Integration

- What does this look like to you?
- How would it compliment rather than compete with existing programs?
- What needs, if anything, to be accomplished with CRES first?

Areas Where CRES Can Survive

- Utility Program Support
- In the Market (i.e. RETA)
- Better suited Organization
- Other

Questions?

TOGETHER We Are Transforming the Northwest

Avista
Bonneville Power Administration
Cascade Natural Gas Corporation
P.U.D. Chelan County
Clark Public Utilities
Cowlitz PUD
EnergyTrust of Oregon
Grant PUD
Idaho Power An IDACORP Company
NorthWestern Energy
NW Natural
Pacific Power
PGE
PSE Puget Sound Energy
Seattle City Light
Snohomish County PUD Public Utility District No. 1
Tacoma Power Tacoma Public Utilities

Public Comment

Action Items


THIS MEETING IS OVER.