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Second choice: In the example above, instead select **Call in** and use your phone to call into the webinar. A window will pop-up with your meeting **Call in** information.

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1. **Call**

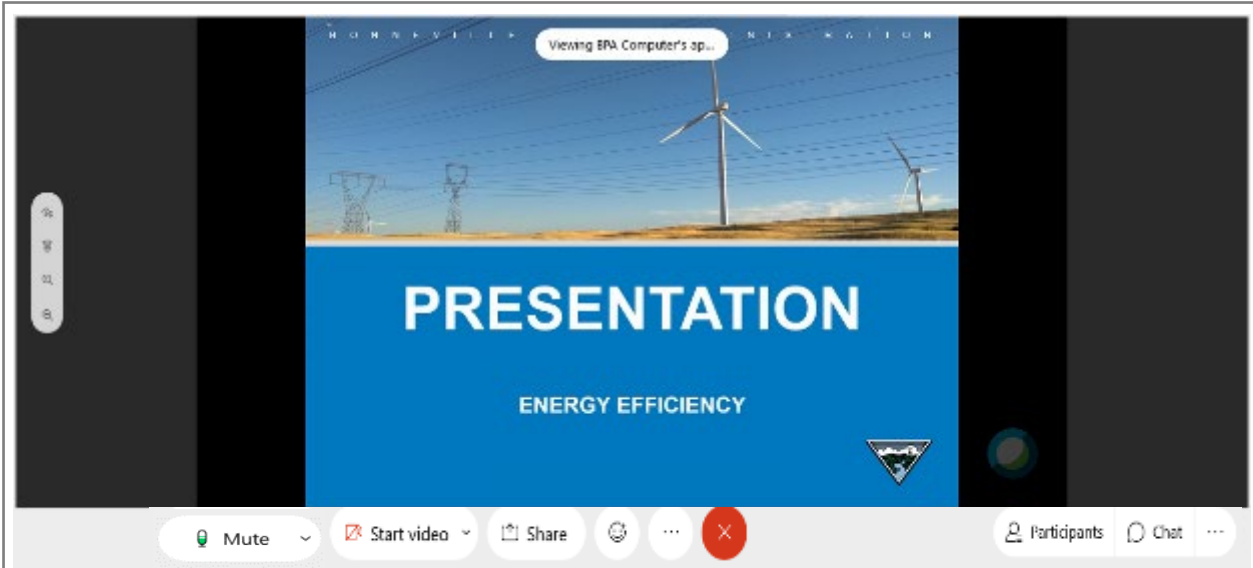
+1-415-XXX-XXX numbers

2. **Enter**

Access code: XXX XXXXXX #

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Last choice: Use Computer for Audio. Connect a headset to your computer for best results.



Use to mute and unmute

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Use to view participant list and chat panel



Agricultural Utility Group

March 2, 2023





Agenda

10:00– 10:05	Welcome, roll call, icebreaker
10:05 – 10:15	Ag measure changes & promos
10:15 – 10:25	New Ag energy audits & REAP funding
10:25 – 10:55	Dairy commercial heat pump hot water heater demonstration pilot
10:55 – 11:00	Questions



Hello!

What are you looking forward to in Spring?





David Lee	Ag Sector Lead/Program Manager
Ben Mabee & Phillip Kelsven	Planning & Evaluation
Dick Stroh, Travis Wood, & Tom Osborn	Engineering
Dena Hilde	EER Liaison
Michele Francisco	Marketing Support
Lita Mahan	COTR
Michelle Kelly	Ag Program Support Specialist
Robert Wallace	Ag Program Specialist
Larry King	Ag Program Specialist



AGRICULTURAL ENERGY EFFICIENCY

Tackling Drought with Energy Efficiency



Your utility recognizes that saving water is important and can lead to saving energy. Your utility offers incentives to help you. By saving water, farmers, dairies, and ranchers may be able to reduce energy costs, increase irrigation uniformity, decrease the amount of fertilizer required, or potentially even increase crop quality and yield. Your utility offers services and incentives to their members for eligible energy-efficiency measures.

Contact your local public utility to learn how you may be eligible for incentives to increase energy and water efficiency in the following areas:

▶ New High-Efficiency Irrigation Pumps

Over time, some irrigation pumps may become worn out, leak water, and become less efficient. Or your old irrigation pump might not be a good match to your current irrigation system requirements. Installing a new more efficient pump will help restore your irrigation system to the best operating point and save energy. If you install a Variable Frequency Drive (VFD), you can save even more energy.

▶ Variable Frequency Drives

VFDs are designed to adjust your irrigation pump motor speed to match your changing irrigation (flow and pressure) requirements. The VFD controls the frequency of the electrical power supplied to your motor. Even small speed adjustments using a VFD can create big energy savings, often as much as 10 – 20 percent. You will also get greater precision and tighter control over water distribution and pressure, and help the pump match-flow requirements. A BPA spreadsheet is used to estimate energy savings and apply for utility incentives.

▶ Irrigation Hardware Upgrades

New sprinklers, regulators, nozzles and gaskets, can reduce the pressure required at the pump, save water, improve water application uniformity, and save energy. As equipment wears out, making the switch to more energy-efficient hardware is one of the easiest ways for you to start saving water and power.

▶ Low Elevation Spray Application (LESA) and Mobile Drip (MDI)

LESA can provide more uniform irrigation application for all of your crops through the converting your center pivot irrigation system with sprinkler heads that are closer to the ground. This greatly reduces water evaporation during irrigation, and reduces the required pressure and energy necessary to irrigate your crop. MDI uses pressure controlled drip tubing to place the water directly on the ground and eliminates evaporative water loss in the air and on the foliage. Many farms in the Midwest and Texas have adopted MDI with good results.

▶ Zonal Variable Rate Irrigation (ZVRI)

A center pivot normally irrigates all the acreage uniformly. However, many fields are not uniform. Some terrain would dictate less water in the low spots and more water in other areas. ZVRI equipped pivots can control the irrigation down to 100 square feet. This results in water and energy savings and improves yield and crop quality in many cases. Your utility may have special incentives and cost sharing opportunities.

▶ Irrigation System Evaluation and Pump Testing

Irrigation system analysis or pump testing may identify opportunities to increase the efficiency of a pumping plant and irrigation delivery system. These opportunities may include lowpressure conversion for center pivots and laterals, reduction of friction losses in piping, and rebuilding or replacing pumps, and trimming pump impellers. A cost share is available from your serving utility.

Strategies for Drought Resiliency

- ✓ Sprinkler upgrades to LESA, LEPA, MDI
- ✓ Zonal Variable Rate Irrigation
- ✓ VFD's on pumps
- ✓ New more efficient/smaller pumps
- ✓ On farm water reuse (dairy and wineries)
- ✓ Pump Test/System evaluation cost share incentives
- ✓ Drought tolerant crop varieties
- ✓ No till drill
- ✓ Collaboration with NRCS EQIP



Dairies

BPA supports utility incentives for dairies that include barn LED lighting, and VFD applications on air compressors and vacuum pumps, heat exchangers and large heat pump water heaters.



Wineries

Many processing applications at wineries—VFDs, and refrigeration are all eligible opportunities for utility incentives. With new cleaning technology, water usage can be reduced at the winery.

YOUR UTILITY CAN HELP!

Call your local utility today to learn more about Agricultural energy-efficiency and available incentives for energy-saving improvements and ways to improve drought resiliency.



Agricultural Program Changes

Measure Changes – Energy Savings

As a result of changes made by the Regional Technical Forum, BPA will update the following measure energy savings, effective October 1, 2023:

- 7.6.1 – Irrigation System Conversions: LESA/LEPA/MDI
- 7.6.2 – Sprinkler Package Replacements
- 7.6.3 – Irrigation System Conversions: High Pressure to Low Pressure

Measure Changes – Energy Savings

IMPLEMENTATION MANUAL SECTION AND MEASURE TITLE	Current kWh Savings	October 2023 kWh Savings
7.6.1 Irrigation System Conversions: High pressure to LESA/LEPA/MDI	57.71	61.71
7.6.1 Irrigation System Conversions: MESA to LESA/LEPA/MDI	36.33	37.03
7.6.2 Sprinkler Package Replacements – High-Pressure	63.82	65.86
7.6.2 Sprinkler Package Replacements – MESA	31.91	32.93
7.6.2 Sprinkler Package Replacements – LESA/LEPA/MDI	15.96	16.46
7.6.3 Irrigation System Conversions: High Pressure to Low Pressure – Center-Pivot or Linear-Move	51.83	58.63
7.6.3 Irrigation System Conversions: High Pressure to Low Pressure – Wheel-line or Hand-Line	50.26	58.63

Measure Changes – Incentive Values

BPA will offer promotional incentives that go into effect on April 1, 2023.

- Utilities have the option of doing the standard payment or the promotional payment until October 1, when the promotional payment will become the standard payment.

As a result of changes made by the Regional Technical Forum and to align with current marketplace costs, BPA will update the following measure incentive values, effective October 1, 2023:

- 7.6.1 – Irrigation System Conversions: LESA/LEPA/MDI
- 7.6.2 – Sprinkler Package Replacements
- 7.6.3 – Irrigation System Conversions: High Pressure to Low Pressure
- 7.7.1 – Irrigation Pump Testing and Systems Analysis
- 7.7.2 – VFDs for Ag Centrifugal Pumps (BPA-Qualified)
- 7.7.3 – VFDs for Ag Turbine Pumps (BPA-Qualified)
- 7.7.4 – VFDs for New Ag Pump Installations (BPA-Qualified)

Incentive Values – Irrigation Measures

IMPLEMENTATION MANUAL SECTION AND MEASURE TITLE	STANDARD PAYMENT RATE PER UNIT: EFFECTIVE OCT. 1, 2022 – SEPT. 30, 2023	PROMOTIONAL PAYMENT RATE PER UNIT: EFFECTIVE APRIL 1, 2023 - SEPT. 30, 2023	STANDARD PAYMENT RATE PER UNIT: EFFECTIVE OCT. 1, 2023
7.6.1 Irrigation System Conversions: High Pressure to LESA/LEPA/MDI	\$14	\$18	\$18
7.6.1 Irrigation System Conversions: MESA to LESA/LEPA/MDI	\$14	\$18	\$18
7.6.2 Sprinkler Package Replacements – High-Pressure	\$14	\$16	\$16
7.6.2 Sprinkler Package Replacements - MESA	\$10	\$15	\$15
7.6.2 Sprinkler Package Replacements - LESA/LEPA/MDI	\$4	\$7	\$7
7.6.3 Irrigation System Conversions: High to Low Pressure – Center-pivot or Lateral-move	\$12	\$18	\$18
7.6.3 Irrigation System Conversions: High to Low Pressure- Wheel-line or Hand-line	\$12	\$16	\$16

Incentive Values – Pump testing, VFDs for pumps and pump efficiency upgrades

IMPLEMENTATION MANUAL SECTION AND MEASURE TITLE	STANDARD PAYMENT RATE PER UNIT: EFFECTIVE OCT. 1, 2022 – SEPT. 30, 2023	PROMOTIONAL PAYMENT RATE PER UNIT: EFFECTIVE APRIL 1, 2023 - SEPT. 30, 2023	STANDARD PAYMENT RATE PER UNIT: EFFECTIVE OCT. 1, 2023
7.7.1 Pump Testing Service Simple System Evaluation	\$50	\$100	\$100
7.7.1 Pump Testing Service Irrigation Pump Test Simple System or Open Discharge	\$100	\$200	\$200
7.7.1 Pump Testing Service Irrigation Pump Test System Analysis 400 acres or less	\$200	\$400	\$400
7.7.1 Pump Testing Service Irrigation Pump Test System Analysis Over 400 acres	\$300	\$600	\$600
7.7.1 Pump Testing Service Irrigation Pump Test (main pump) Complex System Over 400 acres	\$200	\$400	\$400
7.7.1 Pump Testing Service Irrigation Pump Test (booster pump) Complex System Over 400 acres	\$50	\$100	\$100
7.7.2 VFDs for Ag Centrifugal Pumps (BPA-Qualified)	\$50	\$70	\$70
7.7.3 VFDs for Ag Turbine Pumps (BPA-Qualified)	\$80	\$100	\$100
7.7.4 VFDs for New Ag Turbine Pump Installations (BPA-Qualified) – New Turbine pump	\$80	\$100	\$100
7.7.4 VFDs for New Ag Pump Installations (BPA-Qualified) – New Centrifugal pump	\$50	\$70	\$70
7.7.5 Pump Efficiency Upgrade New Efficient Pump 20 to 500 horsepower	\$50	\$70	\$70

Program Requirement Change

Effective October 1, 2023, BPA will change the following requirements for section 7.9 - Other Agricultural Measures:

- Requirement effective until September 30, 2023:
 - d. Nursery and greenhouse project improvements in irrigation, air handling, temperature, and humidity controls for facilities using less than 1 aMW. Please note: If usage is above 1 aMW, projects at the facility are considered Industrial.
- Requirement effective on October 1, 2023:
 - d. Nursery and greenhouse project improvements in irrigation, air handling, temperature, and humidity controls for facilities.

Expiring Measures

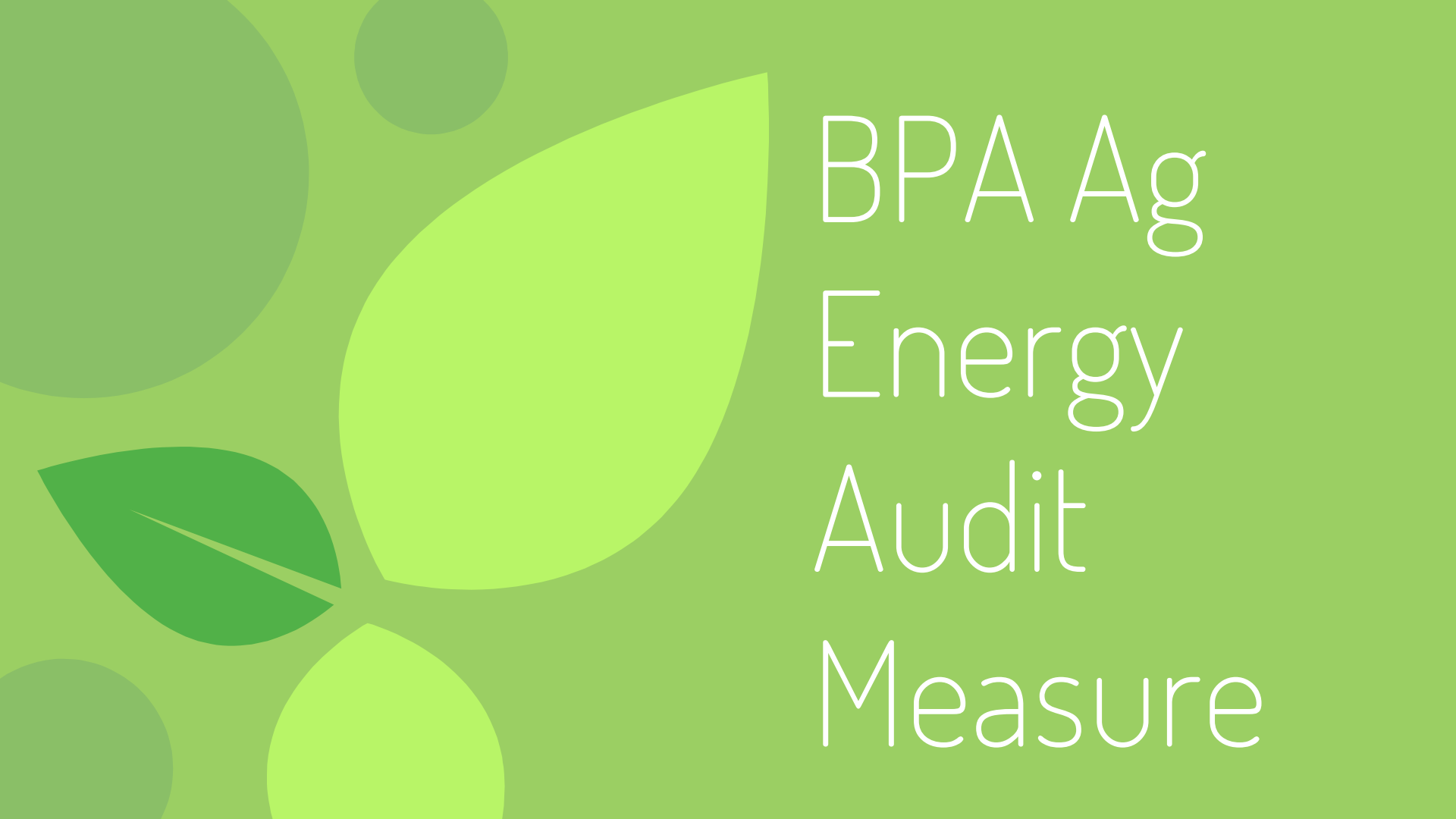
Effective October 1, 2023, BPA will no longer offer the thermostatically controlled tank de-icer:

- Recently expired by RTF
- Very, very low measure uptake over the last several years
- Considered BPAQ process to retain this measure

Upcoming New Measures

Effective October 1, 2023, BPA will offer the following measures, IM section 7.10.1:

- Agricultural Energy Audits

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BPA Ag
Energy
Audit
Measure

What is an Ag Energy Audit?

- Identifies/Analyzes energy efficiency measure
 - Irrigation system/hardware upgrades
 - VFDs for pumps, pump efficiency upgrade opportunities
 - Lighting upgrades
- Follows American Society of Agricultural and Biological Engineers (ASABE) 2009 standard
- Performed by a CEM, P.E. or experience Ag Energy Auditor
- No savings measure that should lead to identifying and implementing other Ag program UES measure and custom project with savings.



Where?

- Crop
- Dairy
- Livestock or Poultry farm
- Indoor Ag grow/greenhouse facility
- Vineyard
- Etc.



Why Do it?

Necessary step to obtain USDA Rural Energy for America Program (REAP) funding

Address barriers identified in 2018 USDA survey results

- Investigating not a priority
- Improvements will not reduce costs enough to cover installation costs,
- Cannot finance improvements

ODOE currently has Rural Energy Development (REDA) funds, covering 75% of cost for Oregon Ag Producers


- Energy Trust of Oregon is funding remaining 25% for Ag producers in their territory
- BPA intends to also fund remaining 25%



Benefits

Comprehensive report for Ag producer

- o Business case for Ag producer to make financial decision on EE improvements implementation
 - o Energy and O&M cost savings
 - o Available utility incentive
 - o Available funding sources
 - o Enables implementation of low cost measures
 - o Assists in planning for capital projects



The New Ag Energy Audit Measure will become effective Oct 1, 2023



Ag Energy Audit Measure Incentive Payment

- Not to exceed to \$ 10K
- Incentive payment with other outside funding sources cannot exceed 100% of energy audit cost
- May be combined with pump testing measure



BPA Ag Energy Audit Measure Requirements/Process Overview

Ag producer complete Ag Energy Audit Screening Form with energy audit proposal price and outside funding amount

- Submit to customer utility for go ahead

Ag energy audit and report completed by CEM, P.E. or experiences Ag energy auditor

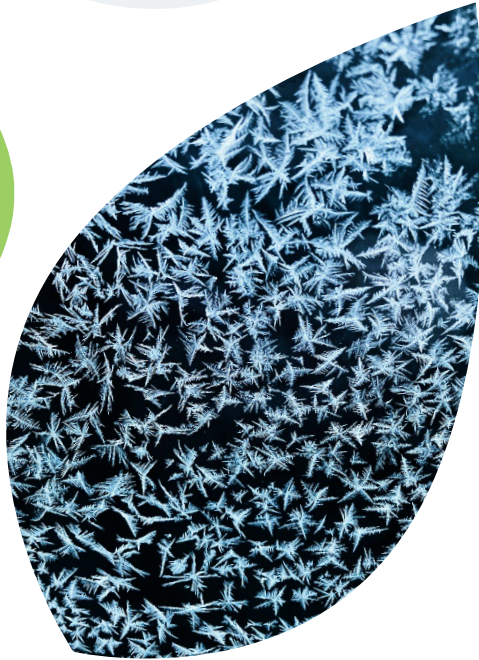
- If applicable, should use Ag program UES measure savings rates
- May include custom project opportunities

Ag energy audit report submitted in BEETS

- Reviewed by BPA Ag engineer/program staff/COTR

EEl reimbursed

ODOE Oregon Ag Energy Audit Overview



- Ag producers and small rural businesses are eligible
- Ag producers submit interest form on ODOE program webpage:
<https://odoe.powerappsportals.us/ORAEA>
- ODOE staff available and able to assist
- ODOE has approved Ag energy auditors to perform energy audit
- Will fund 75%
- More information at:
<https://www.oregon.gov/energy/save-energy/Pages/Rural-Energy-Audit-Program.aspx>

USDA REAP Funding/Process Overview



Program has over \$300M for projects in U.S.

REAP will fund up to 40% of energy efficiency project

Agricultural producers with at least 50 percent of their gross income coming from agricultural operations

Small rural business

EE projects ranked based on simple payback

More information <https://www.rd.usda.gov/programs-services/energy-programs/rural-energy-america-program-renewable-energy-systems-energy-efficiency-improvement-guaranteed-loans>

USDA REAP Funding/Process Overview

- Application packet submission/to dos
 - SAM.gov business registration
 - Packet Requirements for total project costs of \$80K and under to apply for REAP grants
- Energy Audit/Assessment
- Federal Forms:
 - RD 4280-3A – REAP Application Form
 - SF 424 – Application for Federal Assistance
 - SF 424C – Budget Form
 - SF 424D – Assurances Form
 - Environmental Checklist
- Proof of matching funds for the project – bank statement, line of credit, loan, etc.
- Site map with project marked
- Vendor/Installer Certification
 - Can DIY easy installs like lightbulbs
 - Still need a 3rd party to sign this one-pager attesting to the energy savings of the project]



Heat Pump Water Heaters MOOving into the Dairy Farm



Robert Weber- Engineer, Bonneville Power Administration
Richard Stroh – Engineer, Bonneville power Administration



Residential Systems vs. Commercial Systems



RESIDENTIAL



SMALL

120 gal

COMMERCIAL

6 kW

LARGE



Unitary/Integrated
All-in-one packaged system

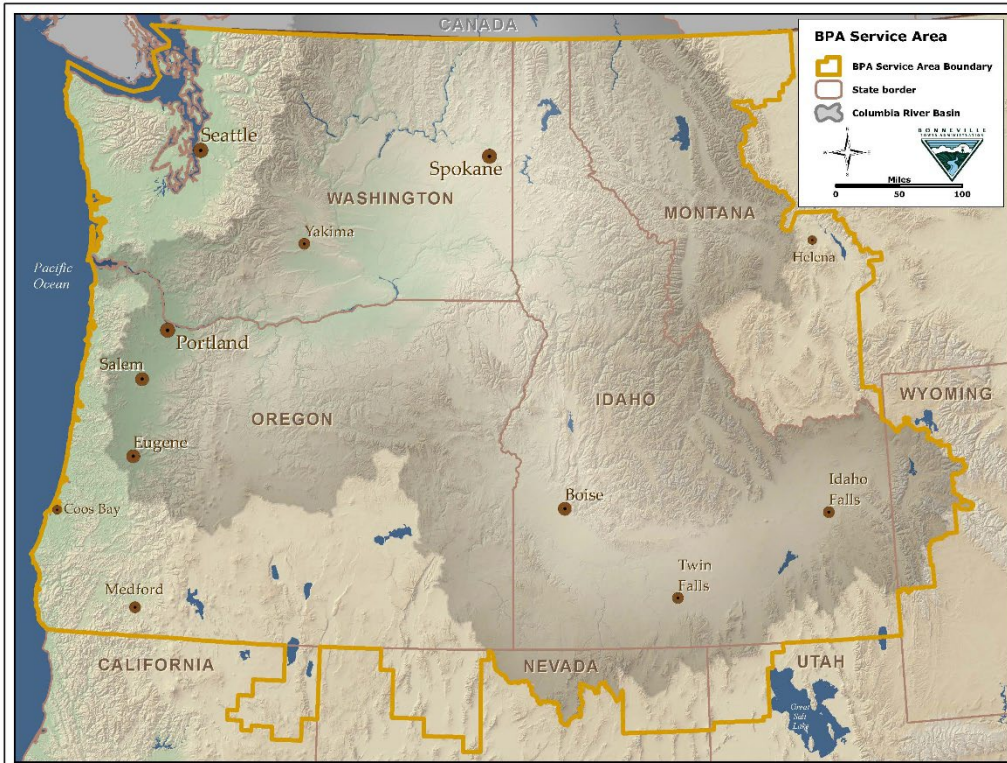
Commercial equipment
Custom engineered system
Plug and play/skid



A commercial HPWH system serves >4 dwelling units or commercial loads requiring ≥ 120 gallons of storage volume and/or >6 kW of input power.



Untapped Opportunity for Commercial HPWHs



Multifamily = Beachhead Market

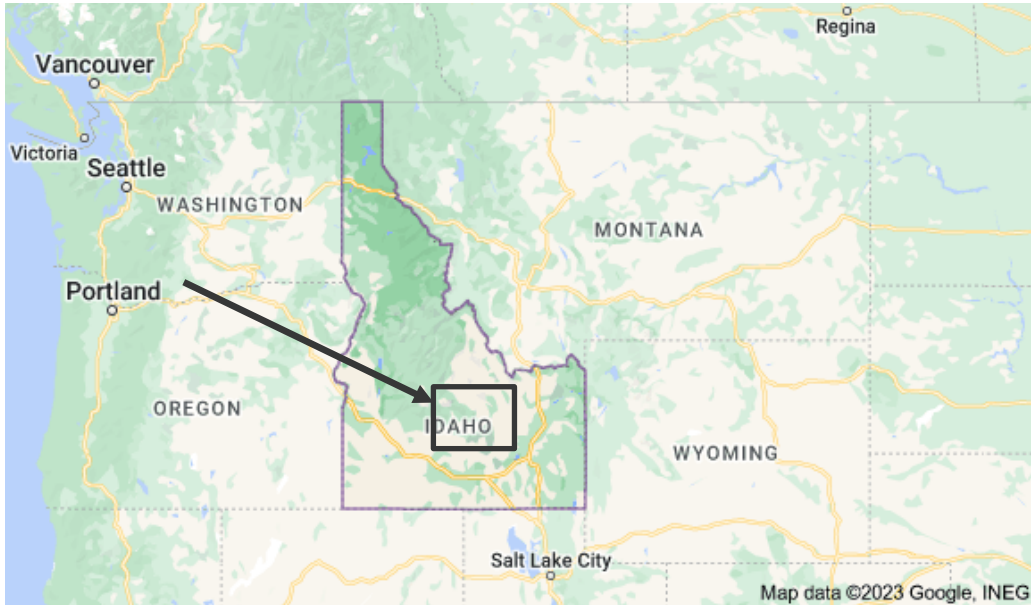
RTF measure by mid 2023 in PNW

Other Opportunities:

- Dairy Farm
- Restaurant
- Hospitality
- K-12 School
- Education Campus
- Corporate Campus
- Food Processing
- Wood Products
- Packaging
- Viticulture
- Fire Station
- Gymnasium



Why Dairy Farms?



Mid-size dairies use **thousands of gallons of water per day** just to sanitize the milking equipment.

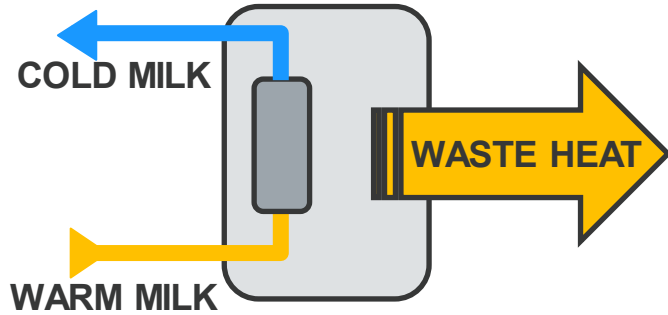
900+ Dairies in Bonneville Power Administration's Service Area.

Huge opportunity to **save farmers money** through energy savings and less reliance on propane.

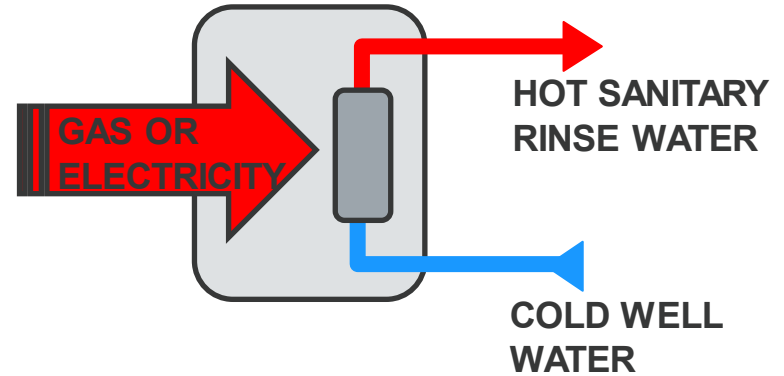


Opportunity Capture: Combine 2 Processes

GROUND WATER / REFRIGERATION COOLING

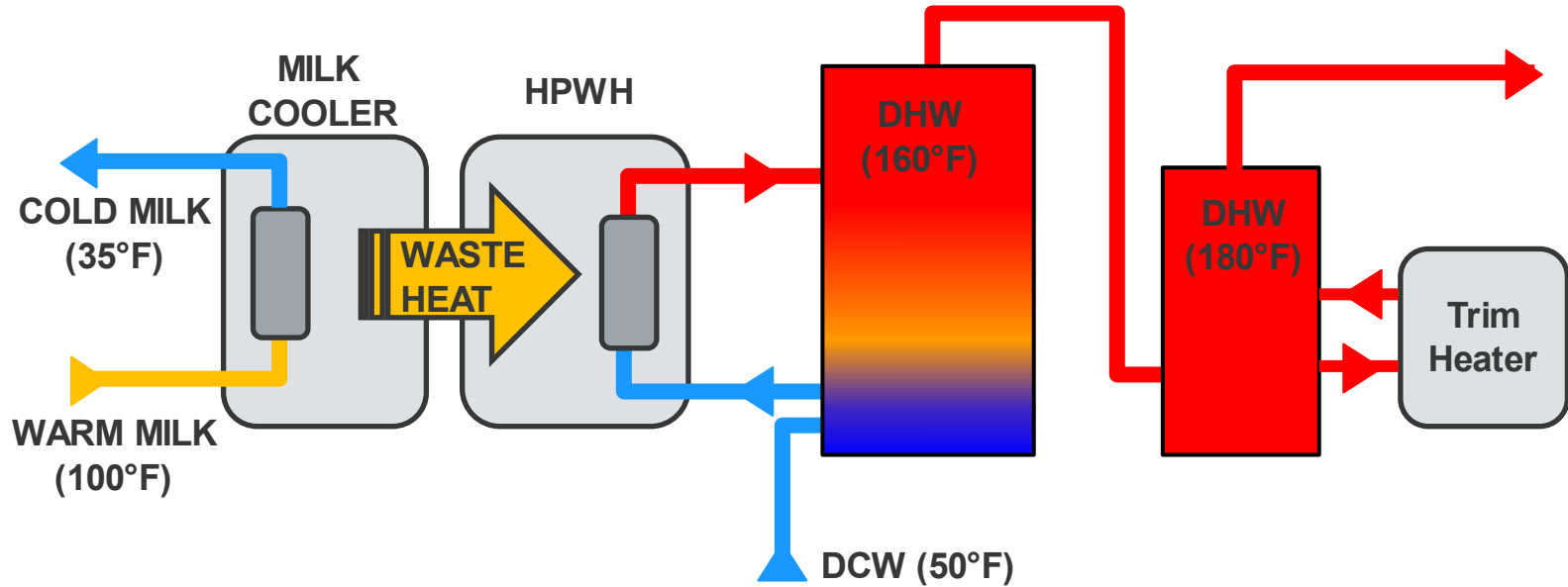


WATER HEATER





HPWH Uses Waste Heat for 85% of Water Heating



Milk cooling provides free water heating



Opportunity Assessment Research Steps

- Starts with site visit and screening process to **gauge feasibility, system cost & energy savings**
- Looking at
 - Dairy characteristics
 - Sizing information
 - System description
 - Water quality
 - Electrical capacity
 - Additional waste heat processes
- Information used to complete **initial engineering design** – product, price, savings

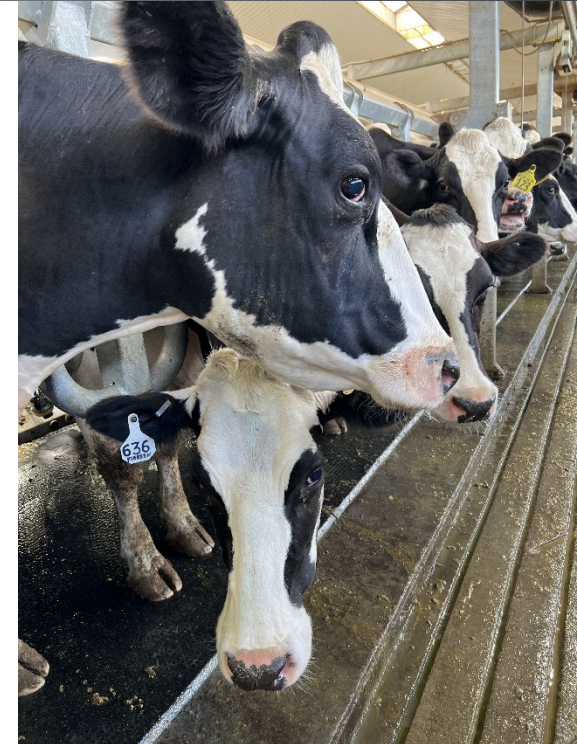




Emerging
Technologies

Webb Basin Dairy – Novel Case

- Mid-sized dairy with around 1,500 milking cows
- Unique geothermal well provides year-round 70 degrees
- Needs 3,000 gallons of water per day for sanitation
- Project completion date end of 2023
- Expect significant cost and energy savings
 - Estimated 2- to 3-year return on investment for farmers
 - Estimated 100,000 kwh/yr in refrigeration savings





Pre-Monitoring of the Milking Operation



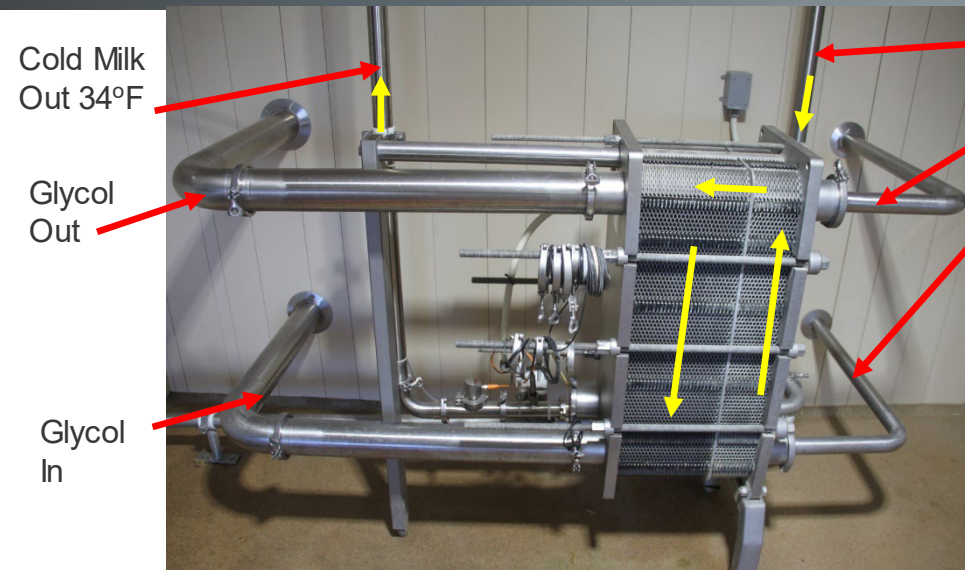
Required Measurements:

- Daily Hot Water Use
- Temperature of Hot Water Delivered to Milking System for Sanitizing
- Daily Volume of Well Water Used to Pre-Cool Milk
- Daily Volume of Milk Produced
- Milk Temperature Entering Storage Tank
- Temperature of Well Water Used to Pre-Cool Milk
- Temperature of Well Water After the Pre-Cooler
- Energy Required to Cool Milk



Emerging
Technologies

Webb Basin Dairy Existing Equipment



Milk Heat Exchanger

Warm Milk In 100°F

Cold Water In 70°F

Warm Water Out 76°F



Hot Water System



Storage Tank



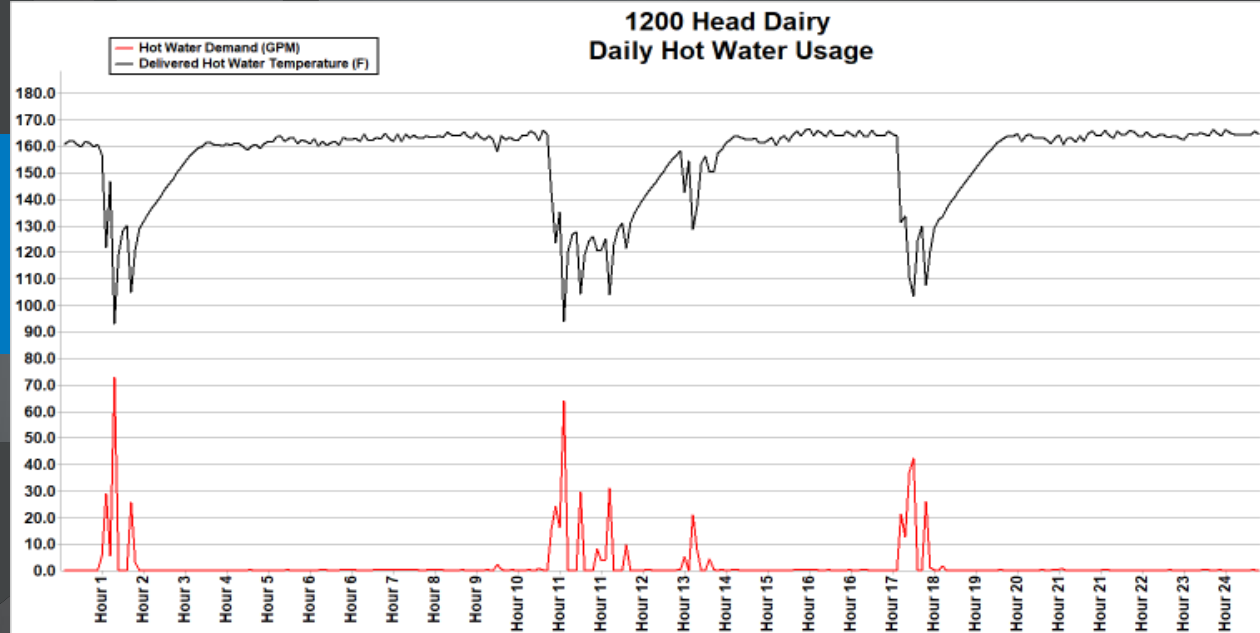
Water Heaters



Dairies are a great candidate for large volume heat pump water heaters because they use a lot of water



Emerging
Technologies





Pre-Monitoring Results

Monitoring Results Revealed:

- Significantly more heat is available in the cow's milk than what is required to heat the DHW used
- Incoming well water temperature 70°F
- Lack of enough hot water storage
- Hard water treatment required





Emerging
Technologies

Utility Incentive Opportunities

- Local utilities are interested in offering rebates to dairies within their service area to install HPWH systems
- Estimated \$20,000 incentive for this case





Future Educational Opportunities

- Webb Basin Dairy is expected to be the first installation of this design
- Plan to document "before", "during" & "after" retrofit
- Hear from the experts involved in the project
- Show dairy farmers & their trusted contractors it's worth getting behind this new technology
- Visual assets on demand



- Example of a Completed Multifamily Virtual Tour
- High Resolution and Technical Photography
- 360 Imagery
- Interviews with Experts







Emerging
Technologies

THANK YOU!

Robert Weber

Engineering Technical Lead
Mechanical Engineer – Senior Project Manager
Energy Productivity
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Questions?



Next AUG meeting:

June 20, 10-11 am (PDT)

&

Promotional incentives are
effective April 1

