Presented by:

NW DUCTLESS HEAT PUMP PROJECT

HOW TO

GET MORE SAVINGS

From Ductless Heat Pumps

Recorded Webinar

WELCOME TO THE WEBINAR

About NEEA:

An alliance of utilities

NW DUCTLESS HEAT PUMP PROJECT

THIS WEBINAR IS FOR CONTRACTORS

...Interested in installing ***ductless heat pumps:***

- How they work to save electricity, today.
- How they can work better in the future.

And...

- How you can help customers and utilities get the most with their energy rebate investments.

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INTRODUCING
NEW RESEARCH

Pacific Northwest
NATIONAL LABORATORY

"Maximizing Mini-split Performance"
RESEARCH PROJECT

The Information in this recorded webinar comes from a multi-year research project.

- Comparison installation tests at the Department of Energy's Pacific Northwest National Labs
- Extensive literature review of relevant research from all over North America
- Interviews with a national panel of experts and utility program managers

To see the complete report, go to:
https://neea.org/resources-reports.
Search for "Maximizing *Mini-Split Performance: A Meta, Market, and Measure Study*"

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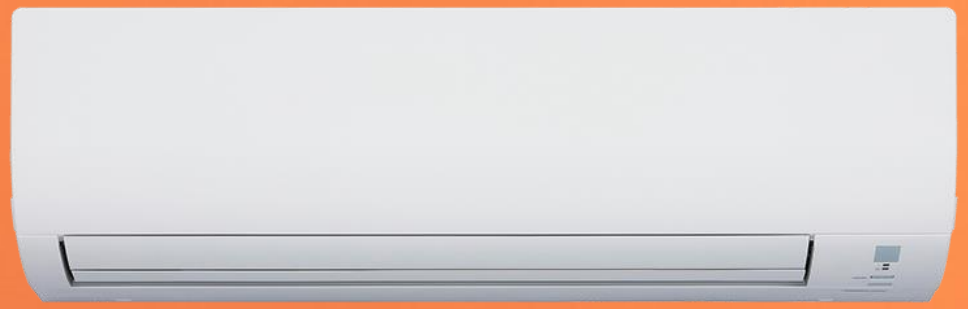
PRESENTER:

Jonathan Moscatello

Consultant for Utilities and HVAC Supply Chain

- 17 years HVAC Experience
- 13 years selling ductless
- 9 years as owner of a ”Ductless Only” contracting company — which my wife leads
- 3 years as an Industry Consultant



AGENDA

1. Why “How Much” electricity savings matters
2. How to save electricity a ductless heat pump
3. 4 Ways to reach for more energy savings

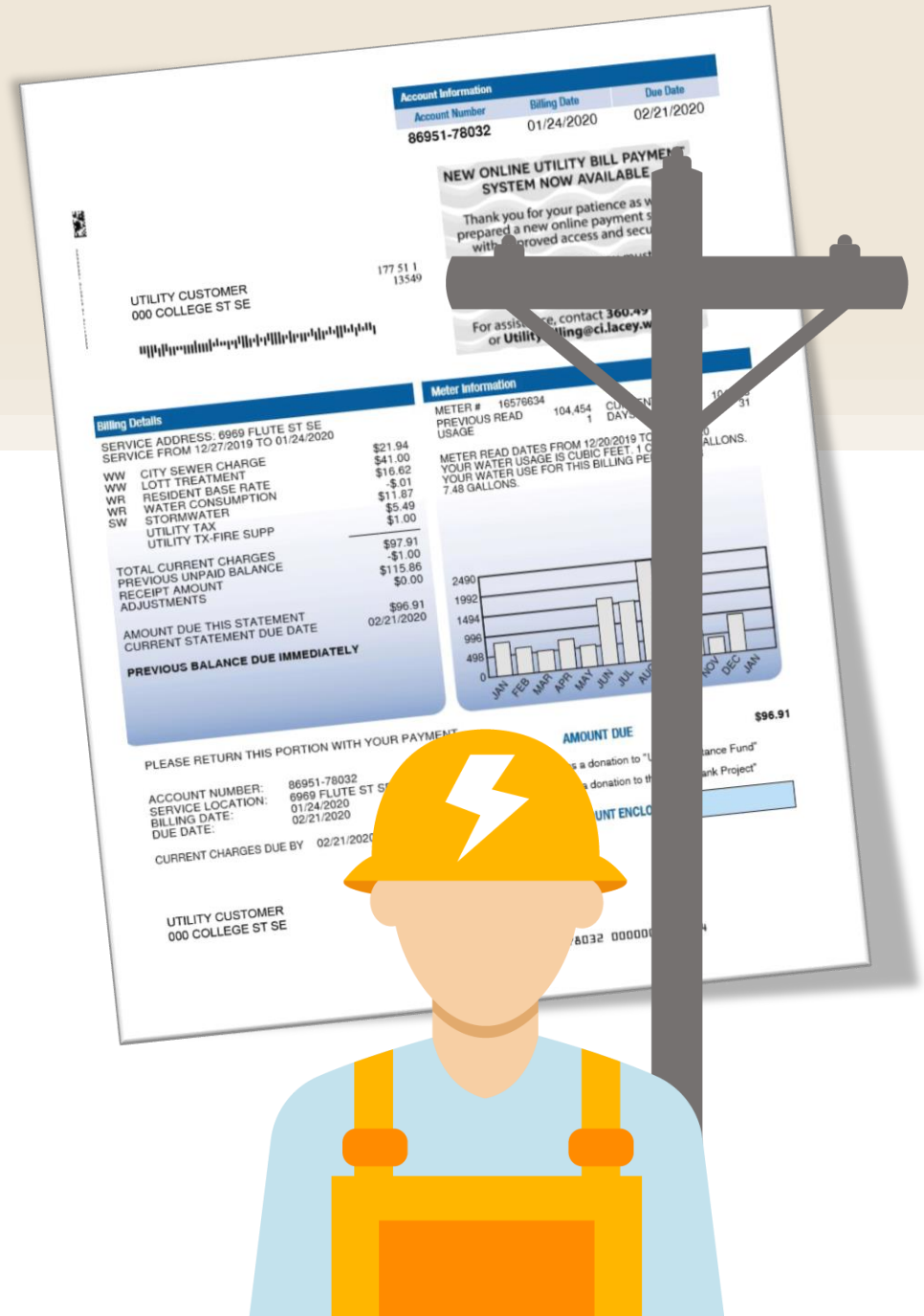
WHY UTILITIES OFFER REBATES

Rebates are tied to energy savings:

- No Savings = No Rebate
- Energy Savings = Rebate

Pretty simple, right?

WHERE DOES REBATE FUNDING COME FROM?



Utilities collect money from rate payers.

Government regulations define how that money may be spent.

Utilities can use money on efficiency rebates only if:

- The energy saved is <u>less expensive</u> than <u>buying</u> energy on the open market.

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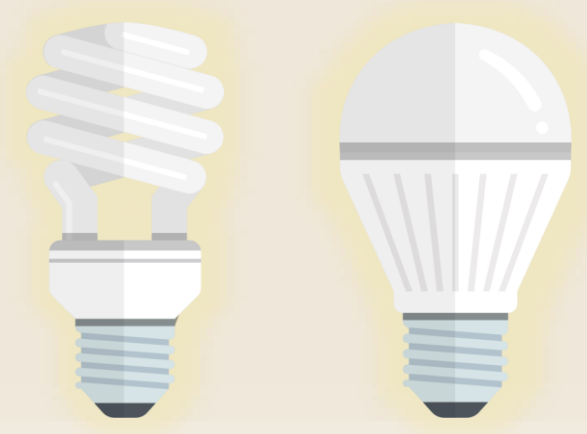
REBATES REALLY INFLUENCE ENERGY SAVINGS!



REMEMBER:

Regulators couldn't allow a rebate to take place:

- If **RESEARCH** *(up front)* didn't prove savings are possible
- And **EVALUATION** *(after the fact)* didn't confirm the savings are taking place

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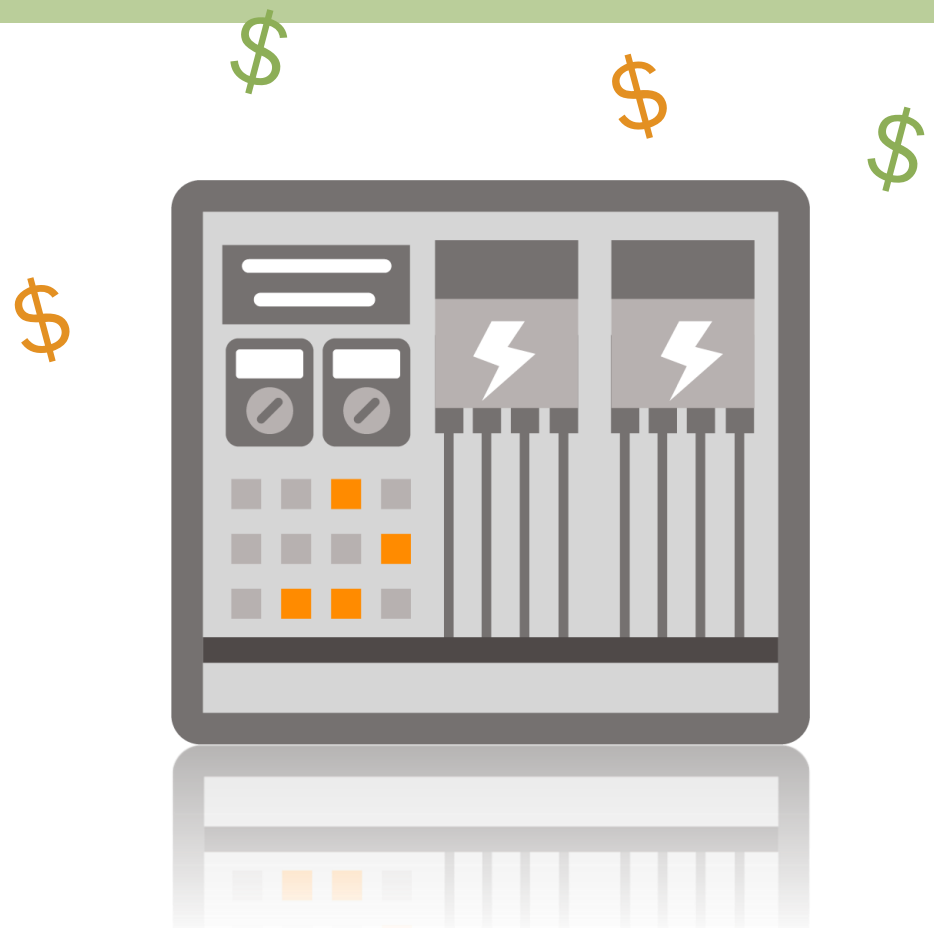
Status: DUCTLESS REBATES ARE AT RISK

WHY?

Regulators are seeing that:

The energy saved by installing a new ductless heat pump...

...often costs more than the open market price of that energy.



Status: DUCTLESS REBATES ARE AT RISK

WHAT CAN BE DONE TO SAVE DUCTLESS REBATES?

- **Reduce the price of a ductless heat pump.**
  This makes the energy saved by a ductless heat pump cost less. (Do you want to lower your prices?)
- **Ensure they save more energy**
  for little or no added cost.

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HOW WE GET ELECTRICITY SAVINGS WITH DUCTLESS HEAT PUMPS TODAY

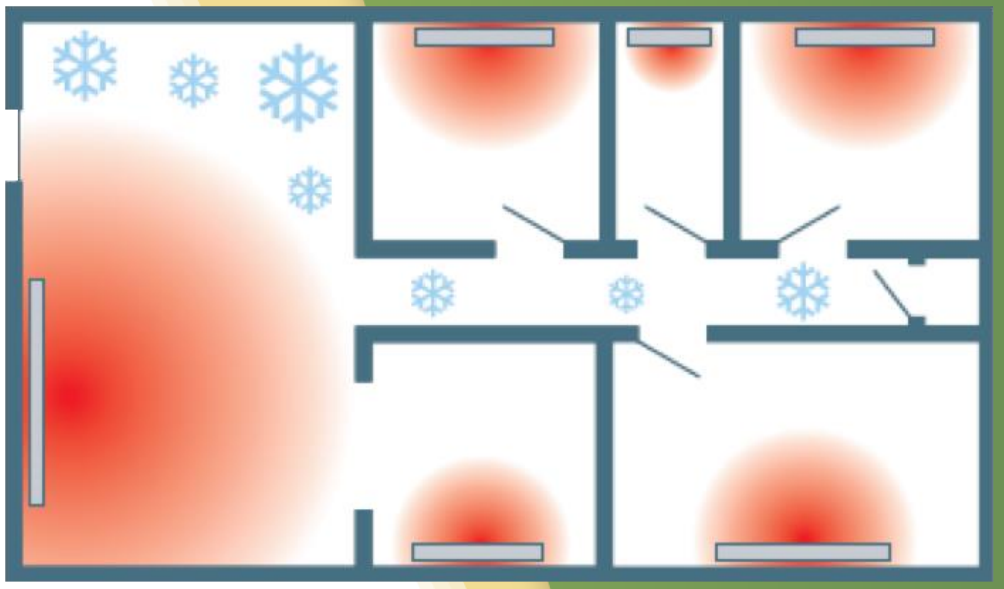
The displacement of expensive electric resistance heating

DISPLACEMENT APPROACH USING A DUCTLESS SYSTEM

EXISTING CONDITION:

Baseboard heating system, wall heaters, ceiling cables or electric forced air furnace

Heat from electric resistance is **2 TO 3 TIMES** more expensive than from a ductless system.



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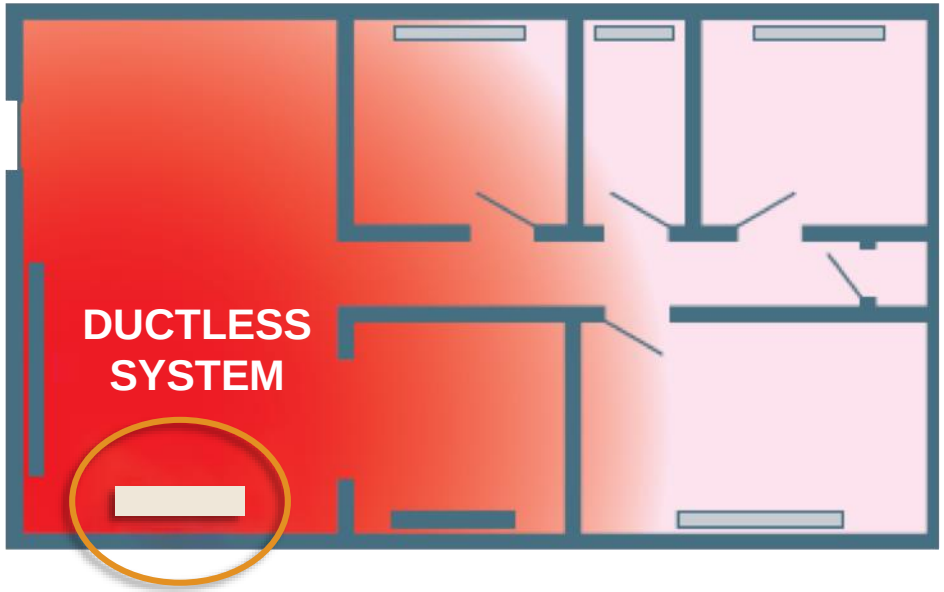
DISPLACEMENT APPROACH USING A DUCTLESS SYSTEM

GOAL: Displace as much electric resistance heat as possible for the lowest installed cost.

STEP 1: Install ductless unit in living room.

STEP 2: Keep electric resistance heat in place with temperature setback.

STEP 3: Educate homeowner to use back-up heat only when they experience the need for supplemental heat.



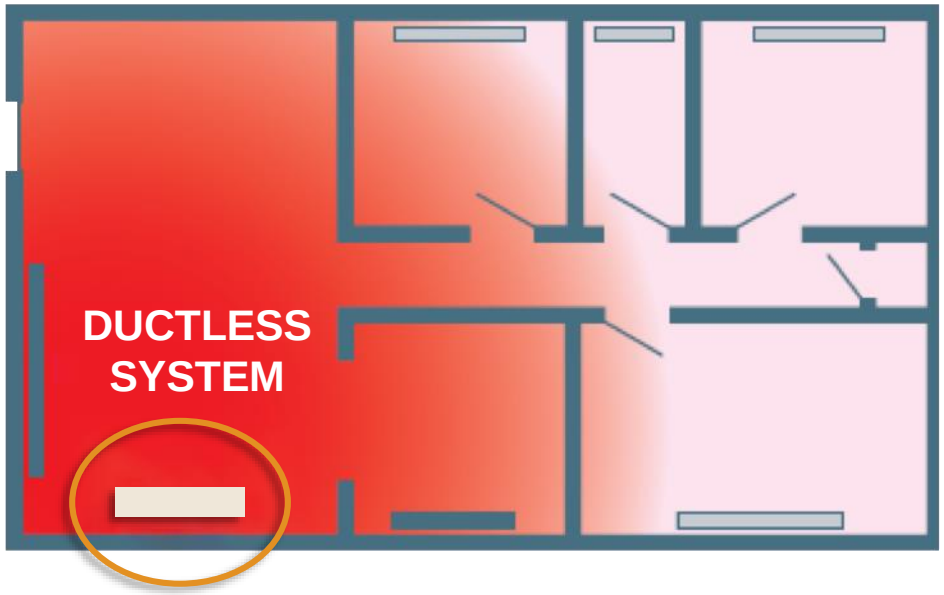
DISPLACEMENT SOLUTION:

Single-head ductless system in primary living area; baseboards remain in place as backup.

RESULTS:

- A single zone ductless system in the main living area can save up to 50% of home's heating bill.
- 91% of customers "very" or "extremely" satisfied.

DISPLACEMENT APPROACH USING A DUCTLESS SYSTEM



4 WAYS TO GET MORE SAVINGS OUT OF DUCTLESS HEAT PUMPS

Findings from the maximizing mini-split research program

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1

TARGET HOMES WITH BIG ELECTRIC HEATING LOADS

Afterall, you can't save what you don't use.

IF ALL (REBATED) DUCTLESS HEAT PUMP INSTALLATIONS WERE MADE IN HOMES WITH A SIZABLE ELECTRIC HEATING SPEND…

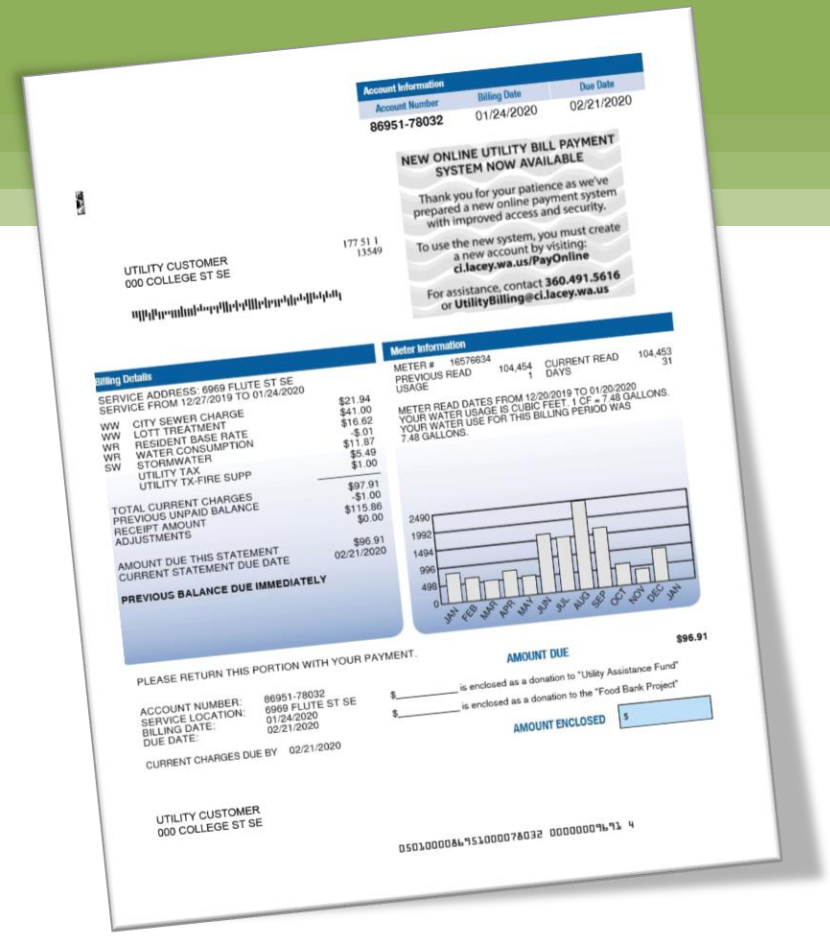
Get More Savings Out of Ductless Heat Pumps

Savings in homes with an electric forced air furnace would increase

137%*

Savings in homes with zonal electric heating would increase

84%*



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**Maximizing Mini-Split Performance: A Meta, Market, and Measure Study https://neea.org/resources-reports*

HOW DO YOU TARGET HOMES WITH BIG ELECTRIC HEATING LOADS?

Get More Savings Out of Ductless Heat Pumps

TIP #1

Ask homeowner what their *winter* month electricity bills are. Then compare to summer bills.

If the difference is $100 or more, this is a good sign!

TIP #2

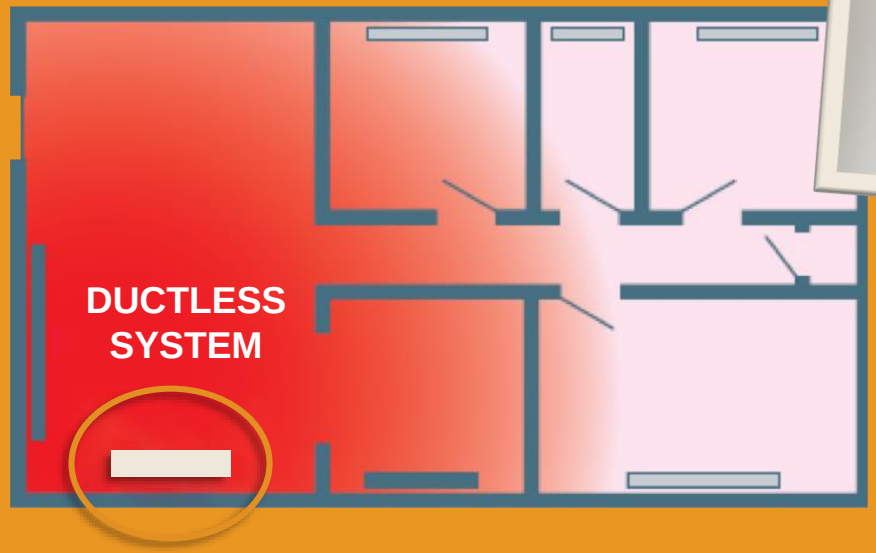
If you are not sure about a situation, call your utility energy efficiency program manager.

They love hearing from you and will appreciate you "double checking" for the sake of their program. It's a win-win.

2

STRATEGICALLY LOCATE INDOOR UNIT

Install in the living room or main area of the home.



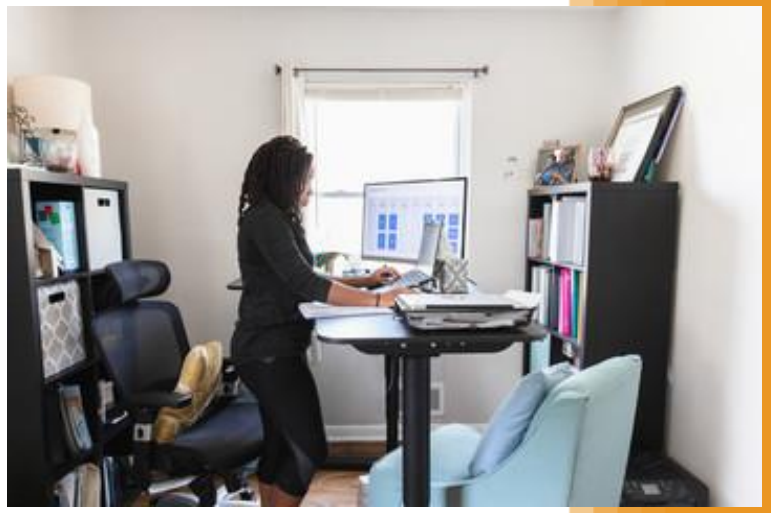
This will “displace” the greatest amount of electric resistance heat.

Get More Savings Out of Ductless Heat Pumps

The problem results when the customer wants the ductless installed in a secondary room.

In this case…

…the right thing to do is **ASK the utility** if they want you to submit a rebate application.

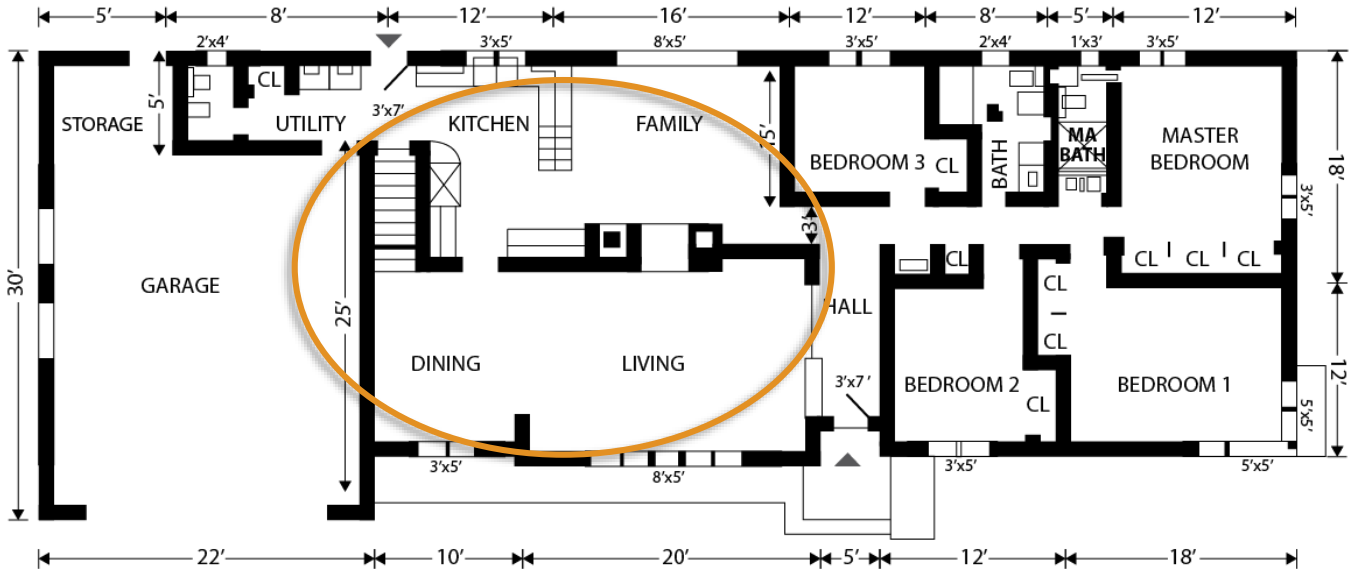


IF ALL (REBATED) DUCTLESS HEAT PUMP INSTALLATIONS HAD THE INDOOR UNIT INSTALLED IN THE MAIN LIVING AREA OR LIVING ROOM…

Get More Savings Out of Ductless Heat Pumps

Savings in homes with an electric forced air furnace would increase **12%**

Savings in homes with zonal electric heating would increase **18%**



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**Maximizing Mini-Split Performance: A Meta, Market, and Measure Study https://neea.org/resources-reports*

Get More Savings Out of Ductless Heat Pumps

GOAL:

Install the indoor unit in the biggest and most frequently used room.

This way, the installation will have the best opportunity to displace the electric resistance heat.

TIP

Large floor area with a good number of windows.

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3

USE RECOMMENDED INSTALLATION PRACTICES

This ensures the ductless system will operate to its full potential and efficiency.

Installation oversights and mistakes reduce system performance and cause much greater energy use.

It's sad. And preventable.

IF ALL DUCTLESS HEAT PUMP INSTALLATIONS STRICTLY FOLLOWED MANUFACTURER & UTILITY RECOMMENDED PRACTICES…

Get More Savings Out of Ductless Heat Pumps

Savings in homes with an electric forced air furnace would increase

9%*

Savings in homes with zonal electric heating would increase

13%*

OTHER BENEFITS INCLUDE:

- Lower rates of call-backs

- Less warranty work

- Happier customers

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**Maximizing Mini-Split Performance: A Meta, Market, and Measure Study https://neea.org/resources-reports*

Learn recommended installation practices

INSTALLER'S GUIDE

DUCTLESS
HEATING & COOLING SYSTEMS

BEST PRACTICES FOR INSTALLING DUCTLESS HEATING AND COOLING SYSTEMS

Quality service and installations generate referrals, increase sales and improve customer satisfaction. Make sure your customers get the most from their ductless system by following installation best practices and educating homeowners. This guide does not replace manufacturer's specifications. Follow manufacturer's installation instructions and building code requirements.

BEFORE YOU BEGIN

- Review the existing heating and cooling system location and layout with your customers. Consider occupancy, usage and climate when integrating the ductless system as the primary heating and cooling system in the home.
- If there is an electric furnace, determine if it is the best backup heat source or if other backup options are more appropriate.
- Review utility rebates and tax credits. Consult GoingDuctless.com for up-to-date information.
- Install system on a dedicated electrical circuit.

OUTDOOR UNIT (COMPRESSOR)

- Set the unit on a stable, level surface
- Use adjustable risers to prevent debris and snow buildup and allow better drainage
- Secure outdoor units to the pad, risers and/or resting surface using bolts and/or adhesive

REFRIGERANT TUBING

- Create new flares using appropriate R410A flaring tool and measurement gauge; DO NOT USE manufacturer-provided tubing flares and fittings
- Apply refrigerant oil to the end of each flare
- Connect tubing with R410A nuts (supplied with your outdoor unit) and tighten to manufacturer's specifications

REFRIGERANT CHARGE

- Adjust refrigerant charge ONLY IF NECESSARY; most installations do not require adjustment
- Gauges are not needed to verify refrigerant levels; if adjustments are necessary, use a scale when adding/removing refrigerant
- Consult the manufacturer's installation manual to verify refrigerant protocols

LINE SET INSULATION AND PROTECTION

- Insulation must cover entire line set length to avoid condensation and decreased efficiency
- Protect the outdoor line set from insulation damage with rigid line hide and building code-approved line set protection
- An insulative sealant must seal penetrations through the shell of the home; return any insulation disturbed by installed line set to original (or better) condition

CONDENSATE DRAIN

- Must slope downhill; can be routed with line set and run to a suitable termination point, away from crawl spaces and walkways

COLD CLIMATE RECOMMENDATIONS

- Avoid installing outdoor unit along pathways; freezing discharge can pose a slip hazard
- Use a pan heater to prevent defrost discharge from freezing inside the compressor
- Use wall-mount brackets to maximize clearance under the outdoor unit for easy drainage and reduced snow and ice buildup

REQUIRED TOOLS


RATCHET FLARING TOOL


PROGRAMMABLE REFRIGERANT CHARGING SCALE


TORQUE WRENCH


R410A GAUGE AND HOSE SET

https://goingductless.com/assets/documents/uploads/DHP_BP-Guide.pdf

INSTALLER GUIDE

DUCTLESS HEAT PUMPS FOR COLD CLIMATES

DUCTLESS
HEATING & COOLING SYSTEMS

Do you know some ductless heat pumps are designed to operate in cold climates? When properly applied and installed, research has shown these ductless heat pumps work well for heating homes and for saving energy. Due to the more demanding conditions in which they operate, installation mistakes, shortcuts and oversights can dramatically impact how well these machines perform. This document builds on the Best Practices for Installing Ductless Heating and Cooling Systems to include practices essential to successful installation and performance of these ductless heat pumps in cold climates.

WHAT IS A COLD CLIMATE?

Areas where winter nighttime temperatures commonly drop below 20˚F, and where historical data shows winter temperatures regularly fall to 5˚F or lower, are considered cold climates. In the Northwest, this usually includes high elevations, areas on the east side of the Cascade Mountains, and much of Montana and Idaho.

Northwest Cold Climate Ductless Heat Pump Specifications*:

1. Compressor must be variable capacity (inverter type)
2. Indoor and outdoor units must be part of an AHRI matched system
3. The AHRI matched system must be rated at or above 10.0 HSPF
4. The AHRI matched system must have a Coefficient of Performance (COP) at or above 1.75 at 5°F
5. Must deliver at least 80% of rated heating capacity at 5°F
6. If a drain pan heater is present, it may only run as part of the defrost cycle

** Northeast Energy Efficiency Partnerships maintains a list of cold climate rated air source heat pumps at https://ashp.neep.org/#!/. To determine if a system meets the Northwest specification, review a listed unit's HSPF and ensure it meets 80% rated capacity at 5°F.*

LOCATION OF THE OUTDOOR UNIT IMPACTS PERFORMANCE

1

1. Avoid Installing outdoor units on walkways and patios

Defrost cycle melt water can re-freeze on ground surfaces and create a dangerous slip hazard.


Wind Baffle

Expect Service Issues

3

2

2. Do not install outdoor units under a roof's driplines

Rain, ice fall and snow melt from roof overhangs and driplines can re-freeze on the compressor's coil surface and overwhelm the unit's defrost cycle. When needed, outdoor units should be installed with drip caps or shields.

3. Don't install outdoor units facing into the wind

If the outdoor unit is facing into dominant wind direction, this could cause counter-rotation of the outdoor fan and lead to failure of the fan motor, fan circuit board, or both.

Tip: *If you cannot avoid the dominant wind direction, install an optional wind baffle offered by the manufacturer.*

https://goingductless.com/assets/documents/uploads/cold-climate-dhp-installer-guide.pdf

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4

EDUCATE HOMEOWNERS ON USING THEIR DUCTLESS

There are several common user errors that impact ductless energy savings:

1. Homeowners don't know they can use their ductless for heating.
2. Using auto-changeover mode.
3. Using a "setback" temperature.
4. Unnecessary or improper use of back-up heat (causing the ductless and electric furnace to fight each other).

IF ALL (REBATED) DUCTLESS HEAT PUMP INSTALLATIONS INCLUDED THE HOMEOWNER RECEIVING A THOROUGH "HOW TO" USE THEIR NEW SYSTEM…

Get More Savings Out of Ductless Heat Pumps

Savings in homes with an electric forced air furnace would increase

8%*

Savings in homes with zonal electric heating would increase

1.2%*

**Maximizing Mini-Split Performance: A Meta, Market, and Measure Study https://neea.org/resources-reports*

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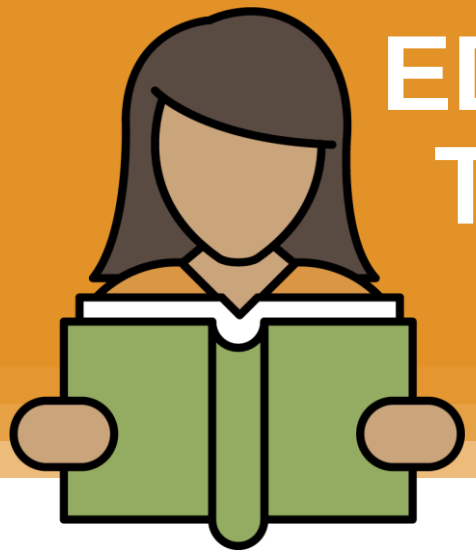

EDUCATING THE CUSTOMER…

ALWAYS A GOOD IDEA!

Get More Savings Out of Ductless Heat Pumps

TIP

THINK OF IT LIKE THIS:

When you (the contractor) sell a ductless heat pump <u>and</u> help the homeowner get a rebate for it — you are responsible for helping to deliver the heating savings to the utility.

That is how the energy efficiency rebate system is designed to work.

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https://goingductless.com/assets/documents/uploads/DHP_Homeowners-Guide_REF.pdf

IN CLOSING:

There are 4 ways to get more savings out of ductless heat pumps

Ways to Get More Savings Out of Ductless Heat Pumps		Ductless + Electric Forced Air Furnace Application	Ductless + Electric Zonal Heat Application
1	Target homes with BIG electrical heating loads	137% [1]	84% [2]
2	Strategically locate indoor head	12% [1]	18% [2]
3	Use recommended installation practices	9% [1]	13% [2]
4	Educate homeowners on how to use their ductless system	8% [1]	1.2% [2]

1 - Additional savings over baseline (2,560 kWh) • 2 - Additional savings over baseline (1,709 kWh)

2 topics we didn't cover, but we believe are on your mind

1 INTEGRATED CONTROLS

Involves using using controls to integrate and coordinate a ductless system with the remaining electric resistance heat:

- Locks it out to restrict use
- Coordinate its use when needed

SAVINGS Good potential, between **21%** to **29%** additional savings

COST Too high – it doesn't appear to pencil out

2 topics we didn't cover, but we believe are on your mind

2 MULTI ZONE SYSTEMS:

HOMEOWNERS APPEAR TO WANT WHAT THEY CAN OFFER.

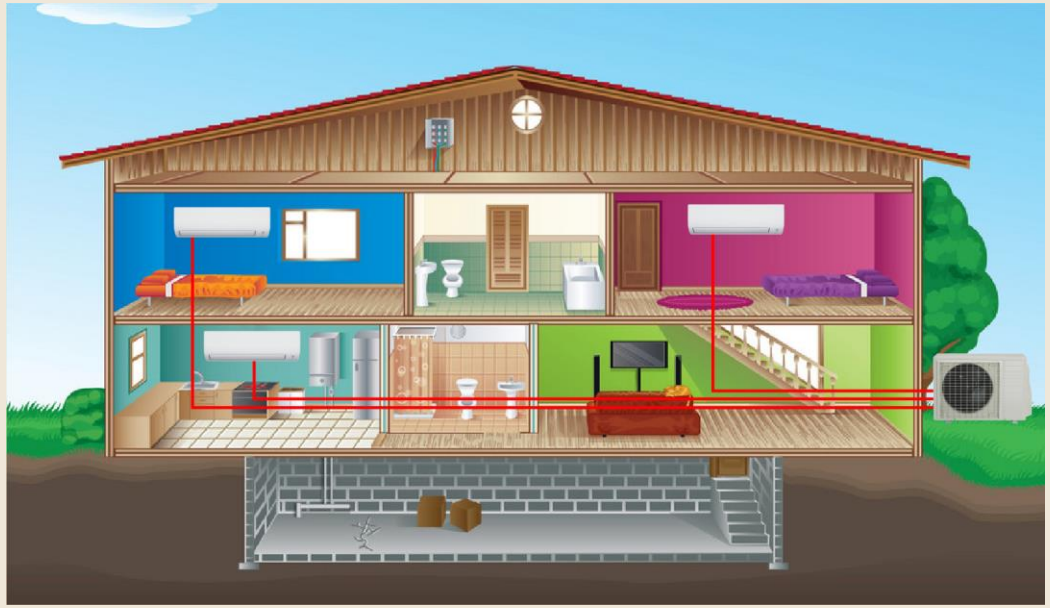
FACTS TO CONSIDER:

- Always leads to additional cost
- And it is not reliable as a savings

There are a lot of factors involved:

- Cost and savings depend on the installation site
- Number of zones
- Application

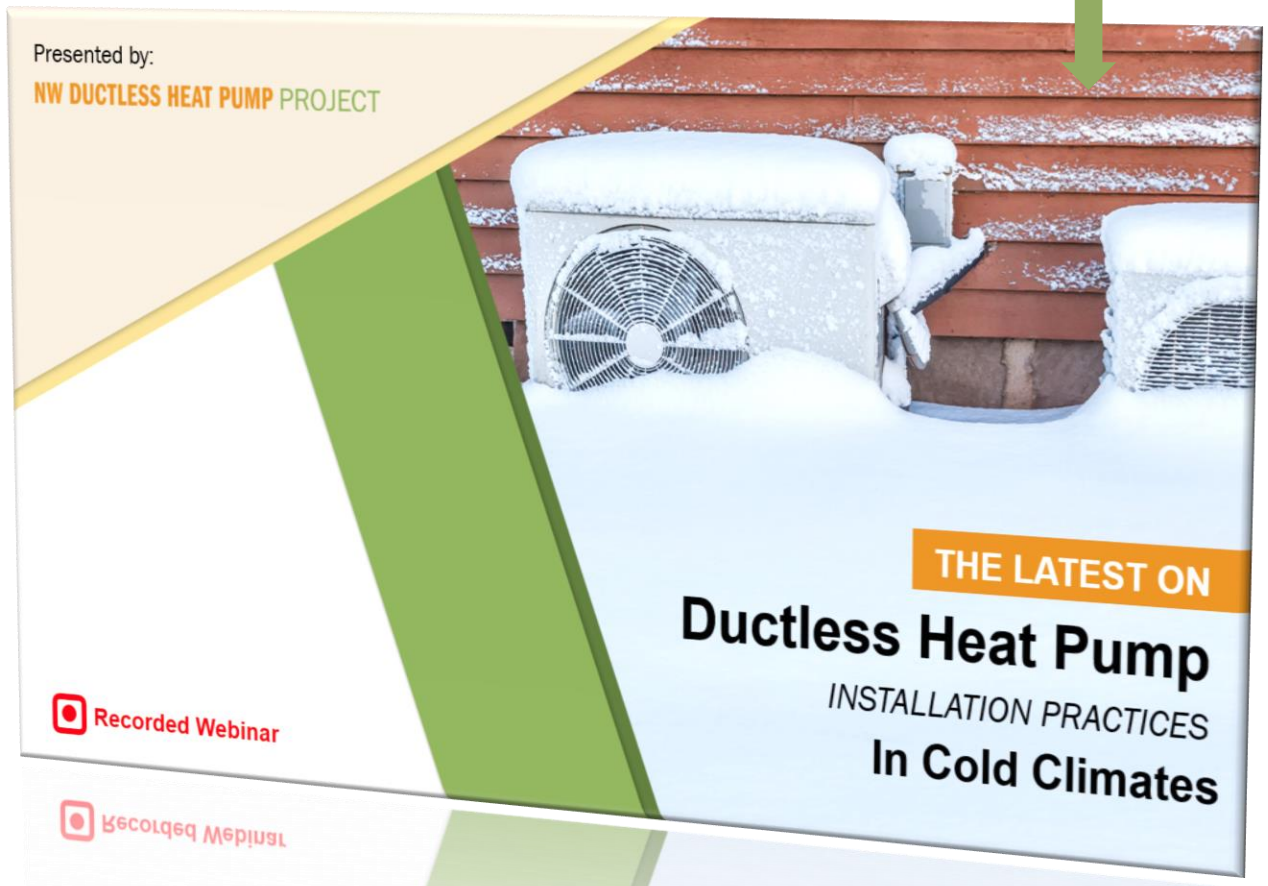
There is not a prescriptive set of recommendations.



Lean more about:

The Latest on Ductless Heat Pump Installation Practices in Cold Climates

Check out our video.



DUCTLESS
HEATING & COOLING SYSTEMS

Thank you!

For other great contractor resources and information, check out:
www.goingductless.com

HVAC
SIZING TOOL
www.HVACsizingtool.com

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