Presented by:

NW DUCTLESS HEAT PUMP PROJECT

HOW TO

SIZE & SELECT A

Ductless Heat Pump

FOR DISPLACEMENT APPLICATIONS

Recorded Webinar

WELCOME

to the webinar

About NEEA:

An alliance of utilities

NW DUCTLESS HEAT PUMP PROJECT

PRESENTER:

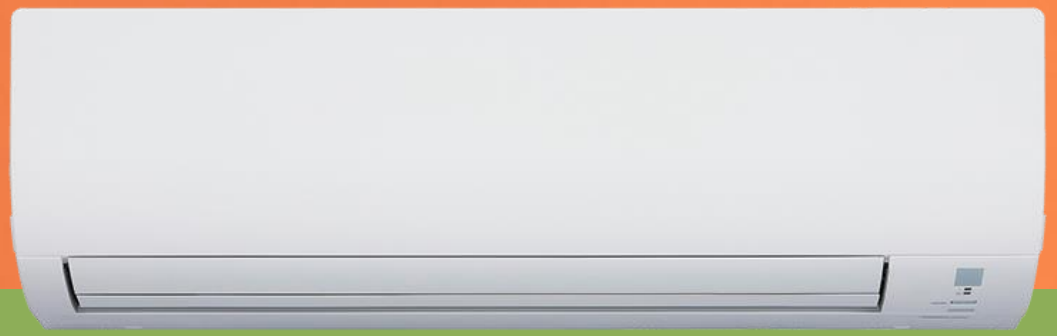
Jonathan Moscatello

Consultant for Utilities and HVAC Supply Chain

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

AGENDA

1. Why Load Calculation Matters
2. How We Save Electricity with Ductless Heat Pumps
3. Quick and Easy Load Calculation
4. Equipment Selection



As a contractor,

DO YOU RELY ON GUESS WORK?

For Quality Work:

- Without call backs
- With little or no warranty work
- With satisfied customers

Do it right...

from the start.

THE WINNING STRATEGY

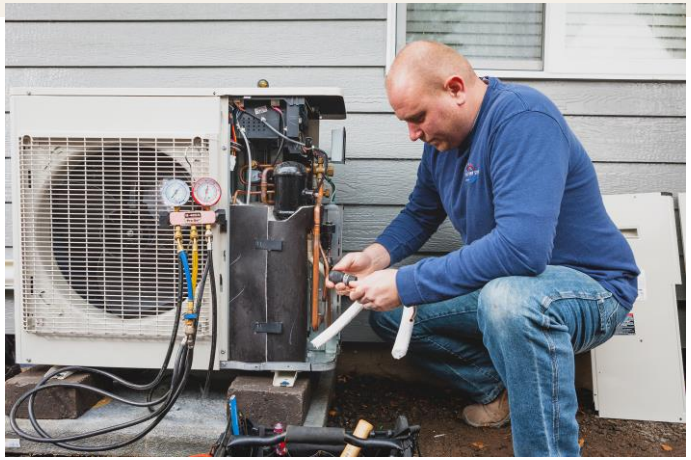
1. Always calculate the heating load.
2. Know when to use a “quick and easy” load calculation method (versus a complete load calculation).

LOAD CALCULATION METHODS

Overview

KEY Question

Q	**What sizing method to use?**
A	*Depends on the type of project or the need*
Displacement of existing heat	= quick & easy load calculation
Small addition or single room	= quick & easy load calculation
New construction installation	= complete load calculation
Whole-home system ***replacement***	= complete load calculation



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How we get **ELECTRICITY SAVINGS** with **DUCTLESS HEAT PUMPS**

The displacement of expensive electric resistance heating

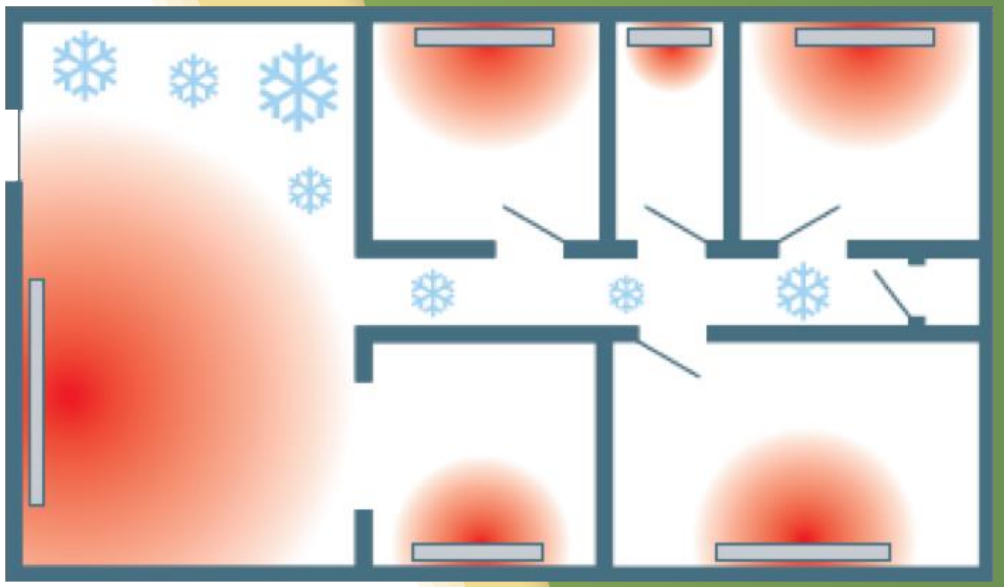
DISPLACEMENT APPROACH

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.



NW DUCTLESS HEAT PUMP PROJECT

DISPLACEMENT APPROACH

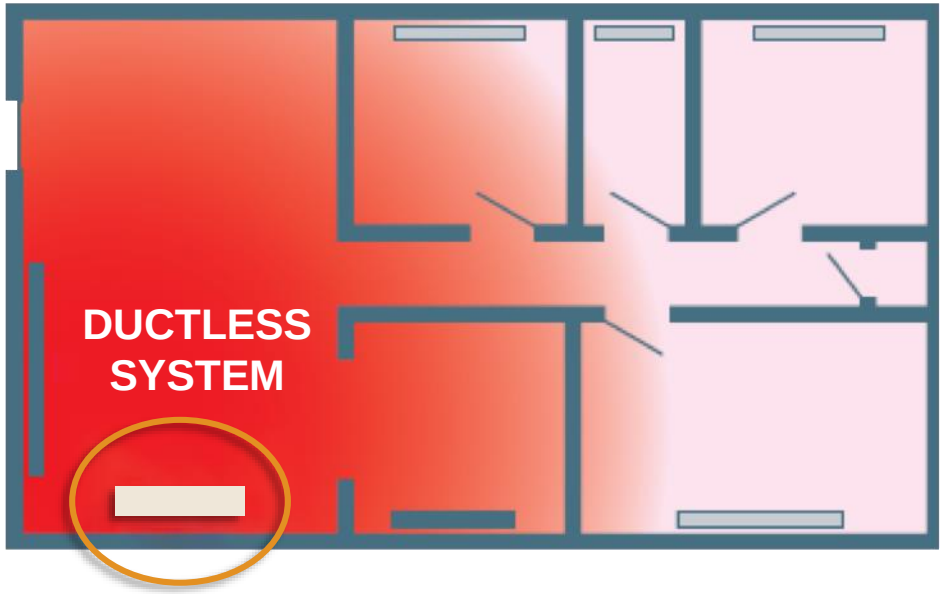
Using a ductless system

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.

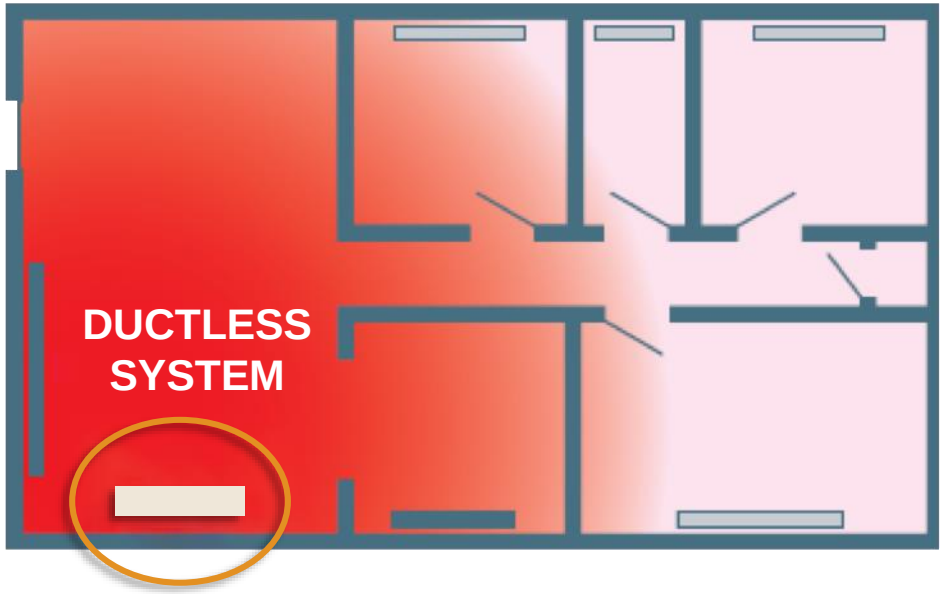


DISPLACEMENT SOLUTION:

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

DISPLACEMENT APPROACH

Using a ductless system



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.

Quick & easy

LOAD CALCULTION

Sizing & selection when displacing the existing heating source

Quick & easy

LOAD CALCULTION FOR DISPLACEMENT APPLICATIONS

Makes use of an innovative table of factors.

Heating Load Factors

INSULATION TYPE	Climate (Design Temperature F)			
	BELOW -10˚ F	-10˚ F to 5˚ F	5˚ F to 20˚ F	ABOVE 20˚ F
	Btuh/sq.ft.			
No-wall Insulation	47	41	35	27
2x4 Construction w/ Insulation	25	22	19	14
2x6 Construction w/ Insulation	18	15	13	10
New Construction (Post 2012)	16	14	12	9

Quick & easy

LOAD CALCULTION FOR DISPLACEMENT APPLICATIONS

Columns represent winter design temperature.

- Choose the column with the winter design temperature that most closely applies to the home's location.

Heating Load Factors

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Quick & easy

LOAD CALCULTION FOR DISPLACEMENT APPLICATIONS

Rows represent insulation & weatherization values.

- Choose the row that most closely applies to the home's level or insulation.

NOTE: *Windows and many other factors are relevant, and we include consideration of these in the row.*

Heating Load Factors

INSULATION TYPE	Climate (Design Temperature F)			
	BELOW -10˚ F	-10˚ F to 5˚ F	5˚ F to 20˚ F	ABOVE 20˚ F
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Quick & easy

LOAD CALCULTION FOR DISPLACEMENT APPLICATIONS

Steps:

1. Calculate floor area of living room (or main living area).
2. Determine the Heating Load Factor (BTUs / ft^2) to use.
3. Multiply floor area by the load factor to get the heating requirement.
4. Select equipment that produces at least the load.

Heating Load Factors

INSULATION TYPE	Climate (Design Temperature F)			
	BELOW -10˚ F	-10˚ F to 5˚ F	5˚ F to 20˚ F	ABOVE 20˚ F
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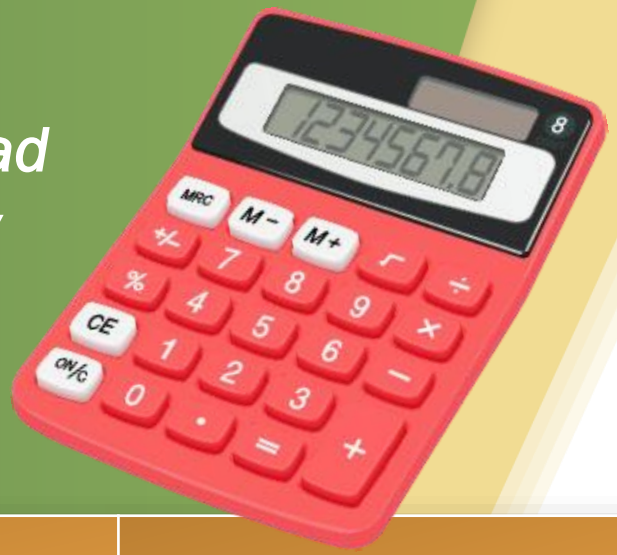
DISPLACEMENT APPROACH

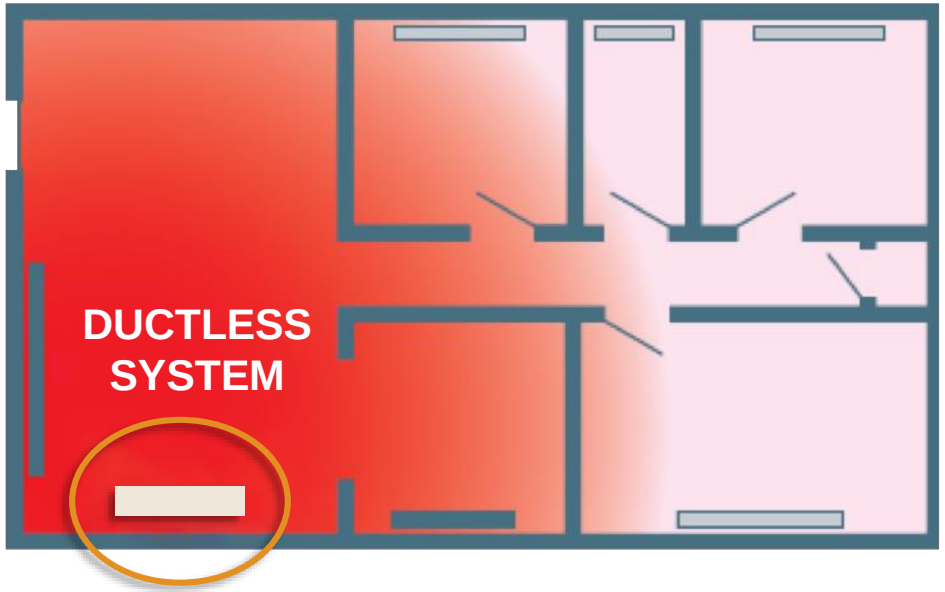
Using a ductless system

HOW TO

Calculate heating load using a quick & easy calculation



STEPS	EXAMPLE
1. Calculate Floor Area of living room (or main living area)	500 ft^2
2. Determine Heating Load Factor (BTUs / ft^2) to use in calculation	1976 home with 20°F design temperature = **29 BTUs/ft^2**
3. Multiply both numbers to get heating requirement at 20°F	500 ft^2 x 29 BTUH/ft^2 = **14,500 BTUH**
4. Select equipment that produces at least 14,500	(see next slide)



DISPLACEMENT SOLUTION:

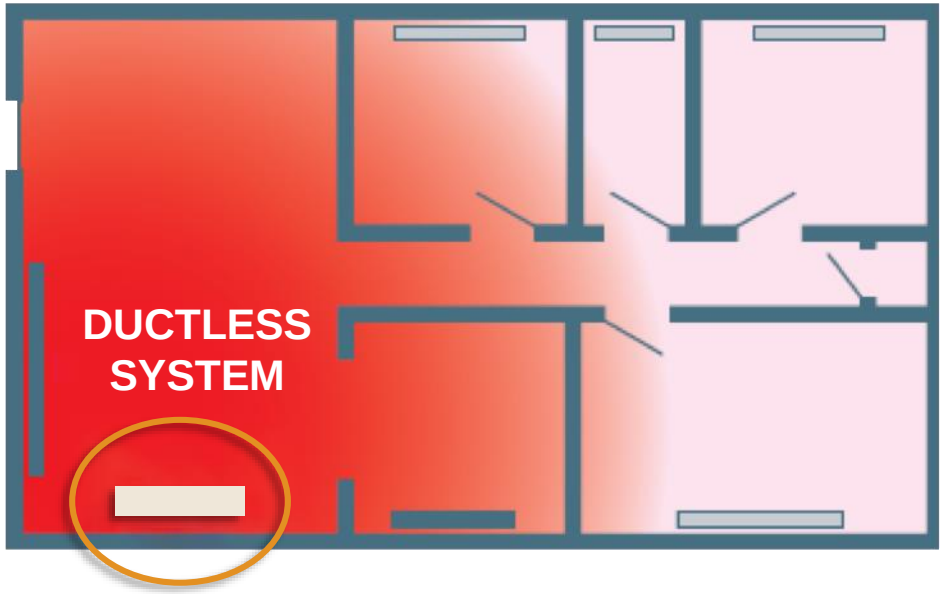
Single-head ductless system in primary living area; baseboards remain in place as backup.

DISPLACEMENT APPROACH

Using a ductless system

Select the ductless equipment to satisfy the heating requirement

Manufacturer's Performance Data	Max Capacity at 17° F	Heating Capacity Range at 47° F
Mitsubishi FH15	18,000 BTU/H	5,150 - 24,000 BTU/H
Daikin Aurora 12	15,300 BTU/H	4,400 – 13,300 BTU/H
Carrier Infinity 9	15,690 BTU/H	3,100 - 19,000 BTU/H
Fujitsu 9 RLS3	16,000 BTU/H	3,100 - 22,000 BTU/H
LG ArtCool Premier 12	14,650 BTU/H	1,023 - 22,178 BTU/H



DISPLACEMENT SOLUTION:

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

DISPLACEMENT APPROACH

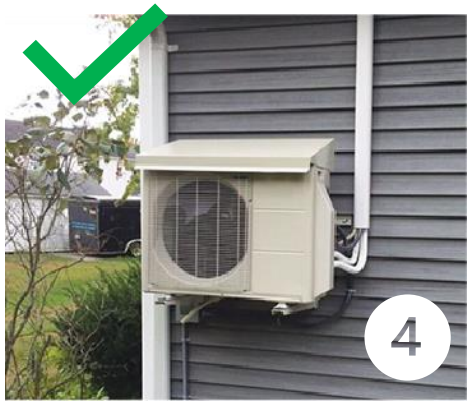
Using a ductless system

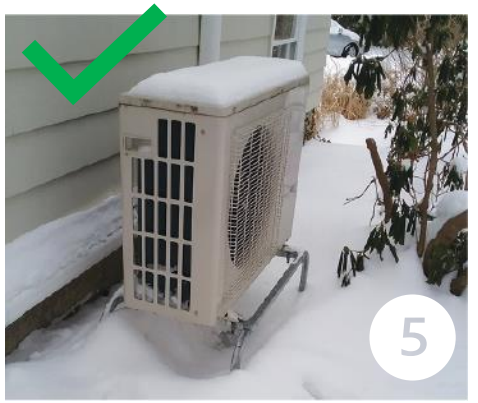
The same process works for single rooms and additions, too!

Whole homes and multiple room additions require a complete load calculation.

Remember to use

RECOMMENDED “COLD-CLIMATE” INSTALLATION PRACTICES





Getting more savings out of

DUCTLESS HEAT PUMPS

Always 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.

NW DUCTLESS HEAT PUMP PROJECT

Great Installation Resources Available

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/nwdhpp-cc-dhp-recommended-install-practices-2020-09-21.pdf

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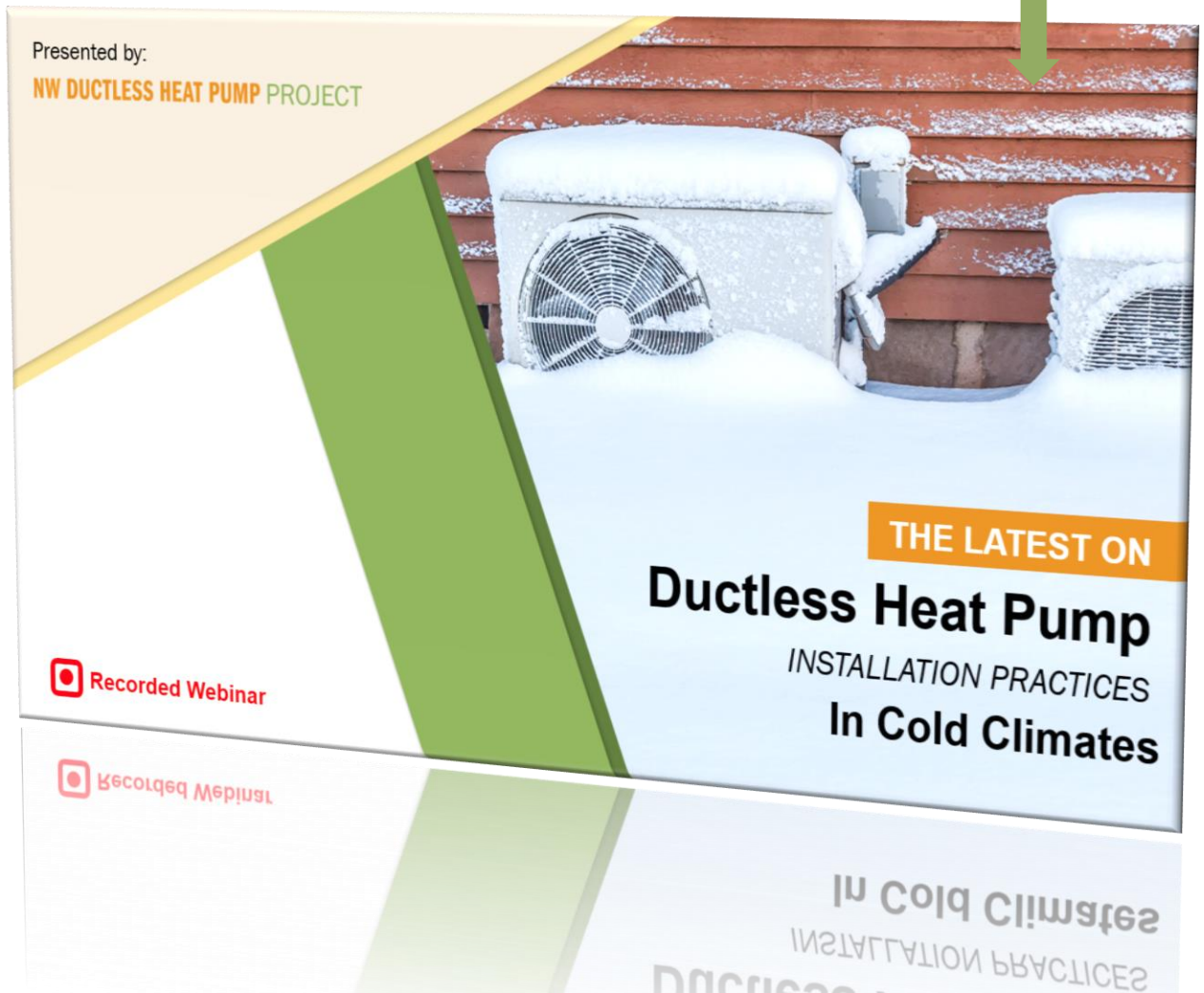
Lean more about:

The Latest on Ductless Heat Pump Installation Practices in Cold Climates

Check out our video.



DUCTLESS
HEATING & COOLING SYSTEMS

Thank you!

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

Check out free load calculation software from

HVAC SIZING TOOL

www.HVACsizingtool.com

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