

# Mini-Split Heat Pumps

For the Kenai Peninsula

November 4, 2019

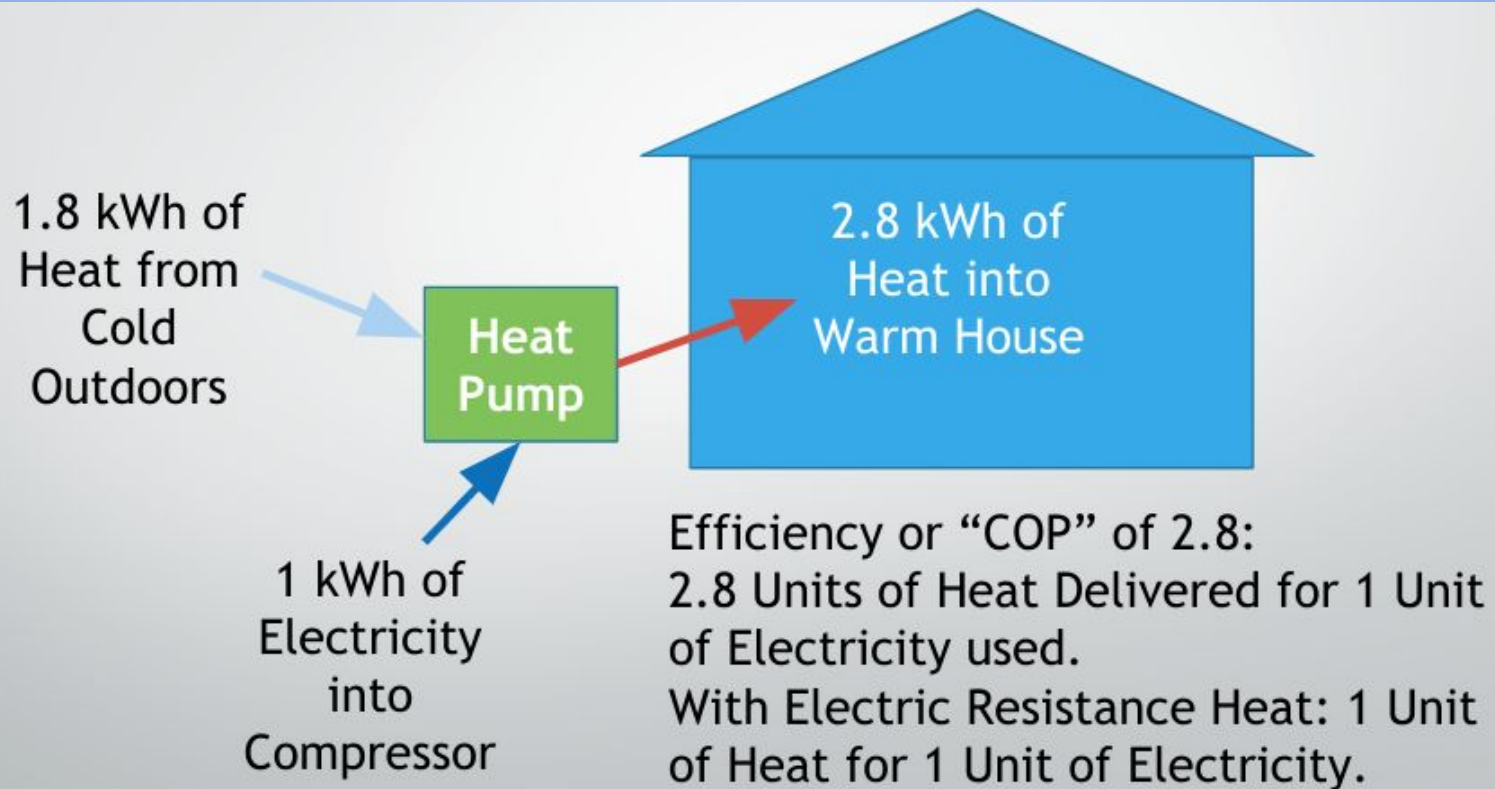
Presentation Available at: [bit.ly/HEA-heat-pump](https://bit.ly/HEA-heat-pump)

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# Our Background in Heat Pumps

- Installed and Monitored Three Heat Pumps in Seward
- On REE Board who sells Gree Heat Pumps
- Lead Author on Alaska Heat Pump Study
  - HEA was a Primary Sponsor
  - Built Online Heat Pump Calculator for Alaska
  - Study Reports: <http://analysisnorth.com/pages/projects.html>

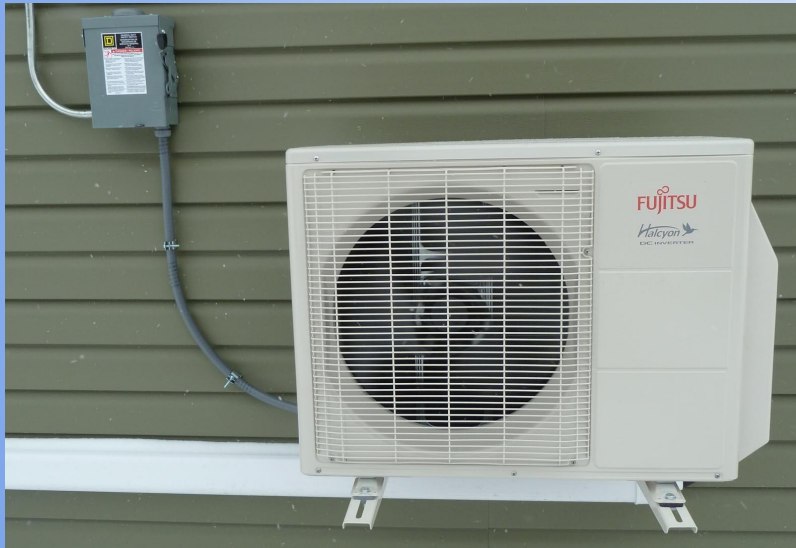
# A Heat Pump uses Electricity to Move Heat from Cold to Warm



# Uses and Types of Heat Pumps

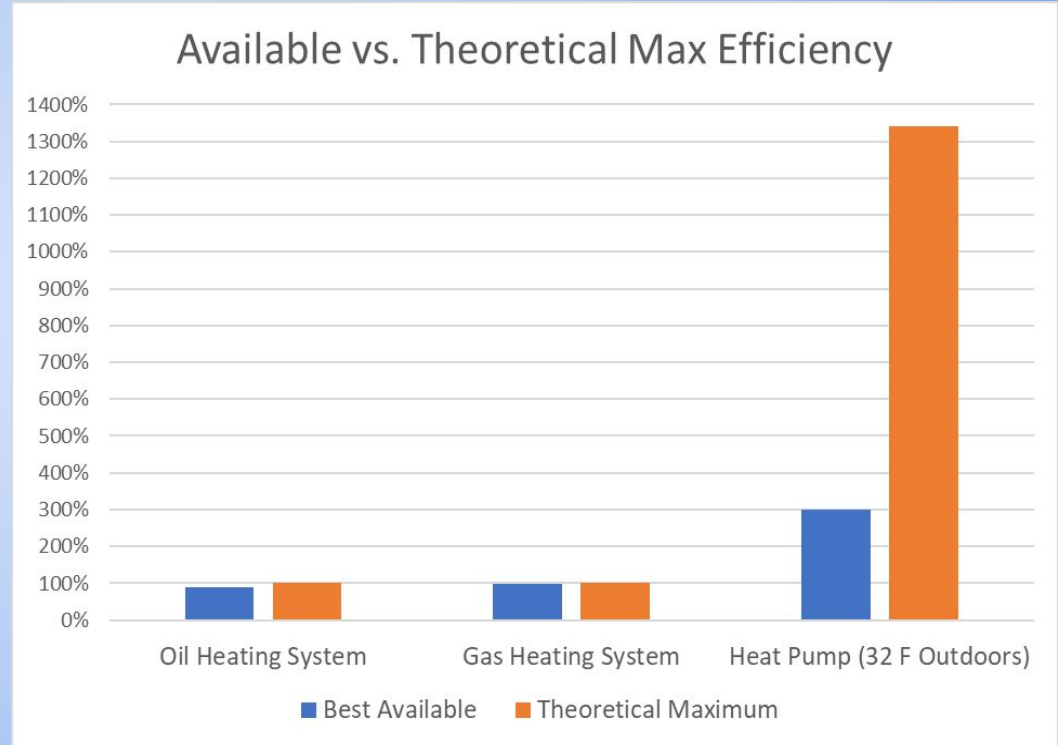
- Used to Heat Buildings, Domestic Water, Swimming Pools
- Types of Heat Pumps
  - Air-to-Air
    - Ductless Mini-Split - **Today's Focus**
    - Ducted Unit
  - Air-to-Water
    - One type: Heat Pump Domestic Hot Water Heaters
  - Ground-to-Air
  - Ground-to-Water

# Mini-Split Heat Pump: Outdoor & Indoor Unit



# Future Trends

- Future Efficiency Improvements Possible
- Electric Grid is Getting Cleaner & Renewable
- More than 100% Efficient converting HEA Generator Fuel to Home Heat !!



# Reduced CO2 Emissions

- HEA Powered Heat Pump: Substitutes Efficient Natural Gas-produced Electricity for Heating Fuel
- CO2 Savings, if You Heat with:
  - Oil: **45%** Reduction
  - Propane: **34%**
  - Electric Resistance: **65%**
  - Natural Gas: **20%**



# Why Mini-Split Heat Pumps Here?

## Pros

- Less Expensive to Run than Electric, Propane and Oil Heat
- No Fuel Storage and Handling
- No Combustion in your House
- Low Maintenance
- 2 - 3 x more efficient than Conventional Electric Heat
- Can Provide Air Conditioning

## Cons

- \$3 - \$5,000 Cost, Single Head
- No Domestic Hot Water
- Limited Heat Distribution.  
Multiple Heads = \$\$
- Reduced Output and Efficiency at Cold Outdoor Temperatures



# Heat Pump Water Heater

- More than 3 times as Efficient as Standard Electric Water Heater
- BUT, Hidden Cost: Takes Heat from your Home that Needs to be Replaced in the Winter.
- Noise Level like an Older Refrigerator
- **Savings from Replacing Electric Water Heater**
  - If Heat w/ Oil, Wood, Heat Pump: Save **\$430/year**
  - If Heat w/ Propane: Save **\$250/year**
- **Savings from Replacing Propane Water Heater**
  - If Heat w/ Oil, Wood, Heat Pump: Save **\$380/year**
  - If Heat w/ Propane: Save **\$200/year**
- **Replacing Oil Water Heater: Similar Energy Cost**



# How to Pick a Heat Pump

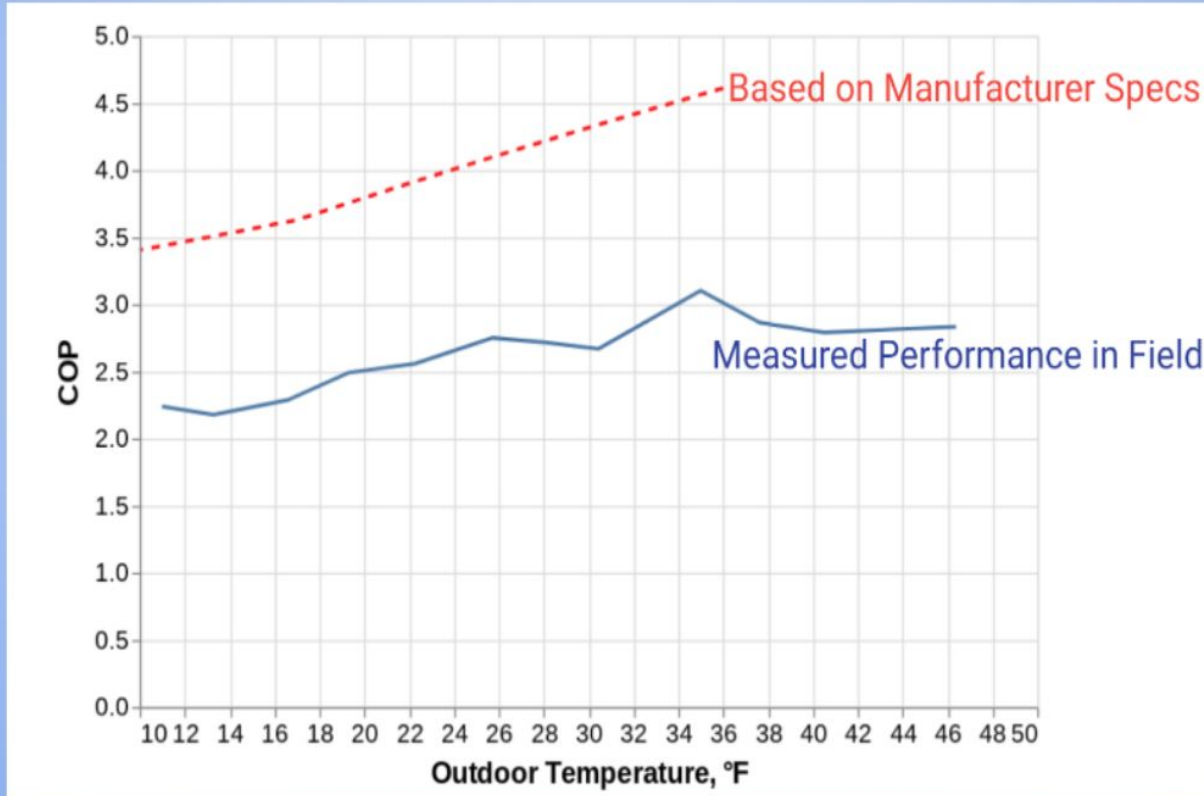
- Popular Brands: Mitsubishi, Fujitsu, Panasonic, Daikin, Gree
- Efficiency: Measured by “HSPF”

## Heating Seasonal Performance Factor

- Want Single Indoor Head Unit with HSPF more than 12.0
- With Multi-Head Units, want HSPF more than 10.0
- Sizing
  - Are more Efficient at Part-Load
  - But, Less Efficient if they have to Cycle
  - See Heat Pump Contractor or Heat Pump Calculator for Help

# Don't Believe Manufacturer Specs

Kaluza Fujitsu Heat Pump



# Installation of Heat Pumps

Mini-Split Installation Video:

[www.greecomfort.com/resources/dealer-resources/installation-video/](http://www.greecomfort.com/resources/dealer-resources/installation-video/)

Pictures of Installations: [bit.ly/HEA-hp-pictures](http://bit.ly/HEA-hp-pictures)

# Slam Dunk Economics:

Avoiding Electric Heat and Propane

(Does Not Pay Back for Natural Gas Heat)

# Simple Economic Calculation

What is the Equivalent Oil Cost when using a Heat Pump?

Take the **Electricity Price times 11.0**

HEA Residential:  $\$0.22/\text{kWh} \times 11.0 \text{ kWh/gallon} = \mathbf{\$2.42 / gallon of Oil}$

Compare to the Current Oil Price of  $\mathbf{\$2.58 / gallon}$ . You **Save \$0.16 / gallon.**

If  $\$3/\text{gallon Oil}$  ---> **Save \$0.58/gallon**; If  $\$0.17/\text{kWh Electricity}$  ---> **Save \$0.71/gal**

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What about **Propane**?

Take **Electricity Price times 7.3**

$0.22/\text{kWh} \times 7.3 \text{ kWh/gallon} = \mathbf{\$1.61 / gallon of Propane}$

Compare to the Current Propane Price of  $\mathbf{\$2.79 / gallon}$ . **Save \$1.18 / gallon**

# More Detailed Alaskan Heat Pump Calculator

HEA and Others Helped us Build an Online Heat Pump Calculator:

**Online Address:**

**<https://heatpump.cf>**



# Resources

Heat Pump Calculator: <https://heatpump.cf>

Alaska Mini-Split Heat Pump Study: <http://analysisnorth.com/pages/projects.html>

Department of Energy Heat Pump Page: <https://www.energy.gov/energysaver/heat-and-cool/heat-pump-systems>

Cold Climate Housing Research Center Heat Pump Page: <http://www.cchrc.org/heat-pumps>

NEEP Cold Climate Heat Pump Resources

Product List:

<https://neep.org/initiatives/high-efficiency-products/emerging-technologies/ashp/cold-climate-air-source-heat-pump>

Installer Resources:

<https://neep.org/initiatives/high-efficiency-products/air-source-heat-pumps/air-source-heat-pump-installer-resources>