Efficiency Works™

Estes Park | Fort Collins | Longmont | Loveland

# 2024 Home Performance Summit

**July 31st, 2024**

# Safety minute and house keeping items

**Food and beverages**

- Help yourself throughout
- Garbage cans in the back

**Restrooms**

- Outside the rear doors

**Guest check-in and public area**

- All guests should have checked in at the security desk and received a visitor badge
- Visitors must stay in the public area unless escorted by a Platte River employee

**Emergency protocols in the Energy Engagement Center**

- Emergency exits
- Meeting location/find a Platte River employee

# Agenda

**Introductions**

**2024 program updates**

**What is Home Performance?**

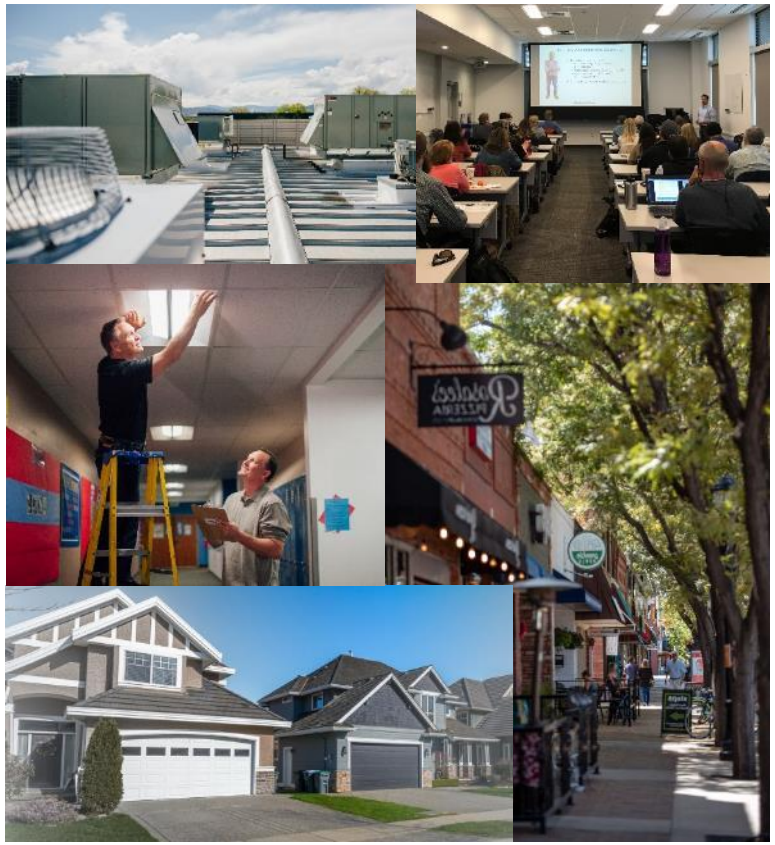
**Building Science**

**IRA/Tax Credits**

**Feedback from the field**

**Real world examples**

# Efficiency Works overview

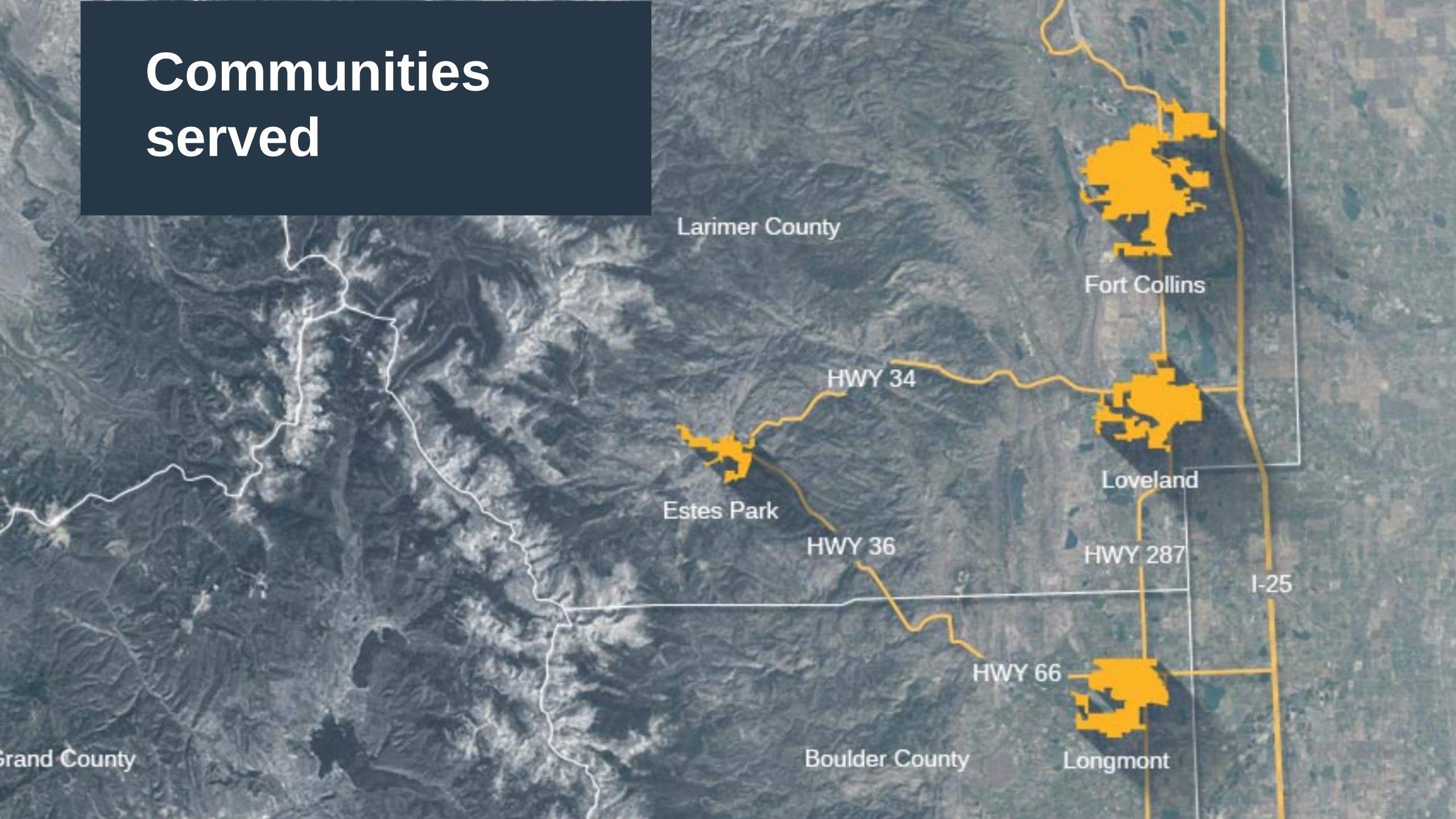


## What is Efficiency Works?

- Efficiency Works unites the energy and water efficiency offerings of the northern Colorado utilities of Estes Park Power and Communications, Fort Collins Utilities, Longmont Power & Communications, Loveland Water and Power and Platte River Power Authority.

- The most sustainable way to use energy is to use as little as necessary to meet your needs. Efficiency Works offers home and business energy advising to help you save energy, water and money.

# Communities served



# 2024 program updates

**30 minutes**

# Key program adjustments

## New offerings

- Service panel upgrade = $500
- Whole Home Upgrade bundling bonus = $500
- Rental 3x rebate bonus

## Offerings ending:

- Air conditioning rebate ended July 1st

# Air Conditioner rebate ending

## Submission protocol

- You have 45 days to submit the rebate following installation.
- We will accept AC rebate applications up through August 14th 2024.
- Any Terms and Conditions submitted for rebates signed after July 1st will not be accepted.
- Please reach out to the Program Manager if you have any of these to submit.

# New rebates

## Panel Upgrade rebate

**Eligibility:**
Any panel upgrade to 200 amps for preparing for electrification.

**Required Documentation:**

- Receipt from electrical contractor
- Photo documentation of the completed install
- Statement of intent:
  - Ex: adding air source heat pump, ground source hp, ductless mini splits, or HPWH

**Rebate Amount**: $500

# New rebates

## Bundling rebate

**Eligibility:**
Any customer that completes an eligible envelope and heat pump measure within 6 months of each other*.

**Eligible Measures:**

Envelope

- Insulation & Air Sealing  - all measures
- Windows & Doors – all measures

Heat Pumps

- Tier 1 ASHP, Tier 2 ASHP, Ductless mini-splits, Ground source heat pump

**Rebate Amount**:
$500 (one time annually) while funds last

This will happen automatically in our system.

**This rebate will retroactively look back to January 1st, 2024, for a possible first project.*

# New rebates

## Bundling example

**Ex:**
**Job 1:** The Smith residence has insulation and air sealing work done on January 1st.

**Job 2:** The Smith residence has a ductless mini split installed in March of the same year.

When the second job is completed, our software will identify the eligibility for a bundled rebate. If everything in the application meets program specifications an additional $500 rebate will be issued to the customer. A notification about this will be sent to the customer only.

If both eligible measures* show up in the same application, they will qualify for a bundling rebate.

**If the two measures show up more than 6 months apart, the customer will not be eligible for the bundling bonus*

# Homes program changes July 1st, 2024

## A new Rental Bonus 3x rebate

**Eligibility:**
Any rental property

**Eligible measures:**

All measures

**Additional requirement:**

Preapproval must be applied for and received **PRIOR** to work beginning

**Rebate amount**:
3x the original earned rebate while funds are available

**Rebate timeline:**

July 1st 2024 - until budget allows

# Homes program changes July 1st, 2024

## Preapproval process

**Step 1)**

Submit a rebate preapproval application prior to beginning work.

**Step 2)**

The EW team to review and declare a decision within 2 - 4 business days.

This new process will also include the Efficiency Works Homes team calling the customer to verify project details prior to granting preapproval.

**Ex details:**

- Confirm relationship to service provider (Are you working with ABC Heating and Cooling?)
- Project scope
- Projected cost
- Projected timelines

# Homes program changes July 1st, 2024

## Preapproval process

**Step 3)**

Once an application has been preapproved, a notification will go out to the service provider.

**Step 4)**

The service provider moves forward and completes the work.

**Step 5)**

When completed, the service provider returns to their portal to complete the Project Update*.

**Step 6)**

If the application meets all programmatic specifications the rebate will be approved.

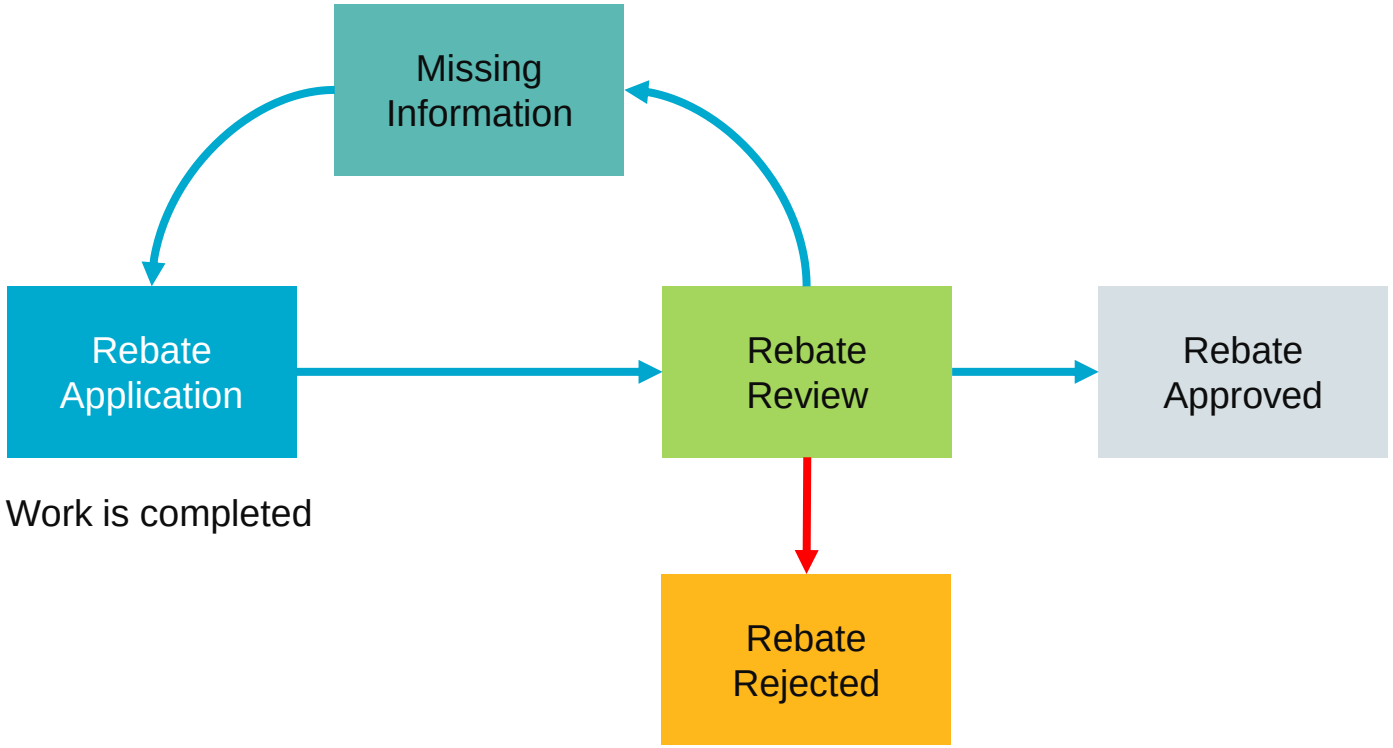
**Any variance of more than 10% of the original preapproved amount will have to be preapproved again or the project will be capped at 110% of the original amount.*

# Legacy application process

Service Provider Forms

Efficiency Works Forms

## Submit and review for final payment

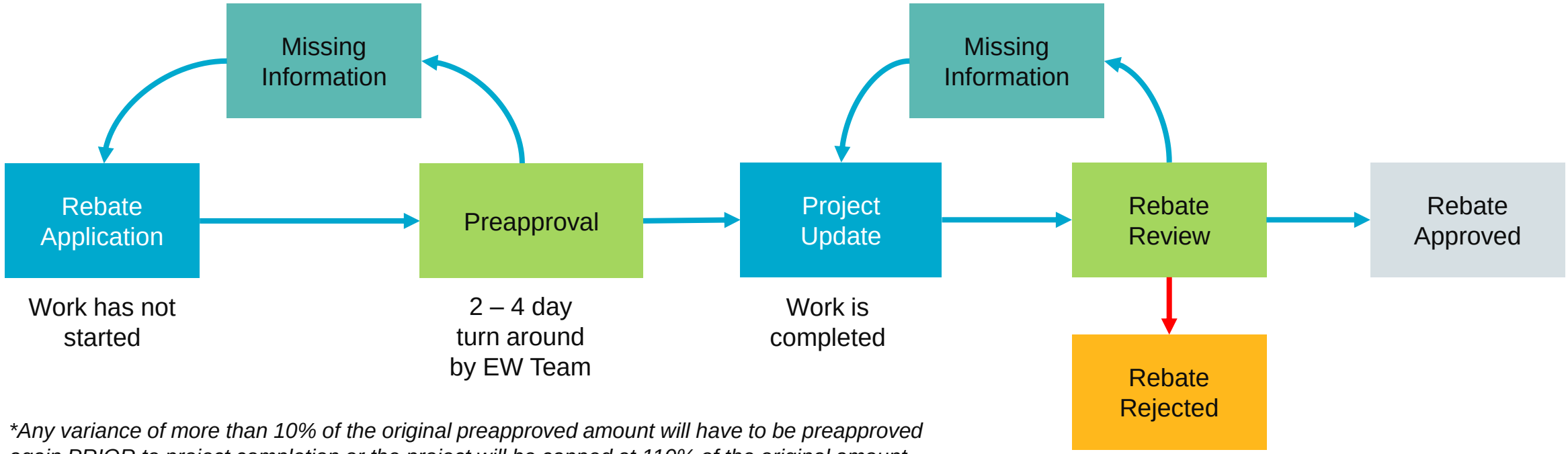


# New preapproval process

Service Provider Forms

Efficiency Works Forms

## Submit for preapproval




**Any variance of more than 10% of the original preapproved amount will have to be preapproved again PRIOR to project completion or the project will be capped at 110% of the original amount.*

# New educational materials

30 min

# Homes rebate journey

10 min

Efficiency Works™ Homes

# Homes rebate journey

Visit **EfficiencyWorks.com/Homes** to get started!

## 1 Eligibility

To qualify, you **must** be a residential electric customer of Estes Park Power and Communications, Fort Collins Utilities, Longmont Power & Communications or Loveland Water and Power.

Own a single family detached home or multifamily units (4 or less per building) are eligible. **Home must be at least one year old.**

## 2 Assessment

For insulation, air sealing, windows, and doors, an assessment is necessary. However, an assessment is not required for HVAC.

## 3 Inform

Ensure you are working with an Efficiency Works listed service provider to ask about available rebates for your home.

## 4 Pre-approval

Certain rebates or bonuses may be subject to pre-approval requirements, verify with a listed service provider.

Visit **EfficiencyWorks.com/Homes** to get started!

## Work completed!

## 5 Work with your service provider

Once you start working with your Efficiency Works service provider, you will be asked to sign the following documents once work is completed:

**Terms and Conditions**

**Certificate of Completion**

**Health and Safety Liability Form**

## 6 Rebate application submission

Your service provider must submit your rebate application within 45 days of completion; you do not need to submit it yourself. You will receive an email notification once it has been submitted.

## 7 Approval

Our Efficiency Works Homes program manager will approve your application after it has been submitted by your service provider. You will receive an email notification once approved.

Visit **EfficiencyWorks.com/Homes** to get started!

Efficiency Works™ Homes

# 8 Payment

Our Efficiency Works Homes program pays out every two weeks. You will receive your rebate check in 4-6 weeks.

Ready to start your rebate journey?
**Visit EfficiencyWorks.org/Homes**

Have any questions? Contact us via email at **homes@efficiencyworks.org**

Visit **EfficiencyWorks.com/Homes** to get started!

# Whole home upgrade

10 min

Efficiency Works™ Homes

# Whole home upgrade

## Get an assessment!

We suggest that everyone should start with an energy assessment, which will assess the home for energy efficiency, comfort, electrification, and indoor air quality.

## Review assessment with an advisor

Once an assessment is complete, map out your whole home upgrade based on your goals.

**Renters:** Provide landlord with the results.

Visit **EfficiencyWorks.com/Homes** to get started!

## Windows

Consider installing Energy Star™ windows, you can be assured that your home will be quieter, more comfortable, and lower utility costs.

**Renters:** Consider covering cold/leaky windows with a Window Insulation Kit and/or window thermal curtains.

## Heat pump for home

Heat pumps represent the highest efficiency heating option available for your home.

**Renters:** Research/purchase a window unit or a portable heat pump.

## Insulation and air sealing

This area of work is typically the highest priority in most homes and can be the biggest factor in reducing your utility cost.

**Renters:** Engage landlord on assessment report for improvements. Purchase door seals and trims.

## Heat pump water heater

Consider a Heat pump water heaters as they are the most efficient way to heat the water in your home.

**Renters:** Provide landlord heat pump information.

Visit **EfficiencyWorks.com/Homes** to get started!

## Induction stove top

Induction stoves can provide precision temperature control, safer working surfaces, and a quicker cooking process.

**Renter:** Buy a portable induction plate.

**Note:** This does require cookware that a magnet can stick to, which includes cast iron.

## Panel upgrade

As each electrification journey is different, so are homes. A panel upgrade may be needed, contact a service provider for more information.

## EV charger

Level One charger plugs into a standard 120v outlet – *4-6 miles of range per hour.
Level Two requires a dedicated 240v circuit – *25-40 miles of range per hour outlet.

**Renters:** Ask the landlord for the potential installation of a Level 2 charger.

## Solar panels with storage

Using solar panels in conjunction with an all-electric home creates higher savings. Discuss with an advisor if your home is a good fit.

**Renters:** Send information and quotes to the landlord.

If solar is installed, a battery system is typically added to store created energy.

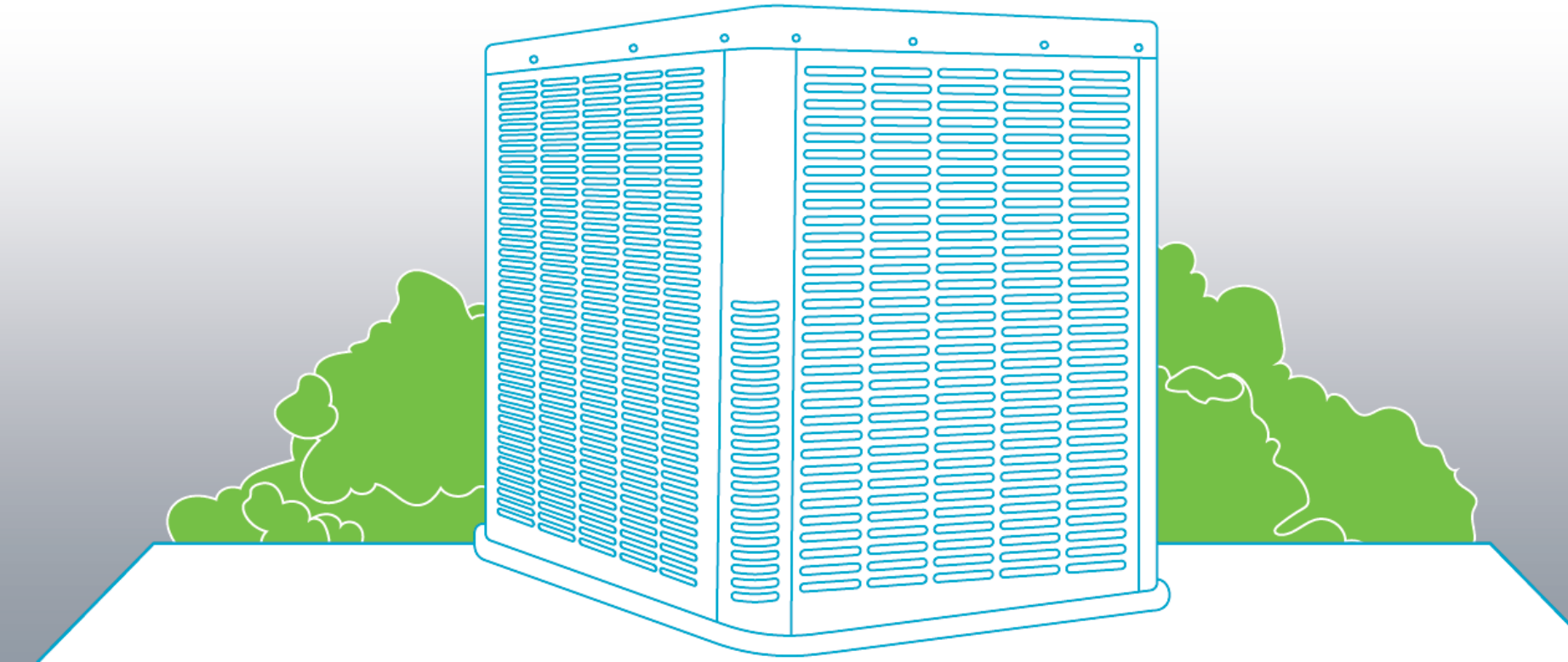
Visit **EfficiencyWorks.com/Homes** to get started!

# Understanding your heat pump

10 min

Efficiency Works™
Homes

# Understanding **your heat pump**




Choose a comfortable temperature for your heat pump to maintain and avoid frequent adjustments. Set it and forget it!

There will be new sounds, all of which are normal.

Heat pumps are designed to run for longer periods at a more efficient rate, unlike traditional systems that cycle on and off frequently.

**Did you know?** Heat pumps do not create heat. Instead, they move heat with a refrigeration cycle which allows it to be more efficient.

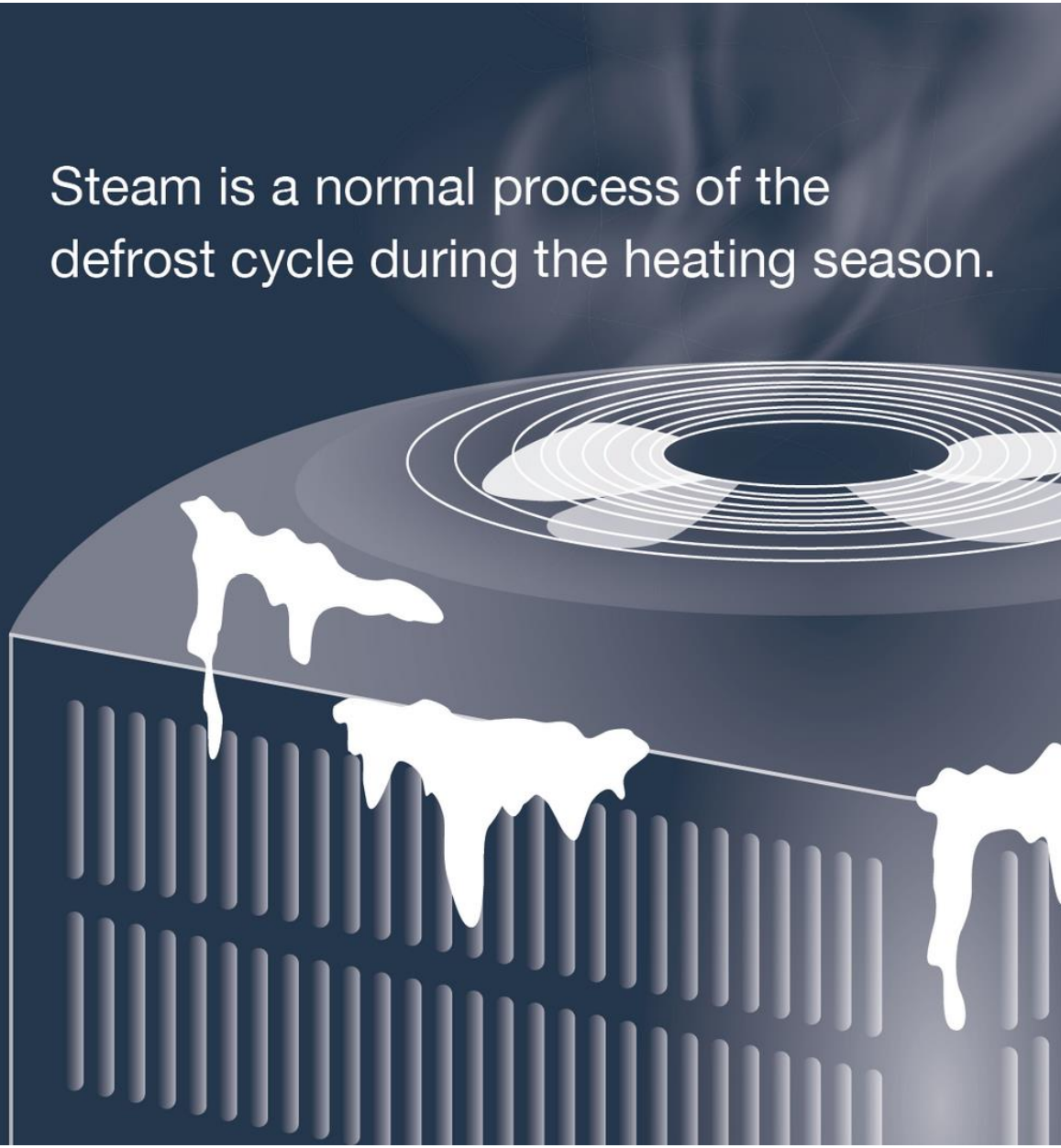
# Defrost cycle insights

A typical defrost cycle last between five to fifteen minutes during the heating season. Your heat pump may go through a few defrost cycles - which is normal.

During the defrost cycle, some systems experience a slightly cooler air stream until the cycle concludes.

As the frost is melted away, you may see steam shooting up into the air. This is normal and should not be confused with smoke.

Steam is a normal process of the defrost cycle during the heating season.



# Operations and maintenance

Ask your service provider about a smart thermostat to automatically adjust the temperature based on your schedule. This can help maximize energy savings without sacrificing comfort.

**Tip:** remember to check your system at least once every season to make sure it is well maintained.

# Operations and maintenance

- Clean or replace your indoor air filters every one to four months depending on your system.
- Be sure to keep plants and snow away from your outside unit. Maintain at least 24 inch clearance on all sides.
- Do not try to hide or cover the outdoor units. (ex: under a porch)

**Did you know?** Furnaces produce air temperatures around 130°F.

Heat pumps produce air temperatures around 105°F.

Have specific questions about your system? Contact your service provider.

Have questions about Efficiency Works? Contact us at **homes@efficiencyworks.org**

# Comfort Science 101

20 min

# Building science


## The house as a system

- Building science is the physics of how a house operates
- All building components interact with one another
  - HVAC
  - Insulation & Air Sealing
  - Windows

# 2nd law of thermodynamics

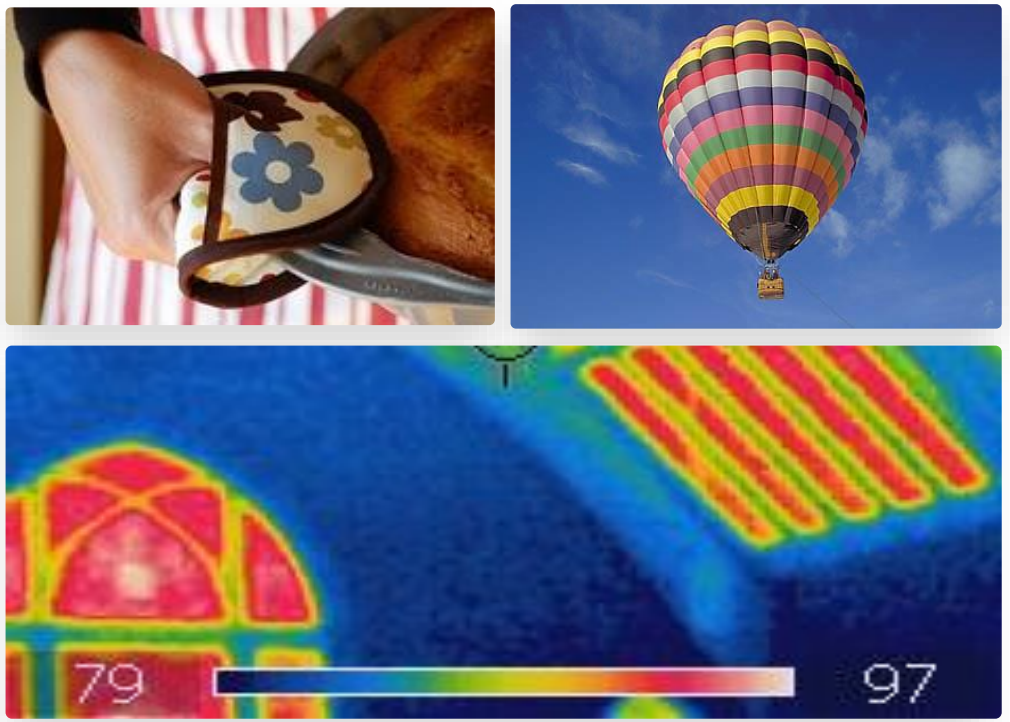
## The house as a system

- Energy will always flow in a predictable manner
  - High to low
- Heat = hot moves to cold
- Moisture = wet moves to dry
- Air = high pressure moves to low pressure

# Heat moves three ways

## The house as a system

- Conduction = objects must be touching
- Convection = air movement
- Radiation = occurs when two surfaces with differing temperatures can “see” each other



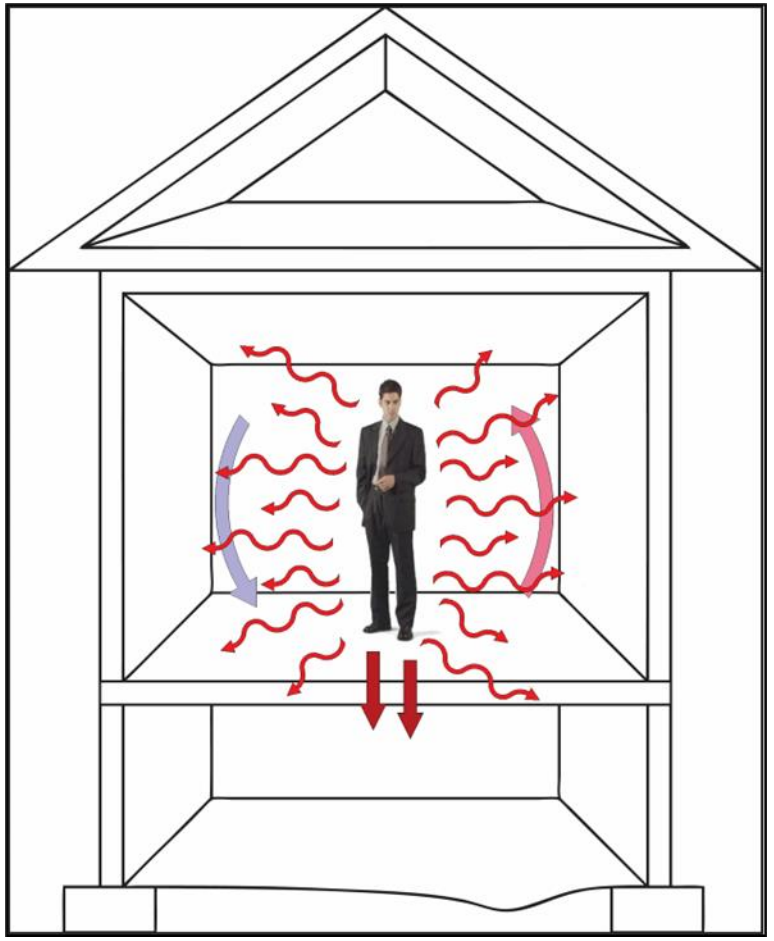
# Human comfort

## The house as a system

Many factors influence comfort:

- **Radiant temperatures**
- Air temperature
- Relative humidity
- Air movement
- Activity levels
- Clothing

**Thermal comfort** is the condition of mind that expresses subjective satisfaction with the thermal environment
*ASHRAE 55*



# Defining envelope

## The house as a system

- The boundary that separates conditioned space from unconditioned space.
- The building envelope is comprised of a **pressure boundary** (air barrier) and a **thermal boundary** (insulation), which should both be **continuous** and **touching** one another

# Good envelope

## The secret formula

- Air barrier is touching the insulation barrier

# Poor envelope configuration

## Web floor trusses

- Envelope = air barrier + insulation (touching)
- Batt insulation is over 12” away from the floor
- Practically uninsulated
- Needs to be dense-packed
- Will cause comfort problems above
- This is why we dense-pack floors over the garage

# Poor envelope configuration


## TGI laminated floor trusses

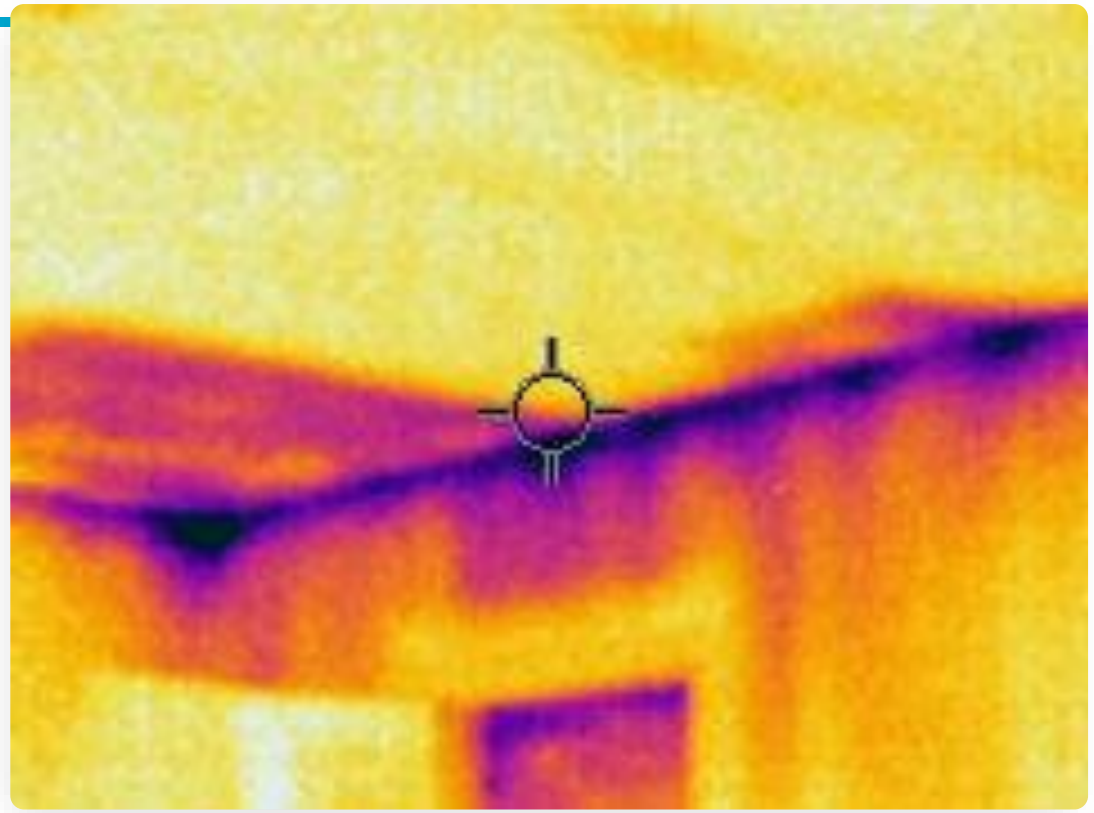
- Batt insulation is over 12” away from the floor
- Insulation is too skinny for bay
- Practically uninsulated
- Needs side-stapled webbing
- Will cause comfort problems above

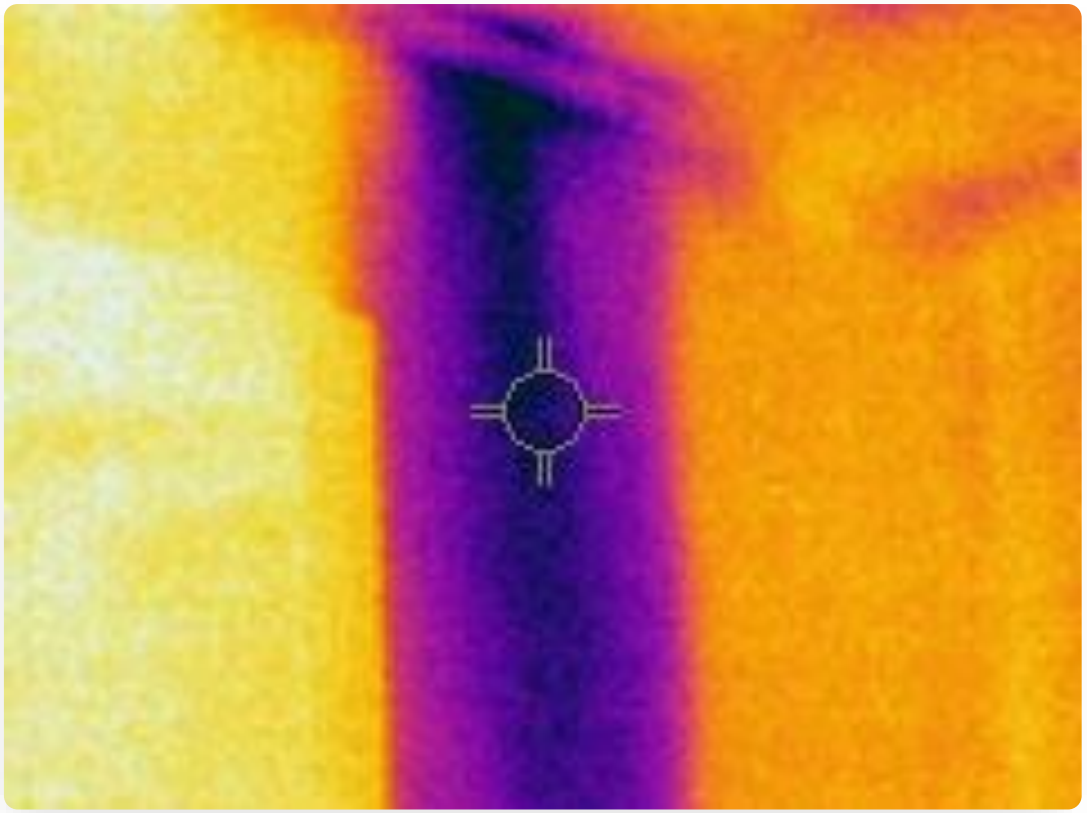
# Leaky top plates

## Air infiltration

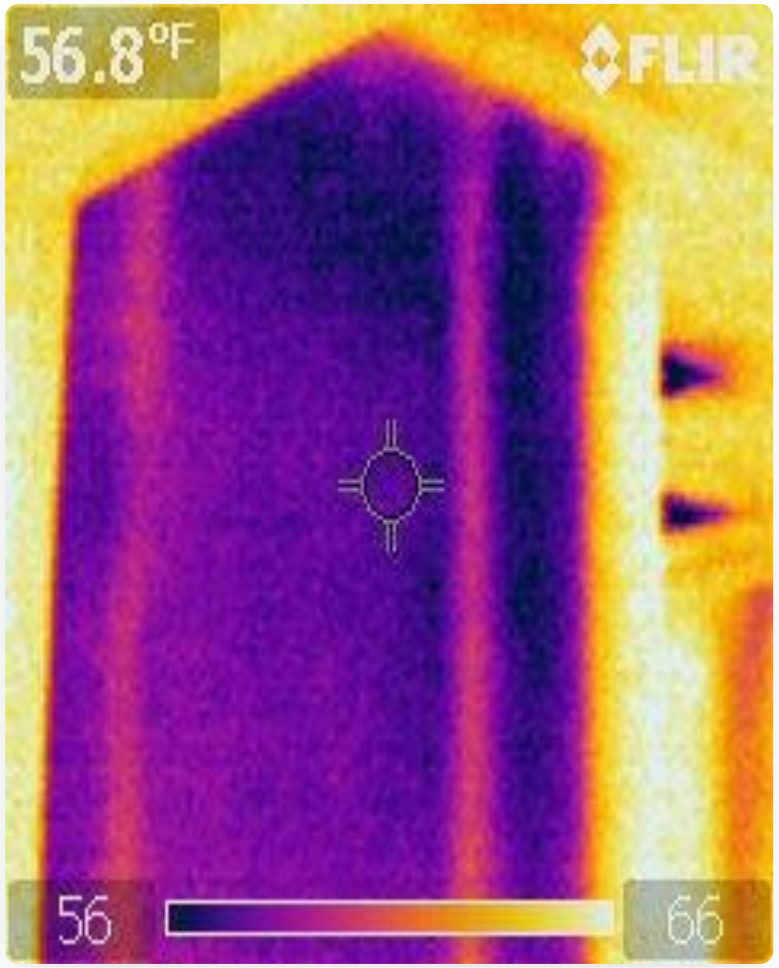
- Plumbing
- Electrical
- HVAC
- Drywall gaps

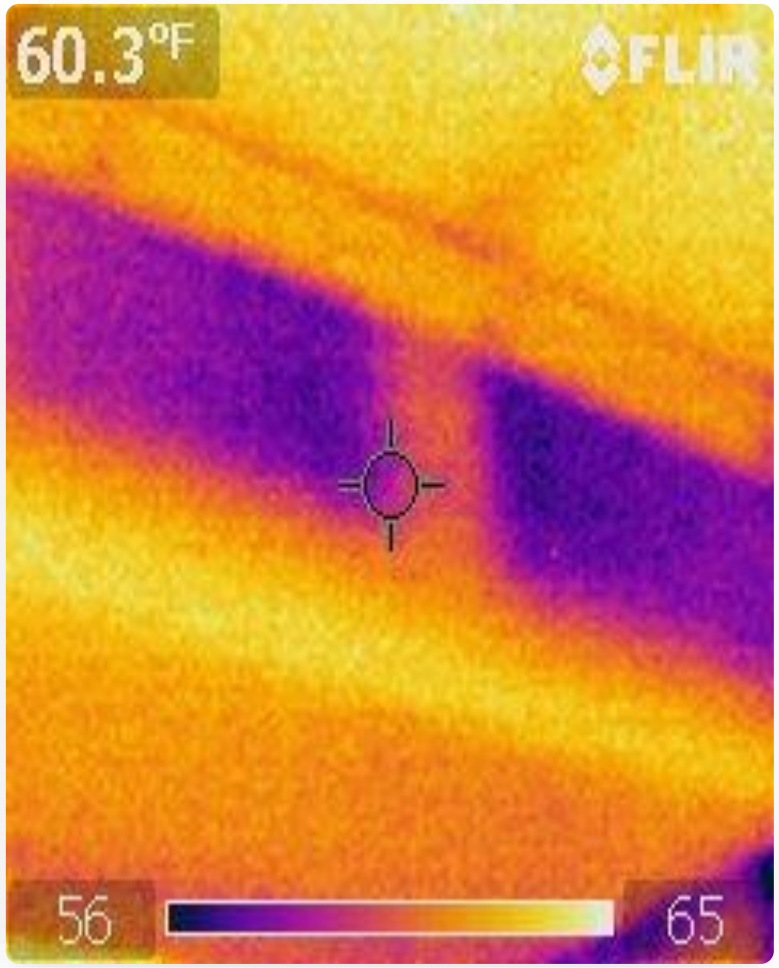
# Air movement in exterior walls



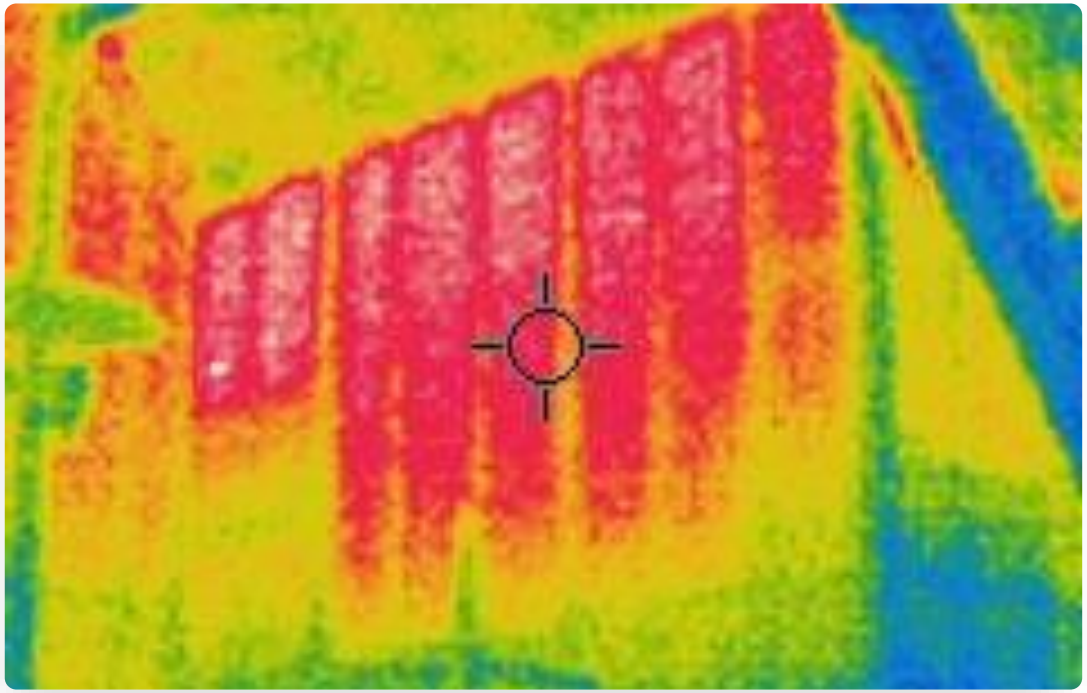


# Wet walls and dropped soffits

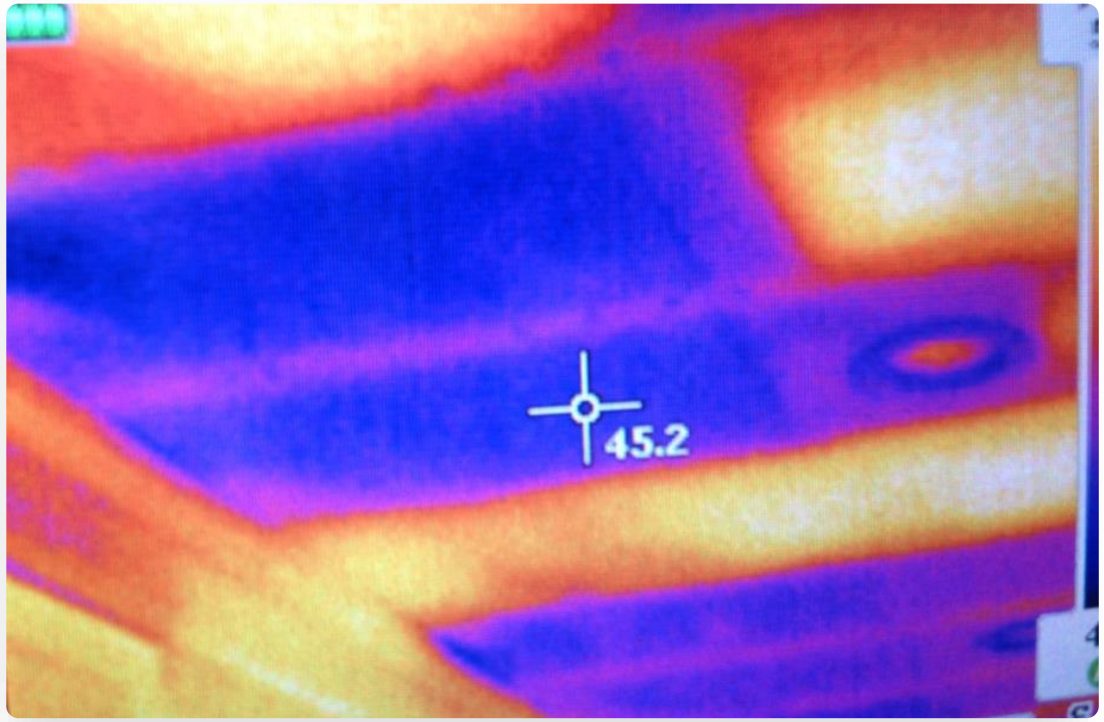


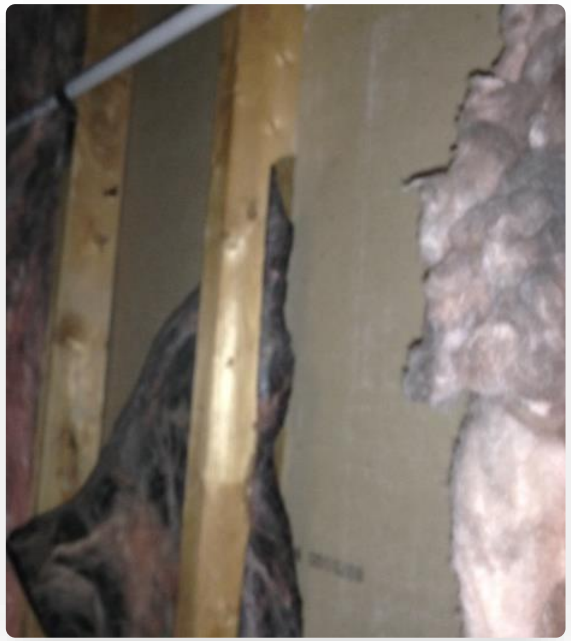
# Missing air barriers

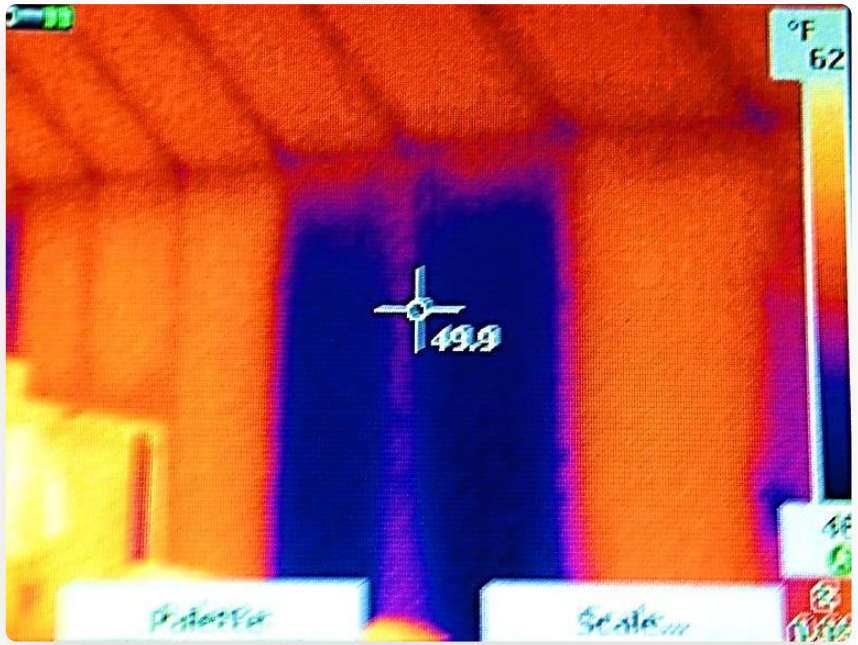


# Missing air barriers under knee walls



# Missing air barriers behind knee walls





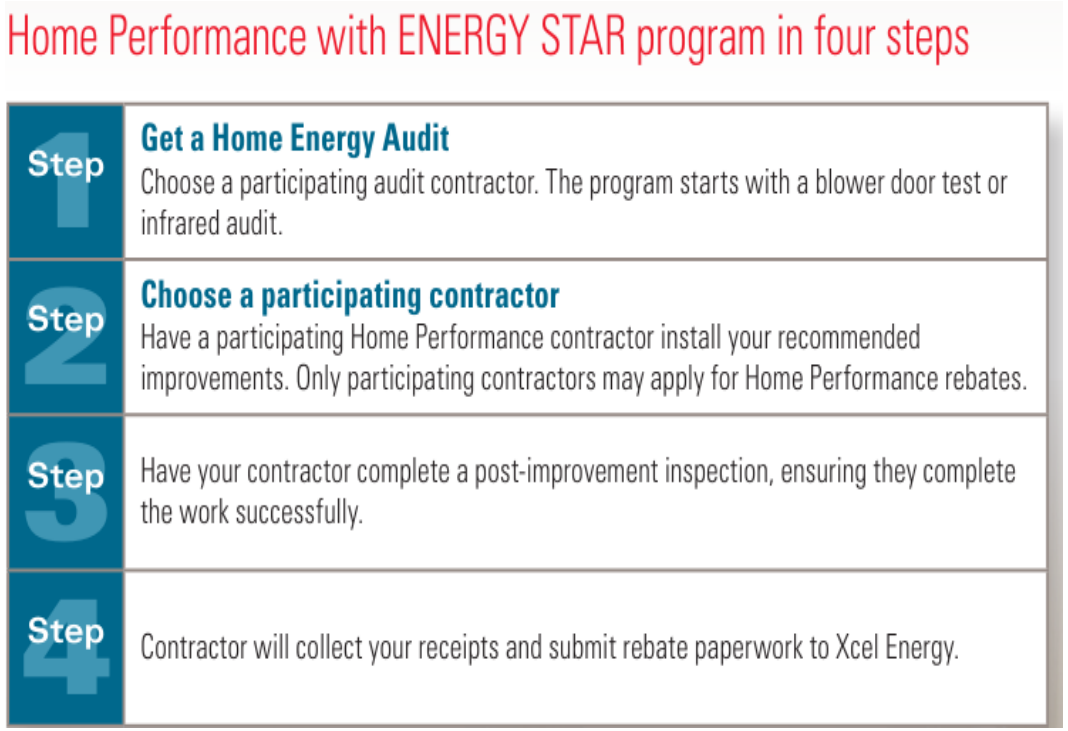
# What is Home Performance?

10 min

# Home Performance at Xcel

## Definitions

- Our Home Performance with ENERGY STAR program is ideal for homeowners who need to make multiple improvements to their home, such as adding insulation, a new, high-efficiency furnace or even an ENERGY STAR-certified thermostat. *Xcel Energy*



# Home Performance with ENERGY STAR

## Process

- Find a contractor
- Get an assessment
- Get the work done
- Experience the difference

### FEATURES AND BENEFITS

**Home Improvement Done Right**

- Air sealing and insulation
- High efficiency heating, cooling and ventilation systems
- Efficient lighting, appliances, and water heating equipment
- Window replacement
- Renewable energy systems
- Smart controls

**Quality You Can Trust**

- **More Comfort**: Fewer drafts and a safer, healthier home
- **More Savings**: Utility bills savings up to 20%, and sometimes more
- **More Quality & Value**: Work performed by specially trained contractors and backed by third-party quality assurance
- **A Cleaner Environment**: Less energy use means fewer greenhouse gas emissions that contribute to climate change

# Building Performance Association (BPA)

## Defined

Home performance is a term used to describe how all aspects of a residential home interact together as one comprehensive system.

A home performance professional understands and addresses the subtle interactions of the components of the house as a system and considers, at every step, that a change to one part of the system can (and almost certainly will) have an effect on the other parts.

https://building-performance.org/

# Home Performance

## Efficiency Works definition

While we are not asking our service providers to offer all the elements below, it would accomplish the Home Performance definition for our customer journey

**Ability to:**

- Offer the customer a one stop shop for multiple trades
- Assess the home's needs according to building science (in house or third party)
- Evaluate health/IAQ and safety concerns in the home
- Measure and control:
  - Heat, Moisture, Pressure, & Air flow
- Perform combustion safety testing on completed work
- Provide Quality Control for the work completed

# Home Performance possibilities

## Examples

### Insulation and Air Sealing example

- Providing their own assessment*
- Providing solar installation in-house
- Partnering with an HVAC company to offer heat pumps

### HVAC example

- Partnering with assessment company
- Partnering with electrician for panel upgrade
- Bringing Insulation and Air Sealing work in house

### Window example

- Partnering with assessment company
- Partnering with electrification contractor
- Partnering with an HVAC company to offer heat pumps

### Full Service (General Contractor)

- Providing their own assessment
- Providing Insulation & AS, Windows, HVAC
- Partnering with electrician for panel upgrade

**This is a high bar that we take seriously to make sure the customer gets an unbiased, accurate report.*

# Break

**15 min**

# Colorado Energy Office IRA/Tax Credits

**(30 min)**

# ARUS – The assessment

**(20 min)**

# Elephant Energy – Business model

(20 min)

# Lunch

**45 minutes**

# Real world examples

**(45 min – 1 hour)**

# Scenario 1 – Mr. Smith (electric home)

## Customer wants improved comfort/lower bills

**Age of home:** 50 years old

**Size of home:** 2500 sf

**$ACH_{50}$:** 6.0*

**Mechanicals:** 25-year-old central heat pump

**Water Heating:** 20-year-old resistance water heater 50 gal

**Comfort concerns:** Bonus room is hot in summer/cold in winter

**Other concerns:** Electric bills are too high

**Figure out what is going on:**

- Get an assessment

**Possible Solutions:**

- Address envelope issues
  - Air sealing, new insulation, knee-walls, windows
- Install a cold climate heat pump
- Install a heat pump water heater

**Long term approach:**

- HVAC team to offer Annual Service Contract
- EW Energy Advisor available for future discussions

# Scenario 2 – Mr. Hood (gas home)

## Customer wants to begin electrification

**Age of home:** 9 years old

**Size of home:** 2200 sf

**$ACH_{50}$:** 2.5

**Mechanicals:** original furnace (100k btuh)/AC 3 ton

**Water Heating:** 9-year-old resistance water heater 50 gal

**Comfort concerns:** none

**Concerns:** Wants a smaller carbon footprint*

**Figure out what is going on:**

- Get an assessment – also look at service panel

**Possible Solutions:**

- Address envelope issues:
  - Air sealing, new insulation, knee-walls, windows
- Perform a Manual J to see what how much capacity needed
- How much air can the duct work handle?
- Install a new heat pump on existing furnace (dual fuel) or Cold Climate?
- Install a HPWH

**Long term approach:**

- HVAC team to offer Annual Service Contract
- EW Energy Advisor available for future discussions
- *Full electrification”?

# Scenario 3 – Mrs. Jones (gas home)

## Customer wants comfort and to begin to electrify

**Age of home:** 28 years old

**Size of home:** 3000 sf

**$ACH_{50}$:** 7.0

**Mechanicals:** Original boiler (150,000 Btuh) (hydronic base boards) / No AC

**Comfort concerns:** Upstairs not cool enough in summer

**Concerns:** Wants to be comfortable in home and use gas as little as possible.

**Figure out what is going on:**

- Get an assessment – also look at service panel

**Possible Solutions**

- Address envelope issues:
  - Air sealing, new insulation, kneewalls, windows
- Perform a Manual J to see what how much capacity needed
- Install air to water heat pump? (feedback?)
- Install ductless mini-splits
- Leave boiler in place for back up heat

**Long term approach:**

- HVAC team to offer Annual Service Contract
- EW Energy Advisor available for future discussions

# Scenario 4 – Ms. Bryant (gas home)

## Customer wants to electrify ASAP

**Age of home:** 50 years old

**Size of home:** 3200 sf

**$ACH_{50}$:** 10

**Mechanicals:** 12 - year-old furnace 150k Btuh/AC 60k Btuh

**Water heater:** 15-year-old tankless

**Comfort concerns:** hard to keep cool in the summer

**Concerns:** Would like to never use gas again and also has 3 teenagers in the home.

**Figure out what is going on:**

- Get an assessment – also look at service panel

**Possible Solutions:**

- Address envelope issues:
  - Air sealing, new insulation, kneewalls, windows
- Panel assessment (upgrade needed?)
- Install a cold climate heat pump
- Install a HPWH (upsize and/or anti scald valve)

**Long term approach:**

- HVAC team to offer Annual Service Contract
- EW Energy Advisor available for future discussions

# Emergency replacement of gas water heater brainstorm

## Customer wants to move to HPWH

**Brainstorming possible solutions:**

Questions to address

1. Is there a HPWH available to install?
2. Will a HPWH fit? – Enough air available?
3. Does the electrical panel have enough capacity?
4. How many people are in the home/typical water use?
    1. Be sure to future proof when sizing.
    2. Should you up upsize the tank?
    3. Should you use anti-scald to have higher internal temp?

**Possible Solutions:**

- Keep a few eligible HPWH units in warehouse
- Ask local distributor to have them on hand for emergency situations
- Proactively push customers to replace before failure.
- Install a temporary gas unit until customer is ready

# Final remarks

**(15 min)**

# Thank you

Homes@efficiencyworks.org

EfficincyWorks.org

Efficiency Works™

Estes Park | Fort Collins | Longmont | Loveland