



# Energy Conservation and Weatherization

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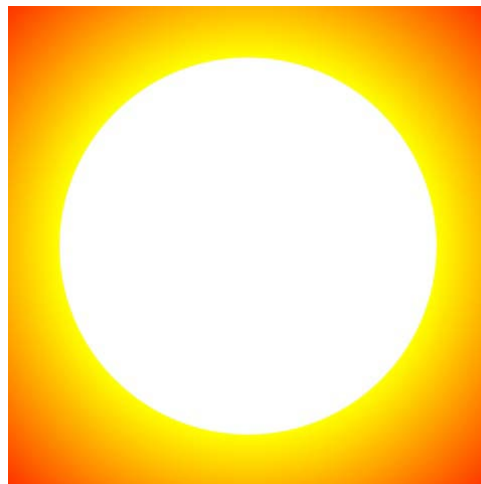
# CONSERVATION

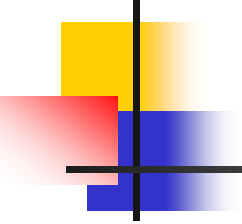
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- Conservation is using energy efficiently and carefully, preventing waste

# WEATHER -IZATION

- Weatherization is the process of making a house more resistant to the discomforts caused by weather





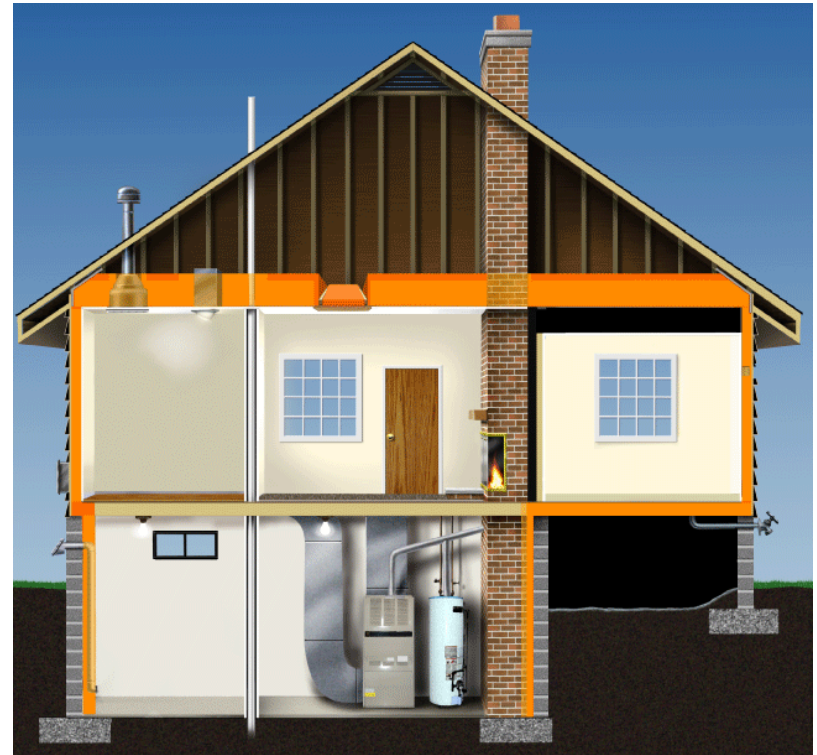
# Why do we want to Weatherize and Conserve?

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- It saves **MONEY**
- It makes a home more **COMFORTABLE**
- It makes houses **HEALTHIER** to live in

# Weather Envelope

- The barrier which protects your house against the loss of conditioned air and temperature
- It consists of Air Sealing & Insulation





# What are we trying to save?

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- 3 Types of Energy Flow
  - Conduction
  - Convection
  - Radiation

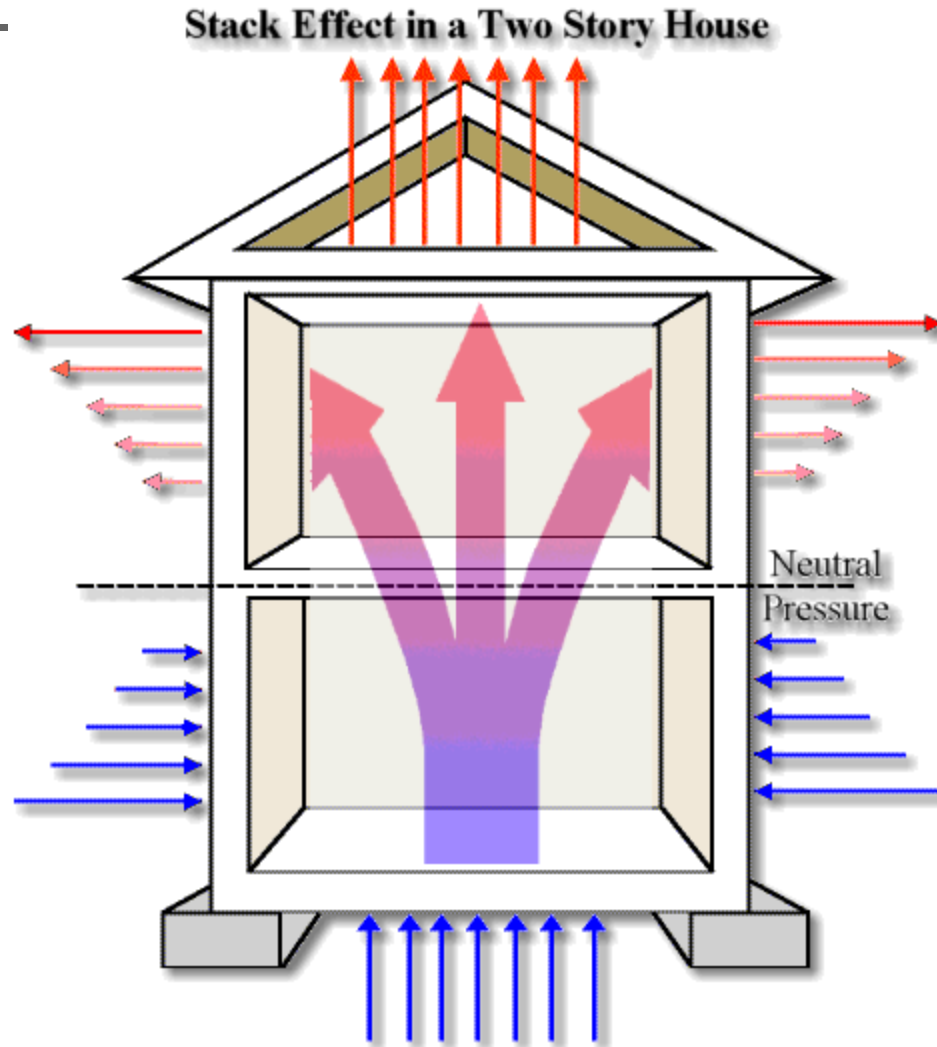


# Your House is like a Chimney

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- **Hot Air** inside tries to go upward (Low Pressure)
- It tries to leak out through holes
- **Cold Air** comes in at the bottom to replace it
- The colder it is outside, the faster the hot air rises (Pressure tries to balance)

Hot Air pushes upward and tries to escape,  
Cold Air forces it up as it enters the house  
through the basement and sills



# Common (Window & Door) Misconceptions

- “My house is cold! I must need new windows and doors!”
- Replacement windows and doors – not a big savings!
- Without proper insulation, they can make the stack effect worse, increasing the chimney effect in your home.
- No matter what kind of windows you get, it’s still going to be glass – a generally cold surface.
- Insulation improvements are more cost effective.
- **New windows and doors will help the most when the house is properly insulated and air sealed**





# Air Sealing

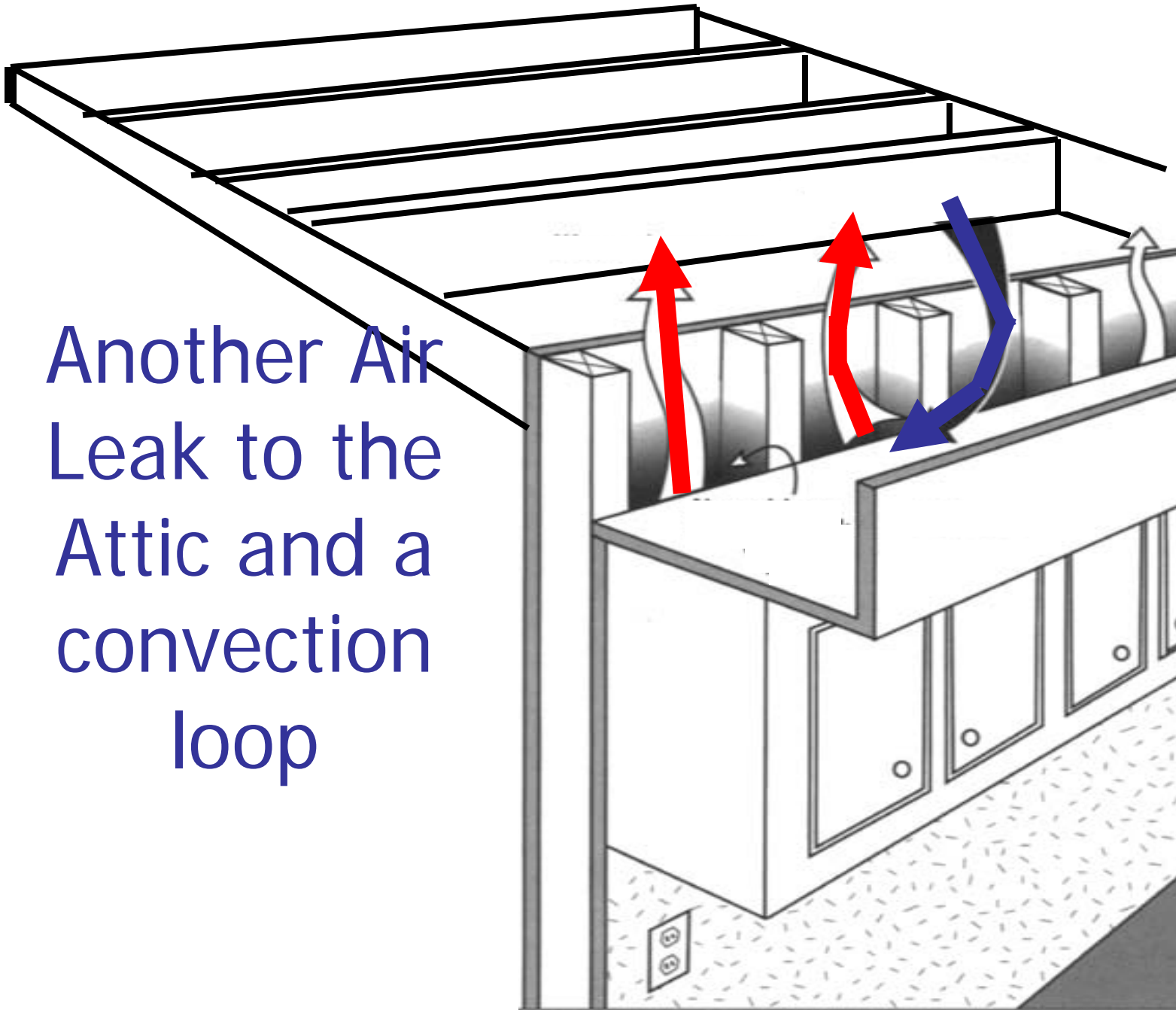
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- We want to prevent air that you have paid to have heated from physically leaving your house.
- We want to plug and seal up the holes where this heat loss happens

# These are common air leaks in the attic



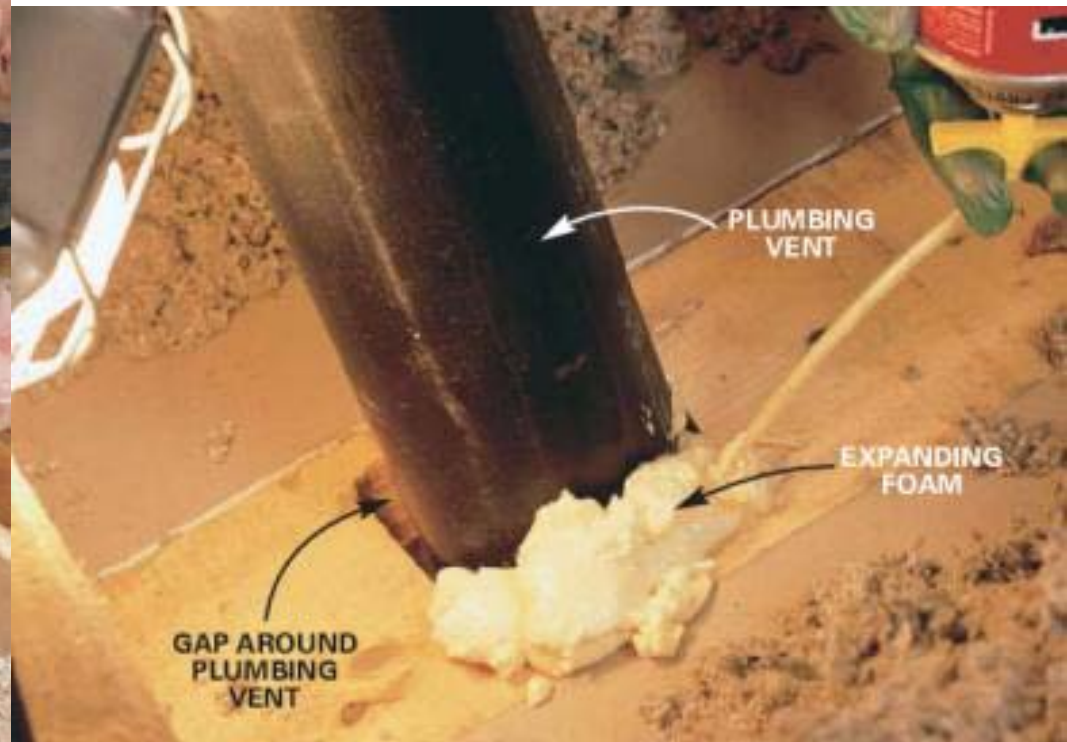
Another Air  
Leak to the  
Attic and a  
convection  
loop



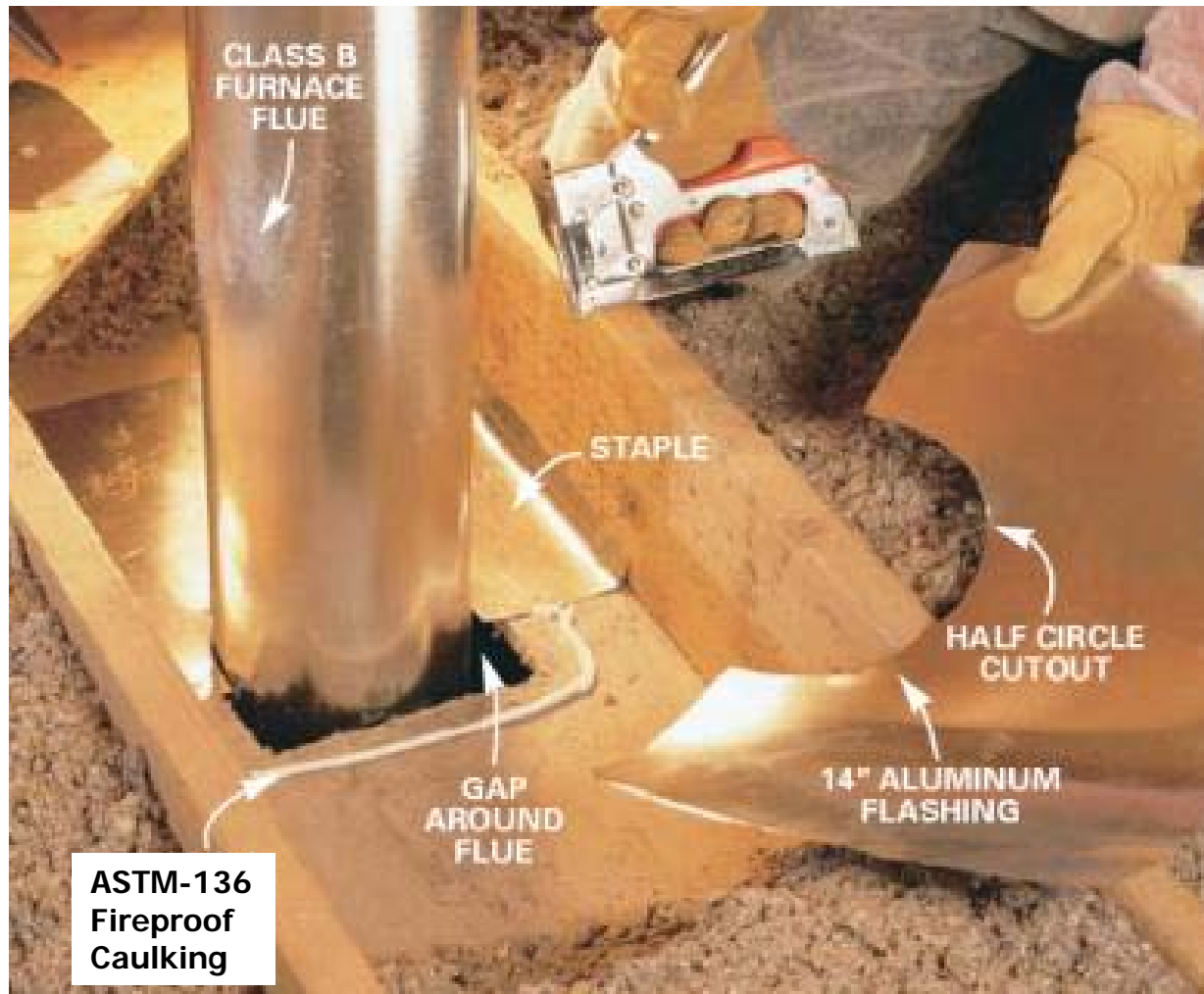
# We seal these leaks



# It's kind of like zipping up your jacket on a windy day



We want to keep the warm air in





# Blower Door

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- Pressurization test
- Seals gaps
- Used with infra red cameras

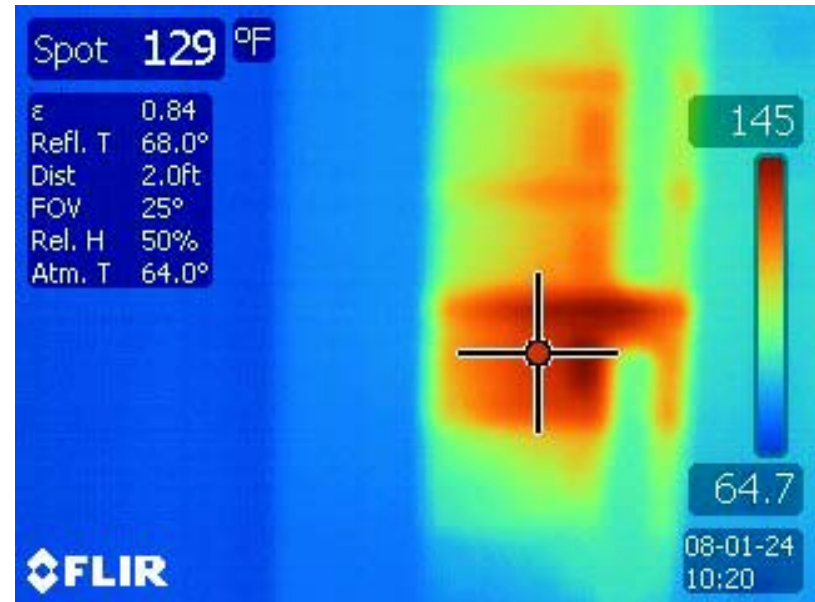
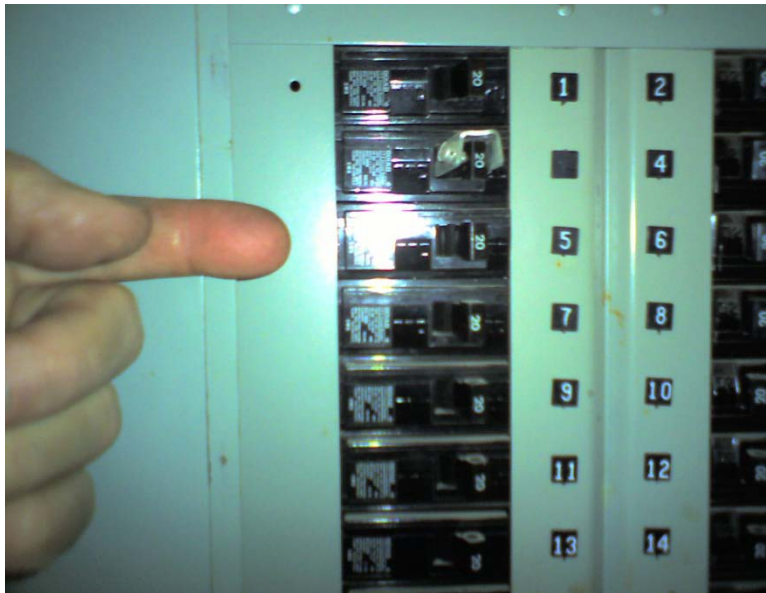


# Infrared Camera

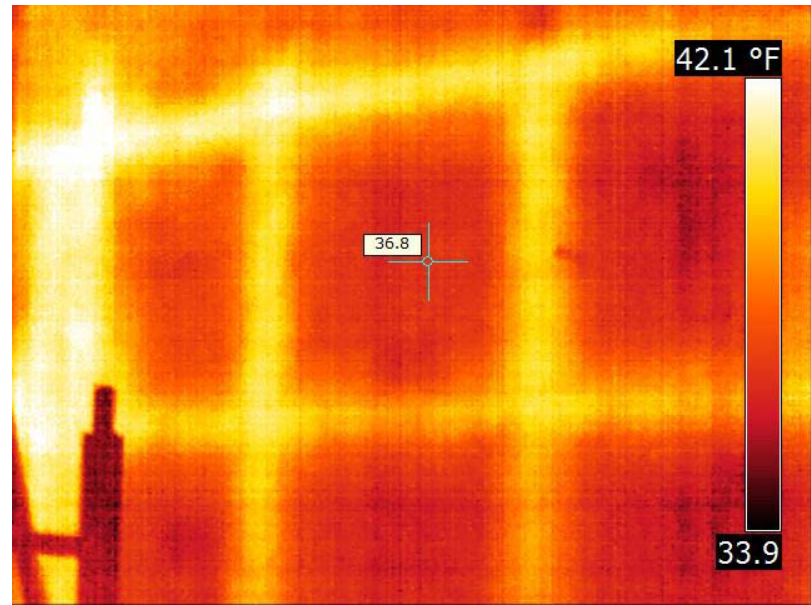
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- Cameras sense surface temperature
- This tells us what's behind the wall:  
Insulation? Nothing?
- Useful for diagnosing various types of  
heat loss

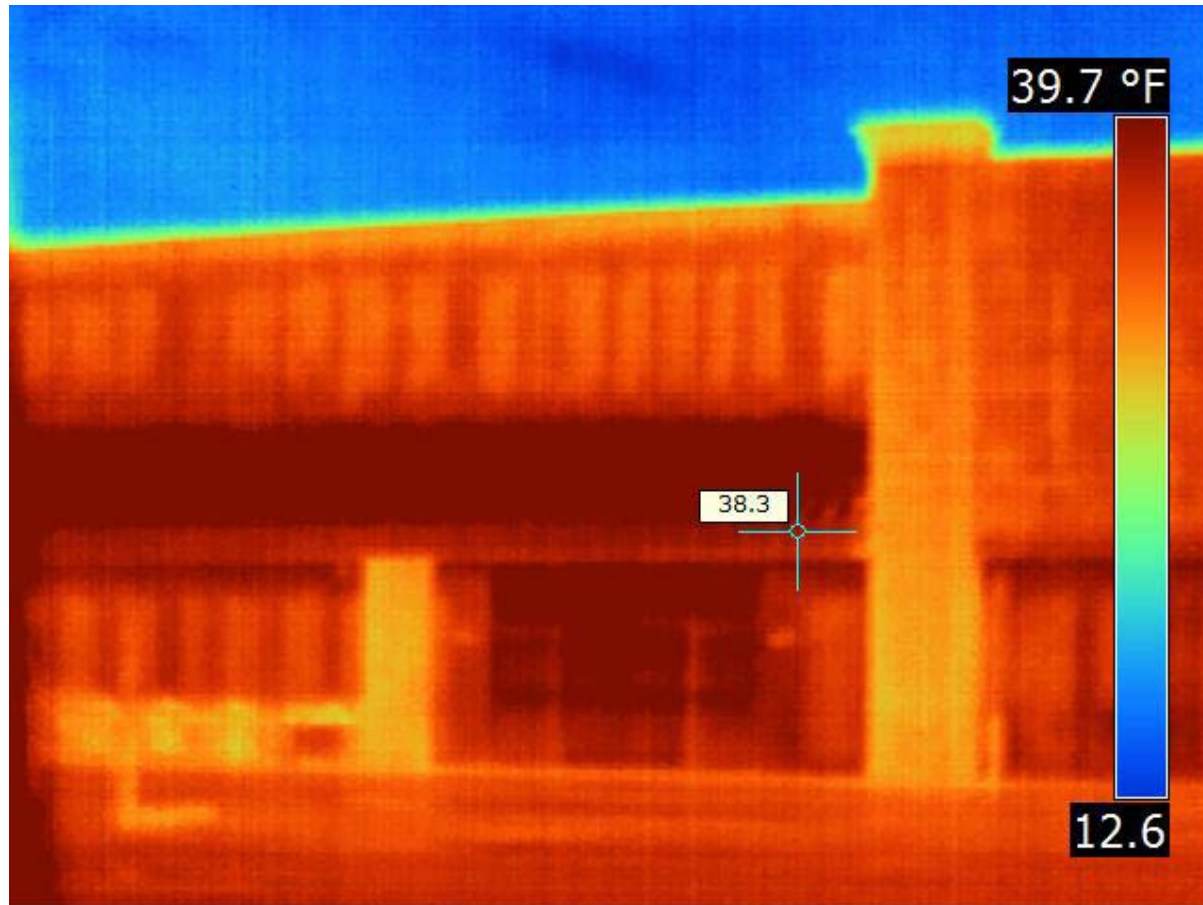
# LOOSE ELECTRIC CONNECTION



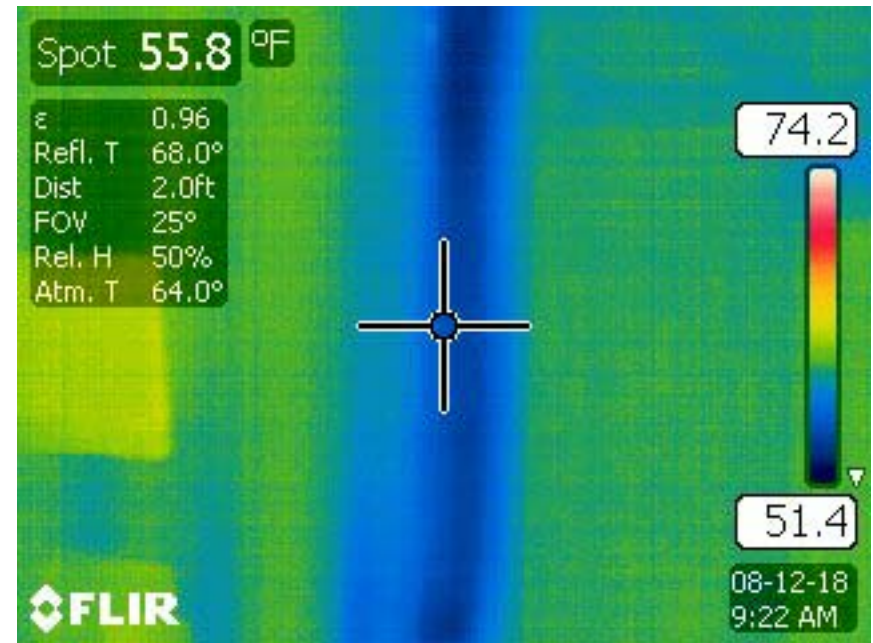
# GROUTED CMU CELLS



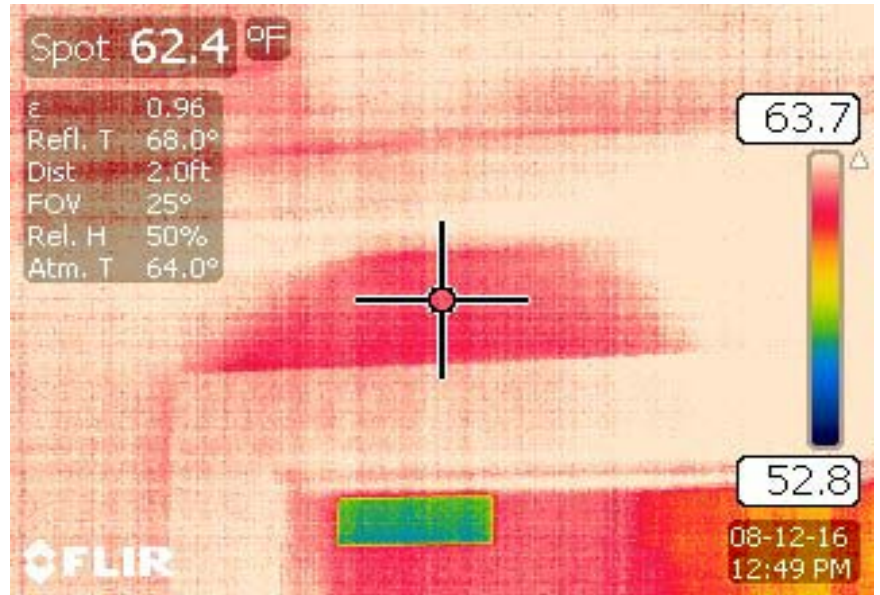
# EIFS NEW CONSTRUCTION



# AIR LEAK IN CHIMNEY CHASE



# ROOF LEAK



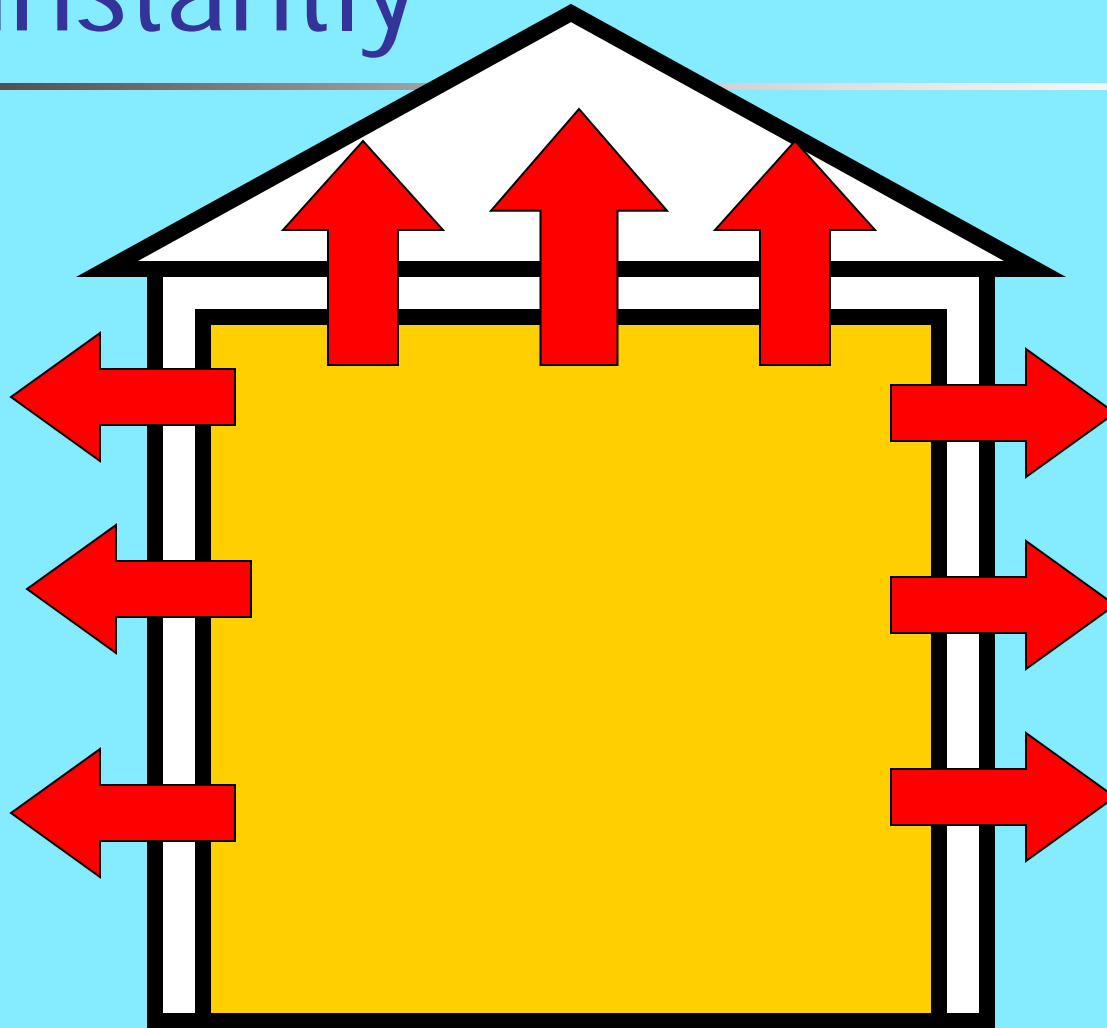
# Insulation is like a potholder

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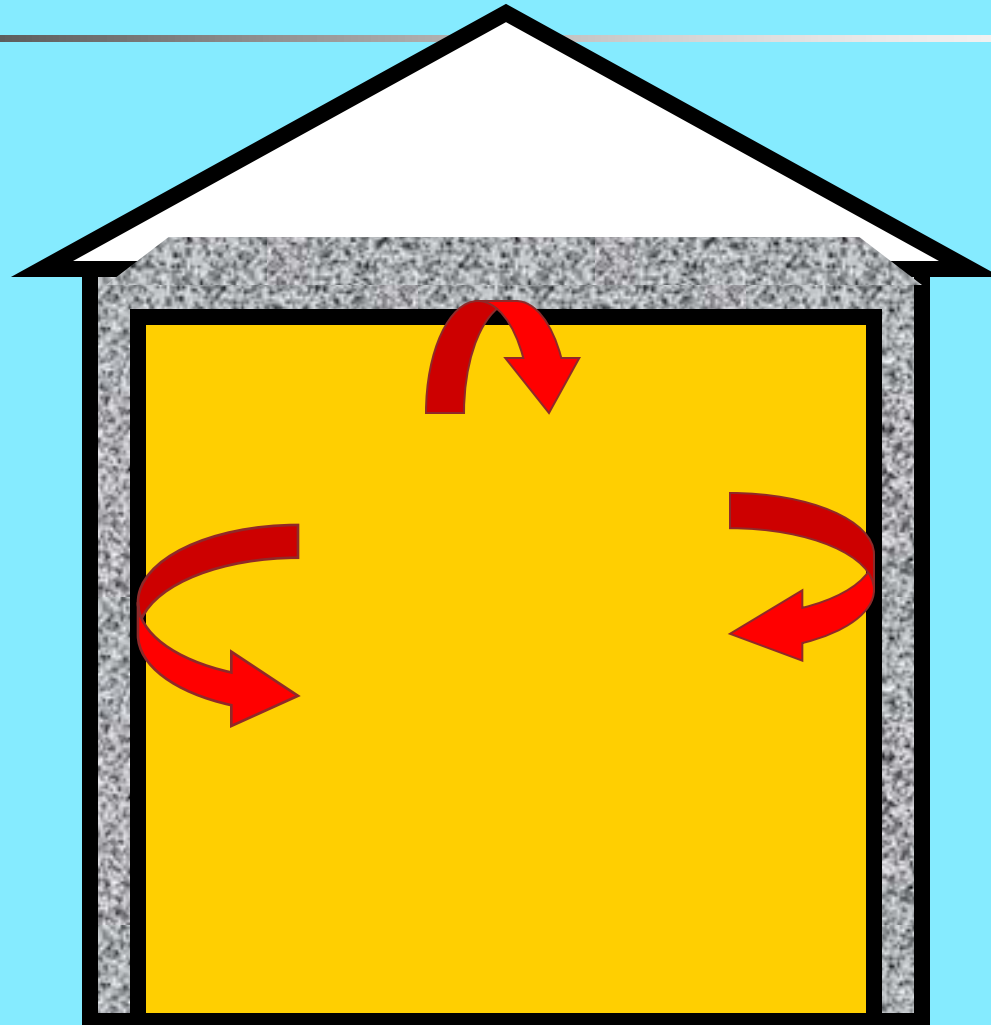
- We want to slow the heat transfer
- An un-insulated house is a lot like grabbing a hot pot without a potholder
- The heat goes into your hand almost immediately



The heat transfers almost  
instantly



But with Insulation, we can resist this heat loss





# Insulation

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- Insulation is rated with an R-value
- The higher the number of the **R**-value, the more **Resistance** to heat loss
- Typically, after air-sealing, we bring the attic up to an R-38, or about 11 inches deep Cellulose insulation
- Electric heat, however we bring to an R-49, or about 14 inches deep Cellulose Insulation



# Types of Insulation

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- There are many types of insulation, old and new
- Rockwool
- Fiberglass
- Cellulose
- Two Part Spray Foam
- Balsam Batt

# How We Insulate Walls



# What is Cellulose?

- Shredded Newspaper treated with Borax
- Hypoallergenic
- Insects and critters don't like it
- Is it flammable?



No.

It goes out when the heat source is removed



# Before & After



# Distribution Systems

- Sealing Duct Seams – brings air to where you want it and has your heating system work less hard to bring the heat to you.
- Heating system testing is important to test for carbon monoxide as well as for back drafting from multiple appliances.
- Insulating Steam pipes also helps to make sure that the heat reaches the place it's intended to heat





# VOC and NEFW

Valley Opportunity Council & New England Farm Workers

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- Good numbers to call in order to get your heating system taken care of
- Springfield:  
NEFW – 413-787-6500
- Surrounding Communities:  
VOC – 413-552-1545
- If you are on fuel assistance and your system breaks down, they'll fix it

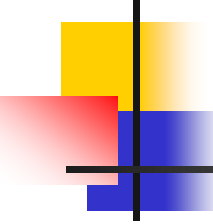
# Heating System replacements

- If you have an old inefficient system, VOC or NEFW, may be able to fix or replace it.



# Energy Efficient Lightbulbs





# 60% Less Energy than Regular Bulbs

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# Lightbulb Replacement



Conventional Bulbs	Fluorescent Bulbs	Lifetime Savings
30-40w	11w	\$28-\$43
50-60w	15w	\$52-\$67
60-75w	18/20w	\$63-\$85
75-90w	22/23w	\$78-\$100
100w	28w	\$106
100-120w	30w	\$105-\$135
150w	34/38w	\$166-\$172



# Conservation Tips for Clothes Washers & Dryers

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- Wash and rinse in cold water
- Wash full loads when possible
- Run the spin cycle a second time to remove excess water
- Air dry your clothes
- Remove clothes from dryer promptly – avoid ironing
- Clean lint screens
- Vent the dryer to the outdoors & check the vent to make sure it's clean

# Conservation Tips

## Cooking

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- Use the smallest available cooking appliance
- Don't peak in the oven
- Double Up – cook two things at once
- Avoid preheating the oven
- Reduce use of oven's "self-clean" feature
- Use the smallest pan possible for stove top cooking
- Defrost food in the refrigerator, not microwave
- Clean the inside surfaces of the microwave oven
- Heat water for beverages in the microwave – faster and saves energy



# Tips for Conservation

## Dishwashers

- Wash a full load
- Air dry the dishes
- Don't rinse dishes individually
- Use a basin when washing or rinsing dishes by hand
- Use the Short Cycle feature for small loads

# When replacing appliances

- Look for the Energy Star label
- Especially for fridges, freezers, air conditioners and dehumidifiers
- Don't buy old appliances for these things: it'll cost you more in the long run





# Tips for your Refrigerator

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- Keep it full
- Check the temperature inside your freezer and refrigerator with a thermometer – recommended settings: fridge 38-40, freezer 0-5 degrees Fahrenheit
- Keep it away from hot spots, not next to stove, supply ducts
- Thaw frozen foods in the refrigerator overnight – provides free cooling and prevents food spoiling
- Cover liquids and wrap foods stored – controls moisture which makes the compressor work harder
- Switch to Energy Saver mode – to turn off door heater (rarely needed in this climate)

# More Refrigerator Tips

- Open the door as seldom as possible
- Unplug a second refrigerator when not in use
- Clean condenser coils and grills
- Make sure refrigerator's air seals are tight
- Defrost regularly – if you have a manual defrost appliance
- If your refrigerator is running, you should go catch it





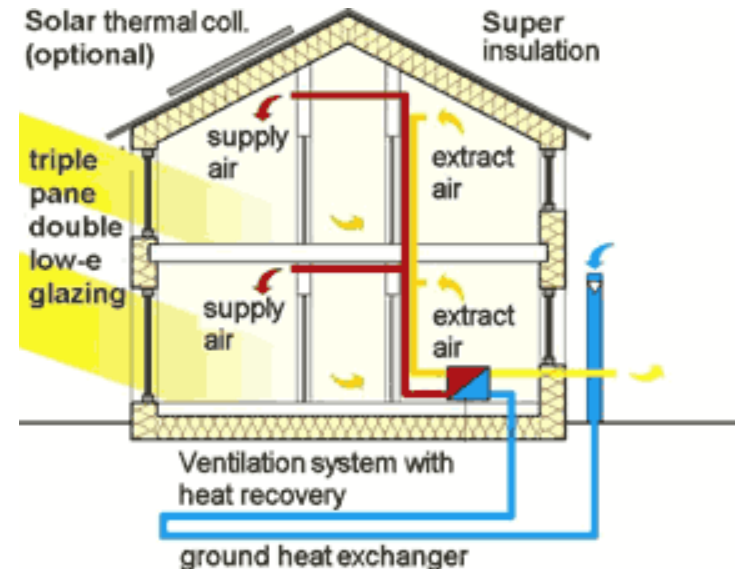
# Conservation tips for **Hot Water Heaters**

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- Hot Water tanks – keep water temperature down – 125 degrees Fahrenheit is good
- Don't wrap because it violates the warranty, they're already foam lined and wrapping could make a double vapor barrier and rust out your hot water tank or over heat it.
- Don't run the water continuously – conserve
- Take short showers instead of baths – conserves
- Repair leaky faucets
- Insulate hot water pipes at the tank and in cold places
- Use Energy Efficient Shower heads

# Future Technology Is Here (Almost)

- Passive House – They are making new super-insulated houses in Europe and now in the U.S.
- These houses are virtually airtight (they use mechanical ventilation for fresh air) and they have very thick insulation (Very high R-values)

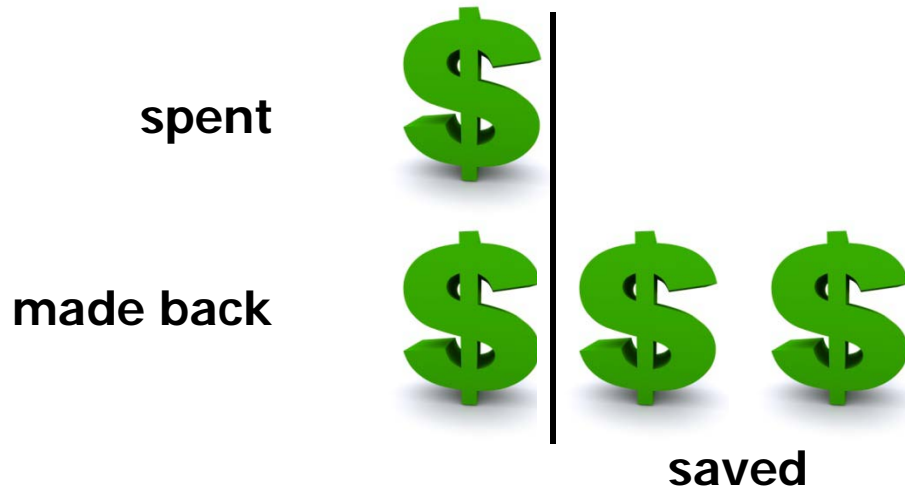




# Bottom Line

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- Many people talk about going green, but many programs don't deliver. Improvements to your building envelope are definitely one of the most cost effective ways to conserve.
- Bottom line: It is cost effective.
- For every dollar we spend, we save two





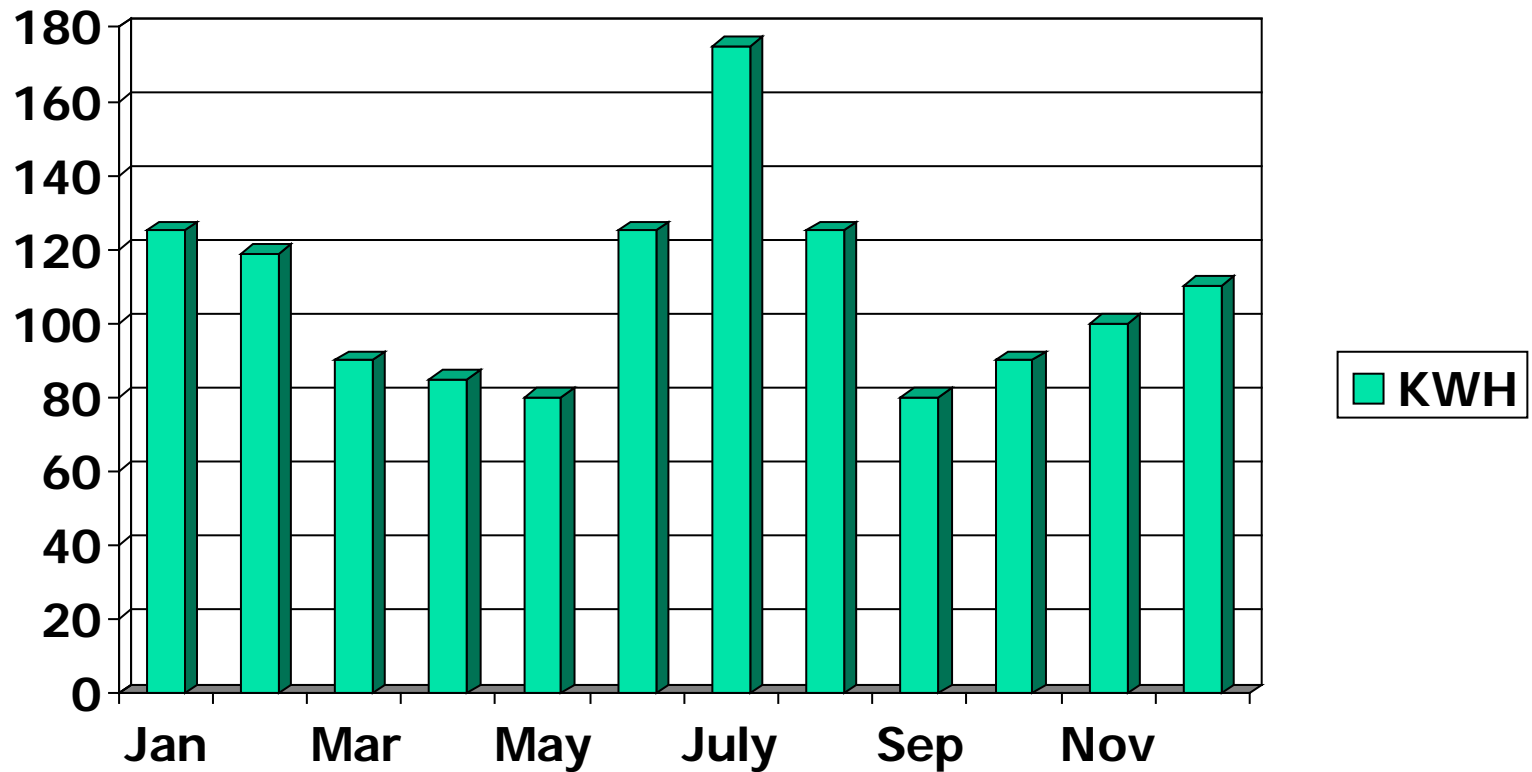
# Understanding your Utility bills!

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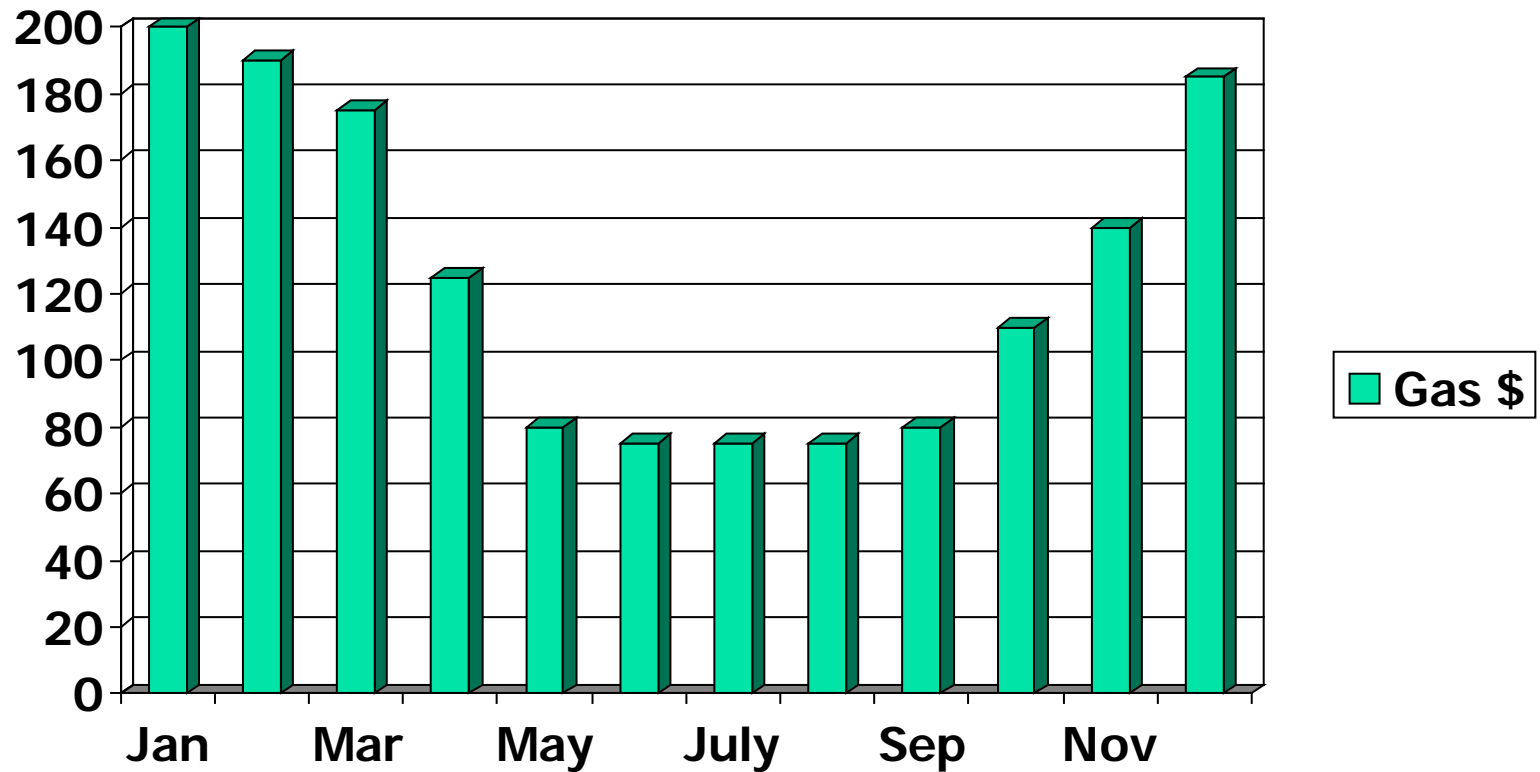
- Save all Energy bills!
- Determine the energy units consumed. KWHs, Gallons or CFs
- Make Chart



# Annual Electric Usage



# Annual Gas Usage





# Typical Heating Costs

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Based on Historical Degree Day Usage  
from 1978 to 2008

- January 21% \$100.00 / 21% = \$476 Annual Heat
- Feb 17%
- Mar 15%
- April 9% \$ 80 base = \$960 for DHW use
- Oct 11%
- Nov 12%
- Dec 17%



# SUMMARY

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- What Type of Structure?
- Define the Envelope
- Review Usage
- Examine building
  - Conduction
  - Convection
  - Radiation
- System Status



# QUESTIONS & ANSWERS

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- THANK YOU FOR YOUR TIME.