U.S. DEPARTMENT OF ENERGY

SOLAR DECATHLON 2009

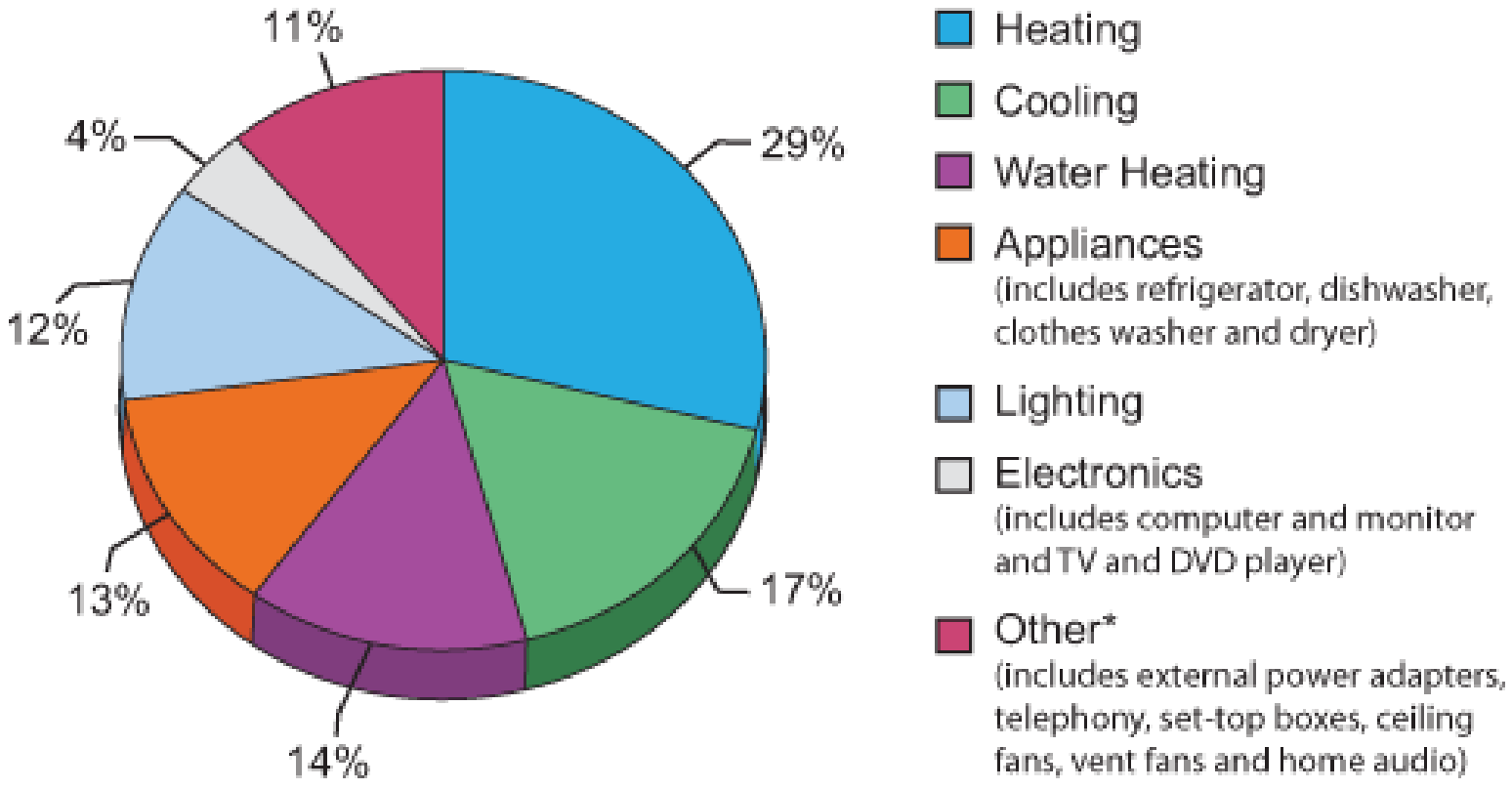
# Inside the Utility Room

## The Biggest Opportunity for Residential Energy Savings

Presented by: Audra Carson
Honeywell International Inc.

# Did You Know?

Annual Energy Bill for a typical Single Family Home is approximately $2,200.



# What You Can Do

- Systems
- Ductwork
- Enhancements/Accessories

# No Matter What Type of System

- Save money and increase comfort by:
  - Properly maintaining system
  - Upgrading/enhancing system
  - Whole-house approach

Can cut your bill in half – up to $500

# Energy-Saving Technologies

- Heating and Cooling Equipment
- Ductwork
- Programmable Thermostats
- Temperature Zoning Systems
- Outdoor Reset
- Whole-house Humidification Systems
- Whole-house Dehumidification Systems
- Ultraviolet Treatment Systems
- Air Cleaners
- Water Heating

# Heating/Cooling Equipment

# Air Conditioners

- SEER and EER
  - Seasonal Energy Efficiency Rating
  - Energy Efficiency Rating
- Sizing
- Shading
  - Plant trees or shrubs around unit

**$1500 Tax Credit for 16 SEER, 13 EER***



** Different for packaged systems*

# Heat Pumps

- What is a heat pump?
  - Most efficient form of electric heating
  - Provides 3x more heating than the equivalent amount of energy they consume in electricity
- 3 Types
  - Air, Water, Ground Source (Geo)
- SEER and EER

$1500 tax credit, varies by ratings

# Furnaces

- Types
  - Natural Gas
  - Propane
  - Oil

- Annual Fuel Utilization Efficiency (AFUE)

$1500 tax credit for 95.5% AFUE

# Boilers

- Types
  - Hot Water
  - Steam
  - Oil
  - Gas

- Annual Fuel Utilization Efficiency (AFUE)
  - Higher the percentage, the more efficient the boiler

90% AFUE for ENERGY STAR qualifying boilers

# Equipment Tips

- Use Variable Speed Equipment
- Put Duct Work in Insulated Space
- Duct Sealing
- Consult the Pro

# Ductwork Tips

- Leaky ducts can add hundreds of dollars a year to your heating and cooling bills
  - Heated or cooled air forced out of unsealed joints or holes is lost energy
  - Hot air that seeps in can increase the load on your equipment
- Insulating/sealing ducts is usually very cost effective
  - Look for obvious holes
  - Avoid cloth-backed rubber adhesive duct tape – fails quickly
  - Use mastic, foil or other approved tapes

# Hydronic Heating Systems

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# Hydronic Heating Systems

- What do they do?
  - Network of pipes beneath flooring that circulate warm water
  - Closed loop system – same fluid is heated and reheated

- Advantages
  - Comfort
  - Efficiency
  - Versatile Installation

# Programmable Thermostats

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# Programmable Thermostats

- **Save Money!**
  - Save as much as 10% a year by turning your thermostat back 10-15% for 8 hours
    - Energy Star
- **Save Energy!**


Save up to 33%* on Energy Bills

Honeywell

*Source: HONEYWELL

# Programmable Thermostats

- Keep temperature set at energy saving set-points for at least eight hours

| Setting | Time | Heat | Cool |
|---|---|---|---|
| Wake | 6:00 a.m. | ≤ 70 F | ≥ 78 F |
| Day | 8:00 a.m. | Setback at least 8 F | Setup at least 4 F |
| Evening | 6:00 p.m. | ≤ 70 F | ≥ 78 F |
| Sleep | 10:00 p.m. | Setback at least 8 F | Setup at least 4 F |

- Avoid using hold/permanent feature
- Install the thermostat on an interior wall, away from heating or cooing vents and other sources of heat or drafts.
- Have your thermostat installed by a certified HVAC contractor

# Programmable Thermostats


- **Convenience – What is Best for You**
  - Set to adjust the temperature of a home according to user's schedule and preferences
  - More precise temperature - +/- 2 degree accuracy
  - Program ventilation – provide fresh air to home at the right time
  - Utility rebates – check with local utility for more information

**Source: ENERGY STAR®*

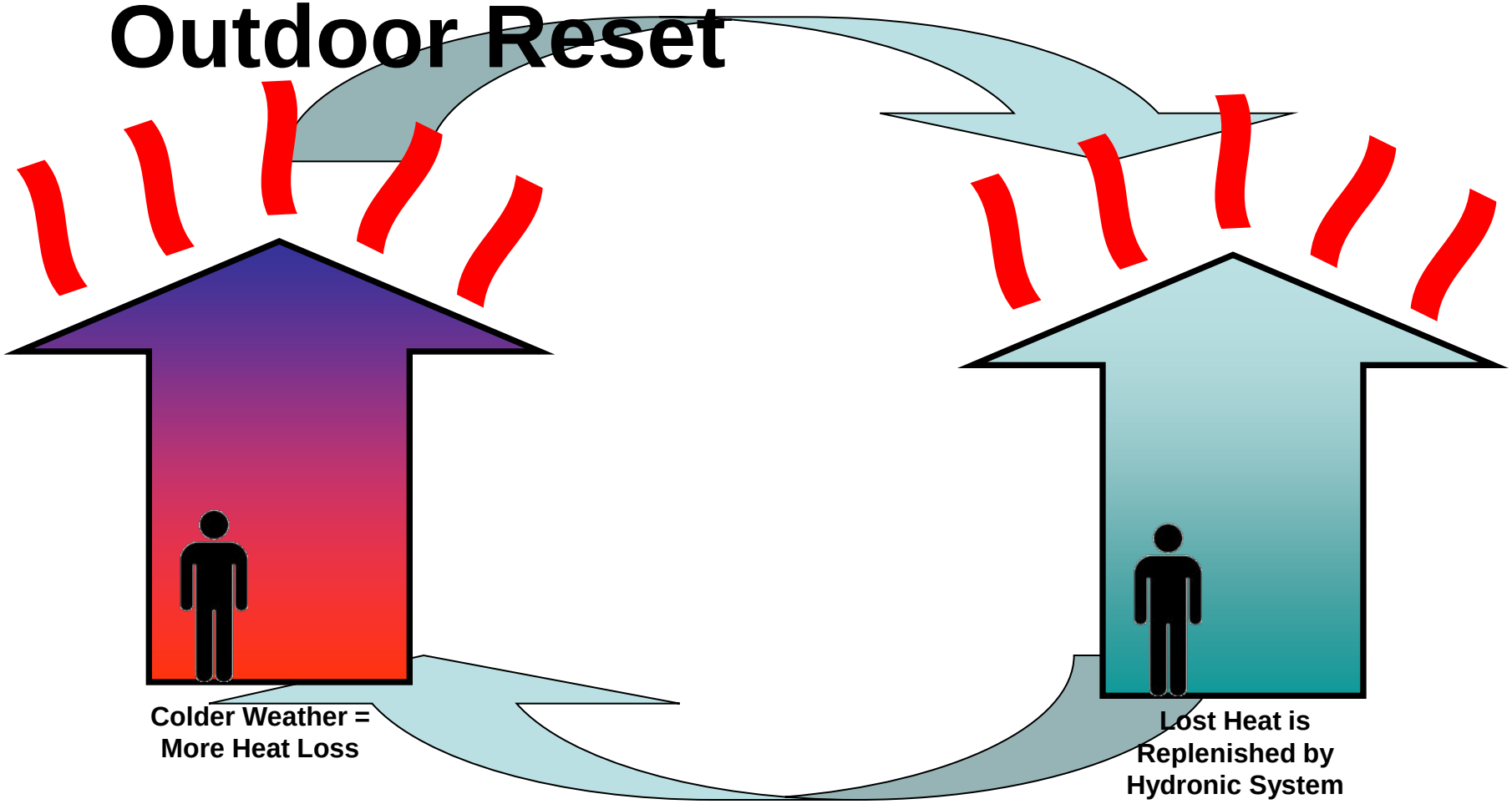
# Programmable Thermostats

- **Set it and Forget it**
  - **7-day programmable** - Different programs for each day of the week and usually permits four possible temperature periods per day
  - **5-2 programmable** – One program for Monday through Friday and another for Saturday and Sunday
  - **5-1-1 programmable** - One program for Monday through Friday, another schedule for Saturday and another for Sunday

**Source: ENERGY STAR®*

# Outdoor Reset

# Outdoor Reset




Save up to 15% on Energy Bills

# Outdoor Reset

- A sensor monitors outdoor temperature
- Sensor communicates with an Outdoor Reset control
- Control optimizes boiler to balance outdoor heat loss
- Boiler runs at a steady, lower temperature

# Temperature Zoning Systems

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# Temperature Zoning Systems

- **Heat and cool areas you occupy to save energy**
- **Multiple Thermostats**
  - Like light switches
- **Increases Comfort and Energy Efficiency**
  - Dampers installed in ductwork and thermostats in zones

**Save up to 33%* on Energy Bills**

Honeywell

**Source: HONEYWELL*

# Whole-House Humidification

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# Did You Know

- The **optimal range** for annual indoor relative humidity (RH) is between 35 and 55 percent*.

- **Humidified air feels warmer**
  - You can turn down your thermostat and be comfortable at lower temperatures

**Lower Temperature – Save Money & Energy**



*Source: ASHRAE

# Whole-House vs. Single Room

- **Single-room** humidifiers humidify only the room where the humidifier is placed.
  - **Whole-house** humidifiers humidify the whole house

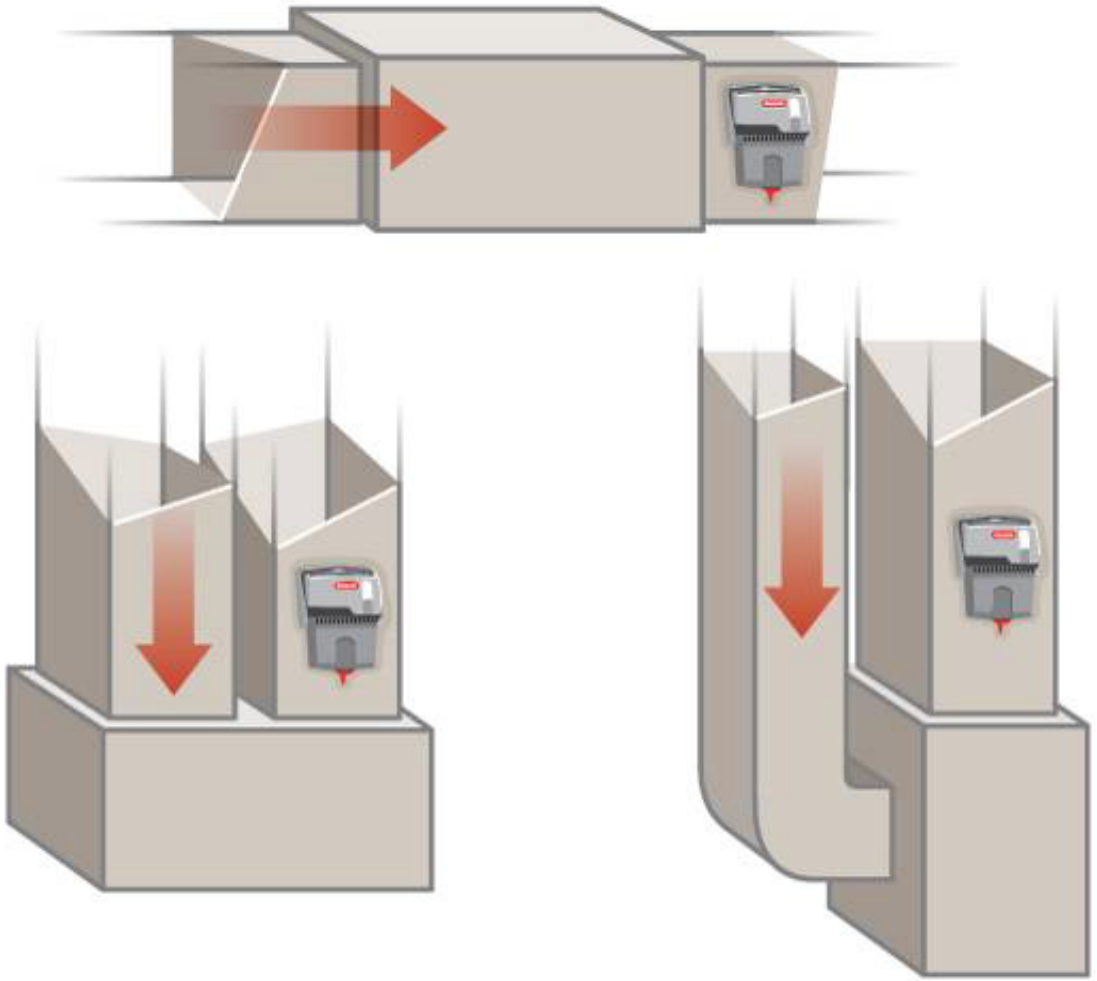
- **Single-room** humidifiers require constant filling of the water tanks
  - **Whole-house** humidifiers do not

# Whole-House Humidification Systems

- **Types of Humidifiers**
  - Bypass flow-through
  - Powered
  - Steam humidifiers

- **Consider if you Have…**
  - Dry skin
  - Dry nasal passages
  - Dry or scratchy throat
  - Chapped lips
  - Unpleasant shocks from carpet or electronics
  - Static Clean

# Whole-House Humidification Systems



# Whole-House Dehumidification

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# Did You Know

- Homeowners turn down the AC in an attempt to be more comfortable
  - Air conditioner cannot remove moisture from the air

- Dehumidifiers reduce energy costs by:
  - Removing moisture from the air
  - Reducing the strain on the air conditioner

**Save up to 6%***

**on cooling costs for every degree the thermostat is turned-up.**



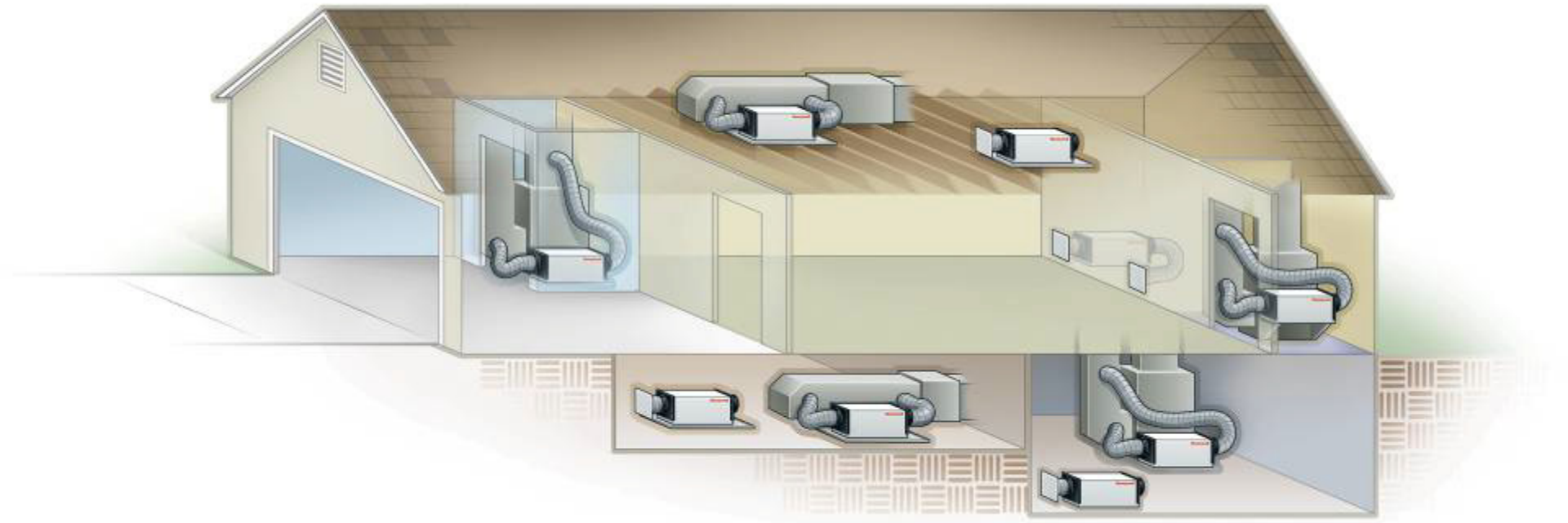
*Source: ENERGY STAR®

# Dehumidification

- What do they do?
  - Removes moisture
  - Improves comfort
  - Reduces strain on air conditioner

- Consideration when …
  - You have trouble sleeping at night
  - Constantly reducing the temperature setting because uncomfortable
  - Floors or other surfaces feel sticky
  - Concerned with mold and mildew growth
  - Notice musty odors or smells in your home
  - Condensation on water pipes
  - Notice wet stains on walls or ceilings
  - Family member(s) have allergies

# Dehumidification



# Ultraviolet Treatment Systems

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# Ultraviolet Treatment Systems

- **What is it?**
  - Ultraviolet Treatment Systems zap mold spores and certain live, airborne bacteria to prevent them from being re-circulated into your home's air, and/or to eliminate mold from cooling coils.
  - The shortwave lights, similar to those used in hospitals, laboratories and commercial kitchens, are easy to add to your existing heating and cooling system.

- **Why UV?**
  - Improves HVAC performance – helping to significantly increase your system's energy-efficiency

# Air Filtration/Cleaners

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# Air Filtration

- HVAC filters play key role in HVAC system
  - Remove contaminants from the air
  - Protect HVAC equipment
  - Minimize energy consumption

# Indoor Air Quality

- The Facts
  - According to the EPA, air inside a home can be 2-5 times more polluted, and occasionally 100 times higher, than air outside.
  - Indoor air pollution is among the top five environmental health risks.
  - We breathe almost 3,000 gallons of air a day.
  - 99% of dust, dirt, pollen and other particles in the air are too small to be seen
  - Certain indoor air elements and conditions can trigger asthma or allergies.

# Did You Know?

- A standard 1” furnace filter removes less than 3% of particles, like dust, mold and pollen.
- A 4” furnace filter removes 25% of these particulates that pass through the system.
- An electronic filtration system removes 80% of the particles that pass through the filter.

# Air Filters

- Minimum Efficiency Reporting Value (MERV)
  - A number from 1 to 16 that is relative to an air filter's efficiency
  - The higher the MERV value, the more efficient the air filter is at removing particles

- Types of Air Filters
  - Flat or Panel Air Filters
  - Pleated or Extended Surface

# Indoor Air Cleaners

Mechanical Air Filters

(Media)

Electronic Air Cleaners

# Air Filtration

- Considerations
  - Total life-cycle cost
    - Wash vs. Toss
  - Filter pressure drop
  - Long-term impact on energy costs

An Energy Conservation Tool

# Water Heating

# Water Heating

**Water heating is the third largest energy expense in a home**

**Typically accounts for 13% - 17% of the utility bill**

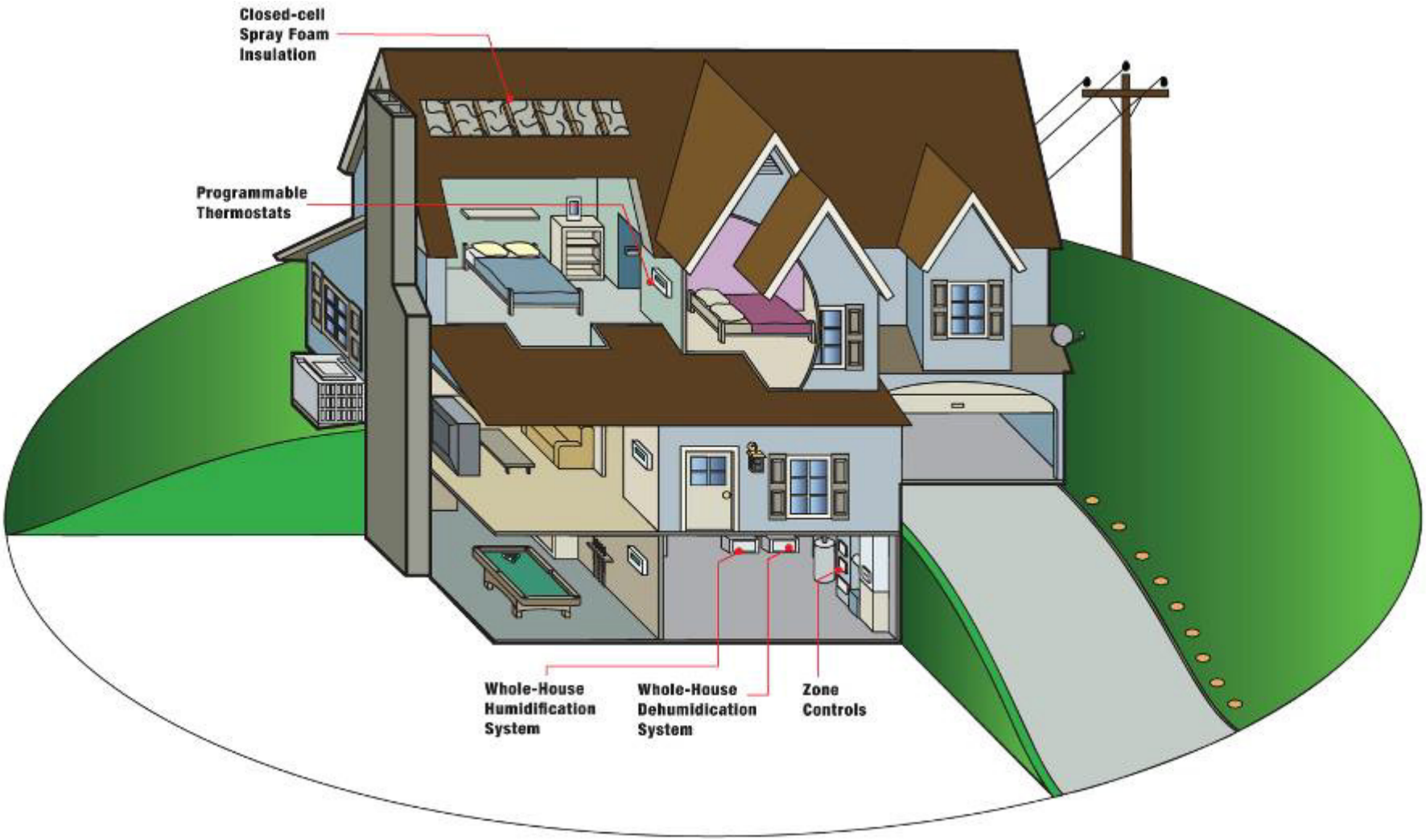
# Types of Water Heaters

- Conventional Storage
- Demand (tankless or instantaneous)
- Heat Pump
- Solar
- Tankless Coil or Indirect

# Water Heater Selection Criteria

- Fuel Type, Availability and Cost
- Size
- Energy Efficiency
- Costs

# Bringing it All Together


Closed-cell
Spray Foam
Insulation
Programmable
Thermostats
Whole-House
Humidification
System
Whole-House
Dehumidication
System
Zone
Controls

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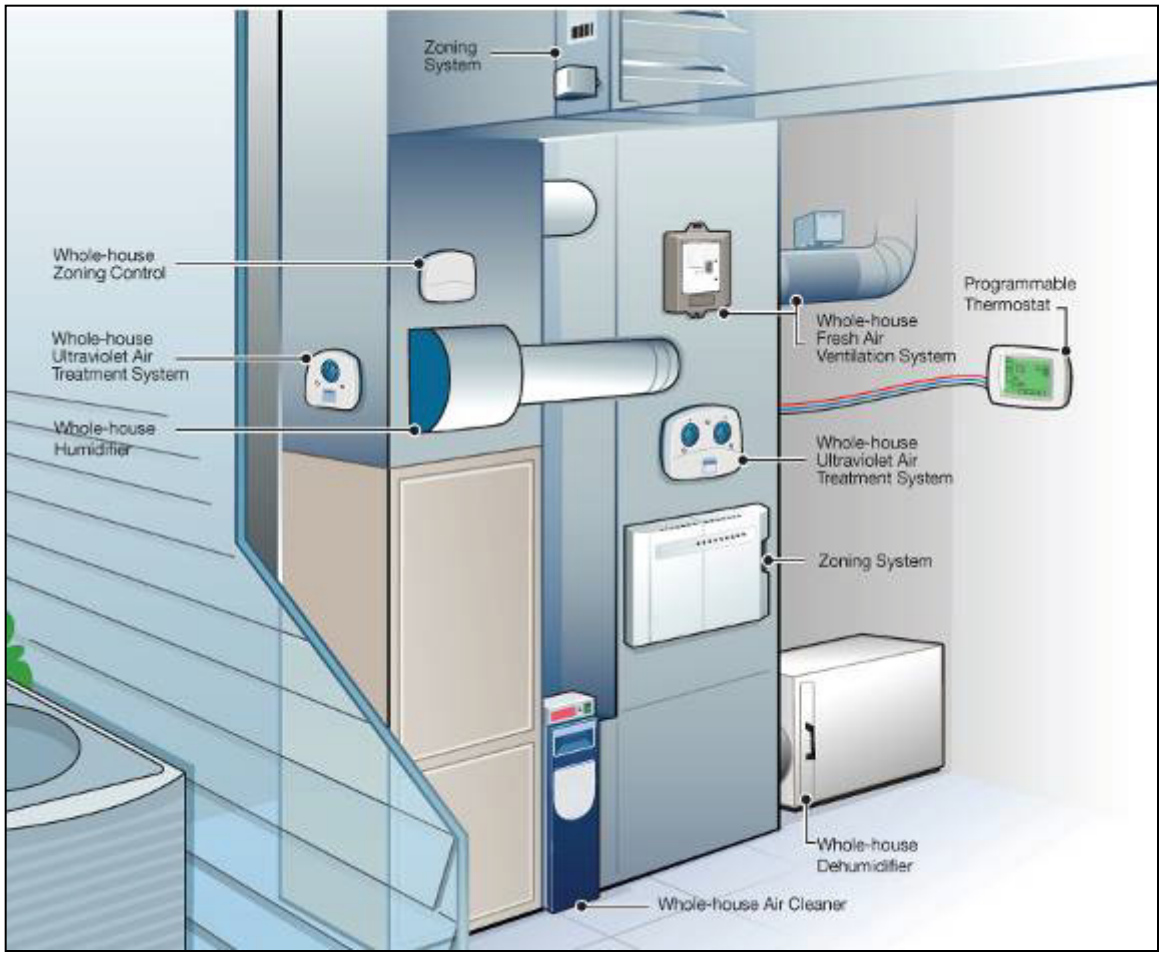
# Energy Efficient “System”

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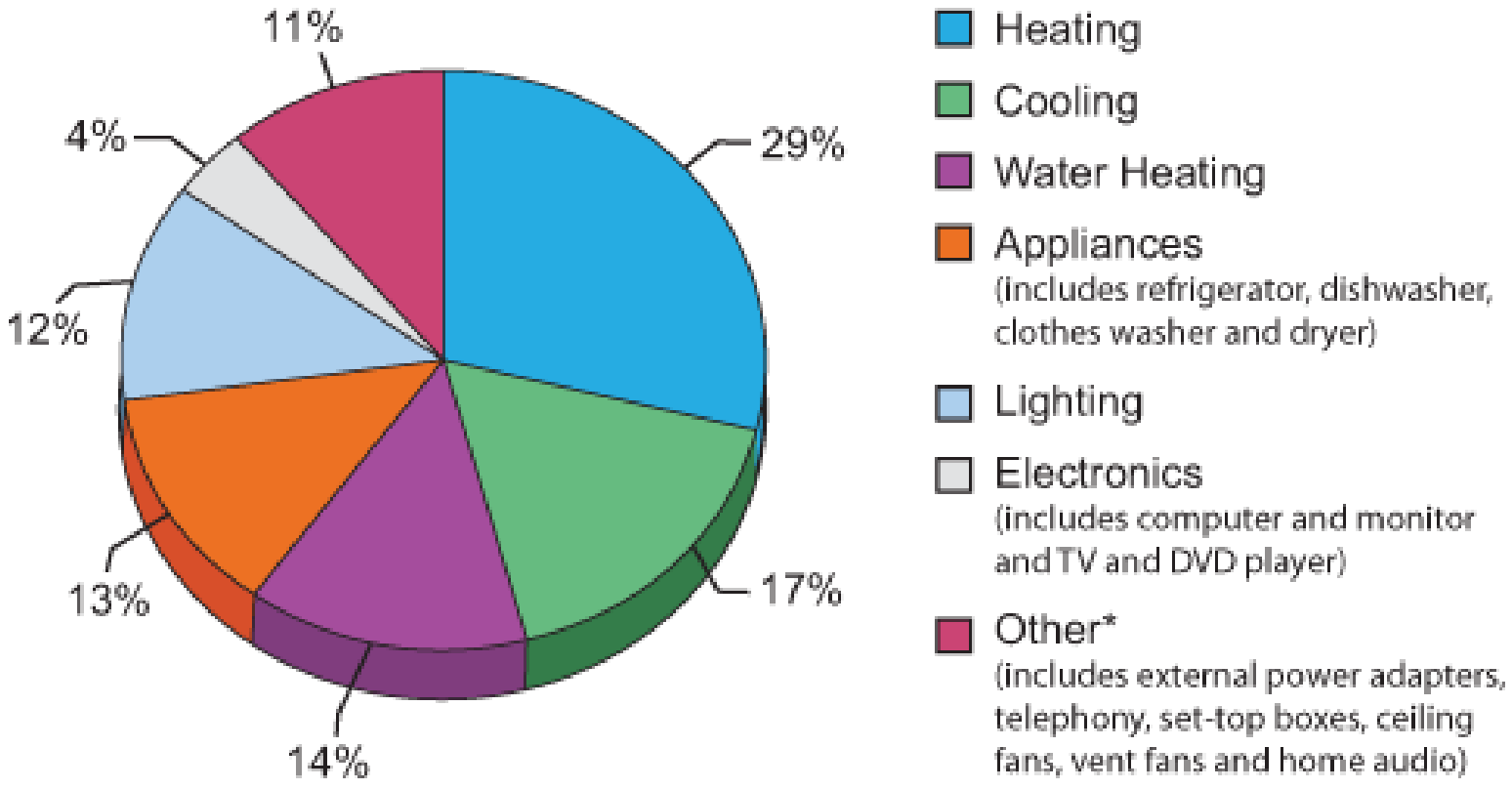

# Questions?