

Greening Your Home: Rehab - Heating/Cooling/Ventilation

Jim LaRue

Presented by
the **Nature Center**
at **Shaker Lakes**
and
Environmental Health
Watch



Greening Your Home: Rehab

Green or sustainable building means construction or rehab of our living spaces so there is little or no harm done to the natural environment or to the health of the residents.

Buildings that Connect People to Nature

- Biophilia which means “love for nature”; human beings have an innate and evolutionarily based affinity for nature.
- It is the connections that human beings subconsciously seek with the rest of life.
- We connect to nature via our windows, our landscape, our gardens, our buildings.
- **The Biophilia Hypothesis - Designing and Understanding the Human-Nature Connection**, Island Press, 2005

Heating/Cooling/Ventilation Strategy

1. Reduce demand:
 - Insulate, air seal as effectively as possible.
 - Heat/cool as little space at any one time as possible (space heating).
 - Adopt personal comfort measures such as wearing warmer clothing inside.

Create an efficient building envelope

- All previous topics in this greenbuilding series are attempts to define a sustainable building envelope.
- The more energy efficient the walls and roof, the less heat/cooling required.

Reduce demand

- Heating a whole house, when only portions are in active use is a waste of energy.
- Use of safe space heating for limited areas while thermostat on regular system is turned down can reduce energy costs while ensuring comfort.

Reduce demand: space heaters

- Never use space heaters that use kerosene or gas because of
 - fire hazards,
 - moisture,
 - combustion fumes.
- Beware of hot surfaces on electric space heaters.



Reduce demand

- Ceiling fans reversed so they blow upward in winter time, can more evenly maintain comfort and heating cost by redistributing heated air back into habitable living space.

Heating/Cooling/Ventilation Strategy

2. Use the most efficient primary heat/cooling source(s) you can afford to buy and operate.

Use most efficient heating systems you can afford

- 80+ forced air systems require a flue liner
- 90+ systems eliminate chimney and its maintenance.



Use most efficient heating systems you can afford

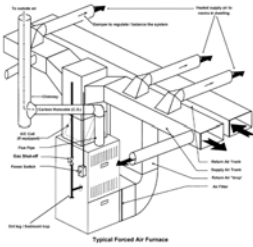


- Boilers: new boilers that are 90+ efficient also have sealed combustion that eliminates chimney requirement.

Heating/Cooling Ventilation Strategy

3. Make sure heating/cooling/ventilation delivery system is the most effective it can be.

Forced Air Heating/Cooling Delivery System:



- Keep ductwork out of exterior walls if possible.
- Seal all ductwork with mastic.

Forced Air Delivery System

- Make sure cold air returns in basement are connected directly to the furnace.
- Insulate ductwork that travels through a vented crawlspace or attic.

Forced Air Delivery System

- In rehab work consider redoing some cold air return work so there is better air pressure balance between interior/exterior of a room.



Forced Air Delivery System



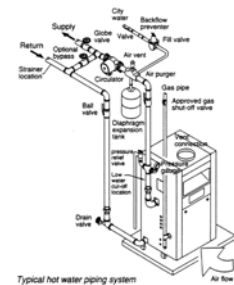
- Balance ductwork so heat is more evenly distributed throughout the house.

Filters/Air Cleaners

- Manufacturer filters are primarily to protect furnace fan.
- Pleated filters are better.
- Air cleaners will pick up more particulates, but not all air in our homes passes through the filters/cleaners.

Boiler (hot water/steam systems)

- Keep pipes out of exterior walls.
- Make sure steam boiler has water added as necessary.



Boiler (hot water/steam systems)

- Bleed radiators of air as necessary.
- Make sure steam radiators are properly leveled so water can return to boiler.
- Insulate behind radiators to help heat radiate away from walls.

Boiler (hot water/steam) systems.

- With thermostatic radiator control valves you can balance heat to each room in a hot water or steam radiator.



Combo Heating Systems



- Using a hot water tank as both the forced air heating source and hot water for household purposes

Ventilation

- The tighter we seal our homes the more critical ventilation becomes.
- But controlled ventilation means fresher air being distributed throughout our homes.
- Controlled ventilation rather than uncontrolled air leakage is the goal.

Spot Ventilation

- Bath fans are important for moisture removal.
- Kitchen fans are also necessary for moisture and gas by-product removal.

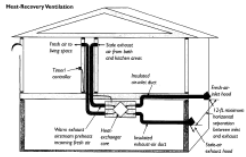


Whole House Ventilation



- Ventilation directly to cold air return, with proper controls, brings fresh air into house appropriately.

Whole House Ventilation



- Heat Recovery Ventilation is a separate system that heats air it brings in with air it vents out.

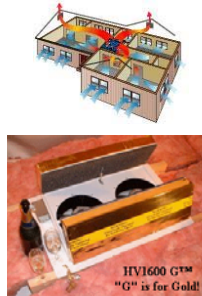
Cooling/Air Conditioning Our Living Spaces



- Ceiling fans can cool our bodies.

Whole House Ventilation

- If carefully used during the summer months, this ventilation system can reduce need for air conditioning.



Air Conditioning Provides Two Things

- Obviously, cooling, but also dehumidification.
- It pulls moisture out of air.

Air Conditioning in Forced Air Heating Systems

- An air conditioning coil can be put in heat plenum with a compressor outside.

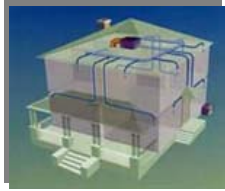


Separate Air Conditioning Units Can Be Added to Homes with Boilers

- Ductless mini-split systems are effective, but quite expensive.



Alternative Air Conditioning System for House with Boiler



- Mini-duct air conditioning can be installed in any home.
- It reduces moisture more effectively than conventional A/C.

Window and portable air conditioners

- Trying to cool a whole house can be expensive.
- Cooling spaces as needed can be best.
- Sizing is important.



Heating/Cooling/Ventilation Strategy

4. Install and use effective controls for your heating/cooling/ventilation system(s).
 - In addition to balancing ductwork/radiators, effective placement and use of thermostats can significantly reduce energy costs.

Thermostats

- Never place one near conditions that can affect it:
 - windows,
 - heat or cooling registers,
 - kitchens/baths, or
 - drafts.



Thermostats

- Setback thermostats permit you to set times when heat or cooling will turn on reducing heating/cooling loads.
- Need to be sure to reset them after a power outage.

Thermostats (heating mode)

- Set as low as comfort will allow for added energy savings.
- Cost of heat recovery after setting back thermostat is not significant.
- In fact, staying on for a longer time can be more energy efficient than cycling on/off too often.

Thermostat (cooling mode)

- Best not to set thermostat lower than 76 degrees.
- It is important to not set thermostat too low or cooling can take place before dehumidification and air feels cold and clammy.

Annual Checkup

- Forced air systems should have an annual checkup to be sure all of the system is functioning effectively.
- Boilers may not need as regular a checkup, but every two years would be good.