

Steps to Healthier Homes

- Start with People
- **House as a System**
- Keep It:
 - Dry
 - Pest-Free
 - Safe
 - Maintained
 - Clean
 - Ventilated
 - Contaminant-Free
- Making it Work



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What's a house?



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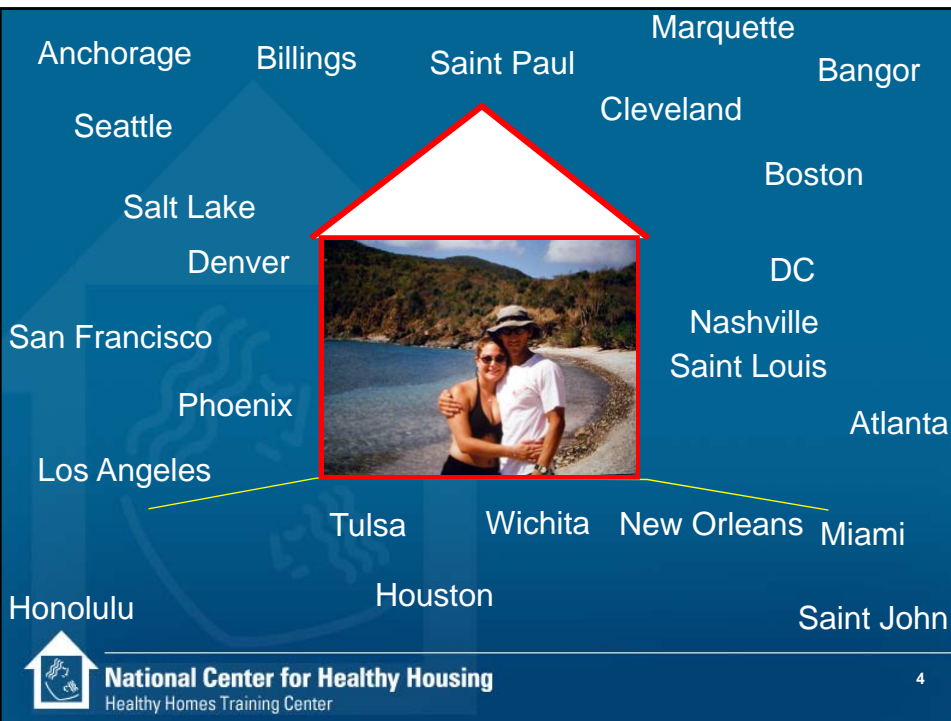
Homes Shelter Us From:

- Animals and insects
- Wind
- Sun
- Rain (sleet, snow)
- Cold or hot air
- Dust



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Most of Us are Comfortable:

- Air temperature: 65° F(active) – 80° F (bathing)
- Air relative humidity: 30% – 70%
- Air motion: 20 – 40 feet per minute
- Surrounding surface temperatures: within 10 – 15° F of room air



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We have Systems to:

- Add heat
- Remove heat
- Ventilate
- Maybe add or remove humidity



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Heating Systems

- Fuel – gas, oil, wood, electric
- Distribution
 - hot water, steam, warm air, space heaters
 - Radiators, baseboard, ducts
 - Radiant floors and ceilings
- Chimneys, sealed combustion, fan powered
- Temperature Controls



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Heat Exchangers



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Cooling Systems


- Fuel – electric
- Windows, fans and shades
- Distribution
 - Central air
 - Through the wall
 - Duct-less splits
- Dehumidification
 - Air conditioners/part-load
 - Dehumidifiers
- Control – thermostat, humidity




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The first photograph shows a furnace with a large, insulated vent pipe. The second photograph is a close-up of a furnace heat exchanger, showing a complex network of metal tubes and fins. The third photograph shows a room with a white wall-mounted furnace, a small table with a lamp, and a chair.

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The first photograph shows a wooden ceiling with a ceiling fan. The second photograph shows a bedroom with a window, a bed, and a desk. The third photograph shows the exterior of a house with large windows and a wooden deck.

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Internal and solar gains: Good when cold out; bad when hot out

- Heat from people (100-150 watts/ person)
- Heat from electric and gas appliances
- Solar in through windows
- In average US house around 23% of heating is done by these gains and 59% of cooling is caused by these gains



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Other factors

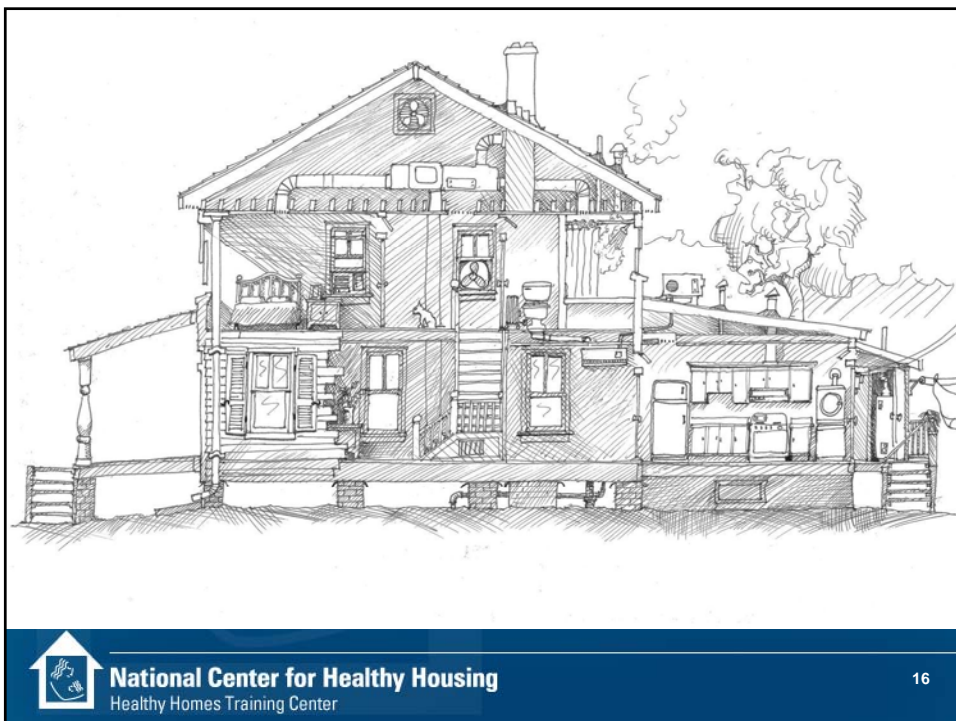
- Water (drinking, cooking, washing, toilets)
- Cooking and storing food
- Ventilating fans
- Lighting
- Computers, stereos, hair dryers, razors



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