Overview of Green Home

Presented by

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Outline

- Why is Green Home Important?
- What is Green Home?
- Green Home Features and Technologies
  - *Energy Efficient*
  - *Water Efficient*
  - *Using Sustainable Materials/Efficient Use of Building Materials*
  - *Superior Indoor Environmental Quality*
- Green Home Standards and Certification

U.S. Homes' Significant Impact

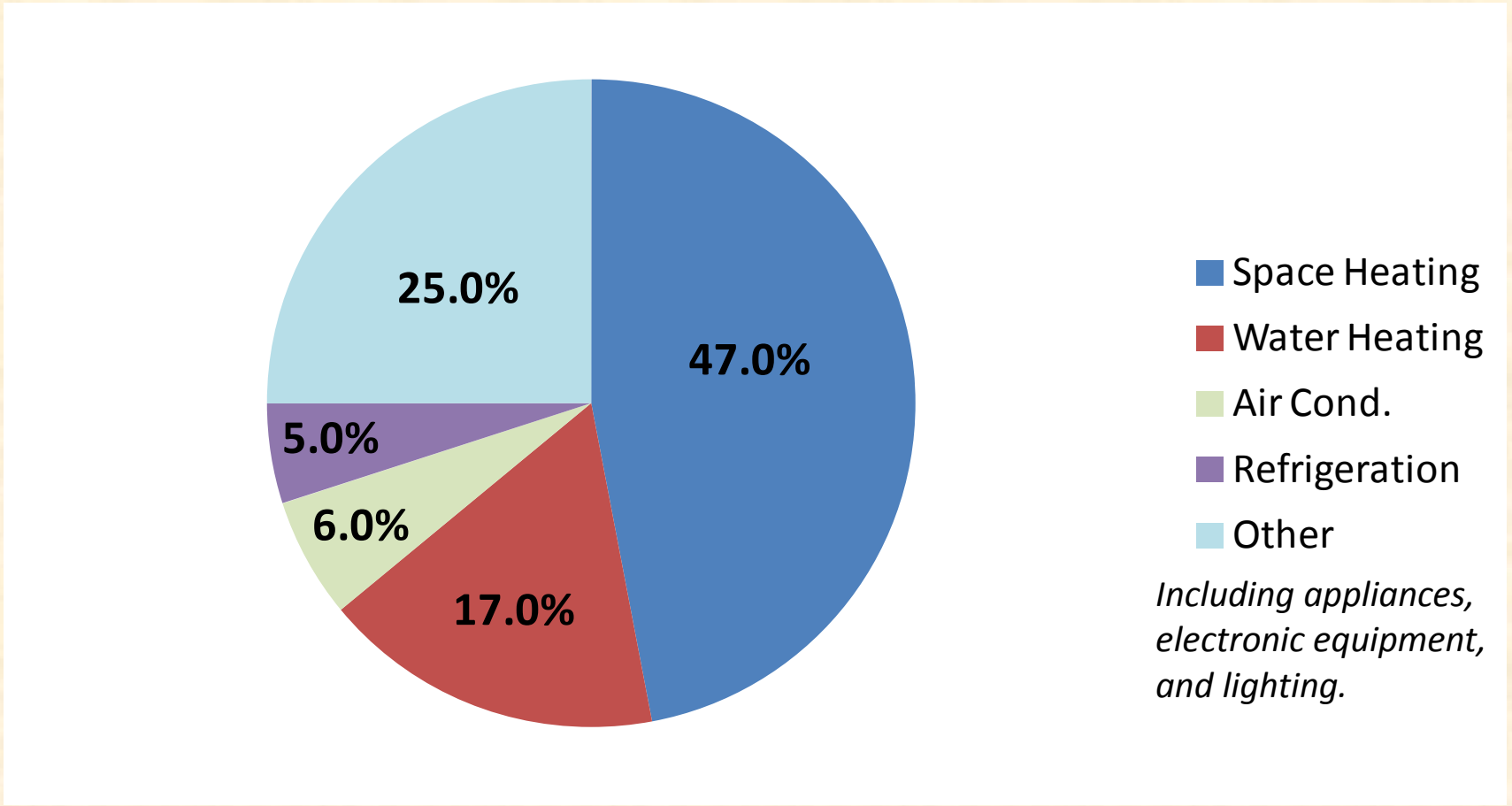
- U.S. homes account for 22% of the total energy used in the nation.
- The residential sector also contributes 21% of U.S. carbon dioxide emissions.
- U.S. homes can have lead, radon, and many other indoor environmental quality problems. Levels of indoor air pollutants can often be four to five times higher than outdoor levels.

What is Green Home?

- Green home is a type of house designed to be environmentally friendly and sustainable, while also focusing on the efficient use of energy, water, and building materials (Roberts 2003).
- Green homes are generally healthier, more comfortable, and more durable.
- Green homes may also address affordability and adaptability issues.

Green Home Features and Technologies

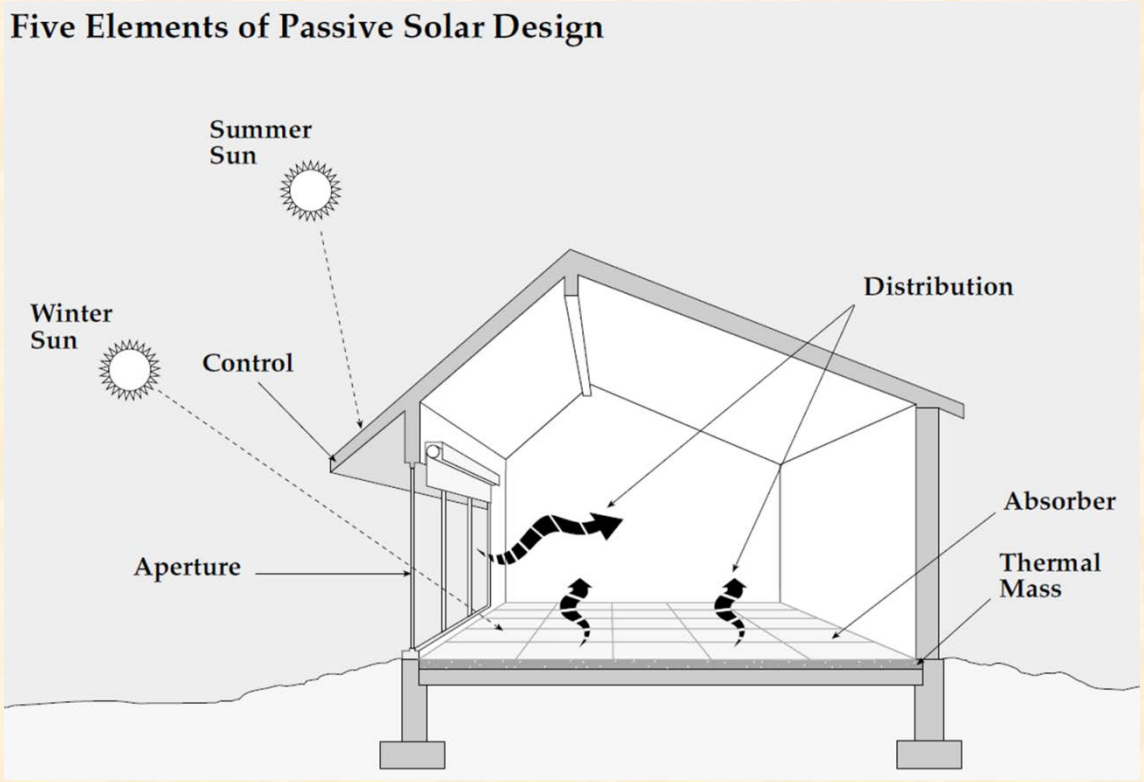
Energy Efficient



Typical Energy Use in Homes

Focal Areas for Energy Conservation

- Passive solar design to reduce a home's energy profile – the most cost effective energy efficiency measure (EEM)



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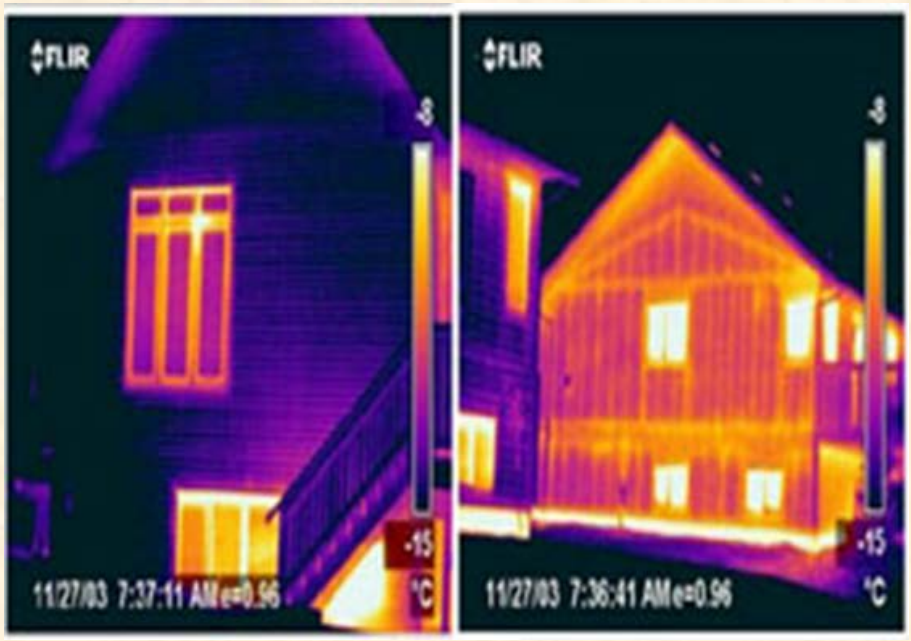
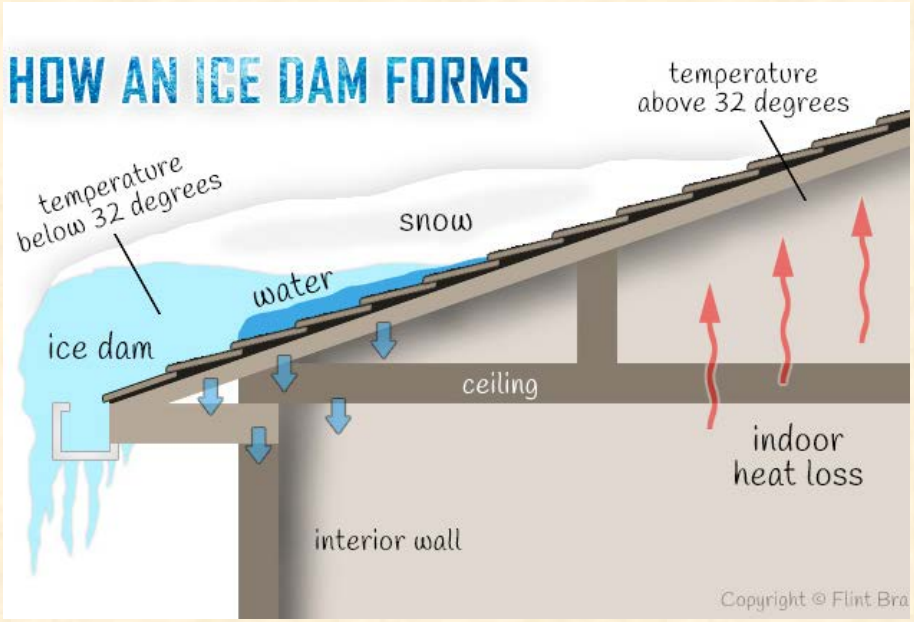
- High performance building envelope (well insulated and airtight)

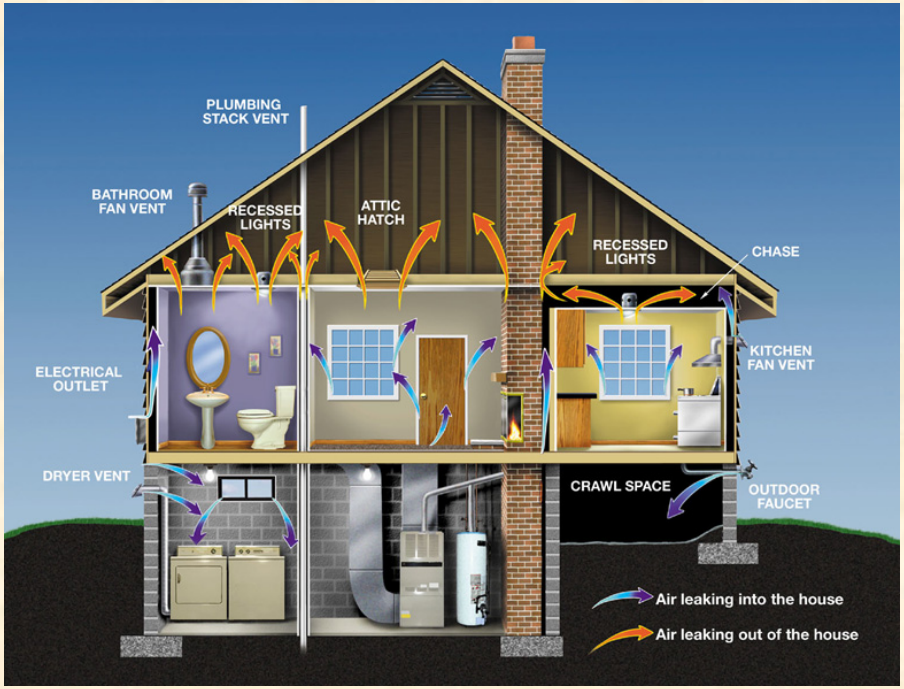


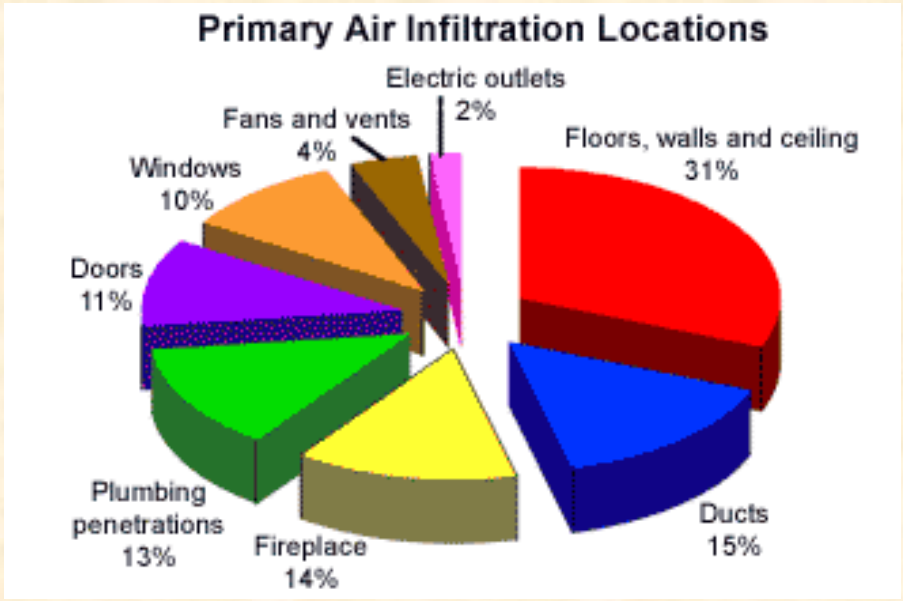
A well insulated home vs. a poorly insulated home with thermal bridging issues under a thermal imaging camera



Ice dam caused by the heat from the interior escaping into the attic due to poor insulation

Air Leakage Problems





Blower Door Test

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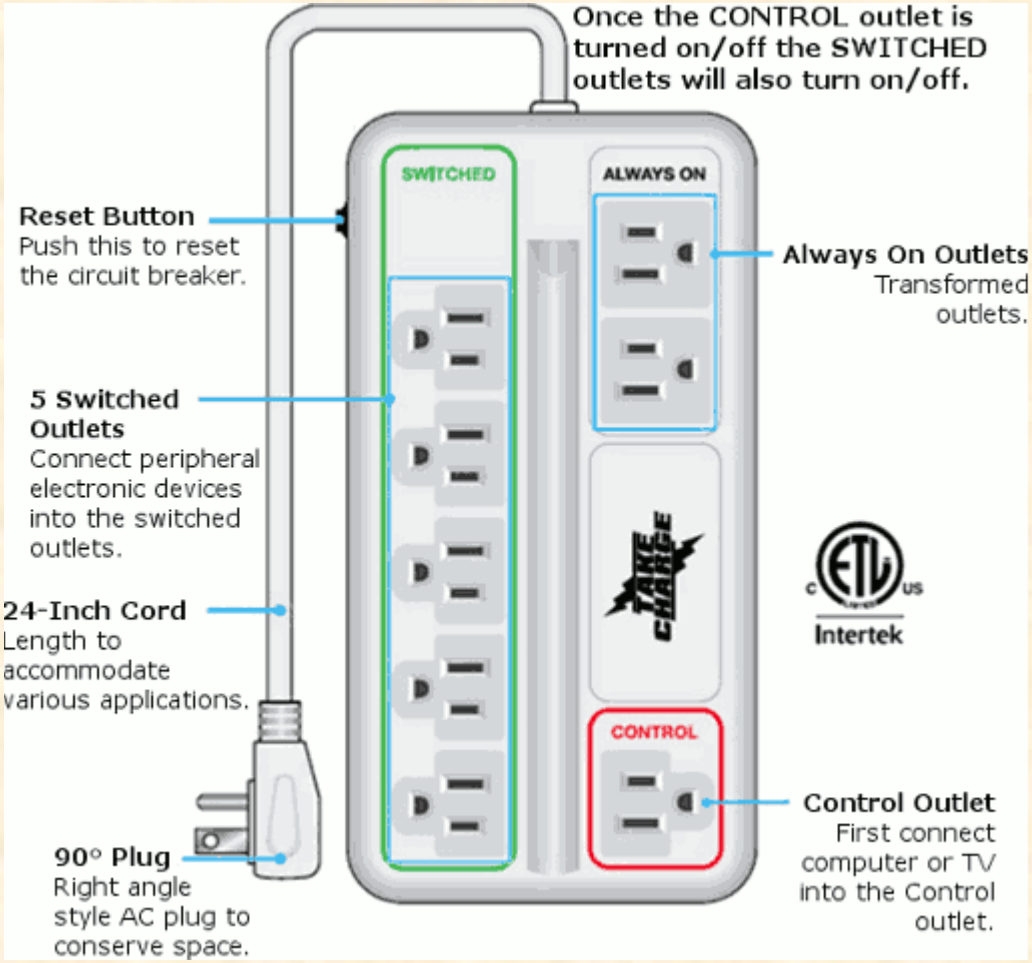
- Energy efficient HVAC, lighting and appliances (e.g., ENERGY STAR)
- Proper system control and personal habits
- Plug load management



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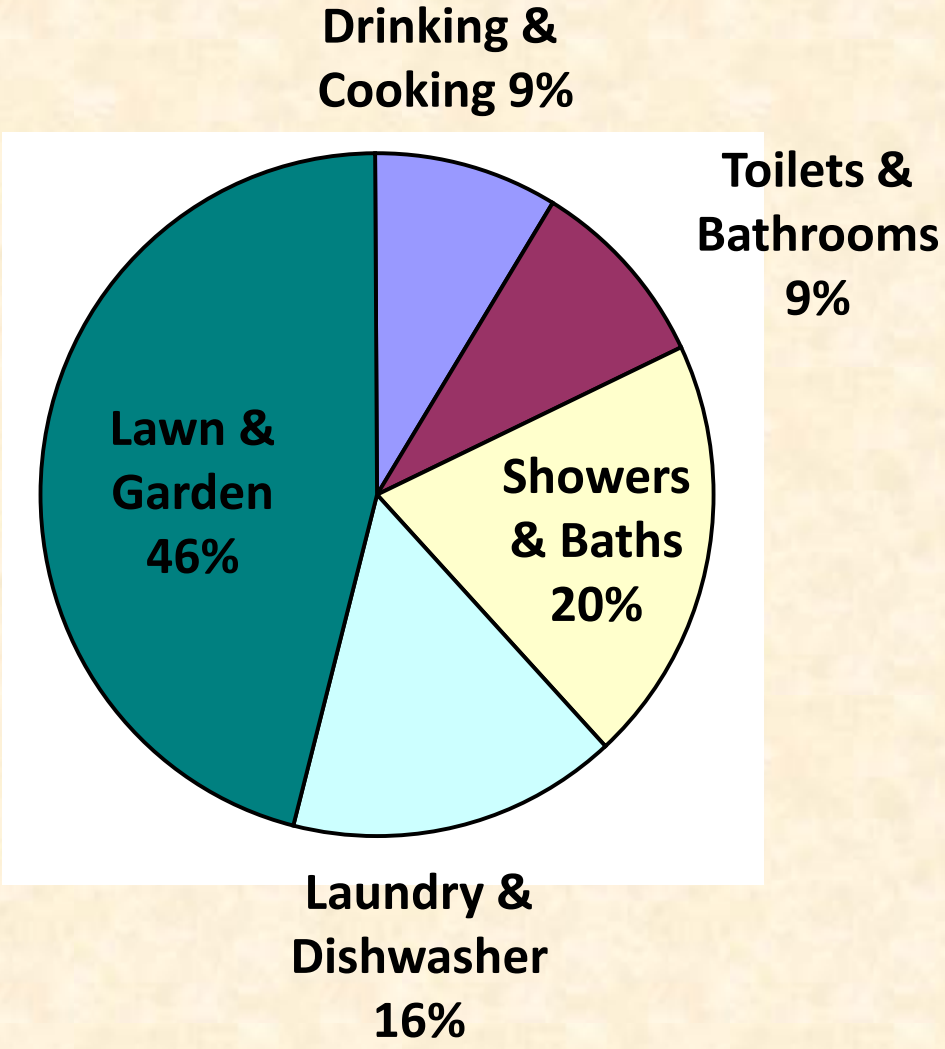
- Using renewable energy sources
  - *Solar space heating and cooling*
  - *Solar water heating*
  - *Solar electric-PV (photovoltaic)*

Water Efficient

- The daily average water use for a U.S. person is 100 gallons, around 4 times the minimum water for a good quality of life *(26.4 gallons, U.S. Agency for International Development)*.
- Buildings (residential and commercial) account for 13.6% of freshwater consumption.
- Buildings consumed 5 billion gallons of potable water per day to just flush toilets.

Water Usage Patterns for Homes

- The average American household uses 120,000 gallons of water per year (329 gallons per day).
- A green home can reduce this amount by more than 60%!



Water Conservation Measures

- Low-flow & ultra-low-flow plumbing fixtures
- Efficient use of appliances
- Personal habits
- Sustainable landscaping practices
- EPA WaterSense Program: WaterSense labeled products and Water Budget Tool (https://www3.epa.gov/watersense/)

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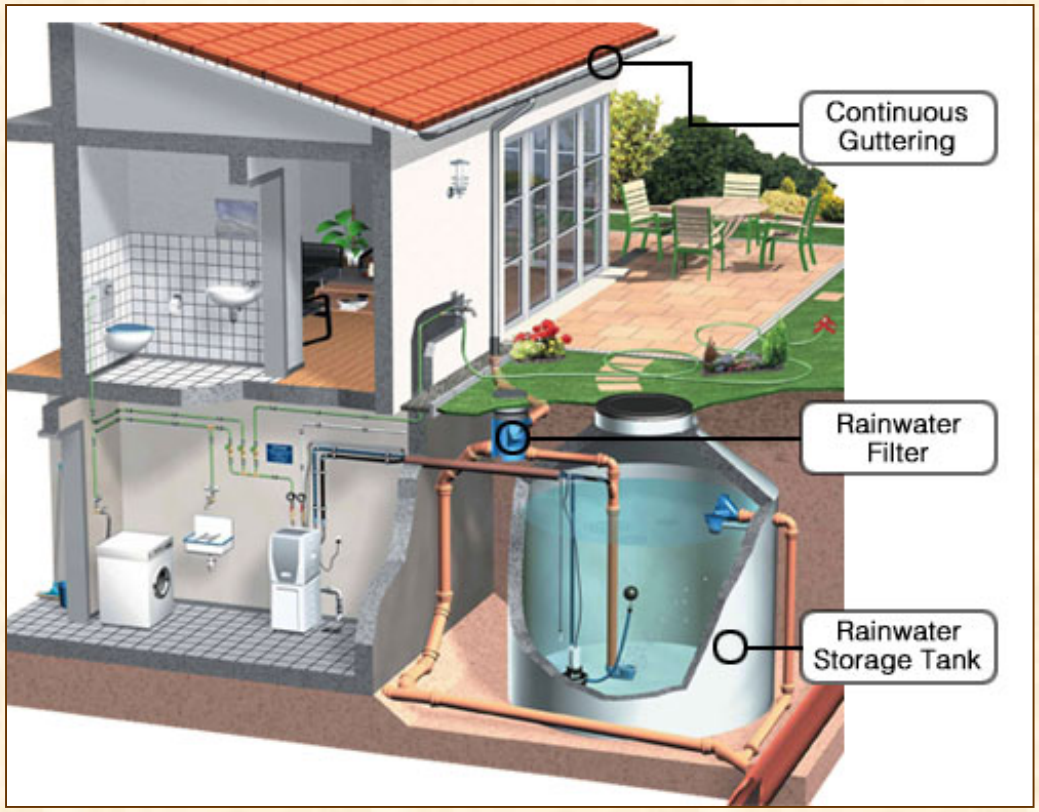
- Recycle the rainwater for gardening, toilets, and laundry



Sustainable Materials & Resource Efficiency

- Building materials affect buildings' performance, indoor air quality, and human health.
- Extraction, processing, and transportation of materials consumes natural resources and energy and produces air and water pollution.
- Construction and demolition wastes constitute 40% of solid waste stream in the U.S.

Focal Areas

- Material-efficient framing/advanced framing
- Environmentally preferable products
  - *Regional materials, materials with recycled content, FSC-Certified wood…*
  - *Low-emitting materials (e.g., Green Seal)*
  - *Low impact based on life cycle assessment*
- Waste management: 3R (reduce, reuse and recycle)

Indoor Environmental Quality (IEQ)

- Americans spend on average 90% of their time indoors.
- Unhealthy air is found in up to 30% of new and renovated buildings (EPA).
- Indoor air pollution causes 14 times more deaths than outdoor air pollution (WHO).
- 20% of U.S. houses has problems related to lead-based paint. EPA is also concerned about lead contamination from the plumbing.

Focal Areas of IEQ Control

- Pollutant Source Control: *combustion, location of air handler, garage, coatings and adhesives…*
- Pollution Control: *ventilation, radon control, HVAC system protection…*
- Moisture Management: *vapor, rainwater, plumbing, HVAC…*

Major Green Home Standards and Certification

- ENERGY STAR Certified Homes: Developed by US EPA
- LEED for Homes: A rating system developed by US Green Building Council (USGBC)
- National Green Building Standard: Developed by National Association of Home Builders (NAHB) and International Code Council (ICC) and approved by American National Standards Institution (ANSI)

Questions & Comments?