



**THE  
SUSTAINABILITY INSTITUTE**

*Sustainable communities. One person at a time.*



# THE SUSTAINABILITY INSTITUTE

- ✓ **Founded in 1999**
- ✓ **Focus on Capacity Building**
- ✓ **Home to Multiple Programs**
  - ✓ **CharlestonWISE & The Impact Project**
  - ✓ **Energy Conservation Corps**
  - ✓ **Pathways to a Green Economy**



- ✓ **Connects you with local, certified contractors**
- ✓ **Trained to work on historic houses**
- ✓ **Helps reduce the overall costs of improvements**
- ✓ **A trusted resource throughout the energy improvement process**

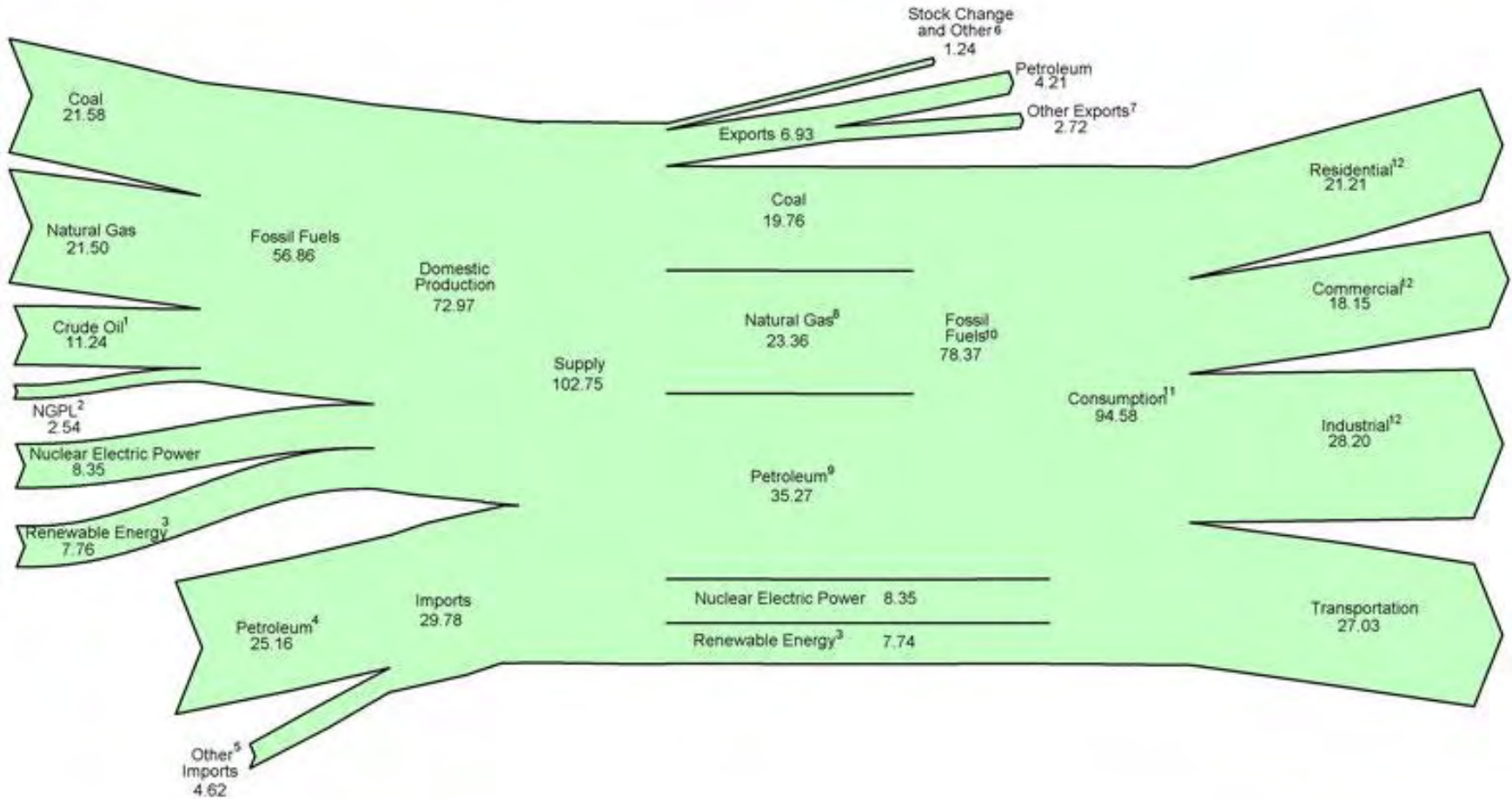


# ENERGY EFFICIENCY WORKSHOP

- ✓ How is energy used in the home?
- ✓ How can I reduce energy use?
- ✓ What are the benefits of an energy efficient home?
- ✓ What resources and incentives are available to help me complete my improvements at a reasonable cost?



# WHY ARE BUILDINGS IMPORTANT?





# SOUTH CAROLINA

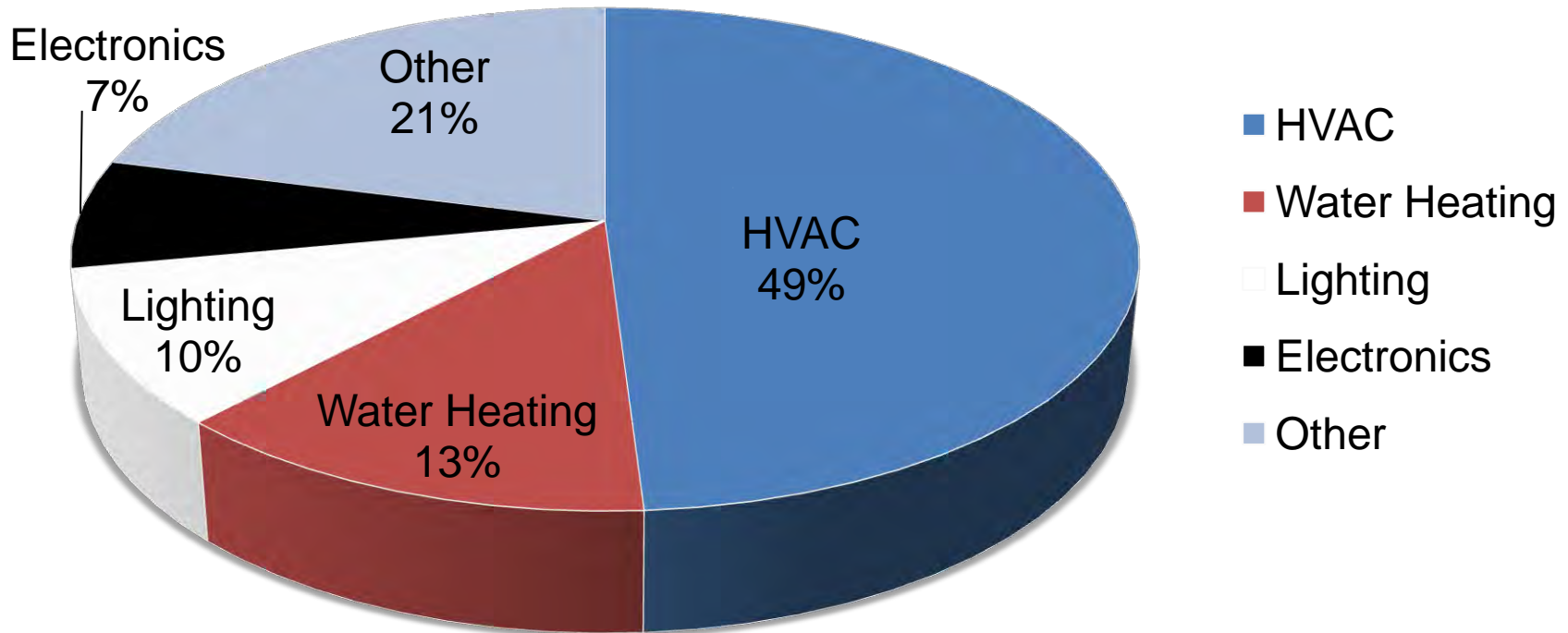
- South Carolina's energy consumption is among the highest in the U.S.
  - Commercial: 1.6¢ lower than the national average.
  - Industrial: 1.2¢ lower than the national average.
- South Carolina has low energy prices!





# ENERGY PROFILES

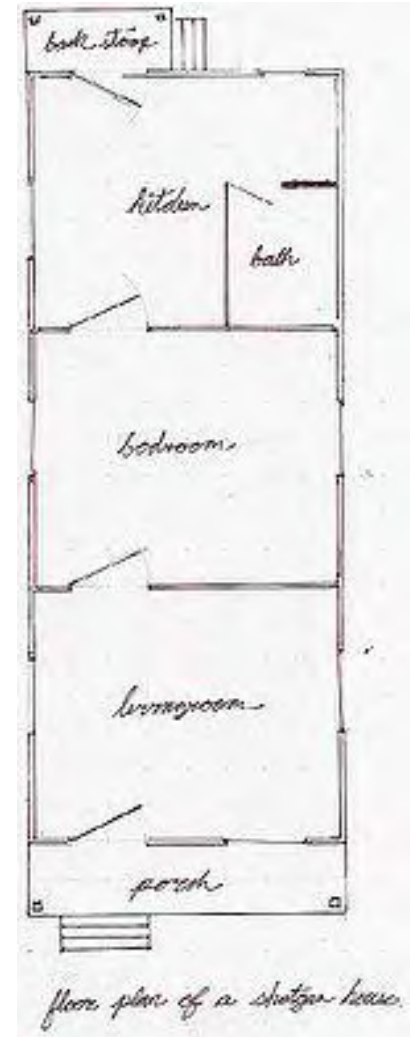
## Home Energy Profile





# ENERGY IN HISTORIC HOUSES

- ✓ Historic Houses are 20% less efficient than existing houses
- ✓ Most were built with climate specific features
- ✓ Can be retrofitted with little impact on historic material







# ENERGY ASSESSMENT

- Energy Assessment:
  - Blower Door
  - Duct Blaster
  - Energy Modeling
  - Cost/benefit Analysis
  - Scope of Work

The image shows a document titled "Energy Audit Scope of Work" dated January 11, 2011, prepared by Sustainable Design & Construction Solutions. The document is a detailed table with columns for "Priority", "No.", "Energy Audit Scope", "Provided by", "Included in Consultant Scope", and "Accepted by Client". The table is organized into four main sections: Preliminary Energy Analysis, Level 1 - Walk-Through Analysis, Level 2 - Energy Source and Engineering Analysis, and Level 3 - Detailed Analysis and Recommendations. The table contains 43 numbered items, each with a description of a task and checkboxes for the other columns. The document is presented as a stack of papers, with the top sheet being the most prominent.

Priority	No.	Energy Audit Scope	Provided by	Included in Consultant Scope	Accepted by Client
Preliminary Energy Analysis	1	Compile General Building Code			
	2	Assess/Verify Utility Information			
	3	Verify Historic Energy Use			
	4	Determine Energy Utilization Index (EUI)			
	5	Use EUI to Identify Energy Intensive Areas			
Level 1 - Walk-Through Analysis	6	Review Energy Use Information			
	7	Review Design vs Current Function			
	8	Review O&M Procedures			
	9	Conduct Air Infiltration			
	10	Identify Low E-Val Cost ECM's			
	11	Provide Cost and Savings Analysis for ECM's			
	12	Identify Capital Improvements to Investigate			
	13	Identify Utility Variables or Other Incentives			
	14	Develop Reduction Targets			
	15	Review Mechanical and Electrical Systems			
Level 2 - Energy Source and Engineering Analysis	16	Measure and Evaluate Operating Parameters			
	17	Determine Envelope Thermal Energy Use by Envelope			
	18	Identify All Possible Envelope Energy Use by Envelope			
	19	Provide List of Owner			
	20	Update EUI and reclassified Project Designations			
	21	Provide Cost & Savings for Each ECM			
	22	Provide Schedule of Work			
	23	Access Non-Energy Incentives for Each ECM			
	24	Define Measurement & Verification Procedures			
	25	Perform All Practical Capital Intensive ECM's			
Level 3 - Detailed Analysis and Recommendations	26	Perform Test & Measure to Verify ECU's Feasibility			
	27	Energy Model Proposed Modifications			
	28	Prepare Cost & Savings for Each ECM			
	29	Prepare Schedule Layout			
	30	Develop Recommendations to Owner			
	31	Develop HIRP/IR for Targeted ECM's			
	32	Prepare Utility Incentives or Other Incentive Applications			
	33	Review Contractor Proposals			
	34	Interview Contractors			
	35	Ensure Key Milestones/Prerequisites are Completed			
Project Finalization	36	Maintain Project Schedule			
	37	Plan and Track Project Budget			
	38	Respond to Contractor RFIs			
	39	Review and Approve Contractor Submittals			
	40	Ensure Appropriate Prerequisites are Completed			
	41	Commission Contractor O&M's			
	42	Verify Adequate O&M Training			
	43	Deliver Systems Manuals for All ECU's			

NOTE: SCOPE OF THIS SCOPE OF WORK IS LIMITED TO THE 2006 INTERNATIONAL MECHANICAL AND ELECTRICAL CODES FOR COMMERCIAL BUILDING ENERGY AUDIT (M-EA) 101-104.  
Prepared by Sustainable Design and Construction Solutions



# PROOF IS IN THE POWER BILL!

## GreenHouse Energy Charges



KWH Used	Energy Charges
342	\$43.33
469	\$55.28
325	\$39.44
360	\$42.85
372	\$44.01
297	\$36.71
550	\$61.34
487	\$55.20
539	\$60.27
431	\$49.75

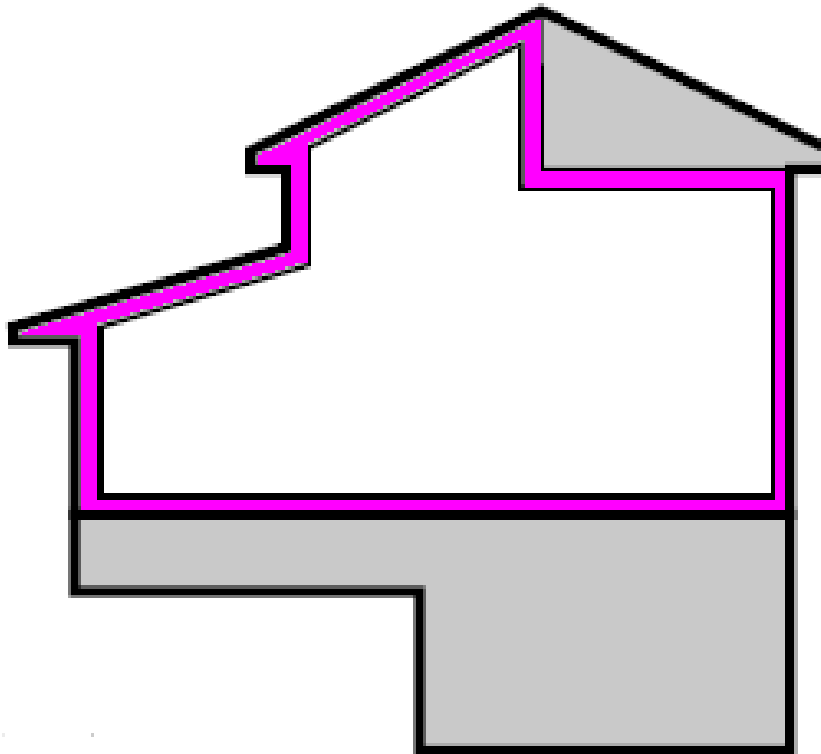


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# **STEPS TOWARD SAVING ENERGY: ENVELOPE IMPROVEMENTS**



# THE HOUSE AS A SYSTEM

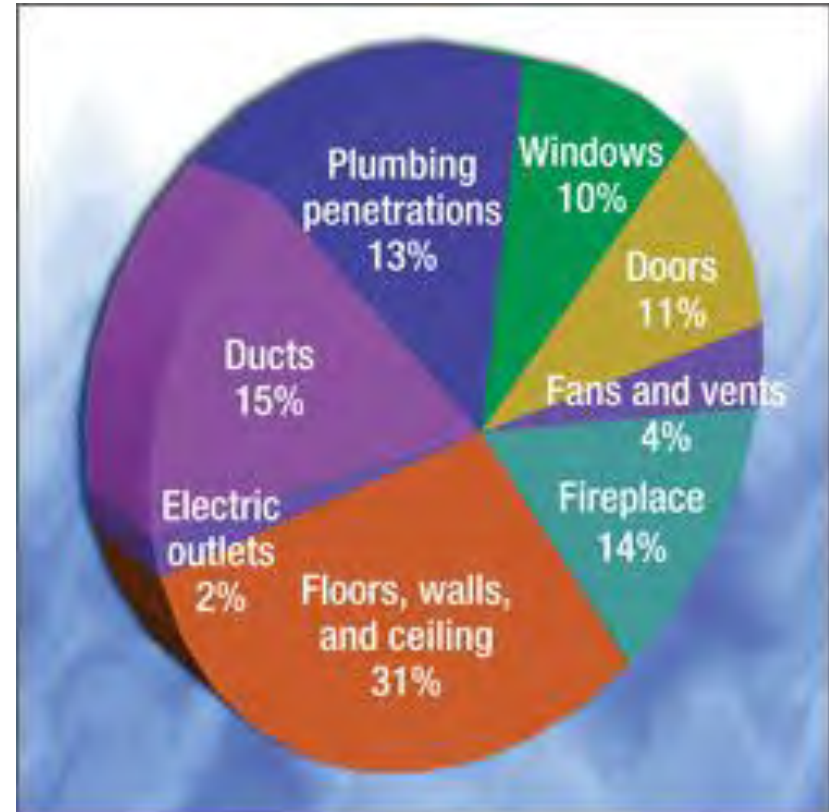


The **ENVELOPE** makes up the outer shell of the home: walls, ceilings, windows, floors, insulation, etc.



# AIR SEALING & INSULATION

- One of the most cost-effective ways to lower energy bills is to improve the “envelope” by sealing air leaks and by adding insulation.





# CAULK IS CHEAP!

- **Where?**
  - Around windows/doors
  - Between ceiling and walls
  - Walls and floor





# SPRAY FOAM

- Cracks from ½ inch to 3 inches
  - Window Rough Openings.
  - Plumbing penetrations.
  - Electrical penetrations
  - HVAC Penetrations





# WEATHER-STRIPPING

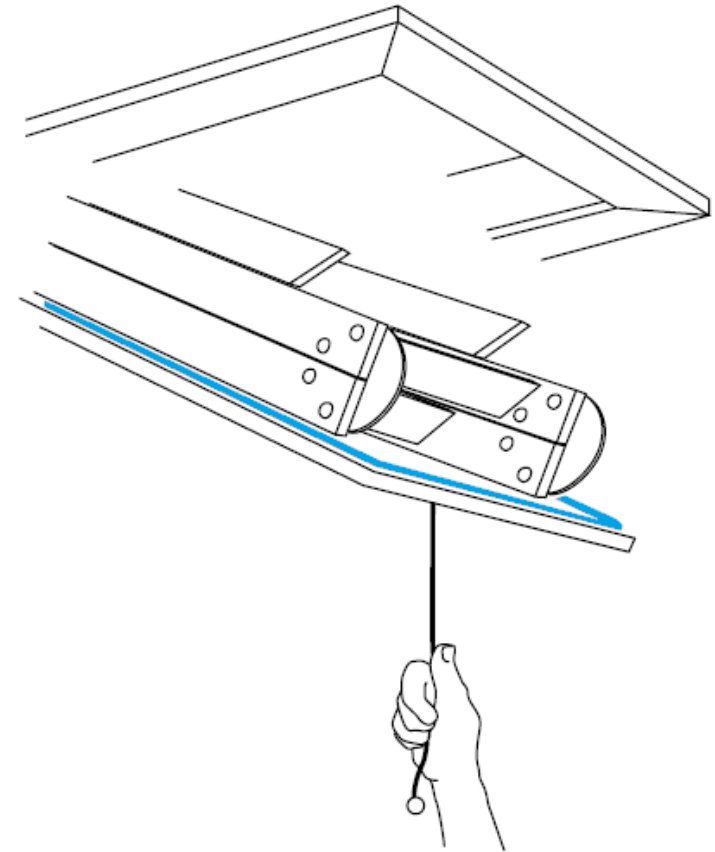
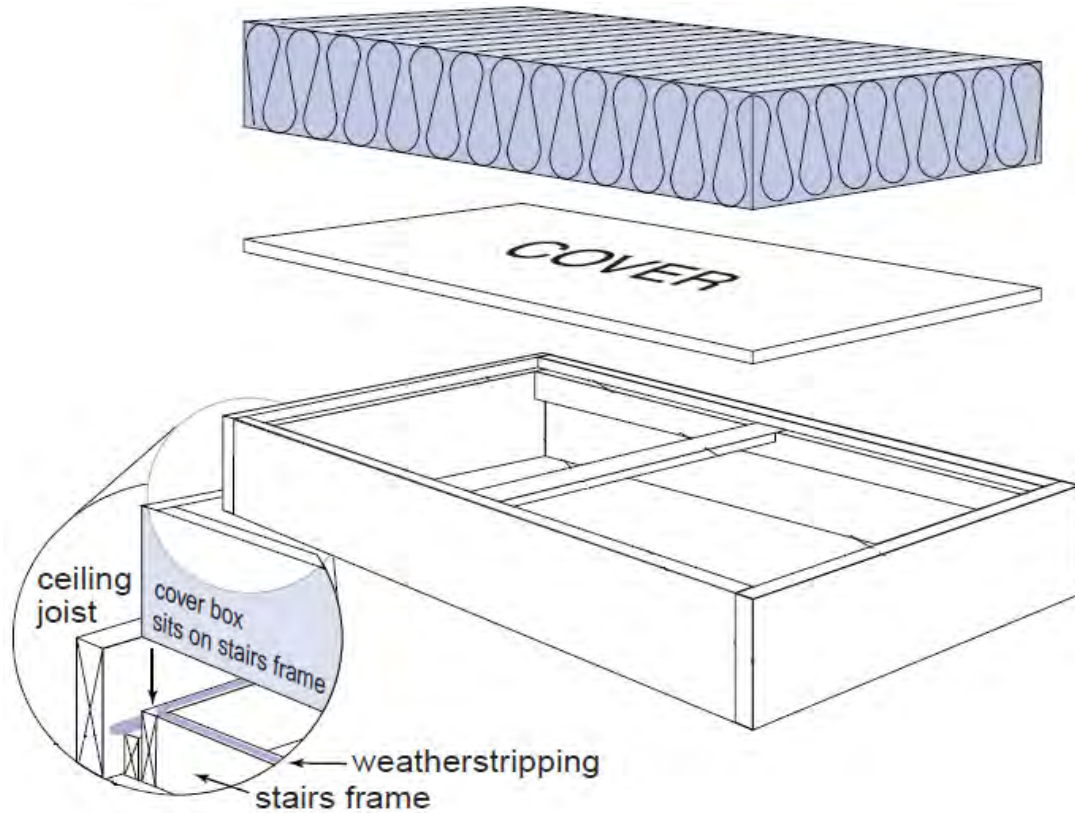
- *A 1/8 inch space between a standard exterior door and its threshold is the same as a two inch square hole in the wall!*







# ATTIC HATCH



Images Courtesy of Southface



# COLLECTIVELY LARGE HOLES



- Child safety covers for electrical outlets installed in sockets not being used helps further reduce the loss of heat/AC through this opening (also provided)



# RECESSED LIGHTING

- Another example of a collectively large hole in your house.
- Auditor secret:
  - Look for spider webs!
  - Look for dirty insulation.





# INSULATION

- “*R-Value*”

- How well insulation can Resist heat flow.
- Higher R-Value = More resistance.

## South Carolina Homes:

- **R-30 Ceiling**
- **R-19 Floors**
- **R-13 walls**





# INSULATION

- Check your home's insulation using a flashlight and ruler.

4 inches = R-11

6 inches = R-19

8 inches = R-26

10 inches = R-30





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# **STEPS TOWARD SAVING ENERGY:**

## **HVAC**



# HVAC



- 44% of your utility bill goes for heating and cooling
- For every degree that you move away from these temperatures, add 4 to 6% to your bill.
- Set thermostats at 68 in winter and 78 in summer



# PROGRAMMABLE THERMOSTATS

You can improve your homes heating and cooling costs by about 15% by installing a programmable thermostat.







# USE YOUR HVAC LESS

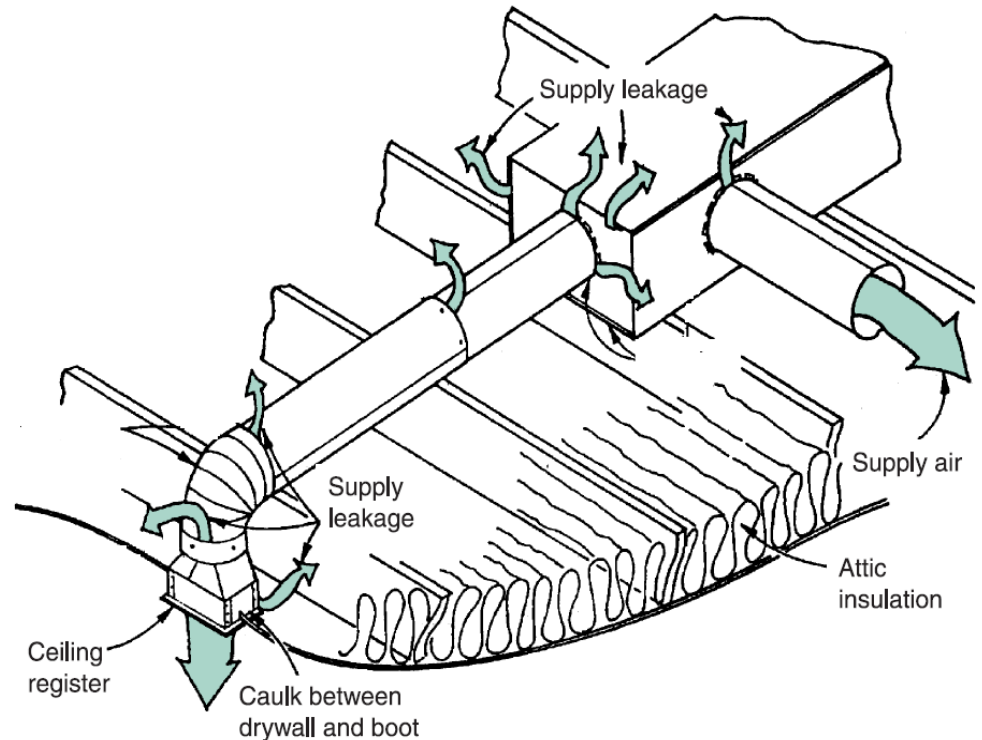
- Operating a ceiling fan 10 hours a day or more can cost less than **\$3 a month**.
- Fans use only about **1/10<sup>th</sup> of the energy** that air conditioning does.





# DUCTWORK

- **Leakage rates of 20%** is typical in both new & existing homes.
- With 20% leakage a home's HVAC system efficiency can be reduced by **50%!**





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# **STEPS TOWARD SAVING ENERGY: WATER HEATER**



# WATER HEATING

*An average family spends about  
**\$400** each year water heating!*



# WATER HEATING

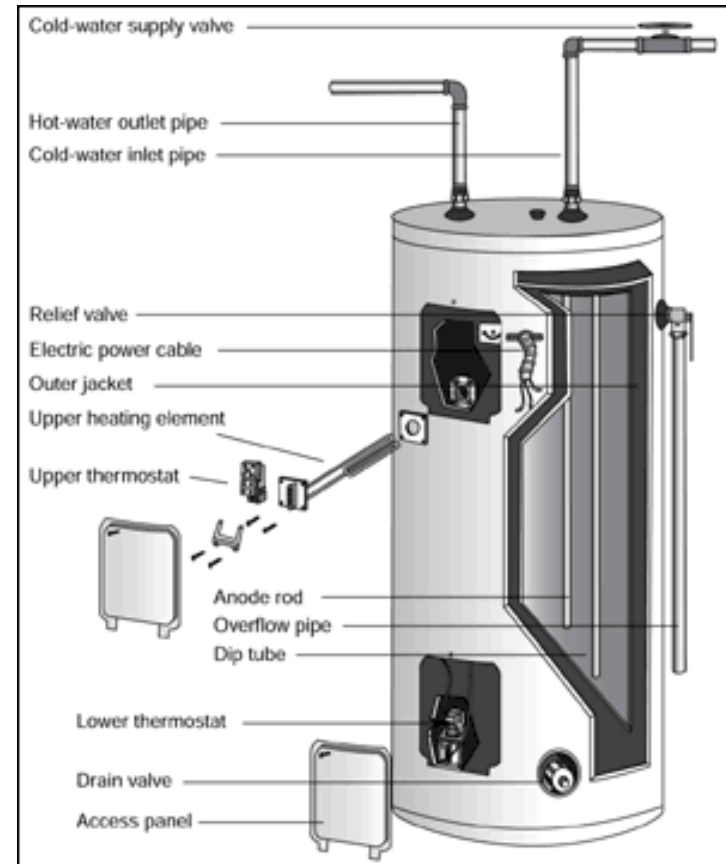
- Apply an insulation blanket over an electric hot water heater
- This reduces heat loss through the walls of the water heater





# WATER HEATING

- Insulate hot water pipes:
  - Reduces the time it takes for hot water to reach the tap.
- Temperature!
  - **120°** Maximum!





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# **STEPS TOWARD SAVING ENERGY: WATER CONSERVATION**



# WATER CONSERVATION

*The Average Daily Household  
water use is 350 gallons!*





# SIMPLE CONSERVATION TIPS



- Take shorter showers!
  - For every minute you reduce your shower, you can save about **2,000 gallons of water a year.**



# LOW-FLOW FIXTURES

- Faucet Aerators
  - Install faucet aerators for the kitchen faucet.
  - It uses about 30% less water per minute than a standard faucet, yet still gets the job done
- Shower
  - Install low-flow shower head  
It uses about 2.5 gallons per minute instead of 5 to 7 gallons with a regular shower head





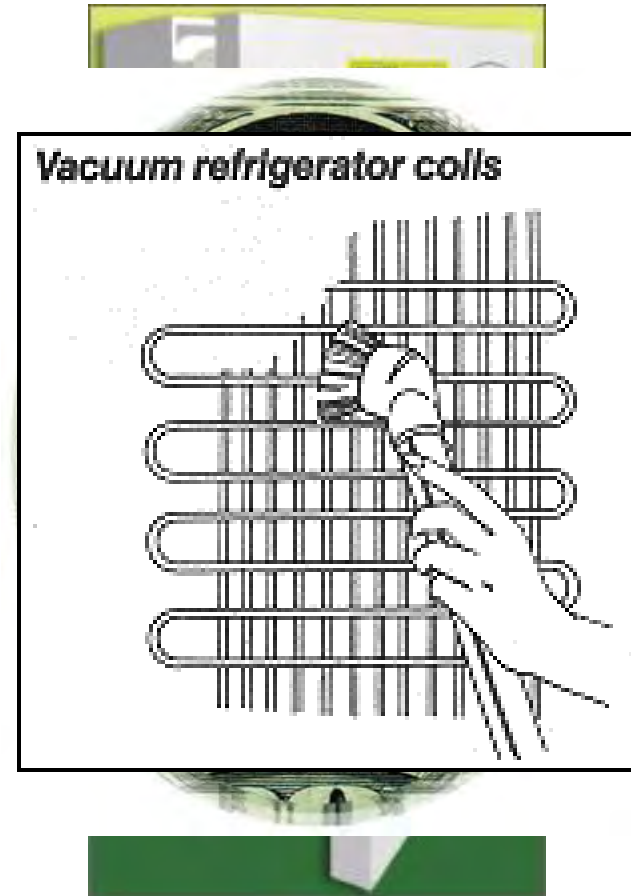
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# **STEPS TOWARD SAVING ENERGY: APPLIANCES**



# APPLIANCES

- Refrigerator
  - Set both the frig. and freezer at the correct temperatures:
    - Frig.: 40 degrees
    - Freezer: 0 degrees
  - Refrigerator is more efficiently when it is at least 2/3 full!





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# **STEPS TOWARD SAVING ENERGY: LIGHTING**



# NATURAL LIGHT

Take advantage of Natural Light  
whenever possible!





# EXTERIOR SHUTTERS- SOLID

- The Historic Charleston Foundation has closed their wood shutters in August and September the past two years and seen an 8-10% decrease in their energy usage compared to previous summers



Image courtesy of the Historic Charleston Foundation



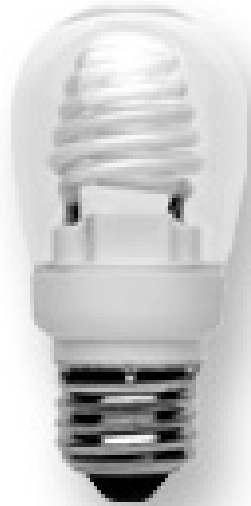
# LIGHTING

*Only about 5% of the energy that goes into a typical incandescent bulb comes out as light. The remaining 95% becomes heat!*





# COMPACT FLUORESCENT LIGHT BULBS



- ✓ CFLs are 4 times more efficient and last 10 times longer than incandescent bulbs
- ✓ Some are guaranteed to last 7 years or more
- ✓ Replace bulbs on the longest first



# QUESTIONS & CONTACTS

- Find us on the web:
  - [www.SustainabilityInstituteSC.org](http://www.SustainabilityInstituteSC.org)
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