Going Green in

SE

SEGARS ENGINEERING

See it, Solve it!

Dave Segars, PE, LEED-AP

- Professional Engineer
- Georgia Tech, BCE; James Madison Univerisity, MBA
- LEED AP BD&C
- Designed and managed the first LEED Silver project in the central Shenandoah Valley, McQuay International.
- Winner of the 2010 Shenandoah Valley Technology Council High Tech Leadership Award.
- Mill Creek South resident since 2010.
- Former Army Lieutenant/Airborne Ranger/COE.

Jeff Nicholson

- Certified Residential Energy Auditor
- Home Inspector
- James Madison University, B.S.
- Inspected thousands of homes over the past 8 years.
- On a quest to make his own home super-insulated and renewably heated without making it unhealthy.

Seen the Bridge Yet?

What We'll Cover:

- Why you should care about energy.
- Where you're using energy.
- How you can save energy (we'll start with the easy/cheap ways and go from there).
- LEED and other building rating systems.
- We'll end with some of your energetic questions.

Why is energy use in your home a big deal?

So what can you do?

Contact LEAP (Local Energy Alliance Program)
www.leap-va.org

LEAP can provide you:

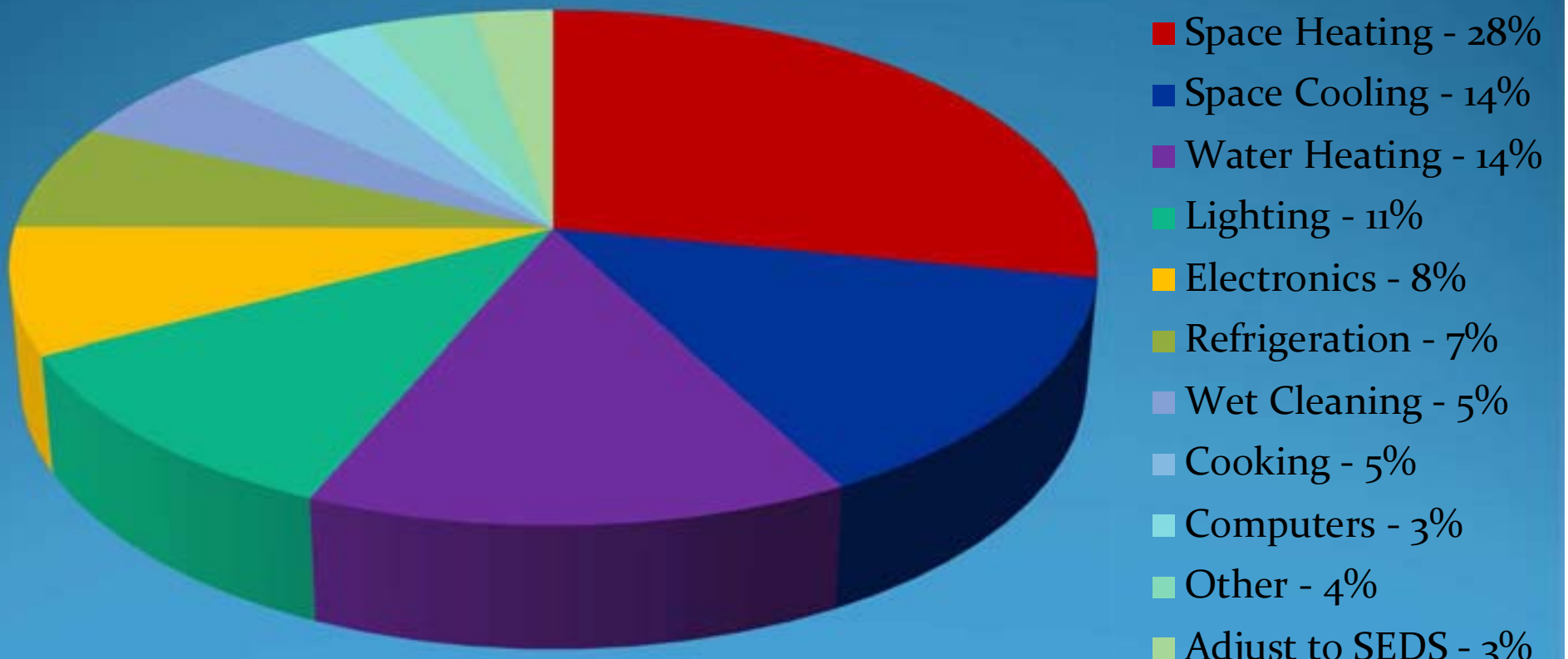
- A referral to an energy auditor
- A $250 rebate on an energy audit (nearly the full cost)
- Energy improvement rebates (up to 20% of job cost)
- PowerSaver Loans of up to $7,500 at 0% APR
- Information on other rebates and incentives available
- Get a free online energy assessment. Find out how much you can save!

Why you need an energy audit

- It's the best way to learn about energy issues specific to your home.
- The auditor will help you discover the most cost-effective changes you can make.
- It tells you how tight you can go.
- It's nearly free with LEAP!

Biggest Uses of Home Energy

source: Energy Information Administration



Start with the easiest switch

60 watt Incandescent
1,000 hours
$0.50: 2,000 hours/$

=

15 watt CFL
10,000 hours
$2.00: 5,000 hours/$
Saves $45 elect.*

=

12 watt LED
25,000 hours
$40: 625 hours/$
Saves $120 elect*
If it costs >$10 to change, go LED.

** Assumes $0.10/kwh*

If every household in the U.S. replaced one light bulb with an ENERGY STAR qualified compact fluorescent light bulb (CFL), it would prevent enough pollution to equal removing one million cars from the road.
Source: http://www.energystar.gov

Vampire Loads and How to Kill Them

- Vampires suck electricity even when you aren't around.
- Install smart power strip.
- Unplug devices that aren't used regularly.

Energy Monitors

- Installed by a licensed electrical contractor into your breaker box
- Wireless
- Real-time usage and cost feedback

Analysis - Wireless Monitoring Unit

- Sleek display to wirelessly monitor live cost, consumption rate, use records, and cost records
- Walk your property and test various devices to identify heavy energy users and find areas for improvement

Easy Heating and Cooling Fixes

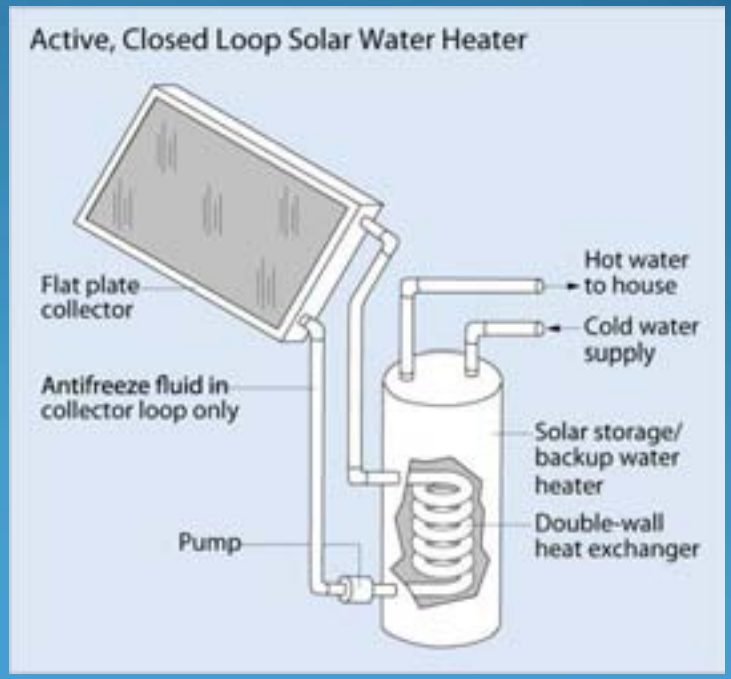
- Change your HVAC filter monthly
- Get your HVAC system serviced annually
- Install a programmable thermostat
- Open a window!

Water Heating

Electric tank water heaters are inefficient

Replacement options:

- Gas tank water heater
- Tankless water heater
- Solar water heater



Other water heater ideas

- Insulate hot water pipes.
- Set water temperature to 120 degrees.
- Don’t run hot water laundry loads.

Easy ways to reduce electrical consumption

- Make your next washing machine a front-loader.
- Use a temporary clothesline

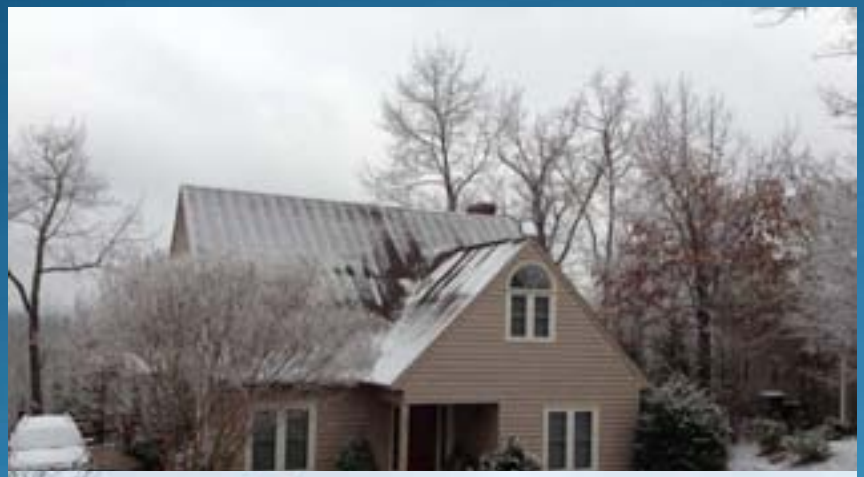
  (makes your clothes last longer too).
- Use a laptop and save 90% over a desktop!

More ways to save electricity

- If your fridge was made before 2003, it uses 2x the electricity of a modern energy star fridge. Replace it for a 4-year payback.

- Clean your coils!

Now – Where is my heat going?



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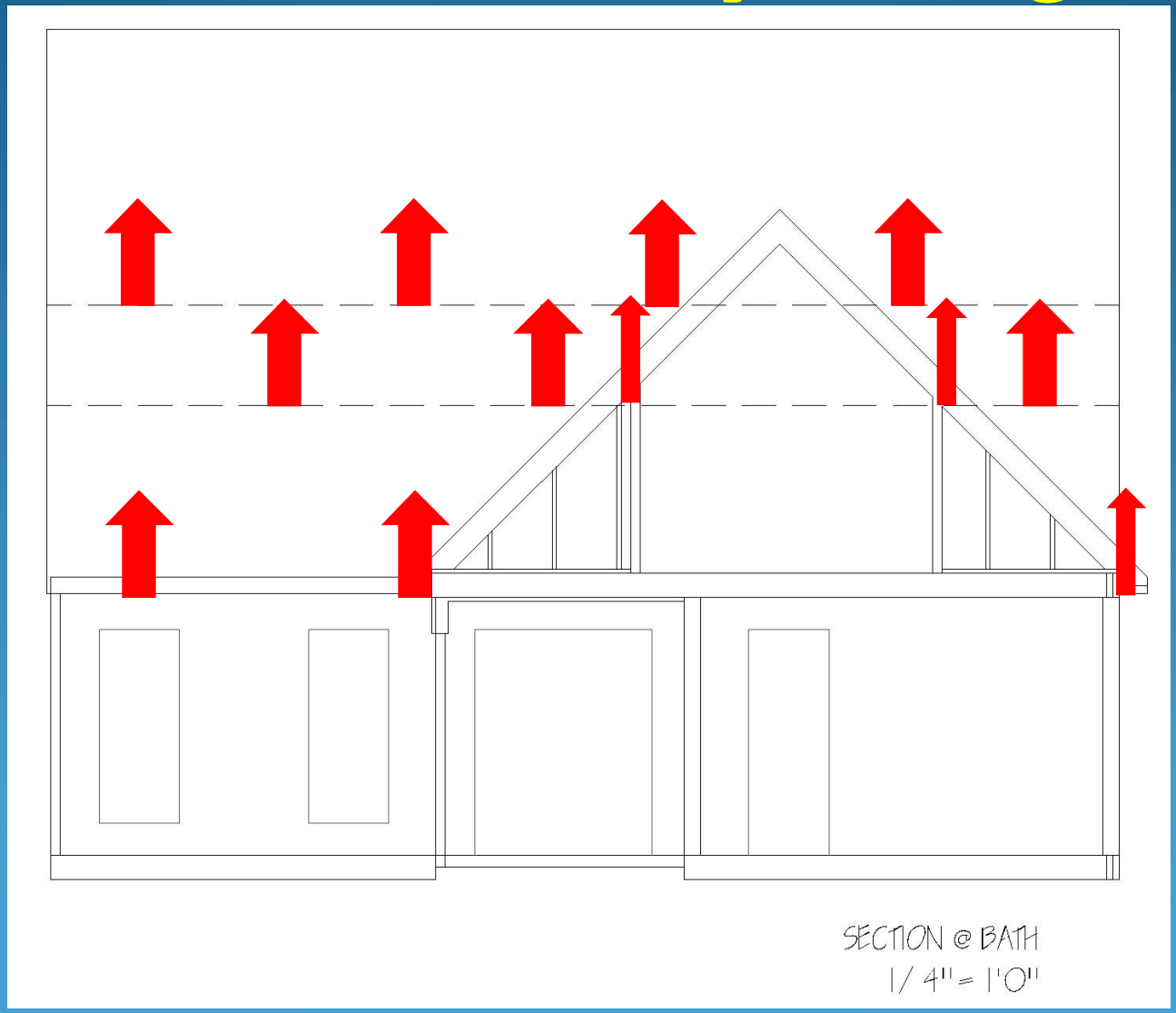
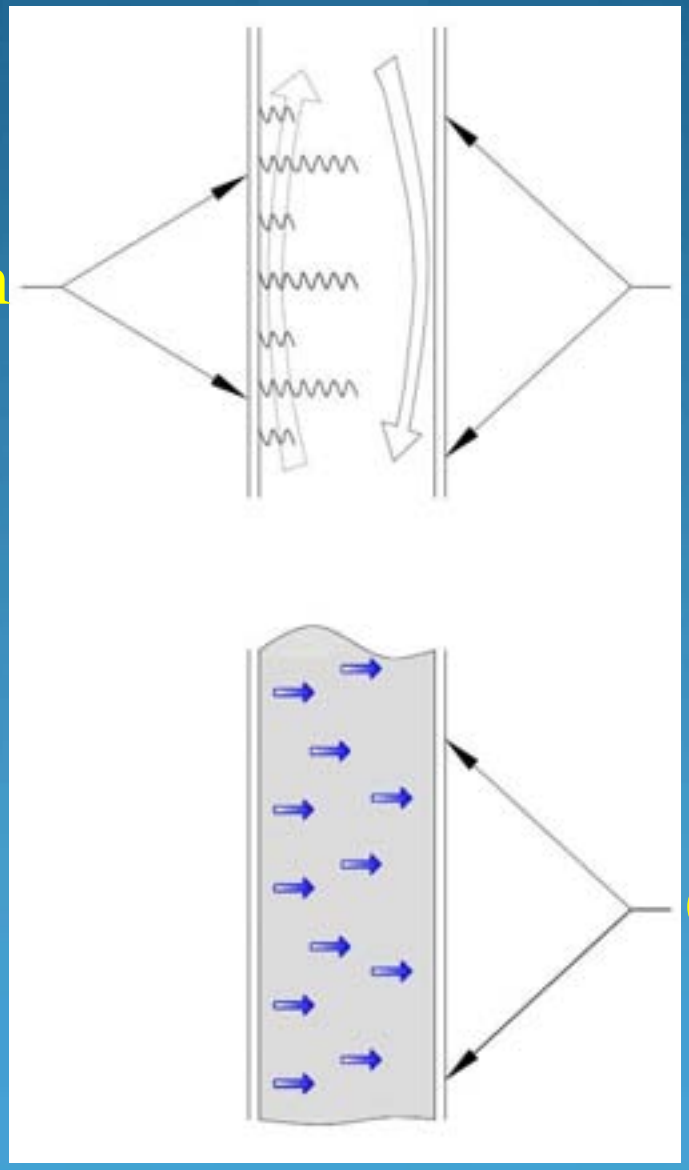


Three types of heat transfer

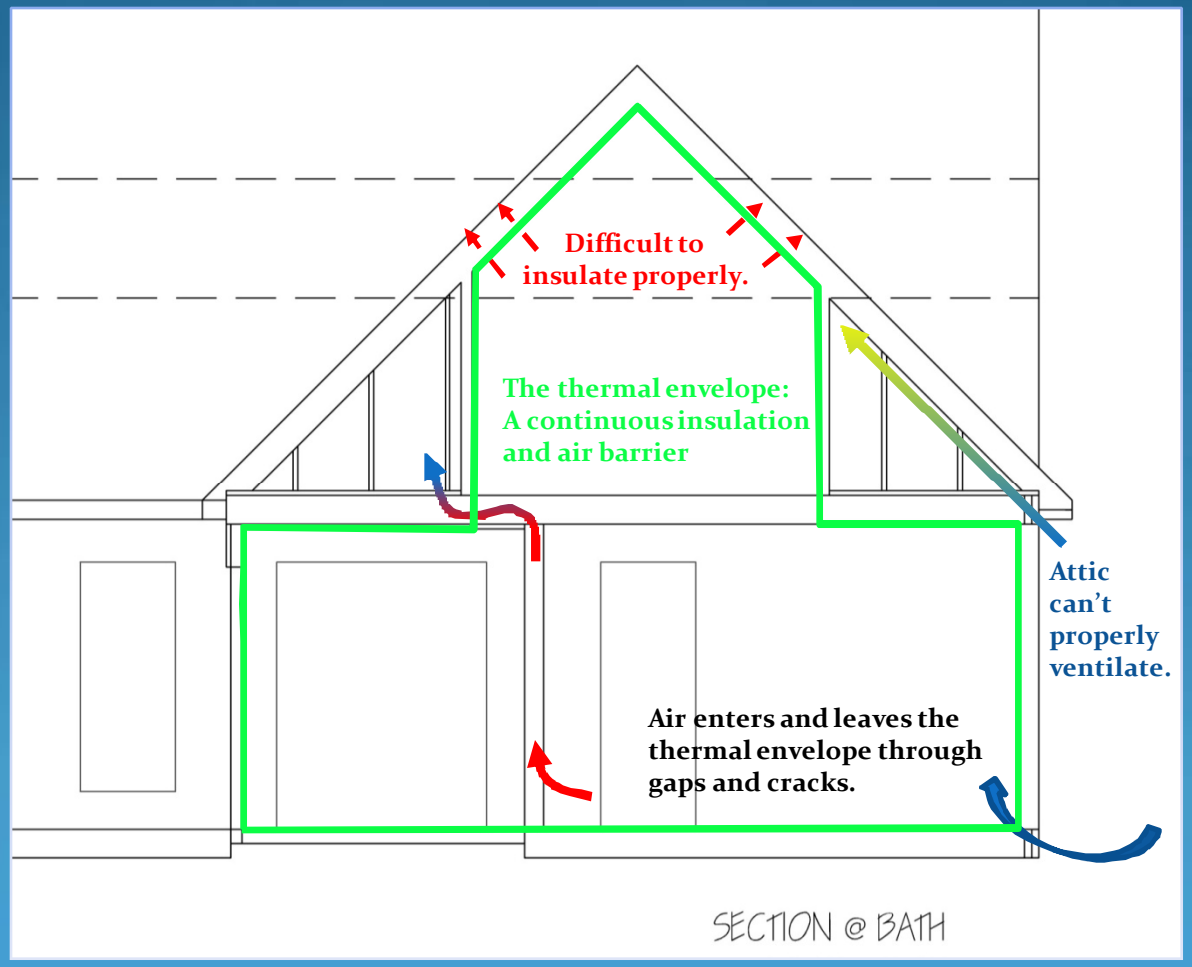
Radiation



Convection

Conduction

Now – Where is my heat going?



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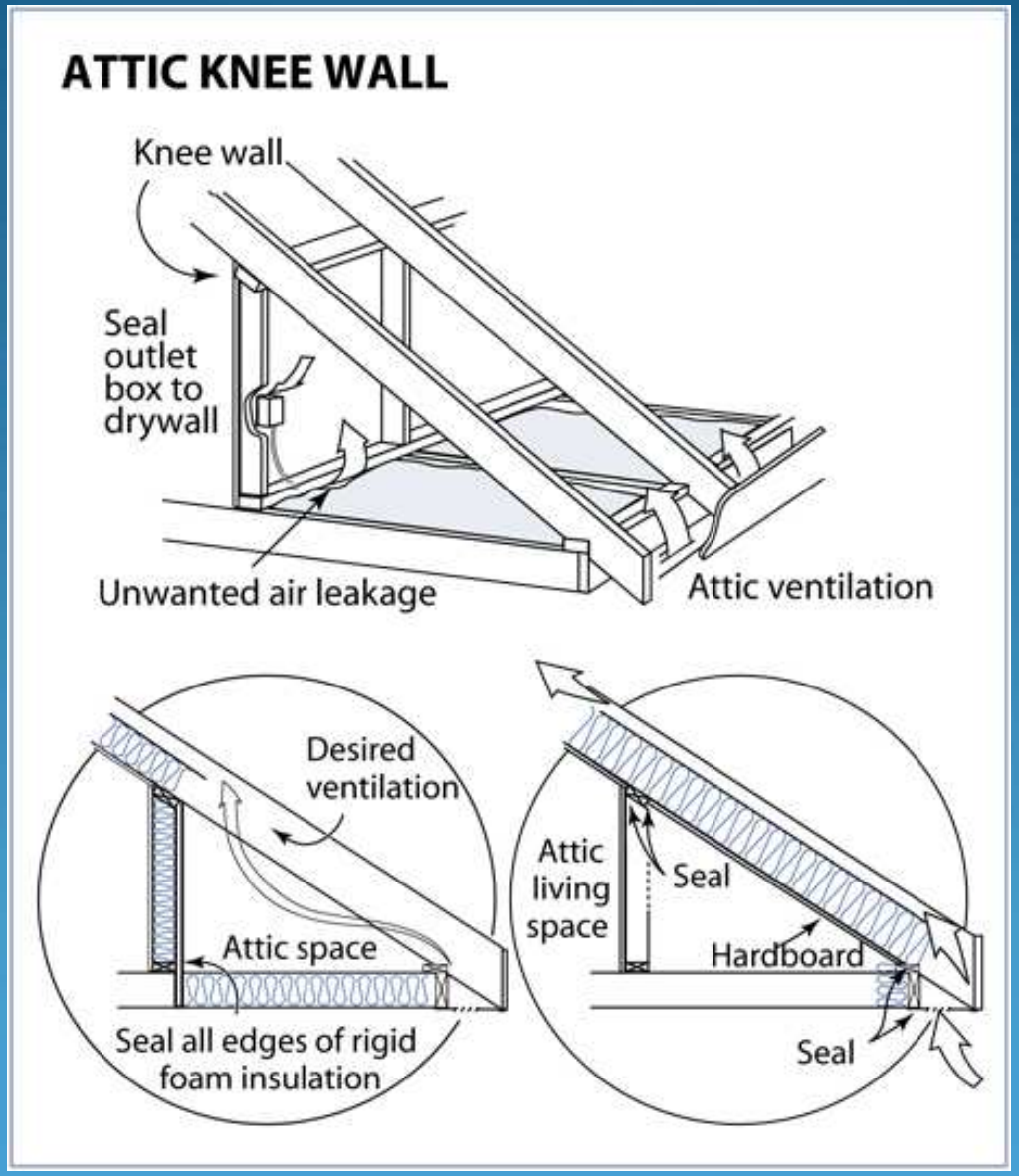
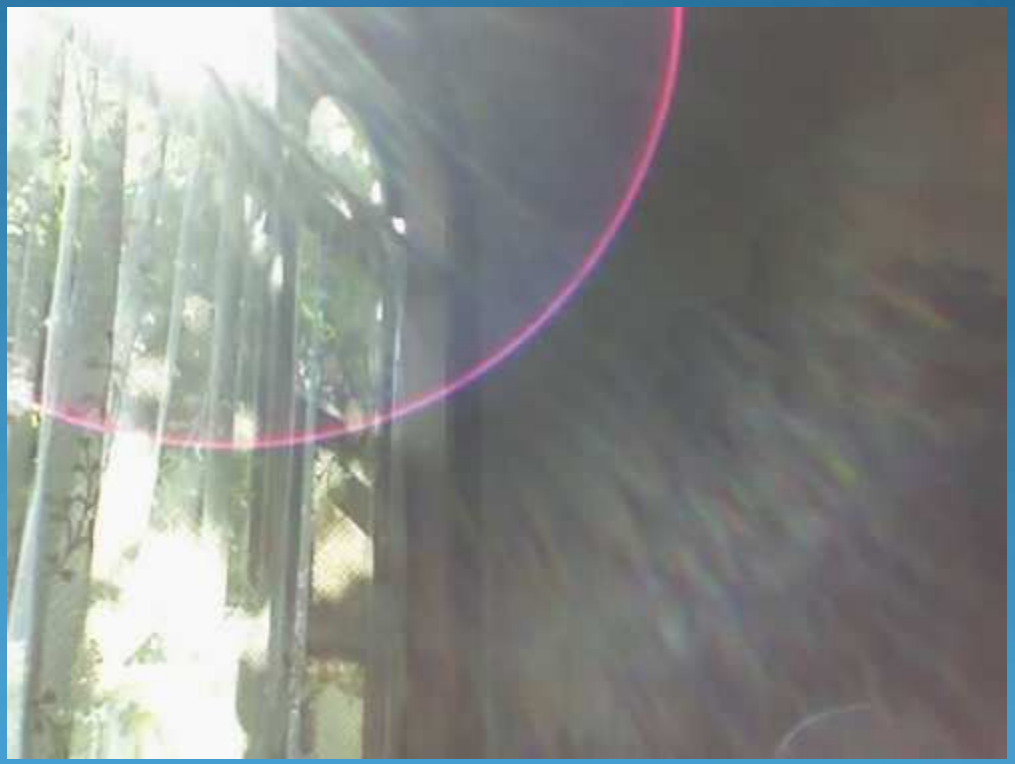


Source: DOE Office of Energy Efficiency and Renewable Energy

Think summer… why is my house hard to cool?

- Solar Radiation
- Air Leakage (convection)
- Conduction
- Internal Gain



How to reduce solar gain

- Low-e window film
- Close shades/blinds
- Install awnings
- Grow shade trees!

Air Sealing

Air Sealing an Existing Home (source: energy savers.gov)
Air sealing is one of the most significant energy efficiency improvements you can make to your home. Air sealing will not just reduce energy costs; it will also improve your home's comfort and durability.
Before air sealing, you should first do the following:

1. Detect air leaks
2. Assess your ventilation needs for indoor air quality.

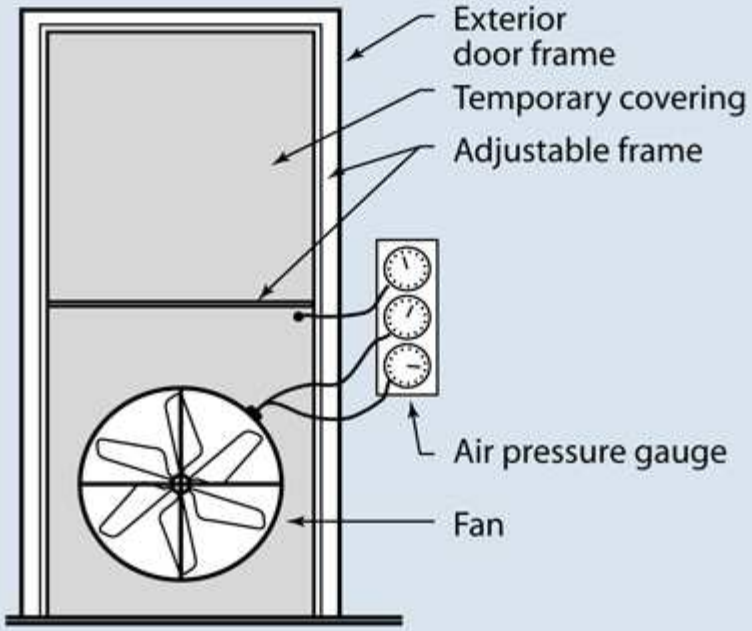
You can then apply air sealing techniques and materials as needed, including caulk and weatherstripping.
Seal before insulating!

(source: energy savers.gov)

Detecting Air Leaks (Energy Audit)

Diagnostic Tools

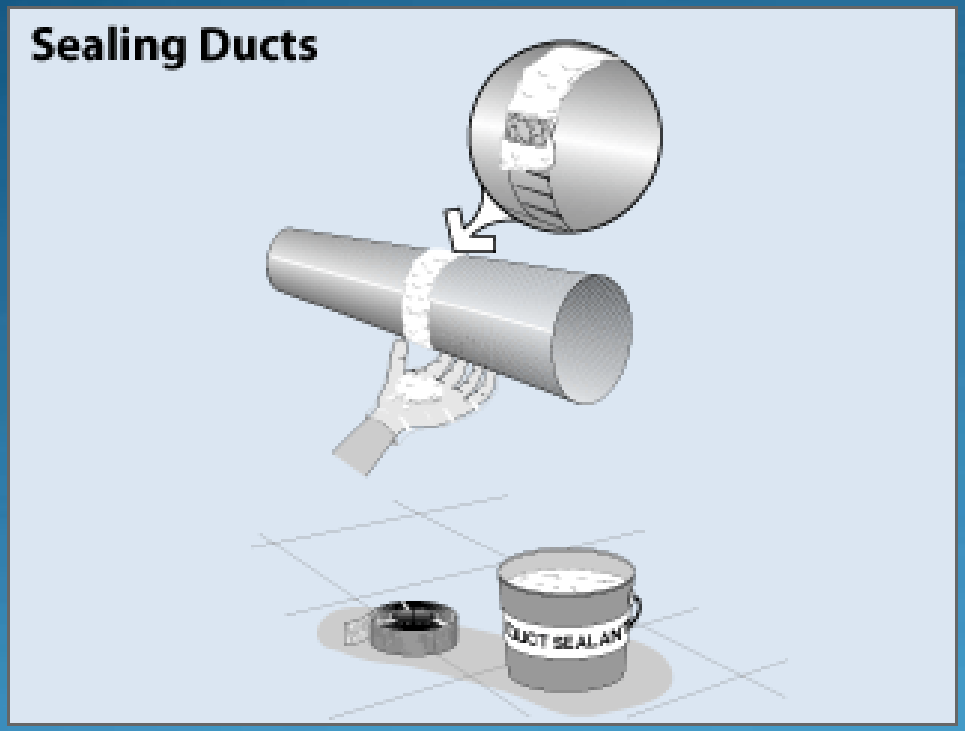
Testing the airtightness of a home using a special fan called a blower door can help to ensure that air sealing work is effective. Often, energy efficiency incentive programs, such as the DOE/ EPA ENERGY STAR Program, require a blower door test (usually performed in less than an hour) to confirm the tightness of the house.



Detecting Air Leaks Yourself

- Close doors and windows.
- Turn on exhaust fans
- Use incense smoke to check for leaks

Plug them holes



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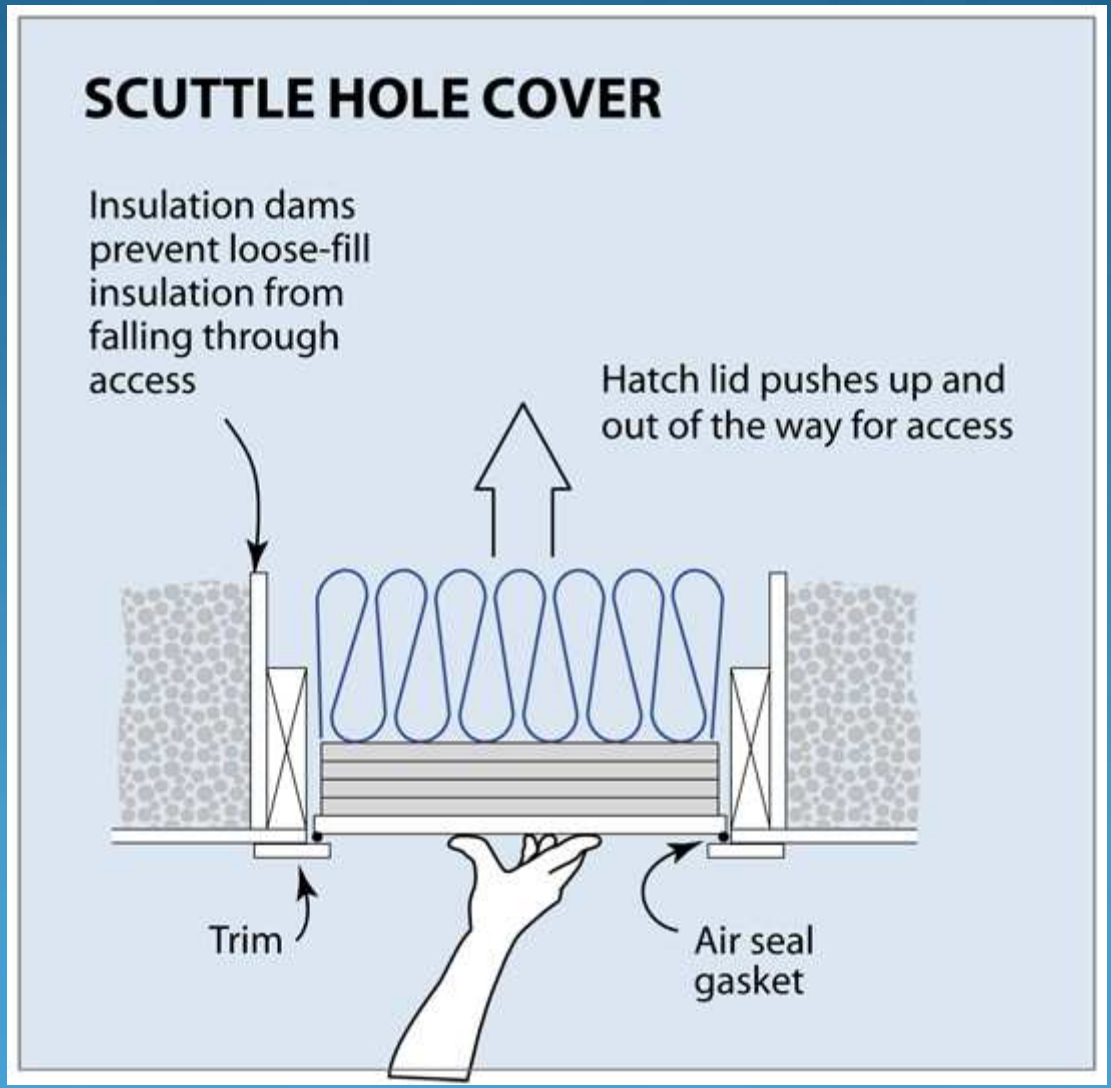

Holes in a MCS House

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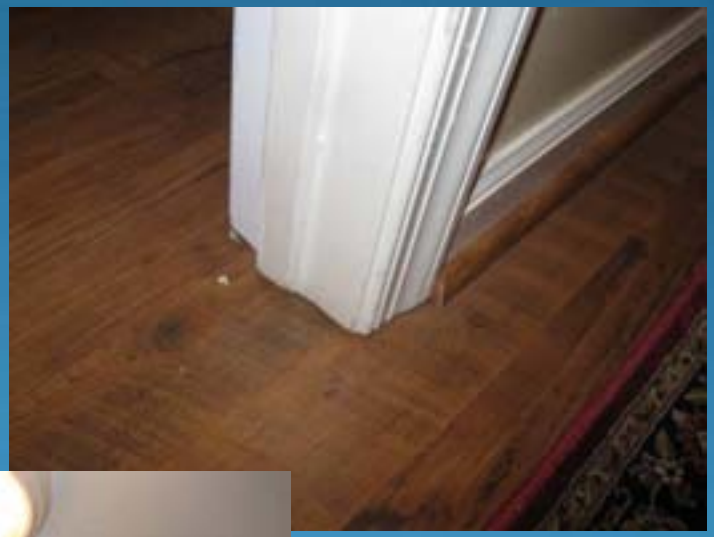
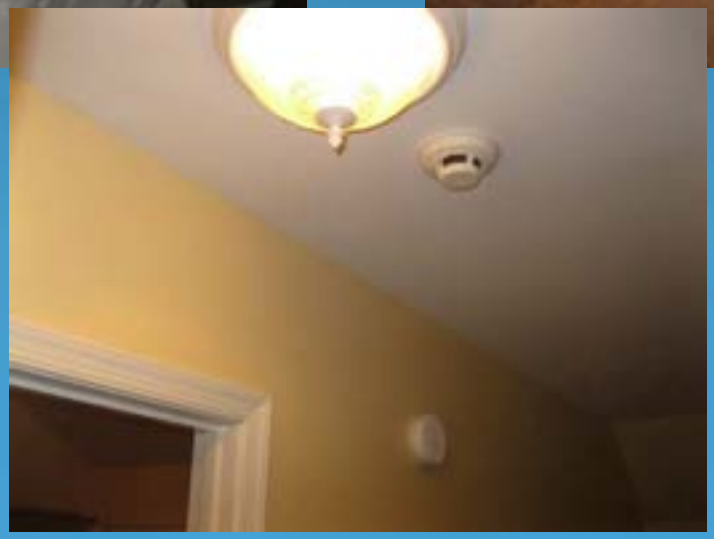
GREAT STUFF
GAPS & CRACKS

Holes in a MCS House





Holes in a MCS House

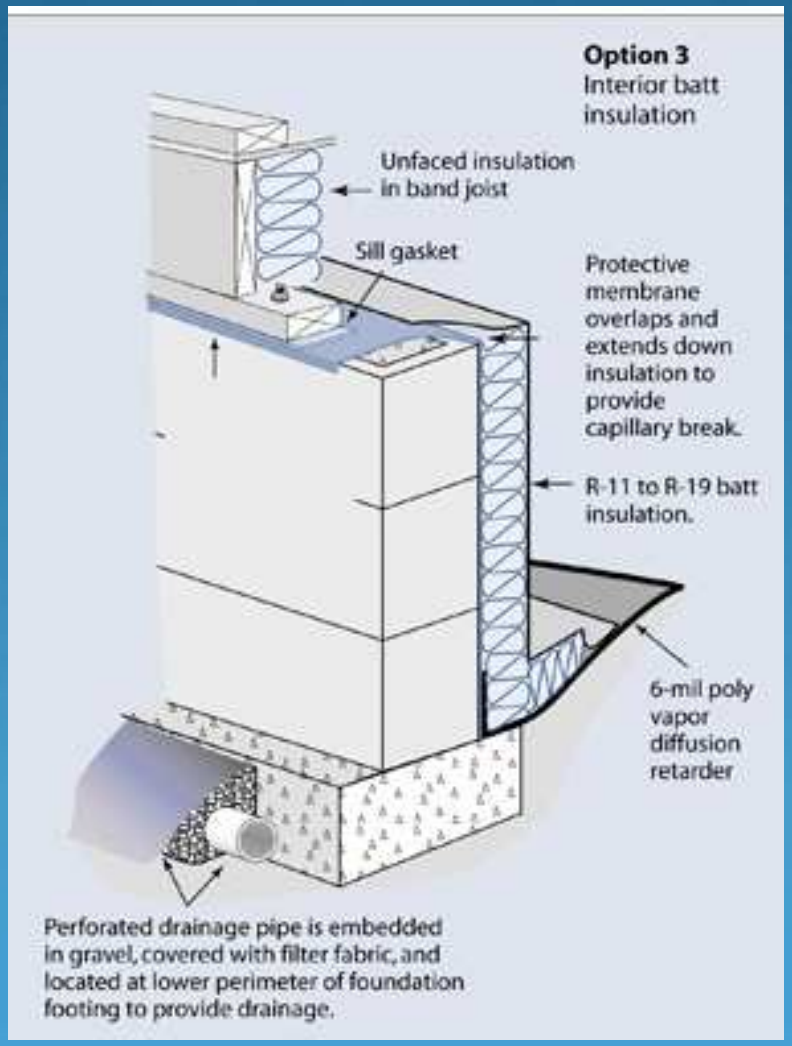
Tighten up, then add insulation

Typical MCS House:
R-25 ceiling insulation
R-13 or R-19 walls

2009 IRC House:
R-38 ceiling insulation
R-13 walls

Superinsulated House:
Up to R-60 ceiling insulation
R-30 or more in the walls
Some houses heated by a towel rack!

Crawlspace Sealing and Insulating



Other ways to conserve

- Buy a low-flow showerhead (1.5 GPM)
- Go from a 3.5 GPF toilet to a 0.8 GPF!
- Use a rain barrel to reduce erosion and runoff while saving rainwater for your garden.

Start a Worm Ranch

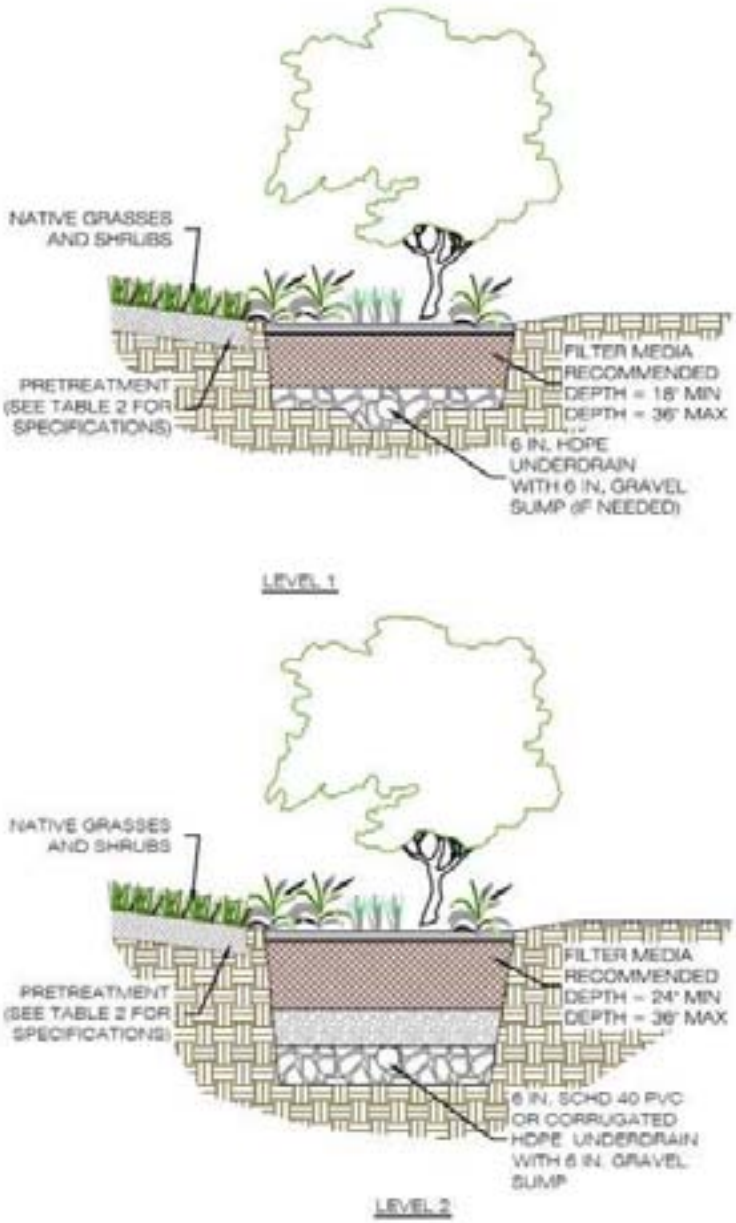
- Worm bins can compost all your kitchen scraps (except meat and dairy)
- This reduces the need to take out the garbage
- Worm bins take up little space and have no smell
- The compost is unbeatable in the garden.

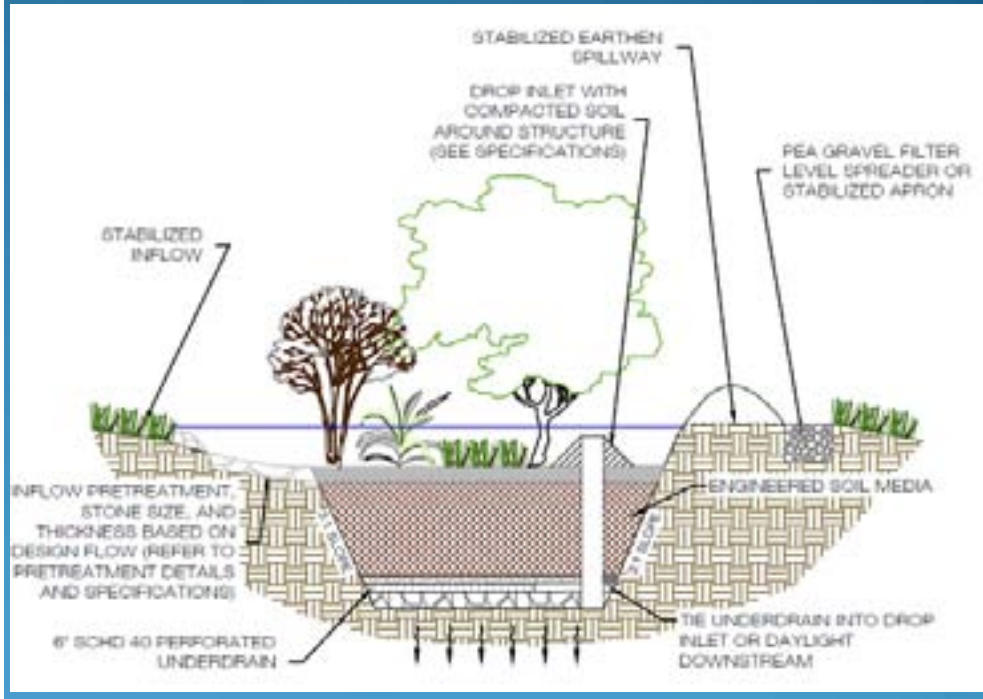
More Yard Ecology

Use rip-rap to prevent erosion on steep hills

More Yard Ecology

BIORETENTION
VIRGINIA DCR STORMWATER DESIGN SPECIFICATION No. 9





More Yard Ecology

Bioretention Basin

Final Exam

True/False – Dave was a Navy Seal

False – He was an Army Ranger and in the Corps of Engineers

True/False - Lighting uses the most residential energy

False – Heating is #1

What's the best way to learn about energy issues specific to your house?

Get an energy audit!

What other improvement should you make before insulating?

Air seal

Final Exam

What's a major source of thermal gain in the summer?

Solar radiation

What are the three types of heat gain?

Radiation, Convection & Conduction

What does a worm ranch produce?

A. A foul odor
B. Worm poop
C. Excellent compost
D. Worm Cowboys

Going Green in MCS
Question/Answer

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540-943-1138. www.segarsengineering.com