

Energy Conservation at Home: What You Need to Know

MCAN Climate Action Conference
November 16, 2008

Presented by: Michael Blasnik
M. Blasnik & Associates
michael.blasnik@gmail.com

1

Who Needs More Energy Savings Advice?

- Common Sources of Advice
 - Utility bill stuffers
 - Newspapers & magazines
 - “Green” group web sites and literature
- Advice often vague and/or misleading
 - Many recommendations ineffective
 - Surprisingly few studies of measured energy savings
 - Often based on other misinformed sources
 - Worthwhile things often ignored or unknown
 - “10 simple things” ... usually lacks prioritization
- Need to prioritize and be specific enough to be useful
 - climate, energy prices, housing stock, appliances, behaviors

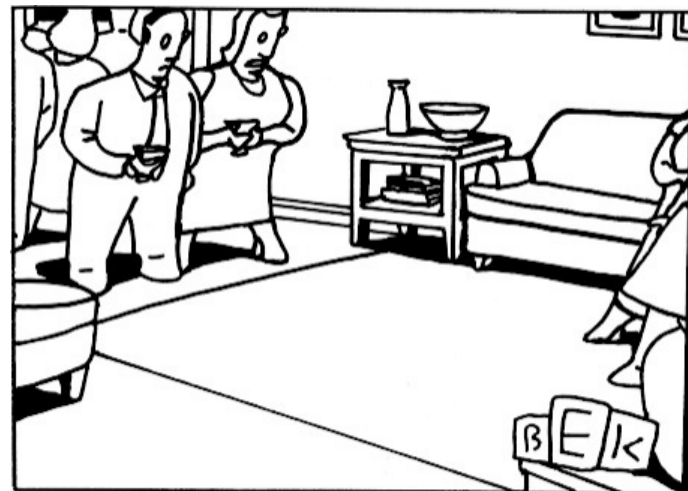
3

Assumptions & Typical Energy Usage

- Boston weather, old houses, gas heat & hot water
- Boston energy prices/costs: single family home
 - Gas ~ \$1.90/therm
 - Heating 400-1200 th/yr, average ~\$1500/yr
 - annual use typically 0.20 – 0.60 th/ft²
 - Hot water, dryer & cooking 150-250 th/yr, \$400/yr
 - monthly use ~5 + 3-6 therms/person (compare to summer bills)
 - Electric ~ \$0.20 /kWh
 - monthly use 300 – 900 kWh for lights, appliances, etc
 - \$1500/yr
 - Approximate CO₂ impacts: 1.3 lbs/kWh, 12 lbs/therm

4

Energy Savings Actions...



“Oh God, here they come – act green.”

5

Energy Saving Actions: Priorities

Action Priorities, when applicable

Action	\$/yr save	lbs CO2/yr
Setback Heat 8°F, 8 hrs/day	\$75-\$140	500-1000
Turning Off Appliances vs. 24x7 operation		
- 2 nd fridge get rid of / unplug	\$125-\$400	800-2500
- Freezer get rid of / unplug	\$100-\$250	700-1600
- Computer off when not used vs. screen saver	\$40-\$120	300-900
- Furnace Fan: ON all year change to AUTO	\$600-\$800	3400-5000
- TV off when not used (vs. background noise)	\$100-\$200	500-1300
- Stereo off when not used	\$80-\$160	500-1000
- Waterbed use quilted pad, no heat	\$150-\$200	900-1600
- Humidifier unplug – not needed in tight home	\$10-\$30	70-200
- Fans off when room is empty in summer	\$5-\$20	25-130

6

Energy Saving Actions: Motivated

Actions for the Motivated

Action	\$/yr save	lbs/yr
Lower Heating Thermostat 2°F	\$60-\$100	400-900
Cold Wash Laundry ½ hot loads to warm/cold	\$10-\$40	60-240
Clothesline ½ of loads, 2x savings if electric dryer	\$15-\$40	100-240
Shorter/Fewer Showers reduce by 4 minutes/day	\$20-\$40	120-240
Power Strip: Computer+	\$10-\$40	50-250
Power Strip: TV+ digital cable & satellite boxes worst	\$5-\$50	30-300
Turn off heat and close off unused rooms	\$0-\$200+?	0-1200
Fans, drapes, etc. instead of Air Conditioning	\$20-\$200	130-1300

7

Energy Saving Actions: low priority

Lower Priority Actions

Action	\$/yr save	lbs/yr
Cook with lids on pots	\$2-\$10	10-60
Use carafe instead of coffeemaker warmer 1hr/day	\$5	30
Unplug cell phone charger	\$1	7
Useless?		
- Clean refrigerator coils	\$0-\$10?	0-70
- Use ceiling fan in winter	\$0?	0?
- Change furnace filters monthly vs. annually	\$0-\$5	0-30
- Close refrigerator door quickly	<\$1	5
- Keep refrigerator full, add water bottles, etc.	<\$1	2

8

Energy Retrofit Priorities

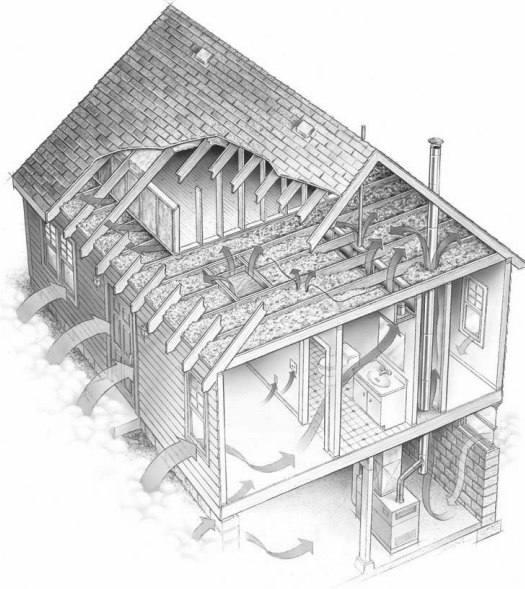
High Priority Treatments when applicable

Retrofit	Cost	\$/yr save	lbs/yr
Insulate empty walls dense pack, 1000 ft ²	\$1,200	\$350	2200
Insulate empty attic bypass seal, 1000 ft ²	\$1,000	\$400	2600
Insulate attic: some existing bypass seal	\$800	\$125	700
Air Seal using blower door	\$600	\$75-\$250	500-1600
- w/Strategic Dense Pack in tricky homes	\$1000	\$100-\$400	600-3000
Replace old (pre-93) fridge	\$500+	\$75-\$200	500-1600
Replace old Clothes Washer 1 load/day	\$500+	\$75-\$175 +\$100 H2O	500-1500
Replace old furnace w/92% if heat>1200 th	\$3,200	\$450+	3000+
Replace 15 bulbs with CFLs	\$60	\$75-\$150	500-1000
Security Lighting: motion detector	\$50	\$40-\$150	250-1000
Very low flow showerhead <1.8 gpm	\$25	\$10-\$40	60-250
Fix hot water leak	\$5-\$150	\$50-\$200	300-1200

9

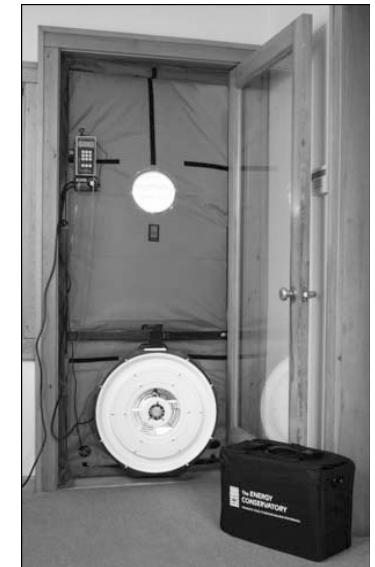
Air Leakage Paths

- Attics & basements usually 50%-75% of leakage
 - plumbing stacks
 - walls without top plates
 - ceiling height changes
 - chimneys
 - soffits
 - recessed lights
 - foundation walls
- Windows and doors typically just 10%-15% of leakage



Blower Door Air Leakage Analysis

- Measure leakage
 - before & after
- Help find big leaks
- Assess ventilation
- works well with infra-red camera
- Requires training
 - green jobs



Energy Retrofits: Lower Priorities

Lower Priority Treatments

Retrofit	Cost	\$/yr save	lbs/yr
Insulate attic: some existing no seal	\$700	\$30-\$60	200-400
Replace old furnace w/92+% avg. use	\$3,200	\$250-\$400	1500-2500
Replace old dishwasher	\$400+	\$25-\$40	200-300
Caulk/Weatherstrip Windows/Doors	\$50-\$600	\$10-\$40	50-250
Insulate basement ceiling 1000 ft ²	\$1,200	\$30-\$100	200-600
Seal basement ducts	\$50-\$600	\$0-\$50	0-500
Tankless Gas Water Heater	\$2,500	\$60-\$120	400-800
Replace 15 old windows	\$10,000?	\$50-\$150	400-1000
Cool Roof (white roof coating on flat)	\$1,000	\$10	130
Tune Up Gas Furnace (annual)	\$150	\$0?	0?

Some Resources

- EPA's Energy Star site
 - http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_index
 - see air sealing guide at
 - http://www.energystar.gov/index.cfm?c=diy.diy_index
- Home Energy Magazine
 - <http://www.homeenergy.org/>
 - great archive of older articles on wide variety of topics
 - look up your refrigerator's rated usage at
 - <http://www.homeenergy.org/consumerinfo/refrigeration2/refmods.php>
- ACEEE (American Council for an Energy-Efficient Economy)
 - Technical resource and advocacy group
 - <http://www.aceee.org/consumerguide/>
- Advanced Energy (North Carolina)
 - has good building science knowledge library
 - http://www.advancedenergy.org/buildings/knowledge_library/index.html
- Building Science Corporation (Westford, MA)
 - Extensive info about how houses work, how they fail, how they should be built, etc..
 - http://www.buildingscience.com/index_html