What Energy Conservation Means to You

By Linda Copman

> In the 1980's then President Ronald Reagan remarked, "*Energy conservation means being too cold in winter and too warm in the summer!*"

Today, Americans are finding that in order to conserve energy, we do not have to make major sacrifices in comfort and our lifestyle, thanks to advances in technology. Furthermore, the high cost of fossil fuels, the effects of global warming, and an array of new cost-saving, energy-efficient technologies are now creating strong external incentives for U.S. householders to change our energy consumption habits. Most of us are ready and willing to change our behavior to save energy, money and to help curb global warming.

According to "**The Short List: The Most Effective Actions U.S. Households Can Take to Curb Climate Change**" (http://www.environmentmagazine.org/Archives/Back%20Issues/September-October%202008/gardner-stern-full.html) in the September/October 2008 issue of *Environment* Magazine, "U.S. households account for about 38 percent of national carbon emissions through their direct actions, a level of emissions greater than that of any entire country except China and larger than the entire U.S. industrial sector. *By changing their selection and use of household and motor vehicle technologies, without waiting for new technologies to appear, [without] making major economic sacrifices, or [without] losing a sense of well-being, households can reduce energy consumption by almost 30 percent – about 11 percent of total U.S. consumption* [italics and emphasis added]."

Yet most of us do not know which specific actions to take to produce the greatest impact on limiting our energy consumption. We have all seen the laundry lists of changes that we can make in our homes, which range from switching to CFL light bulbs, to riding your bike to work, to washing only full loads of laundry in cold water. When reading these lists, it is difficult to distinguish high impact changes from nominally effective ones. This article lays out the most effective actions that your household can take to conserve energy. The actions are divided into two categories: (1) low and no-cost actions, and (2) actions with a higher upfront cost.

Personal Vehicles & Air Conditioning

It is significant to point out that the single most energy-consuming practice in U.S. households is driving our personal vehicles. Motor vehicles account for 38.6% of total household consumption, with heating (18.8%) and cooling (6.2%) our homes accounting for another 25% of the total. *(In Hawai`i these heating and cooling figures are less relevant.)* Taken together, our driving and space conditioning practices account for nearly two-thirds of our total household energy consumption. So these

two areas are those which we should focus on when considering how to reduce our overall energy consumption.

Changes like fully inflating our tires, while beneficial, cannot compare to the gains to be realized by purchasing a fuel-efficient vehicle. The more fuel-efficient the vehicle we drive, the greater the energy savings, dollar savings and the lower the carbon emissions released by that vehicle. The impact of this one choice is multi-fold and positive—likewise for choosing an energy-efficient air conditioner over a less efficient model.

Table 1. Percentage of total U.S. individual/household energy consumed by end use, ranked in order of magnitude, 2005

End use	Percent
Transportation	
Private motor vehicles	38.6
Air travel	3.4
Mass transportation and other	1.4
Subtotal	43.4
In-home uses	
Space heating	18.8
Air conditioning	6.2
(Space conditioning subtotal	*25.0)*
Water heating*	6.5
Lighting	6.1
Refrigeration and freezing	4.3
Electric (heating elements, small appliances, and small motors)	3.9
Clothes washing/drying*	2.5
Color TVs	2.5
Cooking	1.5
Computers	0.6
Propane and natural gas (swimming pool heaters, grills, and lamps)	0.5
Dishwashers	0.2
Other	3.0
Subtotal	56.6
Total	100.0

*Hot water for "Clothes washing" is included under "Water heating."
NOTE: Please see *Environment*'s Web site, www.environmentmagazine.org, for a description of calculation strategies and methods and a complete list of sources.

Table 1. Percentage of total U.S. individual/household energy consumed by end use, ranked in order of magnitude, 2005

In general, actions which involve choosing a more energy efficient option generate greater savings than actions which involve simple curtailment of behavior. For example, buying a fuel-efficient vehicle *(30.7 mpg vs. 20 mpg)* saves more energy than the following four actions combined: (1) carpooling to work with one other person, (2) altering driving habits to avoid sudden acceleration and stops, (3) combining trips to reduce your current mileage by one-half, and (4) reducing highway travel speeds from 70 mph to 60 mph. This is good news for most of us, since we only have to purchase a vehicle once every several years, in contrast to the curtailment behaviors which we must repeat every time we drive. It is easier for most of us to drive a fuel-efficient vehicle to work than it is for us to carpool each day. The same is true of air-conditioning: it is more effective to purchase an energy-efficient air conditioner that it is to turn up the temperature on an inefficient unit.

27 Actions to Reduce Household Energy Use

Table 2. Estimated percentage of total U.S. individual/household energy consumption that can be saved by 27 actions, by action type, 2005

Curtailment	Energy saved (percent)	Increased efficiency	Energy saved (percent)
Transportation			
Motor vehicle use			
Carpool to work with one other person	Up to 4.2	Buy a more fuel-efficient automobile (30.7 vs. 20 mpg EPA average-adjusted composite)	13.5
Alter driving (avoid sudden acceleration and stops)	Up to 3.2	Get frequent tune-ups, including air filter changes	3.9
Combine errand trips to one-half of current mileage	Up to 2.7	Buy low-rolling resistance tires	1.5
Cut highway speed from 70 to 60 mph	Up to 2.4	Maintain correct tire pressure	1.2
Inside the home			
Heating and air conditioning			
Heat: Turn down thermostat from 72° F to 68° F during the day and to 65° F during the night	2.8	Heat: Install/upgrade attic insulation and ventilation[1]	Up to 5.0
A/C: Turn up thermostat from 73° F to 78° F	0.6	A/C: Install/upgrade attic insulation and ventilation[1]	Up to 2.0
Subtotal	3.4		Up to 7
		Heat: Install a more efficient heating unit (92 percent efficient)	2.9
		A/C: Install a more efficient A/C unit (SEER 13 or EER 12)	2.2
Subtotal			5.1
		Heat: Replace poor windows with high-efficiency windows	Up to 2.8
		A/C: Replace poor windows with high-efficiency windows	Up to 0.9
Subtotal			Up to 3.7
		Heat: Caulk/weather-strip home	Up to 1.9
		A/C: Caulk/weather-strip home	Up to 0.6
Subtotal			Up to 2.5
Space conditioning subtotal			Up to 18.3

Table 2, *continued*

Curtailment	Energy saved (percent)	Increased efficiency	Energy saved (percent)
Water heating			
Turn down water heater thermostat from 140° F to 120° F	0.7	Install a more efficient water heater (EFS .7 unit)	1.5
Lighting			
Do not leave one 60-watt bulb on all night	0.5	Replace 85 percent of all incandescent bulbs with equally bright compact fluorescent bulbs	4.0
Replace two 100-watt kitchen bulbs with 75-watt bulbs	0.3		
Refrigeration/freezing			
Turn up the refrigerator thermostat from 33° F to 38° F and the freezer thermostat from −5° F to 0° F	0.5	Install a more efficient unit (replace a 19–21.4 cubic feet top-freezer unit bought between 1993 and 2000 with a new Energy Star unit)	1.9
Clothes washing and drying			
Change washer temperature settings from hot wash, warm rinse to warm wash, cold rinse	1.2	Install a more efficient washer (replace a 2001 or older non–Energy Star washer with a new Energy Star unit)	1.1
Line-dry clothing (do not use dryer) 5 months of the year	1.1		
Color TV			
Watch 25 percent fewer hours of TV each day	0.6	Purchase (or trade in) 52" Projection HD TV instead of a 48" Plasma HD TV	1.3

[1] Roughly 80 percent of older homes are underinsulated, according to the U.S. Department of Energy. "Save Hundreds on Energy Costs," *Consumer Reports*, October 2007, 27.

NOTES: The potential savings listed in this table apply only to individuals and households that have not already taken the action. Adding up savings across actions can overestimate aggregate savings because of interactions between some actions. For example, the energy saved by caulking/weather-stripping a home will be less if a more fuel-efficient furnace is also installed. The estimates in the "Increased Efficiency" column assume that consumers replace old equipment when it wears out rather than discarding functioning equipment. If consumers replace equipment before the end of its useful life, part of the energy they save by using the more efficient equipment is cancelled out by the energy used to manufacture the new equipment. Data for electric heating elements, small appliances, and small motors could not be disaggregated for further analysis.

Please see *Environment*'s Web site, www.environmentmagazine.org, for a description of calculation strategies and methods and a complete list of sources.

Table 2. Estimated percentage of total U.S. individual/household energy consumption that can be saved by 27 actions, by action type, 2005.

To get at which of the actions listed in Table 2 are the most effective in reducing household energy consumption, Table 3 below prioritizes seventeen commonly cited energy conservation actions in terms of the relative energy saved by each action. Reviewing these actions shows that buying a fuel-efficient vehicle *(30.7 mpg)* and installing attic insulation or ventilation are the most effective measures you can take to reduce your household energy consumption.

Yet the decision regarding which actions to take should not be an "either-or" choice; by implementing all seventeen actions, U.S. households can cut their consumption by roughly one-half. Some of the curtailment measures provide significant savings with no upfront costs—in other words, most of us can do at least some of these things now and begin saving energy immediately. To better understand how to calculate the life cycle financial costs of purchasing energy saving vehicles and appliances, see link to **Life-Cycle Costing** article.

Table 3. The Short List: Percentage of current total U.S. individual/household energy consumption potentially saved, by action effectiveness

Action	Energy saved (percent)
For all individuals and households *Immediate low-cost/no-cost actions*	
Transportation	
1. Carpool to work with one other person	Up to 4.2
2. Get frequent tune-ups, including air filter changes	3.9
3. Alter driving (avoid sudden acceleration and stops)	Up to 3.2
4. Combine errand trips to one-half current mileage	Up to 2.7
5. Cut highway speed from 70 to 60 mph	Up to 2.4
6. Maintain correct tire pressure	1.2
Potential savings subtotal	Up to 17.6
Inside the home	
1. Lighting: Replace 85 percent of all incandescent bulbs with compact fluorescent bulbs	4.0
2. Space conditioning: Heat: Turn down thermostat from 72° F to 68° F during the day and to 65° F at night A/C: Turn up thermostat from 73° F to 78° F	3.4
3. Clothes washing: Use only warm (or cold) wash, cold rinse setting	1.2
Potential savings subtotal	8.6
Potential savings subtotal for nine actions listed	Up to 26.2
For all individuals and households *Longer-term, higher-cost actions*	
Transportation	
1. Buy low-rolling resistance tires	1.5
2. Buy a more fuel-efficient automobile (30.7 vs. 20 mpg EPA average-adjusted composite)	13.5
Potential savings subtotal for two actions listed	15.0

Table 3, *continued*

Action	Energy saved (percent)
For homeowners: Inside the home *Immediate low-cost action*	
1. Space conditioning: Caulk/weather-strip home	Up to 2.5
Immediate higher-cost action	
1. Space conditioning: Install/upgrade attic insulation and ventilation[1]	Up to 7.0
Potential savings subtotal for two actions listed	Up to 9.5
Longer-term, higher-cost actions	
1. Space conditioning: Install a more efficient heating unit (92 percent efficiency)	2.9
2. Space conditioning: Install a more efficient A/C unit (SEER 13 or EER 12 units)	2.2
3. Refrigeration/freezing: Install a more efficient unit (replace a 19–21.4 cubic foot top-freezer unit bought between 1993 and 2000 with a new Energy Star unit)	1.9
4. Water heating: Install a more efficient water heater (EFS .7 unit)	1.5
Potential savings subtotal for four actions listed	8.5
Total potential savings for all six homeowner actions listed[2]	Up to 18.0

[1] Roughly 80 percent of older homes are underinsulated, according to the U.S. Department of Energy. "Save Hundreds on Energy Costs," *Consumer Reports*, October 2007, 27.

[2] Approximately 67 percent U.S. households owned their homes in 2005.

NOTES: The potential savings listed in this table apply only to individuals and households that have not already taken the action. Adding up savings across actions can overestimate aggregate savings because of interactions between some actions. For example, the energy saved by caulking/weather-stripping a home will be less if a more fuel-efficient furnace is also installed. The estimates in the "Increased Efficiency" column assume that consumers replace old equipment when it wears out rather than discarding functioning equipment. If consumers replace equipment before the end of its useful life, part of the energy they save by using the more efficient equipment is cancelled out by the energy used to manufacture the new equipment.

Please see *Environment*'s Web site, www.environmentmagazine.org, Notes for Table 3, for data entry sources.

Table 3. The Short List: Percentage of current total U.S. individual/household energy consumption potentially saved, by action effectiveness.

On-Line Home Energy Audit

These tables provide a general overview of the most effective energy-savings actions households can take on a nationwide level. For a more detailed analysis of your home's energy usage and the potential benefit of various conservation measures in your unique situation, you can complete an online home energy audit at http://www.energystar.gov/index.cfm?fuseaction=home_energy_yardstick.showStep2. The link takes you to the Energy Star Home Energy Yard Stick, but there are several other online do-it-yourself audits available, or you can hire a professional energy auditor to help assess the efficacy of various actions. Several Hawai'i firms (http://www.energystar.gov/index.cfm?fuseaction=new_homes_partners.showHomesResults&partner_type_id=RATER&s_code=HI) now offer energy auditing services for home and business owners. For new home buyers, some institutions in Hawai`i have partnered with the Energy Star program to offer special incentives to encourage the construction, marketing and purchase of Energy Star qualified new homes. View a list of Hawai`i institutions that offer such incentives at http://www.energystar.gov/index.cfm?fuseaction=new_homes_partners.showIncentives&s_code=HI.

To read the full story visit "**The Short List: The Most Effective Actions U.S. Households Can Take to Curb Climate Change,**" at http://www.environmentmagazine.org/Archives/Back%20Issues/September-October%202008/gardner-stern-full.html.