

Worksheets And Checklists from Addicted to Energy

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9. Find and Replace Your State's Villains of Inefficiency

Every state's situation is a bit different. Every state has a different mix on energy hogs and most are on this list. The first three steal energy in every state.

What are the *most wasteful* appliances and products in your state?

- Incandescent and halogen bulbs
- Old, large-diameter fluorescent tubes and their fixtures
- Lighting control systems missing or installed without motion detectors, light-level sensors, and automatic dimmers
- Office building windows that are not spectrally selective
- Poorly insulated windows with low R-values
- Poorly insulated walls, ceilings and floors
- Old refrigerators
- Domestic water heaters
- Pool and spa pumps
- Thermostats without motion detectors or twist timers⁵⁴
- Residential HVAC systems with only one thermostat per floor
- Fixed-speed residential furnaces
- Fixed-speed air conditioners
- Idle PCs and servers
- Cable and satellite set-top boxes
- Refrigerated display cases in stores
- Vending machines
- Restaurant kitchen exhaust hoods
- Air compressors in gas stations, auto dealerships, and factories
- Agricultural and well pumps

Identify your state's most wasteful products. Then replace them all. Not 1%, not 10%, not 50%; replace over 90% of your worst performers.

**Replace them. They steal your state's wealth and its jobs,
and they damage the climate.**

What Ails America's Buildings?

I predict your blue ribbon panel will discover the homes and buildings in your state with the **highest utility bills**, and the largest CO₂ footprints, share the following characteristics.

Fifteen Practices that Steal America's Wealth and American Jobs

1. **Insulation** is insufficient and poorly installed.
2. **Heating and air conditioning** system is too large.
3. **Ductwork** for the HVAC system is too narrow, leaks, or was poorly installed.
4. **Thermostats** or HVAC controls are the wrong model, poorly programmed, or one thermostat controls more than one room.
5. **The wrong windows** are installed.
6. **Exterior window shades** are missing on sunny windows.
7. **Fans, pumps, and compressors** are fixed speed.
8. **Outside fresh air** is poorly managed; heat exchangers are missing.
9. **Ovens, refrigerators** and refrigerated display cases are inefficient or vent hot air inside buildings when the air conditioning is running.
10. **Halogen and incandescent bulbs** are still used.
11. **No occupancy/daylight sensors** are installed *on lighting systems*.
12. **No occupancy sensors** are installed *on heating and air conditioning systems*.
13. **No real-time, energy-consumption feedback** given to building occupants.
14. **No knob for users** to turn *down* overactive heating and cooling systems.
15. **No switch for users** to turn *off* heating and cooling systems in individual rooms.

How Many of These Problems Do You Have?

These practices are almost universal in America. They export money and jobs out of your state. They are both environmentally destructive and wealth destroying.

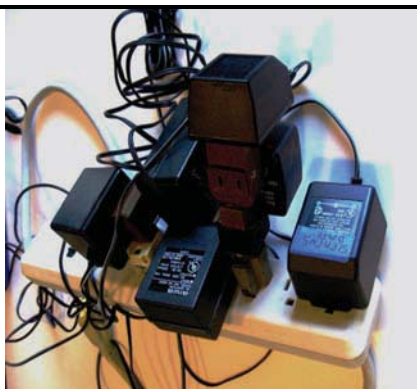
Transformers in Standby

In America

472 million new chargers
are purchased every year.

Over 65% waste power in standby mode.²⁶⁶

How does your house compare
to the Sherwin home?



	Sherwin Home*	White House		
		West Wing	Family Residence	Total
Cordless phones	8			
Cellular phones	3			
TV surround sound	2			
Laptop computers	2			
PC speakers	2			
Scanner and printer	2			
Wii and PlayStation 2	2			
Alarm system	2			
2-way radios	2			
Router and hub	2			
Network modem	1			
Wi-Fi access	1			
Network storage	1			
iPod speaker	1			
Dust Buster	1			
Electric drill	1			
Invisible fence	1			
Abandoned but plugged in	1			
House guests	7			
Other	1			
Total	43			

* This only includes external transformers that are plugged in 24 hours a day.

Appendix and Checklists



You can download and print the checklists in this appendix from
www.EltonSherwin.com

What are Your Home's Top Energy Wasters?

In my experience of visiting American homes, primarily in California, New York, South Carolina, and Connecticut, these are the biggest energy wasters.

Every home is different, but these are the first things to check:

- Pool and spa pumps
- Old refrigerators and freezers
- Incandescent and halogen bulbs
- Desktop and tower PCs left on
- Mini-refrigerators, wine refrigerators, and standalone ice makers
- Drafty or uninsulated walls
- Under-insulated ceilings and floors
- Windows with R-values below R-8 in cold or hot climates
- Unshaded, sunny windows that are *not* spectrally selective in homes using a lot of air conditioning
- Water heaters
- Heating and air-conditioning systems with only one thermostat per floor
- Fixed-speed furnaces
- Fixed-speed air conditioners
- Cable and satellite set-top boxes
- HDTVs
- Surround sound and PC speaker systems
- Stereo systems and entertainment consoles
- Game units left on
- Old or poorly programmed thermostats
- Whole house (attic) fans and gas fireplaces without twist timers³⁴¹
- Fixed-speed or two-speed whole-house fans (attic) fans
- Fixed speed recirculation pumps
- Well pumps
- Rechargeable flashlights without LED bulbs

How Do I Find the Energy Hogs in My House?

“The most energy-intensive segment of the food chain is the kitchen.

Much more energy is used to refrigerate and prepare food in the home than is used to produce it in the first place.

The big energy user in the food system is the kitchen refrigerator, not the farm tractor.”

Lester R. Brown,
Earth Policy Institute³⁴²

How much electricity does your TV use? Your second refrigerator?

I used several products to find my energy hogs—two proved most useful:

- The Black and Decker Power Monitor pictured on page 67 and described in *footnote 78*.
- The Kill A Watt EZ meter pictured here. I bought it online and used it to discover how much electricity my PCs and TVs were using, anything with an accessible plug.³⁴³

Ace Hardware has a product similar to the Kill A Watt called an Am/Watt Appliance Load Tester. It looks like a blue egg with an electric cord. Manufactured by Reliance, it has also received good reviews.

The results of the Sherwin family energy audit are posted at www.EltonSherwin.com in a PowerPoint presentation.



What is My Carbon Footprint?

On Friday, July 3, 2009, I got up early and headed to my weekly Rotary meeting.

Unbeknownst to me, the meeting was canceled. Fortuitously, I was not the only ill-informed Rotarian who was staying in town over the Fourth of July holiday, and we had a small impromptu breakfast including one visitor initially interested in becoming a Rotarian. Her interest may have waned once I started talking.

The conversation turned to measuring a family's carbon footprint, and I said, "Income is the single best predictor of a family's carbon footprint. If you do not want to ask how much money someone makes, you can predict a family's carbon footprint if you know just three things about them: The size of their house, how much they fly, and how many hamburgers they eat."

Our visitor looked me straight in the eye and said, "I live in a 7,000 square foot house, fly my own plane, and my family loves to eat beef."

Needless to say, Rotary is not putting me on the new member recruiting team anytime soon.

Our visitor lived in Atherton. In 2005, *Forbes Magazine* stated that Atherton's zip code was the most affluent in America. It is a mix of old money, new money, and very large homes. Seven-thousand square feet is frugal compared to some of the newer homes.

Six Items Dominate Your Carbon Footprint.

Six items tend to dominate the carbon footprint of most Americans:

- **Air travel**
- **The "stuff" you buy³⁴⁴**
- **Gasoline and diesel you use**
- **Natural gas, propane, heating oil, and wood you burn**
- **Electricity you use**
- **Beef and dairy you eat**

All of these are a function of income. Several are a function of home size. If you have a large income and a large home, you tend to have higher utility bills and you tend to buy more stuff.

**"I live in a
7,000 square foot
house,
fly my own plane,
and
my family loves to
eat beef."**

Seven Steps to Reducing Your Carbon Footprint

Other than moving into a smaller home, here are several practical steps that will reduce your greenhouse gas emissions:

1. **Travel less by plane.** Skip business meetings that are marginally important, or send fewer people. Evaluate your business travel as if you were paying for it yourself.
2. **Drive less.** One or two days a week, take public transport, bike, or work from home. Alternatively, buy a hybrid vehicle and leave your SUV or pick-up truck in the garage.
3. **Buy less stuff.** The larger your home and the higher your income, the harder this is. For ideas about energy efficient gifts see my website, www.EltonSherwin.com.
4. **Burn fewer hydrocarbons to make hot water.** This usually involves installing a solar water heating system or taking much shorter showers.
5. **Stop burning wood, paper, and leaves.** Their soot warms the planet and melts the polar ice. Soot also becomes trapped in the lungs of children, the elderly and athletes causing cancer and asthma.
6. **Use less electricity.** Find and replace the “energy hogs” in your home with the most efficient ENERGY STAR rated models you can find. Turn off your PCs at night. Replace incandescent and halogen bulbs with CFLs and LEDs. Use smart power strips and motion detectors. Turn off the lights when you leave the room; it really does make a difference.
7. **Eat less beef, cheese, and cream.** In some parts of the world a cup of milk a day can save a child’s life. But most Americans consume too many calories. Dairy products and beef have a disproportionately large carbon footprint. So trim back on the portion sizes and the frequency with which you eat beef, milk, cream and cheese.

Reducing your carbon footprint may also improve your health.

“Shifting less than one day per week’s worth of calories from red meat and dairy products to chicken, fish, eggs, or a vegetable-based diet achieves more GHG reduction than buying all locally sourced food.”

*Food-Miles and the Relative Climate Impacts of Food Choices in the United States*³⁴⁵

The Single Most Important Thing You Can Do

Pick one area—your passion— and have an impact.

The largest impact you can have on the planet is to become active. Active in your community, your company, or your church. Active on the web. Or active politically.

Pick one, maybe two items, become an expert, and get in the game. As the National Rifle Association has consistently demonstrated, a small number of passionate, committed individuals can have a huge impact.

To understand the climate crisis and then become a spectator would be like sitting on the sidelines for the Second World War. You want to be in the game.

You can have an impact.

This is just a partial list of areas requiring work if we are to stop climate change. Your objective is to find one area that you are interested in, perhaps passionate about:

- A local school
- Your workplace
- Your place of worship³⁴⁶
- A nonprofit organization
- One town in Africa, India, Central America, South America, or Asia
- A local dump
- A local water treatment plant
- Your utility
- Your planning department
- State or federal government
- A local university
- On the web
- In the media
- With the elderly
- With low-income housing
- With local agriculture

What might you do? You could:

- Research
- Teach
- Train others
- Remodel
- Volunteer
- Blog
- Call radio talk shows
- Attend meetings
- Start a new organization
- Start a committee in an existing organization or business
- Write letters and op-ed pieces

Pick something you care about and make it energy efficient.

What are Your Company's Top Energy Wasters?

What are the top energy wasters in your company? I talk to experts and visit businesses around the country. The amount of wasted energy is staggering.

Here are the most environmentally damaging things I see:

- Old, large-diameter fluorescent tubes and their fixtures
- Poorly calibrated HVAC equipment which needs re-commissioning
- Over-sized, over-aggressive air conditioners
- Lighting control systems either not installed at all, or installed without occupancy sensors, light-level sensors, and automatic dimmers
- PCs left on nights and weekends with power management systems disabled
- Inefficient manufacturing and transportation of products
- Incandescent and halogen bulbs—especially in restaurants and retail
- Water heated by burning oil or gas instead of using solar or waste heat
- Thermostats without occupancy sensors or twist timers³⁴⁷
- Fixed-speed pumps, fans, and motors with no back-pressure sensors
- Office equipment not ENERGY STAR rated
- Poorly maintained cooling towers
- Windows with R-values below 8
- Sunny windows that are not spectrally selective
- HVAC systems with fixed-speed fans
- Rooms without individual thermostats and occupancy sensors
- Under-insulated walls, ceilings, and floors
- Vending machines
- Air compressors in factories, auto-shops, and gas stations
- Refrigeration equipment and refrigerated display cases
- Agricultural pumps and wells
- Restaurant kitchen exhaust hoods and factory exhaust fans
- No thermal storage on air conditioners
- Windows or doors left open while the heating or cooling system is running
- Smoke and soot from fires and diesel trucks
- Refrigerants leaking or released into the air³⁴⁸

What Can Cities and Counties Do?

Last year, at a Rotary breakfast, I heard an update on one city’s “green downtown” program. The speaker had flunked her first audit because a Post-it note was in the garbage can, not the recycling bin. The city will remain anonymous.

I discretely inquired if this *green downtown program*:

- Looked at utility bills? Not part of the program.
- Calculated CO₂ emissions? Not part of the program.
- Ranked or measured anything? No.

These are all very sincere people. Sincerity alone will not stop global warming.

In most communities, two factors dominate greenhouse gas emissions: *utility bills and transportation*. Some communities also have significant agricultural or industrial emissions. Tragically, in many towns, the overconsumption of food may be the number three item responsible for greenhouse emissions.

What can your city or county do? Here are the 10 most important items.

A Simple Plan for Cities and Counties to Reduce Greenhouse Emissions:

- 1) **Eliminate all methane** escaping from your municipal dump and septic tanks, compost piles, farms, ranches, industrial facilities, and natural gas system.
- 2) **Eliminate all black carbon.** Eliminate the soot from: garbage trucks, diesel buses, diesel trucks, and the burning of wood and agricultural waste.
- 3) **Publish and post energy grades—A through F—for all buildings.**
- 4) **Audit the buildings with the worst grades** and require changes.
- 5) **Tighten up your building codes.** Implement the green building program on the following pages. If you want to go further, consider adopting the German *passive house* standard.
- 6) **Implement a financing mechanism** that enables people to install all energy saving technologies that pay for themselves in less than 10 years. Energy Savings Accounts, on page 121, are one such approach.
- 7) **Measure the carbon footprint of the cars that “overnight” in your town.**
- 8) **Measure the carbon footprint of the cars that visit your town.**
- 9) **Reduce items 7 and 8.**
- 10) **Ensure old refrigerators and refrigerants are disposed of correctly.**³⁴⁹

Do not get sidetracked on other things until you have mastered these 10 items.

Play to win. If your programs are not reducing electricity consumption in 80% of your existing buildings, you have not mastered these basics. Something is not working—either your financing mechanism is broken or you are not publishing building grades in large enough fonts.³⁵⁰

A Simple Green Building Code for Homes

What can cities and counties do to lower the carbon footprint of new buildings and remodels? Below is a simple addition to a city, county, or state building code.

These 10 items add some cost to construction, but they pay for themselves quickly in reduced utility bills.

A Simple Green Building Code for Homes

New single-family homes should have all 10 of the following. Remodels should upgrade proportionally; for example, 20% remodels could pick two from the list, 40% remodels four, etc. Residential versions of items #1, #5, and #8 are difficult to find, so you may wish to phase them in.

These 10 items dramatically reduce the carbon footprint of homes, new and old.

- 1) **Thermostat.** A separate thermostat with an occupancy sensor in each room, controlling the room's heating and cooling.
- 2) **Furnace.** Variable-output, variable-speed, modulating furnaces with variable-speed fans and oversized ductwork, blow-tested at installation.
- 3) **Air Conditioner.** Variable-speed, multistage, right-sized air conditioners.
- 4) **Water Heater.** Solar heat or waste heat from a furnace used to preheat domestic hot water.
- 5) **Windows.** R-10 spectrally selective windows.
- 6) **Smart Lighting.** No incandescent or halogen ceiling fixtures.
- 7) **Insulation.** Two R-values of insulation above California Title 24, with the building shell blow-tested and thermally imaged for leaks.
- 8) **Power Monitoring.** Real-time reporting to the homeowner of all power, gas, and water usage by room.
- 9) **Utility Bill Disclosure.** All buildings claiming to be "green" must disclose their energy consumption.
- 10) **High-efficiency, Zero Particulate, Closed Combustion Fireplaces.** These fireplaces emit no soot, most often burning natural gas or propane instead of wood.

These are better homes. They have lower utility bills, and they are more comfortable.

A Simple Green Building Code for *Commercial Property*

You can slightly modify the residential building code on the prior page and get a commercial building code that dramatically reduces greenhouse gas emissions and utility bills.

The Top 10 Items Currently Absent From Commercial Building Codes

- 1) **Thermostat.** A separate thermostat with an occupancy sensor in every room and office controlling the room's heating and cooling.
- 2) **Furnace.** Variable-output, variable-speed, modulating furnaces and boilers with heat exchangers for outside air; variable-speed fans and pumps commissioned at installation.
- 3) **Air Conditioner.** Variable-speed, multistage, right-sized air conditioners with a minimum of 40% thermal storage, commissioned at installation.
- 4) **Water Heater.** Solar heat or waste heat from a furnace used to preheat hot water.
- 5) **Windows.** R-10 spectrally selective windows.
- 6) **Smart Lighting Systems.** Dimmable fluorescents and LEDs with occupancy and daylight sensors.
- 7) **Insulation.** Two R-values of insulation above California Title 24, with the building shell blow-tested and thermally imaged for leaks.
- 8) **Energy Monitoring.** Real-time reporting of all electricity, HVAC and water usage by room.
- 9) **Utility Bill Disclosure.** All buildings claiming to be "green" must disclose their energy consumption.
- 10) **Roof.** Reflective roofs, sometimes called cool roofs.³⁵¹

These are better buildings. They have lower utility bills, lower CO₂ footprints, and will be more comfortable. These ultra-efficient buildings will also protect your state and its businesses from future energy price increases.

All green buildings must disclose their utility bills.

Designing Extraordinary Buildings—A Checklist

I originally developed this checklist as an alternative to the LEED point system. It has 50 points. Great buildings should have *at least* 25 of these features. Sadly, some “green” buildings today have less than five.

The ultimate test of a building’s “greenness” is how much energy it uses, but this checklist can help you get there.

CO₂ footprint during construction

- All wood products are certified as sustainable.
- The CO₂ footprint of all building materials is calculated and reported.
- Uses low-carbon Sheetrock.
- Uses low-carbon cement.
- Less than 10% of building exterior is wood.³⁵²

Building comfort

- HVAC system monitors CO₂ levels at multiple locations on each floor and dynamically adjusts fresh air.
- HVAC system optimizes its performance based on humidity.
- There is a thermostat in every room.
- Building is designed to be habitable during a 24-hour power outage without AC compressors running. One point for each season of the year.
- Occupants can temporarily request more heat or AC in a room.
- Occupants can temporarily adjust blower speed in a room.
- Occupants can change direction of some airflow in offices (similar to an airplane seat).
- Occupants can control a window shade or equivalent in all rooms.
- Occupants can open a window or request more fresh air.
- Building has an open wireless network to receive feedback from tenants and visitors on building comfort, temperature, and problems. Feedback is collected and reported. Optimally, allows users to set some HVAC parameters (temperature, fan speed, and extended away times).

Tenant Feedback

- Building owner provides tenants with Web dashboard of the tenant’s energy consumption updated every fifteen minutes or more frequently.
- Building manager bills individual tenants for their actual electricity consumption and enables large tenants to bill at a department level.
- Building owner provides tenants with breakdown of electricity consumption by room.
- Building owner bills individual tenants for actual hot water consumption.
- Building owner bills individual tenants for actual HVAC consumption.
- Real-time building energy consumption is displayed in building lobby.
- Real-time tenant energy consumption is displayed on each floor (for example, an LCD display in elevator lobbies of each floor).

Monitor and report energy consumption *by room.*

HVAC

- Major HVAC system components monitor energy consumption (electricity, gas, and oil), report problems, and alert facility managers to unexpected levels of energy consumption.
- HVAC system monitors and reports energy usage by floor.
- HVAC system monitors and reports energy usage by room.
- Occupancy sensors reduce HVAC usage in empty rooms.
- Weather forecasts help HVAC system anticipate load.
- Building system reports percent of air-conditioning load sent to rooms remaining empty for the following hour and the percent of heating sent to rooms remaining empty for the following two hours.

Lighting

- Lighting system tracks and reports its energy consumption by room.
- Addressable, smart lighting system automatically reduces consumption when natural light is present or when people are absent.
- Building monitors and records light levels and daylight availability in all rooms.
- Building system reports percent of power used by lighting, percent of lighting used in empty rooms, power saved by motion detectors on lighting systems, power saved by lighting level (brightness) sensors, and percent of lighting provided by daylight.

Plug Load and Occupancy Reporting

- Building monitors and reports electricity usage of subpanels.
- Building tracks and monitors electricity usage of individual circuit breakers.
- Building tracks and reports electricity usage of individual plugs.
- Building can sense, track, and report total power and HVAC load consumed by each room and calculate percent of total building energy allocated to unoccupied rooms.

Demand Response

- Eighty percent of daytime HVAC system is controlled by a utility-demand response system.
- Seventy percent of lighting is controlled by a utility demand-response system.

Water

- Weather radio or sensor data adjusts 80% of landscaping irrigation and sprinklers.
- Water usage is monitored and tracked for landscaping and HVAC systems.
- Water usage is monitored and tracked for each room (restrooms, kitchen, etc.).
- Water usage is monitored and tracked at a fixture level (every shower, toilet, etc.).
- Hot water usage and energy consumption is monitored and tracked.
- Urinals average less than two cups of water per flush, toilets less than one gallon.
- Building owner bills individual tenants for their actual water usage.
- Building has a gray water system.
- Water usage data is available to tenants online.

Reading for Skeptics

Perhaps you, family members, or colleagues continue to have doubts about the reality of global warming and climate change. Here is a short list of resources that may help you with your doubts or help others you know.

Best Overview of the *Scientific Evidence*

- **Woods Hole Research Center**

Clear explanations, good graphics.

Google 'Woods Hole Research scientific evidence.' The URL is a bit long, but this Google search always finds it for me.

Best Call to Action for *Conservative Skeptics*

- **Senator McCain's June 15, 2006 address to the Symposium on Climate Change**

I quoted the last three paragraphs of this speech at the beginning of this book. **Every conservative in America should read this.**

Google 'Senator McCain 2006 address Symposium Climate Change.'

Best Call to Action for *Christian Skeptics*

- **The Evangelical Climate Initiative**

ChristiansAndClimate.org

The *learn* section of this web site is excellent and has links to some of the world's most trustworthy web sites.

First Two Books to Read about Climate Change

These two books are my all-time favorites. I could not put them down and have given away innumerable copies.

- ***With Speed and Violence, Why Scientists Fear Tipping Points in Climate Change*** by Fred Pearce

Factual, straightforward, well written, and fascinating.

- ***Plan B 4.0—Mobilizing to Save Civilization*** by Lester R. Brown

Lester Brown does an extraordinary job describing solutions that have worked around the world. It is available as a free download or for purchase on the web.

Books, Videos and Web Sites

Anyone concerned about climate change should be familiar with the two books on the prior page. The third book I would recommend is Tom Friedman's #1 best seller:

- **Hot, Flat, and Crowded: Why We Need a Green Revolution - And How it Can Renew America** by Thomas L. Friedman

Hot, Flat, and Crowded is a well-researched, fascinating read, particularly helpful for understanding the situation in China.

DVDs

- **The 11th hour**, Leonardo DiCaprio and others

This DVD is often available online for only \$4.99. There is a Patrick Stewart TV series by the same name, so make sure you get the correct one.

- **An Inconvenient Truth**, Al Gore

Several years after its making, *An Inconvenient Truth* is quite accurate.

Web Videos

- **Deforestation:** Award-winning short videos at: www.edenprojects.org
- **A high school science teacher on managing the risks of climate change.** Greg Craven produced several YouTube videos, Google 'Greg Craven YouTube how it all ends.' My favorite is the version that is 9 minutes and 59 seconds long and has a small explosion 11 seconds into the video.
- **Bill Gates'** 2010 speech on energy. Google 'Bill Gates TED 2010 video.'
- **Secretary Chu's** extraordinary two-hour lecture for scientists at the Stanford Linear Accelerator.³⁵³ Google 'Steven Chu SLAC 2009 video.'

Audio Downloads

Many free—and legal—mp3 audio downloads are available on the web as universities, nonprofits, and media outlets post interviews and lectures. I listen to mp3s while I drive, bike, and exercise. These Google searches yield informative mp3s:

- **'Lester Brown earth policy mp3'**
- **'James Hansen NASA mp3' and 'James Hansen climate mp3'**

There are also many university lectures available on **iTunes U**, a feature of Apple's iTunes software. iTunes U enables free downloads of university lectures from Stanford, Berkeley, Yale and others.

Web Sites

- **RealClimate.org** A web site run by climate scientists for the general public and journalists. Focus: climate science. The *start here* tab is helpful.
- **e360.yale.edu** From the Yale School of Forestry and Environmental Studies. Focus: environmental news.
- **TreeHugger.com** From the people who bring you the Discovery Channel. Focus: anything interesting, new, or quirky.
- **GreenerChoices.org** From Consumer Reports. Focus: products.
- **FYPower.org** A partnership of California's utilities, businesses, government agencies, and nonprofits. Focus: practical steps for homeowners, businesses, industry, farmers, and ranchers.
- **ClimateProgress.org** According to Time Magazine "the Web's most influential climate-change blogger." Focus: late-breaking news.
- **Greentechmedia.com** Focus: cleantech businesses, research and news.
- **EltonSherwin.com** Focus: my recent PowerPoint presentations and the products my family has tested in our house.
- **C40 Cities Climate Leadership Group, www.c40cities.org** Focus: best practices from cities around the world. Some of the case studies are fascinating.
- **The Union of Concerned Scientists, www.ucsusa.org** Focus: climate change, clean vehicles, clean energy, nuclear power, and nuclear proliferation.
- **Environmental Defense Fund, edf.org** Focus: balancing environmental concerns, business profitability, and political realities.
- **National Renewable Energy Laboratory, nrel.gov** Focus: alternative energy, solar, wind, and geothermal.
- **Lawrence Berkeley National Laboratory Environmental Energy Technologies Division, eetd.lbl.gov** Focus: buildings, batteries, fuel cells, cleaner combustion, climate modeling, air quality, and more. I frequently add 'lbl' to a Google search, for example, 'carbon capture lbl.'
- **NASA and the DOE.** Focus: Government funded research, data and programs. I also find the fastest way to use these data-rich web sites is to Google the topic I am researching and append 'DOE' or 'NASA,' for example, 'heat pumps DOE' or 'arctic ice NASA.'

Average Energy Savings
from
ENERGY STAR Products
Above Standard Products²⁵⁹

ENERGY STAR PRODUCT CATEGORY	AVERAGE ENERGY SAVINGS** ABOVE STANDARD PRODUCT	ENERGY STAR PRODUCT CATEGORY	AVERAGE ENERGY SAVINGS** ABOVE STANDARD PRODUCT
Office		Lighting	
Monitors	20-60%	Compact fluorescent light bulbs (CFLs)*	75%
Computers	5-55%	Decorative light strings	70%
Fax machines	20%	Residential light fixtures	75%
Copiers	20%	Residential Appliances	
Multifunction devices	20%	Room air conditioners*	10%
Scanners	50%	Dehumidifiers	15%
Printers	10%	Room air cleaners	45%
Consumer Electronics		Exhaust fans	70%
TVs	25%	Ceiling fans	45%
VCRs	30%	Dishwashers*	20%
TVs/DVDs/VCRs	90%	Refrigerators*	15%
DVD products	60%	Clothes washers*	30%
Audio equipment	60%	Commercial Appliances	
Telephony	55%	Water coolers	45%
Digital-to-analog converter (DTA)	50%	Commercial solid door refrigerators and freezers	35%
External power adapters	35%	Commercial hot food holding cabinets	60%
Battery charging systems	35%	Commercial fryers	15%
HVAC		Commercial steamers	55%
Furnaces	15%	Vending machines	40%
Central air conditioners	15%	Home Envelope	
Air source heat pumps	10%	Insulation/Sealing	N/A
Geothermal heat pumps	30%	Roof	N/A
Boilers	5%	Windows, doors, & skylights*	N/A
Programmable thermostats	15%		
Light commercial HVAC	5%		

U.S. EPA, 2007 ENERGY STAR ANNUAL REPORT

Boxes added by author

One of the fastest ways to reduce demand for electricity and lower greenhouse gas emissions is to convert the ENERGY STAR program from a voluntary program to a federal standard. Alternatively, you could require all products imported into America to meet Japanese efficiency standards, which are tougher than ours.

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