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ENERGY STAR *Change a Light, Change the World*
2007 Campaign Facts and Assumptions Sheet

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All facts used for the Campaign are based on the following numbers:

CFL wattage replacement: 13W CFL for 60W Incandescent
Source: DOE market data, most frequently purchased wattage

Average daily usage: 3 hours
Source: "An Evaluation of Residential CFL Hours-of-Use Methodologies and Estimates," Edward Vine, Lawrence Berkeley National Laboratory, Berkeley, CA and Diane Fielding, BC Hydro, Vancouver, Canada; August 2005.

Lifetime – Bulbs: 6,000 hours
Source: Current ENERGY STAR CFL specification minimum. Note: Many qualified CFLs exceed 6,000 hours – manufacturers may accurately assert higher hours on packaging.

Lifetime – Bulbs in ENERGY STAR qualified fixtures: 10,000 hours
Source: Current ENERGY STAR fixture specification minimum.

Number of households (US): 116,900,000
Energy Information Administration's, Annual Energy Outlook 2006 edition.

Electric Rate (US average rate for 2006): $0.1008 / kWh
Electric Rate (US, average rate over CFL lifetime): $.093 / kWh
Electric Rate (state): see spreadsheet "State Households and Energy Prices"
Sources:
US electric rate for 2006: Energy Information Administration's, Annual Energy Outlook 2006 edition. (Converted from 2004 to 2006 dollars). Used for annual savings facts.
US average rate over CFL lifetime: based on projected rate changes over CFL's 5.5 year life. Can be used to develop CFL lifetime savings facts.
State electric rate: EIA's Electric Power Monthly, March 2007 - Table 5.6.B. Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, Year-to-Date through December 2006 and 2005 (http://www.eia.doe.gov/cneaf/electricity/epm/chap5.pdf)

Power output of 1 power plant: 3.3 billion kWh / year
Source: Unit Conversions, Emissions Factors, and Other Reference Data (Nov 2004); Updated average power plant size to 500 MW in 2005

Annual household lighting use: 1,950 kWh / household
Sources: Navigant 2002 (DOE EERE Office of Building Technology), "U.S. Lighting Market Characterization, Volume I: National Lighting Inventory and Energy Consumption Estimate". Cited number is in table ES-1, Pg 10.

Emissions factor 2007: **1.54 pounds CO_2 / kWh**
Emissions factor over CFL lifetime: **1.45 pounds CO_2 / kWh**
Source:
2007 emissions factor: EPA's Climate Change Action Plan (CCAP) number for 2007. Used for annual savings facts.
Emissions factor over CFL lifetime: Based on projected changes in CCAP to emissions factors over the next 5.5 years – can be used for CFL lifetime savings facts.

Car emissions factor: **11,470 pounds CO_2 / car / yr**
Source: EPA's Unit Conversions, Emissions Factors, and Other Reference Data Report (Nov 2004), EIA/DOE 2002

Coal emissions factor: **2.06 pounds CO_2/kWh**
Source: EPA's Unit Conversions, Emissions Factors, and Other Reference Data Report (Nov 2004)

Coal carbon content: **2.14 pounds CO_2/pound coal**
Source: EPA's Unit Conversions, Emissions Factors, and Other Reference Data Report (Nov 2004)

Tree carbon sequestration (Trees planted): **2,200 pounds C/acre of trees/yr**
8,066 pounds CO_2/ acre/ yr
Source: EPA's Unit Conversions, Emissions Factors, and Other Reference Data Report (Nov 2004), EIA/DOE 2002

Annual household electricity use: **10,660 kWh**
Source: EPA's Unit Conversions, Emissions Factors, and Other Reference Data Report (Nov 2004), EIA/DOE 2002

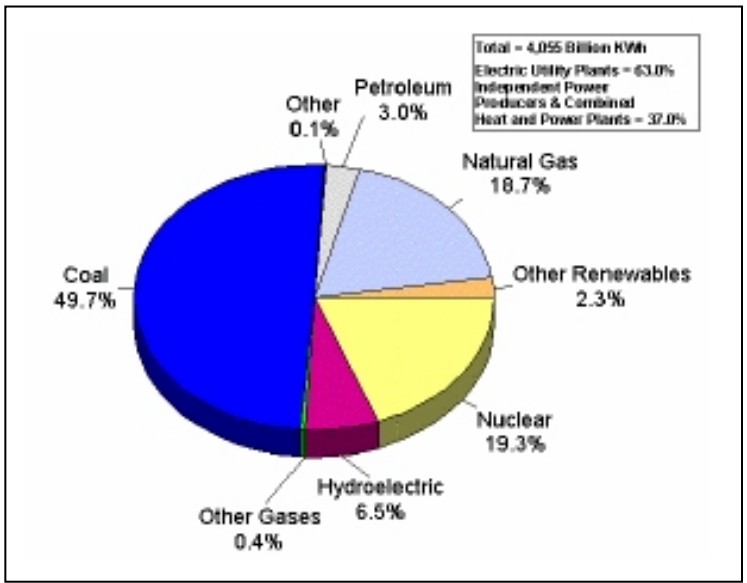
Annual household total energy emissions: **22,880 pounds CO_2 / yr**
Source: EPA's Unit Conversions, Emissions Factors, and Other Reference Data Report (Nov 2004), EIA/DOE 2002. Note: This includes all fuel sources for a home's energy use, not just electricity.

To calculate lifetime savings per CFL (based on a 60W to 13W replacement):

*"If **X** lights were changed to ENERGY STAR qualified ones, it would save **$X** in energy costs, **X** kWh, and **X** pounds of greenhouse gas emissions over their lifetime."*

- ***kWh saved*** = # of CFL bulbs x 282
- ***$ saved*** = kWh saved x energy cost ($.093 is national average over CFL lifetime)
- ***Pounds of greenhouse gases*** = # of bulbs x 409

Breakdown of U.S Electric Power Industry Net Generation (2005):



Source: Energy Information Administration, Electric Power Annual, with data from 2005. (http://www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html)

NUMERICAL LIGHTING FACTS:

- If every American home replaced just one light [bulb or fixture] with an ENERGY STAR, we would save **enough energy to light more than 3 million homes for a year**, more than **$600 million in annual energy costs**, and prevent greenhouse gases equivalent to the emissions of more than **800,000 cars**.
  Sources: See 'Collective savings facts' excel spreadsheet

- If every American home replaced their 5 most frequently used light fixtures or the bulbs in them with ones that have earned the ENERGY STAR, we would save close to **$8 billion each year** in energy costs, and together we'd prevent the greenhouse gases equivalent to the emissions from nearly **10 million cars**.
  Sources: See 'Collective savings facts' excel spreadsheet. Note: this fact is based on the replacement of 9 bulbs in 5 high-use fixtures.

- By replacing your home's five most frequently used **light fixtures or the bulbs in them** with ENERGY STAR qualified models, you can save more than **$65 each year**.
  Sources: See 'Collective savings facts' excel spreadsheet. Note: this fact is based on the replacement of 9 bulbs in 5 high-use fixtures.

- By changing the five most frequently used **light bulbs** in your home to ENERGY STAR qualified ones you can save about **$35 each year** in energy costs.
  Sources: Wattage difference: 47 W (60 W incandescent = 13 W CFL); 4 hr use each day; $0.1008/kWh energy cost

- Lighting accounts for about **20 percent** of the average home's electric bill.
  Source: EIA's Annual Energy Outlook, 2006

- The average home has about **45 light bulbs** in approximately **30 fixtures**.
  Sources: Lawrence Berkeley National Laboratory's Lighting Market Sourcebook for the US for number of fixtures; DOE's U.S. Lighting Market Characterization Volume I: National Lighting Inventory and Energy Consumption Estimate for number of bulbs.

- ENERGY STAR qualified bulbs and fixtures use about **75% less energy** than standard incandescent bulbs and **last up to 10 times longer**.
  Source: ENERGY STAR Lighting Specification. Note: Actual savings over incandescent range from 60-80%. Many qualified screw-in CFL bulbs exceed the 6,000 hour minimum and many pin-based bulbs included with qualified fixtures exceed their 10,000 hour minimum. Manufacturers may accurately assert higher hours on packaging.

- An ENERGY STAR qualified bulb can **save about $30 or more** in electricity costs over its lifetime.
  Sources: Wattage difference: 47 W (60 W incandescent = 13 W CFL); 6,000 hr life; electricity rate $0.1008/ kWh. Higher wattage replacements (i.e., replacing a 75W incandescent with a 20W CFL) will yield higher dollar savings. Note: Because many CFLs exceed 6,000 hours, manufacturers may accurately assert higher savings for their specific product.

- An ENERGY STAR qualified light [bulb or fixture] prevents **more than 400 pounds of greenhouse gas emissions** over its lifetime, the equivalent of keeping nearly **200 pounds of coal** from being burned.
  Sources: Wattage difference: 47 W (60 W incandescent = 13 W CFL); 6,000 hr lifetime, emissions factor = 1.45 pounds CO2/kWh, Coal emissions = 2.14 pounds CO2/pound coal

- ENERGY STAR qualified bulbs and fixtures produce about **75% less heat**, so they're safer to operate and can cut energy costs associated with home cooling.
  Note: Energy savings of 75% equates to reduction in total heat output of 75%.

- ENERGY STAR qualified **ceiling fans with lights** are about 50% more efficient than conventional fan / light units, **saving you more than $15 per year** in energy costs.
  Source: EPA's Climate Change Action Plan (CCAP) number for 2007, with updated electricity prices

- Every light changed is a step in the right direction to preserve energy resources and the quality of our environment for this generation and the next. If we changed a bulb for every child in America, each year we would save **enough energy to light nearly 2 million homes**, **$380 million** on energy bills, and the equivalent in greenhouse gases to the emissions from more than **half a million cars**.
  Sources: Number of children: US Census Bureau 2005 estimates, 73.1 million children under age 18. See 'Collective savings' spreadsheet.

NUMBERS RELATED TO MERCURY:

- CFLs contain an average of **5 mg of mercury** per bulb, about the amount that would cover the tip of a ballpoint pen.
  Source: Based on surveys with a variety of manufacturers and NEMA; documented in "Mercury in Fluorescent Lamps: Analysis of Environmental Impacts and Policies", draft submitted to the U.S. Environmental Protection Agency ENERGY STAR program, October 30, 2006

- All members of the National Electronics Manufacturers Association (NEMA) have voluntarily committed to limit mercury in CFLs sold in the US at 5mg per lamp for CFLs 25W and below and 6mg for CFLs 26W and higher. As of April of 2007, this is a NEMA standard, and should serve to reduce the average mercury content per bulb.
  Source: http://www.nema.org/gov/ehs/committees/lamps/cfl-mercury.cfm

- **Coal-burning power plants** are the single largest source of human-caused mercury emissions in the United States, contributing **more than 40%**. Because CFLs use 75% less energy than the incandescent bulbs they replace, they help to **reduce mercury emissions** (i.e., they represent a net mercury emissions reduction).
  Sources: EPA -- http://www.epa.gov/mercury/about.htm, Mercury in Fluorescent Lamps: Analysis of Environmental Impacts and Policies, draft submitted to the U.S. Environmental Protection Agency ENERGY STAR program, October 30, 2006

- Of the total amount of human-caused mercury released into the environment per year in the United States, the share of **mercury emissions contributed by all types of fluorescent lamps from all sectors is about 1%.**
  Source: EPA -- U.S. Environmental Protection Agency, Office of Solid Waste, Mercury Emissions from the Disposal of Fluorescent Lamps, Revised Model, Final Report – Post-OMB Review, March 31, 1998. Also documented in "Mercury in Fluorescent Lamps: Analysis of Environmental Impacts and Policies", draft submitted to the U.S. Environmental Protection Agency ENERGY STAR program, October 30, 2006

- **CFLs** currently represent less than 2% of the total fluorescent lights removed annually, with the potential mercury emissions from burned out CFLs representing **less than 0.01% of gross total U.S. mercury emissions**.
  Source: "Mercury in Fluorescent Lamps: Analysis of Environmental Impacts and Policies," draft submitted to the U.S. Environmental Protection Agency ENERGY STAR program, October 30, 2006