Pacific Gas and Electric Company
Carbon Footprint Calculator
Assumptions

General Information

1. Typical PG&E Residential Customer – Monthly Household Energy Use
   - Electricity Usage: 540 kilowatt-hours (kWh)
   - Natural Gas Usage: 45 therms (winter 60 / summer 24)

2. ClimateSmart Rates
   - Electricity: $0.00254 per kWh
   - Natural Gas: $0.06528 per therm

3. PG&E Carbon Dioxide (CO2) Emissions Rates
   - Electric: 0.524 lbs CO2 per kWh
   - Natural Gas: 13.446 lbs CO2 per therm

Minimizing Your Carbon Footprint – Estimated Avoided CO2 Emissions

1. Switch to Compact Fluorescent Light Bulbs
   Avoid 34 lbs CO2 per bulb per year
   Assumptions:
   - Compares a 100-watt incandescent bulb to a 23-watt compact fluorescent.
   - Lighting used 2.34 hours per day.
   - PG&E emissions rate (electric): 0.524 lbs CO2 per kWh.

2. Install an Energy-Efficient Clothes Washer
   Avoid 260 lbs CO2 per year
   Assumptions:
   - Avoid up to 15 therms per year and up to 128 kilowatt-hours per year.
   - Based on California Energy Commission-rated Tier 3, 2.65 cubic feet clothes washer supplied by a gas water heater. Savings will vary greatly depending upon number of loads and size of washer, whether front- or top-loading, and whether electricity or natural gas is used for water heating.
   - PG&E emissions rate (natural gas): 13.446 lbs CO2 per therm.
   - PG&E emissions rate (electric): 0.524 lbs CO2 per kWh.

3. Purchase an Energy-Efficient Water Heater
   Avoid 120 lbs CO2 per year
   Assumptions:
   - Avoid up to 9 therms per year.
   - 30 to 50 gallon 0.63 Energy Factor (EF) natural gas water heater. EF is a measure of energy efficiency.
   - PG&E emissions rate (natural gas): 13.446 lbs CO2 per therm.

4. Install High Efficiency Central Furnace
   Avoid 1,000 lbs CO2 per year
   Assumptions:
   - Avoid up to 74 therms per year.
Based on installation of a more efficient furnace (94% AFUE) to replace a less efficient unit (70% AFUE) of the same size (67.611 kBtuh rating). AFUE stands for Annual Fuel Utilization Efficiency and is a measure of heating efficiency on an annual basis.

PG&E emissions rate (natural gas): 13.446 lbs CO₂ per therm.

5. **Install Solar Electric Panels**
   Avoid 3,300 lbs CO₂ per year

   **Assumptions:**
   - Typical residential system is 3-5 kW.
   - 18% capacity factor.
   - Operating 8,760 hours per year.
   - PG&E emissions rate (electric): 0.524 lbs CO₂ per kWh.

6. **Switch to Hybrid-Electric Vehicle**
   Avoid 2,900 lbs CO₂ per year

   **Assumptions:**
   - 12,000 miles per year for average automobile.
   - Compares hybrid-electric subcompact with comparable vehicle: 2007 Toyota Prius (46 miles per gallon average fuel efficiency) and (non-hybrid) 2007 Honda Civic (29 miles per gallon average fuel efficiency).
   - Burning 1 gallon of gasoline produces 19.4 lbs CO₂.

**Average Per Capita CO₂ Emissions (Energy and Vehicle Use)**

1. **Average Californian**
   22,941 lbs CO₂ per person

   **Assumptions:**
   - 2005 California Per Capita Electricity Usage: 7,032 kWh.
   - 2005 California Per Capita Natural Gas Usage: 422 therms.
   - California Emissions Rate for Delivered Electricity: 0.879 lbs CO₂ per kWh.
   - Emissions Rate for Natural Gas: 13.446 lbs CO₂ per therm.
   - 12,000 miles per year and 21 miles per gallon for average passenger vehicle.
   - Burning 1 gallon of gasoline produces 19.4 lbs CO₂.

2. **Average American**
   32,607 lbs CO₂ per person

   **Assumptions:**
   - 2005 United States Per Capita Electricity Usage: 12,347 kWh.
   - United States Emissions Rate for Delivered Electricity: 1,363 lbs CO₂ per kWh.
   - Emissions Rate for Natural Gas: 13.446 lbs CO₂ per therm.
   - 2004 United States Per Capita Vehicle Usage: 464 gallons per person.
   - Burning 1 gallon of gasoline produces 19.4 lbs CO₂.

3. **Average Global Person**
   8,750 lbs CO₂ per person
Sources

1 PG&E’s ClimateSmart program, authorized by the California Public Utilities Commission in Decision 06-12-032.

2 PG&E’s ClimateSmart program, authorized by the California Public Utilities Commission in Decision 06-12-032. The most accurate measure of emissions from power generation involves calculating the emissions from each plant operating in the portfolio of generating assets for each hour of the day and year, and this can vary considerably by time of day, year, and with seasonal variations in weather.

To avoid this complex approach, it is common to approximate emissions from electric usage through the use of an average emissions rate such as the California Public Utilities Commission (CPUC)-approved ClimateSmart electric emissions rate of 0.524 lbs CO₂ per kWh. This reasonable approximation is based on the average emissions rate for PG&E’s electric portfolio, consistent with the emissions rate that is independently certified and registered each year with the California Climate Action Registry (see www.climateregistry.org). The CPUC-approved ClimateSmart natural gas emissions rate is 13.446 lbs CO₂ per therm.


5 U.S. Environmental Protection Agency, 2007 Miles-Per-Gallon Updates.

6 U.S. Environmental Protection Agency, Overview: Pollutants and Programs Average Carbon Dioxide Emissions Resulting from Gasoline.

7 California Energy Commission.

8 U.S. Environmental Protection Agency eGRID (Updated April 2007).

9 California Energy Commission (CEC): Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2002 Update, Page A-24, CEC-600-2005-025, June 2005. The average emissions rate for customer use of natural gas is 11.7 lbs CO₂ per therm. For comparability purposes for this calculator, we use the CPUC-approved ClimateSmart rate of 13.446 lbs CO₂ per therm, which includes both customer use and distribution of natural gas.


11 World Resources Institute Climate Analysis Indicators Tool Version 3.0 (2002 Emissions Data), which is based on: