Energy Efficiency Solutions
2009 Public Discussions

Buildings: Operations and Materials
Policy Drivers for Energy Efficiency

- **Environmental Protection**
  - Global Climate Change

- **Security**
  - Oil/International vulnerability
  - Vulnerability of infrastructure to terrorism, natural disaster, or human error

- **Economics**
  - Prices of electricity, gasoline, natural gas
  - Price volatility: oil, natural gas, wholesale electricity
  - Improved corporate profit, household budgets
US Energy Consumption By Fuel

Source: EIA, Annual Energy Review

Fuel Consumption (Quads)

- Petroleum: 40, 40, 40
- Coal: 23, 22, 23, 22, 24
- Natural Gas: 23, 22, 23, 22, 24
- Nuclear: 8.1, 8.2, 8.4
- Hydroelectric: 2.7, 2.9, 2.5
- Biomass: 3.2, 3.4, 3.6
- Geothermal: 0.3, 0.3, 0.3
- Solar/PV: 0.06, 0.07, 0.08
- Wind: 0.18, 0.26, 0.32
U.S. CO₂ Emissions 2007

Source: [http://www.eia.doe.gov/environment.html](http://www.eia.doe.gov/environment.html)
Commercial Building Energy Uses: Operations Only

- Space Cooling
- Lighting
- Space Heating
- Refrigeration
- Water Heating
- Ventilation
- Electronics
- Cooking
- Other

- Cooling Load Driven by Lighting (42% of Cooling Load)
- Heating Assistance from Lighting (23% of Space Heating Load)

Source: 2006 Buildings Energy Data Book
Agency Problem: Market Penetration of Energy Efficiency Measures in Owner-Occupied and Rental Housing in California (CEC 2004)

- Insulated walls
- Insulated attic
- Double pane windows
- Programmable thermostat
- Compact fluorescent lamps
- Low-flow showerheads

Market penetration (%)

- Owner occupied
- Rental