Energy Use

Think About It...

- Besides personal uses, what else is energy needed for?
- What do you think the most energy is used for in California?
- What costs are involved in making energy available for us to use?

Learn About It...

From 1960 to 2000, California's population doubled. But California's energy use almost tripled! And both our population and energy use have continued to increase.

What is all that energy used for?

Businesses 10%

- offices
- hotels
- restaurants
- stores
- schools
- other businesses

Transportation 46%

- cars & trucks
- airplanes
- trains
- ships
- other forms of transportation

Homes 13%

- heating
- lighting
- cooking
- running appliances
- powering computers
- other home uses

Industry 31%

- generate electricity
- make products
- manufacture steel
- produce & package food
- pump water
- other industrial uses

In California, we use a lot of energy for *transportation*; in fact, California ranks first in the nation in gasoline consumption! And southern California ranks first in California! Even without all our cars, SUVs, motor homes, trucks, trains, ships, and airplanes, we use a lot of energy; and each of us seems to be using more every year as more and more things are manufactured that use energy—from computers to cell phone chargers.

A lot of energy is used to generate *electricity*, which we then use in our homes and businesses. Almost ¾ of the electricity we use is generated here in California. The remaining ¼ comes from other states. For example, electricity generated at hydroelectric plants in Oregon and Washington and Nevada is delivered across power transmission lines.

How Much Energy Do You Use?

- Use the figures below and your Personal Energy Use Log to calculate how much energy you used in one day.
- Is it more or less than the average?*
- How can you reduce your total energy usage?

Appliance	Estimated Energy Use
Air Conditioner – Room	1.3 kWh per hour
Air Conditioner – Central	3.0 kWh per hour
Blender	0.4 kWh per hour
CD Player	0.01 kWh per hour
Clock	0.05 kWh per day
Clothes Dryer	3.0 kWh per load OR 18,000 BTU per hour
Clothes Washer	0.25 kWh per load
Coffee Maker	0.20 kWh per pot
Computer	0.12 kWh per hour
Dishwasher	1.5 kWh per load
Electric Blanket	0.75 kWh per night
Fan	0.17 kWh per hour
Frying Pan	1.20 kWh per hour
Furnace	15.0 kWh per hour OR 100,000 BTU per hour
Hair Dryer	1.0 kWh per hour
Heater – Portable	1.5 kWh per hour
Iron	1.0 kWh per hour
Microwave	1.5 kWh per hour
Oven	3.0 kWh per hour OR 18,000 BTU per hour
Radio	0.10 kWh per hour
Range Burner	1.5 kWh per hour OR 9,000 BTU per hour
Refrigerator	5.0 kWh per day
Stereo	0.10 kWh per hour
Television	0.20 kWh per hour
Toaster	0.10 kWh per use
Toaster Oven	0.75 kWh per hour
Vacuum Cleaner	0.75 kWh per hour
VCR/DVD Player	0.02 kWh per hour
Water Heater	13.0 kWh per day OR 36,000 BTU per hour
100-Watt Incandescent Light Bulb	0.10 kWh per hour
27-Watt Fluorescent Light Bulb	0.03 kWh per hour

*Average electricity use per household is about 17 kilowatt hours per day.

Energy Challenges

Think About It...

- We get energy from many sources—nonrenewable and renewable. So what's the problem?

Learn About It...

Energy comes in many forms—and we depend on it to live our lives. But there are challenges to getting—and using—the energy we need. What are those challenges?

First, supply.

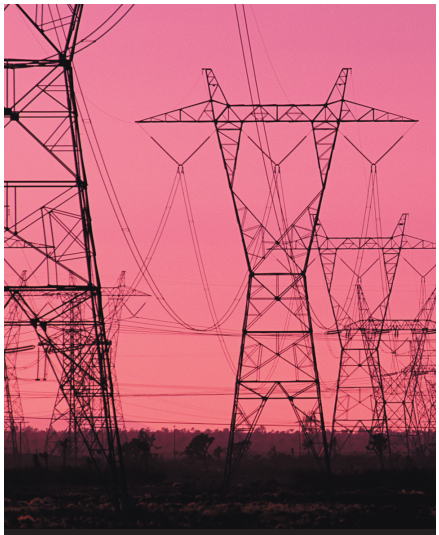
The amount of energy we have doesn't always match the amount we need. In the 1970s, the "energy crisis" had people waiting in long lines and paying high prices to buy gasoline, sometimes only on specified days. In 2008, prices rose dramatically again. Because we depend on other countries for much of the oil we need to manufacture gasoline, our supply is not always certain.

In 2001, the "energy crisis" caused "rolling blackouts" throughout California, meaning that various areas were without electricity for periods of time. Along with other factors, the shortage of electricity was caused by:

- more demand during hot summer weather
- less supply from the hydroelectric plants in the Pacific Northwest where rainfall was low.

Second, the environment.

Most of our energy comes from burning fossil fuels, which emit pollutants into our air. Especially in southern California, these pollutants cause smog. In other parts of the country, fossil fuels also contribute to acid rain; and in the world they are causing climate changes, which can have many negative effects—such as polar ice melting, which could lead to rising sea levels and flooded coastal areas; more hurricanes and tornadoes; increased number of droughts; and changes in forests, crop lands, coral reefs, and wildlife habitats.



SUPPLY

ENVIRONMENT

POPULATION

Other energy sources also impact the environment—whether taking up space, flooding land behind dams, disrupting wildlife, or creating radioactive waste. The more energy we use, the more the environment is affected.

Third, money.

It's expensive to supply the energy we need. Fossil fuels must be drilled for or dug out of the ground and transported to where they are needed; power plants must be built; transmission lines must be connected. When we import energy, even more money must be spent. As the demand goes up and our supply goes down, consumers will be spending even more each month for the energy they use.

Fourth, population.

California is the fastest growing state in the nation.

- In 2008, our population was approximately 38 million.
- By 2050, it is projected to be 55 million.

Energy will be needed to make the products and distribute the water consumed by all these people. And, of course, each person will use energy every day just to live their lives.

So how will we have enough energy for the future?

Think About It...

- What can we do to have enough energy for the future?
  - Do you waste any energy?

Learn About It...

There is probably not one solution to the problems we face supplying energy. Rather the key is likely to find a mix of new technologies and practices that will help us have enough energy for the future.

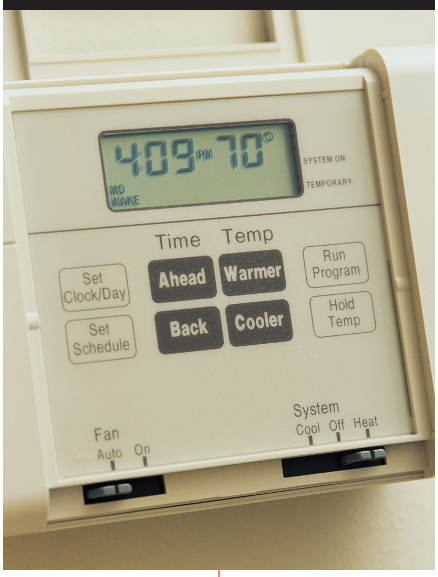
Technology

Efficiency

Increasing *energy efficiency*—that is, using less energy to do more—is an important part of our energy future.

The appliances we use every day eat up a lot of electricity, but they can be—and many have been—designed to consume less. Since 1980, appliances have improved in energy efficiency by 30 to 90%. Today, products that meet strict energy efficiency guidelines set by the U.S. Environmental Protection Agency and the Department of Energy earn the Energy Star label. These products have advanced technologies that use 10 to 50% less energy than standard models. Energy Star products include big appliances such as refrigerators, clothes washers, dishwashers, and air conditioners, as well as table lamps and windows.

ENERGY EFFICIENCY



Other improvements in technology include:

- Smarter thermostats that can cut heating and air-conditioning costs up to 33%. Using a microcomputer, these thermostats allow you to divide the day into periods and to program each period with a specific temperature. For example, at 6 a.m., a half hour before you get up on a cold day, the thermostat can increase the heat to a comfortable temperature. When everyone leaves the house at 8 a.m., the thermostat goes back down. Then at 5 p.m., just before people come home, the heat comes back on, until 10 p.m. when everyone goes to bed.
- Compact fluorescent light bulbs (CFLs) that can last up to 10,000 hours—10 times longer than a standard light bulb. To get the same light, the CFL needs to be just one-fourth the wattage of the standard incandescent bulb, thus using 75% less electricity. These bulbs can replace standard bulbs in table lamps, desk lamps, and ceiling or wall fixtures. They are particularly efficient in lights that will be left on for 3 to 4 hours at a time. CFLs also produce less "waste heat," thus reducing air-conditioning in warmer weather.

Entire buildings can be made more energy efficient by using these improved technologies and by installing:

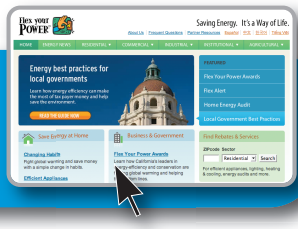
- solar roof panels
- skylights
- light sensors that naturally reduce lighting
- separate climate control zones
- low-emission windows that allow in maximum light but minimum heat

The U.S. Green Building Council has established a system to rate the environmental and economic impact of buildings. This Leadership in Energy and Environmental Design (LEED) Green Building Rating System certifies buildings as Silver, Gold, or Platinum. The rating is based on the number of points achieved in areas such as energy efficiency, water savings, content of building materials, and indoor environmental quality. In southern California, LEED certified buildings include the Audubon Center, The Getty Center, the Los Angeles Convention Center, and Metropolitan Water District's Diamond Valley Lake Visitor Center. What other LEED certified buildings can you find?

Energy & the Future

Continued...

CHECK THIS OUT:
Go online to www.fypower.com for more energy conservation tips.

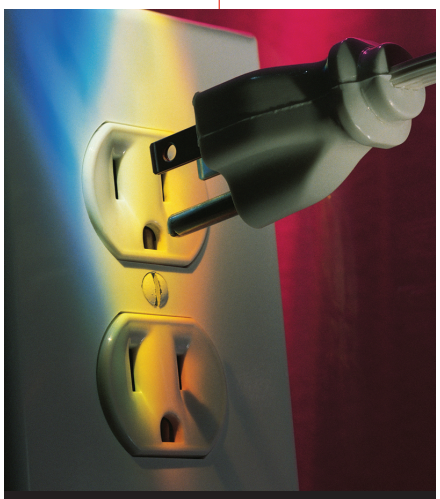


Solar and Other Renewables

Such renewable energy sources as solar, wind, biomass, and geothermal represent only a small part of our current energy supply, but we may need to depend on them much more in the future. By law, California utilities are required by 2020 to have 33% of the electricity they produce come from renewable resources. Using renewable sources provides several benefits:

- They are *sustainable*—meaning they will never run out.
- They add fewer pollutants to our air or water.
- They can reduce our dependence on energy from other countries.

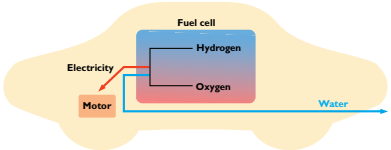
Advances are being made particularly in solar technology. Soon we may have solar cells placed in window panes or glass roofs, turning buildings into micro-power plants!



CONSERVATION

Fuel Cells

Fuel cell technology is often thought of as "space-age" technology because fuel cells have been successfully used in spacecraft to provide electricity. Now the technology can be used to power vehicles, homes, and businesses.



FUEL CELLS

In a fuel cell, no fuel is burned; instead, hydrogen and oxygen are combined to produce electricity. And the only emissions are heat and pure water vapor!

Unfortunately, the hydrogen needed for the fuel cell is very expensive, and it must be stored at high pressure and at an extremely low temperature. But fuel cell systems can include a "fuel reformer," which chemically changes another fuel—such as natural gas, methanol, even gasoline—to hydrogen to power the fuel cell. This process emits some pollutants but much less than using the original fuel.

Fuel cells are being used in some experimental vehicles. They are being designed for use in electric power plants as well as for buildings—hospitals, hotels, manufacturing plants, shopping centers. Eventually, small systems may be used in homes with natural gas supplying the fuel.

Conservation

Even with improved energy efficiency, each of us is still using more energy than we did in the past.

Not only do we have more "things" that use energy—at home and in businesses—but also many of our appliances continue to use energy even when they have been turned off. TVs, DVD players, audio systems, electric toothbrushes, cable boxes, computers—all are "energy vampires," draining electricity while they are just waiting to be used. This "standby power" can add up to almost 10% of residential use and can cost $100 per year per household.

How can you conserve energy?

To reduce the amount of energy we use, we all need to conserve energy—that is, use it wisely and not waste it. Turning off lights, lowering the water heater temperature, weather stripping around windows and doors, along with other conservation practices, can all help reduce our demand for energy. We'll save money, protect the environment, and increase our supply for the future.

REMEMBER: Go to surveys.bewaterwise.com to complete your Water and Energy Surveys.