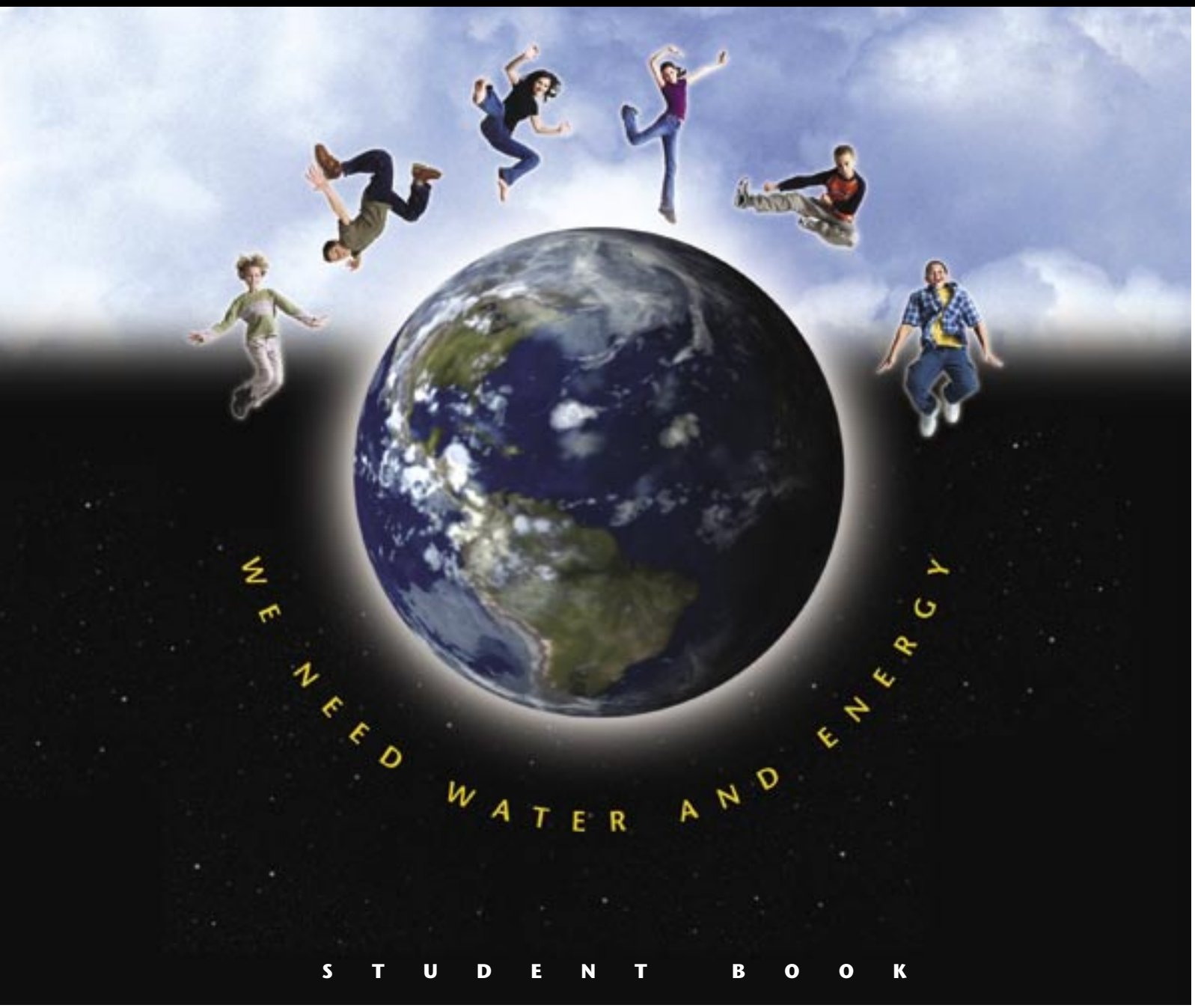
CONSERVATION CONNECTION

WATER & ENERGY USE IN



STUDENT BOOK

CONNECTION: Water, Energy, & Conservation Connection

Think About It...

- What would a day be like **without** water or energy?
- How have you personally used water and energy today?
- How do you think your use of water and energy compares to people's use 100 years ago?
- Is there enough water and energy to last forever?

Learn About It...

We need water and energy.

Water makes up about 65% of our bodies; we cannot live more than about a week without drinking water. And we need water to grow our food and make products that we use every day.

Energy is essential to life; we could not exist without the heat, light, and food that are created by the energy the sun provides. And, of course, we use energy in so many other ways, from cooking our food to running our cars.

We use **a lot** of water and energy every day. Is there a never ending supply? Well, yes...and no.

Water does fall from the sky, but it is not "new" water, just recycled water. The amount of water on Earth never increases or decreases. We have a fixed supply.

Heated by the sun, water on the ground in oceans, lakes, rivers, streams, and other areas evaporates; water vapor is also released from plants through transpiration. All this water vapor rises into the air, cools, and condenses into tiny droplets that gather and form clouds or fog. Finally, when the clouds meet cool air over land, precipitation in the form of rain, hail, sleet, or snow is triggered, and water returns to the land or sea. Thus, the water you use is the same water used by dinosaurs, early Native Americans, pilgrims, and your great grandparents.

Energy—which produces heat, light, or motion—comes from many sources, such as:

- fossil fuels (oil, natural gas, coal)
- the sun
- the wind

Some of our energy sources are *renewable*; they can keep on providing energy. For example, we expect the sun to keep shining and the wind to keep blowing. However, the energy sources that we depend on the most— oil, natural gas, and coal—are *non-renewable*. There is only a limited supply of these fossil fuels in the earth. Once they're gone, they're gone forever.

Our supply of water and energy meets our needs most of the time. But, in times of drought and during periods of high energy demand, we don't have enough water and energy. And the demand for water and energy is growing—every day—while our supply is decreasing as the population grows and as we find more ways to use these precious resources.

So how can we be sure we have enough for the future?

CONNECTION: Water Sources &

Think About It...

- Where does the water you drink and use every day come from?
- How much of the water from rain, and other precipitation, is available for us to actually use?

Learn About It...

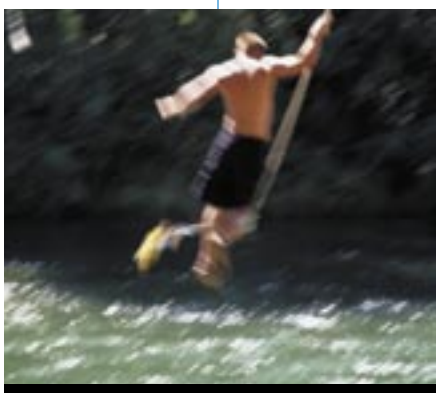
We get all the water we use from only two places – **on** the ground and **under** the ground.

Surface Water

Water on top of the ground is called surface water. We can see this water in:

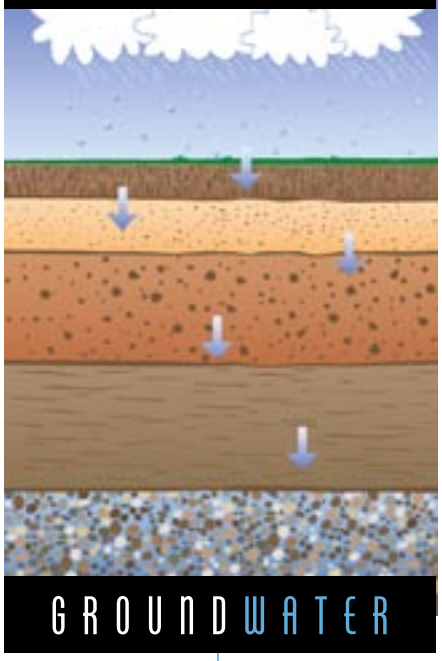
- lakes
- rivers
- streams
- oceans

How does the water get there? From rain, of course, and snow and sleet and hail. In California, about 200 million acre-feet of water falls from the sky every year; that's about the same as 200 million football fields each filled a foot deep with water. That's a lot of water. But only about 1/3 of that water actually ends up in rivers, lakes, and streams. The rest of it is either used by trees, plants, and animals or soaks into the ground or evaporates.



Groundwater

Water that soaks into the ground collects in basins called aquifers. These aquifers are not like lakes above ground. They are more like sponges, holding water in spaces between particles of sand and gravel and in cracks in rocks.



California has about 500 aquifers. Some are just the size of small pools; others are miles long and hundreds of feet deep. Some are just a few feet underground; others are thousands of feet underground. In all of them, the water gets there by soaking into the ground from:

- rain
- irrigation of crops
- river and stream beds
- recharge ponds where water is purposely spread on the ground to refill the aquifer.

That's how water gets into the ground. How do we get it out? Wells are drilled into the ground and electric pumps push the water up to the surface. But even though a lot of water is stored underground, we can't pump it all up. Some of it is too deep and too expensive to reach, and some of it is too salty or too polluted.

Even if we could, we shouldn't pump out all the groundwater because that can cause "overdraft," which causes problems, such as:

- The ground may compact and never be able to hold water again.
- Land may sink, causing buildings, roads, and pipelines to crack or break.
- Plants depending on the groundwater may die.

In California, during most years—

- about 2/3 of the water we use comes from surface water
- about 1/3 of the water we use comes from groundwater.

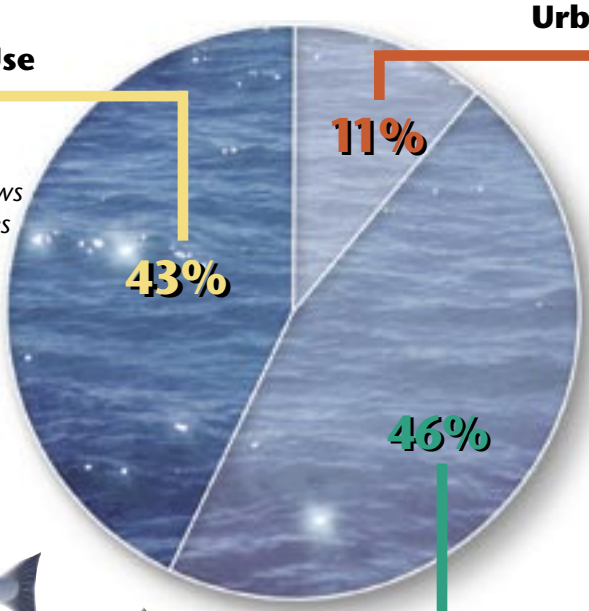
CONNECTION: Water Use &

Think About It...

- Besides personal uses, what else is water needed for?
- What do you think the most water is used for in

Learn About It...

In California, we use all the water we have available to use. We even bring extra water into California from other states. Here's where the water goes:



Agricultural Water Use

- **Crops** *(for people—California grows half the fruit and vegetables eaten in America—and for animals, e.g., alfalfa and corn)*
- **Animals** *(for drinking, e.g., a cow can drink 35 gallons a day)*

Urban Water Use

- **Homes** *(toilets, faucets, hoses, etc.)*
- **Businesses** *(shops, office buildings, restaurants, hotels, car washes, etc.)*
- **Industry** *(to make products, to cool machinery, to produce food, etc.)*
- **Public services** *(street cleaning, fire fighting, park watering, etc.)*

Environmental Water Use

- **Streams** *(to keep flowing)*
- **Plants and trees** *(to live)*
- **Wetlands** *(to stay healthy)*
- **Fish and other animals** *(for habitat and to drink)*
- **Coastal fresh water basins** *(to keep ocean water out)*

Supplying so much water to everyone that needs it is not easy or inexpensive.

About 75% of the rain and snow in California falls in the northern part of the State. But about 75% of the people live in the central and southern part of the state. So the water must be moved to where it is needed.

Continued....

Aqueducts—channels, pipelines, and tunnels—carry water across land and over or through mountains. The system of aqueducts in California moves more water farther than anywhere else in the world. All along the aqueducts are **reservoirs** that are used to store the water until it is needed. These reservoirs might be large storage tanks or lakes formed by dams.

This system of aqueducts and reservoirs allows us to live throughout California. And there are other benefits. Reservoirs are often used for recreation—like fishing, swimming, boating, and waterskiing. Also, reservoirs and the dams that create them can provide flood control by holding back water and can provide electricity by releasing water to turn turbine-generators.

So, what's the problem?

- **First, money.**
  It is very expensive to build and maintain aqueducts and reservoirs. Water must be pumped along the way and lifted over huge mountains. Great amounts of electricity are used, which costs a lot of money.

- **Second, the environment.**
  Taking water out of rivers and streams can have negative impacts on the plants and animals that depend on them and on the people that enjoy them. Water companies try to affect the environment as little as possible. But even so, large amounts of land are taken up by aqueducts, pumping plants, dams, and reservoirs. And when dams are built to form reservoirs, land is flooded, which obviously affects the people, animals, and plants that live there.

Think About It...

- If there's only a fixed supply of water, how can we get more?
- Do you waste any water?

Learn About It...

We can't manufacture water. The surface water and groundwater that we have are all that we'll ever have. But we can stretch our supply.

Recycling

Water that goes down the drain ends up at a wastewater treatment plant. At these plants, water goes through a series of cleanings and treatments. Some of this "reclaimed" water is put back into the environment—rivers, lakes, the ocean, the ground. But some of it, after even more cleaning, is recycled—that is, it is delivered to people to use.

WATER RECYCLING

DESALINATION

California has been using reclaimed water for irrigation for about 70 years. Now recycled water can be used for all purposes except drinking:

- to water school grounds, cemeteries, golf courses, nurseries, parks, greenbelts
- to irrigate crops and pastures
- to manufacture products and cool industrial machinery
- to make snow, fight fires, clean streets
- to flush toilets
- to recharge groundwater

Using recycled water for these purposes saves large amounts of fresh water. But reclaiming water to recycle it is expensive. First, of course, money must be spent to clean the water. But then we must also build separate pipelines, pumps, and storage reservoirs for the recycled water.

However, as more facilities are built and more recycled water is used, the cost of recycled water will decrease. Using more recycled water can help California maintain a reliable supply of fresh water.

Desalination

Where is most of the surface water on the earth? In the ocean, of course. But ocean water is too salty to drink. We can, however, take the salt out of the water in a process called *desalination*.

California already has several desalination plants. One plant on Santa Catalina Island, off the coast of Southern California, produces 25% of the island's drinking water. The desalination plant in the Monterey Bay area is the largest in the state.

Because California is next to the ocean, plenty of salt water is available. However, turning seawater into fresh water is much more expensive than other methods of supplying fresh water. Money must be spent not only to build and maintain the plants but also to pay for the huge amounts of energy it takes to remove the salt. Then the salt must be disposed of. It is often put back into the ocean, where it may upset the delicate ecological balance of the marine environment.

As technology improves and as we need more water to meet our growing demand, desalination may not be so expensive.

Continued....

Conservation

The best way to stretch our water supply is to conserve water. Conservation means not wasting water and using water efficiently.

Californians are familiar with conservation. California has always had droughts—long dry periods without much rain or snow. The longest drought in California lasted 60 years! During these times, people had no choice but to use less water. But if we used less water *every day,* we could:

- make our water supply go further
- reduce costs for distributing water
- benefit the environment by taking less fresh water out and putting less wastewater back in.

Water can be conserved in homes, on farms, at businesses, and in industries—through both improved technology and non-wasteful practices.

New technologies include:

NEW TECHNOLOGIES

CONSERVATION PRACTICES

- faucets and showerheads that put out fewer gallons per minute
- toilets that use a lot less water with every flush
- recycling systems for water used in car washes, laundromats, amusement parks, factories, power plants
- clothes washers and dishwashers that use 40% less water
- drip irrigation systems that put water only where it is needed
- evapotranspiration (ET) systems that monitor the evaporation from soil and the transpiration from plants to determine the exact amount of water lawns and plants need
- irrigation systems that return run-off from the bottom of a field to be used again.

Conservation practices include:

- turning water off when brushing your teeth or washing dishes
- taking shorter showers
- keeping drinking water in the refrigerator instead of running water until it becomes cool
- planting low-water-use plants
- turning off sprinklers when it's raining
- using a broom instead of a hose to clean pavement.

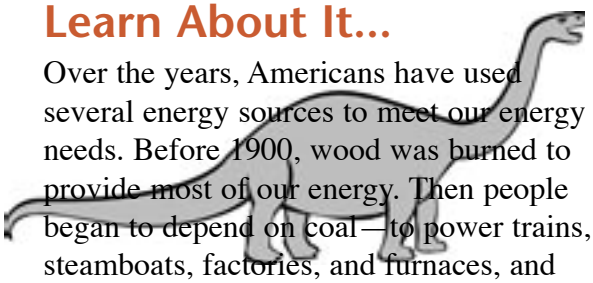
Conservation—with both water-saving devices and practices—would save millions of gallons of water, as well as millions of dollars, every day.

CONNECTION: Energy Sources &

Think About It...

- Where does the energy you use every day come from?
  - Are the energy sources we depend on the same as those in the past?

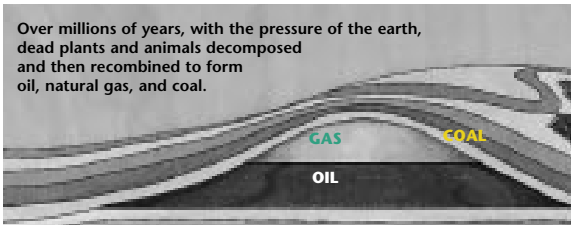
Learn About It...



Over the years, Americans have used several energy sources to meet our energy needs. Before 1900, wood was burned to provide most of our energy. Then people began to depend on coal—to power trains, steamboats, factories, and furnaces, and eventually to generate electricity. Today, the United States—and California—rely on a variety of resources to meet our energy requirement, but fossil fuels supply the majority of our energy.

Fossil Fuels

Petroleum (oil), natural gas, and coal are fossil fuels. Millions of years ago, when the plants and animals that lived on earth died,



they were covered with water, mud, and rock. Over millions of years, with the pressure of the earth, the dead plants and animals decomposed and then recombined to form oil, natural gas, and coal. These fuels are rich in stored up energy. When we burn fossil fuels, the stored energy is released as heat.

Oil, a thick, brown liquid, is found under land and water. We drill holes to find the oil and then pump it out of the ground. Most oil is used to make gasoline and other vehicle fuels. But it is also used to make heating oil to burn in furnaces and to make petrochemicals, which are used to make such products as plastic, fabrics, and cosmetics.

Natural gas is an invisible, odorless gas that is sometimes found along with oil. Drills are used to reach the natural gas, which then rises through pipes to the surface. Most natural gas is delivered to homes and businesses through underground pipes and is used in furnaces and stoves. Natural gas is also used in power plants to generate electricity and, like oil, used to make chemicals used in such products as ink, glue, and nylon.

Coal, which looks like rough black rocks, must be dug out of the ground. The primary use of coal is to generate electricity in power plants, though it is also burned in some buildings and factories to provide heat.

Fossil fuels have been fairly easy to obtain and to use. We have established systems for using them in our cars, homes, factories, and power plants. In California, we use them to generate more than 50% of our electricity. But there are disadvantages to using fossil fuels.

- First, fossil fuels are nonrenewable. They are becoming more difficult to find and recover, and once they are used up, they cannot be replaced.
- Second, the use of fossil fuels causes environmental problems. Whether burned in power plants or in our cars, fossil fuels release harmful pollutants into the air, causing smog and other air pollution problems.

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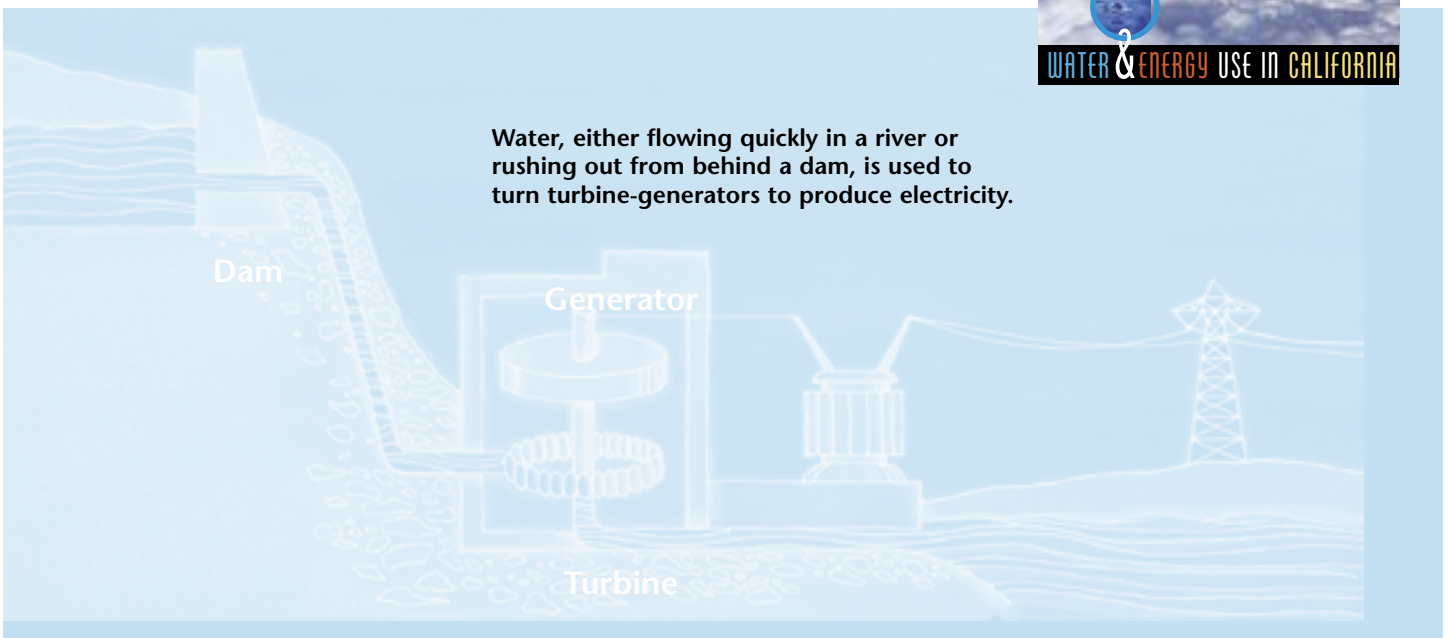


HYDROELECTRIC POWER PLANT

Hydropower

Hydro means water. So *hydropower* means "water power." Water, either flowing quickly in a river or rushing out from behind a dam, is used to turn turbine-generators to produce electricity. Hydropower is an important source of electricity for the nation and for California. About 23% of the total electricity in California is from hydropower.

Some hydroelectric power plants are both producers and consumers of electricity. Here's how it works. During times when a lot of electricity is being used—such as on hot summer days—water is released from a dam at a high elevation to generate electricity. The water ends up in a reservoir at a lower elevation. Then at night, when less electricity is needed, the water is pumped from the lower reservoir back to the higher reservoir to be used again.

Hydropower is a renewable energy source, as long as rivers and streams continue to flow. But there are only so many places with water that we can use for hydropower.

Nuclear Power

Nuclear energy comes from the tiny dense core of the atom—the nucleus. In a nuclear power plant, the nuclei of atoms of uranium, a heavy mineral, are split apart. As each one splits, it releases neutrons, which travel at high speed, hitting other atoms, splitting them apart, causing a chain reaction. This splitting of millions of atoms—called fission—creates a lot of heat, which is then used to make steam to turn turbine-generators in a nuclear power plant.

There are two nuclear power plants in California, producing about 16% of our electricity.

Uranium, the fuel for nuclear fission, is nonrenewable; however, it is a common, inexpensive mineral found worldwide. The primary problem with nuclear energy is that the material left over after the atoms are split apart is radioactive, which means that it gives off radiation that can be harmful to us. Thus, the waste material must be stored carefully since it remains radioactive for hundreds of years.

Continued....

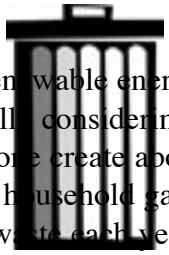
Biomass

Bio means *life*, so *biomass* refers to organic waste material, such as:

- lumber waste from harvesting trees
- plant waste from agricultural crops
- trash and garbage from our homes.

Biomass is burned in power plants to produce heat, which is used to create steam to turn turbine-generators to produce electricity.

In California, there are about 100 waste-to-energy power plants that contribute about 2% of our total electricity.

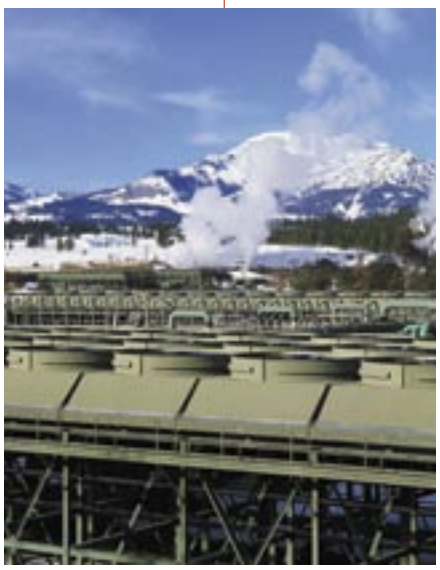


Biomass is a renewable energy source, especially considering that Californians alone create about 45 million tons of household garbage and industrial waste each year; that's nearly 3,000 pounds every second! Burning waste material does, however, release pollutants into the air.

Geothermal

Geothermal energy comes from heat inside the earth. We can see the results of that heat in volcanoes, geysers, and hot springs. The heat underground often heats water or creates steam that we can tap to generate electricity in power plants. The hot water can also be used directly by piping it through buildings to heat them.

California has more than 40 geothermal power plants that produce almost 5% of our total electricity. Geothermal energy is considered to be renewable since heat from the core of the earth is expected to last indefinitely. However, geothermal energy can be tapped only in areas where the heat is close enough to the surface. Also water that is removed must be reinjected into the earth so that the land doesn't sink and the source doesn't "dry up."



GEOTHERMAL POWER PLANT

WIND FARM

Wind

People have been using wind for energy for thousands of years. Wind has powered sailboats, pumped water from wells, and turned grinding stones to mill wheat or corn. Today, wind also turns wind turbines to make electricity. A wind turbine is similar to a child's pinwheel or the propeller of an airplane. The giant blades are connected to a shaft, which in turn is connected to a generator that produces electricity. Often, hundreds of wind machines are grouped together in wind farms in particularly windy areas.

In California, more than 14,000 wind turbines produce about 1% of our electricity.

Wind is, of course, a renewable energy source—but it's not reliable. Winds must blow at a constant high speed to generate electricity, and that condition is not found in very many places and never all year long.

Continued....

Solar

Solar energy—energy from the sun—is the principal source of all the earth's energy. Sunlight heats the land and warms the water. It causes the winds to blow and the rains to fall. It allows plants to grow, providing the stored energy on which all animals live. Even fossil fuels are "stored sunshine." Without the sun, the earth as we know it could not exist. But the energy source that powers the planet can also power the many machines that have become a part of our lifestyle.

There are basically two different ways in which we can capture and use the sun's energy.

- Thermal heat – The sun's heat can be used to heat water, which can be used directly or used to generate electricity.
- Photovoltaic cells – These devices actually convert sunlight into electric current.

Thermal Heat

The intense energy of the sun has long been used to heat water. Pioneer families had homes equipped with solar water heaters. Today, homes across the nation have solar hot water heaters installed. In these systems, cold water from the home's regular water line is pumped to a thermal collector on the roof, where the sun's heat warms the water. The heated water then flows into the regular hot water tank. These systems are used to heat water for homes and businesses and for swimming pools.

Solar heat can also be used to heat water in power plants. At a solar thermal power plant, huge mirrors—solar collectors—are used to focus sunlight onto a tank filled with water or other fluids. The sun heats the fluid to a very high temperature, creating steam to power turbine-generators to produce electricity. California has a few such power plants located in the Mojave Desert.

SOLAR POWER PLANT

SOLAR CELL PANELS

Photovoltaic Cells

Photovoltaic cells—or PVs or, more commonly, solar cells—are composed of thin layers of silicon and other materials. When sunlight strikes a solar cell, chemical reactions release electrons, generating a little electric current. We find solar cells in calculators, camera light meters, sidewalk lighting systems, and freeway phones for stranded motorists. But solar cells, put together into solar panels or modules, are now also providing electricity for homes and businesses.

Electric utilities can use photovoltaic plants to supplement the electricity they provide. A facility in central California provided enough power for about 2,500 homes.

Now, solar cells are appearing on rooftops of individual homes and businesses that have clear access to the sun for most of the day. Some of these solar panels are simply attached to the roof; others are actually part of the roofing material. In some cases, a PV system can be connected to the electric utility's system. Then, if the solar panels are providing more power than the home or business uses, the extra electricity goes to the utility for other people to use—and the home or business's electricity meter actually spins backwards!

CONNECTION: 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!

What is all that energy used for?

Businesses 15%

- offices
- hotels
- restaurants
- stores
- schools
- etc.

Transportation 38%

- cars & trucks
- airplanes
- trains
- ships
- etc.

Homes 17%

- heating
- lighting
- cooking
- running appliances
- etc.

Industry 30%

- generate electricity
- make products
- manufacture steel
- produce & package food
- pump water
- etc.

In California, we use a lot of energy for transportation; in fact, California ranks first in the nation in gasoline consumption! 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 camera phones.

A lot of energy is used to generate electricity, which we then use in our homes and businesses. California generates about 3/4 of the electricity we use. The remaining 1/4 we get from other states. Natural gas is imported to burn in power plants. And electricity generated at hydroelectric plants in the Pacific Northwest—Oregon and Washington—is delivered across power transmission lines.

Continued....

So what's the problem?

First, supply.

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

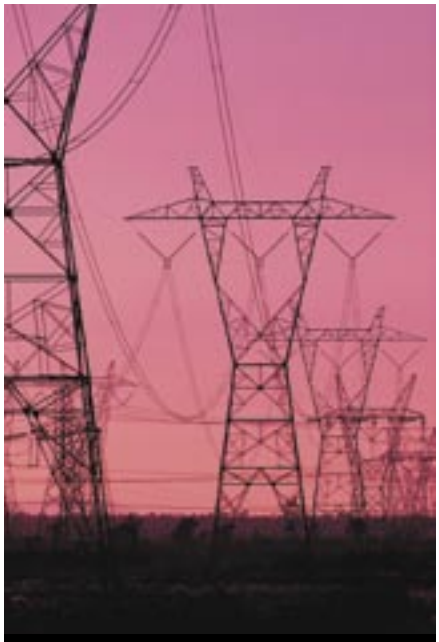
In 2001, the "energy crisis" caused "rolling blackouts" throughout California, meaning that various areas were without electricity for periods of time. Along with other factors, the shortage of electricity was caused by:

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

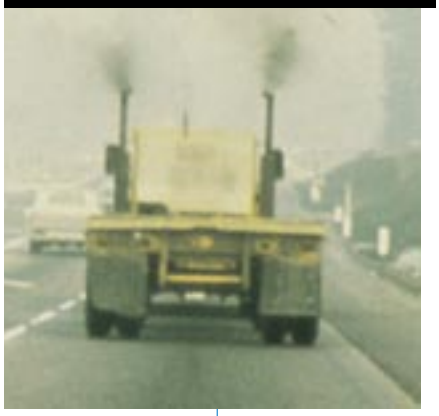
Second, the environment.

Most of our energy comes from burning fossil fuels, which emit pollutants into our air. In California, and other places, these pollutants cause smog. In other parts of the country, fossil fuels also contribute to acid rain; and in the world they may be causing global warming.

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



SUPPLY



ENVIRONMENT

POPULATION

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 2004, our population was approximately 35 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?

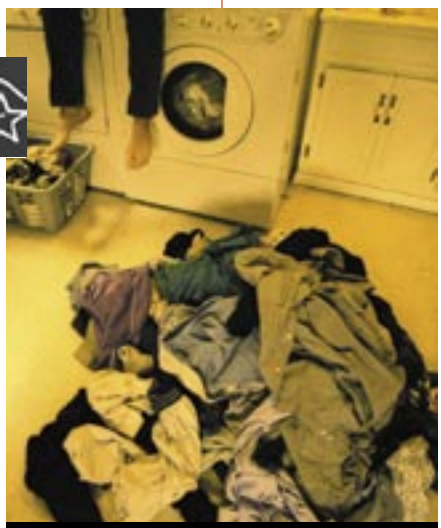
Learn About It...

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 EPA and the U.S. 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.

Other improvements in technology include:

- Smarter thermostats that can cut heating and air-conditioning costs up to 33%. Using a micro-computer, 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

Continued....

Solar and Other Renewables

Such renewable energy sources as solar, wind, 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. Using these sources, as well as other renewables, provides several benefits:

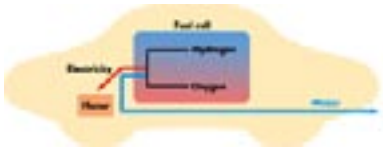
- They are sustainable—meaning they will never run out.
- They do not add pollutants to our air or water.
- They can reduce our dependence on energy from other countries.

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 space craft 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, security systems, cable boxes, computers—all can drain electricity when 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.

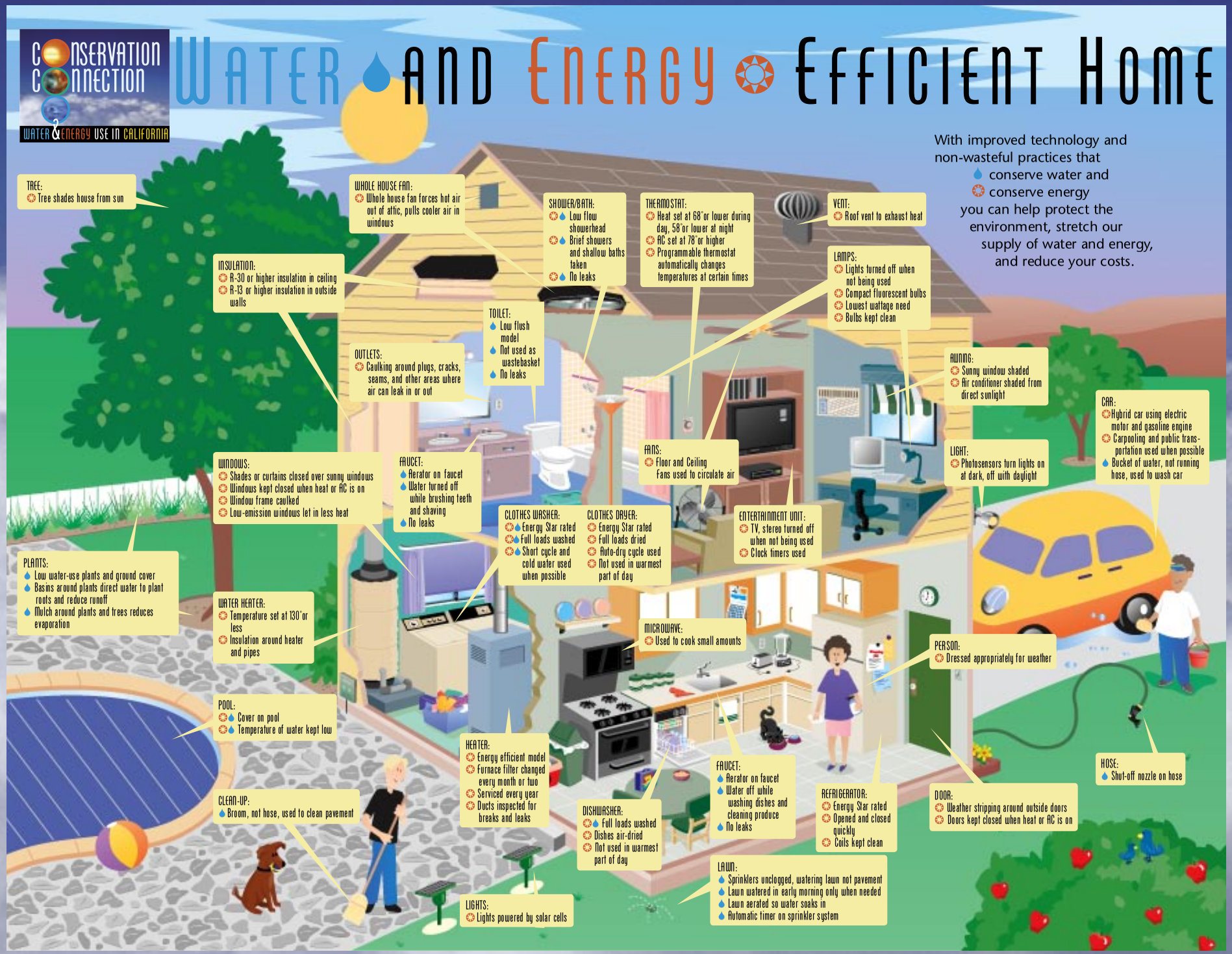
To reduce the amount of energy we use, we all need to conserve energy—that is, use it wisely and not waste it. Turning off lights, lowering the water heater temperature, weather stripping around windows and doors, along with other conservation practices, can all help reduce our demand for energy. We'll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

Water and Energy Efficient Home

Conservation Connection
Water & Energy Use in California

With improved technology and non-wasteful practices that
- conserve water and
- conserve energy

you can help protect the environment, stretch our supply of water and energy, and reduce your costs.



Central Basin Municipal Water District

West Basin Municipal Water District