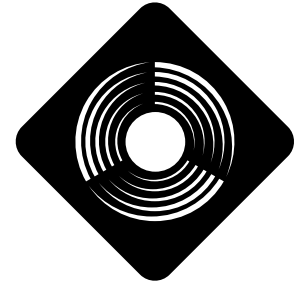


# SOLAR AND ELECTRIC CARS

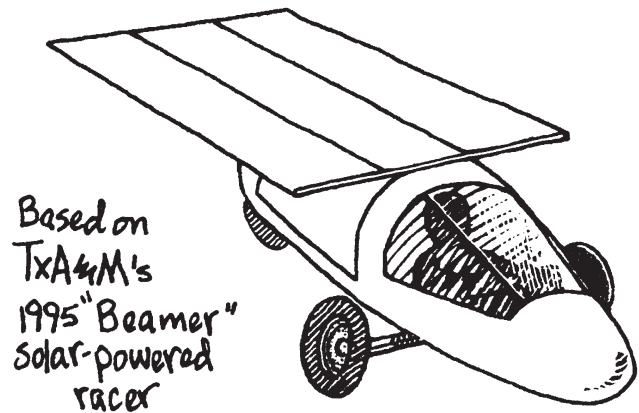


**RENEWABLE ENERGY**  
THE INFINITE POWER  
OF TEXAS

**FACT SHEET 7** A RESOURCE FOR CLASSROOMS AND TEACHERS

## Highlights

- ◆ Renewable energy for transportation
- ◆ Solar-powered model cars: The Junior Solar Sprint Project
- ◆ Electric- and gasoline-powered cars and air pollution
- ◆ Compare the doughnut energy used



Based on  
TxAM's  
1995 "Beamer"  
Solar-powered  
racer

**POWERED BY THE SUN** A solar-powered car has a panel of photovoltaic cells that convert sunlight into electricity.

## Renewable Energy and Transportation

Renewable energy was used for transportation long before any other energy source.

For hundreds of thousands of years, humans used only their own energy to get around. Later, they learned to use animals for this. People and animals get their energy from food. Since the energy in food comes from sunlight, food is a form of renewable energy.

We eat plants, and plants are sometimes called biomass. Biomass can also be used to produce biofuels, like ethanol, to power our automobiles.

A few thousand years ago people discovered that they could use the wind to move them around. Think about how fast sailboats can move. Wind is another form of renewable energy.

But less than 200 years ago, people started using fossil fuels (such as coal and oil) for transportation. These fuels can't last forever, so they are not renewable. And they cause air pollution.

But with new technology, there are new ways we can use renewable energy to get around and reduce air pollution.

# Model Solar Cars

Model solar-powered cars have some parts that are similar to a family car, but the power system is very different. Here is how they work:

- a solar panel converts light energy from the sun into electrical power
- that power is transmitted by a wire to the motor, causing the drive shaft to turn
- the drive shaft causes the wheels to spin
- the spinning wheels move the car forward

# Solar Race Cars

Since a full-sized race car's solar panel is much larger than a model car's, it can capture more solar energy and produce more electricity. Solar race cars have a battery bank that stores some of the sun's energy while it is stopped or driving slowly.

If the car is driving fast, all of the power from the solar panel is used by the motor. In some

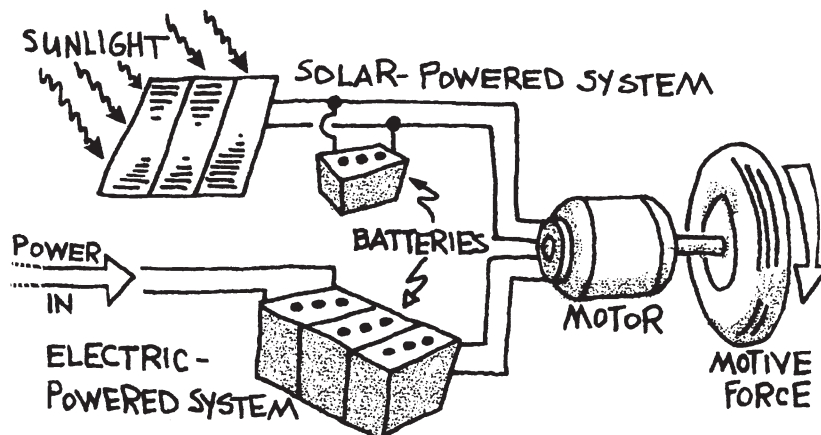
## THE JUNIOR SOLAR SPRINT PROJECT

In this project, students form small teams to design and build model solar-powered cars. Teams then compete to determine the fastest car. For more information, check the internet at [www.txses.org/tjss](http://www.txses.org/tjss) or send an e-mail to [solarsprint@txses.org](mailto:solarsprint@txses.org)

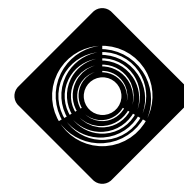
cases, the car may need more power than the panel can provide. Then the motor uses energy stored in the batteries.

# Electric Cars

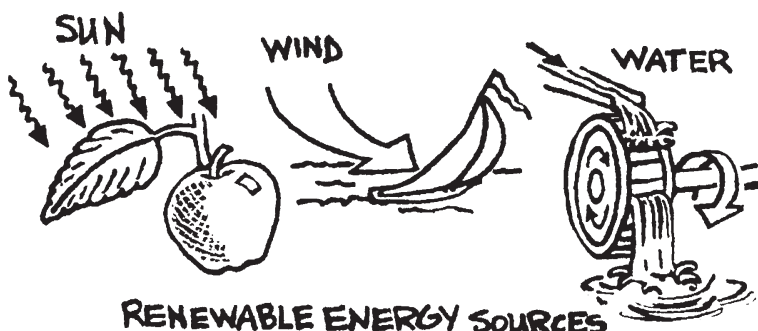
Electric-powered cars are very similar to solar-powered cars. But instead of carrying a solar panel for energy, electric cars plug into an electric power outlet, similar to the ones in your classroom or at home. The electricity from the outlet can come from renewable energy sources.



**SOLAR AND ELECTRIC-POWERED CARS** Sunlight or electricity can be used to power a car's motor instead of gasoline or diesel.



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### RENEWABLE ENERGY SOURCES

**CLEAN POWER SOURCES FOR ELECTRIC CARS** Many renewable energy sources can be converted to electricity to power electric cars.

Because electric cars don't have to carry the fragile solar panels, they can be larger and can carry more people.

Just like solar cars, electric cars don't burn gasoline, so the motor does not produce air pollution. If they use power from nonpolluting power plants, like wind turbine farms, then they don't produce any pollution.

If you drove an electric car, you would recharge its battery bank overnight while you slept.

## Gasoline, Cars and Smog

Gasoline-powered cars are much less efficient than electric cars. They also produce air pollution, such as smog. Air pollution can be harmful to your health. It also can make the air look dirty and make it hard to see pretty sights like city skylines and mountain ranges.

### LET'S COMPARE THE ENERGY USED

We can compare the amount of energy used by four kinds of transportation: a bicycle, a solar car, an electric car and a gasoline-powered sport utility vehicle. There are a number of ways to measure energy. For this comparison, we'll use doughnuts.

1. A 60-pound girl, riding her bike at 10 miles per hour burns up 24 kilocalories per mile. A typical glazed doughnut provides her body 245 kilocalories. About how much doughnut-energy does she burn per mile?
2. The fastest solar car is almost as efficient as the girl on her bike. It uses 30 kilocalories per mile. How much doughnut-energy does it use?
3. One of the most efficient electric cars you can buy is the General Motors EV-1. Since it can store more energy than a solar car, it doesn't have to be as efficient as the solar car. The EV-1 would use 214 kilocalories per mile. How much doughnut-energy would it use per mile?
4. One of the least efficient cars you can buy is the General Motors Chevy Suburban. A Suburban uses 2,729 kilocalories per mile. How much doughnut-energy would it need per mile?

#### ANSWERS

1. The girl burns about one-tenth of a doughnut per mile.
2. It uses about one-eighth of a doughnut per mile.
3. It would need about nine-tenths of the doughnut.
4. About 11 doughnuts!



60-LB GIRL ON BIKE



SOLAR CAR



ELECTRIC CAR

GMC SUBURBAN



DOUGHNUTS REQUIRED TO TRAVEL ONE MILE  
(1 DOUGHNUT = 245 KILOCALORIES)

### ANSWER TO "LET'S COMPARE THE ENERGY USED"

It takes far more energy to run a gasoline-powered car than a solar- or electric-powered car.

## Resources

### FREE TEXAS RENEWABLE ENERGY INFORMATION

For more information on how you can put Texas' abundant renewable energy resources to use in your home or business, visit our website at [www.InfinitePower.org](http://www.InfinitePower.org) or call us at 1-800-531-5441 ext 31796.

Ask about our free lesson plans and videos available to teachers and home schoolers.

### ON THE WORLD WIDE WEB:

Junior Solar Sprint Project  
[www.nrel.gov/education/natjss.html](http://www.nrel.gov/education/natjss.html)

Solar Race Events  
[www.formulasun.org](http://www.formulasun.org)

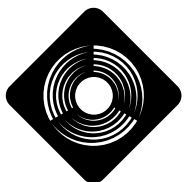
High School Solar Car Race  
[www.winstonsolar.org](http://www.winstonsolar.org)

Texas Natural Resource Conservation Commission Air Quality Lesson Plans and Data  
[www.tnrcc.state.tx.us/air/monops/lessons/lesson\\_plans.html](http://www.tnrcc.state.tx.us/air/monops/lessons/lesson_plans.html)

New Car Fuel Economy  
[www.fueleconomy.gov](http://www.fueleconomy.gov)

Rocky Mountain Institute's Hypercar  
[www.rmi.org/sitepages/pid18.asp](http://www.rmi.org/sitepages/pid18.asp)

Fun Energy Conversions  
[www.wattsonschoools.com](http://www.wattsonschoools.com)



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