



# Is a **HYBRID CAR** in Your Future?



*Judy Neuerburg, VEC administrative assistant, compares the Honda Insight Hybrid's 64 horsepower engine with two horsepower (background) from a prior era.*

The news is out. Hybrid electric vehicles are taking to the streets in ever-increasing numbers. Almost everyone has read about or seen one of the new super-efficient cars on the road. Vernon Electric members were able to view a hybrid, the Honda Insight (on loan from Honda Motorwerks of La Crosse), at the cooperative's Open House in October.

## What Makes it a "Hybrid" Vehicle?

A hybrid is any vehicle that combines two or more sources of power. A gasoline-electric hybrid car is just that—a cross between a gasoline and an electric car.

The two fuel sources in a hybrid car can be combined in different ways. A **parallel hybrid** has a fuel tank that supplies gasoline to the engine. It also has a set of batteries that supplies power to an electric motor. Both the gasoline engine and the electric motor can turn the transmission at the same time—the transmission turns the wheels. As a result, both can provide propulsion to the vehicle.

In a **series hybrid**, the gasoline engine turns a generator that can either charge the batteries or power an electric motor that drives the transmission. The gasoline engine never directly powers the vehicle.

## The Hybrid's Evolution

In order to be useful to the driver, a car must meet certain minimum requirements. It must drive at least 300 miles between refueling, be refueled quickly and easily, and keep up with the other traffic on the road.

A gasoline-powered car meets these requirements, but it produces a relatively large amount of pollution and generally gets poor gas mileage. Did you know that most cars traveling at 60 mph along the freeway require less than 20 horsepower? Cars are built with 200 horsepower so you can "floor it." That is the only time you use that power; the rest of the time you use considerably less

power than what you have available. Most drivers use the peak power of their engines less than 1 percent of the time!

A hybrid car uses a much smaller gasoline engine—one that is sized closer to its average power requirement rather than to the peak power. Using lighter parts, reducing the number of cylinders, and operating the engine closer to maximum load improves efficiency in a smaller engine.

## Hybrid Efficiency

Today's hybrids use many other tricks to increase fuel efficiency. Whenever you step on the brake pedal, the brakes remove the energy from the car and dissipate it in the form of heat. A hybrid can capture some of this energy and store it in the battery to use later. It does this by using "regenerative braking." Instead of using just the brakes, the hybrid uses its electric motor to slow the car. In this mode the electric motor acts as a generator and charges the batteries while the vehicle is slowing down.

A hybrid does not need to rely just on its gasoline engine all of the time. Because it has an alternative power source—the electric motor and batteries—the hybrid sometimes can turn off the gasoline engine, for example, when the vehicle is stopped at a red light.

Hybrid cars use low-rolling resistance tires that are both stiffer and inflated to a higher pressure than conventional tires. As a result they cause about half the drag as regular tires. Advanced aerodynamics using a teardrop design is also used to reduce drag.

Reducing overall weight is critical to optimizing gas mileage. A composite material like carbon fiber or lightweight materials like aluminum and magnesium are used to reduce weight.

*(Continued on page 28 ►)*