

NOVA: The Car of the Future

Global Issues

hydrogen fuel

1. What type of emissions do hydrogen fuel cells create? *(Water vapor is the only emission.)*
2. What are the dangers of using hydrogen as a fuel? *(Hydrogen is an extremely volatile element.)*
3. What would be the challenge for the United States if it were to convert to hydrogen-fueled vehicles? *(Developing an infrastructure for hydrogen fuel.)*

ethanol fuel

4. Why do critics claim it takes more energy to make ethanol than the amount of energy you get out of it? *(While ethanol is a cleaner fuel to burn than gasoline, critics claim that fossil fuels are used not only to produce the fertilizer and pesticides used in cultivating the corn, but also to ferment the corn sugar needed to make the ethanol.)*
5. What is cellulosic biomass, and why is it important in the quest to use ethanol as an alternative fuel? *(Cellulosic biomass is the woody structure that supports plants. It is important because it could someday be harvested and manufactured without any burning of fossil fuel.)*
6. How are bacteria involved in the production of ethanol? *(One species of bacteria tears the cellulose apart to release the sugar; another turns the sugar into ethanol.)*

vehicle engineering

7. How much of the energy stored in gasoline is lost through friction? *(Almost half the energy of an engine's combustion chamber is lost to friction as pistons rub against the walls of the cylinder.)*
8. Does a car have to be heavy in order to be safe? Explain. *(No. Carbon-fiber composite cars can be lightweight while still being strong.)*
9. Why would it be difficult for large automakers to produce cars with carbon-fiber bodies? *(Carbon fiber is expensive, and molding it into car parts is labor intensive.)*

hybrid and electric cars

10. How does a hybrid car work? *(A hybrid relies on both gasoline and electricity. When the car idles, it uses electricity. At speeds where it is most efficient, the car switches to gasoline. The batteries are being charged while the car is using gasoline.)*
11. How can solar energy help fuel hybrid cars? *(Energy from the sun can be collected by solar cells and stored in batteries.)*
12. Name one drawback of all-electric vehicles. *(All-electric vehicles require a lot of batteries to go long distances on a single charge.)*