**Making Stuff Cleaner**

**Electric Cars**

1. Describe two ways that race cars produce waste.
2. How is plant photosynthesis and human respiration an example of a *zero waste world*?
3. The 1909 Baker shown by Jay Leno is an early example of an electric car. What was its range? How fast did it go? How did the users recharge it?
4. What advantage does gasoline have over electricity for cars?
5. Label the **electrodes (x2), electrolyte,** and **circuit** in this battery diagram.



1. What is the purpose of each of the components of a battery?
	1. Electrodes –
	2. Electrolyte –
	3. Circuit –
2. What is the electrode and electrolyte in a typical car battery? Why can’t these batteries be used for anything other than ignition and running the car’s accessories?
3. What kind of batteries do the Killacycles use?
	1. What advantage does this type of battery have over lead-acid ones?
	2. What are the disadvantages of this type of battery?

**Hydrogen Fuel Cells**

1. What is the chemical reaction that occurs inside a hydrogen fuel cell?
2. Environmentally, what is the big advantage of using hydrogen as a fuel source in cars?
3. List the three disadvantages of hydrogen vehicles.
4. What property do heated chicken feathers have that might be useful in developing hydrogen cars?

**Biofuel**

1. Car emissions have improved significantly since the early 20th century. What is the primary air pollutant released by cars now?
2. Explain why burning biofuel in car engines would be *carbon neutral* compared to burning gasoline from oil.
3. What plant source have biofuels (such as biodiesel) traditionally been made from? What do the newer biofuels use as a plant source?

**Bioplastics**

1. What are tires actually made from?
2. How does using orange oil in tires help to reduce their petroleum footprint?
3. What does the Ford Fiesta use in place of petroleum in its seat cushions?
	1. How much plastic is in a typical car?
4. Why is plastic ending up in the landfill such an environmental problem?

**Upcycling**

1. What is thermoplastic? What products are made of it?
2. Plastic can be converted to carbon nanotubes when it is heated in the right conditions. What special properties do carbon nanotubes have?
3. What is a potential application for the nanotubes?
4. What is the biggest source of carbon-based waste and pollution?
5. Explain how waste-to-energy plants work.
6. A large battery can be created inexpensively by using an aluminum smelter. What is the potential benefit of doing this?
7. Why is it a problem that power plants are built so far away from large population centers?
8. How big of a Bloom Box would be needed to generate electricity for a house?

…for an office building?

1. What advantage does the aspen leaf-shaped photovoltaic cell have over regular ones?
2. How is the energy produced by artificial photosynthesis stored?