Study Guide for Unit 30:
Biofuels

Reading - Slides - Audio

Read the following sections of Unit 30 (Biofuels):

- *Biofuels and Biomass*
- *The Pros of Biofuels*
- *The Cons of Biofuels*

Biofuels, Biomass, and Advantages and Disadvantages of using Biofuels

1. What are biofuels?

2. What is biomass?

3. What kinds of biomass do people burn, both today and in the past?

4. Why do most people burn biomass right now in many parts of the world?

5. What is the major problem with burning biomass?

6. What is the major advantage that biofuels have over other kinds of sustainable energy?

Read the following sections of Unit 30 (Biofuels):

- *Biofuels and Biomass*
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Advantages and Disadvantages of using Biofuels II

7. If we power our vehicles using biofuels, will our vehicles be adding greenhouse gasses to the atmosphere or is powering our vehicles using biofuels “carbon neutral”?

8. Which creates MORE air pollution (gasses and particles), burning biofuels, or burning oil or natural gas?

9. Does growing crops for biofuels reduce our food supply?

10. How could relying on biofuels instead of oil to power our vehicles increase the amount of habitat destruction?

11. Which uses MORE water, producing a liter of biofuel or a liter of oil or natural gas?

12. Which has more energy in it and thus can make a vehicle go farther, a liter of biofuel or a liter of gasoline?

13. Which are better for making biofuels, grasses or trees?

14. How does growing biofuels contribute to air and water pollution?

15. How can growing biofuels damage soil?

16. Earlier we learned about EROEI (Energy Returned on Energy Investment). A high EROEI for biofuels would mean that there is a lot more energy in the biofuel we produce than the energy used to grow, harvest, and make the biofuel. What is the EROEI of the biofuels that are being used in large amounts right now? Is it efficient? Is it worthwhile?

Read the following sections of Unit 30 (Biofuels):

- *Diesel vs. Gasoline*
- *Biodiesel*

Biodiesel

17. What is diesel? How is it different from gasoline?

18. What plants can biodiesel be made from?

19. What are the biggest advantages of biodiesel over other forms of sustainable energy?

20. Is biodiesel biodegradable?

21. About what percentage of biodiesel is made from living matter (bio), and about what percentage is from petroleum (oil)?

Read the following sections of Unit 30 (Biofuels):

- *Ethanol (Bioethanol)*

Ethanol

22. What are the biggest advantages of biodiesel over other forms of sustainable energy?

23. Is ethanol common in our gasoline?

24. Why is ethanol put in our gasoline?

25. About how much of our gasoline is typically ethanol?

26. How much ethanol can be put into gasoline? Can you drive a car on pure ethanol?

27. Which has more energy in it and thus can make a vehicle go farther, a liter of ethanol or a liter of gasoline?

28. Can ethanol power large trucks?

29. Can ethanol power airplanes?

30. What crops and other kinds of plants can be used to make ethanol easily through fermentation?

31. What crops and other kinds of plants can be made into ethanol, but only with difficulty using processes that are LESS efficient than fermentation?

32. Which of the following statements is true? "The chemical process to make ethanol from biomass via fermentation is fairly easy and efficient (it does not use a lot of energy to make the biofuel)." OR
"Ethanol can be made using other chemical processes, but right now, they are much less efficient than fermentation. In other words, a lot more energy and effort have to be used and it makes much less ethanol (biofuel) than fermentation."

Read the following sections of Unit 30 (Biofuels):

- *How to grow biofuels*
- *Algae: Even Better Biofuel*

Marginal Land and Wild Grasses, and Biofuel from Algae

33. What is marginal land?

34. What are the advantages of harvesting wild grasses from marginal land to make biofuels like ethanol?

35. How are algae different from plants? How is growing algae for biofuel different from growing plants?

36. What kinds of biofuel can algae be used to make: biodiesel, ethanol, or both?

37. What are the advantages and disadvantages of growing algae to make biodiesel?

Read the following sections of Unit 30 (Biofuels):

- *Conserving Energy: Hybrid and Electric Vehicles*

- *Remember: We use petroleum for other things*

Electric and Hybrid Vehicles

38. Can biofuels substitute for oil? In other words, if biofuels become good enough, will we have any other need for oil and to drill for oil?

39. What are the major advantages and disadvantages of an electric car?

40. What are the major advantages and disadvantages of a hybrid car (but not a plug-in hybrid)?

41. What are the major advantages and disadvantages of a plug-in hybrid car?

42. Why does an electric vehicle require more mining (and thus results in more environmental damage due to mining) than a car that burns fuel? (Note: This also applies to hybrid and plug-in hybrid cars, though less so.)

43. What driving habits save fuel and energy?

44. What kinds of car maintenance help save fuel and energy?