

Hybrids & Alternative Fuel Vehicles 4/E

Chapter 1 Carbon-Based Fuels and the Environment

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of Hybrid and Alternative Fueled Vehicles . It correlates material to task lists specified by ASE and NATEF.
Motivate Learners	Explain how the knowledge of how something works translates into the ability to use that knowledge to figure why the engine does not work correctly and how this saves diagnosis time, which translates into more money.
State the learning objectives for the chapter or course you are about to cover and explain this is what they should be able to do as a result of attending this session or class.	Explain the chapter learning objectives to the students. <ol style="list-style-type: none">1. Describe the role of hybrid and alternative fuel vehicles in today's society.2. Identify carbon-based fuels.3. Explain how ozone affects our environment.4. Describe how organic materials decompose into carbon-based fuels.5. Explain the difference between carbon-based and non-carbon-based energy sources.6. Explain the federal and California Air Resources Board emission standards.7. List alternatives to carbon-based fuels.8. List the factors that will be needed to reduce the carbon footprint.
Establish the Mood or Climate	Provide a <i>WELCOME</i> , Avoid put downs and bad jokes.
Complete Essentials	Restrooms, breaks, registration, tests, etc.
Clarify and Establish Knowledge Base	Do a round robin of the class by going around the room and having each student give their backgrounds, years of experience, family, hobbies, career goals, or anything they want to share.

NOTE: This lesson plan is based on Hybrids 4th Edition

Chapter Images found on Jim's web site @

www.jameshalderman.com

LINK CHP 1: [Chapter Images](#)

ICONS	Ch01 Carbon-Based Fuels & Environment
	<p>1. SLIDE 1 CH1 Carbon-Based Fuels & Environment</p>
	<p>Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE IS CONSTANTLY UPDATED</p>
	<p>2. SLIDE 2 EXPLAIN FIGURE 1-1 The underhood decal showing that this Lexus RX-330 meets both National (Tier 2; BIN 5) and California LEV-II (ULEV) regulation standards.</p>
	<p>At the beginning of this class, you can download the crossword puzzle & Word Search from the links below to familiarize your class with the terms in this chapter & then discuss them</p>
	<p>Crossword Puzzle (Microsoft Word) (PDF) Word Search Puzzle (Microsoft Word) (PDF)</p>
	<p>3. SLIDE 3 EXPLAIN FIGURE 1-2 This label on a Toyota Camry hybrid shows the relative smog-producing emissions, but this does not include carbon dioxide (CO₂), which may increase global warming</p>
	<p><u>DEMONSTRATION:</u> DEMO LOCATION OF THE EMSSIONS LABEL ON AN HEV</p>
	<p>4. SLIDE 4 EXPLAIN FIGURE 1-3 atmosphere allows radiation to pass through to the earth's surface and blocks the release of heat back into space if there is too high a concentration of greenhouse gases.</p>
	<p>5. SLIDE 5 EXPLAIN FIGURE 1.4 The chart shows that the atmospheric concentration of greenhouse gases due to human sources (anthropogenic) such as the burning of carbon-based fuel is increasing.</p>
	<p><u>DISCUSSION:</u> HOST A DISCUSSION ON EMISSION STANDARDS. WHY IS CALIFORNIA MUCH STRICTER?</p>

ICONS	Ch01 Carbon-Based Fuels & Environment
	<p>DISCUSS TECH TIP</p>
	<p>DISCUSS FREQUENTLY ASKED QUESTION</p>
	<p>6. SLIDE 6 EXPLAIN FIGURE 1-5 Acid rain is formed when sulfur dioxide (SO₂) and oxides of nitrogen (NO_x) combine with rain, forming acids.</p>
	<p>7. SLIDE 7 EXPLAIN FIGURE 1-6 The sidewalk section at top is about 20 years old and shows effects of acid rain, as compared to lower section, which is about 5 years old. Notice that the acid rain has eroded the cement, leaving the aggregate (stones) exposed on the upper section.</p>
	<p>DISCUSS FREQUENTLY ASKED QUESTIONS</p>
 <p>QUESTION</p>	<p>DISCUSSION: HOST A DISCUSSION ON GLOBAL WARMING. WHAT ARE THE FACTS THAT SUPPORT GLOBAL WARMING OR CLIMATE CHANGE?</p>
<p>DEMO</p>	<p>DEMONSTRATION: WHILE A HYBRID ENGINE IS IN IDLE STOP MODE, CONNECT A FIVE-GAS ANALYZER. HAVE STUDENTS TAKE NOTE OF THE CO₂ READING TO CONFIRM ZERO OR LOW CO₂ LEVELS IN IDLE STOP MODE. NEXT, CONNECT A FIVE-GAS ANALYZER TO AN ICE AND COMPARE CO₂ READINGS AT IDLE. DISCUSS RESULTS.</p>
	<p>8. SLIDE 8 EXPLAIN FIGURE 1-7 Notice that the temperature has risen and fallen over time, but the levels of CO₂ in the atmosphere have never been higher and are thought to be the cause of global warming.</p>
	<p>9. SLIDE 9 EXPLAIN FIGURE 1-8 Pumping carbon dioxide back into the earth not only reduces the amount released to the atmosphere but also helps force more crude oil to the surface, thereby increasing the efficiency of existing wells.</p>
	<p>10. SLIDE 10 EXPLAIN FIGURE 1-9 Carbonated water is usually the most common (first listed) ingredient in soft drinks and other carbonated beverages.</p>

ICONS	Ch01 Carbon-Based Fuels & Environment
	DISCUSS FREQUENTLY ASKED QUESTION