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California Education and the Environment Initiative

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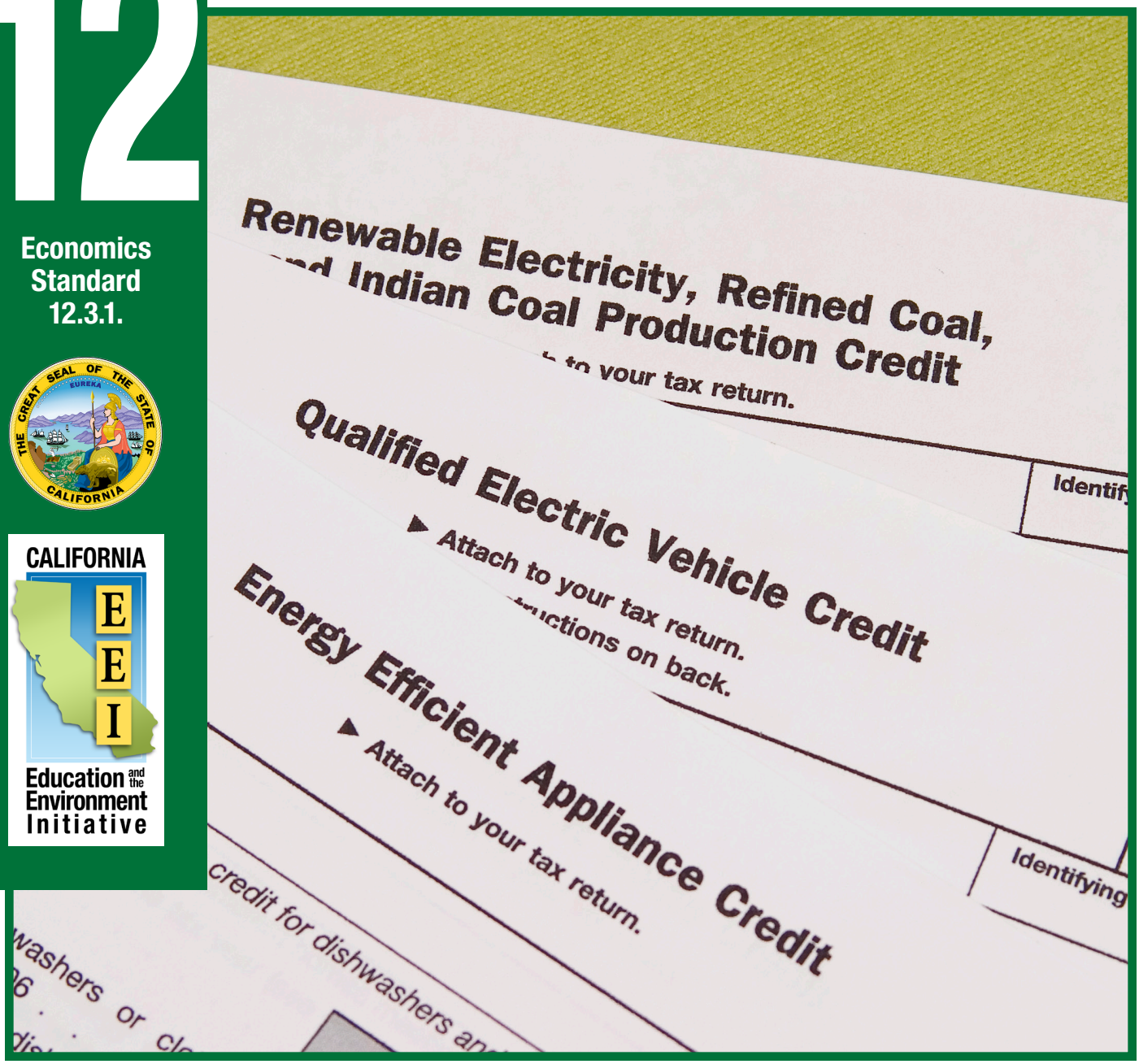
Economics Standard 12.3.1.



Government and the Economy: An Environmental Perspective

California Education and the Environment Initiative

Approved by the California State Board of Education, 2010

The Education and the Environment Curriculum is a cooperative endeavor of the following entities:

California Environmental Protection Agency
California Natural Resources Agency
Office of the Secretary of Education
California State Board of Education
California Department of Education
California Integrated Waste Management Board

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Key Partners:

Special thanks to **Heal the Bay,** sponsor of the EEI law, for their partnership and participation in reviewing portions of the EEI curriculum.

Valuable assistance with maps, photos, videos and design was provided by the **National Geographic Society** under a contract with the State of California.

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http://www.calepa.ca.gov/Education/EEI/

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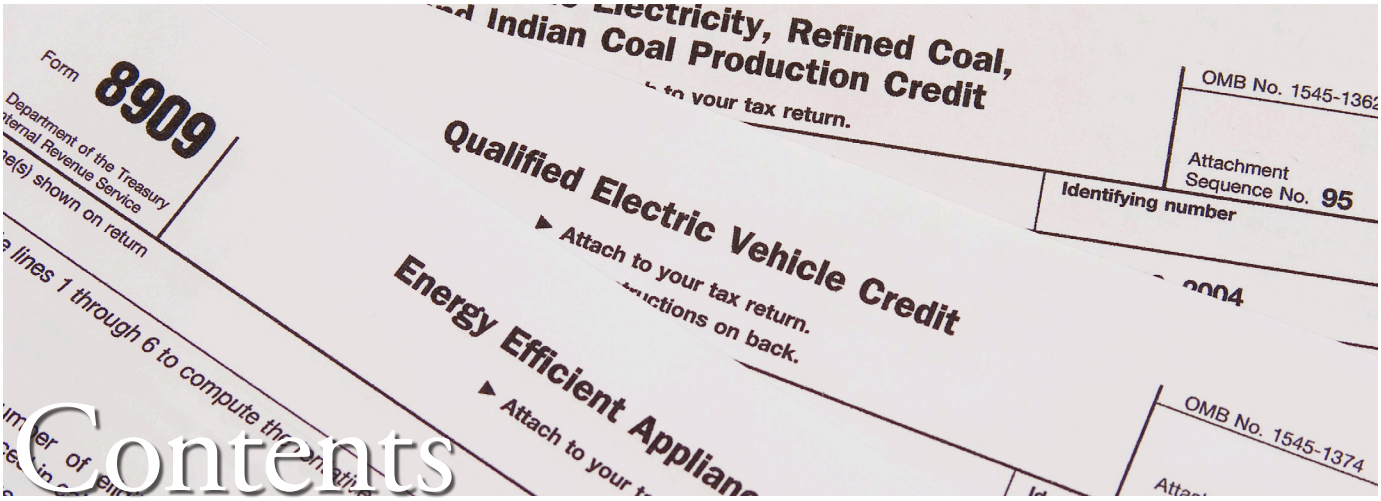

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None required for this lesson.

E-Waste and Eco-Industrial Zones

While the term “e-waste” might make you think of junk email clogging your inbox, the term actually applies to unwanted electronic devices, such as old cell phones and outdated computers. Not all electronic devices are e-waste, only those that contain toxic materials.

When discarded, these pieces of equipment may leach toxins into the environment and are part of a whole new category of government-regulated hazardous waste, called “electronic waste”, or “e-waste” for short. Technology is such a part of our everyday lives that we can’t remember life without cell phones and computers. But what happens to all these electronic wonders when they “die” or become obsolete?

On average, cell phones are owned for less than 18 months, and the typical computer is outdated within 3 to 5 years. By 2005, an estimated 63, million personal computers were “retired” throughout the nation. Fewer than 6% were reused or recycled. Some clever consumers find interesting uses for parts of old laptop and desktop computers, but most of the components of these devices were, until very recently, just thrown away, creating two million tons of toxic trash as a result.

Hazardous Wastes

Our creation and use of technology has created a dilemma. All the new technologies help us save time and money, but they generate waste that, if mismanaged, can be hazardous to humans and other living things. E-waste often contains toxic materials, such as lead, mercury, and other heavy metals. The rapid turnover of cell phones means that almost 2 million are discarded each week, creating 65,000 tons of toxic waste each year. A typical 17" computer monitor’s cathode ray tube (CRT) can contain over 2 pounds of lead, and a 27" TV screen over 8 pounds of lead.

Lead released from mismanaged e-waste is of particular concern because this heavy metal is a toxin that affects the human brain. When lead breaks down in the environment, it can create lead oxide dust. When a significant amount of lead dust is absorbed by the body through the lungs or stomach, it affects the nervous system. Too

Cell phone

much lead can result in learning problems and fatigue, as well as damaging other internal organs. Young children are at higher risk for lead poisoning because their bodies absorb lead more readily than adults, and because they tend to put everything in their mouths.

Landmark Legislation

In 2003, the State of California enacted landmark legislation: the Electronic Waste Recycling Act. This law was intended to offset the cost of diverting e-waste from unsafe disposal toward responsible recycling.

This law allows the government to use monetary incentives to encourage the responsible collection and recycling of certain electronic products. Electronic devices covered by the law include TVs and computer monitors with CRTs, liquid crystal display (LCD) screens, plasma televisions, and portable DVD players with LCD screens. Retailers collect a recycling fee from consumers, on behalf of the government, when the specified electronic devices are sold. The government then distributes these funds to qualified recycling operations that salvage useful materials from covered e-waste. This law internalizes the cost of recycling into the purchase price.

Plasma televisions

This electronic waste recycling fee may sound similar to the "California Redemption Value" (CRV) you pay at a store when purchasing drinks in glass, plastic, or aluminum containers. However, in this case, there is no redemption value and consumers are not entitled to a refund when they recycle their old devices.

In addition to establishing an e-waste recycling system, the Electronic Waste Recycling Act requires manufacturers to reduce hazardous substances in certain electronics they sell to consumers if they want to do business in California.

Eco-Challenges Bring Economic Opportunities

In this new era, state and federal governments are working to get businesses and consumers to think about the consequences of consuming goods that rapidly become obsolete and require proper disposal and/or recycling. Convincing businesses, in particular, that "going green" can earn them good will, as well as save them money is not easy. This is changing as many companies find that thinking "green" is good for the "bottom line." Some businesses have cashed in.

In the early 1990s, a California think-tank introduced the idea of "eco-industrial parks." The concept is simple. A variety of businesses, operating on a common property, often with one large "anchor" company, combine forces to reduce waste and increase efficiency. The businesses share resources: materials, buildings, water, energy, information, administrative costs, and space. As the concept evolved, some

E-waste

projects focused on co-locating companies that can use each other's wastes. This means that the wastes produced or processed by one business can be used as a feed stock by another nearby business to create new products. For example, one company's waste tires might be used by another company to create shredded or crumb rubber for new products like rubber mats or road paving materials. This kind of business model is often called a "resource recovery park" or an "eco-industrial park." The terms are often used interchangeably; however, resource recovery (RR) parks more typically include a collection of businesses that are focused on the reuse or recycling of materials (including such operations as composting facilities) where people can take their used and waste materials to be processed or handled.

Zero Waste

Whatever the name, the goal is simple: to get as close as possible to creating a zero-waste system.

One of the first and finest examples of this symbiosis between businesses is located in the city of Kalundborg, Denmark. This unique collaboration developed in the 1970s as businesses began to realize that the exchange of materials and wastes could increase efficiency and conserve resources. In Kalundborg, a refinery, a power station, and a pharmaceutical plant are at the hub of the resource exchange web. At the periphery are farms, a road paving company, and the city of Kalundborg's residential and municipal facilities.

The symbiosis started with energy flows, followed by material flows. A manufacturing plant recognized the nearby refinery's gas flares as a potential fuel source: the refinery was burning off byproduct gases. The material flows include sludge from a manufacturing plant and from the water treatment plant for a fish farm that a nearby farm uses as fertilizer. Another nearby farm uses surplus yeast from an insulin manufacturing plant as pig food. A cement company uses the power plant's leftover ash. Another company buys liquid sulfur from the refinery, which had to install

a sulfur recovery operation to comply with emissions regulations. In other words, each company benefits from the others, a true symbiosis.

Sustainable Businesses

Today, eco-industrial developers understand that businesses do not necessarily need to be located on the same property. The resource matrix within a regional zone reduces "greenhouse gases" associated with transportation and promotes sustainable businesses that consume waste materials. What is important is facilitating these connections. So far, about two dozen eco-industrial zones have been created in the United States, but the concept is still new, and the future seems bright for creating many more eco-industrial zones.

One of the best examples of a modern resource recovery park in the United States is a collective located in southern California, on the Cabazon Indian Reservation outside Palm Springs. This program is special because it is voluntary. A variety of environmental and waste management firms work together and use almost 600 acres of the reservation. These firms include a biomass power plant and a tire recycling company. The power plant supplies electricity to 45,000 homes in Southern California by burning wood products, such as yard, construction, and demolition waste. The tire recycling company turns 6,000 pounds of used tires per hour into crumb rubber, used to pave roads and surface playgrounds and equestrian arenas.

State and federal grants from the U.S. Environmental Protection Agency and the U.S. Departments of Commerce, Energy, and Housing and Urban Development are sometimes available to provide the "seed" money to begin the collaboration and planning for an eco-industrial park. Other sources of financing include environmental groups, banks, and socially responsible investment funds. State and local agencies and community organizations often act as "connectors" and consultants to bring the businesses together. In some states, low-interest loans are provided and permitting fees are reduced. The government and industry collaboration to reduce waste of all kinds, including e-waste, is good for the local economy and helps reduce the carbon footprint of local industries and consumers.

While globalization has brought distant economies closer together, the future may also favor localization when it leads to increased efficiency and sustainability.

Tire recycling

Case Study: Zero Emission Vehicle (ZEV) Regulations

Traffic is one of the main sources of air pollution. Pollutant levels can be correlated with distance from freeways. High concentrations of regulated air pollutants, such as nitrogen oxides and contaminants from gasoline and fuel combustion, are found within close proximity of freeways. Concentrations of ultrafine particles significantly above those which occur naturally are found within 500 feet (152.4 meters) of freeways; and, pollutants that have adverse effects on health have been identified up to 5,000 feet (1524 meters) from freeways. Health effects associated with traffic pollutants include respiratory and heart diseases.

Air quality in some parts of California, for example, the South Coast and San Joaquin Valley, is among the worst in the nation. California has been working on reducing pollution in the state since 1947 when the Los Angeles County Air Pollution Control District (LCAPCD) was created. Since that time, Los Angeles County set into motion laws that banned use of backyard incinerators and citrus grove smudge pots. The county even made regulations concerning backyard barbecues. The state also required auto manufacturers to use catalytic converters in 1975, which helped to convert carbon monoxide into carbon dioxide. In spite of all the efforts, in 2008 the city of Los Angeles ranked as the #1 most polluted city in the country. The U.S. EPA identifies motor vehicles as the most common sources of air pollution in the U.S.

In 1990, the California Air Resources Board (ARB) adopted a Zero Emission Vehicle (ZEV) requirement in the Low Emission Vehicles regulation. The new program required automotive companies doing business in California to sell a certain number of cars that produced no polluting exhaust when operating—at this time that would be either electric cars or hydrogen fuel cell cars. The requirement was to be implemented in stages. By 1998, 2% of all cars sold in California were required to be zero emissions, and by 2003, 10% had to be zero emissions.

In 1996, however, the auto industry objected to the requirements, saying that the battery technology was not yet good enough. ARB responded by eliminating the 1998 2% goal, but kept the 2003 10% goal in place. It also decided to allow for very low emissions cars like electric hybrids to count toward the goal.

In 1996, the auto manufacturers began leasing electric cars to consumers and public/private agencies. The cars needed to be recharged after short distances (about 60 miles), they were expensive (starting at about $32,000), and very few were available for purchase. Despite these limitations, ARB reported in 2004 that “consumers quickly bought these highly functional vehicles and called for more.” By 2003, however, the automotive manufacturers stopped producing electric cars. General Motors said it was unable to supply the parts to repair the cars, and would not renew leases on the cars already on the road. The company said it

intended to send some of the cars to museums, universities, and research labs, while scrapping the others. The auto companies also sued the state of California over the ZEV law in 2002. The lawsuit was dismissed when the Air Resources Board agreed to revise its standards in ways that eased requirements for automakers to get credit toward compliance with the ZEV program.

As of 2008, the state has made many changes to the original Zero Emission Vehicle regulation. A point system allows for more flexibility in compliance. Manufacturers get credits for producing automobiles that are partial zero emissions vehicles (PZEV) and they get credits for development of new technology ZEV cars, such as hydrogen fuel cell cars. There are three rankings for car emissions that qualify for credits: The gold level is for cars that are zero emission, such as electric cars and hydrogen fuel cell cars. The silver level includes hybrid cars, plug-in-hybrids, and compressed natural gas fueled vehicles, all examples of zero-emission enabling technologies. The bronze level is for extremely clean gasoline vehicles with very low exhaust and evaporative emissions. The fact that the modified ZEV program requirements are more flexible, combined with market pressures, such as high gas prices, makes the ZEV regulations more acceptable to the auto industry. California has received a waiver from the federal government, allowing it to implement standards more stringent than federal emission standards.

Auto makers have given several reasons for opposing the ZEV standards. First, they report that, as recently as 2008, battery technology is still too limited for commercial production. Even so, due to the research prompted by the ZEV program, Mitsubishi Motors estimates its freeway-capable battery electric vehicle called “iMiEV” now in production in Japan, will get 75 miles to the charge, while Tesla Motors estimates that its Roadster will get over 200 miles to the charge. Manufacturers have also claimed that consumers were not interested in electric cars because of their range limitations and high cost. ZEV advocates debate this point, citing the backlog of evidence of high consumer demand for the vehicles at the time the companies ceased production. In recent years, car companies have not been making a reasonable profit from car sales. Instead, most of their profits come from maintenance and selling parts for car repairs. The electric car has fewer parts and very little maintenance. This could mean billions of dollars of lost profits for car companies and service centers.

In 2008, the federal government authorized $25 billion for the Big Three (Ford, General Motors, and Chrysler) to retool their factories for making more fuel-efficient cars. The car companies asked for another $25 billion in loans to prevent the industry from going bankrupt.

Hydrogen fuel cell car

Case Study: The *Exxon Valdez*

In the cold waters off of Prince William Sound, Alaska, on the night of March 24, 1989, the oil tanker *Exxon Valdez* ran into Bligh Reef and spilled 10.8 million gallons of crude oil. Oil covered 11,000 square miles of ocean and killed more wildlife than any other human-caused disaster ever. The remoteness of the region and the amount of oil spilled made the cleanup a nightmarish task. Even today, the environment and the economy of Prince William Sound continue to suffer. The fishing industry in the area has not recovered, and the tourist industry has also declined since the spill. The costs to local residents and the natural environment have been high.

The following three statements from victims of the disaster show the high cost paid by the people living near the spill, as well as the environmental damage it caused.

"Among the tragedies from the spill is that the Alutiiq people cannot rely with confidence on the subsistence natural resources that have sustained us for millennia. We have lived in Prince William Sound and around Kodiak for over 7,000 years without damaging our homeland or its natural resources. But, because of the Exxon oil spill, we have lost something that is beyond compensation. We have lost an intergenerational bond that defines our people as one of the world's distinct cultures. Can this ever be restored?"

—Sven Haakanson, Jr., Alutiiq Native; 20-year commercial fisherman; Ph.D, Anthropology, Harvard University; Director, Alutiiq Museum, Kodiak, Alaska; 2007 MacArthur Foundation Award Recipient, February 2008.

"My husband and I are commercial fishermen. He has been fishing since he was a boy of six. That's just the way it was in coastal villages. When the Exxon supertanker hit the rocks, it stopped us from doing what we live for. We own Prince William Sound fishing rights in the area most heavily oiled and we have not been able to fish there since the spill. In the aftermath of the spill, the monetary value of our rights there fell by ninety-eight percent, not to mention the total loss of fishing income. We've fished other areas but have not had an income from the Prince William Sound fishery for 16 years because of the crash in the herring stocks… [T]he ship that left Valdez on that dreadful day had a captain known to Exxon to be a relapsed alcoholic, who was reportedly drunk and yet they still let him command the tanker that night. The spill was therefore foreseeable and completely avoidable but for Exxon's recklessness."

—Linda Suydam, Alutiiq Native, Longtime Commercial Fisherwoman, Mother of a Fisherman, February 2008.

"… the City of Cordova, Alaska is… the economic and emotional ground zero of the 1989 Exxon Valdez oil spill… [T]he fisheries in Prince William Sound had to be closed because of the oil spill causing numerous business and personal bankruptcies from which the community has not… recovered… [T]he Cordova Chamber of Commerce reflects upon the 1989 spill and its 19th Anniversary with concern and anger that remedial steps to equitably and responsibly move toward closure through respecting the judgment of the Federal District and Appellate Courts by ExxonMobil have been frustrated at every turn because of the apparent preoccupation of ExxonMobil only for its ability to maximize its profits… [T]he Chamber… conveys to the public and to ExxonMobil, its officers, directors, and shareholders the Chamber's disgust at the uncaring attitude for the harm ExxonMobil's actions caused… and the morally deficient way that ExxonMobil as a corporation has conducted itself in doing all it can to avoid responsibility…"

—Cordova, Alaska Chamber of Commerce, February, 2008.
(From **remembertheexxonvaldez.com**)

Exxon Valdez spill

The economic costs of the accident have also been high for the tanker's owner, ExxonMobil. The company has paid nearly $3.4 billion dollars for cleanup, fines, and as legal settlements with seven fisheries since the accident. In addition, local residents sued ExxonMobil over the disaster. In 1994, they won $87 million plus $5 billion in punitive damages. On appeal, however, punitive damages were reduced to $2.5 billion. In 2008, the Supreme Court reduced them again to $507 million. Since ExxonMobil had made a previous settlement with the seven fisheries affected by the spill, the court allowed ExxonMobil to pay itself back with part of the final settlement. So $54 million of the $507 million went directly to ExxonMobil. After attorneys' fees, the

Exxon Valdez cleanup

remaining money was distributed to about 30,000 people who were affected by the oil spill, which resulted in a grand total of $15,000 apiece.

The *Exxon Valdez* was not the first oil tanker accident in history. Previous oil tanker accidents led to several attempts by the government to pass laws that would have limited the damage caused by future accidents. In 1976, Alaska passed a law that required oil tanker ships to have a two-layered hull that would withstand collisions better than a single hull. Oil companies challenged the law in court saying that the cost of retrofitting their ships would have been high and would have affected profits. The law was thrown out in 1978.

Federal efforts to mandate double-hulled ships were unsuccessful. The Nixon Administration promised that double-hulled ships would be required for the fleet servicing the Alaska pipeline, but Congress never passed a law requiring such ships. A 1975 bill introduced by Senator Warren Magnuson of the State of Washington that would have required oil tankers to be "double-hulled" never passed Congress. Later, President Jimmy Carter gave a directive to the Coast Guard to require double-hulled ships, but it was never implemented. If the *Exxon Valdez* had been a double-hulled ship, most experts agree that the tanker might have spilled 60% less oil than it did—if any at all.

Passing a law that would have required oil companies to use double-hulled ships could have affected the oil market in several ways. It is likely that the companies' profit margins would have decreased, resulting in increased costs to consumers, and in the short-term there might not have been sufficient tankers to move the oil to the pipeline, again affecting profitability and cost to consumers.

The *Exxon Valdez* case, then, raises difficult questions about who actually pays for environmental damage when the government steps in to protect the health of people, animals, plants, and habitats. Per the law, the polluting companies pay. Generally, though, it is the consumers who ultimately pay the costs through increased prices.

Case Study: Environmental Tax Shifting

One popular way to reduce the number of young smokers has been for states to increase taxes on cigarettes. These taxes, based on the quantity of a product, such as packs of cigarettes, are called excise taxes. On average, states have increased excise taxes on cigarettes to $1.18 a pack, and they have found that every 10 percent increase in cost results in a seven percent decline in cigarette sales.

Governments use taxes to raise revenue and sometimes to promote solutions to specific problems. A tax on plastic shopping bags in Ireland reduced use of the bags by 90 percent. Plastic bags were littering beaches and killing marine life, and they are considered non-biodegradable. The tax made the price of plastic bags so high that stores encouraged the use of reusable cloth bags. Some California cities are considering doing the same thing. San Francisco and Oakland have banned plastic bags, and other cities, for example, Santa Monica are attempting to ban them. California cities are not allowed to tax plastic bags, but California AB 2058 proposed that large retailers be required to charge a 15-cent fee for plastic bags. A bag tax would likely lead to decreased use of plastic bags–plastics- and plastic-bag makers opposed it. Their need for profit conflicts with environmental health.

Governments taxing items like plastic bags is called tax shifting, because it shifts the burden of paying taxes away from one group—income-tax payers—to another—companies and individuals that pollute or use polluting items. Germany is perhaps the leader in tax shifting. The German government has taxed almost every source of energy to discourage overuse, and it has been able to shift tax revenue away from wages by 2.1 percent. Sweden raised taxes on carbon and sulfur emissions and shifted revenue away from income tax by 1.9%. Setubal, a city in Spain, allows 0.7 cubic meters (25 cubic feet) of water to each home without tax, but taxes every cubic meter (35.3 cubic feet) after that. The Danish people pay extremely high taxes on their cars in order to encourage use of public transportation, and they pay taxes on landfill use to discourage throwing

Path littered with plastic bags

away items instead of composting or recycling them. There are many examples where tax shifting is being used to resolve environmental problems, a process called environmental tax shifting.

In Iowa, the 1987 Groundwater Protection Act used environmental tax shifting to protect the groundwater supply by seeking to diminish the use of pesticides and fertilizers. For example, the manufacturers of these products are charged registration fees as a means of increasing the cost of pesticides and fertilizers and thereby decreasing their use. Nebraska is another state that is seeking to resolve a water pollution problem by taxing fertilizer. Revenue from fertilizer taxes is used to support the Natural Resources Enhancement Fund.

Tax laws can work in the other direction, too, by favoring the economic well-being of certain industries over the well-being of the environment. Mining companies, for example, get a "percentage depletion allowance," which is a tax break for the depreciated value of their mines. The purpose of the tax break is to help mining companies recover some of the high cost of mining. Opposing the allowance, Senator Russell Feingold of Wisconsin proposed a bill to repeal it. The bill claimed that the tax policy provides "double subsidies for the hardrock mining industry." In contrast, the United Kingdom cut its coal mining by 50 percent by cutting subsidies to the mining industry.

By using tax breaks and excise taxes—fiscal policies—the government can influence the behavior of both producers and consumers.

Coal mine

Case Study: Partnership for a New Generation of Vehicles

In the 1990s, General Motors (GM) developed a prototype car called the Precept, a diesel hybrid with a rating of 80 miles per gallon (MPG). Ford developed the Prodigy, which was able to get 72 MPG, and Chrysler developed the EXS-3, which could get 70 MPG. The automakers developed these prototypes as part of a federal program called the Partnership for a New Generation of Vehicles (PNGV).

The program began in 1993 as a collaboration between the federal government and the Big Three automakers (General Motors, Ford, and Chrysler). Its aim was to use the know-how and resources of eight government agencies (Departments of Commerce, Energy, Defense, Interior, and Transportation; the National Science Foundation (NSF); National Aeronautics and Space Administration (NASA); and the Environmental Protection Agency) to develop fuel-saving technologies. To that end, the federal government invested $1.5 billion dollars. Armed with the new technology, the Big Three were able to build the prototypes. Some great innovations resulted from the partnership. These included the following:

- a carbon coating that is better than Teflon, and carbon foam that could be used as a lightweight radiator, or to cool brakes or fuel cells
- a device that converts gas to hydrogen, for use in fuel cell technology
- cleaner diesel technology
- hybrid technology and fuel cell technology
- lighter, cheaper, high-tech aluminum, magnesium, and fiberglass
- automotive weight-reduction for better mileage

Partnership for a New Generation of Vehicles

PNGV

www.pngv.org

PNGV logo

Hybrid car

Despite all these accomplishments, the PNGV program had many critics. Some environmentalists argued that the program did not set Corporate Average Fuel Economy (CAFE) standards, so automakers were not required to increase mileage. Further, they said that PNGV did not require automakers to use the technology they developed in their regular production vehicles. Some politicians also criticized the program, arguing that automakers did not need federal assistance to research new technologies, and that taxpayer money could be better spent elsewhere. Others criticized the program because no incentives were created to encourage the adoption of the technology.

In 2001 the program ended, and the automotive companies walked away from the technology. None of the three new cars—the Precept, Prodigy, or EXS-3—has been manufactured for sale since then. When Ford Motor Company decided to produce a hybrid in 2004, it bought a license from Toyota rather than use the technology developed under PNGV.

In 2002, the Bush Administration began the FreedomCAR (Cooperative Automotive Research) program. While the new program resembled PNGV in that it provided subsidies to automakers (totalling more than $800 million), it focused specifically on developing hydrogen fuel technology. Perhaps because of that, FreedomCAR has its critics, too. Critics say the technology will not be practical for another 15 to 20 years. Furthermore, they argue, hydrogen fuel is expensive and currently derived from petroleum, meaning this program won't help the United States end its dependence on fossil fuels. Finally, the FreedomCAR program also requires no CAFE standard changes, nor does it require the automotive companies to use the technologies created under the program.

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