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Automobiles & the Environment

Automobiles affect the environment in many ways. Impacts begin when a vehicle is manufactured (including the production of all the parts and materials that go into the car) and end with its scrappage in a junkyard (which can recycle many parts but also involves the disposal of many wastes). Over the life of an average motor vehicle, however, much of the environmental damage occurs during driving and is greatly associated with fuel consumption. Over the dozen or so years of a vehicle's life, nearly 90 percent of lifecycle ("cradle to grave") greenhouse gas production for a typical automobile is due to fuel consumption.

Environmental impacts start with mineral extraction and the production of the raw materials that go into the parts of a car. For example, iron ore gets turned into steel, which now accounts for most of the mass in vehicles. Steel can be recycled, of course. On average, today's automobiles are about 75 percent recyclable, and using recycled steel helps reduce energy use and pollution. Other metal components, such as aluminum (used in some engine parts and wheels, for example) and copper (used for wiring) are also largely recycled. The lead and acid in batteries are poisonous and dangerous. But batteries can be recycled, if they are returned to a service station, a parts store, or brought to a municipal hazardous waste facility. Plastics, which are mostly made from petroleum, are more difficult to recycle. In any case, some degree of pollution is associated with all of these components, much of it due to the energy consumption, air pollution, and releases of toxic substances that occur when automobiles are manufactured and distributed.

Most of the environmental impact associated with motor vehicles occurs when they are used, due to pollution in their exhaust and pollution associated with supplying the fuel. In the United States, nearly all of today's automobiles use gasoline; a lesser number use diesel fuel. In some areas, various alternative fuels are being introduced, but these are not widely available for most drivers. When gasoline, diesel, or other fuels are burned in car engines, combustion is never perfect, and so a mix of hazardous pollutants comes out the tailpipe. If combustion were perfect and didn't create noxious by-products, the exhaust would contain only water vapor and carbon dioxide. Carbon dioxide (CO_2) isn't directly harmful to health, at least not in low concentrations. After all, co_2 is also what we exhale after "burning" the calories in the food we eat. However, co_2 from fossil fuels like gasoline and diesel is very harmful to the environment because it causes global warming-more on this pollutant shortly.

Motor fuel is itself a product and so, like a car, environmental damage occurs throughout its lifecycle as well. For gasoline and diesel, the product lifecycle begins at the oil well and ends when the fuel is burned in the engine. Fuel cycle impacts are the forms of pollution and other environmental damage that occur between the oil well and the fuel tank. Gasoline and diesel fuel are poisonous to humans, plants, and animals, and their vapors are toxic. Other energy sources have their own fuel cycles. With battery-powered electric vehicles, for example, no fuel is burned onboard the vehicle, and so nearly all of the fuel-cycle pollution and energy use occurs at electric power plants and in producing the fuels that run the power plants. Many of the same air pollutants that spew from vehicle tailpipes are also spewed from power plants and oil refineries (as well as the tanker trucks that deliver gasoline to your local filling station).

Petroleum products now provide 96 percent of America's transportation energy needs. Air pollution isn't the only problem associated with these petroleum-based fuels. Oil extraction lays waste to many fragile ecosystems, harming tropical forests in South America and Southeast Asia, deserts and wetlands in the Middle East, our own coastal areas, and the fragile tundra and arctic coastal plains of Alaska. Millions of gallons of oil are spilled every year. Sometimes the disasters are well known, such as the 1989 Exxon Valdez spill in Prince William Sound. More often there are rarely reported but still tragic smaller spills that occur in the oceans and in coastal waters, bays, and rivers throughout the world. In our own communities, groundwater is sometimes tainted by leaks from underground fuel storage tanks and miscellaneous spills that occur during shipping and handling of the 120 billion gallons of fuel we use each year.

In addition to these environmental harms, gasoline and diesel consumption bring economic and security risks. The Middle East contains the largest concentration of the world's oil. The United States maintains a global military presence partly to maintain access to foreign oil. The 1991 war with Iraq was directly related to securing our oil supply. The tragic situation in which the United States finds itself since September 11, 2001, presents many grave challenges for national defense and security. Choosing more fuel-efficient vehicles to reduce our reliance on a world oil market in which Middle Eastern countries play a dominant role is one way we, as individuals, can assist in energy-related aspects of national security.

Major recessions were triggered by oil crises in the 1970s and early 1980s, causing unemployment and inflation. Oil imports drain over \$50 billion per year from American pockets, representing lost job opportunities even when our economy seems to be doing fine. Over half of US oil is now imported and our dependence on foreign sources is steadily rising, perpetuating the risk of future oil crises. The gasoline price run-ups of the past two years are just the latest examples of how petroleum dependence can squeeze family budgets only to enrich oil producers. Our addiction to gasoline and diesel fuel also involves moral compromises. It entails deals and economic arrangements with some oil-rich countries whose standards of human rights and environmental protection may not be the same as what we expect at home. Of course, these issues go beyond strictly environmental concerns. Nevertheless, choosing greener vehicles that consume less fuel not only protects the environment, but also helps protect US jobs while reducing the economic costs and moral liabilities of oil dependence.