BUYING A CAR? NEW TECHNOLOGIES LOWER FUEL USE

CARS AND TRUCKS ACCOUNT FOR NEARLY 20% OF ALL U.S. EMISSIONS AND MORE THAN 25% OF THE EMISSIONS OF THE AVERAGE AMERICAN

What are the options in new technologies?

Cutting oil use, reducing smog-forming pollution, and curbing greenhouse gas emissions which lead to climate change require a significant shift toward clean transportation technologies. These clean transportation technologies include hybrid electric vehicles (HEV) and plug-in hybrid electric vehicles (PHEV), both of which need gasoline combustion engines to provide some of their power; battery electric vehicles (BEV) which run on electricity from the grid; and fuel cell vehicles (FCEV), which run on hydrogen gas. A new study from the University of Minnesota in December 2014 shows that plug-in all-electric vehicles have both a greater air quality and global warming emissions benefit when they are charged using electricity generated from natural gas or renewable sources as compared to gasoline cars. Many regions in the US—including Massachusetts--use very little coal to generate electricity, meaning many EVs are delivering emissions benefits today and have the potential to deliver even more in the future.

Hybrid Electric Vehicles deliver more than double the fuel economy of today's gasoline cars by using a "series/parallel" full-hybrid system. Series operation is very efficient in stop-and-go city traffic. During parallel operation, the gas engine directly drives the wheels at higher speeds, where it is most efficient. Examples: Chevrolet Volt, Ford Fusion Hybrid, Honda Accord Hybrid, Nissan Leaf, Toyota Prius.

Plug In Hybrid Electric Vehicles, like their HEV cousins, run on a combination of gasoline and electric power. The major difference between the two is that the PHEV uses a larger battery that can be recharged by plugging into the electric grid. If your trip is short, it can be powered entirely by electricity. Recharging a PHEV is as simple as plugging it in to a charger on the wall in your garage or at a public charging station. The battery pack fully recharges in 10 hours or less when plugged in to a 120 volt, 20 amp circuit, and 4 hours or less when plugged in to a 240 volt outlet—like those used for a clothes dryer—though some home wiring may need to be upgraded to at least 30 amps. Examples: Chevrolet Volt, Ford Fusion Energi SE, Honda Accord Plug-In, Toyota Prius Plug-In.

Battery Electric Vehicles are all-electric cars and can be recharged at home (or, increasingly, at work), and can often take advantage of existing electricity infrastructure. A BEV would take up to 7 hours to fully recharge using a 220 Volt outlet—like those used for a clothes dryer—though home wiring may need to be upgraded to at least 30 amps. Actual recharge times will likely be less because Americans' average daily travel is about 30 miles. Examples: Chevrolet Spark EV, Fiat 500e, Ford Focus Electric, Honda Fit EV, Nissan Leaf, Tesla Model S,Volkswagen E-Golf.

Fuel Cell Electric Vehicles are all-electric cars but rather than being charged by the grid, they are run by a fuel cell containing gaseous hydrogen and a battery. They are refueled at special hydrogen refueling stations and enjoy a longer range than many battery-electric models. With the right fueling infrastructure put in place, fuel cells can be a good option

for larger vehicles, longer-distance driving, and drivers who lack access to home charging. Examples: Honda FCX Clarity, Hyundai Tucson Fuel Cell, Toyota FCEV.

What are the elements to consider? Driving range; source of electrical power if a plug-in (fossil fuel? renewable?); emissions; public infrastructure for electrical recharging or hydrogen stations; zero waste manufacturing; and, of course, cost and possible federal and/or state tax credits (see http://www.plugincars.com/federal-and-local-incentives-plug-hybrids-and-electric-cars.html) See also http://www.ucsusa.org, http://www.epa.gov/greenvehicles/. No matter what type of car you buy, plan to purchase the size car you need most of the time and rent the bigger car for those few trips you make when you need more space.

MPGe (miles per gallon equivalent) is one measurement the car manufacturers use to translate electric car efficiency into miles per gallon. One gallon of gasoline generates 115,000 British thermal units of heat, as does 34 kilowatt-hours. But this compares energy consumption rather than cost of fuel. Focus instead on another figure: kilowatt-hours per 100 miles. This must be provided by the manufacturer. More information is available at www.fuelconomy.gov.