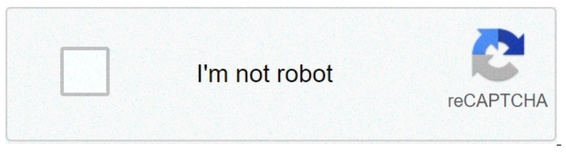

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Heat of combustion of fuels

Like many people and corporations, Audi seems to be working hard to reduce its carbon footprint. If you're not familiar with that term, or its relative, carbon offsets, then you might want to check out How Carbon Footprints Work and How Carbon Offsets Work. In the meantime, here's a quick primer: A carbon footprint measures all carbon dioxide (CO2) emissions produced by a single person or business. Carbon dioxide is the primary greenhouse gas produced by human activities, so that's why it receives most of the attention. But an accurate carbon footprint measurement also accounts for other gases, such as methane and chlorofluorocarbons. Scientists express carbon footprints in tons of CO2 or CO2 equivalents per year.If you reduce the CO2 emissions related to a certain activity, then you decrease that activity's footprint. If you cut emissions so that they equal the footprint, then you achieve what's known as carbon neutrality. Companies tackle this problem in many different ways. Some build wind farms to replace coal-fired power plants. Others engage in carbon sequestration activities, such as planting trees to trap carbon dioxide in forests and soils. And still others participate indirectly by funding projects that reduce greenhouse gas emissions. All of these methods qualify as carbon offsetting.Transportation, which often relies on burning fossil fuels to move people and goods, poses a significant challenge in the fight to reduce carbon output. It takes a lot of electricity from a CO2-spewing power plant to build a car -- and even more to extract, refine and deliver the petroleum products to fill its gas tank. And then, once the car gets on the road, its internal combustion engine produces a steady supply of greenhouse gases, which collect in the atmosphere and become part of a great, planet-warming blanket. Electric and hydrogen-powered vehicles could eliminate some of these issues, but they may not be viable solutions for years.Despite these challenges, Audi has dedicated itself to "balanced mobility," which the company defines as "holistic, CO2-neutral mobility over short, intermediate and long distances" [source: Audi USA]. E-gas, a fuel that can power internal combustion engines, plays an important role in this effort. How can Audi hope to achieve carbon neutrality with an old-school technology? It will actually use carbon dioxide as a raw ingredient to make its engine-friendly fuel. A refuse biogas plant will provide the CO2, and a purpose-built factory in Werlte, Germany, will carry out the necessary chemical reactions. Beginning in 2013, the factory in Werlte will consume 2,800 metric tons of CO2 and will generate 1,000 metric tons of e-gas a year [source: Audi USA]. This, combined with other green practices we'll explore a bit later, will enable Audi to achieve carbon neutrality across its entire value chain.Chemists and consumers know e-gas by another name: methane, or natural gas, which is already used extensively to heat homes and to power natural gas vehicles. On the next page, we'll take a closer look at this synthetic gas and the chemistry required to produce it. fuel valve image by Luis Bras from Fotolia.com Machines use varying forms of fuel with different ingredients based on the engine's functionality needs. Off-road diesel fuel is usually used for farm equipment. Home-heating fuel is usually purchased for furnaces or large generators. The fuel types are similar. Off-road diesel fuel is used for farm equipment and other non-transportation diesel vehicles. It has fewer taxes placed on it so off-road diesel has a red dye added to differentiate between that and other diesel fuels. There are several types of fuel that fall under the home-heating fuel category but generally, that term refers to home-heating, fuel oil No. 2. Home-heating fuel is used to heat homes either with a furnace or generator. Home-heating fuel is subject to taxes off-road diesel fuel is not subjected to because they are used differently. Take care regarding the fuel used in off-road vehicles or your home. Each type of machine, especially when it comes to home-heating equipment, may have different requirements compared to other machines. Some kinds of home-heating fuel and off-road diesel fuel are interchangeable; others are not. General Motors says it is testing a new combustion process for conventional engines called homogeneous charge compression ignition, the Associated Press reported. The technology could increase fuel economy by up to 15% and approach the fuel efficiency of a diesel engine without the need for advanced pollution controls, the company said in a statement. The process ignites an air-fuel mixture in the cylinders by compressing it, producing a low-temperature, flameless energy release in the combustion chamber, the company said. Since all the fuel in the combustion chamber is burned at the same time, the engine uses less fuel to produce power that is similar to conventional engines, the AP explained. It is being tested in a Saturn Aura and an Opel Vectra, which are operable concept vehicles. GM set no date for when the technology might come to market but said it still needs to work on controlling the combustion process. This content is created and maintained by a third party, and imported onto this page to help users provide their email addresses. You may be able to find more information about this and similar content at piano.io In the beginning, there were horses and buggies (and buggy whip makers). Then, around 1860, some clever folks figured out that mixing oil-derived “gasoline” with air and stuffing both into a closed space and lighting it with a spark(plug) would result in a big BOOM. If contained, all that energy could drive a piston inside an engine, which if properly connected to a buggy’s wheel, would make the whole assembly move around under its own power, accompanied by a lot of noise, smoke and terrified onlookers. The car, or “automobile,” was born and the buggy whip industry hasn’t been the same since. Over 150 years later, the same basic mechanics, albeit greatly refined, continues to power the millions of cars, motorcycles, trains, airplanes, lawn mowers, cruise ships and bar stool racers around the globe. But how does the gas in your tank and the air blanketing our little planet get together inside your car’s engine? Currently, there are three primary ways, one of which is starting to disappear. Carburetors (a.k.a. “carbs,” and no, not the kind that’s in your waffles) From the beginning, engines used a complicated device called a “carburetor” to mix air and gas together in the proper amounts before it headed into the combustion chamber inside an engine cylinder. Carburetors use a series of tiny orifices, passages, springs, cylinders and probably some black magic to accomplish this and for nearly 100 years, they dutifully got our VW Beetles, Benzes, Honda Trail bikes and Mustangs around with general reliability. But even with decades of refinement, carburetors are still inefficient, wasteful, environmentally unfriendly and overly complicated, let alone having to learn all that black magic to work on them. Also, when you drive your vehicle somewhere that is at a drastically different altitude, they tend to work even more poorly. Mechanics hate them and that’s why it costs a fortune to get them worked on. Because of their inefficiency, no modern cars use carburetors. However, for simple engines (weed trimmers, lawnmowers, pressure washers, bar stool racers and such), they are still widely used since they require no electrical power to operate. But eventually, they will likely disappear from use altogether, except from vintage machines and black magic shops. Electronic Fuel Injection (EFI) Recognizing the limitations of carburetors, in the mid-1900s vehicle designers developed a new way to get gas into an engine using a system called “fuel injection.” Tack on a small computer or other electronics for regulation of the system and you have “Electronic Fuel Injection,” or EFI. It is not pronounced “Effie.” It’s E-F-I. This fancy-sounding acronym describes a system of delivering fuel to an engine using a pump that pressurizes the fuel so that it can be “injected” into the airstream going into the engine in very precise amounts, upping efficiency and cutting down on wasted fuel (and icky emissions). Sensors in the exhaust and in the air-intake system constantly measure the system’s needs and efficiencies, and the computer/electronics constantly adjusts the amount of fuel being sent into the engine. The system can also correct for differences in altitude so the vehicle performs pretty much the same no matter where it is. However, modern EFI systems require electrical power to work and if the system gives out for some reason, you’ll probably need to get towed back to civilization, although total failures of EFI systems are quite rare. Pretty much every car made today comes with EFI – or DFI (see below). Also, with the advent of the computer age, consumers can now buy software and hardware to hack make adjustments to some fuel injection systems for more performance, although doing this wrong can result in decreased performance, lower gas mileage, a damaged engine and an F at the annual DEQ test. So consider yourself warned. Direct Fuel Injection (DFI) A close cousin of EFI is DFI. The systems are essentially identical but instead of pumping gas into the air before it goes into the engine as EFI does, DFI systems pump a very precise amount of fuel directly into the combustion chamber inside the engine where it then mixes with air just before being set alight by the spark plug. DFI is even more efficient that EFI, resulting in more power, less waste and cleaner exhaust gases. DFI is relatively new technology but it is beginning to show up in more vehicles as the system evolves and comes down in cost. No black magic is required. And what about that “octane” rating thing? It used to be that high-performance or big-engined luxury cars had to have “premium” gas or they would run poorly – and possibly be damaged by detonation (also known as “knock”), which is when the gas/air mixture explodes before it should inside the engine’s cylinders. EFI and DFI have pretty much solved that problem. Carbs, not so much. Gas typically comes in three grades: Regular, Plus, and Premium (also called Super or any other number of idiotic marketing monikers) and with octane ratings from 85 to 93 or so. The higher the octane rating, the more energy and knock avoidance goodness the fuel contains. But once fuel injection systems matured, it became less of a big deal what you pumped into your car. The bottom line is this: unless you are piloting a six-digit supercar that the maker specifies should only drink the most expensive grade of liquid dinosaur, you can now run most any car on “regular” gas and your car’s computerized fuel and engine management systems will make the appropriate adjustments to protect your engine. If you do have a high-performance car and are heading for a track day or some backroads shenanigans, filling up on Plus or Premium can put a bit more pep in your car’s step. Otherwise, you’re just blowing extra dollars out the tailpipe. Editors' Recommendations