Alternative Fuels for Cars

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The Problem

- Everyone is running out of petroleum. We get lots of things from it: gasoline, plastic, diesel, and any number of other things. By far the most important item we get from it is gasoline. Petroleum can sustain the demand for plastics, medicines, tar, etc., but it cannot sustain the enormous demand we put on it for gasoline. That, plus global warming, partly caused by the carbon dioxide in car emissions, means we must find another way to power cars.

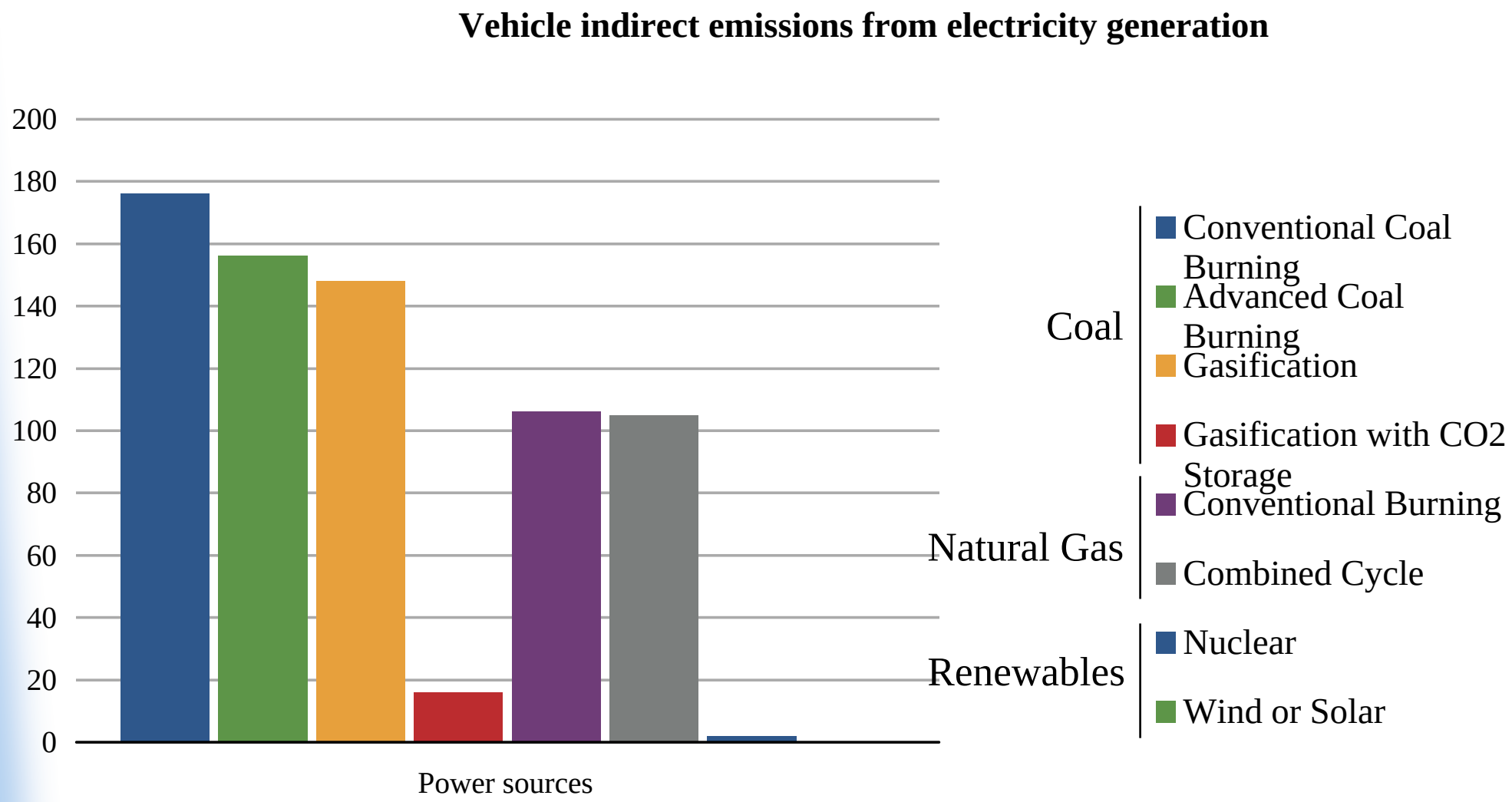
Objective

- An average American "needs" a car that can sustain 60 mph, can hold 4 people, can run for 200 miles without refueling, costs less than $25,000, meets all safety standards, and can go from 0 to 60mph in 10sec. So, what kind of fuel can power a car that meets these criteria, has few harmful emissions, and does 50+ mpg?

Emissions in this presentation

- Lots of people think that rechargeable electric, fuel cell, compressed air, etc. all have no emissions at all. This is wrong! They may have indirect emissions because it takes energy to recharge the battery, make hydrogen, compress air, etc. If that energy is taken from non-clean power sources, there are emissions. In this presentation, I have said “no emissions” but bear in mind, that is just the car itself.

http://www.treehugger.com/files/2008/04/plug-in-hybrid-cars-co2-emissions-electricity-energy.php



Efficiency and MPG

- For purposes of this poster, I have used the term “efficiency" to mean MPG of gasoline (and fossil fuels). This means that electric powered vehicles, for instance, would have infinite efficiency. However, fossil fuels could have been used to generate the electricity, so it could be less efficient than it may seem. If I could find the information, I have put down the gasoline MPG equivalent; otherwise, I have just said they get “infinite” MPG.

Some of the Options

- Rechargeable electric
- Solar
- Fuel cell
- Compressed air
- Gas and electric hybrid
- E85
- Natural gas

Rechargeable Electric

- Generally, rechargeable cars plug into a standard outlet to charge. However, it can take up to 6 hrs. to charge the battery. The batteries are also very heavy, which gives the motor more work to do, and renders the car less efficient.

Rechargeable Electric (Tesla Roadster)

- Holds 2 people
- 0 to 60 mph in 4 sec.
- About 220 miles per charge
- $98,000
- No emissions
- 125 mph (top speed)
- Infinite MPG

Rechargeable Electric (GEM e4)

- 30 miles per charge
- 25 mph (top speed)
- 4 people
- $10,000
- S-l-o-w acceleration
- No emissions
- Holds 4 people
- Infinite MPG

Fuel Cell

Fuel cells work by combining hydrogen and oxygen. When the two elements combine to create water, energy is emitted. The fuel cell captures electricity which, in a car, is used to run a motor. There is a problem though. To create hydrogen, one runs a fuel cell backwards, using electricity to separate hydrogen from oxygen. So why don't you just use that same electricity to charge a battery? You can't gain energy by converting electricity to hydrogen! In fact you lose some! So what's the point of a fuel cell car? Here are some of my thoughts...

Fuel Cell (continued)

- Refueling: Batteries take a long time to recharge, up to 6 hours in the Tesla Roadster. Hydrogen you can fuel up in nearly the same time it would take to fuel up a gasoline-powered vehicle.
- Distance: Looking at the stats I found, it appeared that a fuel cell car could travel further on a tank. (or that hydrogen holds more energy). As far as I know, the Tesla goes the farthest of any electric car, going 220 miles per charge. The FCX Clarity can go up to 280 miles on a standard tank of H2, and it could have a yet larger tank!

Fuel Cell (continued)

- Weight: Fact: Batteries are heavy. Fact: Hydrogen is lighter than air. Big difference, isn't it! So, we could have a larger tank on a fuel-cell car, and have it not be much heavier, making less work for the motor!

Fuel Cell (Honda FCX Clarity)

- Runs 280 miles on 1 tank of hydrogen
- No emissions
- Seats 4 people
- 100 mph top speed
- 64 mpg gasoline equivalent
- 0 to 60 in 9.2 seconds

Compressed Air

- The compressed air engine runs pretty much the same as an internal combustion engine, which is a standard engine, except it uses bursts of compressed air instead of explosions. This one has the same problem as fuel cells, and my thoughts on it are similar. Although my example vehicle doesn't go that far, the tank could be quite a bit bigger, and everyone knows air is light!

Compressed Air (e.Volution)

- 124 miles on 1 tank of compressed air
- Top speed of 60 mph
- No emissions
- In Africa, $10,000

Solar

- There are no commercially available solar cars, (so no, you cannot buy one) but they are built and raced as experimental vehicles. They are not very safe, and are very long and low so as to fit enough solar panels on the car to run its motor. They are also extremely expensive ($300,000 and up).

Solar (Catalyst)

- Infinite miles provided there is good sun
- Top speed of 70 mph
- No emissions (Really, because it makes all of its own electricity)
- Infinite mpg (This is better than compressed and rechargeable, as it only uses solar cells to make its electricity.)
- Holds 1 person

Gas and Electric Hybrid

- Hybrids have both an engine and a motor. The engine is used to charge the battery and power the car. The motor assists the engine when necessary or runs the car without the engine at slow speeds. There are two popular examples of this: the Honda Civic and the Toyota Prius. They get approximately the same mpg, although they have dramatically different Hybrid systems.

Gas and Electric Hybrid (Toyota Prius)

- 50 mpg
- Holds 5 people
- $22,000
- About 400 miles without refueling
- Top speed of 100 mph

E85

- E85 is 85% ethanol, 15% petroleum. Ethanol is a fuel generally made from corn. Ethanol itself has 67% of the amount of energy that gasoline does. However, to make the stuff from corn is very energy-intensive and the ethanol itself gives off just a little more energy than there was to make it. It is less energy-intensive to make it from sugarcane, although that can only be grown in a few places.

E85 (Saab 94-X bioconcept)

- 0 to 60 in 7.8 sec.
- Top speed of 146 mph
- 30.7 mpg gasoline equivalent
- Holds 5 people

Natural Gas

- Natural gas is a fossil fuel. However, there is a lot more of it left then there is of gasoline. It does pollute, but only barely, just giving off CO2, and not any of the other stuff. As the name implies, it is a gas. It is almost always used compressed.

Natural Gas (Honda Civic GX)

- 220 miles on 1 tank of fuel
- $24,590
- Seats 5 people
- Emits only CO2
- 24- 36 mpg gasoline equivalent

Comparison

	Rechargeable (Tesla)	Rechargeable (GEM)	Solar	Fuel cell	Compressed air	Hybrid	E85	Natural gas
Sustain 60 mph	5	1	3	4	2	4	6	n/a
200 miles without refueling	3	1	6	4	2	5	n/a	3
Under $25,000	2	5	1	n/a	5	4	n/a	3
0 to 60 in 10 sec.	4	1	n/a	2	n/a	n/a	3	n/a
Few harmful emissions	2	2	3	2	2	n/a	n/a	1
50+ mpg	5	5	6	4	5	3	1	2
Can hold 4 people	2	3	1	3	n/a	4	4	4
Total	**23**	**18**	**20**	**19**	**16**	**20**	**14**	**13**

Rank Order- 1 worst

Note: There are other ups and downs not shown in this comparison. Please refer back to detailed car description for that info.

Conclusion

- All of the cars have their own pluses and minuses. Really, all the cars, overall, are about the same in practicality. Seeing as none of them are perfect, it greatly depends on what you want your car to do that decides which car would be the best for you. For instance, if cost is a concern, you might consider a compressed air vehicle. If you go on long drives, you might want to have a fuel cell car. Also, it appears that there are plenty of good options that don't run on gasoline!

Sources

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