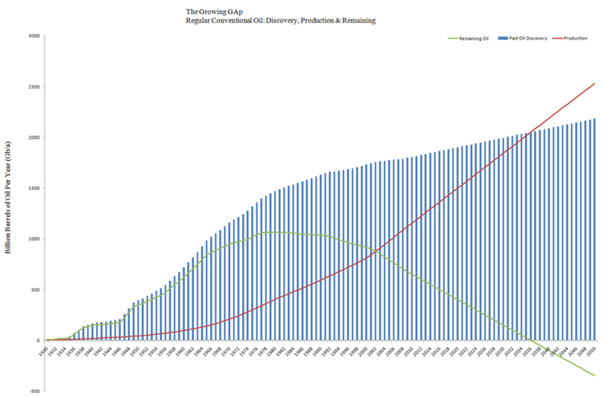
PEAK OIL

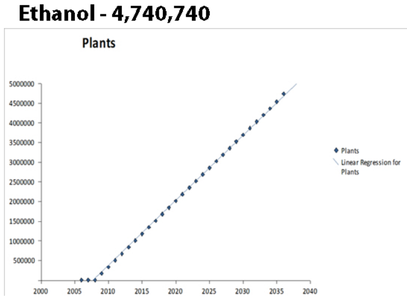
2003 - Production exceeded discovery and known oil reserves began to shrink

2036 - Predicted date that discovered oil reserves will be depleted

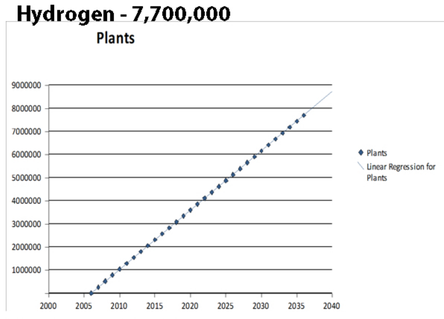


Number of alternative fuel plants that will be required to offset oil dependency by 2036

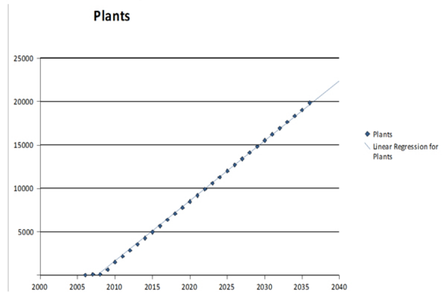
Ethanol - 4,740,740



Hydrogen - 7,700,000



Biodiesel - 19,849



ALTERNATIVE FUELS

FUEL TYPE	AVAILABILITY	COST OF FUEL (GAL)	EMISSIONS	PROS	CONS	INFRASTRUCTURE
Vegetable Oil (WVO, SVO)	Local greasy food restaurants and factories. As of 2000 the United States was producing in excess of 2.9 billion gallons of waste vegetable oil annually. WVO, SVO, PPO.	Free other than initial cost for filtration system	Less carbon dioxide and sulfur. More nitrous oxides	From current production 1% of US oil consumption could be offset. Not very difficult or costly.	The EPA clearly states it is illegal to burn SVO (straight vegetable oil).	Viable as a fuel today. Small systems with a centrifuge can handle 5-7 gallons per hour. Larger systems are feasible.
Biodiesel	Same as vegetable oil; Fats and oils from sources such as soy beans, waste cooking oil, animal fats, and rapeseed	Initial investment in reactor required. Costs are dependent on cost of methanol and catalyst used to create fuel	Biodiesel is domestically produced, renewable, and reduces petroleum use 95% throughout its lifecycle.	Could offset 1% of US oil consumption. No vehicle modification necessary. Lubricity is improved over that of conventional diesel fuel.	Needs at least a B20 mix to be used in freezing winter climates. Hoses and seals may be affected by higher-percent blends.	Viable as a fuel today. 100 gallon per day reactors can be acquired easily.
Algae Fuel (biodiesel/biobutanol)	Can be grown on ocean or wastewater. Yields claims cover a vast range from 5,000 to 150,000 US gallons of oil per acre per year. Algae can produce 15-300 times more oil per acre than conventional	Expensive processing plants.	Depends on the production process. Systems have been made to recycle CO2 emissions from power plants.	The United States Department of Energy estimates that if algae fuel replaced all the petroleum fuel in the United States, it would require 15,000 square miles.	Energy losses due to converting the algae lipids into fuels.	Only a few plants exist, however bio-fuel infrastructure is fairly abundant.
Hydrogen fuel cell	Hard to acquire. Moving and storing mass quantities is unpractical and costly. Non-existent infrastructure.	With renewable energy produced on site, gas only costs initial instalation of equipment + maintanence.	Depends on type of production of hydrogen and oxygen (renewable energy?)	Potential for near-zero greenhouse gas. Doesn't need to be imported. Low noise. When hydrogen is used in fuel cell applications, maintenance should be very minimal.	low volumetric energy density calls for a large tank. Moving and storing mass quantities is unpractical. Lack of infrastructure. Cost.	Fueling stations already exist in southern California. Fuel cost is comparable to gasoline.
Propane/LPG	A by-product of petroleum refining or natural gas processing. Approximately half of the LPG in the U.S. is derived from oil, but no oil is imported specifically for LPG production.	World prices of LPG in general move in line with crude oil prices, although as with most commodities it does have its own supply and demand parameters, which is a critical determinant of price.	Fewer toxic and smog-forming air pollutants.	85% of LPG used in U.S. comes from domestic sources. Less expensive than gasoline. The gaseous nature of the fuel / air mixture in an LPG vehicle's combustion chambers eliminates the cold-start problems associated with liquid fuels.	Extremely explosive. Fewer miles on a tank of fuel. No new passenger cars or trucks commercially available (2004 only1).	There are over 3,000 publicly accessible fueling stations nationwide.
Ethanol	Abundant in Midwest. Comes from corn, grains, or agricultural waste (cellulose).	It is cheaper than gasoline in some areas, such as the Midwest, and more expensive in others.	Ethanol is produced domestically. E85 reduces lifecycle petroleum use by 70% and E10 reduces petroleum use by 6.3%.	Domestically produced, reducing use of imported petroleum. Practices are very similar, if not identical, to those for conventionally fueled operations. Byproducts in production can be used in other applications.	In the US, takes 1 gallon of fossil fuel to produce 1.3 gallons of ethanol. Less efficient than gasoline. Can only be used in flex-fuel vehicles. Currently expensive to produce. Fuel ethanol content is lowered to 70% in the winter in cold climates to facilitate cold starts. Special lubricants may be required.	Already avaiable at many gas stations around the country. Most popular in the midwest.
CNG	Domestic, available around the world. Underground reserves.	Less expensive than oil. Anywhere from $0.95 to $2.50 in the midwest. Usually just over $1.	60-90% less smog-producing pollutants. 30-40% less greenhouse gas emissions.	Most abundant natural resource in the US(could lessen dependence on foreign countries). Nearly 87% of U.S. natural gas used is domestically produced. Less expensive than gasoline. Very safe.	Only slightly "greener" than petroleum based fuels. Fewer miles on a tank of fuel. High-pressure tanks require periodic inspection and certification.	Vehicles already on the road. Ford, Honda, Mercedes... Stations exist in many locations, many of which are private. The Clean Air Act approves EPA certified conversions for vehicles as a clean fuel. Pipelines already exist around the country.
LNG	Domestic, available around the world. Underground reserves.	Less expensive than oil.	Cleaner for the environment than diesel.	Liqufication reduces volume about 600x. Same horsepower. Very safe.	Need to put through a refridgeration process and kept cold during transport. High-pressure tanks require periodic inspection and certification.	Popular in austrailia, Lacks infrastructure in US.

Available now/Extremely feasible in the near future

Fairly possible in the next decade

Not likely to become a viable fuel option in the foreseeable future

CURRENT ALTERNATE FUEL VEHICLES

Ethanol

Volkwagen TotalFlex

Electric

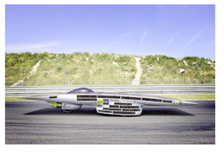
Tesla Roadster

GM EV1(no longer in production)

Hydrogen

Honda FCX Clarity

Solar



Propane

Ford F-150 Roush

Natural Gas

Honda Civic GX

Biodiesel