LAFAYETTE COLLEGE

Internal Combustion Engine Cars Fact Sheet

Brandon Commodaro
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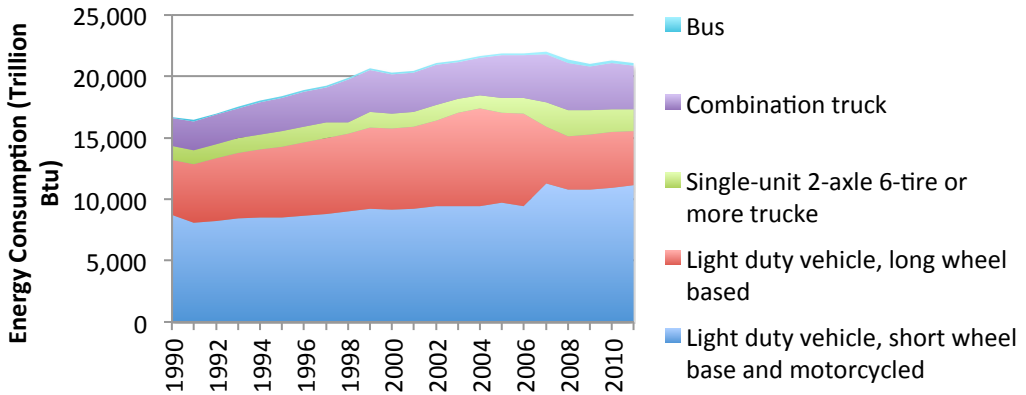
Last Updated: 4/15/14

IC Engine Fuels (HHV)

IC engine cars can operate using a variety of fuels

- *Gasoline - regular 87 octane* (124,340 Btu/gal)
- *Diesel – No.2* (137,380 Btu/gal)
- *Biodiesel* (127,042 Btu/gal)
- *Ethanol – E100* (84,530 Btu/gal)
- *Natural Gas* (22,453 Btu/lb)
- *Propane – LPG* (91,410 Btu/gal)

Domestic Energy Consumed by Mode of Transportation



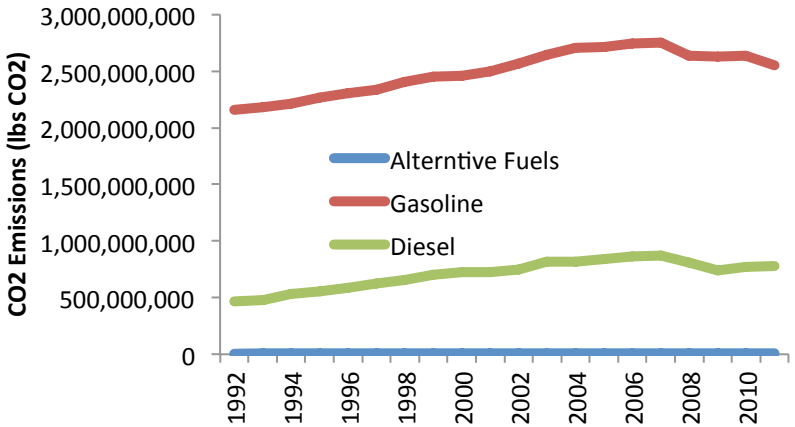
2012 US Car Sales

- *Passenger and Commercial Vehicles:* 4,976,954
- *Hybrid Vehicles:* 431,798

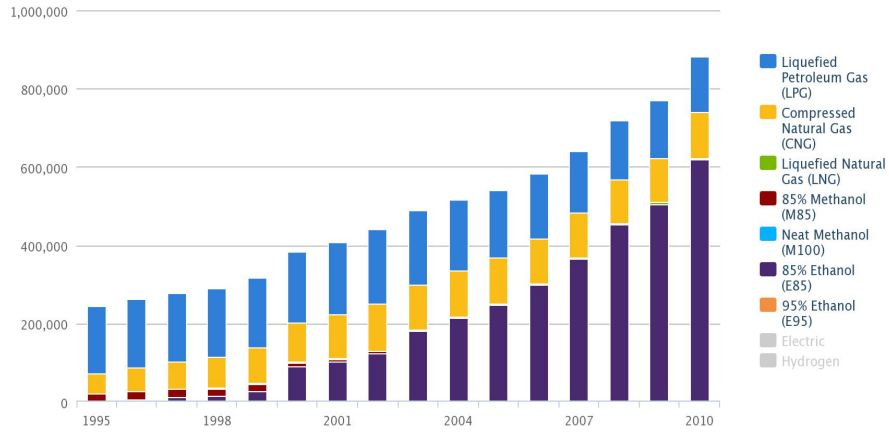
Carbon Intensities (CO_2/ kWhr)

Gasoline: 0.265 kg
Electric: 0.539
Diesel: 0.252

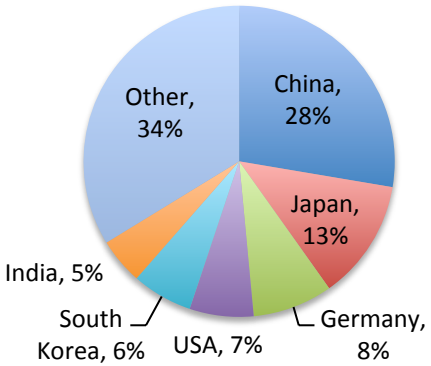
Domestic CO_2 Pollution For Highway Vehicles



IC Engine Alternative Fuel Vehicles in Use in the U.S.



2013 Global Car Production



Trends and Innovations in Technology

- CAFÉ Standards regulating minimum allowable fuel efficiencies for consumer automobiles are set to steadily increase until 2025
- With Tesla's mission with its Gigafactory, electric car battery cost might decrease to the point where electric vehicles stand as a viable alternative to internal combustion vehicles
- If half of the passenger vehicles in the US were replaced with 100% electric vehicles, CO_2 emissions produced from passenger vehicles would increase by 60.7%

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IC Engine Fuels (HHV)

- Data came from the US Department of Energy
- Alternative Fuel Data Center

http://www.afdc.energy.gov/fuels/fuel_properties.php

Domestic Energy Consumed by Mode of Transportation

Graph from US Department of Transportation

- http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_04_06.html

Car Sales from US Department of Transportation

- http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_01_15.html_mfd
- http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_01_19.html

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Domestic CO_2 Pollution For Highway Vehicles

- CO_2 pollution was calculated assuming gasoline carbon intensity of 19.56 lbs CO_2 per gallon
- Data from the US Department of Transportation alternative fuel consumption in terms of equivalent gallons of gasoline

http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_04_10.html

IC Engine Alternative Fuel Vehicles in Use in the U.S.

- Data from the US Department of Energy Alternative Fuel Data Center

http://www.afdc.energy.gov/data/10300

2013 Global Car Production

- Global Car Production from the International Organization of Motor Vehicle Manufacturers (OICA)

http://www.oica.net/category/production-statistics/

- CAFE Standards

http://www.nhtsa.gov/Laws+&+Regulations/CAFE+-+Fuel+Economy/Environmental+Impact+Statement+for+CAFE+Standards,+2017-2025

Trends and Innovations in Technology

- Tesla Gigafactory

http://www.technologyreview.com/news/526126/does-musks-gigafactory-make-sense/ (Final EIS (July 2012)

- Calculated values assuming that all passenger US vehicles were gasoline internal combustion engine.
- Energy consumption by mode of transportation was taken from the US Department of Transportation

http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_04_06.html