**Objective:**
Compare dollar cost and CO2 emmissions for our 14 ft displacement dinghy powered by a 5hp Honda 4-stroke vs. an electric 1 kw DC/ lead acid system. To equalize the max. power discrepency, both gph and W/h are determined by measurements on the same boat and at the same speed = 5 mph.
Joe Grez Feb 4, 2011

**Conclusions:**
In the USA and on average, this electric boat emits, approx 1/8 the CO2 emissions as the gasoline version.

If maintenance and repairs are included, the cost per mile difference multiplier is 1.6 in favor of the electric system.

New system purchase prices are comparable.

Different regions will have vastly different CO2 results depending on their particular mix of solar, wind, nuclear, coal, dams etc.

Average USA pricing rates were used for the analysis. Results for your region may be quite different. Gasoline prices vary from $2.90 to $3.40 and electricity rates vary from 8 cents to nearly 29 cents.

**Assumptions:**

| | | | | |
|---|---|---|---|---|
| energy density of gasoline | 33.8 | kwh/gal | | |
| electricity cost, national average * | 0.12 | $/kwh | | |
| gasoline cost, national average ** | 3.25 | $/gal | | |
| co2 rate for electricity generation, national average *** | 0.67 | tons/MWh | 1.34 | lb/kwh |
| co2 rate for gasoline engines **** | 19.56 | lb/gal | | |
| average yearly usage | 240 | miles per year | | |
| battery lifetime | 5 | years | | |
| electric system maintenance per year (parts only) | 30 | dollars/ yr | $150 for batteries/ 5 years | |
| gasoline system maintenance per year (parts only) | 11 | dollars/ yr | $5 per year in oil plus $30/5 years for water pump | |

| | |
|---|---|
| * http://www.eia.doe.gov/electricity/epm/table5_6_a.html | current |
| ** http://www.eia.doe.gov/petroleum/data_publications/wrgp/mogas_home_page.html | current |
| *** http://www.eia.doe.gov/oiaf/1605/pdf/EFactors1998-2000.pdf | Apologies; this is for 2002. |
| **** http://www.carbonfund.org/site/pages/carbon_calculators/category/Assumptions | current |

| **Analysis:** | miles per gallon | miles per kWh | $ per mile (electricity only) | $/mile including maintenance | miles/lb CO2 |
|---|---|---|---|---|---|
| gasoline, 5 mph | 16 | | 0.20 | 0.25 | 1.2 |
| electric, 5 mph | | 4.6 | 0.026 | 0.15 | 0.14 |
| multiplier | | | 7.8 | 1.6 | 8.4 |

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