

# Cars

## Physics and Mathematics of Sustainable Energy

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A few facts:

- Gasoline: 10 kWh per litre or 38 kWh per gallon
- Typical gas mileage for car: 30mph, but this ranges considerably.
- Carbon intensity of gasoline: 240g per kWh.
- Carbon intensity of electricity generation in the US: let's us 500 g per kWh. (This varies around the country and from day to day depending on the particular mix of electricity on the grid at any one time.)

1. Suppose you drive 20 miles each way to work every workday in a typical gas car.
  - (a) How much gas does this use?
  - (b) How much energy does this use? Answer in kWh per person per day. Is this a lot or a little?
  - (c) How much carbon dioxide is emitted by the car in one year? Answer in tons per year. Is this a lot or a little?
2. Suppose you have two lights on your desk that you leave on for an average of 2 hours a day. You switch from a compact fluorescent bulbs that draw 14 watts to LEDs that draw 7 watts.
  - (a) About how much energy will you save in one year?
  - (b) How much less CO<sub>2</sub> will be emitted as a result?
  - (c) How far would you have to drive to emit an amount of carbon dioxide equivalent to that which you saved by switching bulbs?