

# Cars

## Physics and Mathematics of Sustainable Energy

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A few facts:

- Gasoline: 10 kWh per liter or 38 kWh per gallon
- Average gas mileage for car in US: 25mpg, but this ranges considerably.
- Carbon intensity of gasoline: 240g per kWh.
- Burning one gallon of gasoline releases around 9 kg of CO<sub>2</sub>.

1. Suppose you drive 20 miles each way to work every workday in a typical gas car in the US.

(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 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? (Use 350g/kWh for the carbon intensity of electricity.)

(c) How far would you have to drive to emit an amount of carbon dioxide equivalent to that which you saved by switching bulbs?