Alternatives to Petroleum for Transportation

**Natural gas?** (via compressed natural gas) energy cost/mile at today’s prices is approx. 70 percent that of gasoline. Problems? greenhouse gas, retail infrastructure

**Hydrogen?** (fuel cells or combustible)

**Biofuels?**  Drawbacks include:

1. Photosynthesis operates with a very low power density (see graph), thus requiring large areas of farmland
2. Humanity already claims a large share of the biosphere’s primary productivity (~one fifth) and would cause a large loss of biodiversity and land degradation
3. Economic and net energy costs are very high, due to energy required for fertilization, machinery, irrigation, and biomass conversion

Example of US corn: ethanol is 10 percent of US automobile gasoline, but occupies 40 percent of US corn land. Ethanol for all motor vehicle fuel would take all suitable farmland in the United States

One acre of corn ethanol as fuel vs one acre of solar panels to power an electric car: which would power a car a greater distance from one year of production?

1. Most land that could be used to grow biofuel crops could or is already used to grow food. Rising food prices have already happened due to biofuel production. (corn for tortillas in Mexico)

**Electric automobiles:**

* Cost of batteries
* Energy cost per mile
* Maintenance cost
* Can EVs disrupt global oil markets?