Just refrigerator efficiency saves more energy than all that we're generating from renewables, excluding hydroelectric power... I cannot impress upon you how important energy efficiency is. It doesn't mean you eat lukewarm food and your beers are lukewarm. You can still have it; you just make a better thing.

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Energy in Everyday Life

Order of Magnitude Estimate

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If our cars could burn trash for fuel, what fraction of our transportation energy needs could be supplied?

Our guidelines for making an order-of-magnitude estimate:

* *Guess*
* *Talk to your gut*
* *Divide and conquer*
* *Lie skillfully*
* *Punt*
* *Use guerrilla warfare*
* *Lower your standards*
* *Cross-check*

Its probably more than 1% but likely less than 100%, so i'll guess we could meet about 50% of our transportation energy needs by burning trash as fuel.

The US population is about 300 million people, and on average it is ~1 car per person.

OK. Let's now estimate the mass of gasoline used by 1 person in a year.

The average person drives ~12000 miles per year in a car that gets ~25 miles/gallon of gas. So in one year that is 12,000 ÷ 25 ~ 500 gallons ~ 2000 liters of gas.

Water has a mass density of 1 g/cm^3 = 1 kg/liter^3 and gas is kinda like gasoline, so the mass of gasoline used by 1 person in a year is ~ 2000 kg.

OK. Let's now estimate the mass of trash generated by 1 person in a year.

My household of three puts out a trash can every week that weighs ~80 lb. So each person in my house generates ~25 lb/week, which is ~ 12 kg/week.

I'll assume we are average over the USA. Thus each person generates 12 kg/week x 52 weeks/year~ 600 kg/year.

Wow!
We burn ~3 times more gasoline (2000 kg) than we generate in trash (600 kg).

Now we need to compare the energy content of trash relative to gasoline.

Trash is mainly paper, food scraps, plastic and (generally) non-combustibles like glass and metal.

The energy density of paper is likely more than 10% and certainly less than 100% of gasoline, so i'll estimate 50%.

The energy density of food scraps is less, and that of plastic is more, so we'll estimate that the overall energy density of trash is 50% that of gasoline.

Since trash production is ~1/3 of gasoline consumption and the energy density of trash is ~1/2 that of gasoline, we would reduce our transportation energy needs by ~1/3 x 1/2 = 1/6 ~20%.

Provided we could burn trash in our cars as efficiently as we burn gasoline …

GutCheck