



Short takes

Posted by [Engineer-Poet](#) on April 24, 2007 - 5:54pm

Topic: [Alternative energy](#)

Tags: [agw](#), [biodiesel](#), [carbon tax](#), [fuel economy](#), [innumeracy](#) [[list all tags](#)]

[ED by PG:] Engineer-Poet graces us with a new "Short Takes" segment--a few interesting takes all thrown together, whether it's educating us on differential equations, cracking on the MSM for being innumerate or dropping snarky limericks on us--there's nothing quite like the E.P.-ster, and it's under the fold.

The Toledo Blade gets it wrong

First, innumeracy in the media: The Toledo Blade [editorializes](#) that the new EPA ratings for hybrid vehicles rate them worse compared to guzzler counterparts. The specific example cited is the Prius' rating falling all the way from 55 to 46 MPG, while a large pickup only drops from 16 to 15. Hey, a drop of 1 MPG is a lot better than 9 MPG, right?

Wrong this time. That's not how we use fuel; what we actually *use* isn't miles per gallon, but gallons per mile. Taking the *difference of gallons per mile* gives the real comparison.

Between the old and new driving cycles, the Prius's fuel consumption rises from 1/55 to 1/46 gallons/mile. This is a difference of $(1/46 - 1/55) = .00356$ gallons/mile. The pickup's consumption rises from 1/16 to 1/15, a difference of 0.00417 gallons/mile. So in this case, a difference of 9 MPG is actually a smaller increase than a difference of 1 MPG. The editorial gets it exactly backwards.

Why did the Blade editorialists make this mistake? Perhaps because they don't use numbers much, and don't have their claims checked by anyone who is. This kind of error leaps out at anyone who is familiar with differential calculus*. What does this say about the breadth of education among journalists? A more sinister possibility is that they don't care about the facts, and hope to mislead a readership which is as bad with numbers as the editorialists made themselves look. Either way, they did the public a disservice.

Which is a call for snarky limericks addressed to the Blade editors:

Though the EPA changed its routine
For the way that it tests each machine
You went down the wrong path
When you fix up your math
That old Prius still comes out more green.

* The differential of the function $y=1/x$ (the relationship of MPG to fuel consumption) is $-1/x^2$. This means that the value of the function is changing, not 3 times, but **9 times as fast** around

$x=15$ than around $x=45$. A calculus student would expect the 9 MPG change around 55 to make less difference than a 1 MPG change around 16. Algebra makes it only a bit less obvious: $(1/x - 1/y) = 3 \cdot (1/(3x) - 1/(3y))$. Even checking with mere arithmetic would have caught it. To get this wrong by accident requires a rather deep level of ignorance. Is it past time to require at least Algebra II for all journalism majors... indeed, for any 4-year degree? It sure wouldn't hurt.

"Green" diesel subsidies: more \$/ton than a carbon tax

RR [writes about biodiesel companies complaining about big competitors](#). What struck me wasn't the competitive aspect, but the huge cost of the subsidy per ton of CO₂ avoided.

A gallon of diesel fuel is about 7.67 pounds; at 12/14 carbon by weight, it contains 2.98 kg of carbon. Each 12 grams of carbon burns to make 44 grams of CO₂. A \$1.00/gallon "green diesel" subsidy costs about 33.5¢/kg of carbon or about \$91.50/tonne of avoided fossil CO₂ emissions.

That figure is mighty high; the suggested cost of carbon taxes is much lower. The Stern review puts the "social cost" of the marginal ton of CO₂ at \$85; if it cost more than that to avoid emissions, it wouldn't make any sense to do it. An effective tax on CO₂ would probably need to be no more than \$30/ton. Why are we paying 3 times that for diesel we can call "green"?

That's a rhetorical question, of course; we're paying it because the subsidy is less about the climate and even US balance of payments than bestowing legislative favors. We could accomplish a great deal more for all of the putative goals by taxing fossil fuels more, and other things less. The problem with that is that it has no narrow constituency which can be tapped for campaign contributions. Is there any chance that our legislature will ever do the right thing instead of what gets them the biggest handouts?



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