

# Net energy -- a useless, misleading and dangerous metric, says expert

**As oil becomes scarce, the world needs new transportation fuels. As new fuel options develop we need means of assessing which are most effective at replacing petroleum. So far many scientists have used a measure called 'net energy'.**

However, Professor Bruce Dale from Michigan State University claims, "Net energy analysis is simple and has great intuitive appeal, but it is also dead wrong and dangerously misleading – net energy must be eliminated from our discourse." Dale's perspective is published in the first edition of *Biofuels, Bioproducts and Biorefining*.

Instead, Dale recommends comparing fuels by assessing how much petroleum fuel each can replace, or by calculating how much CO<sub>2</sub> each produces per km driven.

A fuel's 'net energy' is calculated by attempting to assess how much energy a new fuel supplies, and then subtracting the energy supplied by fossil fuels needed to create the new fuel. The calculation is often carried out in a way that leaves grain ethanol with a net energy of -29%, giving the impression that it uses more fossil fuels to produce it than the new fuel supplies. Dale claims that this figure is then used by opponents of biofuels to pour scorn on the new products.

The problem with net energy, says Dale, is that it makes an assumption that all sources of energy (oil, coal, gas etc) have equal value. "This assumption is completely wrong – all energy sources are not equal – one unit of energy from petrol is much more useful than the same amount of energy in coal...and that makes petrol much more valuable," says Dale.

For evidence, he points to the markets, where a unit of energy from gas, petrol and electricity are worth 3.5, 5 and 12 times as much as a unit of energy from coal, respectively.

"Clear thinking shows that we value the services that energy can perform, not the energy per se, so it would be better to compare fuels by the services that each provides...not on a straight energy basis...which is likely to be irrelevant and misleading," says Dale.

For example, biofuels could be rated on how much petroleum use they can displace or their greenhouse gas production compared with petroleum. His calculations indicate that every MJ of ethanol can displace 28 MJ of petroleum, in other words ethanol greatly extends our existing supplies of petroleum. Using corn ethanol provides an 18% reduction in greenhouse gasses compared with petrol, while fibre-produced ethanol gives a 88% reduction compared to petrol.

"As we embark on this brave new world of alternative fuels we need to develop metrics that provide proper and useful comparisons, rather than simply using analyses that are simple and intuitively appealing, but give either no meaningful information, or worse still, information that misleads us and misdirects our efforts to develop petroleum replacements," says Dale.

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