

# Flarend tells AAPT about energy savings

Richard Flarend has taught an energy and environment course at Penn State Altoona the past five or six years. On 30 July 2007 at this summer's meeting of the American Association of Physics Teachers (AAPT) in Greensboro (NC), he shared some of what he does in that course in a talk on "Home Energy Savings After the Light Bulb." That is to say, after you've replaced all your light bulbs with compact fluorescents (and also bought a new more energy-efficient refrigerator), then what do you do?

The "energy crisis," Flarend said, can be interpreted as a political issue (in terms of global warming) or an environmental issue (pollution), but he prefers to talk about it to his students as an economic issue: supplies (of fossil fuels) are dwindling, and prices have gotten too high. He has his students investigate their last twelve months of electric and fuel bills, but he finds them most conversant with gasoline. He lamented the current downward trend in fuel economy due to switching from cars to trucks. Only in 2006 did fuel economy replace a cup holder in customer demand, he said.

Regarding the greater safety of more massive vehicles in collisions, Flarend noted that this is only for head-on collisions, which, he noted, are rare. On the other hand, lighter vehicles are easier to maneuver to avoid the more frequently-occurring collisions -- and they get twice as many miles to the gallon of gasoline. Flarend viewed the added cost of a heavier vehicle as a \$3 tool paid to do the special things it's needed for and suggests renting a larger vehicle for the few times it's needed. He cited lifetime savings between \$4000 and \$9000 for hybrid vehicles, more than their added cost.

Ethanol is not a solution, Flarend went on, because it would require half our 400 million acres growing corn to yield at 100 bushels per acre to replace all our gasoline use. The hydrogen fuel cell is merely an alternative to the battery, he added, and it suffers from a lack of infrastructure to service it.

To heat homes, Flarend advocated heat pumps, which use less energy than oil or gas, also produce no carbon dioxide emissions. Homes should be built air tight but with effective ventilation systems that can be controlled, he noted. For a 10% increase in price, a house can be built to use only half the energy from utilities -- savings that will continue after the mortgage is paid and will increase with energy prices. Electric prices will not increase as much as fuel prices, he said, because of alternative and more efficient ways to generate electricity.

And, within the home, Flarend pointed out that a front-loading washer saves \$200 a month and that an energy recovery drain preheats incoming water thus reducing the water heater load.

Flarend urged his listeners to visit [www.dsireusa.org](http://www.dsireusa.org) for state energy incentives and to make sure to take advantage of federal credits as well -- on alternative fuel autos, photovoltaic

panels, windows and skylights, HVAC, and insulation. But, because of the enhanced demand for these items, Flarend cautioned that the mark-up on them is currently high.