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Ultimate Fuel Saver: Sugarcane, Grass

If Filipino sugarcane farmers are hurting today from flat world prices and substitute sweeteners, wait will 2010. By then, the 50-percent tariff on sugar imports will dip by WTO command to 5 percent. Either they shape up efficiencies or ship out of global competition. But 50 or so legislators from Sugarlandia have found a way to save them by making ethanol from sugar a mandatory gasoline additive. By stroke of chance, it will also enrich corn, cassava and rice planters, for their starchy crops too can yield bio-ethanol. The rest of the country can benefit from cheaper fuel and cleaner air.

Recently approved by the House committee on energy is a bill that would require mixing 5-percent local ethanol to imported gasoline. On the fifth year, it should be 10 percent. The aim is to cut RP's dependence on fuel from crude oil whose prices continue to rise as world stocks decline. Oil miners admit their reserves will last only up to 40 years, and speculations further push prices to unprecedented heights. Too, ethanol would replace methyl tertiary butyl ether as an additive that lowers carbon monoxide emission. The Clean Air Act of 1999 had junked toxic lead as carbon reducer, but the alternate MTBE has been found just as harmful in causing acid rain and contaminating ground water, and is thus now banned in the US, Europe and Australia. Ethanol, as oxygenate to completely burn gasoline, emits no carbon monoxide, philstar.com reported.

Energy security and clean air may be tough to measure in peso terms, but not the economic benefits of gasohol, the mix of gasoline with ethanol. Bukidnon Rep. Miguel Zubiri, who researched and drafted the bill, says a 10-percent mix by 2010 would mean replacing 400 million liters of imported gasoline per year. That's from the present annual consumption of 4 billion liters; in five years, it would have grown to 6 billion, so ethanol blending would save the country 600 million liters of imports. The conserved foreign exchange would run to the billions of dollars.

Sugar planters naturally are ebullient. Wringing ethanol from cane sugar would mean diverting half of their produce from sweeteners to fuel. The prospect of new markets would now spur them to plant more instead of switching to other crops.

Millers are as happy. The process of ethanol production is simply to truck the cane to them for crushing to extract juice which, instead of being crystallized into sugar would just be fermented into biogas. The bagasse or crushed cane can be used as fuel to run the mill. For millers this spells more business at lesser costs. The first bio-ethanol plant of San Carlos Bio-energy Inc., with 25 million liters annual capacity, is scheduled for inaugural today in Negros Oriental. It is perhaps anticipating the tax breaks and other incentives to be offered under the bio-ethanol bill.

Motorists have reason to rejoice too. By Zubiri's computations, a liter of bio-ethanol would retail for P20-21, or 50 percent cheaper than gasoline, which now hovers at P30. Aside from peso savings and less emissions is extra engine power because of more efficient fuel burning. That also means less maintenance and repair costs for engine and fuel line clogs. There would be a strong temptation to go for blends higher than 10 percent. But that may not yet be possible because carmakers, although manufacturing for as high as 30-percent mix, specify only 10 percent without voiding the warranty. In Brazil, the pioneer in gasohol, filling stations sell the standard E-25 or 25-percent blend, but many motorists prefer as much as 65 to 85 percent and thus have modified their engines and fuel lines to avoid corrosion.

Oil companies are only too willing to switch from MTBE to ethanol, Zubiri assures. There's lower cost for them, since local biogas will be mixed to gasoline right in tanker trucks. Besides, word has spread that industry giant Petron will soon offer the blended product. Caltex, after launching a bio-ethanol brand in Queensland, Australia, is expected to follow suit in RP. Shell, which has repackaged itself from crude oil miner to bio-fuel pioneer, can't be far behind. Zubiri quotes the smaller players as looking at bio-ethanol as a way to lower their retail prices for bigger market slices.



Wringing ethanol from cane sugar would mean diverting half of sugar planters' produce from sweeteners to fuel.



An Illuminating Study

The use of highly-efficient, cost-effective white light-emitting diodes as a replacement for inefficient, polluting kerosene lamps common in the developing world, could potentially save tens of billions of dollars per year worldwide, according to a scientist at the US Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab).

Evan Mills, of Berkeley Lab's Environmental Energy Technologies Division, notes in an article in the May 27, 2005 issue of the journal Science that more than 1.6 billion people have no access to electricity, and many others have only intermittent access. As a result, those who can afford illumination when it's dark rely on lamps that burn kerosene, diesel, propane, or biomass-based fuels.

Mills proposes a lighting option that developing nations might use to reduce the cost of providing effective, cleaner lighting to their citizens. "As they modernise, developing countries can select better technologies, and in so doing surpass levels of efficiency typical of industrialised nation. The latest improvement is the solid-state white light-emitting diode [WLED]." In recent years, R&D performed by private industry as well as the US Department of Energy has made these light sources suitable for task illumination.



More than 1.6 billion people have no access to electricity, and many others have only intermittent access.



Mills also points out that LED systems are well-suited to developing nations as they are rugged, portable, use direct current, have long service lives, and run on widely available AA batteries, according to e4engineering.com.

"Evaluated in terms of total cost of ownership, (purchase plus operation), WLED systems emerge as the most cost-effective solution for off-grid applications," says Mills. He estimates that solar-powered WLEDs could appear on the market for \$25 without need for subsidy. The annual fuel saving for each lantern is on the order of a month's income for the poorest one billion people of the world, who often subsist on less than \$1 a day.

According to Mills, the problem of fuel-based lighting has been largely ignored by the energy policy community. Important next steps include more in-depth assessment of the opportunity, designing and field-testing affordable high-performance systems for various applications, mounting pilot programs, and developing viable business models for reaching the target markets.

"Studies show that illumination, one of the core end-use energy services sought by society, is available to people in industrialised countries at 1,000 times more energy efficiency than for the unelectrified poor in the developing world," Mills says. Fuel-based sources, such as a wick lantern, generate one-500th the illumination of electric light sources, and their energy efficiency is much lower.

Mills estimates that fuel-based lighting throughout the world consumes 77 billion litres of fuel annually, at a total cost of \$38 billion per year, or \$77 per household. This, he says, is equivalent to 1.3 million barrels of oil per day, roughly the total oil production of Indonesia, Libya, or Qatar, or half the total oil production of pre-war Iraq.

A single fuel-based lamp used four hours per day emits more than 100 kilograms of carbon dioxide into the atmosphere each year. Mills calculates that fuel-based lighting is responsible for about 190 million metric tons of carbon dioxide per year, equivalent to one-third the total emissions from the United Kingdom.

Despite these large numbers, unelectrified households receive much less light for their money than those in the industrialized world. Kerosene and other fuel-based lighting represents 17 percent of global lighting energy costs, according to Mills, but only 0.1 percent of lighting energy services, measured in terms of lumen-hours. The cost per unit of kerosene-based lighting is about 150 times higher than the highest efficiency fluorescent lamps.

High-efficiency LEDs provide white light, and the technology is improving as manufacturers devise products with higher light output and energy efficiencies, and lower cost per unit output.

Evan Mills, an energy efficiency expert, holds a prototype white light-emitting diode (WLED) made by a company called Ignite Innovations. This lamp, which grew out of a Stanford-led effort involving several Silicon Valley companies, Berkeley Lab, and others, features a one watt WLED, solar panel and rechargeable AA batteries. (Photo: Roy Kaltschmidt)



N-Power Key to Reduce Global Warming

The current climate change resulting in global warming is the greatest challenge facing the world and nuclear power is a ready option to replace the sources of energy production causing this warming. This was stated by Special Adviser to the Prime Minister on Strategic Programme Dr Ishtaq Ahmad at a seminar on Global Warming: Causes, Adaptation and Mitigation, organized by Pakistan Nuclear Society here on Friday.

Global warming is inducing the melting of glaciers which will result in high sea levels causing the submerging of many parts of the world. This change, appearing in extreme and unpredictable weather conditions, is threatening the water availability, crop yields, biodiversity and human health, Dr. Ahmad said, dawn.com reported. Global warming is being caused by greenhouse gases, produced due to burning of oil in industry and transport, specially the electricity-producing plants using oil as fuel. And only mitigating option available to us is the use of nuclear power which produces no greenhouse gases and other pollutants, he said.

Dr. Ahmad said nuclear energy was already meeting 17 per cent of world's energy demand and could replace the fossil fuel plants because it was safe, cost-competitive and environment- friendly. This necessity has been realized all over the world and all the relevant forums hold the firm view that nuclear energy is the only alternative to meeting the demand for clean electricity without any environmental implications. Pakistan is also embarking upon an ambition nuclear power program. Other clean sources of electricity like hydro, solar and wind have their own role, he added.

He said developing countries of South Asia were most vulnerable to climate change as their agriculture-based economies were climate sensitive. Being technologically backward, they have little capacity to adapt to the climate changes and lack financial capacity to face ravages of adverse climate. Other measures to mitigate the effect of greenhouse gases include enhancement of forests, energy conservation, improvement in fuel efficiency, disposal of carbon dioxide in depleted gas fields and its disposal under the sea but it involves costly solutions, the adviser said.

In order to bring about reduction in unwanted greenhouse gases coming from vehicular emissions, experiments to run the transport on hydrogen fuel are underway and this option is as yet uneconomical due to production cost of hydrogen. Nuclear energy has a role here again as being the only energy input which can produce hydrogen without greenhouse gases. Production of hydrogen through oil energy will cause the production of gases which are required to be eliminated, Dr Ahmad said.

On the adaptation measures, he suggested construction of new dams for increased water storage, improved irrigation practices, development of crop varieties as per climate changes, capacity building of farmers for adjustment to changed seasons, and genetic research in livestock sector for minimizing the adverse effects of heat stresses.

The adviser said the vital climate change research remained essentially neglected in Pakistan in the past, but in view of its significance in socio-economic domain, the government had initiated multidisciplinary efforts in this regard. A Global Change Impact Study Centre is conducting an organized study on the subject.



Future Belongs to Renewables

More than 5 millennia ago, the discovery of wind power changed the world. Sailors learned how to harness the power of the wind, powering vessels across the seas, spurring trade and commerce. Later, windmills became widespread, pumping water for agriculture and grinding grain. Long before the advent of fossil fuels, renewable energy—wind, biomass (wood and peat), and waterpower—was king. Coal, and then oil and natural gas, moved humanity into a new era of unprecedented growth, prosperity, and mobility, in which we are now firmly ensconced. Between 1800, just before the dawn of the industrial revolution, and 1990, world energy use went from about 400 metric tons of oil (equivalent) to over 30,000 tons—an almost tenfold increase. From 1970 to 1990, a single generation, the world's population climbed from 3.6 to 5.6 billion, and energy use more than tripled. Unfortunately, however, this prosperity has come at a price. The scientific consensus now clearly points to a significant warming of the planet, as carbon emissions



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from the burning of fossil fuels trap heat in the lower atmosphere which would otherwise be radiated into space. This has already led to visible shifts in weather patterns, and is predicted to cause widespread effects, including an increase in sea level sufficient to submerge coastlines the world over, drought, and major shifts in climate. The impacts on human civilization are expected to be so great that the Pentagon has identified global climate change as one of the most serious threats to world security in the coming decades, Cyprus-mail.com said.

The Earth is nothing more than a spaceship, traveling through the cold and forbidding vacuum of space, protecting its precious crew with a thin veil of gases. If this ship had been provided with a user's manual (as originally imagined by David Brower), it might have read like this:

1. The planet has been delivered in perfect working condition, and cannot be exchanged for a new one.
2. Please don't adjust the thermostat or the atmosphere--controls were preset at the factory for optimum performance.
3. The life support systems were thoroughly tested during a 3.5 billion year breaking-in period, and are capable of providing all of the food, water, and enjoyment required for a full and happy life. These systems are powered by a maintenance-free fusion reactor that will supply all energy required for another 5 billion years.

4. Air and water are in limited supply and are not replaceable; but they will recycle and purify themselves if there are not too many passengers on-board.

5. There is only one life per passenger, and it should be treated with dignity.

6. If there are too many passengers on board, read the emergency manual and be even more diligent that no foreign or toxic substances are introduced into the air, food and water.

Today's conventional carbon-based energy sources violate at least two of these rules, ignore another, and impinge on the remaining ones. But things are changing. The high energy prices of recent years have helped to spur a huge investment in renewable energy technologies. By going back to the past, with today's know-how, truly remarkable developments in wind and solar power production have occurred.

Electricity from the sun, using photovoltaic (PV) cells, is now cheaper and more widely available than ever. Sun is abundant and free to all, as the user manual points out. Nor does it harm the environment--in fact it is completely benign. Even energy giants like Shell and BP have seen the huge potential of solar power and have invested heavily in new PV technology--which is now available in Cyprus. The cost of PV cells has dropped 95 per cent since the 1970s, and keeps falling. Government subsidies are now available to individuals and businesses in Cyprus to help cover the costs of installing solar power systems. With over 300 days of sun a year, this island is an ideal place for sun power.

Wind power is now the fastest growing energy technology in the world, according to the US National Renewable Energy Laboratory (NREL).



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