

Tuesday 15 November 2005

**SUBMISSION**  
**PETROL PRICING SELECT COMMITTEE (CAIRNS)**

Rising oil prices are having an adverse impact on Australia's economy as is self-evident from much publicised economic data and stock market performance.

Australia needs a responsible energy plan, which will balance our transportation requirements with the necessity to reduce the spiralling costs of fuels.

Oil prices have been on a roll this year. And this has happened despite the Organization of Petroleum Exporting Countries (OPEC) increasing its oil output.

Earlier this year, the run up in oil prices was attributed to surging demand for petroleum products due to a strong global economy.

Concerns on security of oil supplies have heightened as a result of the war in Iraq and unrest in other oil producing nations.

While the underlying factors behind the dramatic increase in the price of oil this year are a combination of all the above, the impact is hardly comforting.

Higher oil prices, which work like an added tax, have the effect of holding down employment, consumer spending, and private sector profits.

The rate of employment growth is slowing as business confidence appears to be undermined by rising oil prices. High oil prices are also taking the bite out of consumer spending as the lion's share of oil consumption stems from transportation cost and its subsequent effect on consumer markets.

To bring clarity to energy security, we need a comprehensive long-term national energy strategy that will reduce our reliance on oil while meeting the nation's growing transportation needs.

Both the supply and demand sides of the transportation issue will have to be addressed to make a meaningful impact in reducing our dependence on oil. Steps to reduce the costs associated with domestic transportation fuels must be implemented to meet transportation needs.

From a longer-term perspective, it is prudent to develop alternatives to oil. Renewable energy sources such as solar, wind, geothermal, biomass based fuels and ethanol as well as technologies such as hydrogen powered fuel cells offer the potential to migrate from the fringe.

If Australia's dependence on oil is not reduced, the course of our National & State economies may well be shaped by decisions made by OPEC rather than what is in the best interests of Australia.

With regard to ethanol, it is an absolute nonsense for politicians of all persuasions to speak of '... helping our sugar cane farmers', when talking up the purchasing of E10 fuel. Ask any cane farmer how much do they receive from the sale of E10 fuel!

The answer is simple... **NOTHING... ZILCH** or... **not a brass razoo!**

No other country in the world is more dependent on transport than our own. Why then is the present fuel price extortion allowed to continue? I doubt if any Government could get away with it if we had not been conditioned to believe that liquid hydrocarbon resources were finite, raising the spectre of running out of fuel and society grinding to a halt, and perhaps descending into anarchy.

Governments however appear to have no interest in countering the nonsense of this rhetoric. The fear and uncertainty it engenders creates the ideal environment to burden us with more taxes, draconian legislation, and reduce our expectation of improved living standards. All this is done for our own good of course.

In an absolute sense oil resources may be finite; however, for the foreseeable future, the more we look the more we find. This is the case with all other minerals. An example is the vast quantities of oil located and capped on Cape York!

The claims and counter claims about petrol prices continue to frustrate an already bewildered public. OPEC blames the Government tax takes and the Government blames OPEC for the high US dollar price per barrel. In Australia we get a double whammy because of the relative weakness of our dollar against the U.S. currency.

The truth is both governments and OPEC are to blame. Our own Federal Government collects almost 50 cents on every litre of petrol sold. Governments claim that they need the revenue to provide for all the facilities we demand. The Government's take is so large, and obviously has such a large impact on the price, that there has to be a better way.

According to RACV figures the 46.5 cents federal excise collected, plus GST, which is in effect a tax on a tax on every litre of fuel, amounts to \$12.4 billion a year, yet Canberra only spends \$1.7 billion on roads!

One would be forgiven for asking... where is the massive \$10.7 billion per year (and mounting) unaccounted-for excise funds going?

In 2000, the Western Australia Government's Select Committee on Fuel Prices made some significant findings that indicates:

- The impact of high fuel prices is **greater** in the country than the city
- The gap between country and city fuel prices has **widened since deregulation in 1993**
- The major oil companies **dictate and manipulate** retail prices at franchisee sites
- The way GST is applied on fuel discriminates against country consumers
- Retail competition has been **limited to the city**
- Freight is **not** a major factor in the price differential between city and country prices
- Oil companies **do not generally discount** in the country areas of the State
- Oil companies **do not offer price support** in the country areas of the State
- Oil companies have **made windfall gains from world parity pricing**

I am a proponent of **HYDROGEN** fuels and suggest the following as a solution for outrageous fuel prices...

Hydrogen can be made from water by using the energy of the sun to create an electric current which can then be utilized to split (electrolyse) water into hydrogen and oxygen.

Wind power, tides and falling water (hydro-electric turbines) can also create electricity to split water into hydrogen and oxygen. When hydrogen is produced from the sun or other renewable energy sources it is called "Solar-Hydrogen"

Hydrogen can be produced from water, sewage, garbage, landfill accumulations, agricultural biomass, paper product wastes and many other waste streams that contain hydrogen-bearing compounds.

Hydrogen can be used as a clean burning, non-polluting fuel in virtually every application where other fuels are used today.

Because hydrogen is pollution free, small personal or local power plants could be designed to utilize much of the energy we now throw away. Cogeneration with hydrogen could at least double energy utilization compared to present practices.

These power plants could be mass-produced so that the cost per kilowatt will be substantially less than that of large conventional power plants.

All fuels need air (oxygen) for combustion. Hydrogen is the only common fuel that is not chemically bound to carbon; therefore when hydrogen burns in air it produces only heat energy, water and possibly trace amounts of oxides of nitrogen. Water and oxides of nitrogen are natural in our atmosphere.

When hydrocarbon fuels (coal, oil, natural gas, propane, wood) burn they may create serious pollutants like carbon monoxide (a poisonous gas which is produced by incomplete combustion) and carbon dioxide... (a greenhouse gas).

Hydrogen is the only fuel whose production and end use can both contribute directly to eliminating many of our most insufferable economic, health and environmental problems.

Unlike electricity, whose production as a secondary energy medium must be juggled to accommodate peak usage periods, hydrogen can be transported and stored for industrial and domestic needs and to make electricity at virtually any time.

It is less expensive to move hydrogen across the continent as a compressed gas by pipeline than an equal amount of electrical energy. Liquid hydrogen is the safest and most economical choice for moving energy across the oceans.

Hydrogen would be most cost competitive at 20-25 cents a litre equivalent of unleaded petrol. This estimate is based upon large-scale extraction of hydrogen from biomass wastes or solar thermal extraction techniques utilizing large parabolic solar concentrators called 'Gensets'.

Solar Dish 'Gensets' hold the world efficiency record for converting solar energy to electricity.

Burning hydrogen does not contribute to the 'Greenhouse Effect', ozone depletion or acid rain. Transition to a hydrogen energy system could restore the atmosphere to natural conditions prevailing before these anomalies became serious problems.

Hydrogen could be stored and supplied through the same pipeline network that now supplies natural gas. Depleted natural gas fields and similar geological formations could also be utilized for storing hydrogen.

Hydrogen is naturally produced by plants and animals and... is non-toxic.

Existing cars, trucks, buses and motorbikes could be economically converted to burn hydrogen fuel.

A vehicle converted to operate on hydrogen easily meets zero emission standards for cars and can actually improve upon it by cleaning the air through which it travels by reducing atmospheric concentrations of carbon monoxide, diesel soot, tyre particles and unburned hydrocarbons and converting these pollutants into carbon dioxide and water. This air cleaning capability provides a Minus Emissions Vehicle (MEV).

Hydrogen is the best way to power future fuel cell electric automobiles or existing vehicles that have internal combustion engines.

Hydrogen fuel cells utilize the energy of a reaction between hydrogen and oxygen, which is converted directly and continuously into electrical energy for electric vehicle propulsion.

Another advantage of fuel cells is that the device also produces clean, potable water, which is currently used on manned spacecraft and could also be useful in solving critical drinking water problems wherever potable water shortages exist.

One pound of hydrogen when combined with oxygen will make nine pounds of water. Therefore a hydrogen power plant could make valuable quantities of high quality water in addition to producing electricity. (Simple analogy... for every kilo of hydrogen produced would also provide 10 litres of pure water).

Our current energy system is seriously inadequate in terms of its ability to meet increasing demand far into the future.

A transition to a hydrogen energy system will be the most significant, ongoing job creation opportunity ever conceived for both blue and white-collar workers.

Hydrogen is the safest of all fuels. Gaseous hydrogen is 14-times lighter than air, therefore it rapidly disperses into the atmosphere in the event of an accidental release. This is not true of other fuels. Other fuels have a much greater "dangerous time" until they are dispersed from the location of accidental release.

Hydrogen is already used to produce countless products and to enhance many industrial processes.

The United States produces in excess of 100 billion cubic feet per year of hydrogen for industry and for the space program.

The largest user of hydrogen is the petroleum industry for converting crude oil into gasoline and hundreds of chemicals.

It is of interest to note... nobody sustained hydrogen burns in the 1937 Hindenburg accident. Seven million cubic feet of hydrogen, equal in volume to three-football fields in size and 50 feet in height, burned in less than one minute. However, diesel fuel for the propulsion engines, which fell to the ground... continued to burn for many hours.

If liquid hydrogen is spilled it will very rapidly evaporate, leaving no pollution or toxic residue.

Carbon is a valuable by-product of separating hydrogen from hydrocarbon compounds. In the process, pollution, carbon monoxide and hydrocarbons are transformed into carbon dioxide and water.

Carbon is the most versatile of all elements. With it we can make materials to replace wood and steel.

Over 75% of our landfills are hydrocarbons that can be converted into non-polluting hydrogen fuel and superior building materials.

Hydrogen packs more chemical energy in a pound for pound comparison than with any other fuel. For example, one kilo of hydrogen provides as much energy as five (5) litres of petrol.

Hydrogen is more fuel-efficient than petrol or other fossil fuels.

In many ways Germany, Saudi Arabia, Russia, Canada, Japan and the United States are already ahead of Australia in research and development of hydrogen fuel and its applications.

Mercedes and BMW have experimental fleets of hydrogen-powered automobiles. Japanese automakers are also testing hydrogen-powered cars.

Using a small portion of **Queensland's** total landmass, we can manufacture enough Solar-Hydrogen to supply the entire energy requirement of Australia.

Australia could make a significant transition to hydrogen fuel by the year 2010.

Solar hydrogen could make Australia fuel-independent and pollution free for as far into the future as the sun will shine.

Hydrogen could represent a lucrative cash crop for farmers in areas where there is abundant solar radiation. Many farmers could profit financially by converting biomass and animal wastes into hydrogen through a process of bio-remediation (utilizing micro-organisms to break down unwanted or excess materials).

Using solar thermal electricity to make hydrogen is 30 times more efficient than the best green plants' photosynthesis process. Earth's human population of 5.6 billion simply cannot wait for another "dinosaur age" to replenish fossil fuels.

A substantial part of the expense in building and operating a fossil fuel power plant is devoted to disposing of heat from wasted energy.

A conventional nuclear or fossil-fuelled central power plant can deliver only about one-third of the energy in the fuel in the form of electricity. Heating the environment wastes the remaining energy. A hydrogen-fuel plant can deliver 70% or more of the energy as a combination of "co-generated" heat and electricity products in a pollution free application.

It is a fact that every State of Australia could eventually be richer than Saudi Arabia by manufacturing, marketing and provide endless supplies of Solar-Hydrogen for Australia... and other countries.

Hydrogen is the simplest, lightest and most abundant chemical element in the universe.

Hydrogen is colourless, odourless, tasteless, non-toxic and is the only truly clean chemical fuel.

To make hydrogen available for use as fuel energy is required to separate it from other elements. Solar energy is the most abundant available source of energy on earth. Solar energy reaches the Earth at a rate that is 18,000 times the energy consumed by human activities and is an ideal source for separating hydrogen from other elements.

Solar hydrogen fuel can be produced to supply a clean sustainable supply of fuel for all human energy needs... **FOREVER.**

Burning any fossil fuel creates pollutants that cause millions of people to suffer from lung, respiratory, and allergic types of illness. Burning hydrogen will eliminate much suffering and productivity losses and would substantially reduce health care costs.

If done to optimize economies of scale, many methods of producing hydrogen will be vastly cost competitive with fossil fuels or nuclear energy.

The socially relevant costs of bringing any fuel to market must also include such factors as pollution and other short and long-term environmental costs as well as direct and indirect health costs. When these factors are taken into consideration, together with its initial cost competitiveness, hydrogen is surely the most logical choice for an Australian energy medium.

In conclusion, I quote from an age-old indigenous quotation...

**"In our every deliberation, we must consider the impact of our decisions on the next seven generations."**

Thank you for your attention.

*Selwyn Johnston*

*Attachment: Research Resources (Pages 7/9)...*

## RESEARCH RESOURCES...

### US Department of Energy... What is the Hydrogen Economy?

The hydrogen economy is a world fundamentally different than the world we know now.

Picture it... hydrogen is available to everyone, everywhere... from the corner fuelling station to the large industrial facility on the outskirts of town.

The United States is not so dependent on a single source of fuel. Hydrogen is produced, domestically, cleanly and cost-effectively, from a variety of sources including renewables, such as biomass and water; fossil fuels, using advanced technologies to ensure that any carbon released in the process does not escape into the atmosphere; and nuclear energy. Hydrogen is delivered and stored routinely and safely.

Hydrogen-powered fuel cells and engines are as common as the gasoline and diesel engines of the late 20th century... they power our cars, trucks, buses, and other vehicles, as well as our homes, offices, and factories.

U.S. companies that for decades invested in hydrogen technologies now export commercial products and services around the world. And developing countries have access to clean, sustainable, and economical hydrogen-based energy systems to meet their growing energy demands.

There are many challenges to building a hydrogen economy. It's not a vision that will be realized tomorrow, next month, or next year... but it is achievable, and together with its partners, the Department of Energy is working to make it happen.

<http://www.eere.energy.gov/hydrogenandfuelcells/future/economy.html>

### US - National Hydrogen Association

Why hydrogen? We're developing hydrogen infrastructure and technologies to:

- Reduce our dependence on imported fuels
- Improve the environment
- Drive economic growth

The National Hydrogen Association is the premier source for information on hydrogen and hydrogen technologies. Since 1989, we've provided data and educational materials to the media, safety and codes & standards officials, policy-makers, and the general public.

[The NHA has over 100 members, including major industry, small business, government, and university organizations](#) (click onto the link in this sentence). Each represents a stakeholder in some aspect of the developing hydrogen economy.

<http://www.hydrogenus.com/>

**By simply logging onto the WebSite of any vehicle manufacturer or oil company and type 'Hydrogen Fuel' into their 'Search' facility will result in an enormous amount of current hydrogen research material. A similar search of 'Google' produces over 14,000,000 results from all major world economies.**

## Solar Hydrogen - Energy of the Future

A team of Australian scientists predicts that a revolutionary new way to harness the power of the sun to extract clean and almost unlimited energy supplies from water will be a reality within seven years.

Using special titanium oxide ceramics that harvest sunlight and split water to produce hydrogen fuel, the researchers say it will then be a simple engineering exercise to make an energy-harvesting device with no moving parts and emitting no greenhouse gases or pollutants.

It would be the cheapest, cleanest and most abundant energy source ever developed: the main by-products would be oxygen and water. Rooftop panels placed on 1.6 million houses, for example, could supply Australia's entire energy needs.

"This is potentially huge, with a market the size of all the existing markets for coal, oil and gas combined," says Professor Janusz Nowotny, who with Professor Chris Sorrell is leading a solar hydrogen research project at the University of NSW Centre for Materials and Energy Conversion. The team is thought to be the most advanced in developing the cheap, light-sensitive materials that will be the basis of the technology.

"Based on our research results, we know we are on the right track and with the right support we now estimate that we can deliver a new material within seven years," says Nowotny.

Sorrell says Australia is ideally placed to take advantage of the enormous potential of this new technology: "We have abundant sunlight, huge reserves of titanium and we're close to the burgeoning energy markets of the Asia-Pacific region. But this technology could be used anywhere in the world. It's been the dream of many people for a long time to develop it and it's exciting to know that it is now within such close reach."

The results of the team's work will be presented this week at an international conference.

Eminent delegates from Japan, Germany, the United States and Australia will be in Sydney on August 27 for a one-day International Conference on Materials for Hydrogen Energy at UNSW.

Among them will be the inventors of the solar hydrogen process, Professors Akira Fujishima and Kenichi Honda. Both are frontrunners for the Nobel Prize in chemistry and are the laureates of the 2004 Japan Prize.

Since their 1971 discovery that allowed the splitting of water into hydrogen and oxygen, researchers have made huge advances in achieving one of the ultimate goals of science and technology - the design of materials required to split water using solar light.

The UNSW team opted to use titania ceramic photoelectrodes because they have the right semi-conducting properties and the highest resistance to water corrosion.

Professors Nowotny and Sorrell say that with appropriate government support and financial backing, their technology could help Australia become part an OPEC of the future.

"We have a solar energy empire in Australia and have a moral obligation to utilise this," says Nowotny. "The very same sentiments were shared by David Sukuzi when he visited Sydney recently. He said he hoped Australia would serve as an example to the rest of the world."

Solar hydrogen, Professor Sorrell argues, is not incompatible with coal. It can be used to produce solar methanol, which produces less carbon dioxide than conventional methods.



At present, the UNSW work is backed by Rio Tinto, Sialon Ceramics and Austral Bricks a major producer of titania slag, Rio Tinto hopes that an early outcome will be a more environmentally friendly and economically attractive local source of fuel for its remote mining operations while Sialon Ceramics is interesting in production and marketing of a solar-hydrogen production device.

### Background on solar hydrogen

- 1.6 million individual households equipped with 10m x 10m solar hydrogen panels would meet all of Australia's energy needs.
- Hydrogen generated from water using solar energy constitutes a clean source of energy as neither its production nor its combustion process produces greenhouse or pollutant gases. Hydrogen produced by existing conventional methods emits carbon dioxide at the production stage.
- When this technology matures it would allow Australia to be a leader in solar technology, becoming part of an OPEC of the future. Australia is ideally placed to commercialise this technology as it has abundant sunlight.
- This technology ultimately will reduce Australia's total reliance on coal, gasoline and natural gas, providing energy security.
- Titanium dioxide is plentiful and cheap. Titania ceramics also have many other applications, including water purification, anti-viral and bactericidal coatings on hospital clothing and surfaces, self-cleaning glasses, and anti-pollution surfaces on buildings and roads.
- As sources of fossil fuels disappear, the race is on to be the world's leading provider of hydrogen. The US Government recently committed an extra US \$1.2 billion to hydrogen research. Japan has launched a 20-year research program that is sending satellites into space in the hope that it can harvest solar energy and send it back to the earth by laser onto cells of titania (TiO<sub>2</sub>). The European Commission has instituted an intense R&D program in pursuit of solar hydrogen. Iceland aims to be the world's first hydrogen economy.

### UNSW'S Solar Hydrogen Program

- The UNSW team's particular expertise is in photosensitive oxide semiconductors
- UNSW's research program aims for the development of a commercial (i.e., practical and inexpensive) device for the production of hydrogen from photolysis of water using solar energy
- The UNSW device can be marketed internationally
- The hydrogen-generating device has no moving parts, so maintenance is minimal
- Already offers to be involved in UNSW's research are coming from the US, Europe and Asian countries (the LA Resource Policy Institute, for example, has proposed that it become a partner organisation of UNSW)

[http://www.unsw.edu.au/news/pad/articles/2004/aug/Solar\\_hydrogenMNE.html](http://www.unsw.edu.au/news/pad/articles/2004/aug/Solar_hydrogenMNE.html)